



Research Paper

New York City's oyster gardeners: Memories and meanings as motivations for volunteer environmental stewardship



Marianne E. Krasny*, Sarah R. Crestol, Keith G. Tidball, Richard C. Stedman

Cornell University, Department of Natural Resources, United States

HIGHLIGHTS

- Place meanings and memories motivated volunteer oyster gardeners in New York City.
- Meanings included ecological and social elements of oysters, the city, and estuary.
- Place meanings may be integrated with functional volunteer motivation frameworks.

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ABSTRACT

We conducted an exploratory study to determine the motivations of volunteer oyster gardeners in New York City (NYC), and the memories, meanings, and sense of place they associate with their work. Oyster gardeners are volunteers who place cages with young oysters at agreed upon locations, and monitor the oysters' growth and survival. Open-ended interviews were conducted with 10 oyster gardeners and transcripts were coded to understand specific motivations, social–ecological memories and meanings, and sense of place, and how these relate to oyster gardening. Oyster gardeners' social–ecological memories of and meanings related to oysters and the NYC estuary were tightly intertwined with their sense of place and motivations. These links suggest that whereas altruistic concern related to improving the environment is an important motivation for environmental volunteerism, the specific focus of environmental volunteerism may be driven by social–ecological memories, meanings, and sense of place derived from experiences with and the features of local places and species. In some cases, this process may rise to the level of creation or recognition of iconic species, which implies additional motivations for environmental volunteerism, including ecological and socio-cultural meanings attributed to species as well as fascination and related aspects of biophilia. The results suggest that government agencies and non-profits might consider a broader suite of functions that environmental stewardship serves for the volunteers, including attachment and memories related to particular species and places and their ecological, historical, and cultural values.

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1. Introduction

Volunteer environmental stewards play an important role in the collective management of small plots of land, streams, and other natural resources. Whether allotment or community gardeners, friends of parks or watershed groups removing invasive species, or urban tree planting communities of practice, these volunteers contribute to the local provision of ecosystem services

(Andersson, Barthel, & Ahrne, 2007; Connolly, Svendsen, Fisher, & Campbell, 2013; Haase, Frantzeskaki, & Elmqvist, 2014; NYC Department of Parks & Recreation, 2011; Pataki et al., 2011; Wolf, Blahna, Brinkley, & Romolini, 2011), as well as to broader collaborations of non-profit organizations and government focused on resolving environmental problems (Fisher, Campbell, & Svendsen, 2012; Hansell, Hollander, & John, 2009; Sirianni, 2009; Svendsen & Campbell, 2008). Further, the social–ecological memories (Barthel, Parker, Folke, & Colding, 2014), memorialization (Tidball, Krasny, Svendsen, Campbell, & Helphand, 2010), and symbols and rituals (Tidball, 2014b) associated with tree planting, community gardening, and other community environmental stewardship, or “civic ecology” practices (Krasny & Tidball, 2012), may become a social mechanism that contributes to resilience in cities and elsewhere

* Corresponding author at: Department of Natural Resources, Fernow Hall, Cornell University, Ithaca, NY 14853, United States. Tel.: +1 607 255 2827.

E-mail addresses: mek2@cornell.edu (M.E. Krasny), src85@cornell.edu (S.R. Crestol), kgt2@cornell.edu (K.G. Tidball), rcs6@cornell.edu (R.C. Stedman).

(Berkes & Folke, 1998; Tidball, 2014a). Because of these outcomes, understanding what motivates volunteers to engage in environmental stewardship is critical.

Studies of motivations of environmental volunteers draw from psychological studies of community service volunteerism (Clary et al., 1998), which take as their starting point Katz's (1960) functionalist framework for the study of attitudes. Katz (1960) claims that the same attitude may serve different psychological functions for different people, including instrumental or adaptive (satisfies utilitarian needs), ego-defensive (aids in handling internal conflicts), value-expressive (helps maintain self-identity and enhances self-image), and knowledge (helps us understand and give meaning to our surroundings). Others expanded on this attitudinal work to explain behaviors, including volunteerism, and showed how behaviors serve different functions for different people; thus a single observed behavior may have multiple causes. For example, Clary et al. (1998) showed how volunteer activities that appear similar serve multiple functions that address the various psychological needs of participants, such as to express altruistic or humanitarian values or to improve career chances. Studies of environmental volunteerism applying functionalist approaches have found that participants rank wanting to improve the environment as their most important motivation for volunteering (Asah & Blahna, 2012; Bruyere & Rappe, 2007; Measham & Barnett, 2008), which is considered a values-based or altruistic motivation (Clary et al., 1998). Studies that measured actual engagement in volunteerism over time found that frequency and duration of volunteer activities may have different motivations than those for initial volunteering, with motivations for prolonged volunteerism including personal motivations such as ego defense (e.g., wanting to feel less guilty about human damage to the environment, Asah & Blahna, 2012) and personal enhancement (e.g., opportunities to use one's expertise, Ryan, Kaplan, & Grese, 2001).

A smaller number of studies have focused on the role of sense of place in driving or motivating environmental volunteerism (Amsden, Stedman, & Kruger, 2013; Andersson et al., 2007; Gooch, 2003) or as a predictor of more general pro-environmental behaviors (Stedman & Ingalls, 2014; Stedman, 2002), as well as on how a desire to recreate or memorialize the past (Tidball et al., 2010) coupled with biophilia (Tidball, 2012) spurs people to collective tree planting and similar volunteer civic ecology practices particularly after disturbances or disaster. Other research has explored the role of individual species or groups of organisms in motivating environmental volunteerism. These include flagship species, i.e., charismatic mega-fauna used to generate broad public support for conservation (Campbell & Smith, 2005; Campbell & Smith, 2006), as well as iconic species that carry historic and cultural meanings specific to a particular place (Maynard et al., 2012; Petter et al., 2013).

