

Building Environmental Literacy in Florida through Non-Formal Environmental Education: Challenges and Opportunities

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Abstract

The growth of environmental education (EE) programs in the U.S. has produced a wide array of curricula, offered by a range of agencies. Approaches to the human-nature relationship vary within this diverse movement, as do goals and pedagogical strategies. Weaknesses in the environmental education movement persist, and given recent shifts in the political climate of the U.S., must be addressed if EE is to be an effective tool in stimulating the systemic change demanded by our current environmental crises. An increase of synergy between geography educators and environmental educators could strengthen both.

This paper examines the goals, actions and curricula of EE organizations in Florida through an online survey and curricular analyses to identify dominant target levels of environmental literacy being emphasized within Florida's EE community. Findings support the existences of a strong non-formal environmental education sphere, which retains a heavy emphasis on lower levels of ecological literacy, such as immersion in nature and fundamental scientific knowledge. More efforts to foster systemic and critical thinking are needed. The EE community must collaborate to determine which organizations and sites are best suited to these efforts.

Keywords: environmental education, Florida, geographic education, environmental literacy, parks.

Introduction

The United States, like other countries of the world, faces increasingly urgent environmental problems, not the least of which is sea level rise and other climate related challenges. Recent political developments in the U.S. have undermined established processes for responding to climate change and containing environmental ills; the need for an informed and active citizenry is more urgent than ever before. Despite more than three decades of attempts to introduce environmental education (EE) into formal educational settings and to develop non-

formal opportunities for environmental education at parks and other sites such as zoos and aquariums, there is no evidence that American environmental literacy has improved since the publication of Kevin Coyle's 2005 report, which found shockingly low levels of environmental understanding among American adults. The focus of most environmental education on the K-12 educational realm now seems misplaced or at the least, inadequate, as we cannot wait until today's fourth graders grow up and become environmental decision-makers; irreparable damage to the biosphere is being done each passing day. Considerable overlap exists between geographic education and environmental education with both disciplines focusing on human-nature relationships and place based education (Bednarz et. al, 2014). Therefore, it is essential that geographers partner with environmental educators, sharing their rich knowledge base while ensuring that geographical impacts of environmental issues are explored and addressed (McKeown-Ice, 1994). This multi-disciplinary approach will enhance the building of both a geographically and environmentally literate population equipped to address the breadth of issues facing our environment on both a local and global level. Florida is a state with a population of over 20 million (U.S. Census Bureau, Quick Facts) and one faced with multiple, urgent environmental problems. This paper examines the status of non-formal environmental education in Florida through an online survey and curricular analysis. Our hope here is to begin a conversation between geographers and environmental educators.

Environmental Literacy

Kevin Coyle's 2005 assessment of environmental literacy in the U.S. was a seminal report, identifying general patterns among the U.S. population that should have made most environmental educators deeply concerned. The report concluded that "the average American adult, regardless of age, income, or level of education, mostly fails to grasp essential aspects of environmental science; about 80% of Americans are heavily influenced by incorrect or outdated environmental myths; and just 12% of Americans can pass a basic quiz on awareness of energy topics". The country's divisiveness over climate change was brought into sharp focus by the election of Donald Trump to the U.S. presidency in November 2016, and the subsequent withdrawal of the U.S. from the Paris climate accord. Many commentators have noted the lack of understanding of climate science and other fundamental environmental processes that often surfaces in ongoing debates about climate change and other key environmental rules and policies (Leiserowitz et al. 2010; Freedman 2013).

Coyle identifies three levels of environmental literacy: basic *environmental awareness*, *personal conduct* knowledge, and *systemic* knowledge, which he calls simply "literacy". Over 50% of American adults were found to have only basic awareness of major environmental subjects such as water pollution and the need for energy efficiency. Important conclusions from the report are that most adult Americans are only aware of environmental problems; some citizens have made the connection between personal conduct and the environment; the majority of people lack the ability to think critically or deeply about the causes of key challenges such as climate change, water scarcity or pollution, or biodiversity loss. What is primarily missing from the

average American's approach to the environment is any semblance of systemic thinking that might engage larger processes such as the global economy, decision-making systems and individual-society relationships (Bednarz et al., 2014; Kollmus & Agyeman, 2002).

As Coyle (2005) argues, the point of environmental education is not to make people into walking encyclopedias of ecological facts, but to give them the information and cognitive skills to understand important causal relationships in the biosphere, as well as their role as individuals and as communities, in impacting those relationships. Indeed, environmental educators maintain EE seeks to develop action-oriented citizens equipped to instigate change through implementation of processes by which individuals gain understanding of environmental issues and problems, develop skills to examine and evaluate potential solutions addressing environmental issues (Kopnina, 2011; Short, 2010; Stapp et al. 1969).

Much environmental education, however, seems stuck either at the level of increasing sensory enjoyment of wild places, with the goal of increasing biophilia, or at the level of fundamental factual information about the environment. Moving our environmental education programs beyond these basic levels is mandatory and urgent. Among the recommendations made by the National Environmental Education Foundation (NEEF) report is the need for "more effective deployment of off-site centers, people, and places, including zoos, aquariums, museums, arboreta, and botanical gardens; nature centers and natural parks and refuges and field study areas; school yard habitats and gardens; green campuses; and more" (Coyle, 2005). These non-formal facilities provide a unique venue in which individual can continue to learn about the environment and its issues through interaction with nature, offering additional opportunities to explore, develop and enhance environmental knowledge, attitudes, and behaviors (Ballantyne & Packer, 2005). Hence, improving environmental education programs at parks and other non-school settings is critical to rapid improvement of American eco-literacy among the most important population: adults. The call for non-formal environmental education for adult populations can be traced back to the international development of the principles of environmental education. In the mid-1970s, the United Nations Conference on the Human environment at Stockholm created twenty-four principles designed to achieve environmental sustainability; principle nineteen emphasized the need for environmental education from grade school to adulthood. The International Environmental Education Programme, founded by United Nations Educational, Scientific and Cultural Organization (UNESCO) in 1975, called for the development of curricula for study of the environment for all age levels, as well as technical training and increased awareness of the global environment.

