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Formative Interests and Pathways to Natural Resources Careers Among Racial and Ethnic Minorities

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FORMATIVE INTERESTS AND PATHWAYS TO NATURAL RESOURCES
CAREERS AMONG RACIAL AND ETHNIC MINORITIES

By

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A THESIS

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Table of Contents

List of figures

List of Tables

Acknowledgements

List of Abbreviations

EE – Environmental Education

NR- Natural Resources

SCCT – Social Cognitive Career Theory

Abstract

Land use, values, and ethics vary across cultures; however, those making natural resource (NR) management decisions are often not representative of the diversity of people who live on the land. Diversifying the workforce is a step towards ensuring management decisions and policies are inclusive of all peoples; however, few people from minority groups are pursuing degrees related to NR management. The purpose of this study is to assess factors affecting the decisions to pursue careers in NR fields among historically underrepresented groups of people, with an emphasis on the role that youth environmental education (EE) programs play in creating career pathways. A two-pronged methodological approach was used. The first method uses the Social Cognitive Career Theory as a theoretical framework to explore the career motives of minority professionals and students in NR programs through in-depth, semi-structured interviews. Second, quantitative data were collected through an online survey of EE program directors to understand the priorities, methods, and challenges related to increasing diversity and inclusion within their organization, as well as any explicit efforts to promote NR career opportunities or continuing interest in the outdoors. Qualitative findings reveal that nearly all participants learned of NR careers late in the career decision-making process. Quantitative data from EE program directors revealed that 66% of organizations have a high priority for increasing diversity, though roughly 40% have no explicit efforts to promote careers in the field. These data are evidence of the lack of awareness about career opportunities in NR and a need to better promote career opportunities among people from underrepresented groups.

1 Introduction

1.1 Rationale

The fundamental connection between natural resources and people necessitates a need for management practices that ensure all human interests and values are being met (Wallace, Wagner, and Smith 2016). However, the agencies and organizations that manage these resources have historically lacked representation by women and racial/ethnic minority groups. Diversifying the workforce is one step towards ensuring management decisions and policies are inclusive of all peoples. Having a more representative body of people actively engaged in and advocating for ethical management practices of our forests and natural resources can ensure the continued flow of benefits for all peoples in the future.

Another consideration is the projected shift of racial demographics in America to a minority-majority (Colby and Ortman 2015, Frey 2018). Engaging with racial/ethnic minority groups can raise awareness and agency over NR decisions among these groups of people and will help to ensure that forests and natural resources continued to be valued by the general public. Larger public support will allow policies and funding levels to continue supporting sustainable management. An unengaged public that is unaware of the importance of the major issues surrounding natural resources (e.g. climate change, development pressure, invasive species, etc.), or the linkages between healthy ecosystems and human health and well-being (e.g. ecosystem services paradigm), or the economic contributions of forest products industry (particularly in forest resource-dependent rural communities) might be less likely to show support for natural resource management in general.

Furthermore, diversifying the workforce is important for its potential in providing unique solutions through differing perspectives; it fosters innovation and leads to more effective problem solving (Ostergaard, Timmermans, and Kristinsson 2011). Scientists are now realizing the benefits that other cultures can offer in providing solutions to some of the complexities facing natural resource management. For example, the traditional ecological knowledge of indigenous cultures is now being recognized for insights into the symbiotic relationship between humans and their environments (Morishima and Mason 2017).

Studies confirm that the percentage of minorities in environmental and natural resource professions is not congruent with the racial diversity composition in the United States (Haynes, Jacobson, and Wald 2015; Kern, Kenefic, and Stout 2015). The importance of diversifying the workforce, in general, gained national attention in the 1970s, and has since motivated federal, state, and local agencies to provide solutions (Wyche and Frierson 1990). Yet despite decades of funding, resources, and research, little improvement has been made (Massey 1992; Maughen et al. 2001). According to Sharik et al. (2019), racial or ethnic minorities comprise only 13% of overall enrollment in forestry or other natural resource undergraduate degree programs in 2017.

How to successfully generate interest in natural resources (NR) and science, technology, engineering, and mathematics (STEM) careers among minority groups has perplexed government, university and industry administrators alike (Huntoon & Lane 2007). Many researchers who approached this topic have focused on the barriers or supports of individuals in the field, but nearly all have been limited in the number of underrepresented participants they reach. In their research on culturally diverse recent

hires, Balcarczyk et al. (2015) interviewed 22 individuals recently employed by the U.S. Fish and Wildlife Service to gain their perspectives on barriers and supports to entering a career within the field. Of these 22 people, only 5 identified as a race or ethnicity other than white. Similarly, Sharik and Frisk (2011) surveyed undergraduate students in forestry and related programs on their decisions to matriculate into those degree programs. Twenty students identified as either Asian, Native American, or Hispanic; while 97 participants were of Caucasian race. In both of these examples, roughly 20% of the participants were of a race/ethnicity other than white, which is closely representative of overall percentage of minorities in the NR field as a whole. However, more research into minority perspectives is needed to augment our understanding of career choice motivators.

1.2 Literature review

The low number of minority students matriculating into natural resource and environmental programs (Blockstein, Mandula, and Ploetz 1992; Lawrence, Holland, and Morrin 1993; Sharik and Frisk 2011) implies that there is little interest to pursue these disciplines among underrepresented groups or there is little perceived fit (Bal and Sharik 2019). How career interests develop and career choices are made is a complex process that has been studied extensively by experts in the field of career development (Krumboltz, Mitchell, and Jones 1976; Vondracek, Lerner, and Schulenberg 1986). Influential theories postulate that career choice is a journey that happens throughout one's lifetime (Ginzberg et al. 1951; Super 1953) and that people pursue careers that reflect their interests, have positive outcome expectations, and confirm self-efficacy beliefs

(Lent, Brown, and Hackett 1994). Fitzgerald and Benz (1994) recognize that these cognitive drivers are usually made under ideal situations, however, and the ability to choose a career free of external constraints, such as the economic market or familial responsibilities, is a privilege that many are not afforded.

The social cognitive career theory builds on former career development theories by considering the cultural and contextual factors that can influence a person's career actualization (Lent, Brown, and Hackett 1994). While each individual possesses a certain level of personal agency, there exist socially constructed variables surrounding gender, race, ethnicity, and culture that influence the opportunities or the limitations one perceives or experiences. As such, marginalized groups may face a unique set of sociostructural barriers towards occupational vocation, including educational inequality or discrimination (Fitzgerald and Benz 1994).

Structural and institutional discrimination has systematically prevented land access rights to nearly all racial and ethnic minority groups throughout the formation and history of the USA (Schelhas 2002). These restrictions can formulate distrust in land management and a disassociation with the natural environment. It is well known that natives have been disenfranchised from their land beginning with the settlement of North American by colonists. The story of land acquisition did not end there. Hispanos were promised lands under the Treaty of Gaudalupe Hidalgo, but a long process kept the lands in US procession, much of which became national parks. When Asians began acquiring large tracts of land for family farming, 11 western states passed the "Alien Land Laws" that prohibited foreign citizens from owning land. Black Americans have systematically been

stripped of land acquisition throughout history. After emancipation, former slaves were denied purchase of land by white landowners. Landowners who did sell property to black farmers charged exorbitant prices and foreclosed when the farming economy declined. Over the last century, 98 percent of black agricultural landowners have been dispossessed of their lands (Newkirk 2019).

With limited opportunities to formulate positive relationships with nature and the environment, natural resource careers may not be on the minds of young men and women from minority racial or ethnic groups. This is tenable based on prior research into the perceptions of natural resource careers among minorities. Limited exposure to the outdoors and natural areas (Bowman and Shepard 1985; Gharis, Laird, and Osborne 2017) or a negative predisposition to nature (Hayes and Jacobson 2015) have been identified as barriers to pursing this field. Another commonly cited barrier is the lack of knowledge of natural resource careers (e.g., Bowman and Shepard 1985; Adams and Moreno 1998; Maughan et al. 2001; Kuhns et al. 2004, Outley 2008; Davis et al., 2002). For an individual to become concerned for the state of the environment and motivated to protect its well-being, some formative experience which develops a love for the natural world is usually a precursor (Sobel 1996; Tanner 1980). Early experience is a significant indicator of pursing NR careers among students and professionals in the field, who state their love of nature and the outdoors as a vocational motivator (Hager, Straka, and Irwin 2006; Sharik and Frisk 2011). A child's connection to and involvement with nature is often a precursor to adult environmentalism (Wells and Lekies, 2006).

In recognition of these findings over the last several decades, a number of interventions have been employed to engage diverse youth with the sciences and the natural world (Dorsen, Carlson, and Goodyear 2006; Tsui 2007). Environmental education is a common intervention which seeks to instill a positive value of nature and create environmental stewardship (Rickinson 2001). Hungerford and Volk (1990) caution that exposure does not necessarily lead to behavioral change, however. For those who find a meaningful connection with nature, additional supports may be needed for this connection to manifest into a career.

Studies have identified several support systems that are attributed to the career development and advancement of minorities within the sciences. Parental and familial support (Armstrong et al. 2007; Balcarczyk et al. 2015, Turner and Lapan 2003), role models and mentorship (Balcarczyk et al. 2015, Maton et al. 2000), and early work experience (Armstrong et al. 2007; Bettis, Tackie, and McElhenney 2017; Balcarczyk et al. 2015) are among those most commonly cited as important factors to pursuing vocational interests.

Research focusing on barriers and successes to pursing NR careers among historically underrepresented groups of people is limited. Many more studies exist relative to the strategies of diversifying STEM fields, broadly. While these studies provide some insight into the challenges and successes that minorities experience in actualizing educational and career goals, NR fields differ from "traditional" sciences in two significant ways: (1) NR careers are largely unrecognized by urban and minority populations, and (2) the field is negatively perceived to be low-paying or not prestigious (Outley 2008; Richmond

1996). Even more limited is research into the formative interests and career pathways into the field while using a theoretical framework to examine the culture-specific and contextual variables that impact career development.

The purpose of this research is to explore the pathways to NR careers among minorities by:

(1) further examining the formative interests and career motivators of racial/ethnic minority career professionals and students currently in a NR field or pursuing a NR degree

(2) examining the role that environmental education programs play in guiding diverse members to NR careers

1.3 Theoretical framework

The social cognitive career theory (SCCT) as a theoretical framework has wide-ranging acceptability in research and has applicability across multiple cultures. SCCT identifies three aspects to career development: (1) how career interests develop, (2) how career choices are made, and (3) how career success is maintained (Lent, Brown, and Hackett 1991). SCCT builds off of the former work of Albert Bandura's general social cognitive theory (Bandura 1986). Bandura's theory asserts that people exercise personal agency in making choices, but they are also influenced by a number of factors relative to their social position that either strengthen or weaken that agency. The SCCT integrates those factors within a career choice framework by assigning personal agency relative to career

motivations as self-efficacy, outcome expectations, and goals. These three variables are the basic building blocks of SCCT.