Given the importance of sense of place, social-ecological and biophilic memories, flagship and iconic species, and other phenomena specific to environmental volunteerism, we wondered how a consideration of such factors might add to existing studies of environmental volunteerism. These factors may be particularly important in urban and disturbed systems, where people have strong memories of past, seemingly more positive environments and a sense of loss that such conditions no longer exist (cf. Livingston, 1981).

To expand our perspectives on environmental stewardship volunteerism, we undertook an initial qualitative study of the motivations of oyster gardeners in the New York City (NYC) estuary, and of the memories, meanings, and sense of place they associate with their work. We focused on the oyster gardening program under the auspices of the non-profit NY/NJ Baykeeper, whose goal is to restore oyster populations in the NYC estuary thus "allowing this keystone species to begin playing its natural role in cleansing our waterways"

(NY/NJ Baykeeper, 2012). Similar to live oaks in New Orleans, which are an important cultural and social-ecological symbol of the city and play a role in sense of place of local residents (Tidball, 2014b), oysters played a major role in the cultural, economic, and environmental history and were once iconic of NYC as a place, as detailed in the popular book *The Big Oyster: History on a Half-Shelf* (Kurlansky, 2006). Today, a small but committed cadre of volunteers is working to restore oyster populations decimated by pollution and habitat loss. Volunteer oyster gardeners work with scientists to place cages with young oysters at locations throughout the estuary, and to monitor the oysters' growth and survival. Thus, the case of volunteer oyster gardeners in the NYC estuary holds particular interest as an example of urban environmental stewardship that potentially integrates social-ecological memories (Barthel, Folke, & Colding, 2010) and meanings (Tidball, 2014b) with the literature on volunteer motivations (Clary et al., 1998), including motivations of environmental stewards.

More specifically, this study explores the following questions: What memories and meanings do volunteer oyster gardeners attribute to oysters in the NYC estuary? How are these memories and meanings associated with sense of place? What motivates oyster gardener volunteers to participate in the oyster gardening program? In answering these questions, we hope to integrate previous studies of environmental volunteers using a functionalist approach, and work that has pointed to the importance of sense of place in environmental volunteerism.

2. Literature review

2.1. Studies of volunteer motivations

A springboard for many studies of volunteer environmental steward motivations is functionalism, which is based on the premise that "people come with needs and motives important to them and volunteer service tasks do or do not afford opportunities to fulfill those needs and motives" (Clary et al., 1998, p. 1529, see also Snyder & Omoto, 2008). Clary et al.'s (1998) Volunteer Functions Inventory (VFI) focuses on six psychological categories of purposes or "functions" served by volunteerism: Values (expressing altruistic concern), Understanding (gaining skills or knowledge), Social (building relationships), Protective (assuaging negative feelings), Career (practical experience), and Enhancement (personal development). While originally developed within the context of community service, the VFI has been applied and modified in studies of environmental volunteerism. Importantly, the Values category has been redefined as expressing concern for the environment and is the primary motivation found in studies of why people become engaged in environmental volunteerism (Asah & Blahna, 2012; Bruyere & Rappe, 2007). Other motivations reported in the literature include socializing, giving back to and connecting with one's community, leaving a legacy for future generations, learning about the natural environment, reflection or escape and exercise, educating others, attachment to the environment, environmental care ethic, and wanting to assuage guilt about human damage to the environment (Asah & Blahna, 2012; Bruyere & Rappe, 2007; Gooch, 2003; Liarakou, Kostelou, & Gavrilakis, 2011; Measham & Barnett, 2008; Warburton & Gooch, 2007).

Bramston, Pretty, and Zammit (2010) formalized earlier efforts to apply Clary et al.'s (1998) functional approach in environmental stewardship studies by integrating literature on environmental attitudes, values, and behavior into a new Environmental Stewardship Motivation Scale (ESMQ). When testing this instrument with rural residents and university students in Australia, three dimensions emerged that define the scale: caretaking the environment, social belonging, and learning. These dimensions parallel

other environmental concerns and values classifications, which have focused on the biosphere, other people or altruism, and the self (Schultz, 2001; Stern, 1994).

In addition to research focused on environmental stewardship more broadly, several studies have narrowed in on volunteers helping to conserve particular organisms (e.g., sea turtles) or groups of organisms (e.g., trees). In a survey of sea turtle volunteers in FL that was designed using the VFI, Bradford and Israel (2004) found that concern for sea turtles was the primary motivator, reflecting a Values motivation with a species specific focus. In qualitative interviews of Earthwatch volunteers engaged in sea turtle conservation in Costa Rica, motivations similarly included a desire to help or contribute to turtle conservation, as well as those that were unique to the Earthwatch experience including gain fieldwork or research experience, and travel and learn about a culture, which would fall under the VFI Understanding and possibly Career categories (Campbell & Smith, 2005). In a related study, Campbell and Smith (2006) applied Kellert's (1997) classification of values associated with wildlife in interviews of sea turtle conservation volunteers and found that conservation, scientific, esthetic, humanistic, and experiential values related to sea turtles predominated, while intrinsic, existence, and spiritual values were less evident. Values missing amongst the sea turtle volunteers included utilitarian and ecological values; thus these volunteers were concerned about poaching and other threats to turtle populations and were attracted by a charismatic species, but showed little concern related to the broader environmental problems underlying sea turtle population declines.