The specific goals now seen in U.S. environmental education, such as fostering awareness and concern, knowledge building and skills acquisition, and cultivating new patterns of behavior, arose from the Belgrade Charter, and non-formal environmental education got its official start at the Intergovernmental Conference on Environmental Education in Tbilisi in 1977. Non-formal environmental education in the U.S. actually started in the cultural milieu of the 1960s, in which some seminal programs linked environmental awareness to social justice issues, but did not become widespread until decades later.

Environmental Education in the U.S.

The National Environmental Education Act of 1990 established the National Environmental Education and Training Foundation, operating as the National Environmental Education Foundation (NEEF), as an independent non-profit organization complementary to the U.S. Environmental Protection Agency (EPA), extending its ability to foster environmental education for all ages and in all segments of the American public. The goals of environmental education in the U.S., as proscribed by the EPA, are in line with international guidelines, and are designed to increase awareness of, knowledge about, and attitudes of concern toward, the environment, as well as skills to resolve problems and participation in problem-solving activities. Environmental education in the U.S. happens through three primary avenues: the K-12 school system, non-formal education organizations or sites such as parks, zoos, aquariums, non-profits and commercial enterprises, and through higher education. Despite three decades of the development of environmental education programs in these diverse venues, multiple challenges to environmental education have been identified in the academic literature and by practitioners themselves. Some of these issues have to do with a lack of consensus on what environmental education ought to be doing; others focus on specific content or pedagogical concerns; additional discussion address outreach and target populations.

Here, we focus on the criticism that EE lacks a focus on systemic thinking; programs have paid scant attention to large-scale, global systems that perpetuate an entrenched and destructive human-nature relationship (such as mass consumerism and a global capitalist economy) (McLean, 2013). The connection between large economic systems and persistent and growing environmental degradation has not been adequately engaged by environmental educators. Potter notes in 2010 that government, at least, seemed to be coming to terms with this central relationship: "In 2009, the 110th Congress and our new administration are coming face-to-face with the realities of our failure to understand that environmental issues are economic issues; what affects our environment, affects our economy, and vice versa" (Potter, 2010, p. 27). Potter's optimism did not foresee, of course, the dramatic change in the U.S. politics and official positions on climate change and the environment that began in November 2016.

Coyle notes that few people move beyond a superficial understanding of how their personal conduct might be related to environmental problems, such as littering, using too much water and energy, and driving too much, failing to promote an understanding of the global implications of American consumer lifestyles. Sheelah McLean, in writing about Canadian environmental education in particular, notes that a lack of analysis of power in society results in programs that promote only individualistic solutions to environmental issues, but also confirm environmentalism as a space friendly to white, middle-class subjectivities (McLean, 2013).

Geographic education could play a distinctive role looking at the spatial aspect of EE in addition to the human-nature relationships. The scale of changes resultant from the human nature relationships is foundational in geography; however, geographers, much like environmental educators, remain concerned at the public's limited understanding of geographic

concepts. Without a proficient understanding of geography, individuals are limiting their ability to make sound decisions addressing critical societal, economic, environmental and political issues (Bednarz et al., 2014).

Indeed, individual decisions are made every day using geographic reasoning that have global implications. While one's purchasing decision may seem innocuous, when compounded at a societal level, these expand into large scale issues contributing to degradation of the environment. Nepal and colleagues (2005) identified the connection between consumer demand for beef, higher deforestation rates, greater emissions of greenhouse gases to the atmosphere, and expanded threats to ecoregions.

Part of the challenge for environmental and geographic educators is to more fully engage the complexities of a global consumer society and how individuals and communities might challenge its assumptions and values. Achieving this kind of understanding is made more difficult by what geographers call the spatial fix, a term used initially to describe the manner in which American corporations moved industrial production away from spaces of unionization and environmental laws, to spaces in less developed countries where wages were low and laws lacking (Smith, 2008; Soja, 1989). In an environmental context, the spatial fix occurs when, the movement of waste, for example, out of the U.S. to other countries for disposal hides the direct consequences of their lifestyles from the view of American consumers. Similarly, few Americans "see" the cost in terms of devastated landscapes, polluted rivers, and damaged lives that result from their rampant need for disposable consumer items. Some critics have also noted that, inasmuch as EE addresses human responsibility for environmental woes, it tends to focus solely on personal conduct. Personal lifestyle change, while rewarding and perhaps minimally helpful, is nowhere sufficient to address the largescale concerns we now face. Asking questions about who benefits from continued destruction of the environment, and who is most harmed, is critical but not often encourage in our EE programs (McLean, 2013). We suggest that geographers can offer new perspectives and concepts that may aid environmental educators in strengthening their community impact.

