Assessing the Impact of Environmental Literacy Initiatives Among Namibian Secondary School Students

An Interactive Qualifying Project submitted to the faculty of Worcester Polytechnic Institute in partial fulfillment of the requirements for the Degree of Bachelor of Science

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May 4, 2014

Abstract

Our project goal was to assess the effectiveness of environmental education efforts in developing secondary school students into critical thinkers with an intimate relationship with their environment. Through interactions with environmental educators, we determined the state of environmental education, and learned the challenges that are preventing it from being successful. We helped EduVentures, a local NGO, field-test a new initiative that will take this education to rural areas, where it is typically underemphasized. Our recommendations to EduVentures and the environmental education community as a whole, aim to help Namibia's students become a more environmentally responsible generation as the country continues to develop.

Acknowledgements

First and foremost, we want to thank our sponsor, EduVentures, for providing us with the opportunity to work with them, and learn from rural communities. Specifically, we would like to thank Corris Kaapehi, Holger Vollbrecht, Maria Johannes, Tauno Iipinge, and Benson Murama for providing their vast knowledge on the state of environmental literacy in Namibia.

We would also like to thank the principal of the K.J. Kapeua Combined School of Ovitoto, for allowing us to pilot the EduMobile program with his students. Thanks are also in order to the students that completed the EduMobile program, for giving us valuable insight to the execution of the project.

For providing us knowledge on the current state of environmental education in Namibia, we would like to thank Vicky Endjala, from the Namib Desert Environmental Education Trust; Stephanie Bradley, form the Cheetah Conservation Fund; Robert Logan, from the Gobabeb Research and Training Center; Vilho Absalome, and Frans Kamenye, from the Ministry of Environment and Tourism; and Dickson Kasote, from the United Nations Science, Education and Culture Organization.

For providing us knowledge on the workings of environmental clubs, we would like to thank club supervisors Liina Nantinda, from the Hochland High School; and Nyundu Kandjebo, from the Katji-na-Katji Secondary school; and students from the Hochland High School.

For giving us valuable insight and guidance for our project, we would like to thank our advisors, Professors Melissa Belz and Robert Hersh.

Finally, for satisfying our appetites and giving us multiple opportunities to explore typical German cuisine, we would like to thank the staff of Goethe Café.

Authorship

All Parts of this Report Were Edited by All Members of the Project Team

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Acronyms

The follow is a list of expanded acronyms that will be used through this report:

EE: Environmental Education

NaDEET: Namibian Desert Environmental Education Trust

NEEN: Namibian Environmental Education Network

MOE: Ministry of Education

MET: Ministry of Education

GDP: Gross Domestic Product

FAO: United Nations Food and Agriculture Organization

SAEP: South African Education and Environment Project

MMAEP: Midland Meander Education Project

UNESCO: United Nations Education, Science, and Culture Organization

CCF: Cheetah Conservation Fund

GRTC: Gobabeb Research & Training Center

AAP: Africa Adaptation Project

Nam-PLACE: Namibia Protected Landscape Conservation Area Initiative

CCP: Connecting Classrooms Project

Executive Summary

With a quarter of Namibia's work force employed in agriculture, it is vital for people living in rural areas to be aware of the environmental challenges the country faces and how to best preserve their natural resources (Ministry of Labour and Social Welfare, 2012). This makes environmental education (EE) a necessary facet of Namibia's education system. This project focuses on ways in which environmental literacy, or basic understanding of ecological principles and the ways society affects environmental conditions (ENVIS, 2011), can be enhanced through EE programs and EE clubs.

Namibia faces several environmental challenges that will influence the nation's development, such as water scarcity and climate change. These issues make EE a relevant and valuable subject in the Namibian school curriculum, and yet, according to many EE educators in Namibia, these topics are not often taught in schools, and when they are covered, the lessons lack a connection to the experiences of the students. In Namibia, the primary focus of EE is biodiversity preservation and sustainable development. The government has encouraged Non-Government Organizations (NGOs) to provide informal EE that can supplement the current curriculum (Government of the Republic of Namibia, 2004a).

The sponsor of this project, EduVentures, is a non-profit NGO based in Windhoek, Namibia, and it is launching a program to improve EE education in rural schools. Environmental literacy is especially important in these schools, because it allows students to sustainably interact with their environment. EduVentures focuses on biodiversity, climate change, and sustainability issues concerning Namibia. Its mission is to preserve natural and cultural heritage while expanding knowledge of the environment to Namibian youth (Kaapehi & Johannes, 2014). Its new program, EduMobile, is intended provide an interactive and student-centered learning

experience, which will allow students to gain a broader understanding and appreciation of Namibia's environmental concerns. Once completed, the program will consist of a mobile classroom truck, which is equipped with desks, and educational technology, including a solar-powered SMART board system. EduMobile is a unique EE program because it travels to rural schools to provide EE, instead of having students meet at a centralized EE facility.

The goal of this project was to understand how the key concepts of environmental education relevant to Namibia – biodiversity, climate change, water resources – can be transformed into a compelling educational experience for rural students. Our objectives were to assess the state of EE in Namibia, assess EduVentures' field test of the EduMobile program in a rural school, and determine the role that EE clubs play in sustaining environmental education.

We conducted in-depth interviews with EE organizations and government agencies to better understand approaches to EE in Namibia. We assessed the shortcomings and successes of the EduMobile program during its first pilot phase school, K.J. Kapeua Combined School through interviews with the EduVentures staff, student surveys and group discussions with students, as well as by observing the EduMobile program in action. To determine the role of EE clubs in increasing environmental literacy, we met with student members of the Hochland High School EE club, their supervisor, and interviewed other club supervisors from across the country via phone.

We studied the various aspects of increasing environmental literacy among secondary school students (ages 14-18) in Namibia. Specifically, we examined the state of EE in Namibia, as well as two different models for increasing environmental literacy. Our key research topics were the challenges that EE faces in Namibia, what organizations are doing to overcome them, and what can new organizations and programs do to improve the state of EE. We determined that

the main obstacles for EE were the lack of emphasis on this topic in rural schools, and skepticism to change traditional, unsustainable practices that have consequences unknown to rural communities.

Our experiences with EduVentures led us to discover many things about its new EduMobile program. We found that the content of the program was too complex for the students and that language barriers confused and created disinterest in the students. The students had trouble relating the content of the program to their local environmental issues. The program intended to have students look at their environment and actions critically. While they did recognize that some of their actions were environmentally irresponsible, they had trouble connecting the consequences to the action. This was exacerbated by the fact that both program leads had little teaching experience. While the program intended to continue the students' environmental experience through an EE club, they underestimated the challenges associated with sustaining it.

We investigated how EE clubs are formed and operate, as well as the role they play in Namibia's EE. Clubs have the potential to help students become an active medium between communities and EE, resulting in positive change, and an increased environmental literacy. We determined that a dedicated supervisor and active, self-motivated members are necessary for a club to be successful. We learned that EE clubs maintain member engagement by focusing on a long-term project such as the maintenance of a vegetable garden, and by providing incentives for active membership, such as opportunities to go on educational trips and attend EE conferences. The fundamental challenges that EE clubs face are leadership transition, funding, and stigma. If club leadership is not maintained, adequate funding is not provided, or members become

discouraged due to resistance to their environmental protection efforts, then the club cannot be successful or reach its full potential.