SCCT recognizes that cognitive volition is rarely independent of extraneous environmental factors. The "social" aspect of the theory emphasizes the role that others play in shaping a person's career development process. Each individual has a social web of people within their environment who, directly or indirectly, impact their perceived capabilities. This can be done through teaching, encouragement, and sharing values, or adversely, by dissuasion or discouraging one's dreams. Similarly, a number of other contextual factors surrounding one's environment and culture create sociostructural barriers or supports that work in concert with self-regulation to influence attitudes and behaviors towards work and career attainment.

The three interlocking models – interest, choice, and performance explain academic and career development over time while also considering how the above sociocognitive mechanisms exert influence on the different progressive stages. An individual's career interest development is the product of various occupational-related activities that one is exposed to (directly or vicariously) throughout adolescence in the home, at school, or during early work experiences. Through repeated exposure to these activities and feedback from others, a person develops self-efficacy beliefs about their ability to perform related tasks. A person with strong self-efficacy will have expectations for certain positive outcome related to their performance. Therefore, it is presumed that people will formulate career interests around those activities which they believe themselves to be efficacious and will return positive outcome expectations.

The choice model addresses how those formulated interests progress towards career attainment by setting goals. Goal setting increases the likelihood that people will take actions to pursue their career choice. Well-defined goals that are held with a strong conviction raises the probability that actions will be taken toward those career choices. Career choice is often reserved for those individuals who have acquired certain educational and vocational requirements. People are often constrained by a number of sociostructral barriers, such as economic strength, substandard education, and poverty which can limit their occupational options. As such, adults may choose work or have work chosen for them, but the notion of career is reserved to those with certain privileges. SCCT suggests that people will choose careers based on their interests if certain conditions exist and supports (financial, emotional, familial) enable those decisions.

Finally, the performance model of SCCT was developed to explain the level of persistence within a career as being the product of the level of success and achievements one accomplishes. Performance attainments are maintained directly by self-efficacy and indirectly through continuous goal setting, which helps to sustain task-relevant actions. In summary, SCCT has three models to explain the progression of career pursuits, while recognizing the cognitive and external factors that can affect each stage of the development.

Figure 1. SCCT's 3 models for career development over time (from Lent et al. 1994)
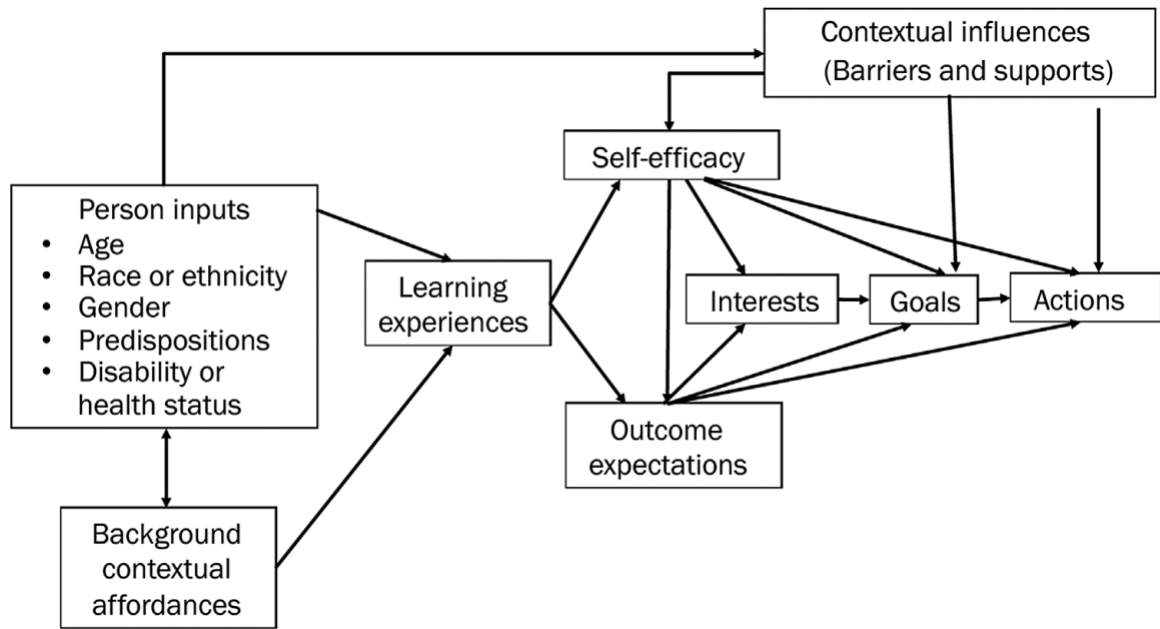
2 Methods

A multi-method approach was used to address our two research questions. Understanding the factors that influence career pathways involved interviewing minority career professionals and students currently pursuing a degree in natural resources to gain their perspectives and to identify any potential barriers or successes in navigating the field. Understanding the role that environmental education programs play in providing a pathway to a NR career involved developing a survey instrument and administering it to program directors of EE organizations to gage a number of factors surrounding their programming structure and efforts to target diverse groups.

2.1 Interview of Minority NR Students and Career Professionals

Fifteen culturally diverse career professionals and students enrolled in a NR program were identified using a snowball sampling method. This method was chosen because of the hard-to-reach nature of participants (Heckathorn 2011) due to the limited number of minorities currently in the field. Initial participants were identified through contacts known to the authors. Those who agreed to engage were asked at the end of the interview to identify others in the field whom where racially/ethnically diverse. Participants were in geographic locations throughout the U.S. The racial/ethnic demographics were 1 Hispanic, 1 Native-American, 1 Asian American, and 13 African Americans. It is recognized that there is bias leaning toward African Americans; however, this is inherent with snowball sampling in which participants will identify others with whom they have interpersonal relationships (Faugier and Sargeant 1997). It should be noted that generalities cannot and should not be drawn across cultures. The problem of selection

bias is outweighed by learning the personal experiences of "hidden" individuals who would otherwise be missed from random sampling.

Participants were interviewed to understand their formative interests and drivers for pursuing a career in natural resources as well as challenges and supports to navigating the field. The interviews consisted of four identifying questions, 16 open-ended questions centering around SCCT constructs (Lent, Brown, and Hackett 1994), and two opinion-related questions relative to best practices for increasing diversity in the field (Appendix). To develop a context for understanding an individual's formative career interests, we used the Interest Model of SCCT to construct a framework for the interview. We asked direct, open-ended questions such as "How did you first become interested in natural resources?" This was followed by indirect questions about contextual background factors, which can either present or inhibit opportunities for exposure to interest-developing activities. The questions asked to address these factors were both distal (i.e formal education) and proximal to career choice (i.e influential people). Self-efficacy was measured through questions related to perceived aptitude in formal and informal education, as well as career-related activities. Outcome expectations were addressed through a set of three questions about their reasoning for pursuing the field ("if I do this, what will happen?). Lastly, the Choice Model of SCCT provided a framework for understanding how participants ended up in a NR career through questions targeting career awareness and goal-setting.

The interview protocol was reviewed by the Institutional Review Board of Michigan Technological University and permission was granted to conduct research on human

subjects. The interviews were semi-structured in format and were conducted in person or by videoconferencing technology, depending on the location of the interviewee. Responses were recorded and notes were taken during the process in case of technical difficulties. Interviews lasted between 35 and 90 minutes.

The qualitative data were transcribed using Amberscript audio-to-text software and manual corrections were made where needed. At the inception of data analysis, deductive reasoning was used to develop categories following themes derived from SCCT and previous related studies. However, during the iterative coding process, the coder used inductive reasoning to allow new themes to emerge from the rich content that resulted from the open-ended questions. This directed analysis of content is an acceptable method for verifying theories and allowing for the comparison of research findings across multiple studies (Zhang and Wildemuth 2009). All transcripts were coded by one person and initial themes were verified early in the process by a second member to account for reliability.

2.2 Survey of Environmental Education Program Directors

An online survey instrument was developed by the authors using the Survey Monkey platform. A test pilot was administered among several academics and environmental educators, and then the survey was further refined. The final instrument consisted of 8 constructs to assess the priorities and methods of EE programs in diversifying program participants and identifying career opportunities. These consisted of background information of program directors, organization overview, program format, participant

demographics, diversity and inclusion efforts, member support, evaluation, and challenges and goals. There were 40-46 variables within the above listed constructs, depending on how questions were answered. The survey included a mix of multiple choice, Likert scale, and short answer questions.

Purposive sampling (Tongco 2007) was used to identify organizations that conduct environmental education (EE) programming throughout the United States. A total of 354 organizations were identified through web-based searches. The North American Association for Environmental Education (www.naaee.org) and their affiliates were used as a search mechanism for identifying many of the programs. Guidestar, an online database of non-profits (www.guidestar.org), was also searched. After programs were identified, an email was sent to the program director explaining the nature of the research and asking for their participation. Those who responded affirmatively were sent the online survey. Two follow-up emails were sent to non-respondents within two weeks of each other to remind targeted EE directors of the survey. A total of 121 program directors completed the survey (34% response rate).

Descriptive statistics analysis was used to return frequencies of responses related to the above constructs. Responses to a number of variables were tallied that would provide insight into an organization's capacity to create NR career pathways, such as the size of organizations and the program formats offered. Of particular interest to our investigation was understanding the degree to which different programs prioritize to increasing racial/ethnic minority participation and whether or not NR careers are discussed as part of

the program. Responses to these two variables were further analyzed through methods of

cross-tabulations in SPSS software.

3 Results

Results are broken into two components based on each of the research questions. The first section focuses on the formative pathways and career interests of students and professionals and presents the qualitative analysis of interview transcripts. The second section presents quantitative summary data from select questions of the survey of EE program directors and administrators that examines the role that these programs play in guiding diverse members to NR careers.

3.1 Interview Results

Interview participants included 4 students and 11 professionals (Table 1). Career stages of professionals range from early (just out of college) to late (near retirement). Two respondents did not fully meet the sampling qualifications and for these participants, several interview questions had to be skipped due to irrelevance. One participant is indirectly involved in NR through education. Responses to NR career outcome expectations and goals did not pertain to this respondent. Another participant, who is a program manager at the US Forest Service, arrived in her position through a pathway of public administration rather than an interest in NR, rendering responses to questions surrounding formative interests in natural resource irrelevant. Both of these professionals provided useful data for understanding pathways to NR careers and barriers surrounding career awareness and, therefore, data from these individuals were included in the study.