How might non-formal environmental education programs deal with some of these problems? Non-formal EE typically is delivered through the following types of activities:

Program Type	Activities
Experiential Programs	Camps, backpacking, group outings, adventure experiences
Educational Tours	Kayak trips, hikes, tram rides
Specific Events	Speaking engagements, workshops, films, demonstrations, conferences
Hands-On Activities	Building oyster beds, beach clean-ups, protecting beach nest sites, butterfly gardening, native plants
Creative Activities	Photo exhibits, art exhibits, literary events

Table 1: Non-formal EE Activity Types

Non-formal environmental education may be provided through non-governmental organizations, such as the Sierra Club, Audubon, or place-specific organizations such as the Tampa Bay Watch in Florida. Government agencies, most notably, public parks at the national, state and local scale have been critical sites of environmental education as public attendance at such locales has increased steadily over the past few decades; other non-profit sites include zoos and aquariums. Recently, commercial organizations have also emerged that provide environmental educational services; often commercial enterprises work in tandem with public parks. The visibility of environmental education in the public realm through such non-formal educational opportunities is a major difference between the opportunities for increasing environmental literacy among adults and those for increasing geographic literacy. Further collaboration between geography education professionals and EE could benefit both spheres.

Research Goals

The focus of this research project is an evaluation of non-formal environmental education programs in the state of Florida.

- (1) How has Florida met the challenge of providing non-formal environmental education to the public?
 - (a) What types of organizations dominate the EE arena in Florida?
 - (b) What barriers prevent organizations from expanding or improving EE?
- (2) At what level of environmental literacy are most programs situated?
 - (a) What is the dominant theme of the educational programs?
 - (b) What types of learning strategies are employed?
 - (c) What topics are emphasized?
- (3) Are there significant differences in the approach to environmental education taken by non-governmental organizations, state agencies (such as parks) or commercial organizations?

In order to evaluate to what extent environmental education programs in the state are addressing the need for critical thinking, systemic analysis, and a more transparent understanding of how power impacts human-environment relations through environmental and climate justice, a more detailed categorization of the levels of eco-literacy was needed. Based on fieldwork (in cooperation with agency employees), document analysis and literature review, we developed a five-level framework for environmental literacy.

Building off of the three broad steps in environmental literacy developed by Coyle, this framework addresses the need for an emphasis on systemic thinking and human agency, illustrated below.

Level One: Aesthetic/Wonder: nature appreciation and immersion. This level is appropriate for children or anyone new to the outdoors. A foundational precept of environmental education has long been that one “will fight to save what one loves,” and that increasing the experience of people in the outdoors will foster love of nature, laying a foundation for future action.

Level Two: Scientific knowledge: Life and Earth Sciences. This level reflects the growing attention to environmental education in the K-12 public school system. The majority of education related to the environment is happening in life, earth and physical science courses, in which teachers attempt to mold environmental education into their work to meet state science standards. A foundational knowledge of the workings of the planet is essential to good environmental stewardship.

Level Three: Ecological knowledge: habitat and ecosystem based, with humans as part of biosphere; non-prescriptive. This stage reflects the need to move beyond the focus on life and earth sciences to ensure ecosystem-based knowledge that includes relationships between living organisms, the non-living landscape, and between humans and nature. Humans are seen here as members of the biotic community; this level introduces the role of our species in modifying the environment.

Level Four: Social/cultural understanding: focuses on human-nature relations, actions and individual responsibility; emphasizes household or local scale change. Building on a strong foundation of science and ecological knowledge, this level develops a deeper understanding of the role humans have played in modifying the world around us, and highlights human society’s roles in degrading and damaging ecosystems, endangering habitats and other species, in resource depletion, etc., and begins to examine individual responsibility and the connection between action and effect.

Level Five: Systemic understanding: focuses on socio-economic and political contexts for human-nature relations; emphasizes collective action and large scale change. Level Five is the highest level of environmental literacy and it reflects a critical and analytic understanding of large scale human systems, their development and persistence, their long-term impacts on the biosphere, and identifies collective action necessary to make positive changes to these systems.

The five levels of environmental literacy mirror the Environmental Protection Agency’s five key components of environmental education:

- **Awareness and sensitivity** to the environment and environmental challenges
- **Knowledge and understanding** of the environment and environmental challenges
- **Attitudes of concern** for the environment and motivation to improve or maintain environmental quality
- **Skills to identify and help resolve** environmental challenges
- **Participation in activities** that lead to the resolution of environmental challenges (EPA, 2016)

Specifically, “awareness and sensitivity” is instilled in Level One of environmental literacy; Levels Two and Three instill “knowledge and understanding,” while Level Three encourages personal responsibility, which is linked to “attitudes of concern”, and Levels Four and Five convey skills and encourage participation. The framework provides a roadmap for ensuring that EE addresses systemic thinking, human agency, and large-scale global processes; includes advocacy for the environment in the form of engagement with changes in behavior and large scale systems.

Assessing the level of environmental literacy being targeted by EE programs in Florida is accomplished through standard program evaluation techniques by focusing on the overlap in theme/goal, topic/focus and process/pedagogical strategy/activity. Figure One illustrates this framework.