Based on our experiences with educators from EE organizations, EduVentures, and members of EE clubs, we developed a set of recommendations: **For EduVentures, we recommend that they take advantage of opportunities to make education relevant, work more closely with local teachers, simplify and increase the interactivity of its lessons, and develop a workbook and other materials that the students can keep after the program.**

For the EE community, we recommend that the Ministry of Environment and Tourism advertise funding opportunities for clubs more often, a nation-wide committee be created to evaluate current EE efforts, educators explore more social networking platforms in order to maintain a constant exchange of ideas, and educators expand their efforts to rural communities.

Additionally, we formulated critical questions to foster discussion among EE community:

- How can students be motivated to continue their EE without the direct guidance of an educator?
- If schools are not teaching EE, how can EE organizations reach those schools and supplement their education?
- Besides transferring knowledge, what can EE organizations do to address the skepticism that rural communities experience when asked to change their practices?
- How can teachers be supported to sponsor environmental clubs

EduVentures has a unique program that can take EE to rural communities and make it relevant to the students' lives. Although the current state of EE in Namibia poses many

challenges, the program is worth pursuing. Mainly because it creates the opportunity for the students to obtain an EE that will directly benefit their lives, and their country. The EduMobile program is breaking new ground in rural education and it could lay the foundation to better prepare a new generation of Namibians to address its environmental challenges.

1.0 Introduction

Environmental education (EE) in Namibia aims to educate the country's citizens about biodiversity, climate change, and sustainable development. To raise awareness of these issues, EE efforts focus on the youth of the country. Besides just transferring knowledge, EE programs also intend to provide students with the necessary skills to be able to positively impact their communities, and address Namibia's environmental issues. Additionally, the country could benefit from having its citizens hold a more intimate relationship with their environment, seeing as they heavily depend on it for economic reasons.

The government has made great strides towards improving their education system. The constitution calls for "Education for all" (Government of the Republic of Namibia, 1990) and is a goal of Vision 2030 (Government of the Republic of Namibia, 2004b) which is the nation's set of socioeconomic goals for the future. Namibia has recognized the need for EE, and has required secondary schools to dedicate a few hours to the topic. However, topics like agriculture are taught, without any real emphasis on its environmental impact, or on proper, sustainable practices that should govern the subject. As Namibian schools do not spend enough time on EE, the government has asked Non-Government Organizations (NGO) and other educators outside the official school system to lead programs that promote EE throughout the nation (Government of the Republic of Namibia, 2004a).

Across the globe, EE organizations share many common themes that make them successful. The teaching approaches that these organizations employ are all student-centered. Instead of having all students simply focus on the teacher's lecture, the programs allows them to contribute to their own learning by making use of their previous relationship of their environment. To allow for the EE to sustain itself, these organizations form environmental clubs

throughout their programs. The clubs, which are typically student run, allow for much more than just spreading awareness of environmental issues. They have the power to develop critical thinking skills, and foster independent inquiry within the students. The result is a group of students that have the knowledge and skills to positively impact their communities.

The organizations we researched base their programs around their own facilities, and require students to travel there in order to attend their program. EduVentures is a Namibian NGO that does the opposite. They bring the EE to the student's local environment. EduVentures brings its curriculum to the students with their new EduMobile program. The NGO is building a truck that will be outfitted as a classroom, and can travel across rough terrain to the remote regions of Namibia. While still in development, the EduMobile program is the first of its kind in Namibia, and represents a great step towards Namibia's "education for all" goal. No other EE organization has brought programs to students' local environments on the scale that EduVentures seeks to do.

Our goal was to assess environmental literacy initiatives in Namibia, and identify what role environmental clubs can play in expanding EE. Our team sought to answer research questions which would help us achieve our goal: What are the challenges surrounding EE in Namibia? What is currently being done to address those challenges? How can environmental organizations impact students in a way that they can be inspired to further their EE? To do so, we accompanied EduVentures on the first field test of the EduMobile program, conducted in-depth interviews with EE practitioners, as well as students and teachers who had set up environmental clubs. Our project has generated several recommendations for the EduMobile program, and EE in Namibia. The recommendations will help improve the nation's environmental literacy, and protect their natural wonders and rich biodiversity.

In Chapter 2.0, we will discuss the critical aspects surrounding EE in Namibia in greater detail. We then explain our methods in Chapter 3.0. In Chapter 4 we document our findings in an extended case study and, in Chapter 5, we provide recommendations for EE in Namibia and the EduMobile program.

2.0 Background

Environmental education is defined as, "the process of developing environmentally literate citizens who […] collectively achieve an improved quality of life through the sustainable use of and appropriate developments of […] resources" (Imene, 2002, p. 1). In this chapter, we will provide context to our project by discussing the importance of environmental education (EE), the approach of existing EE organizations around the world, and the major challenges they face. Finally we will explain the mission of a local non-governmental organization (NGO), EduVentures, and the motivation behind its education programs. Before we delve into the particular importance of EE in Namibia, we will briefly discuss the status of their education, and describe the challenges the nation faces in their rural education.

2.1 Education in Namibia

In 2004, Namibia's government drafted a document called Vision 2030. It details the social and educational goals towards an improved quality of life that the country is striving to meet by the year 2030. Vision 2030 highlights the importance of access to education, and pledges to provide full and appropriate education to all levels. This vision resulted in the implementation of the Universal Primary Education policy in the year 2013, making primary education (ages 6-18) free. The Ministry of Education (MOE) seeks to place qualified teachers in rural school communities by hiring, and training them to meet the needs of the students. In 2011, the MOE created a stipend, called "Bush Allowance" to encourage teachers to work in rural regions of the country (Ikela, 2011). The stipend is given to teachers who agree to travel to remote regions. This is not the only way Namibia supports education financially. Approximately 25% of Namibia's government budget is spent on education (Ministry of Finance, 2012). This is

a high percentage, considering the US government spends a total of 16% of their budget on education (Chantrill, 2012). Even with the money that Namibia's Ministry of Education is allotting towards education, there is evidence that there are still many challenges preventing education from fulfilling its role. This is especially true in rural communities, which typically have less access and monetary resources, which are both crucial for the success of education (Fischer, 2010).

2.1.1 General Challenges in Rural Education

Rural areas typically depend on primary production[1]. However, primary production usually does not generate enough income for the community (Atchoarena & Gasperini, 2003). The lower income produces challenges in education in several ways. Fewer funds translate into inadequate infrastructure for schools. It is not rare for students to have to study in ill-equipped, overcrowded classrooms (Lakin & Gasperini, 2003). Factors, like poor ventilation and lighting in a classroom, can have a serious toll on the concentration and motivation of both students and teachers. Along with the infrastructure, it is difficult for schools to obtain the necessary, up-to-date textbooks, or basic learning materials such as blackboards, etc. (Lakin & Gasperini, 2003). These working conditions, combined with low salaries, can discourage current rural teachers, and detract many aspiring teachers from travelling to work in rural areas. In addition to the quality of the infrastructure and teachers, the curriculum's relevance also contributes to the academic imbalance.