Interview transcripts were analyzed according to the two models for career development within the SCCT theoretical framework. First, the Interest model (figure 1) is used to convey data relevant to the formation of NR career interests. Results are compiled into the main thematic categories of the Interest model - Contextual Background Affordances and Learning Experiences. SCCT's Choice Model is used as a framework for analyzing participants' decisions to pursue their chosen field. Following a summary of NR career pathways, results are categorized according to the main themes of the Choice Model: Outcome Expectations, Goals, and Self Efficacy. Results indicate a variation of barriers and supports throughout the career development stages and will, therefore, be presented in a separate section according to a career-cycle analysis.

Table 1. Career positions of NR professionals and degree programs of students in the field

CAREER PROFESSIONALS	
Job Title / Field	Employer (general)
Conservation Coordinator	State Conservation District
Curator of Citizen Science Programs	Zoological Society
Director of NR school	College / University
Career Pathways Coordinator	State NR Agency
Acting Deputy Chief	Federal Agency
Deputy Director	Federal Agency
Executive Director of Forest Assets	College / University
Sustainability Strategy Manager	Private Industry
Program Manager	Federal Agency
Habitat and Education Coordinator	Conservation Non-profit
Teacher	Public School System
STUDENTS	
Program	Degree
Environmental Science	Bachelor of Science
Urban Forestry	Bachelor of Science
Forestry	Master of Science
Forestry	Master of Science

3.1.1 Interest Model

3.1.1.1 How Career Interests Develop

NR career interests developed among participants throughout different life stages and derived from either internal or external influences. Participants described internal motivators stemming from an innate love of nature or a growing concern for their environmental surroundings. Others referenced an external influence as being responsible for awakening an interest in NR careers, such as a particular experience or an influential person. In some cases, participants spoke to both internal and external influences as being motivators. The following quotations are representative of comments regarding NR career interest development:

Internal Influences

Love of nature/outdoors*: "Growing up I always had a fascination for trees, whether that be in an urban setting or trees that I would always see on the highway, I knew that I had an affinity for working outdoors and for working with nature."*

State of the environment: *"I was not a hiker. I was not camping. I was not in nature readily, you know, that wasn't a thing; but really, I was seeing things in my community and seeing blight and environmental justice as pretty much symptoms."*

External Influences

Person: "*My teacher became my senior advisor and then being his research assistant, I decided I didn't want to go to medical school. I thought it might be fun to pursue a career in natural resources.*"

Learning Experience: "*When I was in high school, I did a program...where they were introducing high school students to fields of forestry and natural resources. Having that experience, it allowed me to be outside and actually connect with nature and understand all of the trees and everything around us.*"

Both Internal and External

"*It was really more of the exposure. It wasn't a single point type of experience. It was more of a collective experience and being a Boy Scout and loving being out in the outdoors and so forth.*"

The above influences were formulated from a combination of variables measuring the impacts of person's environment during their upbringing or early learning experiences, and all are found to be antecedent to career development interests in natural resources. These variables are broadly categorized according the SCCT's Interest Model themes: 1) Contextual Background Affordances and 2) Learning Experiences. In terms of Contextual Background Affordances, two subthemes emerged which include Access to Nature and an Imparted Value in Nature or Science. The Access to Nature subtheme incorporates our findings of participants' early exposure to nature and the types of

experiences they had in the outdoors. The Imparted Values subtheme developed from the importance participants placed on others who had engaged with them in science or nature. The second overarching theme of the SCCT theory, Learning Experiences, includes 4 categories that capture the types of educational experiences or exposure to natural resource-related topics that had some significance to participants' formative career interests.

3.1.1.2 Contextual Background Affordances

3.1.1.2.1 Access to nature

Nearly all participants (n=14) referenced opportunities to access and experience nature in some capacity, regardless of the environment they were predisposed to during childhood – urban (n=8), suburban (n=3), or rural (n=4). Those who spoke to their involvement in nature all had positive experiences. Four categories emerged that capture the types of experiences participants had in the outdoors. These include outdoor recreation, childhood play outdoors, visiting wildlife areas, and visiting anthropogenic nature spaces.

Outdoor recreation - Outdoor recreation was the most referenced type of experience in nature among participants and includes the following activities: camping, hiking, fishing, hunting, and gardening. The most commonly cited recreational activity was camping. Camping took place in various environments, including urban areas not traditionally used for the recreation. Fishing and gardening were the next most cited outdoor activities, followed by hiking and then hunting.

"We used to camp in Detroit…and it was really kind of nice – you going to be camping in the city."

"I used to go to the Boys and Girls club…We would go on Wednesday and you could choose what you wanted to do. Like they had all these activities set up to play sports and stuff like that. But the one I really enjoyed was, during the summer, you could go on an overnight camping trip…It was just one night but it was fun…It lived in Highland park and it was just five minutes from my house."

"My parents, they fished a lot. Se we were always on the boat or the lake or at a river fishing…so I was exposed to the outdoors a lot when we would go down south and be in the woods…At home we had gardens in the backyard and we grew our own vegetables."

Childhood play outdoors - Whether deliberately engaging in an activity outdoors during play that is nature-related (ie. climbing trees) or indirectly experiencing nature through other un-related activities, such as sports, participants referenced outdoor play as being an integral part of their childhood and in some cases significant to NR career interests.

"I spent a lot of time in our own backyard just hiking and exploring with my friends- going to the creek, building forts."

Wilderness areas - These include state or national forests and parks. Visiting these areas was only cited by two participants, though both had said those experiences were significant to their career interests.

"One time, Mrs. Jackson took me to Hartwick Pines State Park. She took me there cause I was so interested in trees, and Hartwick Pines has some of the best trees you're ever going to see."

Anthropogenic spaces - Participants described visiting outdoor spaces that were created by humans to experience nature and wildlife. These included city parks, zoos, nature centers, arboretums, and orchards. These spaces were visited most by participants living in an urban area. Activities within these spaces included picnicking, sightseeing, and inner reflection.

"I had a really vivid imagination and the love for animals and would go to our local nature center and things like that."

I remember living in the inner city and I would go to the parks on the weekends…It was more like urban recreation…we would have cookouts in the park…we visit the zoo."

3.1.1.2.2 Imparted Values of Nature and Science

Nearly all of the fifteen participants (n=12) describe a person who, during their childhood, had instilled in them a value for nature or the environment. These early influences were formative to developing interests in nature and science but distal to the career decision-making process. People who were influential to participants included parents, teachers, or friends.

Parental influence - Several participants fully or partially attributed their interest in nature and/or science as being influenced by a parent. Examples of this include parents who actively engaged in an outdoor activity or recreation with them or shared spiritual values and beliefs centered on the natural world. In another case, having a parent in the STEM field had initiated early conversations around environmental issues that were later attributed as a drive to pursue a NR field.

> *"My parents were very out-doorsy and so it was not uncommon camping, fishing, and all that stuff was part of my childhood. So, I always had an interest in the outdoors based on my parent's interest in the outdoors."*

> *"My mom in high school started talking about environmental issues. She's a science-certified teacher in Detroit public schools."*

Others, including teachers or friends - Some participants described people in their lives outside of the household who imparted on them some value or appreciation for nature. Often, this included a teacher who had shared their passion for the subject and took extra measures outside of the classroom to impress upon them their enthusiasm. One participant remarked how having nature enthusiast friends had opened doors for experiences with nature.

> *"One of my very dearest, closest teachers – instead of just like saying, "Okay, we're going to go plant on Earth Day" she like took us one-on-one as students and she taught us how to properly plant the trees, as well as name the tree, until, like, I had an emotional type of connection to that specific tree."*

"I started having friends whose parents were like outdoor enthusiasts and so I started hanging out with people that were really into nature and getting exposure to like nature park trails and going to the arboretum. It was like nature exploration, but it was very urbanized."

3.1.1.3 Learning Experiences

Participants referenced learning experiences throughout their childhood and into their years more proximal to career contemplation that were integral to NR interests developing. The following categories developed from responses: Youth programs, work experiences, television and books, and formal education. Categories are listed in order of prevalence.

Youth programs - Youth programs are structured, non-formal learning experiences aimed at engaging children in the sciences or outdoors. The most common experience shared among participants was involvement in boy scouts and girl scouts (47%). Similar experiences included summer camps that were science focused or had outdoor recreation activities such as archery and horseback riding.

"When I was really, really young, I went to this camp called Camp Sunshine back in Maryland and we would do canoeing and archery, team sports like basketball and soccer outdoors."

"My mom, she put us in, like, this hiking camp in Los Alamos. We also had, like,

summer youth programs in the reservation, in the pueblo…they would pick us up,

we would eat breakfast outside, do different activities, like swimming."

Work experience – Several participants (n=6) referenced an early work experience which

exposed them to a field of natural resources and allowed students to work directly with

natural resource professionals These include high school summer work programs,

internships, or an academic research project. Half of these participants (n=3) had acquired

their positions through a direct diversity initiative aimed at exposing underrepresented

students to natural resource positions.

"When I was in high school, I did a program with Exon Mobile and it was a

partnership between Exon Mobile and YMCA in Brooklyn and they were doing a

program where they were introducing high school students to fields of forestry

and natural resources. We actually had to, like, redesign a garden and that kind

of got me interested in the urban side of Forestry."

Television and book - Science or nature related books and television were mentioned by 5

participants as being formative learning experiences. Three participants recalled watching

programs on TV as a regular occurrence with their family or out of an individual interest.

Others mentioned being gifted books or actively checking out nature-related books from

the library based on a curiosity in the subject.

Formal education - Only one participant had mentioned her formal education during high

school as having a direct influence on her decision to pursue a career in the field. Some

had positive experiences in school but did not directly credit their primary science education as being a motivator.