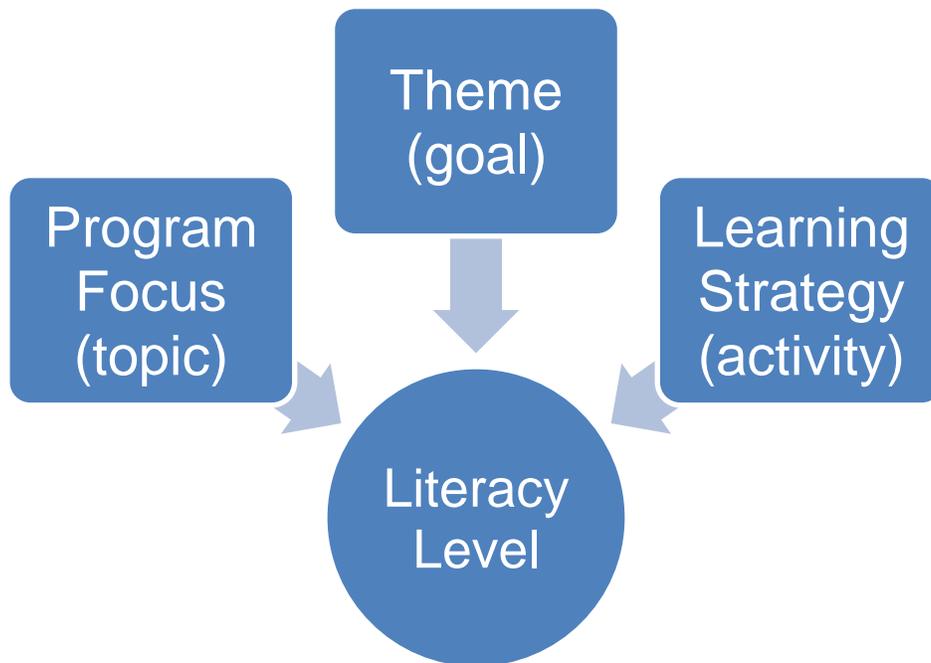


Figure 1: Concept Diagram

This study uses a state level online survey of environmental education providers. Relevant curricula, documents and web-documents were collected. We apply evaluation techniques (Robson, 2000) in the analysis of these data.

An online survey was sent to 225 environmental education providers in the state of Florida; the survey link was also distributed through the League of Environmental Educators of Florida’s (LEEF) newsletter for two months. Providers were identified through a search of databases provided by LEEF and the Suncoast Youth Conservation Centers of Florida, as well as search engine searches. Organizational websites and promotional materials were evaluated when available. Reminder emails were sent at regular intervals over a three month period.

The lists of possible activities, topics and themes for the survey questions were developed through extensive content analysis of environmental education documents from throughout the state and through conversations with environmental educators. Thus, the surveys reflect a ground-up process of interrogation of the environmental education field in the state. Parks, environmental NGOs and commercial environmental education providers typically offer a suite of activities such as hikes, tram tours, and nature camps, and events, such as film showings, gardening workshops, or training to work with injured birds. Additional types of activities include habitat restoration (such as building oyster beds or pulling invasive plants) and assisting in citizen science (such as counting gopher tortoises once a year).

Results

Eighty-six surveys were completed, a return rate of 38% based on the 225 surveys emailed individually to organizations.

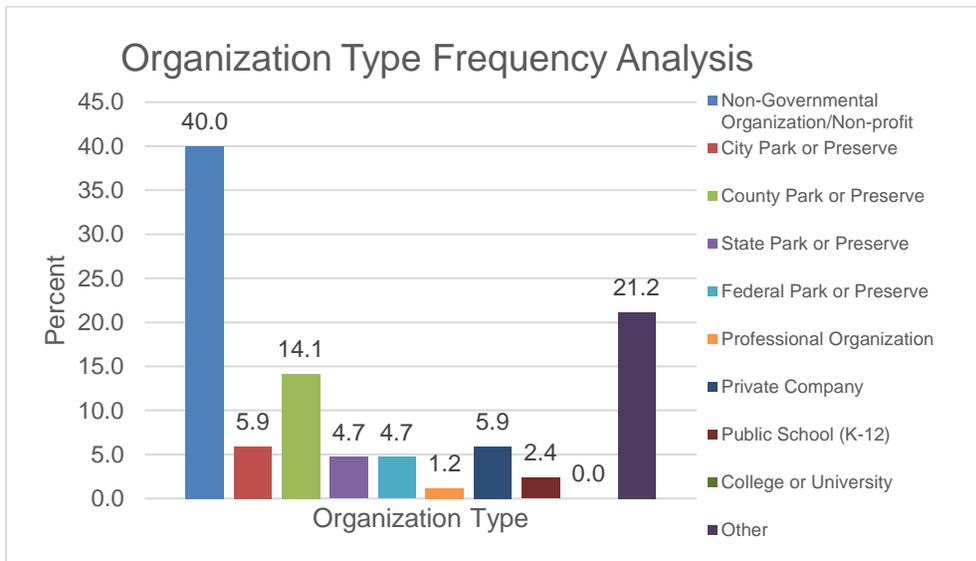


Figure 2: Organization Type Frequency Analysis

The primary type of organization responding to the survey was a non-governmental organization (non-profit), as indicated in Figure 2. For analysis purposes, all park types were listed as “public agencies”, and this category was compared to non-governmental organizations (NGOs) and commercial organizations to identify any significant differences in the responses across organization type. Following this overview, characteristics of each sector will be examined.

The large majority of respondents indicated that providing non-formal environmental education was their primary mandate, far more than noted that providing recreational opportunities was their primary goal (see Figure 3). This finding emphasizes the way that parks and environmental non-profits see their role in the community as educators, rather than as passive sites for leisure.

