The Adventures Course

Environmental-based Education, Leadership, and Empowerment in the Udzungwa Mountains Region

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Key Words

Udzungwa Mountains National Park, environmental center, biodiversity conservation, environmental-based education, leadership development, entrepreneurial empowerment

Introduction:

Biodiversity Conservation, Development, and the Integration of Education

Biodiversity is the principle of life on Earth, but is often at odds with the impact of human activities (Miranda, et al., 2016). The perception of biodiversity, in relation to the well-being of future generations, may lie in the regional development of children through Biodiversity Education and Sustainable Development (BESD) (Miranda, et al., 2016). However, the benefits of increased opportunities for education reach far beyond biodiversity conservation. In fact, the United Nations (UN) labels quality education as sustainable development goal number four, stating that, "full access to quality education is the first step to achieving sustainable development, poverty eradication, gender equality and women's empowerment" (Global Giving, n.d.). Overall, expanding opportunities for education can link people to the environment, while addressing socio-economic issues.

The Role of Environmental Education in Addressing Challenges in Africa

In Africa, challenges associated with climate change, deforestation, resource exploitation, deterioration of ecosystems, and water quality issues are linked to the livelihoods of people (Pretorius, 2016). Wide-spread occurrence of poverty, food insecurity, instability, disease, water scarcity, and sanitation problems intensifies the impacts of these challenges (Pretorius, 2016). In addition, Africa's characteristic low capacity to respond to these challenges, is associated with the fact that countries in Africa generally do not meet the human development standards set by the UN (Pretorius, 2016). To address the lack of environmental awareness in many African countries, the UN, in collaboration with other stakeholders, have created The Africa Environmental Education and Training Action Plan (AEETAP) to promote development of future professionals through environmental education (Lotz-Sisitka, 2017). The AEETAP was designed in response to the Arusha Declaration of 2012, with the objective of creating achievable environmental education and training through "formal, non-formal, informal social learning, networking and capacity building systems in Africa, with gender equality throughout" (Lotz-Sisitka, 2017). This action plan provides a framework for programs aimed at meeting socio-economic challenges environmental awareness. In order to support human well-being in an era of increased climate-related issues, the need for expanding access to education in Africa has become an urgent issue (Pretorius, 2016).

The Relationship between UMNP and the Surrounding Villages

Population increase and government protection of natural areas and wildlife have created a shortage of resources in places like rural Tanzania (Harrison, 2006). Particularly in the villages surrounding the Udzungwa Mountains National Park (UMNP), this shortage has resulted in a broken relationship between the local people and biodiversity conservation efforts (Kikula, et al., 2003). Without proper preservation, significant loss of habitat could be seen in this biodiversity hotspot (Nyundo, 2006). While villagers may be aware of the importance of sustainable development, they are caught in a cycle where people are causing problems, but must exploit resources in order to survive (Harrison, 2006).

The resources found in the UMNP region can be used as a tool for teaching the youngest generation of local people about the importance of wildlife conservation, while also facilitating self-sufficiency and development through hands-on learning. In alignment with the AEETAP, a science-informed environmental education center, located within the villages of the UMNP region, will connect the parks back to people, in a way that allows the community to harvest and profit from goods in a sustainable manner. This will create a model for environmental education that engages the community through hands-on learning, leadership initiatives, and income generating opportunities.

Background:

The Link between Environmental Education and Biodiversity Conservation

Lack of alternatives to poor resource management

Environmental education and biodiversity conservation in rural areas go hand-in-hand. Education has the potential to foster increased understanding of protected lands and the ability to yield more sustainable use of natural resources in the long-term (Global Giving, n.d.). However, in rural communities surrounding the Eastern Arc Mountains, a lack of education limits opportunities to earn supplemental income beyond agriculture and fails to discourage unstainable practices (Harrison, 2006). In fact, 79 percent of Tanzanians earn only a primary education, ending at standard seven (grade four) (Harrison, 2006). Where secondary education is available, curriculum should facilitate sustainable use of the land through holistic, hands-on learning.

The economies of rural areas often rely on natural capital because villagers typically have relatively little physical capital (Ferraro, Lawlor, Mullan, and Pattanayak, 2011). However, protection of national parks limits the villages of neighboring settlements from collecting firewood and building materials, which are integral to the livelihoods of local people. Deadwood and charcoal burning are severely detrimental to the health of the forest, but constitute for 93 percent of fuel in communities located in the UMNP region (Nyundo, 2006). Socio-economic assessments show that villagers generally perceive their natural resources as important, but lack alternatives for sustainable use (Harrison, 2006). With no clear knowledge on how to profit from alternative resources, a growing population has placed an increased pressure on fuel gathered from park lands, threatening biodiversity conservation (Nyundo, 2006).