3.1.2 Career Pathway

Participants obtained careers in natural resources through one of three identified pathways. They either applied directly to a natural resource program in college, switched majors during their undergraduate studies after learning of the field, or had an indirect path in which an opportunity arose in the field that matched their skill sets from another career trajectory (Table 2). Their pathway is significantly correlated to the life-stage of career awareness. Participants who learned of the field during middle school and high school matriculated directly into a natural resource program. Those who learned of the field while in college had later switched majors. Likewise, participants who had an indirect pathway into the field had not learned of careers until they were an adult. Only in one case had a participant learned of the field in high school but did not apply directly to a natural resource program. She attributes this to a limited understanding of the field:

> *"I want to say that I saw forestry when I was just like doing green job and Google searching my senior year…[but] I thought that these people were volunteers from communities that were putting these programs together. I didn't know that it was like their career. I knew that I wanted to go into some type of green field. I didn't know what forestry was at the time and so I'm like, okay. Well, let me do environmental science."*

26

This limited awareness of available careers in NR fields was expressed by nearly every other participant and identified a significant barrier. Even those who became aware in middle school or high school that there were careers focused on the environment or natural resources had not understood the breadth of careers available. Those who applied directly to programs in college generally attributed their decision to pursue the filed as having been externally influenced from people or learning experiences.

Table 2. Life stage that participants became aware of the field of natural resources and the point in which they decided to pursue a career. Listed is the avenue in which they became aware of careers

Pathway to Career Choice			
Life stage that participant became aware of field	Direct Apply to Program	Switched Majors	Indirect Path/Chance
	AVENUE OF DISCOVERY		
Middle school	Summer youth employment Program		
High school	Research into careers		
High school	Diversity outreach to family member		
High school	High school class that exposed careers		
High school	Parent in a related field		
High school		Independent research into careers. Switched majors from environmental science	
College	Looking into related programs when applying to college		
College		Academic Advisor. Switched majors from biology	
College		Summer internship. Switched majors from environmental science	
College		Academic Advisor. Switched majors from pre-med	
College		Academic Advisor. Switched majors from environmental engineering	
College			Graduated with a general science degree. Offered natural resource job
Adult			Job offer. Career transition
Adult			Job position matched skill set from another discipline
Adult			Professional development trainings

3.1.3 Choice Model

Participant's decision to actualize a career in a natural resources field was influenced by a combination of several variables and are categorized according to SCCT's Choice Model themes: 1) Outcome Expectations, 2) Goals, and 3) Self-Efficacy. Positive outcome expectations included two main categories. Participants anticipated that careers in the field would result in desirable working conditions or have workforce demand/stability. In terms of goals, two categories emerged for this theme - impacting others and personal/professional achievements. The Self-Efficacy theme is used to capture participant's responses towards their ability to perform job-related tasks. Constructs include external validation, support systems, personal characteristics, and experience.

3.1.3.1 Outcome Expectations

Desirable working conditions - Most participants chose a NR career because they anticipated the career to be fun and adventurous. The aspects of the career that were most appealing to individuals included the possibility to travel and experience new things, having a diversity of interesting, non-traditional work and the ability to work independently and/or outdoors.

> *"When I think about all of the opportunities in terms of seeing different forest types and traveling to different places and then knowing that forest management*

is different in each of those- like to me, that's extremely fulfilling because there's always something new to learn in forestry and natural resources."

"There's a lot of opportunities to travel, there's a lot of opportunities to see different places that you would have never dreamed of and that's a really big thing for me."

"I think the number one thing that attracted me is the ability to be on my own. In my mind, if you were that professional that came in and you worked for a company or the forest service, you were given a truck, a phone, and you had to go do your job. And you weren't tied to a desk…I can be outside, or I can be inside."

Workforce demand/stability - Several participants recognized that careers in the field could offer stable work and financial security. These motivators were usually secondary to enjoying their work through fulfilling their interests. Some recognized the need for increasing diversity in the field and saw the potential of filling this need as creating occupational opportunities.

"Like, with forestry, I enjoy doing it and I know I'm going to make money out of doing it too."

"I was looking to work and make money and it seemed to be that as I was pursuing this it looked like always a job that I can take on."

"I realized this market of Natural Resources is so untapped in certain communities that there is a vast amount of work to do."

3.1.3.2 Goals

Goals are the determination to engage in a particular activity or to affect a specific outcome. Participants expressed strong values surrounding family, community and society and expressed their desire to engage in activities that would have an impact on others. Many interviewees also exhibited strong self-motivation and persistence and set occupational goals for achieving personal and professional success.

Impacting Others - The most significant driver for participants was the goal of impacting others. They saw their role in the field as a platform to combat issues facing their community and to contribute to society. Many were also driven by a desire to diversify the field and to be a role model for others. The following quotes are representative of this human dimension of the field:

> *"I know that if I'm able to pursue something I'm interested in and have a job from that, then I can take care of them [family]. And the second point would be my community and cultural values. I think I would be able to combat a lot of issues or just recognize the ones that are facing my community."*

> *"I'm also going to be able to reach out to who I feel is our greatest natural resources, and that's our children."*

> **"***No matter what role I'm in, I want to be making somebody else's life better."*

"I have this desire to kind of bring that together with social sustainability and find ways to care for the underprivileged and create value for the people that aren't as advantaged."

"I want to encourage students, like minority students, to pursue careers in natural resources and Forestry."

"I'm doing this not for me, but for other women and for other black girls."

"You know, another kid like me who were being bullied, here's an opportunity for me to get involved in this kid's life."

Personal/Professional Achievement - Individuals set personal goals for success in the field. Upward mobility, financial independence, and becoming an expert were constructs that gave participants purpose.

"I want to go back and get my Master's cuz I really want to try to land a job in my field and try to make an impact for myself and for other people."

"Forestry specifically incorporates my love for trees and it gives me something to be an expert to. Urban forestry and becoming a certified arborist, like, I'm going to become a certified forester because I've always wanted to…I want to be the go-to-person."

"I think the support system was my desire to succeed...and I got a taste of the money."

"There was an old saying that kids either go to two places: the jail yard or the graveyard. And I didn't want to be a statistic anymore."

3.1.3.3 Self-Efficacy

When participants were asked how they knew they would be successful in their occupational pursuits of natural resource field, nearly all responded initially that they did not know, or it was not important to them. For example, the respondents remark:

"I didn't really know that; I just knew I had an interest and thought that would be something that would be fulfilling or promising or satisfying to do."

"I didn't know whether I'd be successful. That was not something that was really important to me. It was more important that I was doing something that I loved."

Upon further reflection, many were able to identify factors that confirmed self-efficacy beliefs about their ability to perform tasks related to their job. The following constructs arose: (1) External Validation, (2) Support system, (3) Personal Characteristics, and (4) Experience/Background. In terms of external validation, participants gained confidence in their ability to succeed form others telling them that their work was exceptional. Other participants recognized that they have support systems in place that have allowed them to rebound from challenges. Some participants put trust in their personal characteristics, such as persistence, a strong work ethic, and ability to communicate effectively. Others credit their past performance accomplishments and experience giving them self-efficacy.

Self-efficacy was not a direct driver for participant's decision to purse the field, but rather reinforced their ability to navigate the system and overcome barriers.

3.1.4 Barriers and Supports

Throughout the interviews, participants discussed challenges they faced and support systems they attributed for their ability to overcome those adversities. The barriers and supports that arose were dependent on the career-stage of the participant. Findings are presented according to this life-cycle analysis in the following sections: (1) Distal (2) Proximal, and (3) Sustaining. The Distal section covers the childhood years of the participant during which formative career interests were being developed. The proximal section includes the life-stage during which participants were being introduced to the NR field and contemplating their career choice through early years of higher education. Barriers and supports in the Sustaining section are experienced by participants during their later academic studies and in the workforce.

Distal

Barriers. Though this life-cycle stage did not present barriers directly related to natural resource careers, one distal variable reoccurred through interviews which gave rise to the disadvantage among some minorities for pursuing higher education. *Lack of social capital* developed as a construct from the number of participants who claimed they were first-generation college students. Many came from working-class families and were not afforded the parental guidance of navigating a higher intuitional system.

> *"I think they day that I told my mother I was going away to college was probably*
>
> *one of the proudest days of her life…cause no one else in our family had done it."*

One student, who was of first-generation Native-American descent, explained how her early teachings and education was so different from western academia and provided challenges when she pursued her bachelor's degree.

> *"Having this western academia, it's definitely different than my teachings back*
>
> *home because we never really had a written language and everything in English*
>
> *is written."*

Supports. Several respondents recognized the advantages that had positioned them to be successful in their occupational pursuits later in life. Three categories emerged: (1) Childhood mentorship, (2) Social/economic capital, and (3) Strong value/belief system. This last category encompassed strong values surrounding family, community, culture, and religion that were prevalent in their household and which participants attributed to be an early support system. In terms of social/economic capital, interviewees described several variables that were advantageous including financial stability, having had a quality education or having attended a prestigious school, and having parents who had or valued a higher education. Childhood mentors and role models were mentioned by three participants at this life stage. This early support system was greatly influential for one respondent. He claims:

> *"I met a lifetime mentor…and she basically tracked me from the time I was 7*
>
> *years old all the way up until I graduated from [redacted] and I felt that having*

the lifetime mentor was very, very important because she kind of open doors for me and positioned me to the people who can help me along in my interests for the natural resource.”

Proximal

Barriers. The most significant barrier to careers in natural resources was the limited or lack of NR career awareness. Thirteen respondents cited this as a barrier since they had not learned the breadth of careers until after they matriculated into college or beyond into their adulthood. Even those who had been introduced to NR fields through external influences claimed they had a very limited understanding of career options available and the potential in those careers.

“It was an eye-opening because I just never would have thought of it. It wasn't something that ever crossed my mind as a high school student of throughout most of my undergrad career.

“I didn't know that there were jobs where you could literally just work in the natural environment other than, you know... there were tree cutting companies and places like that.”

“I had no idea you could major in forestry. It was wonderful, it was literally one of those OMGs. I could major in forestry!”

Nearly equally significant as a barrier to this field was the participants' parents being unfamiliar with the field. One participant explains how this was a challenge:

"I was doing something that no one knew about, so my family didn't necessarily know how to advise me."

In most cases, the participants had expectations from their parents to pursue more lucrative careers, such as medicine or law. This created stress around making career decisions. Take for instance this response:

"It was kind of a foregone conclusion that I was going to go to school and probably be a doctor/lawyer...It was kind of like I didn't really have a choice in the matter."

In three cases, parents strongly disapproved of the participants career choice. One parent told a student:

"That's a job for a white person."

Lack of roles models in this early career stage was mentioned by several participants. Without a predecessor to look to for guidance, respondents described how navigating the field was made difficult:

"And so, you know what it was- really stumbling through, at least initially."

"I'll be perfectly honest with that because there was such a lack of role models. There wasn't like a person who said hey, you know, let's go study this or let's go do that."

Some, however, explained that they were able to identify role models later in their career and recognized them as being significant support systems, as implied by one respondent:

"I think after I got into the field there were a number of different role models, but certainly as I started, not really."