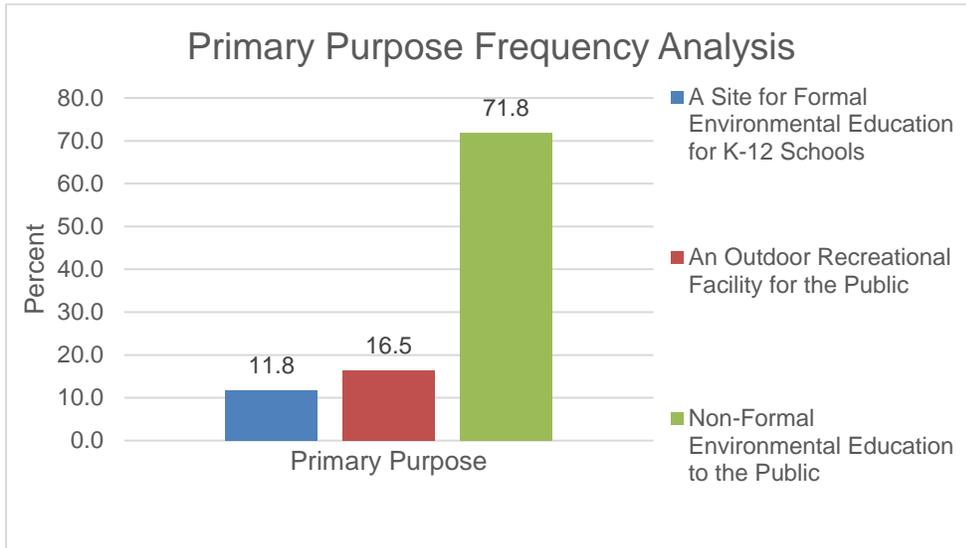


Figure 3: Primary Purpose Frequency Analysis

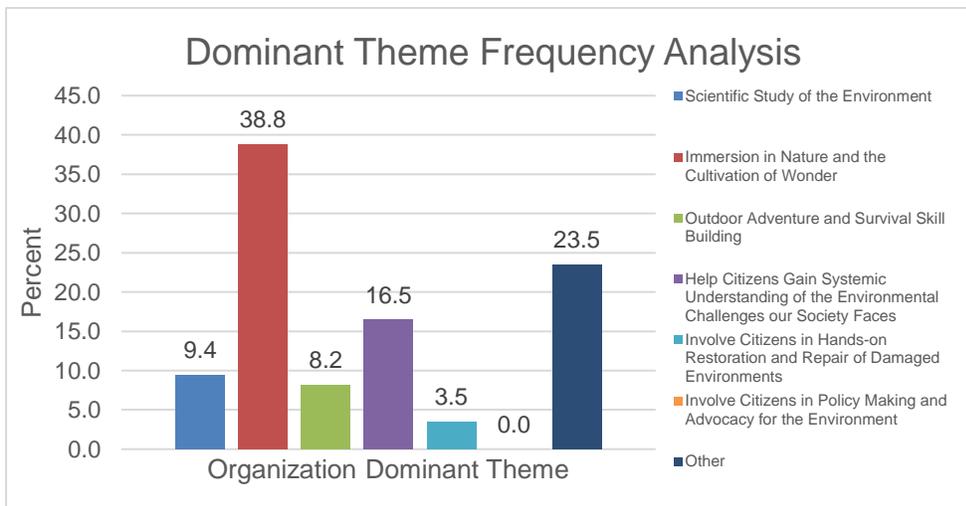


Figure 4: Dominant Theme Frequency Analysis

Figure 4 demonstrates the responses to the question, “what is the dominant focus of your organization’s programs?” The frequency with which “immersion in nature and developing a sense of wonder” was chosen reflects the common understanding in the environmental education literature that the first step toward ecological literacy is getting the public “out” into nature. It was somewhat surprising that so few organizations indicated “scientific study of the environment” as their dominant theme, while “helping citizens gain a systematic understanding

of environmental challenges faced by society” was the second most frequent response. This would seem to indicate a prioritization of higher level thinking within environmental education. However, 23.5% of respondents chose “other” and wrote in their purpose. Some examples of these answers include “ethical angling”, “land conservation”, “gardening” and “teaching about plants.” Several respondents noted under other that they strive to combine scientific education with decision-making and care for the environment.

Evaluating Environmental Literacy Levels

In order to identify the level of environmental literacy each type of organization emphasizes, three aspects of environmental programming are evaluated: themes or goals; focus or topics; and processes or activities. The results of the survey were sorted into groups based on type of provider, i.e., NGO, government agency, or private company, to better understand where the most effective strategies are being used across sectors. First, participants were asked to identify the primary theme of their work with a choice between immersion in nature and the cultivation of wonder, scientific study of the environment, outdoor adventure and survival skill building, help citizens gain systemic understanding of the environmental challenges our society faces, involve citizens in hands-on restoration and repair of damaged environments, involve citizens in policy making and advocacy, and other. Next, frequency analysis was done for specific topics and activities for each sector. Topics and activities were ranked according to their relative place in the five levels of environmental literacy (this process is discussed below).

Dominant Themes

While all three sectors emphasize “immersion in nature” as their primary theme, there are some differences in the relative weighting of themes across sectors. Of the public agencies, for example, 44% emphasized immersion in nature (Level One theme), while this percentage was 60% for private companies and 29% for NGOs (see Table 2, below). Helping citizens gain systemic knowledge, a Level Five topic, was chosen less frequently by all organization types.. Only NGOs emphasized “outdoor adventure and survival skills”, with 14% choosing this theme as dominant, compared to 4% for public agencies and zero for commercial enterprises. Surprisingly, scientific study of the environment (Level Two and Three) was more prominent among commercial organizations than either NGOs or public agencies.

Organization	Primary Theme	Secondary Theme	Tertiary Theme
NGOs	Immersion (29%)	Systemic Analysis (20%)	Outdoor Adv. (14%)
Public Agencies	Immersion (45%)	Systemic Analysis (13%)	Science (9%)

Commercial Organizations	Immersion (60%)	Science (20%)	Systemic (20%)
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Table 2: Primary, Secondary and Tertiary Themes across Organizations

Superficially, such patterns seem to suggest that Level One themes are dominant across types of providers, but a significant number of public agencies and NGOs were also invested in higher level learning, through their emphasis on “helping citizens gain systemic understanding”, a Level Five theme. The category of “other”, which allowed respondents to write-in their foci, complicates the analysis; for both the NGOs and public agencies, “other” was chosen by nearly one-fourth of respondents (see discussion above of comments under “other”).