Not only are the infrastructure and available resources different, but the needs of rural communities also differ from those of urban ones. A centralized, national education system

[1] Primary production refers to making use of the natural resources for profit. E.g.: Mining, fishing, agriculture, etc.

typically favors urban growth, as that translates into a better economy for the nation overall. Urbanization results in a national curriculum that is geared towards building urban students, but not as beneficial, or practical, for rural learners (Lakin & Gasperini, 2003). Unfortunately, the impracticality of some of the material and the economic difficulty that rural families live with puts them in a complex and difficult position – families are sometimes forced to see education as a luxury (Lakin & Gasperini, 2003). Often children are left with no choice but to leave school, and help their families by providing an additional source of income. Usually, there is little enforcement of education policies in rural communities because they understand that many find themselves in difficult economic situation (Lakin & Gasperini, 2003).

2.1.2 Education in Rural Namibia

While primary education is free and compulsory in Namibia, there are many students who are still not attending school. This can be seen by the differing attendance rates within the country. In rural areas, primary school attendance rate[2] is 76.3%, while in urban communities it is 83.3%. The difference is even more significant in secondary school, ages 14 to 18. The rural attendance rate for secondary school was only 26.6%, and the urban attendance rate was more than double, with 57.8% (UNICEF, 2008). It is important to note that secondary education, which encompasses grades 8 to 12 (ages 14 to 18), is not compulsory, and therefore it is not free; this explains the significant decrease in both rural and urban attendance rates from primary to secondary school.

Over half of the population lives in rural areas, and, according to data from the World Bank, 49% of rural Namibia's population lives under the poverty line (The World Bank, 2010).

[2] In this section, attendance rate refers to the percentage of students of the appropriate age who attend school.

This statistic highlights the importance of education in rural communities. Education helps reduce poverty by "improving individuals' absorption capacity for techniques and methods […]" (Umoh, 2010). In Namibia, the government mandates schools to allot a certain amount of hours of their curriculum towards EE (Ministry of Education, 2008). However, we found that this policy is not put into practice. This issue is discussed in more detail in our Findings chapter (Chapter 4.0).

2.2 Importance of Environmental Literacy in Namibia

In urban areas, people must be aware of how cities contribute to environmental issues, like pollution. On the other hand, rural areas have a smaller impact on these issues, but a bigger dependency on their environment. Rural areas depend mostly on agriculture, and eco-tourism (Ministry of Labour and Social Welfare, 2012). These activities directly benefit the community, so providing rural schools with a curriculum focused on the environment will give students knowledge that is especially relevant to their everyday lives. The goal of EE is achieving widespread environmental literacy, or the basic understanding of ecological principles and the ways society affects environmental conditions (ENVIS, 2011). Because of their economic dependence on the environment, terms like biodiversity loss, climate change, and water and waste management gain special importance to the future development of the country.

2.2.1 Biodiversity Loss

Namibia is rich in biodiversity, which refers to the variety of life in an environment, including plants, animals, and humans. Biodiversity awareness is important in Namibia because of its ecotourism and agricultural economy, which depend on a thriving natural environment in

order to be successful. To combat biodiversity loss, EE aims to not only to raise awareness, but also to convert them into skilled and willing participants in environmental management (Peyton, Campa, Winterstein, Peyton, & Peyton, 2008). Ecotourism and species protection are two economic incentives for biodiversity protection (Naidoo, Weaver, Stuart-Hill, & Tagg, 2011). The ecotourism industry makes up 19.9% of the country's GDP in 2011 (Smit, 2011). However, biodiversity is threatened by a number of factors, including the Namibian economy. One of the main reasons for biodiversity loss is that land previously used for wildlife habitat has been converted for other uses such as livestock grazing (Richardson, 1998). Cattle farming has been a documented staple of the Namibian region's economy since 1961 (FAO, 2011). By teaching students about the incentives for biodiversity preservation and the causes of biodiversity loss, they will be able to aid in biodiversity and ecosystem preservation.

Figure 1: Black-Faced Impala, a species endemic to Namibia

2.2.2 Unpredictable Weather and Climate Change

Namibia's unpredictable weather and arid climate constitute another major environmental issue for the country. Sporadic rainfall is characteristic of this highly variable climate. Figure 2 depicts the irregularity of the Namibian climate in terms of monthly rainfall over a 100-year timeframe (Dirkx et al., 2008). The figure shows the peaks and lows of monthly rainfall amounts in Namibia, which range from 8 to 51 mm per month depending on the region. The variability of the climate makes predicting trends in rainfall very difficult (Dirkx et al., 2008). From the figure, we can understand that there are some trends, but predicting major draughts is a challenge. EE will inform Namibian students how to cope with extreme and unpredictable weather events such as torrential rain or severe drought, as well as inform them of how industries like mining, which is prominent in the country, can contribute global warming. It is crucial that students learn how climate change can affect Namibia's biodiversity, agriculture, resources, and economy (Kaapehi & Johannes, 2014). Climate change, which is referred to as any significant change in the measures of climate lasting for an extended period of time, has been proven to increase climate variability (EPA, 2010). Namibia, which is already susceptible to unpredictable weather, is especially vulnerable to the effects of climate change.

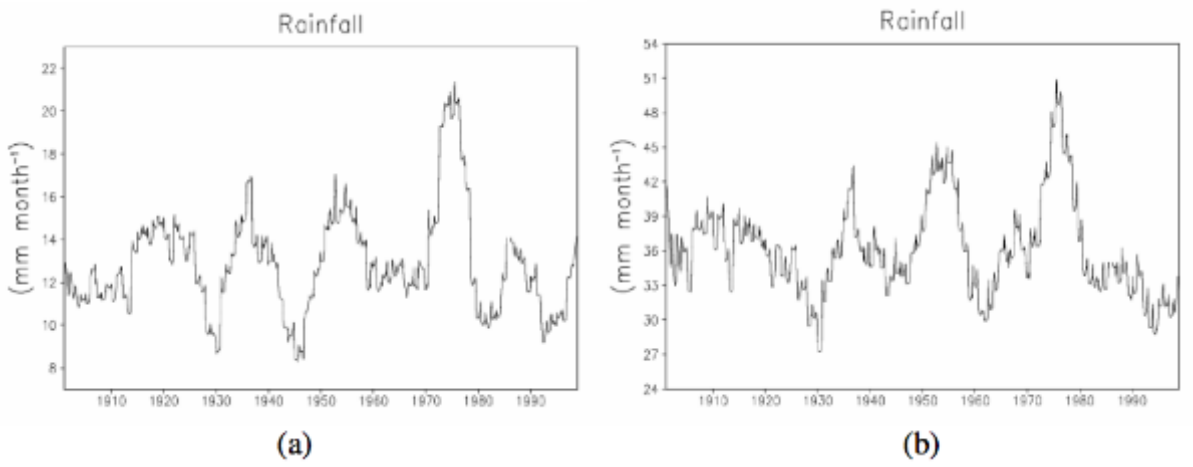

Figure 2: Monthly mean rainfall (mm month^-1) measurements 1901-200: a) southern Namibia (16-20E, 28-24S); b) northern Namibia (16-20E, 22-18S). Source: (Dirkx et al., 2008).

2.2.3 Waste and Water Management

Due to the climate, geographical location, and young age of the country, sustainability and sustainable development are particularly vital to Namibian life. In an environmental setting, sustainability refers to the conservation of ecological balance, by avoiding the depletion of resources. Sustainable development is the mode of human development in which resource use aims to meet human needs while preserving the environment so these needs can continue to be met in the future (Kaapehi & Johannes, 2014). Limited domestic energy sources and the fragility of the environment make sustainable energy sources, such as solar, wind, and hydroelectric power, crucial to Namibia's development. Additionally, waste management systems, such as recycling and proper waste disposal, along with sustainable agriculture practices are important to protect Namibia's environment (Kaapehi & Johannes, 2014).