Supports. The two supports systems that were most integral to this life-cycle stage are familial support and academic mentorship. While family response to career choice was a barrier to some, having the support of their family provided encouragement during difficult times. As one participant explains:

"He [father] would always remind me that I'm the only forester that he knows."

Academic mentors were also an important support system by introducing participants to the career or by providing continuing guidance during this decisive time. Academic mentors included high school teachers, guidance counselors, professors, and academic advisors.

Sustaining

Barriers. Participants experienced the broadest range of barriers during the late life-cycle stage in which they were pursing their degree or after entering the workforce. Four categories of barriers emerged under the Sustaining theme that were more prevalent than in other life-cycle stages. Difficulties navigating the field or persisting in a career stem from the following barriers: (1) lack of diversity, (2) discrimination, (3) non-inclusive environment, and (4) limited role models. Participants who identified lack of diversity as

a barrier describe feelings of isolation resulting from the inability to relate to anyone, as expressed by this quote:

> *"I'm walking in rooms which I'm the only person of color and, you know,*
>
> *definitely it feels difficult when you don't have that anchor."*

The discrimination category is used to more broadly categorize barriers of prejudice, bias, racism, and negative stereotypes experienced by participants. These barriers involved varying degrees of discrimination including bullying and being over passed over for promotions. The non-inclusive environment category encapsulates cultural insensitivity and hostility by members of the same race/or ethnicity. Limited role models continued to be a barrier for some during this stage in their career, as evidenced by these participant responses:

> *"I don't see many people of color who I can look up to."*

> *"I want an African-American mentor- like I want someone that looks like me."*

Supports. The support systems recognized most among participants throughout their academic and professional career were all social factors and includes: (1) Mentors/Role Models, (2) Peer and Family support, (3) Inclusive Environment, and (4) Professional Development, encompassing professional societies and conferences, which was mentioned as a support system among four participants. Mentors and role models became more accessible and had greater influence on participants during this stage than earlier stages. Role models were mentioned by six participants, who felt that having an

individual of a similar identity as them to aspire to was a motivator in their career pursuit. Mentors, rather, are individuals who would offer encouragement and support over a prolonged period and had invested time to ensure the success of their mentee. Examples of this include the following excerpts:

> *"She has literally taken the time and effort and capacity in her life to really continue with me throughout this whole time."*

> *"The amount of encouragement that she gave me that was relevant to my experience and to my social identities, it was unfathomable."*

Participants also recognized the support system that their family and peers offered them in the pursuit of their career interests. These individuals were credited with being a support in the form of trust, companionship, and verbal praise. The third category of support, inclusive environment, includes those experiences in which participants felt an overall sense of inclusivity and cultural acceptance in their workplace or institution. This environment could be created by a body of people or an individual.

> *"All the faculty are looking out for the best interest of the students and no matter what ethnicity, race, or creed you come from."*

> *"He tried to give me a mentor and I feel like he was very concerned about the dynamic or the culture of the Forestry Department here at our school."*

*"She had a cultural competency that enabled her to be empathetic with my
experience and she really found ways to create a healthy group of communication
to support me in a very unique way."*

4.1.4. Participant solutions for increasing diversity

Participants were asked at the end of the interview their advice for increasing diversity in
natural resource fields. The following are popular solutions suggested by participants:

Early natural resource education – Several participants expressed the need to expose
diverse youth to environmental education beginning in grade school or even as early as
pre-school. This entails branching out to areas with dense populations of minorities that
may not be getting exposure to nature/environmental education. Providing teachers with
the necessary tools and knowledge to have this education in the schools is important
(training of trainers). It was also suggested to bring in NR career professionals to schools
and have them talk about their field. Another solution would be for agencies and
organizations to partner with schools to provide off-school opportunities for students to
learn in different environments.

Career Awareness – The greatest need expressed among participants was the importance
of promoting NR fields at early career development stages to both students and their
parents. This includes explaining the possible careers, the job market, courses needed in
higher education, and the outcomes one can expect. Since many of these careers are
misunderstood, broadening perceptions of what some of these careers are is important. It

was acknowledged that career counseling at an age early enough to mentor them along the way would be beneficial for many students.

Support systems – Making sure there are support mechanisms for students enrolled in programs is imperative. One method is to increase the availability and visibility of role models and then use them as a recruitment tool. Universities and workplaces should promote inclusive environments by creating a welcoming and respectful space. This can be done by providing cultural and sensitivity training to those of the dominant culture. Another support system would be for professional societies to model those societies which already have diversity initiatives through scholarships and other incentives.

Change recruitment strategies – Participants suggested a number of strategies to improve recruitment efforts to minority students. One way was to talk about areas of the field that are relatable to current students, such as technology. A lot of fields are using technologies like drones that could be interesting and appealing to younger generation. For relatability purposes it was recognized the importance of having people of color who are in the field doing the recruiting efforts. Creating partnerships is often used as a means for recruitment, but it was emphasized the need to create partnerships with leaders of communities who have better access to members in that community.

Marrying skills – Many NR careers encompass different disciplines and can benefit from the skillset that minorities can bring from other fields. For example, a student of computer science may excel in GIS mapping. Because of this reason, it is important to

promote this field to students or adults who are at a later stage in their career development and who could possibly make a lateral transition.

3.2 Survey of EE directors/administrators

A total of 121 out of 354 EE directors and administrators responded to an online survey, resulting in a 34% response rate. The programs ranged in size based on annual budget from $500 to $6.5 million with a mean of $465,855. The organizations had a variety of program offerings such as afterschool programs, field trips, summer camps, wilderness immersion programs, and workshops/interpretive programs. The most popular program offering among all the organizations that responded was a one-day field trip. Most of the programs targeted K-5 grade school youth (93%), followed by middle school youth high school students, and then pre-school children. The least targeted group of any program format was college students (49%). Overall, the racial/ethnic composition of program participants for the various programs associated with the survey was slightly less diverse than nationwide estimates (Figure 2).
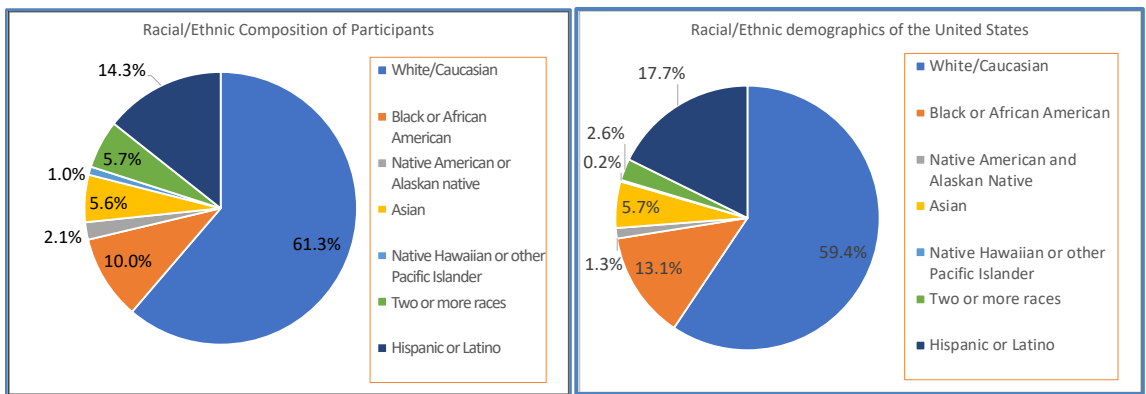
Figure 2. Racial/ethnic composition of EE program participants according to survey results (left) and racial/ethnic demographics of the United States (right) according to US Census Data (2017)

Directors and administrators reported that the highest objective priority of their programs is awareness of environmental issues and environmental stewardship. They placed the least priority of identifying careers and career pathways to participants of their program (Figure 3).
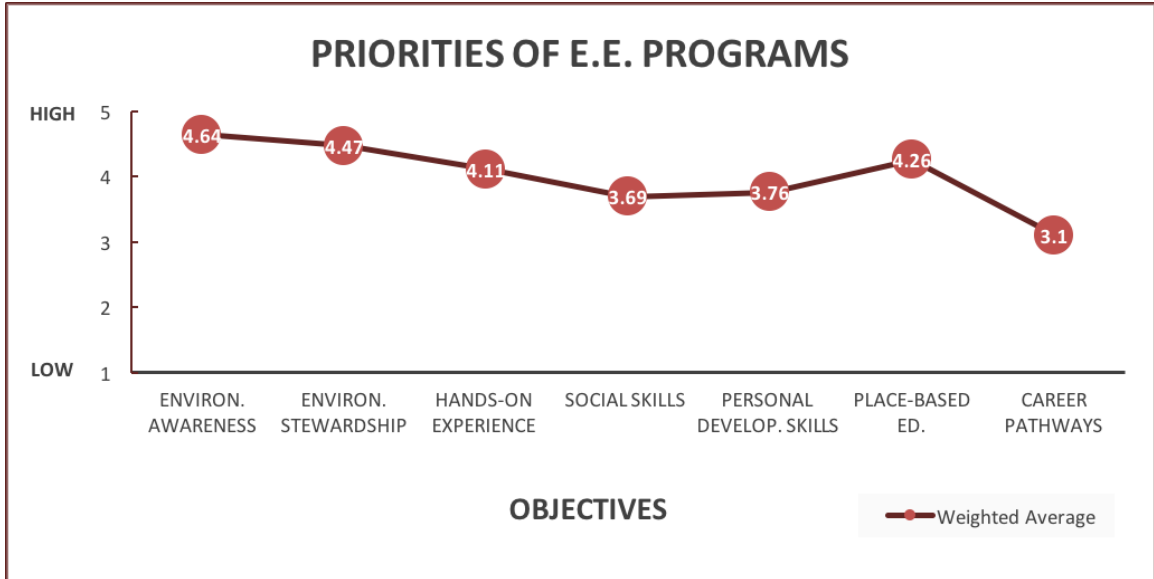
Figure 3. Objective priorities of environmental education programs