These findings also reiterate that parks tend to see their role as educational, not recreational. Hence, Outdoor Adventure and Survival Skills were not a major theme, showing up only modestly among NGOs. While this may appear surprising at first, “Outdoor adventure” is a term associated with more rigorous and risky types of activities (back country camping, rock climbing, scuba diving). Adventure activities may require extensive training and expensive equipment. Few organizations primarily aim to provide these kinds of experiences to the public. This focus is distinguished from “immersion”, which attempts to get the public out into nature in a less athletic manner, and is much more prominent.

Program Focus/Topics

The second question used to assess the targeted level of environmental literacy asked respondents to choose all of the topics that they offer in their regular programs, from a list of twenty-two possibilities developed from field work, interviews and document analysis.

Topics were sorted based on their association with one of the five levels of environmental literacy (see Table 3). For example, programs emphasizing local ecosystems, local wildlife and plant communities tend to be very descriptive, and are generally designed to bring the public into a park setting in which they may enjoy experiencing nature. As such, these topics reflect the first and second levels of environmental literacy. Topics such as problems of invasive plants and animals, local watershed management, history of local land-use move into the third level of environmental literacy. Environmental justice, the politics of policy change, ethics, consumerism, sustainable living, diverse views of nature, climate change, and toxic waste reflect the fourth level, in which participants begin to grasp the complexities of social and cultural human systems, the impact of individual choices on the environment, and the processes for larger scale change. Level Five, which reflects a complex, analytical understanding of large scale systems shaping the human-nature relationship is seen in sustainable development, climate justice, community action, alternative energy, waste reduction, and urban environments. However, assignment of topics to levels cannot be said to be exact, and clearly some topics may belong to multiple levels. Hence, for analysis of topics, in which fine distinctions between levels may be difficult to discern, Levels One, Two and Three were combined and Levels Four and Five were combined. Thus,

programs on topics in the first category could be considered to be emphasizing lower levels of environmental literacy – experience of nature and basic scientific knowledge – while programs focusing on topics in the second category are emphasizing more complex social, cultural and systemic analyses.

Level of Literacy	Theme	Topics	Activities
Level 1: Aesthetic/Wonder	Immersion in Nature and Cultivation of Wonder	Local wildlife	Hikes
	Outdoor Adventure	Local plant communities	Nature camps
		Local ecosystems	Kayak trips
Level 2: Scientific knowledge: Life and Earth Sciences	Scientific Knowledge of the environment	Local wildlife	Plant identification workshops
		Local plant communities	Raptor and wildlife education
		Local ecosystems	Speakers and presentations
Level 3: Ecological knowledge	Scientific Knowledge of the environment	Local ecosystems	Speakers and presentations
	Involve citizens in hands-on restoration and repair of damaged environments	Local Land-use history	Films
Level 4: Social/cultural Understanding	Help citizens gain systemic understanding of environmental challenges	Environmental ethics	Speakers and presentations
	Involve citizens in policy making and advocacy	Diverse Views of Nature	Films
Level 5: Systemic understanding	Help citizens gain systemic understanding of environmental challenges	Climate justice	Films
	Involve citizens in policy making and advocacy	Environmental justice	Weekly discussion groups

Table 3: Examples of Correlation between Literacy Levels, Topics and Activities

Clear patterns emerge in the frequency with which programs are offered on specific topics, as can be seen in Figure 5 (below). The top two quintiles of program topics reflect topics that were offered by between 80 and 100% of respondents (top quintile) and between 60 and 79% (second quintile). For respondents who identified as non-governmental organizations and public agencies, there is a clear emphasis on lower level environmental education topics. Higher level topics emerge only in the bottom quintiles. Commercial organizations, however, have a greater number of higher level topics offered more frequently.