The desert climate and sporadic rainfall have long-term effects on Namibia's water resources. Water is critical for many applications such as human consumption, livestock upkeep, agriculture, and industry. These factors have made water availability and provision the top

environmental issue in Namibia. Specifically, the quantity and quality of available water resources are major issues (Scholes, 2001). Windhoek has the largest water reclamation plant in the southern hemisphere, and it recycles more than a third of the city's wastewater. A part of the recycling plant can be seen in Figure 3. However, careful management is still necessary to maintain water resources because of its limited supply. As Namibia continues to develop, it will have an increasing dependence on its natural resources, leaving the country vulnerable to drought, climate change, and other environmental issues (Government of Namibia, 2002). The combined effect of climate fluctuation, population growth, and urban development requires increasing attention towards improving resource utilization efficiency and sustainable practices (Dirkx et al., 2008).

Figure 3: Windhoek's water reclamation plant. Source: Colby Foster (WPI Student), used with his permission.

2.3 Environmental Education Approaches and Programs

After exploring which issues make EE especially important in Namibia, we researched different EE initiatives across the globe. In this section, we will discuss some examples of these

cooperative efforts. Specifically, we will briefly describe the following examples: United Nations Food and Agriculture Organization efforts in Peru and Zimbabwe, the EarthTeam in San Francisco, California, the Midlands Meander Education Project in South Africa, and the South African Education and Environment Project (SAEP) out of Cape Town, South Africa (SAEP, 2012). We learned of the organizations programs, and extracted the critical points of their teaching approaches.

2.3.1 Student Centered-Learning.

In Peru, the United Nations Food and Agriculture Organization (FAO) created a program for rural primary schools in the Highlands that would supplement their current EE. It covered sustainable resource management, which is vital for primary production, the main source of income for these communities. They concluded that the knowledge the students had of the area was crucial to making the curriculum relevant. As the students provided their local knowledge, the instructors could adapt the curriculum and make it address the needs specific to that area. From the success of this approach, the FAO concluded that the programs must be as location-specific and student-oriented as possible. A series of workshops created to introduce EE into primary schools in Zimbabwe, also proved the same point. The more student-centered and practical their content of the lessons was, the more students found themselves acquiring and applying knowledge. In both cases, it was also stressed that these programs were successful because they stayed away from conventional, teacher-oriented teaching methods (Desmond, Grieshop, & Subramaniam, 2003).

The South African Education and Environment Project (SAEP) hosts programs that focus on environmental literacy for youth near Cape Town, South Africa. Since SAEP's beginning, it

has sought to empower youth through EE and activism, with the main goal of improving the life of impoverished communities. Most of the group's work is aimed at afterschool programs, which allow students the opportunity to gain insight into environmental issues in their own communities. The organization has expanded to host several programs that are all aimed at different educational opportunities for communities, including early childhood programs and academic support. The programs are student centered, allowing the student to learn through self-discovery. The organizations are not tied to any governmental organization. Their NGO status allows them to specialize in certain areas needed in the regions they visit (SAEP, 2012).

2.3.2 EE Clubs and Independent Inquiry

EarthTeam is an EE club network based out of Berkeley, California that facilitates collaboration between EE clubs to accomplish environmental projects. The network is active throughout California, USA and has been addressing environmental issues in their community such as waste management, climate change, and environmental restoration since 2000 (EarthTeam, 2014b). The success of the network is based on the successes of independent clubs, which are almost completely student run. They are also effective at developing critical thinking skills, and fostering the students' curiosity and intimacy with the environment. Students can then, independently, learn more about their local environment. Figure 4 shows students from EarthTeam working on their waste action project (EarthTeam, N.A.). The environment, standard of living, and communication resources in California are very different than in Namibia. However, it serves as an example on how clubs can work together to accomplish more than individuals, and strive to advance the world into an environmentally responsible one.

Figure 4: EarthTeam working on their waste action project. Source: (EarthTeam, 2014b)

2.3.3 Connecting EE Activities Across Schools

The Midlands Meander Education Project (MMAEP) targets schools in rural South Africa that are in need of supplemental EE. This project focuses on training educators to become effective EE club advisors, with the ultimate goal of allowing students to contribute to their own learning through successful clubs. Their mission is to increase awareness of the importance of the natural environment and focus on local schools to integrate EE into their curriculums. These local schools participate in the Wildlife and Environmental Society of South Africa's (WESSA) Eco-Schools program with MMAEP's assistance. The program emphasizes "wise resource use, creativity, sustainable living, and community building," in its curriculum MMAEP's impact on the local schools has helped the children become environmentally conscious and contribute to their communities (Midlands Meander Education Project, 2014).

2.3.5 Fostering EE in developing countries

The FAO, and, the United Nations Educational, Scientific and Cultural Organization

(UNESCO), encourage national governments to promote 'non-formal education,' meaning any education that is not provided by the nation's system of schools, colleges, and universities (Atchoarena & Gasperini, 2003). In the examples above, the EE programs were led by organizations not linked to the government or school system. They were successful because they had the time and power to understand the specific needs of the local communities – they made the education relevant to the their lives (Taylor, 2003). The advantage of 'non-formal education' is that it allows programs to reach people in both rural and urban areas, and address their specific needs with more flexibility than central governments can. The most important aspect in making education relevant to communities is being able to recognize the needs that must be met for successful development of the population (Taylor, 2003).

Namibia faces many environmental issues, which challenge the nation as it continues to grow and develop. Therefore, EE, a topic that is typically not taught in schools, can greatly benefit the country, especially in rural communities. The NGOs and their programs mentioned above have the power to make an impact on communities where the traditional education system cannot address the local issues. NGOs can directly address relevant problems in communities. In the next section, we describe EduVentures, an NGO in Namibia attempting to increase environmental literacy in rural communities through non-formal education.

2.4 EduVentures: Non-formal Education in Namibia

EduVentures is a non-profit NGO based out of the National Museum in Windhoek, Namibia that provides non-formal education to Namibian schools. The organization focuses on EE, specifically the biodiversity, climate change, and sustainability issues that are of concern for Namibia. EduVentures' mission and vision statements reflect their commitment to preserve the

natural and cultural heritage while expanding knowledge of the environment. The dedication of scientists and teachers has helped grow this organization from conducting small projects with local students to planning an outreach program for rural communities. EduVentures was founded by Nicholas Krone (Teacher) and Tharina Bird (National Museum Scientist), in an effort to combine data collection for the National Museum of Namibia with an education experience for secondary school students (ages 14-18). The result was a successful trip to the outskirts of the Namib Desert that left students with a rewarding educational adventure and the museum with new specimens and information. Since its founding, EduVentures has developed expeditions and competitions that provide interactive learning experiences to Namibian youth. These valuable experiences will help them become future leaders in preserving their country's environmental treasures (EduVentures, 2008).

EduVentures' newest program is called EduMobile. In Namibia, it is a revolutionary project, as it is currently the only one of its kind that is taking EE to rural communities. The program is based on a mobile classroom, which is equipped with technology that can allow a truly interactive experience for rural learners. EduVentures is aware that education is very dynamic, and learning must be continuous. For that reason, the program devotes time to creating EE clubs at every school it visits. A more in-depth description and analysis of the program can be found in section 4.2.