Economic Dependence on Agriculture

In addition, the dependence on agriculture among the communities surrounding the UMNP reinforces the barrier between environmental conservation and sustainable harvest of natural assets (Harrison, 2006). In the Vidunda Catchment Region of the Eastern Arc Mountains, 97 percent of households rely on agriculture for sustenance use or income (Harrison, 2006). A dependence on cultivation creates land-use conflict as the demand for a larger agricultural footprint is suppressed by government protection placed on the neighboring park. Clearing of land for wood or farmland has resulted in heavy degradation of an estimated 63 percent of the Udzungwa

Mountains, which can accelerate climate change, impact hydrology, and threaten endemic species. At the same time, farmers are unable to produce enough crops to meet the needs of a growing population, resulting in heightened rates of poverty concentrated in areas surrounding Tanzania's protected areas (The World Bank Group, 2015). Lack of education limits opportunities to earn supplemental income beyond agriculture and fails to discourage unstainable practices. Without an education system focusing on vocational and practical skills, alternative income generating activities (AIGs) will not be able to take hold (Harrison, 2006). In the absence of holistic and widespread education opportunities, economic shortcomings create a negative attitude toward conservation in communities located near wildlife reserves and national parks.

Biodiversity Education at Early Childhood as Linked to Sustainable Development

Environmental communication and education programs often use approaches that deliver simplified and overgeneralized information to the community. Lack of communication and misconceptions about biodiversity can lead to ineffective environmental awareness and the incapacity to manage natural resources sustainably (Miranda, 2016). An interdisciplinary study by Miranda, et al., in the Mediterranean forest used participatory methods to identify the connections between biodiversity education, sustainable development, and the influence of combining science with creativity and collective actions, such as painting or cooking (2016). Results "provided clear evidence of the engagement of children in understanding basic concepts of biology and ecology associated to biodiversity

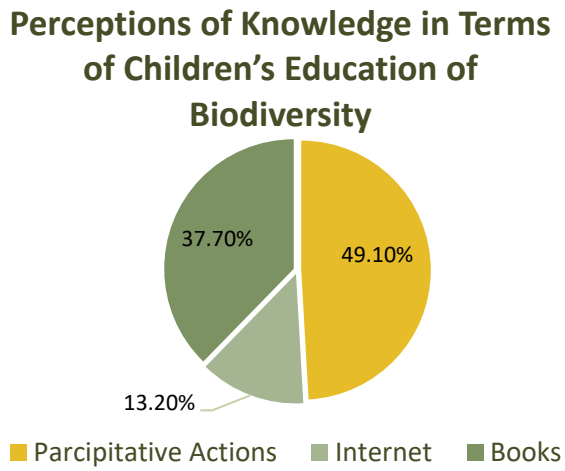

Figure 1: Children retain more information from participatory activities than from books or the internet (Miranda, et al., 2016).

in Mediterranean region, but also to ecosystems dynamics and to human well-being" (Miranda, 2016) (Figure 1). A model of environmental education implemented in South Africa took these concepts a step further to include six components of blended Education for Sustainable Development (ESD), including academic components, interactive lectures, peer learning, society, industry skills, and work-integrated learning (Figure 2)

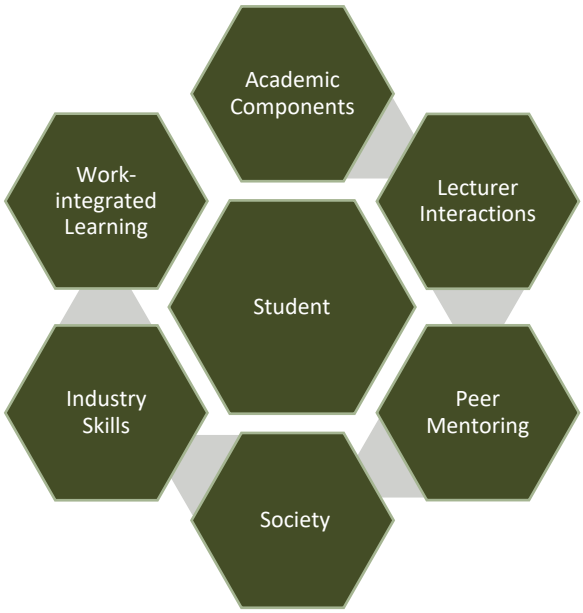

Figure 2: The Six Components of Education for Sustainable Development (Pretorius, 2016).