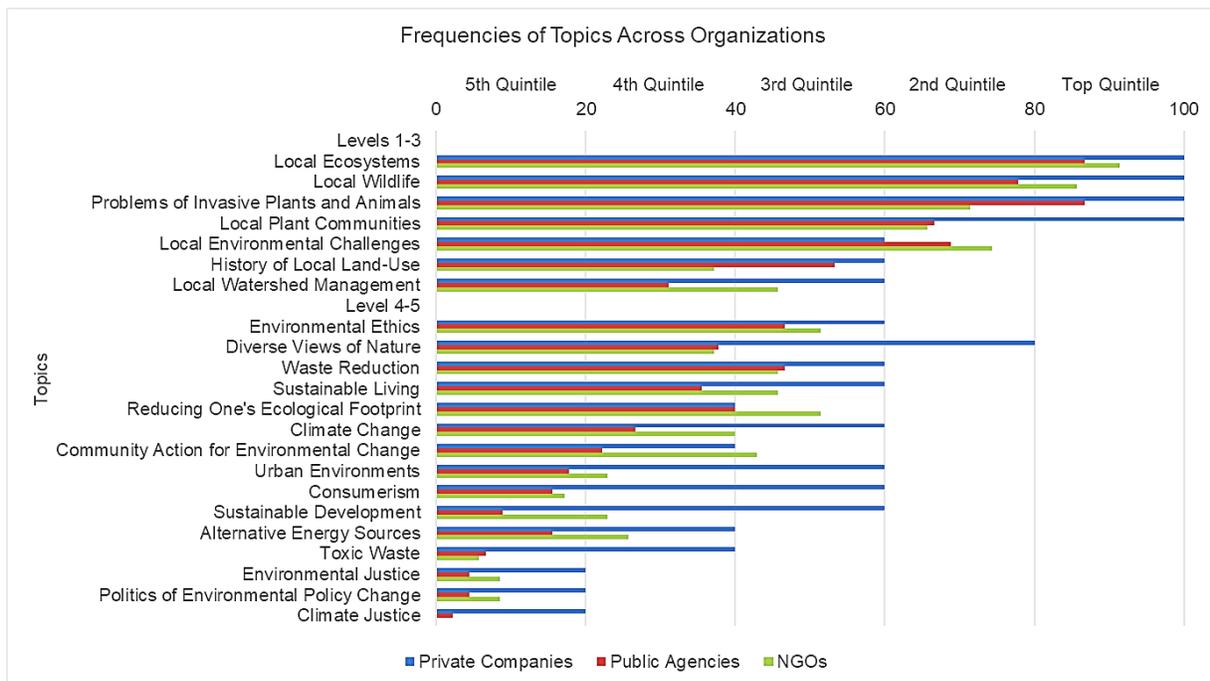


Figure 5: Frequencies of Topics across Organizations

Process of Implementation/Learning Strategies

The third approach to understanding the target level of environmental literacy of organizations in the different sectors is to examine the learning strategies provided through an examination of types of activities most frequently offered (refer to Table 3). Activities such as general guided hikes, tram rides, and camps indicate a focus on a lower level of environmental literacy; such activities are designed to combine experience in nature with basic scientific information about the environment. Similarly, family outings, festivals and basic skills training such as fishing, archery and outdoor adventure (kayaking, climbing, camping) share a focus on immersion and basic learning. Festivals tended to be arts-focused, with some wildlife oriented gatherings (Raptor Fest, for example, at Boyd Hill Nature Preserve). Guided hikes with specific topics such as wildlife, plants, and insects tend to be more focused on imparting information than experiential. Along with citizen science, plant identification, wildlife education and Master Naturalist courses, these activities focus on the second and third levels of literacy: earth and ecological sciences. Moving into the social/cultural and systemic analysis levels, weekly discussions, films, hosting advocacy meetings, skills training for ethical hunting and wildlife protection, restoration and clean-up projects, and other kinds of educational opportunities such as complete courses of study and specific non-credit courses are examples of activities opportunities to address higher level thinking.. Speakers and presentations may also fall into this category, as analysis of topics offered over the study period revealed that most speakers were addressing human-environment interactions at a fairly high level of analysis, rather than simply

conveying factual data about an ecosystem (though, the latter did appear, for example, an event about gopher tortoises). Recognizing that, depending on the specific topic, activities such as films or courses may cross over literacy levels, a rough distribution can be seen in Table 3.

It is clear that the more widely offered types of activities tend to be concentrated in the lower levels of environmental literacy; similarly, activities associated with higher levels of environmental literacy are offered by substantially fewer of the participating organizations (see Figure 6). For example, festivals are offered by over 80% of NGOs and Public Agencies; less than 19% of public agencies offer weekly discussions or host advocacy group meetings. Restoration projects and film showings are offered by less than 39% of both NGOs and Public Agencies. Similarly, of commercial organizations, less than one-fifth offer advocacy meetings or film showings. Citizen science, plant identification, wildlife education and specialized hikes appear fairly frequently, in the third quintile for NGOs and Public Agencies, and in the third and second quintiles for commercial organizations.

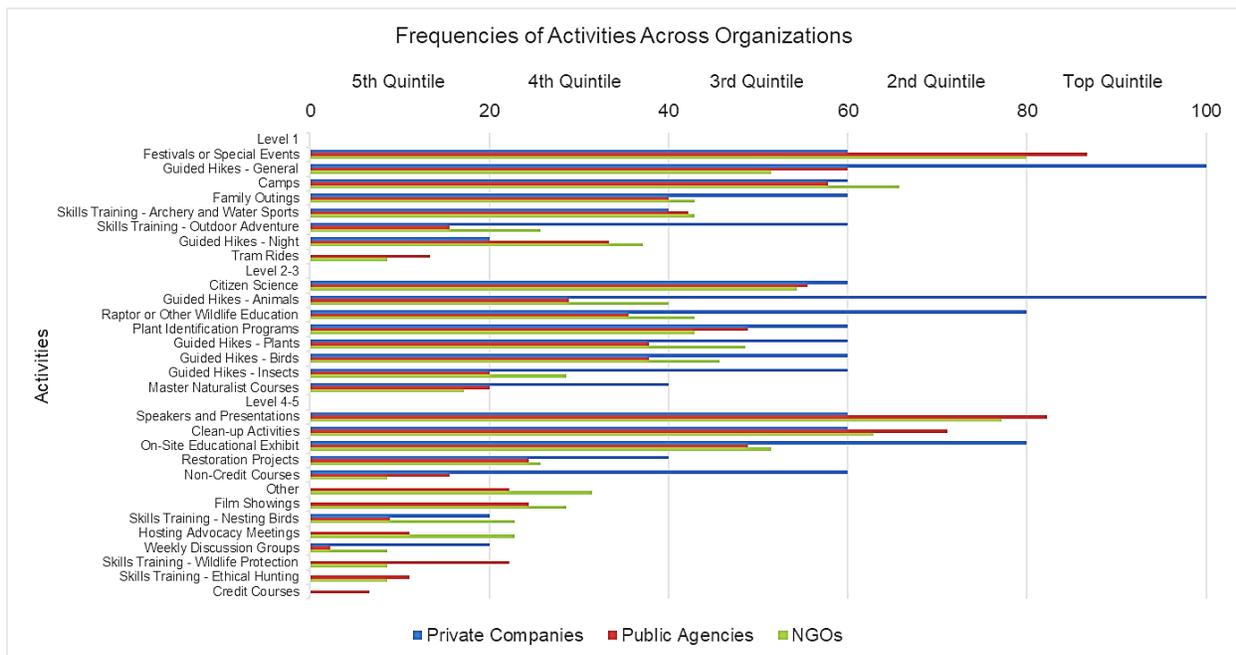


Figure 6: Frequency of Activities across Organizations

Discussion

An important finding of this research is that only one-third of Florida’s environmental education programs for adults offer programs on climate change, while ignoring the issue of climate justice completely. Environmental justice has been an important component of environmentalism in the U.S. for nearly four decades. Climate justice, a newer concept, is rapidly becoming a rallying point for grassroots climate change activists, and is increasingly incorporated into conversations among policy makers and scholars about building resilience to climate change