EE aims to not only raise awareness of important topics, but to develop citizens into agents of change, who can collectively improve the quality of life of their communities. Namibia has more than just economic reasons to conserve their environment. While the government is making efforts to improve the overall education of the nation, they have a small role in EE. NGOs present an opportunity to fill in a void that the government can't – educating rural citizens

to be active members of the environmental community. In this chapter, we explored what other successful EE organizations can do, and we briefly discussed EduVentures and its promising EduMobile program. In the next chapter we describe our collaboration with EduMobile.

3.0 Methodology

The goal of this project was to understand how the key concepts of environmental education relevant to Namibia - biodiversity, climate change, and water resource allocation - can be transformed into a compelling educational experience for rural students. We achieved our goal through three primary objectives, which were as follows:

- Explore Namibia's current environmental education initiatives, along with their challenges and successes
- Assess EduVentures' field test of their EduMobile program in order to determine its strengths and weaknesses
- Determine the role that EE clubs can play in increasing environmental literacy

The objectives above will be covered in detail in Sections 3.1 through 3.3. To achieve these objectives, we utilized semi-structured interviews, group discussions, and surveys. After the objectives have been discussed, we will explain the challenges we faced in completing this project.

3.1 State of Environmental Education

Our first objective was to explore the state of environmental education in Namibia. In order to achieve this objective, we had to reach out to several environmental education (EE) organizations throughout the country. We were able to connect with many representatives from these organizations at the 2014 Namibian Environmental Education Network (NEEN) Conference in Swakopmund. This experience gave us the opportunity to collect valuable information on the state of EE in Namibia, and determine the challenges it faces. Because of the

many aspects of EE, we had to be flexible in our information collecting approach, and speak with as many educators as possible.

3.1.1 Organizations Involved in EE

Throughout our project we connected with many organizations that are involved in providing EE to students. These organizations include the Namib Desert Environmental Education Trust (NaDEET), the Cheetah Conservation Fund (CCF), the Gobabeb Research and Training Center (GRTC), the Ministry of Environment and Tourism (MET), and the United Nations Educational, Scientific, and Cultural Organization (UNESCO). Additionally, we connected with EE club supervisors from Hochland High School, Katji-na-Katji Secondary School, Gabriel Taapopi Secondary School, Linus Shashipapo Secondary School, and the University of Namibia.

3.1.2 NEEN Conference

The NEEN Conference is an annual event where students, teachers, and members from various organizations meet to discuss EE in Namibia. The 2014 conference was held at Westside High School in Swakopmund from April 24th to April 27th. The conference consisted of presentations from many EE organizations on their latest programs and projects. Participants also had the opportunity to go on an excursion in the Swakopmund area to learn more about the local environmental issues. We accompanied our sponsor EduVentures to the conference, where they showcased their new EduMobile program. At the conference we conducted several semi-structured interviews with many individuals including: Vilho Absalome, the head educator at the MET's Namutoni EE center and former NaDEET educator; Stephanie Bradley, an educator from

the CCF; Vicky Endjala, an educator from NaDEET; (John) Nyundu Kandjebo, the supervisor for the EE club at Katji-na-Katji Secondary School; and Dickson Kasote, an intern from UNESCO.

We spoke with these individuals about their experiences in EE and framed our discussions around the themes of student engagement, teaching approaches, program goals, curriculum relevance, and overall challenges. Specifically, we asked them questions like: How are students selected to participate in your program? What do students want out of your program and why do they go? How do students coming in to your program relate to their environments? How do you measure the success of your program? What do you see as the challenges facing EE? Why isn't it spreading and being effective? For complete notes from our interviews with Vilho Absalome, Stephanie Bradley, Vicky Endjala and, Robert Logan, please see Appendices A, B, C, and E respectively.

In addition to the discussions we had at the conference, we were able to stay in touch with many of these individuals via email. Two individuals agreed to meet with us in the week following the conference, Frans Kamenye and Liina Nantinda. In our post-conference interview with Frans, we were able to continue our conversation from the conference and he shared with us his experiences as director of education for the MET. We asked him about the role of the MET in providing funding for EE clubs, the availability of networking platforms for environmental educators, and the actions the government is taking, besides funding EE efforts, to address Namibia's environmental issues. Liina is the supervisor of the Hochland High School EE club and is a prominent figure in the Namibian EE community. Our interview with her focused on EE clubs and the role that they play in sustaining EE. Specifically, we asked her about club formation, operation, activities, and challenges. We hoped to determine the responsibilities of a

club supervisor, and what is necessary for EE club maintenance in the long-term. For complete notes from our interviews with Frans Kamenye and Liina Nantinda, please Appendices D and F respectively.

3.2 Assess EduVentures' Field Test of EduMobile

Our second objective was to assess EduVentures' field test of their EduMobile program, to determine its strengths and weaknesses. Specifically, we wanted to determine how EduVentures was going to address the challenges of EE, such as student engagement, language barriers, content relevance, and development of students' respect for their environment. Additionally, we wanted to determine how they planned on utilizing SMART technology in their education efforts. We carried out semi-structured interviews and group discussions with the EduVentures staff. We also interviewed and surveyed students from K.J. Kapeua Combined School, which was the first school that the EduMobile program visited. The knowledge we gathered about EduVentures and their programs helped us to determine the NGO's ability to provide an effective EE experience to students.

3.2.1 Interviews and Discussions with EduVentures

Two key staff members that were included in our semi-structured interviews were Corris Kaapehi, the program manager, and Maria Johannes, the environmental educator. While Corris and Maria were the developers of the program, the rest of the staff was also included in these interviews, and provided valuable insight into our project. We asked the EduVentures staff questions about the status and current goals of their EduMobile program. Specifically, some of the questions we asked were: What is the status of the EduMobile truck? How will we be

traveling to schools? Do you have any prior teaching experience? What is the planned teaching method for the program? A full list of questions from this interview can be found in Appendix G. Additionally, we studied the curriculum that EduVentures was planning to use for their program, so that we could be familiar with the content ourselves and be knowledgeable during classroom activities. Finally, we discussed the logistical details of the program, as well as EduVentures' long-term goals for EduMobile.

In addition to this first meeting, we had on-going discussions with the EduVentures staff concerning program updates and challenges. In some of these discussions we asked them to reflect on their experiences at the first school in their program. The purpose of these discussions was to get feedback from Corris and the staff and to discuss any changes we thought were necessary. The group discussion method was best in this situation because it allowed for the free flow of ideas and information. Group discussions have guiding questions or themes that are the primary focus, but that focus can be easily shifted by any of the group members. The ability for the topic to fluctuate gives members a lot of freedom in the information they want to divulge. This strategy aided us in formulating recommendations for the EduMobile program.

3.2.2 Interactions with Students from K.J. Kapeua Combined School

We travelled with EduVentures to K.J. Kapeua Combined School in Ovitoto to pilot their EduMobile program. Eighteen students were selected from the school to participate in the program. Over the course of the five-day program, we spent most of our time with the students, and were able to learn a lot about their lives. Throughout the week, we organized several group discussions with students, as well as conducted multiple surveys. Our notes from these discussions and other observations can be found in Appendix I, and the surveys we gave the

students can be found in Appendix J. The goal of the discussions and surveys was to evaluate the effectiveness and appeal of the EduMobile program. We defined program effectiveness as the ability of the program to ensure that students retained the information they learned throughout the week. We defined program appeal as the willingness and motivation of students to participate and engage in the program.