(Pretorius, 2016). This framework could be adopted in rural Tanzania in order to convey the importance of biodiversity conservation and sustainable development through holistic education in an engaging, hands-on manner.

Environmental Education Programs Used Elsewhere

Communities experiencing land-use conflict similar to that of the Udzungwa Mountains have implemented institutions of environmental education as a tool in connecting parks to people. Holistic, skill-based education in villages neighboring protected areas encourages better use of natural resources and alternative income generation among rural communities (Lotz-Sisitka., et al., 2017). Examples from around the world, including the United States, Costa Rica, Peru, and Tanzania, can be used to design a model of education that will foster environmental stewardship, community leadership, and entrepreneurial empowerment among future generations (Parra, 2015), (Shelby, Cruz, Arodoin & Durham, under review), (Shaver's Creek Environmental Center, 2012), (International Centre of Insect Physiology and Ecology, 2007), (Associazione Mazingira, 2018), (Dolan, Polly, n.d.). These successful programs for interactive environmental education in similar climatic regions, paired with site-specific knowledge, will serve as guide for designing a program tailored to fit the local needs of the region surrounding the UMNP.

Exposure to Environmental Awareness and Biodiversity Conservation

The ANIA Project

The ANIA project in Peru - a children's forest program, provides a small area of land where youth voluntarily care for plants in order to "strengthen their knowledge, skills, values, self-esteem and appreciation for the environment (Parra, 2015)". The forest space utilized in the ANIA project in Peru consumes a small footprint of about 2.6 hectares (6.4 acres) of forested land on the edge of a conserved area (Parra, 2015). As seen in figure 3, the teaching forest of the ANIA forest consumes a total space of approximately 5.4 hectares (13.3 acres), which houses space dedicated to agriculture, agroforestry, medicinal plant cultivation, a resource processing area, and other classroom space (Parra, 2015).

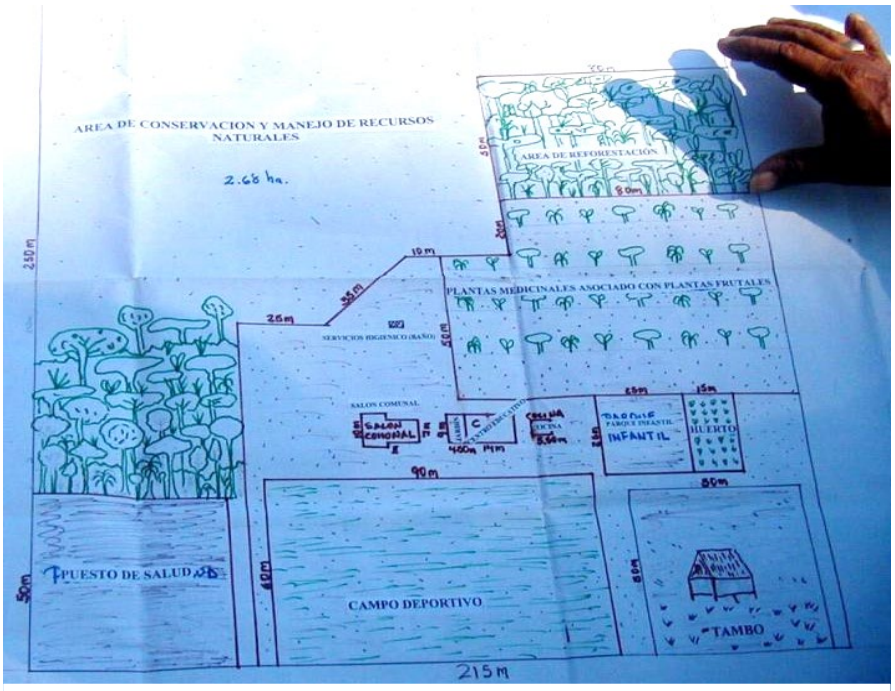

Figure 3: Layout of ANIA Teaching Forest, Peru (Parra, 2015).

Here, youth are instructed on sustainable agriculture and resource management practices through hands-on learning. Students are responsible for the collection, production, packaging, accounting and commercialization of non-timber forest products and medicinal plants (Parra, 2015). Such projects provide children with lifelong skills to harvest forest resources in a sustainable and economical way.