effects. Climate change itself is arguably the most important environmental challenge of the twenty first century, even if one does not address the disparate impacts of changing climate on diverse populations. Of programs that target mixed age groups, 35% offer programs on climate change – an encouraging statistic -- even though climate justice is tackled by less than 3% of respondents. Across all age groups, climate justice, environmental justice, and the politics of environmental policy change are largely ignored. And yet, these might be considered the most pressing topics for public debate at this time.. The topic of alternative energy sources, closely linked to solutions to climate change, is also largely ignored: it is absent from adult programs, and only one-fifth of groups targeting kids offer this topic. For mixed audience organizations, the rate is slightly higher, with 26% of respondents indicating they offer programs on alternative energy.

This study of non-formal environmental education opportunities in Florida confirms that the focus of environmental education continues to remain at lower levels of environmental literacy, whether literacy is defined using Coyle's (2005) three broad categories, or using our more focused five categories. Immersion in nature remains a prevailing approach utilized by non-formal educators. However, program topics and activities indicate an increasing attention to teaching both science and more complex analysis of social, cultural and systems that shape environmental problems.

While more than fifteen years have passed since Coyle's report on the dismal state of American environmental literacy, progress in addressing weaknesses in the field has been slow. Environmental crises continue to escalate as impacts of climate change are increasingly visible, the horrific impacts of waste production become widespread in the world's oceans, and water and food resources continue to be scarce for much of the world's population. Non-formal environmental education can provide a critical avenue to greater public understanding of urgent issues such as climate change.

Synergy between environmental and geographic education could supplement environmental literacy. Educators and individuals would benefit through emphasis on human-environmental relationship parallels between the disciplines. Additionally, enhanced understanding of geographic scale, and framing concepts such as the spatial fix, would add richness to the understanding of the impact of individual and community decisions. Through geographic processes and mapping, individuals could better understand the impact of their decisions at a local, regional and global scale, highlighting the connections of our environment and the positive and negative consequences to the world's environment (McKoewn-Ice, 1994). Hill (2006) contends "most effective education of adults occurs when the global and local are linked" (Hill, 2006, p. 267). Geographers are well-equipped to add complexities of scale and space to non-formal environmental education programs.

While lack of state and federal support for climate change education is a problem for educators in Florida, this cannot prevent educators from taking on the challenge of increasing citizen understanding of their deep entanglement in these issues. Greater strides need to be

taken to expose the public to research-based arguments about the human impact on nature, and to address the roots of our environmental crisis in large-scale cultural and economic systems. Global economic and cultural systems that perpetuate the endless spiral of consumption, destruction of nature, and the warming of the planet seem most often to lie behind the curtain of our environmental education programs. Very few of the educational activities encountered in this research addressed these complex social relations. Environmental educators should be discussing in a collaborative manner how they may assist citizens in becoming better informed about the relationship between large scale economic structures and the environment.

Conclusion

Practitioners and researchers alike must consider the mechanisms through which we can assist learners to move from Levels One, Two and Three, to the higher levels of environmental literacy that are required for meaningful action to occur. Environmental educators can agree that getting more children, youth and adults out of doors, into less humanized landscapes where people can connect with nature in a sensory and experiential manner is a very positive foundation for environmental literacy. However, the process through which people move from this affective connection to deeper, systemic thinking about environmental problems, and ultimately, to collective action that will change the human impact on the biosphere, has not been adequately conceptualized.

Florida has a strong foundation of diverse non-formal EE providers who collectively provide opportunities for immersion in nature, as well as increased scientific understanding of environmental issues. The state's political climate, and the lack of a state office supporting EE, creates significant challenges for educators. Nonetheless, educators should work to increase both the availability of, and participation in, processes of learning that increase environmental literacy at the levels that are currently not as prevalent: in systemic analysis, critical thinking, and understanding of complex social and political processes that influence environmental decision-making. Ultimately, the environmental education community must determine who – which sector, which specific organizations – will take on this task.. Public agencies such as parks may be limited by inadequate budgets and lack of staff, and it is unlikely they alone can take on this challenge. On the other hand, as public spaces, parks are well-positioned to partner with both commercial organizations and NGOs to provide both more complex environmental education programming and to support advocacy work on behalf of the environment. A greater collaboration between institutions of higher education and public parks and preserves might be a catalyst for stronger EE programs. Training in climate change education, climate justice and environmental justice issues is available through NGOs such as Sunrise, World Resources Institute, and Catalyst Miami. Working together at the state level, with greater collaboration between those working in the K-12 arena, the non-formal sector, and higher education is needed to strengthen environmental literacy in this critical state.

Finally, we suggest that a partnership between the state's strong geography organizations, specifically The Geographic Alliance (which promotes geography education in the K-12 arena throughout Florida), and the Florida Society of Geographers (which promotes geographic education at the collegiate level) and organizations such as LEEF, the League of Environmental Educators of Florida, could prove fruitful for both disciplines. Overlapping concerns about worsening environmental crises, including problems related to massive consumer waste and climate change, should unite these disciplinary communities to marshal shared resources, working together to boost citizen understanding of, and commitment to ameliorating, environmental problems in the state.

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