In contrast to Campbell and Smith's (2005, 2006) studies of volunteers working in an exotic setting distant from where they live, Gooch (2003) conducted a qualitative study using semi-structured interviews of volunteers working locally with Landcare, Coastcare, and other stewardship organizations in Australia. Her results revealed a motivation not reported in the earlier functionally-based survey and "exotic experience" sea turtle qualitative studies – i.e., a personal attachment to the local area. Recognizing the social and ecological aspects of place (cf. Amsden, Stedman, & Kruger, 2010), Gooch (2003) reported that the volunteers identified strongly with the biophysical and social settings, i.e., the places, where they were volunteering. Similarly, Andersson et al. (2007) and Barthel et al.'s (2010) qualitative studies of allotment gardeners found that sense of place was an important driver for involvement, and Measham and Barnett (2008) found that sense of place plays an important role in multiple forms of environmental volunteerism.

2.2. Memories, meanings, and sense of place

Stedman (2002) defines sense of place as a combination of place meaning, i.e., the symbolic meanings that people ascribe to settings, and place attachment, i.e., the bond between people and places or the degree to which a place is important to people. Place attachment in turn may be broken down into place dependence, i.e., the potential of a place to satisfy an individual's needs by providing settings for his or her preferred activities, and place identity, i.e., the extent to which a place becomes part of personal identity or embodied in the definition of the self (Jorgensen & Stedman, 2006). Should they be found in studies of volunteer motivation, these components of place attachment could contribute to a more nuanced understanding of functional volunteer motivations. For example, wanting to restore a place that is part of one's self-identity or on which one depends for recreation or spiritual restoration might be considered as a subset of Enhancement motivations; however, items Clary et al. (1998) included under this category (feeling important, needed, or better about oneself, or increasing self-esteem) may not fully capture identity and dependence. Alternatively, sense of place related motivations may provide insight

into why an individual with Values or altruistic motivations would specifically choose environmental volunteerism.

Symbolic and emotional meanings developed through active experiences are important in developing sense of place (Pred, 1983), and social–ecological memories can be a means for stewards to retain and transmit ecological practices and knowledge and to generate ecosystem services (Andersson et al., 2007). Tidball (2014b) explored the importance of symbolic meanings to volunteer tree planters in post-Katrina New Orleans. Most important, trees symbolized "survival, stability, strength, and longevity", or the "rootedness" of the people of New Orleans and their will to survive and rebuild. Further, memories, even vague notions of the landscape based on distant and transmitted information that may not be accurate, can be important in creating sense of place and motivating volunteer stewards (Gooch, 2003). Again working in post-Katrina New Orleans, Tidball (2014b) found collective or social–ecological memories, defined as the "means by which knowledge, experience and practice about how to manage a local ecosystem and its services is retained in a community, and modified, revived and transmitted through time" (Barthel et al., 2010), along with loss of the legacy of live oaks and associated social, cultural, and ecological values, spurred collective tree planting.

Important to our study of volunteerism centered on oysters, Tidball (2014b) goes further to suggest that live oaks became "social–ecological icons" or iconic species that reify and reconstitute a host of meanings, memories, and place values specific to New Orleans. Although similar to flagship species in that they capture the imagination of the public and become rallying points for conservation, iconic species are unique in that they can be flora or fauna and they draw on local history, social–ecological memories and meanings, and sense of place.

2.3. Oyster restoration in the NYC estuary

The case of volunteer oyster gardeners in NYC has elements suggesting that symbolic meanings attributed to organisms, social–ecological memories of past conditions, and sense of place could be important to volunteer motivations. Oysters played an important role in the cultural, social, economic, and environmental history of NYC, starting with pre-European Native American inhabitants of the island of "Mannahatta" and continuing through the decline of oyster populations and estuary health in the early and mid-20th century. Before pollution and overfishing decimated its populations, the Eastern oyster was such an integral element of NYC's culture and economy that the species became an iconic symbol of the city as a place, lending it the nickname "The Big Oyster" (Kurlansky, 2006). In the late 19th century, huge middens of oyster shells were found along the NYC waterfront, oysters were cheap and plentiful, and oyster fishing was a major source of income; hence New Yorkers were constantly reminded of the bivalves with which they shared the estuary. However, because the NYC oyster fishery started to collapse in the early 1900s, few oyster gardeners had direct social–ecological memories of oysters at the time we conducted our study in 2012, and we were uncertain how familiar the oyster gardeners were with the history of oysters in NYC.

3. Methods

3.1. Setting and participants

This exploratory study took place within the context of the oyster gardening program of the non-profit NY/NJ Baykeeper, which trains about 15–20 oyster gardener individuals or groups (e.g., schools) each year. The oyster gardeners are provided with a cage of 300 young oysters that they place at a mutually agreed upon

Table 1
Interview questions for volunteer oyster gardeners.