Group discussions

The schedule of the EduMobile program allowed room for several group discussions a day, mainly during breaks between activities and at meal times. Over the course of the week, we tried to gauge the students' interest on environmental issues, and if it was changing as the program went on. We asked them about the activities and lessons used during the day, which was their favorite, and which was their least favorite. Our group discussions were also a way for us to learn about the students' interest in addressing environmental issues. Finally, we gave students the opportunity to tell us anything they wanted to share about their views on the environment or their education. We wanted to learn as much as possible about how they value their local environment, and whether they were becoming motivated to take initiative in their community.

Surveys

While group discussions allow for open communication on various topics, surveys are very directed. This is useful to get very specific information from participants. We decided to complement our discussions with several surveys throughout the week. The surveys were designed to help us answer the same questions as the group discussions, as well as learn about how students communicate with one another. Some of the questions we asked were: What was your favorite activity today and why? How do you think you could preserve biodiversity around

your school? Name one issue in Ovitoto that you want to fix. How can an environmental club help your school? For more detail on the surveys we gave during the week see Appendix J. The surveys were distributed each day after the conclusion of the lesson, and were prefaced with verbal explanations of the questions. Ultimately, the purpose of the surveys was to attempt to gather additional qualitative data.

3.3 Environmental Education Clubs

Our final objective was to assess the role that EE clubs play in increasing environmental literacy. To learn more about EE clubs in Namibia, we first talked with the EduVentures staff. They were able to give us a list of several well-established EE clubs in Namibia, including the Hochland High School EE club in Windhoek. We met with four students from the Hochland EE club to discuss their roles in the club, how to club operates, and the club's role in the community. As mentioned earlier, we also were able to interview the supervisor of the Hochland EE club, Liina Nantinda. In addition to speaking with individuals from Hochland High School, we conducted several phone interviews with the supervisors of EE clubs at schools throughout Namibia. Lastly, we gathered knowledge from the students at K.J. Kapeua Combined School about their interest in creating an EE club at the end of the EduMobile program. The information we collected from all our sources gave us a comprehensive understanding of the role of EE clubs in increasing environmental literacy and the challenges they face.

3.3.1 Group Discussion and Interview with Hochland EE Club Members

We talked to our sponsor about EE clubs on a basic level, but we wanted to know how EE clubs are formed, how they operate, and how they can be maintained. We developed a set of

topics and themes for our discussion with the students from the Hochland High School EE club[3], and had the topics approved by the EduVentures project manager. EduVentures coordinated a meeting with the four students from the EE club, and offered us a space to conduct the discussion. We chose to utilize a group discussion method for the same reasons discussed in 3.2.1.

Of the four students who spoke with us, one of them was the student leader of the EE club, and another was the assistant student leader. The other two members were active participants in the club, having roles in organizing the upkeep of the school garden. We wanted to know why the students had joined the EE club, and how it had affected their lives. We asked questions about the club structure, club activities, and the day-to-day-routine of the club. The students told us about the impacts they had made on their school and community through being involved in the EE club. We gathered information on what had made their club a success, as well as the challenges their club had faced. At the end of the meeting, we opened the floor for the students to ask us questions or provide any more information they thought we should have in order to truly understand the workings of their EE club. The full conservation with the Hochland students can be found in Appendix O.

The purpose of our interview with the club supervisor, Liina Nantinda, was to learn about the role of the supervisor in EE club operation, and gain a better understanding of how EE clubs help to increase environmental literacy amongst students. Liina was able to share with us the vast number of experiences she has had during her career in EE and gave us a unique insight into how a successful EE club operates.

[3] Hochland High School is located in Windhoek, and has an enrollment of about 700 students.

3.3.2 Phone Interviews with EE Club Supervisors

The Hochland High School EE club was the only group we could contact in the Windhoek area, so in order to learn about other EE clubs, we reached out to schools across Namibia. Unfortunately, due to time, we were only able to meet with one other EE club supervisor, (John) Nyundu Kandjebo, the supervisor of the EE club at Katji-na-Katji Secondary School. This meeting occurred at the NEEN conference. In all other cases, we held short phone interviews with the supervisors of the clubs. Our goal was to gain a broader understanding of how EE clubs were run in different regions, and what kind of environmental literacy benefits they gave to students.

We spoke with four EE club leaders. These leaders were: Disney Andreas, the president of the environmental society at the University of Namibia in Windhoek; (John) Nyundu Kandjebo, from Katji-na-Katji Secondary School in the Kavango region; Fran Samende, from Linus Shashipapo Secondary School in the Kavango region; and Mr. Kaholongo, from Gabriel Taapopi Secondary School in the Oshana region. We asked these individuals questions concerning their club's formation, structure, activities, and community impact. In addition, we asked them about the challenges that their clubs have faced, and about what advice they would give to a new EE club that was just getting started. We were able to obtain email addresses for all of the EE club leaders we talked to, but we received limited responses to our follow-up questions. All phone interviews can be found in Appendices K, L, M, and N.

3.3.3 K.J. Kapeua Combined School EE Club Formation

Part of the EduMobile program includes educating students on how to form an EE club at their school. During the testing of the EduMobile program at K.J. Kapeua Combined School, we

were able to gauge the students' interest in forming an EE club. Through the group discussions and surveys discussed in 3.2.2, we asked students questions that alluded to the idea of an EE club, without specifically naming the concept. The idea behind this strategy was to determine if the students had interest in the things that would be required of EE club membership, instead of just interest in being part of a club. The EduMobile program assisted the students in forming their club towards the end of the week, and at this point we directly asked the students what they would want to accomplish with their new EE club. By using this progression of questions throughout the week, we were able to determine if there was sufficient interest among the students for an EE club to be successful at K.J. Kapeua Combined School.

3.4 Challenges

We encountered several challenges collecting and analyzing data throughout our project. One of the obstacles we faced was difficulty communicating with a few members of the NEEN conference, due to language barriers. Often times, we would have to repeat our sentences, talk slowly, and be sure to enunciate our words for them to understand. They had to do the same for us to interpret what they were telling us. Similarly, when we gave students surveys, it was difficult to get valuable feedback from them, as they did not understand our questions, and we sometimes did not understand their responses. Initially, we only gained information on Namibia's state of EE from our sponsor, who gave us a skewed view of the students' actual level of education. This affected our ability to fully comprehend the challenges we would face during the school visit, such as the student's English abilities. In addition to the language barrier, the students were overly cautious when giving us feedback and almost always refused to give us

negative comments. They did not want to insult us, or the EduMobile program in anyway. We had to work hard to extract useful, honest data from the students. .

During our interviews with the EduVentures staff, both from the United States and in Namibia, we encountered bias, as they were unfailingly optimistic about the progress of the EduMobile program. However, the mobile classroom truck and the SMART board, which are core components of the EduMobile program, were not available during our time in Namibia. These challenges gave us a skewed assessment of the complete EduMobile program. We also had to adapt our project and question topics for the school visits due to the status of the EduMobile program.