Leadership Development

SELAL

Environmental education and leadership programs are beneficial when included in the standard curriculum of schools located near biodiversity hotspots. Similarly to Tanzanian authorities, the Costa Rican government has long focused conservation efforts on forest protection, especially in biodiverse areas like the Osa Peninsula, where balancing natural resource management with conservation is can be difficult. Shelby, et al., recently reviewed an environmental education system that was implemented on a national scale in 1970, following the creation of the Costa Rican National Park Service. Here, environmental leadership is an integral part of community-based environmental education (Shelby, Cruz, Arodoin & Durham, under review). The curriculum is aimed to link community resources and future leaders through "problem-posing education". In order to be effective, knowledge must be accompanied by on relevant, place-based environmental education, enabling students to connect attitudes and values through hands-on learning and skills. This program is successful because it focuses on site-specific topics, including ecotourism, which is becoming a substantial part of the Costa Rican economy. Ultimately, students will "come to understand their interdependence with one another and with their environment, and that understanding guides them toward more sustainable actions." (Shelby, Cruz, Arodoin & Durham, under review). In the long-term, this education system has the potential to mold students into future leaders in their communities, acting as guides to more sustainable development.

Outdoor School

The principle of environmental leadership is well-illustrated in the mission of Shaver's Creek Environmental Center: "Connecting people to people, and people to nature" (Shaver's Creek Environmental Center, 2012). According to their website, Shaver's Creek, located in Pennsylvania, USA, has a goal of providing "a bridge between Penn State [University] students and Pennsylvania schools, organizations, and families — working to find synergy and interrelationships that connect community outreach efforts" (2012). In particular, Shaver's Creek's Outdoor School program pairs groups of primary-school children with college-age, student mentors who are trained to lead them in environmental

"Connecting people to people, and people to nature."

-Outdoor School at Shaver's Creek

experiences in an overnight camp setting (figure 4). "By offering activities that promote a healthy self-image, provide clear understandings of the earth's natural systems, and foster an emotional bond to the natural world, Outdoor School strives to guide children

Figure 4: Penn State Students act as mentors and teachers for primary school children while learning about the environment Shaver's Creek Environmental Center, (2012).

toward healthy and harmonious relationships with other people and the earth" (Shaver's Creek Environmental Center, 2012). The foundation of this program can be implemented in Tanzania to build a structure of environmental education and mentorship throughout local schools.

Entrepreneurial Empowerment

ICIPE Butterfly Farm

Educating the community on sustainable development and the importance of biodiversity conservation can provide alternative sources of income generation. In Tanzania, non-timber forest products can be utilized to generate supplemental income to agricultural production. The 2007 Arc Journal issued an article about promotion of nature-based sustainable businesses for communities adjacent to the East Usambara Hills. This project provides villagers with training in farming, processing, and marketing of butterflies, beetles, organic honey, medicinal plants, and silk. Participants are aimed to increase household income by 20 percent, as well as an increased support for community support for conservation. After a period of implementation, the enterprise is projected to become economically self-sufficient. In addition, a book of guidelines and best practices for nature-based sustainable business generated from this project is set to be published in Swahili for household use (International Centre of Insect Physiology and Ecology, 2007). This type of vocational training of non-traditional or underutilized market segments has the potential to provide alterative income to struggling farmers.

Associazione Mazingira Co. LTD

In the villages adjacent to the UMNP there is a socio-economic dependency on a limited supply of natural resources, creating conflict with the conservation of the environment (Nyundo, 2006). In an effort to "improve the living conditions and environmental awareness of the populations bordering the UMNP," The Association Mazingira, or "Environmental Association," seeks to implement village-based programs of environmental education and alternative income generation opportunities (Associazione Mazingira, 2018). These programs include: Training courses for groups of women to use efficient energy options, as

well as management of tree nurseries, training opportunities for tourism-based revenue, and instructional courses and support in the start-up phases for agroforestry gardens, beekeeping, local handicraft production, tailoring etc. (Associazione Mazingira, 2018). According to an assessment of ecological and socio-economic impacts of deadwood collection in the UMNP, women provide the oversight of daily decisions in the household, meaning gender dynamics play a key role in mitigating the use of resources (Nyundo, 2006). In an effort to combat poverty in rural villages, these projects are designed to include women in household income generation (Nyenga, 2018).