Interview question	Purpose or study construct
Please talk about how you first became involved in the oyster gardening effort.	Background information
What motivated you to become a volunteer oyster gardener?	Motivation general
Please describe any childhood memories of relatives, friends, or community members who were commercial oyster men or otherwise engaged with oysters. Please also describe any general memories you have about oysters in your community. (Follow-up question: If you can talk about any stories you were told or experiences that were shared with you about personal or community involvement with oysters, please do so.)	Motivation oysters, memories
What do oysters mean to you? Do they carry any special meaning? (Follow-up question: What do they represent? Or, what significance do they hold for you?)	Motivation oysters, meaning
Please talk about the role of oysters in New York City's history or the history of your neighborhood. (Follow-up question: What you have read or heard about oysters? What do you know about oysters as a former symbol of what it was like living in the city [or the borough an interviewee has identified with]?)	Motivation oysters, historical knowledge
Please tell me about the past environmental health of the NYC estuary and the role oysters may have played in estuary health.	Motivation oysters, ecosystem knowledge
Please describe any interest you may have in learning about oyster biology and ecology.	Motivation oysters, interest in oyster biology and ecology, fascination with oysters
What can you tell me about the decline of oysters in the NYC estuary? (Follow-up question: How did you acquire this knowledge [e.g., from reading, from oyster gardener training]?)	Motivation oysters, knowledge about oyster decline
What role do you see restoring oysters playing in restoring ecosystem health in the NYC harbor? (Follow-up question: How did you acquire this knowledge [e.g., from reading, from oyster gardener training]?)	Motivation oysters, knowledge about link between oysters and ecosystem
Sometimes people engage in environmental stewardship as an act of defiance in the face of what they see as past and current attacks on the environment. Please describe how any desire to defy what you see as attacks on the environment plays a role in your decision to be an oyster gardener. As an oyster gardener, what role, if any, do you see yourself playing in standing up for the environmental integrity of the NY estuary?	Motivation oysters, restoration as act of defiance of past and current insults to the environment
How do you feel about the work that you are doing currently with oysters? What impact is your work having? On oysters? On the harbor ecosystem? On your community?	Motivation oysters, feelings of making a difference ecologically or culturally, via oyster restoration
Of all the factors we have discussed that might relate to your decision to become an oyster gardener, which one(s) are the most important?	Motivation general
If there were a volunteer gardener program focusing on clams or mussels instead of oysters, would you join it? Can you explain why or why not? (Follow-up question: Would the meaning of your volunteer work change for you if it was clams or mussels?)	Motivation general
Do you volunteer in other conservation activities? If so, how do your motivations for volunteering in the oyster gardener program differ from your motivations for these other programs?	Motivation general
We are trying to understand if oysters are an important factor in motivating you to volunteer for this program. Is there anything else you would like us to share?	Motivation general
In addition to oyster gardening, what role do oysters play in your life? For example, do you eat oysters, collect them along the beach in another location, enjoy studying them?	Sense of place, role of oysters and memories of oysters
We are also trying to understand if oysters are an important factor in how people feel about NYC. Is there anything else you would like us to share?	Sense of place, role of oysters and memories of oysters

location in the Hudson/Raritan Estuary, and then monitor oyster growth and mortality for one year. During the 2012 season, 18 individuals or groups participated in the oyster gardening program.

Requests for interviews were emailed to 12 gardeners who were participants in a separate study of oyster genetics; sites for the genetics study were chosen to ensure a geographically representative sample of the NYC estuary. In addition to being geographically representative, these sites were used in this study for logistical reasons (we were able to travel to sites with the genetics study crew). All of those contacted accepted participation in our study, but we deleted two sites where a group (e.g., school) was conducting the program rather than a single individual. Thus our final study population included 10 oyster gardeners who were conducting their volunteer work in sites geographically representative of NYC's estuary and five boroughs.

We conducted semi-structured individual interviews with the 10 gardeners in the vicinity of each participant's garden site during July and August 2012. The selected sites maintained by the interviewed oyster gardeners were distributed across the Hudson-Raritan Estuary, from the southern end of Staten Island to the

eastern reaches of Jamaica Bay in Queens north to the Bronx. Interviewees were divided equally between men and women; ranged in age from mid 20s to late 60s; and held diverse professions, including an attorney, a college professor, a psychologist, an Ameri-Corps environmental educator, a head of a marketing business, a NYC Parks Department natural areas manager, a director of a community-building nonprofit, and three retirees (including two former engineers). Half had lived in NYC since birth, with others having residency from 6 months to 30 years. Four of the interviewees had participated in the oyster gardening program for multiple years.

3.2. Interviews

The 17 open-ended interview questions were designed to gather information about what drew the volunteers to the oyster gardening program and what drives their feelings toward their work (Table 1). The interview included: (1) an open question about what motivated them to become involved in the volunteer program; (2) more structured questions that specifically addressed

how various aspects of oysters per se, including social–ecological memories and meanings associated with oysters and oyster gardening, might play a role in motivating oyster gardeners; and (3) questions to determine the role of oysters and the actions taken to restore them in the gardeners' sense of place. The questions were designed specifically for this study based on our interests in applying social–ecological meanings and memories and sense of place to understanding volunteer motivations. At the request of NY/NJ Baykeeper, the politically sensitive subject of seeking to restore oysters with the intent of consuming them or reinstating the oystering industry was not pursued, though participants were not forbidden from speaking about these motives. The interviews ranged from 30 to 60 min and were recorded and transcribed verbatim.

3.3. Data analysis

We employed supervised content analysis and used an iterative process to code all the interview transcripts using categories related to what gardeners overtly or implicitly expressed as motivations for their stewardship behavior, as well as the meanings and sense of place they attributed to oysters, NYC, and its estuary. The second author coded all the transcripts with respect to the presence or absence of support for a proposed motivation (e.g., whether personal memories of oystering serve as a motivation), while allowing motivations and meanings not specifically addressed in the interview questions to emerge. Going through the transcripts multiple times and adding codes (simultaneous, nested or hierarchical coding, cf. [Saldaña, 2013](#)) introduced more subtleties to broader motivation categories, such as adding culture, economic, and environment subcodes to a broader code of history of oysters in NYC; or cleaner water, marine life, and childhood subcodes to the broader code of memories of oysters. The initial and additional codes were entered into Atlas TI software.

After conducting the first rounds of coding, the second author discussed initial categories with the other authors. Throughout the subsequent iterations of the coding process, she regularly discussed the coding with the first author so as to develop jointly agreed upon coding schemes. The first author then read all the transcripts as a check on the second author's coding scheme, and offered insights on additional codes, which were incorporated into the final coding scheme. Although we did not quantitatively tabulate numbers of responses due to the small number of study participants, we were able to readily discern common and less common responses and those that were discussed with greater richness of details.