Despite organizations having the least priority for identifying career pathways among all of their programming objectives, 59% of respondents indicated that there are measures to identify natural resource careers (Figure 4). Some of the methods used to identify careers included: 1) directly educating participants of NR career opportunities, 2) inviting a NR professional guest speaker, 3) providing tours of magnet school, universities, or colleges with NR programs, and 4) creating internship opportunities. Still, nearly half of organization have no efforts to identify careers during their programming.
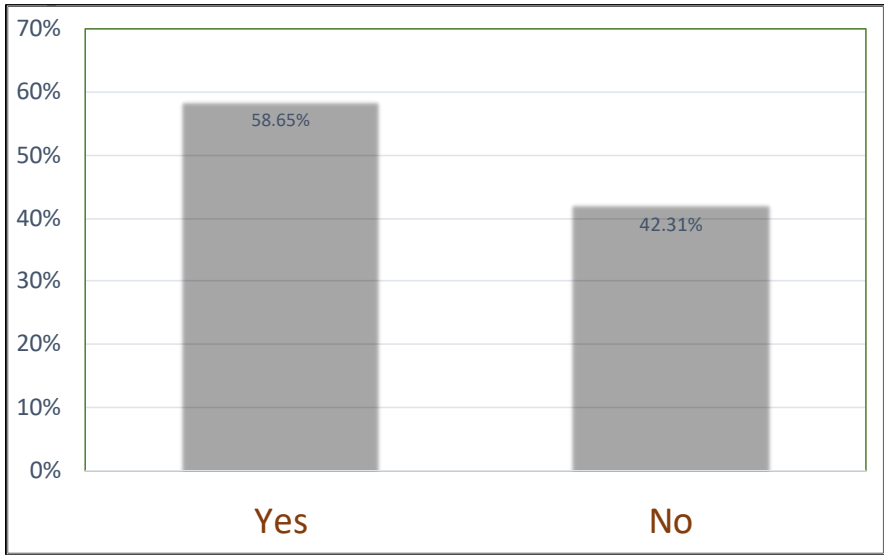
Figure 4. Percent of organizations identifying natural resource careers during programming

Organizations reported priorities to increase diversity across several categories of traditionally underrepresented groups of people including women, LGBTQ+ identifying people, racial/ethnic minorities, people with disabilities, and underserved communities (Figure 5). Most were neutral in their priorities; however, minorities and underserved communities had an essential or high prioritization above other groups, with 66.35% of organizations indicating that increasing racial and ethnic diversity of participants was important.
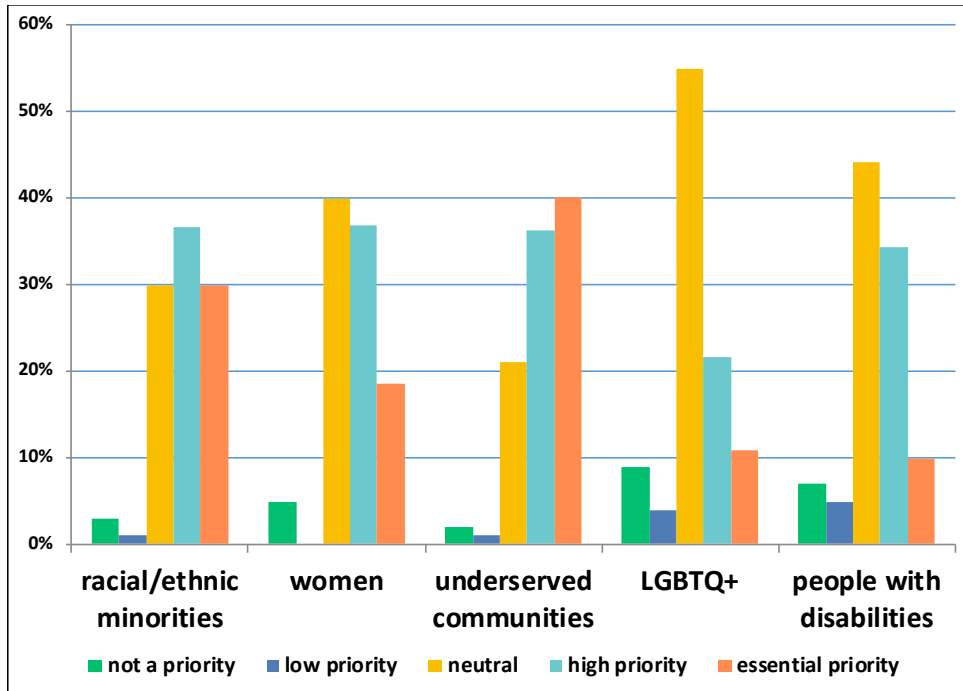
Figure 5. Priorities of environmental education organizations to recruit participants differentiated by group of historically underrepresented peoples

Cross tabulations were performed against organizations prioritizing to increase diversity of racial/ethnic minorities with those that have measures to identify careers (Figure 6). The analysis indicated that 42% of the organizations that specified a priority to increase racial/ethnic diversity were not identifying careers during their programming.

		Do you identify NR careers		
		Yes	No	Total
Priorities for increasing diversity	not a priority	2	1	3
	low priority	0	1	1
	neutral	17	14	31
	high priority	17	18	35
	essential priority	20	10	30
Total		56	44	100

Figure 6. Cross tabulations of environmental education organizations with priorities to increase racial/ethnic diversity and organizations that identify careers during their program

Survey results indicated that organizations had recognized an increase in ethnic/racial minority participation in their programs over a five-year period from 2012-2017 (Figure 7). While some reported that they were unsure of the change in participation or there was no change in the number racial/ethnic minorities attending their programs, no organizations reported a decline in numbers over that period. Over half (55%) had reported a slight change, somewhat of a change, or a significant change.
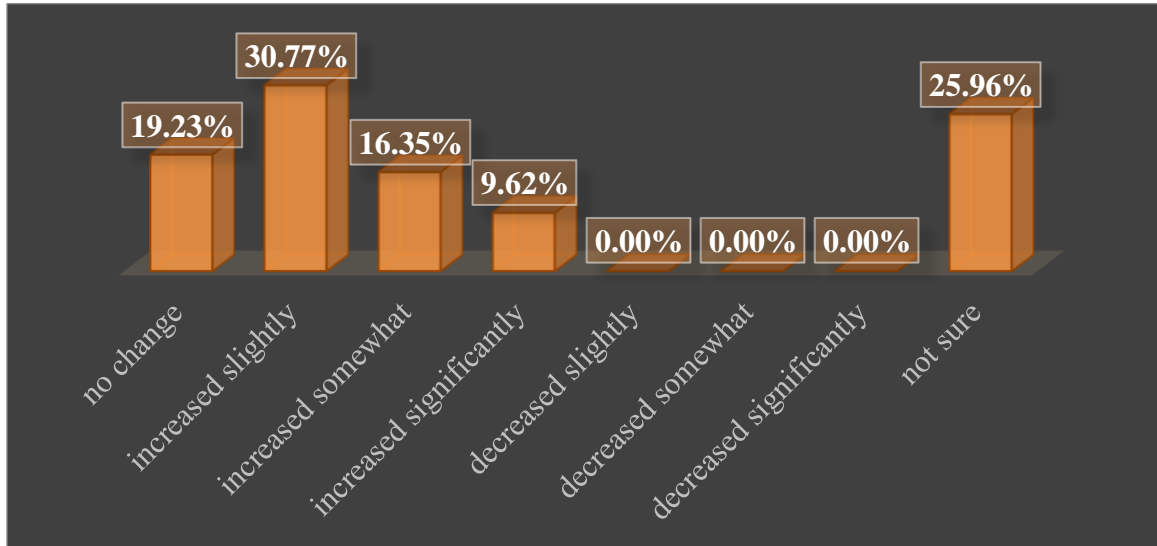
Figure 7. Perceived change in racial/ethnic minority participation over a 5-year period from 2012-2017

Survey participants were asked to identify areas they felt had inhibited access to their

programs among racial/ethnic minorities. Several barriers were provided from those

identified in literature and through suggestions from a pilot survey that was sent to

individuals in environmental education (Figure 8). These included: (1) lack of awareness

about the program, (2) lack of role models or staff who identify as a similar

race/ethnicity, (3) fear of exclusion from the dominant culture, (3) disassociation with the

environment, (4) familial responsibilities, (4) parental support, (5) transportation.
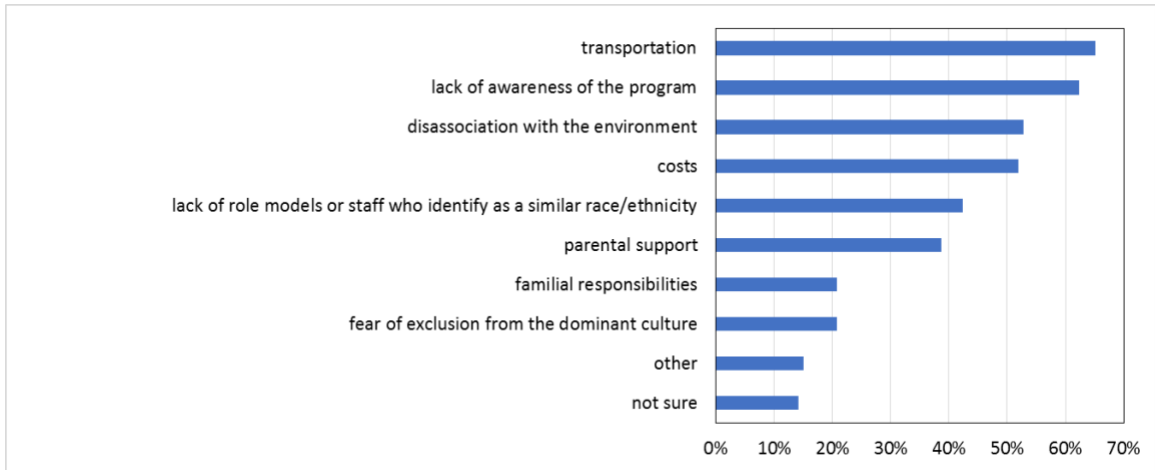
Figure 8. Reasons believed by environmental education program directors/administrators to inhibit participation by racial/ethnic minorities

Of the barriers that were provided in the survey, most administrators believed

transportation to be the biggest factor preventing racial/ethnic minority students from

attending their programs. Lack of awareness of their program was the second most

common perceived barrier For respondents who wrote in an "other" response, 88% had

made reference to the geographical location of their organization and the distance from

urban area or made a point to their area being predominately white.

4 Discussion and Implications

4.1 Social Cognitive Variables Affecting Career Choice of Minorities

This study explored the social cognitive and environmental variables influencing natural resource career interests and choice among historically underrepresented people. Results indicate that minorities were largely influenced by social and environmental factors for career interest development, and choices to pursue the field arise from cognitive variables surrounding SCCTs constructs of outcome expectations and goals, but not self-efficacy. SCCT posits that self-efficacy is a dynamic set of beliefs influencing career choice rather than passive traits, and people pursue careers that confirm beliefs about their ability to perform related tasks. Our data provide limited support for this and suggest rather that self-efficacy is a construct affecting one's decision to sustain career choices rather than pursue career interests. SCCT's choice model could also be improved by emphasizing the significance of value and belief systems on forming career decisions. Deep rooted values behave differently than interests in forming goals and aspirations. This is largely evidenced from results of goal setting that encompass aspects of community, family, and social responsibility. This human dimension construct differs from participants formative interests. Minorities entered the field for reasons similar to the majority of career professionals but saw this career as a mechanism to affect a greater purpose of personal values.