SEGA Girls' School

The embodiment of hands-on, holistic education is demonstrated at Secondary Education for Girls Advancement (SEGA) boarding school in Morogoro, Tanzania (Dolan, Polly, n.d.). According to the Nurturing Minds Website, SEGA provides comprehensive secondary education to approximately 200 girls from underprivileged families. The SEGA community "works to foster development of healthy self-esteem, independent thinking, and decision-making and life skills among students." The 30-acre campus has 22 solar-powered buildings, including a computer suite, where environmental stewardship is facilitated by "promoting social and environmental consciousness and a spirit of volunteerism and social action among students through community projects." SEGA also enables students to gain hand-on business experience by operating school-run businesses, including a poultry farm (figure 5), a food market, and an on-campus guest house.

Larry Summers - former Chief Economist at the World Bank – suggests that, "Investment in girls' education may well be the highest-return investment available in the developing world" (Dolan, Polly, n.d.). According to Paul Hawken in his project "Drawdown," educating girls lies the foundation for slowing population growth, reducing infant and maternal mortality rates, lowering incidence of HIV/AIDs and malaria, farming more productive agriculture plots, and addressing the human impacts on climate change" (Hawken, 2017). Each of these issues is faced in rural Tanzania, and would benefit from inclusive education and empowerment as additions to the

Figure 5: SEGA students practicing poultry production (Dolan, Polly, n.d.).

current education system in the villages surrounding the UMNP (Harrison, 2006).

Local Context

With an increased knowledge of the economic assets available in communities adjacent to protected areas, paired with the necessary knowledge and skills to procure them, villagers are able to build their economies in a way that supports environmental conservation and sustainable resource use (Harrison, 2006). Examples of institutions designed to merge environmental education, leadership, and economic empowerment can be found in biodiversity hotspots around the world (Parra, 2015), (Shelby, et al., under review), (Shaver's Creek, 2012), (ICIPE 2007), (Associazione Mazingira, 2018), (Dolan, Polly, n.d.). Combined with local knowledge of the rural villages of the Eastern Arc Mountains, these examples will serve as a foundation for an innovative program that features hands-on learning, a holistic curriculum, and sustainable practices that lead to income generation in the Eastern Arc Mountains.

Proposed Project

Udzungwa Region Environmental Center Adventures Course

Connecting the conservation of biodiversity and natural resources found in the UMNP to the livelihoods of the local people in the neighboring villages must begin with opportunities for community involvement and hands-on learning (Harrison, 2006). A center for environmental-based education, leadership, and empowerment in the Udzugwa Mountains region has the ability to institute a program that embraces three steps in linking villager participation to the conservation of adjacent protected areas. This framework addresses education on the importance of conserving the environment, instruction on how to conserve the environment, and training that demonstrates the profitability of conserving the environment. This strategy is in line with the Africa Environmental Education and Training Action Plan's goal to, "[ensure] that everyone has the opportunity to acquire the knowledge, skills, values and attitudes that empower them to contribute to sustainable development (Lotz-Sisitka, 2017). The **Udzungwa Region Environmental Center** will focus on promoting a connection between the forest and the community, providing leadership development, and fostering entrepreneurial empowerment among youth. By reimagining environmental education, the three-tiered structure (figure 6) of the Udzungwa Region Environmental Center (UREC) **Adventures Course** will educate, mentor, and empower youth in rural communities located adjacent to the UMNP. Each tier will feature elements from the six component blended approach to Education for Sustainable Development (ESD) designed in South Africa, ensuring a comprehensive learning experience (Pretorius, et al., 2016). In essence, this will encourage sustainable practices of agriculture and resource-use in line with biodiversity conservation.

Tier One – Explorers

Effective methods of conservation begin with an appreciation and understanding of the importance of the biodiversity and ecological services protected by national parks. The first tier of youth participation in realizing the benefits of conservation includes hands-on

learning to discover the value of nature through the **Explorers Program**. This first tier is designed specifically for children in standard I-IV, or **ages 7-10**, in order to engage primary school students while avoiding years that children must focus on standardized testing in core curriculum (Nyenga, 2018). These students will be given the opportunity to visit the environmental education center as **a class trip one day per week** in order to gain exposure to the program and gain interest in proceeding to tier two, with the eighteen area primary schools in the region each assigned a weekday.

Enrollment in the Explorer Program at the Udzungwa Region Environmental Center will be **included in traditional primary education**. At this level, students will be taught by professional staff, while paired with older students as mentors. This program is designed to introduce younger children to environmental education and the opportunities available at the center in an engaging way.