3.4. Validity

Construct validity reflects how well the constructs (e.g., sense of place, social–ecological memories) in a study reflect existing theory. We used in-depth discussions and review of our interview instrument by experts in sense of place, symbolic meanings, and social–ecological memory to ensure construct validity. We also used an application form administered by NY/NJ Baykeeper that included questions about motivation as a means to triangulate the results from the interviews. Finally, two individuals working with the oyster gardening program through NY/NJ Baykeeper reviewed an initial draft of our results.

4. Results

Using quotes from the interviews, we first report on how the volunteers describe memories, meanings, and sense of place related to oysters, following which we report on other motivations for volunteering.

4.1. Memories, meanings, and sense of place

Volunteers described memories and meanings attributed to oysters and to the NYC estuary, as well as an attachment to NYC, its waterfront, and estuary, and in some cases its oysters. Responses related to these constructs tightly coupled cultural/historical and ecological elements of the estuary and thus might be considered as social–ecological meanings and memories ([Barthel et al., 2010](#)), and are consistent with descriptions of sense of place as integrating ecological and community elements ([Amsden et al., 2010](#)). Social–ecological memories included personal memories involving a family member who had related stories about oystering, memories based on lived experiences of the estuary, and memories that were the result of reading or hearing stories about past environmental and social conditions in the estuary.

Only two gardeners recollected childhood stories that directly addressed oystering, both of which were transmitted by their grandfathers. One of these gardeners, whose grandfather had been an oysterman on Staten Island, recalled memories and meanings related to a sustainable way of life.

I remember my grandfather telling me about the way the watermen lived, their families. . . It was a really sort of closed system where they repaired the boats, built the boats, . . . So there was a whole way of life, if you would, and many, many thousands of people, I think, were sort of employed by this and I guess for many decades, sustainable.

He continues with more specific memories and insights about shellfish, water quality, and marine habitat.

“ . . . when I was a boy, the oysters had been gone for some time. There was still a large clamming industry here and maybe a hundred men made their living from clamming when I was a boy. And the water was much clearer; the bottom was covered with sea grass and seaweed, alright. But today the ocean is clearer, it's sort of almost back to the cleanliness that I remember as a boy but the bottom is still, the habitat, I don't think has been restored. I'm not seeing the grass and things like that that I would see.

A second gardener, whose grandfather had told him stories about oysters, recalled how oysters were part of history and contributed to water quality.

. . . when you tell [others] that [Tottenville, Staten Island] was a thriving resort area back in the 1800s, they're amazed, and I think the oysters were a good part of that, keeping the water clean at the time.

Another gardener articulated the historical connections between the use of the waterfront and water quality.

So I would say that the history of the waterfront and water quality in the estuary are hopelessly tied to each other. And they're going to continue to be hopelessly tied to each other because the usage of the waterfront a lot of times is going to determine the quality of the river.

Sometimes an awareness of how water quality had improved over recent years provided a vision for the future, which gardeners connected to the volunteer stewardship activities.

. . . when I worked on the Bronx River. . . I would read up on some of the work that people did with Bronx River Alliance 20 years ago. . . and 30 years ago on the river, and they were pulling like cars out of the river and refrigerators, and it was a dump, and I'm sure those people when they were doing that, they probably thought, “okay, we're doing this to clean the river but maybe this river will never get cleaned,” and a few years [later] I'm working

on an oyster reef in the Bronx River, which . . . they never even thought possible.

Memories readily translated into meanings, which similar to memories, included socio-cultural and ecological components. Prominent among the meanings attributed to oysters was the notion of filter feeders that would remove pollutants from the water, as reflected in a reference to oysters as the “liver” of the estuary.

If the East River, where we are, is a living organism. . . we used to have the largest population of oysters, and we no longer have that. To me, that’s almost like cutting out the liver from the human. And if we can rejuvenate the oyster population. . . and bring back some life to the East River, then I think that says a lot for our own population. That’s why [oysters are] important to me, because I want the river to be healthy again.

Other meanings reflected lost habitat and how those losses related to everyday life. One gardener pictured oysters as a “missing link” between the city’s inhabitants and its natural habitat; another as symbolic of NYC’s “forgotten waterfront”.

They kind of symbolize this lost habitat and, and all the changes, symbolic kind of changes that have happened to urban areas like New York City . . . people are afraid of the water, and just these just terrible notions of the environment, and so for me they symbolize just this missing link that . . . New Yorkers don’t have to nature anywhere.

I think they’re a symbol of New York’s sort of forgotten waterfront and an asset that one time fed and made incredible incomes for a lot of people. . . You know, when you think about New York now you don’t think about the ocean. You don’t think about the Hudson River. You don’t think about the estuary. People used to think about that because of the oysters.

Similarly, comments about oysters as symbolic of a “growing and bustling” city, as a regional cultural icon similar to lobsters, and as representing the past’s food stand “hotdog”, reveal how oysters had multiple socio-cultural meanings. For example,

. . . they were so plentiful that they were very inexpensive and were essentially poor man’s food. And I love the fact that they were sold on carts the way they sell hotdogs today! And that it was like street food.

These quotes suggesting the importance of oysters to NYC provide evidence of the role of oysters in the gardeners’ sense of place, including the identity component of place attachment. Memories that remerged as a result of oyster gardening also could lead to identity-based notions of attachment, as in the comments of one gardener who focused on the links between the ecological role of oysters and boyhood memories.

When I was a boy here there was a really large fishery here that depended somewhat on worm production. And the tidal flats where that was, are gone now. You know the big mud fields and stuff? So I was kind of really surprised when I opened the oyster cages and could smell some of those aromas that I used to smell from the mud flats; the sort of sulfur chemistry that can form. And, but also, to see worms and shrimp and things like that, that I hadn’t seen up close in years now living amongst the oysters.