The Namibian school system held examinations during the critical moments in our project when we would have liked to have longer in-depth discussions with students in EE clubs. Due to the examinations, the students were unavailable to meet as often as we would have liked. Our phone interviews also were challenging as the language barrier made it difficult to get our point across and understand the interviewee.

The project was approved by the IRB. There were no known risks to NGOs, EE clubs, principals, teachers, or students associated with any of our methodologies. The surveys and interviewee identities were kept anonymous by request, and the students' responses were kept anonymous by default.

4.0 Findings and Discussion

In this chapter, we discuss the challenges of developing environmental literacy, and the strategies devised by various environmental education (EE) organizations to overcome them. We also discuss how EduVentures can apply these strategies to address the challenges, and how environmental education initiatives can be sustained by student involvement in environmental clubs.

EE efforts in Namibia are focusing on educating secondary school students on the importance of sustainability, biodiversity protection, and other environmental issues. The goal of these programs is to provide students with the necessary skills and knowledge to initiate change in their communities. By reaching the youth, EE also aims to create a more environmentally responsible, future generation that will have the power to undo the problems that have been caused by years of environmental negligence. Additionally, these programs seek to develop students professionally, by improving their leadership and presentation skills, as well as their overall confidence and critical thinking abilities. As one might expect, however, from such an innovative approach to education and youth capacity building, environmental educators face a number of challenges.

4.1 Challenges of EE in Namibia

Resistance Against Environmental Education

Through our interviews with environmental educators, we observed that many efforts encountered resistance to environmental initiatives from communities. EE concepts are relatively new, and sometimes they conflict with habits that have been in place for many years. This is especially true in rural communities. Frans Kamenye, Head of Education at the Ministry of

Environment and Tourism (MET), explained how people's "stomachs" are more of a priority than the environment. He explained that if a community has been hunting in an area for many years, educators cannot simply expect them to stop because they are hurting a certain species. This frustrates both groups, and the relationships can be damaged, even severed. Another example of this social challenge revolves around firewood. Rural communities obtain firewood by cutting down surrounding trees, without realizing that this action contributes to desertification. The biggest resistance, however, is found in smaller habits, like littering, or irresponsible water usage. We noticed that even educators themselves had conflicts with environmentally responsible habits. Educators from the Namibia Environmental Education Network (NEEN) conference would sometimes litter during field trips, and many meals were served on Styrofoam plates. Frans Kamenye reminded us that it is a slow process, and the root of the problem is people's upbringing, which is why there is a focus on EE for the youth.

Education Gap Among Namibian Schools

Many educators at the conference were aware that different regions of the country have differing levels of education. As he was talking about the Gobabeb Research and Training Center's (GRTC) upcoming program in May, Robert Logan said, "For this upcoming [program], we have a couple schools from the rural north, and a couple from Windhoek. Judging by the quality of their applications, their education and grasp on environmental science will be vastly different, and we haven't dealt with that before." He also expressed concern about the language barrier that would present itself when dealing with these students. Even though Namibia's official language is English, there are 9 officially recognized languages, and the count goes even higher if all existing dialects are considered. Officially, English is not used until the third grade,

but sometimes it is not even enforced in higher grades. Dickson Kasote, a UNESCO intern, spoke to us on the subject: “It is just a matter of time until the nation’s teachers start actually teaching in English. However, it is a serious problem […].” They are currently planning to address this challenge by splitting the students into groups with equal representation from different schools, “[taking] it slow and [keeping] it simple,” and relying on the school’s teachers that come along to the program.

Tailoring Environmental Education to Local Issues

All of the organizations we talked to at the NEEN conference hosted their EE programs at their facilities. This presents a challenge in making EE relevant to the home environments of the students. For example, the GRTC Research Center is located south of Swakopmund, in the Namib Desert. Students that attend the GRTC from northern Namibia live in a completely different environment. Figure 5 shows how varied the ecology of Namibia can be from region to region. To combat this challenge, the GRTC refrains from using advanced technology for teaching its programs. He mentioned that it is easy to get students excited when they use advanced technology, but they might relate science exclusively with the instruments they use, instead of the process revolving around them. The center focuses on conducting simple activities that can still carry educate and prepare students. By keeping the activities simple, students can replicate them at home and learn more about their local, more-relevant environment.

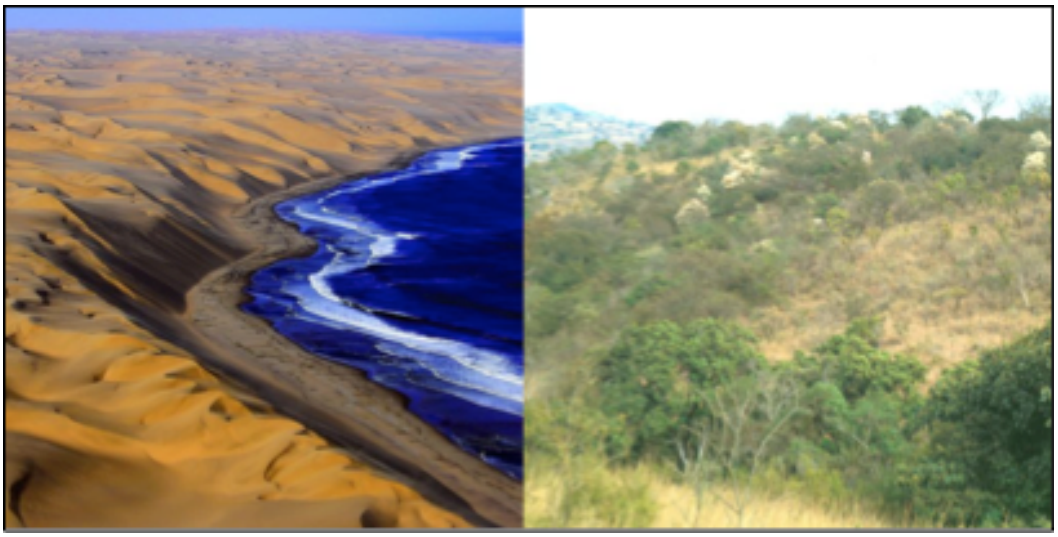

Figure 5: Namib Desert (right) and Shrub Savanna of the North (left) of Namibia. Source: (Pielow, 2007)

In addition to the above challenges, EduVentures will face additional ones because of the uniqueness of its program. It is unique in the sense that it is the only EE program in Namibia that takes the educational experience to the students' local environment. Besides the language barrier, the main challenge will be sustaining the students' interest in EE after the program is over.

4.2 EduVentures and EduMobile

In this case study, we will discuss EduVentures' new program, EduMobile, and its success and shortcomings during its first pilot run. We will consider what EduVentures hoped to accomplish through the new program, the curriculum they devised and how they put into practice, the challenges they anticipated and how they planned to address them, as well as our role during the field visit as participant/observers. Of course, the strength of a case study is that it allows multiple perspectives to be examined, and so we also discuss student attitudes to the EduMobile lessons and field activities, and more broadly, what they saw as valuable and less valuable. .

EduVentures is an NGO-Trust in Windhoek, Namibia. Its goal is to increase the environmental literacy of secondary school students, which refers to the knowledge, tools, and sensitivity to properly address an environmental problem. An environmentally literate student has an intimate knowledge of his environment, and how his actions can contribute both positively and negatively to it (Carnegie Melon University, 2003). EduVentures has set out to increase environmental literacy among Namibian youth. Previously, EduVentures has done this by providing students with an opportunity to explore Namibia's biodiversity through expeditions to various locations. After realizing that the expeditions were too costly, and were an unsustainable way to educate Namibians about the environment, EduVentures decided to begin a new cost efficient program that would target rural schools.