A study of *Interdisciplinary and Participatory Research at Early Childhood to Biodiversity Education and Sustainable Development* by Miranda, et al., in the Mediterranean region, provided clear evidence that the engagement of children in understanding basic concepts of biology and ecology are associated with connecting ecosystem dynamics to human well-being (2016). Furthermore, combining environmental science with creative outlets, such as painting or cooking, yields better understanding of the relationship between people and the planet among students (Miranda, et al., 2016) The **academic theory** and **lecturer interaction** components ESD at the proposed environmental center will be combined with innovative methods of engaging primary school students, such as **games**, **scavenger hunts**, **art workshops**, **nature walks**, and supervised **wildlife interactions** (Pretorius et al., 2016).

Using the design provided by the ANIA project in Peru, best practice would place the education center on the edge on a protected

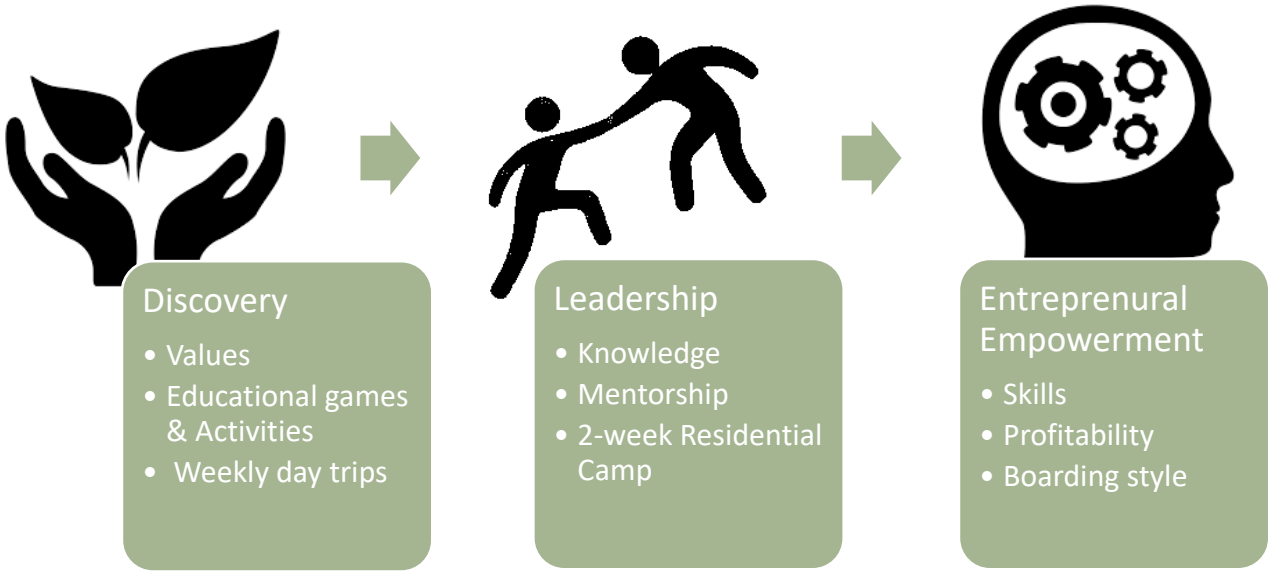

Figure 6: The three tiers of environmental education, as used in the Adventures Course

area or national park in order to provide the resources necessary for teaching both forestry oriented skills inside the tree-cover, as well as agricultural and business focused curriculum in cleared land, without deforesting the land further for cultivation or infrastructure (Parra, 2015). For the Explorer level of this program, this would provide opportunities for **seed planting** and **gardening**. Additional integral parts of environmental education, including **plant interpretation**, **wildlife identification**, and **elementary ecosystem curricula**, can be added to the ANIA model when constructing for the facility to be built in the foothills of the UMNP.

Tier Two - Guides

The second tier of the proposed model for environmental education is designed to foster leadership development through a 2-week residential camp at the environmental center, welcoming students from a different area school with each cycle. The **Guides Program,** will be composed of students from standard V-VII and Form 1-2, or **ages 10-15** (Foreign Credits, Inc., 2012). Inspired by the concepts of Outdoor School at Shaver's Creek, this program will incorporate mentorship into environmental education by pairing older student mentors with younger student mentees from the Explorers Program during their day visits to the environmental center (Shaver's Creek Environmental Center, 2012). Guides will responsible for assisting professional staff in the instruction of games and activities during the daytime, while attending their own lessons and group activities in the evening after the Explorers depart.