The place dependence aspect of place attachment related to oysters was also evident in the gardeners’ responses, as for example this gardener who talked about how learning about the former oyster culture helped her to bond to the city in general:

I’ve lived here long enough that I’m fairly connected, but not significantly connected. But I would have to say that learning

about the oyster culture here in New York City definitely helped deepen my connection to the city. And I have found that really interesting and intriguing, but it was also just a way for me to connect with the former role the city had as a seaport.

In short, volunteers had distinct social–ecological memories, meanings, and more broadly a sense of place related to oysters and the NYC estuary. We turn next to the relationship of these and other factors in motivating their volunteer activities.

4.2. Other motivations for volunteering

I just really enjoyed . . . learning about oysters, the history of oysters in New York City. . . they provide so many ecological services, I want to be involved in this because it seems like something that needs to return to New York City . . .

I just love the opportunity to be connected to the water again. . . I’m not really gonna fish in Brooklyn, but [oyster gardening is] just a way for me to engage and connect with the water.

Related to their memories, meanings, and sense of place, oyster gardeners expressed a strong desire to recover, restore and connect to a healthier estuary and waterfront in which oysters had played a large role; thus a sense of loss related to what the city and its estuary used to be played a role in volunteer motivations. We also found specific environmental and other functions that restoring oysters would serve including as a means to filter the polluted estuary waters, and thus bring back the water quality and the thriving community of birds, fish, and humans that once depended on oysters. Educating others about oysters emerged strongly as another commonly discussed motivation, and additional motivations included desire to contribute to research, fascination with oysters, and recreation. We discuss these motivations in more depth below.

4.2.1. Environment

All 10 interviewees were drawn to oyster gardening at least in part by a desire to use oysters as a means to improve NYC’s marine environment, thus expressing Values motivations. This focus on improving the environment also dominated answers oyster gardeners shared on their application surveys (NY/NJ Baykeeper, [unpub. data](#)). Such functional motivations can be related to notions of place dependence, or how people use the estuary. As in their statements about memories and meanings, the gardeners integrated ecological with social and economic functions of oysters when talking about the importance of restoring them to the environment.

You may not want to eat them for generations, but they’ll serve to filter out many of the undesirable contaminants in our water, and also serve as food for fish and other wildlife that might want to come up our way, and there could be a rejuvenation of the coastal areas of New York—hopefully.

I think that if we restore oysters to Jamaica Bay. . . not only will it clean the water, but then if we’re able to actually do some type of a program where we could farm them. . . it will actually create jobs.

The oyster gardeners were aware that their individual efforts were small compared to the scale of the water contamination.

In the back of my head I don’t know about how an oyster garden can make a big difference, but I thought it would take us a step in the right direction toward bringing the harbor a little bit back.

At the same time, they felt that they were part of a larger movement that collectively could make a difference to the future of the estuary, even if they might not be present to witness that future.

I just tell [others] I've got a little oyster garden. . .and all we're doing is tracking them. But it's part of a larger project to—eventually establish a billion oysters in the harbor.

I can someday see 50-foot oyster beds out here, and people being able to fish out of the harbor. Probably not in my lifetime, but I really believe there's the potential for that to happen. And if they've been able to reverse what was going on in the Chesapeake Bay, at least, what I think has been going on, in my lifetime, it certainly can happen here.

This latter quote in particular reflects our earlier statement about the conjoining of place identity and dependence-based motivations: people want the ecosystem services that a healthy oyster population can contribute to, and they see that this healthy ecosystem then becomes part of the local iconography, with ecosystem health embedded in place meanings that underpin place identity.

Despite their memories and the multiple meanings they attributed to oysters, as well as the role oysters played in their connecting to the water and the city, most gardeners, when asked if they would join a volunteer program cultivating another bivalve such as clams, answered positively because “any filter feeder” would do the same thing.

I think that oysters are, oysters are maybe charismatic, maybe because they've got this really awesome history as a city and, and they provide all these different ecological surfaces that other shellfish don't. Like they, they reef, the 3-dimensional structure and they've got all these really neat things about them and they don't really live here anymore. So they're kind of like a mystery and so they're intriguing but, but I think I would definitely support other shellfish kind of work because mussels and clams, they still do same filtering as oysters do and they also provide habitat and things like that. . .

4.2.2. *Education and changing behaviors*

The desire to educate others was a common motivation, integrating teaching about cleaning the environment with the history of the city and its reliance on oysters and other marine resources. In addition, gardeners felt that by teaching others about oysters, they would be able to influence behaviors and even change city government policy. Gardeners had multiple audiences for their educational efforts, including inner-city children, school groups and their parents, scouts, and the gardeners' own children. For example,

I work with inner city kids and. . .most of them. . .don't have exposure to nature and the natural world. [With hands-on exposure] they start to realize the link between the animal and what they're eating and understanding that it is a native animal that used to live here and could be found in the waters around here and I think that's pretty neat for kids.

Education extended to more informal settings. A recurring topic was using oyster gardening as a starting point for conversation about the ecology and history of oysters:

I think that popularizing—publicizing restorative efforts, is important, and educating people about the many things that can go on. And oysters. . .it's sort of a catchy thing. I tell people that I have this. . .little cage of oysters out there, and they just think that's real cool. And then you can talk about restoring the estuary: what it used to be, and how it will be in the future. So it's a positive—it's a massive—it's an educational vehicle to have people become more aware and be supportive.

Gardeners also hoped they could influence environmental and conservation behaviors, sometimes through enhancing place attachment that rested on ecological meanings.

The more people you connect to [the waterfront and estuary]—that you bring to the park just to have basic recreation, to educate about the river, it's going to make them care about it. And that's really what's important. Because when you care about something you want to protect it.