4.1.1 Social and Environmental Factors Influencing Career Interest Development

Social factors throughout childhood and adolescence, including direct and vicarious learning experiences, are significant for early career interests developing. Our study finds that the learning experiences that were most significant to interests in natural resources careers formulating were those which encompassed variables of nature, outdoors, and the environment. This is similar to findings in other studies of formative interests in natural resources (Adams and Moreno 1998; Sharik and Frisk, 2011; Tanner 1980).

Access to nature, therefore, becomes a significant variable for minority students to become interested in the field. This contextual background affordance was mentioned by all participants of our study to whom NR career interests were relevant. Experiences in nature included childhood play outdoors, outdoor recreation, visits to anthropogenic spaces to experience nature and science, and travel to state or national parks. Contrary to Tanner's (1980) study, these experiences were not dependent on pristine, natural environments. People can have meaningful experiences with nature through a variety of environments, including urban parks. Findings suggest the need to meet students "where they are" for opportunities to engage youth in outdoor experiences. These results of participants having meaningful experiences with nature during childhood highlight the importance of early exposure for creating formative interests in natural resource careers.

Participants were also impacted by influential people, such as parents, friends, and teachers who shared an appreciation for nature and the outdoors. This is contrary to Adam and Merano's 1980 study, which claims minorities pursued natural resources on their own volition and had little influence from family members, natural resource professionals, our guidance counselors. While people have their own cognition, children are strongly influenced by their environment and influenced through observational learning in the home and classroom. Having people in one's inner circle who are appreciative of nature is a background affordance and was mentioned by several participants as having been influential in interests developing. Because people can be external influencers of NR career interests developing among minorities, we express the importance of outreach to unexpecting youth is important.

4.1.2 Pathways to Natural Resource Careers

Participants generally learned of careers late in their lives. This is consistent with findings of other studies (Adams and Merano 1998; Haynes, Jacobson, and Wald 2015). Results indicate that the majority of participants had learned of NR fields and the breadth of careers that are offered after they matriculated into college. For these respondents, many had a latent interest in the subject through early nature experiences but didn't know how to actualize that into a career. Others had pursued a different career path altogether and made a transfer to a natural resource field in a position that matched their former skillset. These pathways that span different life stages are exemplary of the need to recognize opportunities to engage with individuals in natural resource topics and possible career options at any age.

Since NR fields are multi-disciplinary, it is important to recognize the skill sets of

minorities from other disciplines who could fill the need for many positions. Attracting

people underrepresented in the field through non-traditional pathways could diversify the

workforce, allowing other people of color to potentially see a place for themselves in the

agency or organization.

4.1.3 Choice Model

4.1.3.1 Values

Participants generally chose their career path because of their interest in the subject or

because they saw this career as providing desirable outcomes. While this may seem an

obvious conclusion of career choice, regardless of the field, it is interesting to note the

change in drive of participants after entry. The initial predictors of career choice (i.e.

interest and desirable outcomes) became less vocalized as participants discussed career

goal aspirations. Departure from these early motivators towards a greater importance of

social responsibility reflects a set of values surrounding humanity.

Seron et al. (2016) found similar commitments among women pursuing STEM fields. His

study found that women chose engineering fields with the goal of "solving real-world

problems" that would allow them to make a difference by serving the public through

socially conscious projects. Minority participants, both male and female, overwhelming

set career goals focusing on human dimensions. While most participants held strong

values for nature and the environment, those values were generally less transformative in

their career goal aspirations than the desire to positively impact others. Social

responsibility was a construct that evolved from participants' narrative responses around goals and aspirations. Variables included youth outreach and empowerment, being a role model to others, diversifying the field, environmental justice, and improving the environment for their immediate community and future generations. Recruitments efforts should highlight aspects of natural resource careers that have a human dimension component.

4.1.3.2 Self-efficacy

These results do not show supporting evidence that self-efficacy was a strong factor for career choice. The hypothesis that academic aptitude in the sciences would lead to greater confidence in participants' ability to succeed in a NR field and thus be a motivator to their pursuit was not supported by the data. Nearly all participants responded positively to a direct question about their aptitude in sciences; however, in narrative response to decisions to pursue this field, only one participant made mention of this being a motivator. As a matter of fact, many people explicitly stated that self-efficacy was not something that was ever considered.

These results are contrary to a study of social cognitive predictors of interest in environmental science among African American college freshman (Quimby, Wolfson, and Seyala 2007). That study found that the only social cognitive variable to be significant to African American interest in environmental science was their self-efficacy. This was measured by a 5-point Likert scale of the Skills Confidence Inventory developed by Lent and adapted for environmental science.

One possible explanation for participants attenuating the importance of self-efficacy is because there is no clear set of skills needed to succeed in NR fields. This is due in part to the nature of natural resource fields themselves being so broad. Other STEM fields have clear skill set requirements. For example, engineering fields require a strong aptitude in mathematics, whereas medical fields require academic excellence in biological sciences. There is no apparent analogy in NR careers because the field is multi-disciplinary. Another explanation to this finding is that most participants had a limited awareness of NR careers and, therefore, were unaware of what is required of the careers. Since self-efficacy is built through judgments of one's performance capabilities, it would be difficult to assess without opportunities to prove themselves, other than perhaps being "good at science" in high school.

Self-efficacy is a construct impacting one's decision to sustain a career and is affected by contextual barriers or supports. Performance accomplishments and verbal praise are both factors which can build someone's self-confidence around a task. Opportunities to prove self-worth is usually attained after one has been performing and can be fomented or diminished through barriers one encounters or the support one receives.

4.1.4 Contextual Barriers and Supports

Barriers and supports to NR careers among minorities were dependent on the life-cycle stage of career attainment. Several of the identified barriers are consistent with the challenges that are experienced by minorities in many other fields and transcend across all career stages. Social/economic/institutional disadvantages are systemic barriers that require progressive change and are beyond the scope of our recommended implications.

The most significant barrier to NR fields is the limited awareness of careers. Nearly all participants learned of careers late in the decision-making process. This is confirmed through other studies (Balcarczyk et al. 2015; Bowman and Shepard 1985, Adams and Moreno 1998, Maughan et al. 2001, Kuhns et al. 2004, Outley 2008). More needs to be done to introduce middle school and high school students to career options while occupational interests are formulating. There is need and opportunity for environmental education programs that target diverse groups to integrate components of careers awareness into their programming. Natural resource agencies and organizations that participate in career fairs should have presence in urban cities and other areas with dense populations of minorities.

Familial barriers were important to participants during the stage proximal to career choice. Challenges ranged from a limited understanding of the field on part of family members to participants dealing with strong disapproval from parents of their career choice. Like many students on a college track, parents impose expectations to pursue more lucrative careers such as law and medicine. Recruitment efforts from agencies and organizations would benefit from including parents when discussing career options to youth. Addressing the broad range of career options and opportunities for upward mobility in many NR careers may help mitigate perceived wage ceilings.

While other fields are experiencing a rise in the number of minorities, particularly some traditional STEM fields, lack of diversity continues to be a barrier that deters minorities from the NR field (Bal and Sharik 2019; McGrown 2015). Lack of diversity can lead to feelings of isolation and unrelatability to the majority population. Agencies and

organizations should consider the many qualified candidates from other disciplines who have skills and different perspectives that can be utilized in different NR career positions. Having faces of diversity within organizations and agencies can overcome barriers of isolation and other constructs created around a lack of diversity that are felt among diverse members of society. It can allow others who are interested in natural resources to see a place for themselves. Increasing diversity alone in the workforce is not a one-step solution. Measures for inclusivity need to be taken to overcome a separate set of barriers in the career stage and to help guarantee retention.

Lack of role models and mentors was a barrier during the stage of career development. But as participants progressed through their careers, most were able to find individuals who offered support and encouragement. Mentors and role models, therefore, became a significant support system for minorities, emphasizing the need for these supporters early in the academic career, starting in perhaps middle school and high school.

4.1.5 Limitations

One limitation to this component of our research study is the small sampling base of our interview participants and the disproportionate number of African Americans to any other racial/ethnic minority group. While care was taken to not make generalities across cultures, we cannot be certain that our results would not have been different if races and ethnicities were more balanced. Furthermore, interview questions formulated around SCCT variables may have been leading participants to answer in bias. Special attention was paid to this by the coder, however, and answers that were not given freely in narrative response were not weighted as heavily.

4.2 Insights from EE survey results

4.2.1 Discussion

The second research question addressed the role that EE programs could have in creating

pathways to NR careers among historically underrepresented youth. Early education of

nature and the environment was an expressed need among participants of our qualitative

analysis. It was predicted that EE programs are positioned to provide these positive

experiences due to overall general objectives of EE programs to engage youth in positive

nature experiences. A plethora of research has been undertaken into the importance of

nature appreciation during the formative years of childhood and the effectiveness of EE

programs for creating meaningful experiences (for a review see Rickinson 2001).

Directors and administrators of EE programs had given optimistic insight into their

priorities of increasing diversity among their participants and had reported an overall

increase in racial/ethnic over the previous five-years. That 66% of reporting organizations

had indicated a high or essential priority for increasing diversity suggests more than mere

intention and perhaps a means to do so in come capacity. Several barriers to increasing

diversity were identified in survey responses, however. The two most commonly

perceived obstacles were transportation and limited awareness of their programs. These

can both be due in part to the geographical location of their organization in relation to

diverse populations, as indicated by open-ended responses. Certainly, access to programs

in natural settings would prove difficult to reach for urban populations. While this may be

a limitation for certain organizations to diversify their participant base, it need not be a

limitation for diverse groups of people getting access to environmental education. Many

EE programs exist in urban and suburban areas. Strengthening partnerships between these organizations and local schools could improve access to environmental education for minority students. Additionally, for organizations that are not bound to a geographical region by a brick and mortar facility, bringing the classroom to minority populations would eliminate the need for transportation. Another possible solution for the barrier of transportation exists through organizations whose purpose is solely to provide transportation for minority students to nearby wilderness areas. For example, Wheels to Woods (www.treefarmsystem.org/wheels-to-woods) is a non-profit organization that provides funding to schools and other youth programs to transport students to forests for educational purposes.