Students enrolled in the Guides Program will spend two weeks of the standard school year in dormitory-style housing or tented camps, where they will study sustainability leadership. Using the problem-posing curriculum concept used in the SELAL program in Costa Rica, students will responsible for exploring solutions that are applicable to conservation in the UMNP and surrounding area (Shelby, Cruz, Arodoin & Durham, under review). The residential nature of the Guides Program is designed to foster **peer learning** and **society**, as aligned with the blended approach of ESD. This middle tier serves as an extension of the first by adding more scientific practice and group dynamics to the topics introduced in primary school. At the same time, immersing students in hands-on conservation and sustainability practices will act as a prelude for the upcoming, third tier.

Tier Three – Rangers

The **Rangers Program** is the third and final tier of environmental education offered by the Udzungwa Region Environmental Center Adventure Course. It is designed for Forms 3-6, **Ages 15-19**, and offers tuition-based, boarding accommodations, with opportunities for financial aid.

This segment builds on the previous two tiers while incorporating the **work-integrated learning** and **industry skills** outlined in the blended model for ESD (Pretorius et al., 2016). Inspired by the curriculum used at SEGA Girls School in Morogoro, TZ, students enrolled in the Rangers Program will have the opportunity for hands-on involvement poultry production, weaving and sewing, beekeeping, and other income generating activities (Dolan, Polly, n.d.). According to a socio-economic baseline survey of the villages bordering the UMNP conducted by the World Wildlife Fund, basic accounting skills are a barrier to economic independence (Harrison, 2006). Village households are often unable to manage income and expenditures, resulting in a large amount of informal debt and financial

insecurity (Harrison, 2006). The goal of the Rangers Program is to help students discover alternative income opportunities to traditional agricultural practices, while guarding the natural environment. Providing a diverse array of opportunities in a boarding school setting will provide the rangers with several options for exploration, as well as the responsibility of tracking their expenditures and income generated by their work. This system will foster a sense of ownership over their projects and entrepreneurial empowerment among youth.

The Rangers Program is divided into two sections: Junior Rangers and Senior Rangers, designed to focus on sustainable occupation opportunities and entrepreneurial development, respectively. Years 1 and 2 of the Rangers Program, including ages 15-17 are enrolled in the **Junior Rangers** section. These students are charged with gaining **teaching experience** through assisting professional staff in the classrooms of the previous two tiers. This will strengthen the leadership component of the overall program and help to develop the **soft skills** needed throughout their careers. While living at the environmental center, the Ranger I class will also **gain exposure** to the array of opportunities offered through the Adventures Course, including production of non-timber forest products, beekeeping, butterfly farming, poultry production, sewing and weaving, cooking, and even tourism hospitality. To aid their exploration and prepare them for advancement, students will be given the opportunity to shadow Senior Ranger students in their projects.

Years 3 and 4 of the Rangers Program, including ages 18-19, are enrolled in the **Senior Rangers** section. Here, students are able to choose a **focus area** or areas to further develop their knowledge and expertise in an income generating activity. In align with the projects used by the International Centre of Insect Physiology and Ecology butterfly farm and Associazione Mazingira Co. LTD, the Senior Ranger projects will promote nature-based sustainable businesses among the community (International Centre of Insect Physiology and Ecology, 2007), (Associazione Mazingira, 2018). By structuring the curriculum as a **capstone project** to the Adventures Course, perceived ownership over one area will foster development of basic **accounting skills** and entrepreneurial empowerment.

Providing villagers with opportunities for alternative income generation has the potential to significantly boost household income while reducing reliance on agriculture

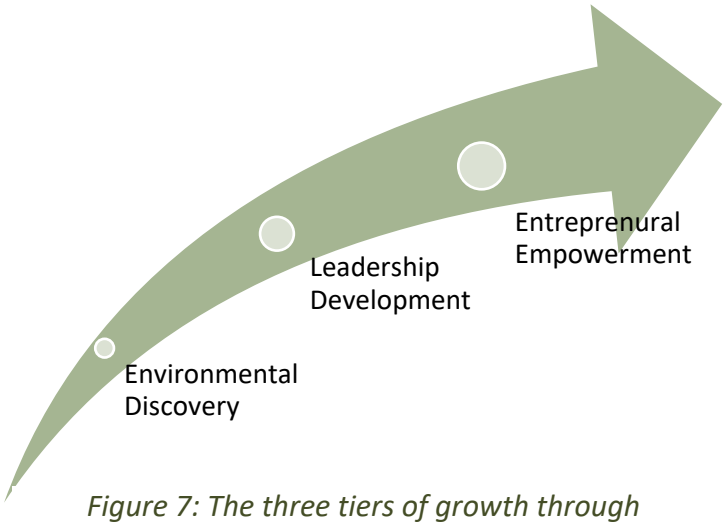

Figure 7: The three tiers of growth through environmental education.