In one instance, a gardener went beyond environmental behaviors to suggest that oysters might symbolize an “iconic” shift in the meanings people attribute to NYC and in the success of the conservation movement, similar to how the return of beaver had been a symbolic moment for the transformation of the Bronx River, thus enhancing New Yorkers' place identity.

I want New York City to succeed and I want it to be a place where people come and not only say “oh look at all the pretty buildings,” but they come to the waterfront and say “oh look at that beautiful, beautiful estuary. Look at that river. Look at how gorgeous it is. . .” You know I would love to see wetlands come back, and mud flats come back, and marshes come back, and to come to the waterfront and learn about the history which is oysters and to have the oysters come back and have people not only understand what that means but to celebrate it—to be excited about it. Because I feel like when that happens there is going to be this huge iconic moment for conservationists everywhere, or just people everywhere who love the environment or the love of New York City to be like “look! Look what's back!” Like. . .”yay!” It's like when otters, it's like when the beavers came back to the Bronx River. You know? People were like “oh my gosh!” So it was exciting. I want it to be that same excitement for people.

For some gardeners, attracting the attention and, ideally, the support of the NYC government also served as an end goal.

Habitat loss and environmental pollution. . .[I]f you can change that, you're going to have a return of oysters. . .that's doable and who's going to do it? We're going to do it. How are we going to do it? We have to convince the City of New York to get involved. I mean we can do it on our own small scale like we're doing over here on this marina but it has to connect with the government because it's very expensive to, to change the. . .infrastructure of the city so that you can keep that particular animal alive, and that requires the government to get involved.

4.2.3. *Additional motivations*

Other volunteer motivations included contributing to oyster restoration research through monitoring their individual cages, fascination with oysters, and opportunities for recreation. Contributing to research may help counteract what volunteers feel is their small contribution to oyster restoration, given that oyster survival rates are often low.

We'll hopefully learn something from this project, and it'll help in the long run, although this particular one may not be successful.

In addition to a desire to gain a deeper understanding about oyster biology, ecology, and role in filtering the estuary, a more general fascination with oysters motivated some volunteers.

I'm a huge invertebrate fan in general. Love 'em! . . .their life cycles are just so alien to us. . .I think bivalves are so much fun. They're just really neat, like the whole way that they live their lives, and how they're mobile and then they're sessile. And then just how they can change their gender throughout the year, I

think, right? It's just really cool. And then the way that they just know to settle near each other.

Finally, several gardeners referred to recreation, including time for reflection and relaxation and spending time with family, as a motivation.

... it's not even work to me; it's just a pastime. . . You can collect your thoughts and just relax for a while, so it's very, very peaceful.

It's another way for me to engage with the water. My grandkids were here, and we took pictures with oysters, and I anointed them my research assistants.

Connecting to meanings, memories, and environmental motivations discussed above, some gardeners spoke about oysters playing a part in restoring waterfront recreation, a significant part of the city's past.

I'm hoping that through this project and others like it, we can rejuvenate our coastlines and bring back fish. I would love to bring my daughter out here—well, we go fishing, anyway—and I would love to bring her out here and be able to eat the fish that we catch.

5. Discussion

Our exploratory study of oyster gardeners supports the results of environmental volunteerism research drawing from a functionalist framework (Asah & Blahna, 2012; Bruyere & Rappe, 2007; Measham & Barnett, 2008), in that wanting to improve the environment was an important motivation, and several other motivations, including desire to educate others and contribute to research, were ultimately for the purpose of improving estuary health. Further, our initial research suggests that using multiple domains of place attachment, iconic and symbolic meanings, and memories in viewing environmental volunteerism may add a depth of understanding to past functionalist approaches. Finally, our study points to several new lines of inquiry related to the integration of social and ecological elements in memories, meanings, attachment, and volunteer motivations associated with particular places and species.

The links between the gardeners' motivations for volunteering and their social–ecological memories, meanings, and sense of place related to oysters and the NYC estuary suggest a possible pathway forward in conceptual frameworks for environmental volunteerism. In particular, this and other work suggests that whereas the VFI Values or altruistic concern related to improving the environment is an important motivation of environmental volunteerism, the specific focus of environmental volunteerism may be driven by social–ecological memories, meanings, and sense of place derived from experiences with and the features of local places and species. In some cases this process may rise to the level of creation of new or recognition of existing iconic species, such as oysters or live oaks, which suggests additional leverage points for environmental volunteerism. Supporting this view is research demonstrating that seeing a decline in environmental quality of a place or species imbued with certain meanings and attachments predicts intentions to engage in environmental behaviors such as voting or joining an environmental activism group (Stedman, 2002), as well as more specific actions taken on one's own property (Brehm, Eisenhauer, & Stedman, 2013). Similarly, authors have described how sense of place and wanting to bring back a past environment perceived as more healthy were important in motivating environmental stewardship volunteering in Australia and the US (Gooch, 2003; Hull, 2014). Thus, altruistic values centered on the environment may be an underlying factor or primary motivation,

whereas sense of loss coupled with memories, meanings, and sense of place might be a precipitating factor or selective motivation for environmental volunteerism (cf. Liarakou et al., 2011).

Another perspective is to consider memories and related meanings as elements of place dependence and identity, which are components of place attachment. Wanting to restore or bring back places that have been lost or altered, but that have meaning to us, are part of our identity, and on which we depend (Tidball & Stedman, 2013) might be more related to ego motivations such as Clary et al.'s (1998) Enhancement (e.g., increase self-esteem) motivation category. Warburton and Gooch's (2007) findings that elder volunteers related environmental work to wanting to leave a legacy for the land and for future generations also suggests an expansion of the Enhancement motivation category to encompass place-related needs or functions.