EE programs are well positioned to provide early career awareness due to their captive audience that is engaging in activities relative to formative interests in NR careers. The need for early NR careers awareness was iterated extensively through our interviews with minority students and professionals. While survey results indicated that roughly half of organizations had some component of identifying careers, a large gap for opportunities still exists. Forty two percent of organizations that have priorities to increase diversity have no measures to provide career awareness. This gap proves troublesome due largely from the fact that many of the students and professionals of our qualitative analysis had stated a childhood love and appreciation for the outdoors, but no knowledge of how to actualize those passions into a career. This missed opportunity among EE organizations could be attributed to their program offerings. The majority of program formats were one-day field trips, many to nature centers. Speculation would suggest that these

programs are limited by time constraints. What we do not know from our survey results is whether teachers are having follow-up conversations with students about their acquired knowledge and how an appreciation for nature and the environment can be transformed into careers. This expectation could create its own set of obstacles if teachers are not informed themselves of career options. As was suggested by interviewees, training of trainers could be a solution to this barrier. Training of trainers workshops should include a component to educate teachers about the possibilities of careers that exist in natural resource fields.

Survey results provided some insight into the role that EE programs can play in creating career pathways for minorities. That many organizations have some or high prioritization for increasing diversity is encouraging. Though this was just to serve as a preliminary analysis of the role of EE programs, we were able to identify some areas that prove challenging for organizations to reach diverse audiences.

4.2.2 Limitations

We would suggest that future research in this area be much narrower is scope. Challenges in analyzing data can be attributed to the many different variables across organizations, such as sizes and available funding, various costs of the programs for participates, the different types of programs offered (i.e. after-school, field trip, summer camp).

Secondly, the sampling method of EE programs returned more nature centers than any other organization type. This may have skewed results of program format type to have more field/day trips than any other category. We also acknowledge that the distribution of

the survey to geographic areas without large populations of minorities may have made

many of the survey variables surrounding diversity less applicable.

5 Conclusion

This study sought to explore ways to increase minority enrollment and career pathways into NR fields through the lens of those who have chosen that path. A further explorative study of the priorities and perceived challenges to increasing diversity in EE programs was investigated due to their role in providing meaningful experiences in areas relative to natural resources. Findings from this study expose some key areas to inform efforts to improve racial/ethnic minority representation. First, developing interest in nature at an early age is important. Data from the narrative responses of our interview aligned with other studies of early nature appreciation, such that positive childhood experiences in nature are salient influences on adult environmental attitudes. It is important to note that these nature experiences can come in many forms. Agencies and organizations interested in promoting positive outdoor/nature experiences for minorities need not look further than their backyard in many cases. As evidenced by responses of interviewees, most of their outdoor exposure was in their own neighborhoods and community.

Second, increasing awareness of NR careers is critical. This was found to be the biggest gap to improving minority presence in NR careers. Most participants from our study had formed interests in natural resources and the environment throughout different life-stages but didn't know how to transform those interests into a career. It should not be assumed that nature exposure alone will lead minorities to proactively pursue those interests. Institutions, organizations, and agencies can be more effective in promoting careers. This was evidenced through our investigation into EE programs, which found that many were not taking advantage of their captive audience to discuss NR career options.

Furthermore, it is imperative that urban centers and other areas with dense populations of racial/ethnic minorities be targeted equally for recruitment efforts. It should not be assumed that people living in cities are disassociated with the environment. Universities and agencies should be participating in career fairs in these areas.

Our study also exposed the importance of human values to minorities in their chosen career path. Participants recognized how a career in NR fields can help them improve the lives of others, including those in their own communities. This is different than most other narratives of people pursing NR careers, which focus primarily on a deep affection for nature and desirable working conditions. The social component of NR careers is rarely emphasized in discussions around NR careers. We suggest that recruitment efforts to minorities demonstrate the positive impacts that many NR careers can have on communities and society. Other NR careers that have a direct human dimension component, such as community outreach and engagement, may have appeal to certain individuals as well.

Another significant point to draw attention to from our study is that career pathways and career choice happens at various life stages. Cultivating interest and awareness among kids and young adults is important, but a direct pathway from high school to a career-tract degree program is not the only way to access this field. Many people realize their occupational interests and goals in a later life-stage. Recruitment efforts should not stop in the pre-college life stage but continue throughout adulthood. Increasing diversity in the field could simply mean recruiting adults who have skills in another discipline to fill NR positions that are multi-disciplinary.

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7 Appendix

7.1 Appendix 2. SCCT Interview Questions

Close-ended openers

Can you please state your name?

How do you identify your race/ethnicity? [person inputs]

Who is your current employer and what is your position? [choice actions]

What level of education did you complete? [learning experiences]

Open-ended questions

    A. How did your interest in natural resources/ the outdoors develop?
        [Contextual Influences Proximal to Choice Behavior - Interest]

    B. How did you become aware of careers in natural resources?
        [Contextual Influences Proximal to Choice Behavior]

    C. At what point did you realize that a career in natural resources was ultimately
        what you wanted to do?
        [Contextual Influences Proximal to Choice Behavior – Choice Actions]

    D. How did you know that working in natural resource fields was something that
        you would be successful at? [Self-efficacy]

    E. Was there one particular experience, person, or incident that really motivated
        your pursuit?
        [Contextual Influences Proximal to Choice Behavior]

Contextual Background Factors

Distal – A. Describe where you grew up and what your parents did for a living?

    B. Did your family and loved ones support your decision to pursue a career in
natural resources? Or did they have other expectations from you?

Proximal – A. Was there a person in the field whom you looked up to as a role model?

        B. Did you have any other support systems that may have contributed to your decisions to continue in this field? (supports)

        C. Did you encounter any challenges or negative experiences in the pursuit of your career goals? [barriers]

Learning Experiences

A. Were you interested in the sciences that were part of your curriculum in primary school? [Interests]

    1. Did you feel that you had a strong aptitude for the subject? [Self-efficacy]

B. Where you exposed to any outdoor programming or recreation as a young adult? (boy scouts, camping, fishing, E.E. field trips…)
[Background Affordances]

Outcome Expectations

A. What was your reasoning for choosing this field? (self-gratification / Income / Demand)

B. Do you feel this is a fulfilling career? Do you feel valued? Why or why not?

In your opinion, what is the best way to increase racial/ethnic/gender diversity in natural resource professions?

7.2 Appendix 2. Survey Frequency Tables

7.2.1 Table 3. Participant make-up of programs according to life-stage

Organizations from our study are meeting a range of participants from pre-school to adulthood; however, the majority reported grade-school and middle school program participants.

		Responses		Percent of Cases
		N	Percent	
$Q07_participant_types_a	pre-school children	71	10.2%	58.2%
	grade school youth	114	16.4%	93.4%
	middle school youth	109	15.6%	89.3%
	high school students	96	13.8%	78.7%
	college students	60	8.6%	49.2%
	young adults / interns	77	11.0%	63.1%
	adults	87	12.5%	71.3%
	general public	83	11.9%	68.0%
Total		697	100.0%	571.3%

a. Dichotomy group tabulated at value 1.

7.2.2 Table 4. Percentage of racial/ethnic composition of program participants

		White	Black or African American	Native American or Alaskan native	Asian	Native Hawaiian or other Pacific Islander	Two or more races	Hispanic or Latino
N	Valid	95	94	50	86	35	56	89
	Not Valid	33	34	78	42	93	72	39
Mean		64.8316	10.6064	2.1800	5.9302	1.0286	6.0536	15.1685
Median		70.0000	6.5000	1.0000	3.0000	1.0000	5.0000	10.0000
Std. Deviation		24.73977	10.74656	2.86919	8.18290	1.33913	4.85955	16.76593
Range		90.00	60.00	15.00	50.00	5.00	20.00	80.00
Minimum		10.00	.00	.00	.00	.00	.00	.00
Maximum		100.00	60.00	15.00	50.00	5.00	20.00	80.00

7.2.3 Table 5. Change in racial/ethnic diversity of a 5-year period from 2012-2017

7-point Likert scale indicating a change in racial/ethnic participation ranging from no change to significant change. No responses indicated a slight decrease, somewhat of a decrease, or significant decrease.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no change	18	14.1	17.3	17.3
	increased slightly	32	25.0	30.8	48.1
	increased somewhat	17	13.3	16.3	64.4
	increased significantly	10	7.8	9.6	74.0
	not sure	27	21.1	26.0	100.0
	Total	104	81.3	100.0	
Missing	System	24	18.8		
Total		128	100.0		

7.2.4 Table 6. Perceived barriers inhibiting minority participation in programs

Responses to "other" generally described barriers relating to the geographic location of their program and the lack of minority representation in those areas.

		Responses		Percent of
		N	Percent	Cases
Factors Inhibiting Minority Participation	Costs	55	13.5%	51.9%
	Transportation	69	17.0%	65.1%
	Parental support	41	10.1%	38.7%
	lack of awareness about the program	66	16.2%	62.3%
	Disassociation with the environment	56	13.8%	52.8%
	Fear of exclusion from the dominant culture	22	5.4%	20.8%
	Lack of role models or staff who identify as a similar race/ethnicity	45	11.1%	42.5%
	Familial responsibilities	22	5.4%	20.8%
	Not sure	15	3.7%	14.2%
	Other	16	3.9%	15.1%
Total		407	100.0%	384.0%

7.3 Appendix 3. Permissions

Institutional Review Board Approval

On January 31st, 2018 the IRB at Michigan Technological University sent the following email response regarding Minority Underrepresentation in Natural Resource Fields:

Thank you for your submission. I have reviewed the materials and have determined it qualifies for an exemption from further review.

Federal Regulations state that Exempt status studies do not require further review unless changes have been made. In the case of ANY changes made to the approved protocol of a study you are conducting, both for procedural or personnel changes. you must submit a request to continue with change and it will be the determination of the IRB Office whether the Exempt status is still appropriate.

If for any reason you make ANY changes, or complete the study, you are asked to notify our office. ANY changes in a protocol which affects the human subjects must be approved by the IRB prior to implementation except where an immediate change is necessary to eliminate a hazard to the subjects. Changes submitted will be reviewed and a determination made by the Compliance Office whether the Exempt status is still appropriate.

The memo you receive for approval will have no expiration date; therefore, you will not receive expiration alerts because there is no end date listed, and no further review is required as long as the study is conducted according to the original submission. When alerted a board document has been posted, the approval memo can be found in IRBNet by clicking on the Reviews button, and the board document is located on the next page.

If you have any questions, feel free to contact me.

Regards,
Cheryl Gherna