(International Centre of Insect Physiology and Ecology, 2007). This hands-on, **work-integrated curriculum** will foster independent thinking and decision-making among students (Dolan, Polly, n.d.). Because the students enrolled in the Ranger Program are structured as a cohort of young businessmen and women, they are provided with opportunities for

networking and partnerships within the community.

Summary

Upon completing of all three tiers of learning offered by the environmental education center, participants will leave with a comprehensive set of skills needed to understand, implement, and profit from environmental conservation. By exposing children the importance of biodiversity conservation at a young age, it creates a lasting impression on the way people interact with their natural environment (Miranda, et al., 2016) Curriculum is designed to encompass all six components of the model for blended Education for Sustainable Development, offering a comprehensive approach to environmental education (Pretorius et al., 2016). The Adventures Course will provide students with the resources and training necessary to pursue their post-graduation goals, including tertiary education at a university or vocational school (Dolan, Polly, n.d.). Work-integrated curriculum and accounting skills will also provide entrepreneurial empowerment and financial independence among the next generation of community members (Pretorius, 2016). Finally, leadership and group dynamics developed over a progression through the three tiers of academia provided by the Udzungwa Region Environmental Center is designed to create future generations of environment-informed village council members and community leaders (figure 7).

Project Implications

The three tiered nature of the curriculum offered by the Udzungwa Region Environmental center are designed to foster the environmental education, leadership development, and entrepreneurial empowerment among youth in the villages surrounding the UMNP. The Adventures Course has the capacity to create a lasting impact on the community by providing a holistic and practical education that can be implanted in their professional lives. Graduates of this program have the ability to continue their education, open their own businesses, or become leaders in the community.

The by-products of this design will also benefit the surrounding community by diversifying the economy, creating more resistance to shocks (Harrison, 2006). Products made by students can become goods that are marketed to the community or tourists visiting the UMNP, creating revenue for the school and for Senior Ranger students during their capstone project. In that way, the environmental center has the ability to become financially self-sustaining. Opportunities for employment will also be available through the center, providing additional benefits to adults in the community.

This model for comprehensive environmental education has room for expansion to additional market sectors over time. For example, SEGA Girls School features a guest house that welcomes international and domestic tourists to the school grounds for accommodation, meals, and tours at a reasonable cost (Dolan, Polly, n.d.). The World Bank labels hospitality underdevelopment as one of the main barriers to expanding tourism opportunities to Southern Tanzania (The World Bank Group, 2015). This expansion would provide opportunities for students to learn about the hospitality industry, while generating revenue for the center, the

community, and the UMNP. Expansion projects like this one can be created after a period of implementation of the core elements of the Adventures Course offered by the Udzungwa Region Environmental Center. According to the Arc Journal, such community-based projects are often funded in-part by international organizations, national park services, or private donors, who wish to embark on a joint venture in strengthening future generations of conservationists (International Centre of Insect Physiology and Ecology, 2007). With these funding opportunities, construction of this institution can be made possible.

This program is designed to address several issues currently constricting the conservation of biodiversity and the livelihoods of villagers living in the communities surrounding the UMNP. Currently, the habitats of endemic and endangered wildlife are faced with the damage caused by deforestation and exploitation of nearby resources (Nyundo, 2006). Education of youth on the importance of ecosystem services and biodiversity can aid in mending the relationships between parks and the surrounding people by encouraging attitudes that support nature (Miranda, et al., 2016). Projects to promote community-based forest management and sustainable development require environmental education of villagers in order to become self-sufficient (Marshal, 2008). Therefore, knowledge about how to conserve the environment through sustainable development is important to ensure that these resources are preserved for future generations of people living in among the Eastern Arc Mountains. This knowledge, paired with the leadership focus of the Adventures Course, enables students to become future stewards of conservation in the community. Finally, research has found links between environmental conservation, economic activity, and poverty alleviation (Kikula, et al., 2003). By providing students with the opportunity to develop eco-friendly, alternative income generation activities and accounting skills, the Adventures Course has the opportunity to promote economic empowerment and diversification. In other words, work-integrated environmental education will break the existing cycle in which people know they are harming the forest, but must exploit natural resources in order to survive (Harrison, 2006).

The attitudes, knowledge, skills approach used in this program has the ability to become a model for environmental education across rural Tanzania and other African communities tasked with the challenge of balancing biodiversity conservation with the livelihoods of the local people. Overall, increasing opportunities for education can strengthen the relationship between people and their environment, while addressing socio-economic issues.

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