Building on previous work that has expanded the VFI to encompass environmental concern (Asah & Blahna, 2012; Bruyere & Rappe, 2007; Measham & Barnett, 2008), our study suggests further broadening Clary et al.'s (1998) categories to capture fascination with oysters, or relatedly the biophilic connections and wonder that are inspired by wildlife (Kaplan & Kaplan, 1989; Kellert, 1997; Wilson, 1984). Direct contact with nature was the second most important motivation in a study of environmental volunteers at a children's camp in Greece (Liarakou et al., 2011), which similar to nature fascination does not appear within the VFI scale. Additionally, the finding of recreation as a motivation in this and other studies (Asah & Blahna, 2012) might be considered as an expansion of the existing VFI categories. For example, Enhancement might be broadened to capture the unique reflective, biophilic, and other nature-specific aspects of environmental stewardship volunteerism, which is closely tied to nature-related recreation (Krasny & Delia, in press).

Whereas social interaction motivations have been found in other studies of environmental volunteerism (Asah & Blahna, 2012; Bramston et al., 2010; Bruyere & Rappe, 2007; Measham & Barnett, 2008), they were not widely discussed by the volunteers in this study, except in the context of educating others. This may be due to the fact that the oyster gardeners we interviewed generally work alone tending "their" oyster cage, rather than gathering together at a common site such as in invasive species removal at city parks and other stewardship efforts. We also did not find wanting to be on one's own, as has been reported for some forms of nature-based recreation (Manfredo, Driver, & Brown, 1983; Zeidenitz, Mosler, & Hunziker, 2007), to be a motivation in our study.

The finding that the oyster gardeners embedded social meanings within ecological meanings in describing their motivations suggests a tighter coupling of social and ecological factors in research on environmental volunteerism. For example, oyster gardeners clearly identified the ecosystem service of water filtering as important to their motivations and meanings related to oysters, but also connected this ecosystem function to social, cultural, and economic aspects of the harbor, waterfront, and city as a whole. In that the gardeners were familiar with Kurlansky's (2006) account of oysters in NYC, which integrates environmental, cultural, and economic history, it is possible that this and related sources of information (e.g., their grandfathers' stories, their memories of an abandoned waterfront and polluted water) may have influenced their perceptions. Regardless of the origin of their integrated social–ecological memories or meanings, this integrative thinking has not been emphasized in the environmental volunteerism literature yet is consistent with social–ecological systems perspectives in natural resources and environmental management (e.g., Liu et al., 2007; Pickett, Cadenasso, & Grove, 2004) and with Amsden et al.'s (2010) study demonstrating that individuals integrate aspects of their social community into their sense of place.

5.1. Limitations

The generalizability of this initial study is limited by the small sample size and the uniqueness of oyster gardening as a case of volunteer environmental stewardship. Further, the interview questions focused heavily on oyster meanings and memories and knowledge of oysters' social–ecological role in NYC and its estuary, in addition to the more general questions about motivations; thus the results may be biased in favor of an over emphasis on oysters. Finally, we did not distinguish between initial motivations and reasons for continued or more frequent volunteer activity.

5.2. Applications

The results of our study suggest that government agencies and non-profits wishing to leverage volunteer efforts for ecosystem services production might consider a broader suite of functions that environmental stewardship serves for volunteers. For example, knowing that volunteers are often motivated by wanting to restore a particular species or place, or by a desire to leave a legacy for the environment and future generations, organizers of such efforts might consider specifics of the species and places that are the subject of volunteerism. Species and places that hold particular social–ecological meanings and memories and contribute to potential volunteers' sense of place, may serve to motivate volunteerism. Further, organizers should consider how volunteers integrate ecological, cultural, and social values of species and places, perhaps especially in cities.

6. Conclusion

Our work points to possibilities for expanding conceptual frameworks for motivation in environmental stewardship contexts that could be tested in future studies. Whereas many individuals have needs related to altruism and self, the question arises: why fulfill these needs through environmental stewardship? Memories and meanings gained through personal experience and stories, which integrate social and ecological features of places to which one becomes attached, may be important factors in decisions to direct one's volunteer efforts toward specific environmental stewardship efforts. Other factors may include witnessing the decline of places to which one is attached, as well as biophilic fascination with a particular species. Thus, in addition to focusing on previously reported needs environmental volunteers are seeking to fulfill through their efforts, organizers of such programs may want to take into account social–ecological memories and meanings, as well as domains of attachment, loss, and biophilic values associated with particular places and species.

The consideration of functional approaches with those focusing on iconic species and associated meaning, memories, and sense of place suggests linkages that could be explored in future studies. In particular, functional motivations related to wanting to restore a species or the environment may encompass both place dependence (e.g., restoring the estuary as a place for fishing and other forms of recreation) and place identity (oysters as symbolic of what it means to be a New Yorker). Thus, place dependence and place identity may be linked in environmental volunteerism, serving both Values and Enhancement functions, while also having symbolic meanings.

Finally, the importance in this study of linked social–ecological meanings and memories, sense of place, and fascination with nature, along with Values motivations such as restoring a healthier social–ecological system and educating others, raises several related questions. Should we continue to expand and revise Clary et al.'s (1998) VFI and fit sense of place and related elements into a typology of motivations developed for volunteerism that was

derived from studies of non-nature related activities? Do we maintain the VFI categories and use our findings and those of others to suggest that sense of place and related elements explain specific types of volunteerism within the VFI categories? Or do we expand the number of functional motivation categories, or even develop a new conceptual framework for viewing environmental volunteerism that incorporates past work on functional motivations, nature connectivity, memory, meanings and symbolism, and sense of place? Our exploratory study of oyster gardeners serves to provoke thinking about these questions, which future work may address to provide understanding that can be applied to supporting community environmental stewardship, including in cities.

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