EduMobile is the NGO's most recent program. As the name suggests, the program will use a large truck, transformed into a mobile classroom, to travel to various Namibian schools. The sides of the truck can be folded outwards, to create a spacious and open classroom, equipped with 20 desks, scientific equipment, and a SMART board[4], which is an interactive digital whiteboard display. In Figure 6, the truck can be seen in its early stages of construction. When the sides are folded out, the truck looks like a butterfly, which is what earned the program its alternative title, "Ombombo," or "butterfly" in Herero. The sides, or wings, of the truck will be outfitted with solar panels that can generate enough power for all of the equipment in the classroom. The EduMobile classroom is expected to be operational by the end of 2014[5].

[4] EduVentures is new to SMART board technology, so we created a how-to-guide that will teach them how to develop effective lessons. This guide can be found in Appendix B.

[5] Unfortunately, even though EduVentures commissioned the assembly of the truck over a year ago, it is still incomplete. Progress of the truck's construction is slow due to its unique design. A supporter of EduVentures had donated the SMART board several months ago, but it was not delivered until April 28th, 2014, which was too late for them to use the board during the duration of our project

Figure 6: The EduMobile truck under construction. Source: Tauno Iipinge, used with EduVentures' permission.

4.2.1 The EduMobile Program

The EduMobile program is different from many of the other EE initiatives in Namibia because of where the program takes place. Many EE organizations have research centers where students come to learn about the environment. Subsequently, the students learn more about the environment surrounding the research center than about their own local environments. Since the EduMobile truck will travel to the students' school, the students' local environment will be the focus of instruction. This concept has yet to be explored by EE organizations in Namibia, and EduVentures is the first to pioneer this new educational strategy.

Despite the truck being under construction, EduVentures decided to start the pilot phase of EduMobile. The goal of the pilot phase is to test the program and gain valuable insights on how it can be improved in the future. The pilot phase consisted of EduMobile visiting twenty schools, starting with K.J. Kapeua Combined School in Ovitoto, located 150 km north of Windhoek. The location of K.J. Kapeua Combined School can be seen in Figure 7. During the

pilot phase, EduVentures hopes to refine lesson plans and field activities, and solicit student reactions in order to determine what aspects of the program need further development before launching EduMobile into full operation.

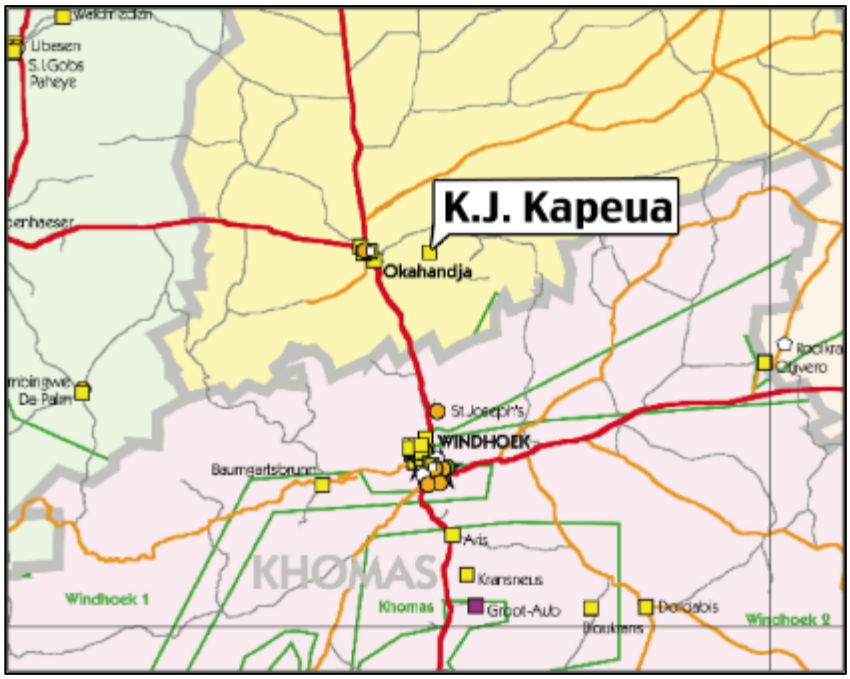

Figure 7: Regional map showing the location of K.J. Kapeua Combined School, north of Windhoek and east of Okahandja. Source: Corris Kaapehi, use with his permission

Part of the pilot phase is to estimate the success of the lessons in terms of student comprehension and satisfaction. To do this, our team was asked to evaluate the program on the basis of our observations and in-depth discussions with students. Our notes from these discussions, and other observations throughout the week, may be found in Appendix I. We were able to interact and play with the students between activities, gleaning many useful insights into their lives. After each day's activities, we asked the students a few questions on the blackboard about the day. Their responses supported many of our observations and conclusions about the EduMobile program. Another way that EduVentures expected to measure the effectiveness of their program was through content-based questionnaires given at the beginning and end of the

program. The questionnaires were meant to compare the student's understanding of environmental topics before and after the program. Our surveys were less content oriented as the questionnaires, and were given out daily.

The EduMobile Schedule

The EduMobile program consists of a short pre-visit, and then five days at each school, as can be seen by a summary shown in ***Table 1***.The beginning of the week is lecture oriented, while the end of the week is action oriented. The topic taught the first day depends on the area being visited, which makes the program immediately relevant to students. The first topic will be on biodiversity, climate change, or heritage. EduVentures will always teach sustainability on the second day of the program, since they have recognized that is a relevant topic for all. On Wednesday, there is a field trip to local areas of environmental concern. The field trip gives EduVentures a chance to assess the students' awareness of environmental issues, and gives them the chance to learn more about their immediate surroundings. The day is meant to inspire students as much as possible, so that on Thursday, students will be excited to create an EE club. Finally, Friday is meant as a conclusion to the program, where students can share what they have learned through a final project that they present to their peers.

Pre Visit	Monday*	Tuesday	Wednesday	Thursday	Friday
Introduce EduVentures to students and school staff	Interactive Lesson on: **Biodiversity** -or- **Climate Change** -or- **Heritage**	Interactive Lesson on **Sustainability**	Field trip to local sites of environmental concern	Interactive lesson on **How to form and maintain Environmental Clubs**	Project Presentation

Table 1: Summary of five-day schedule of the EduMobile program. *The first day's lesson depends on the area being visited. Previous knowledge on the area allows EduVentures to select which of the three modules would most benefit the visited school. **Students are assigned a project on Thursday night, and they have the entire day on Friday to complete it. The project varies with each location site.

4.2.2 K.J. Kapeua Combined School Site Visit

K.J. Kapeua Combined School is located in Ovitoto, a small town about an hour and half north of Windhoek. The last half hour of the journey takes place on a bumpy dirt road. The town is situated on a flat grassy area between a few small green hills. Most of the people in Ovitoto are Herero, and live off cattle farming. The cattle, donkeys, and horses roam freely on gravel streets and the surrounding countryside, as can be seen in Figure 8. The structures in the town are made of cement or brick and are scattered around the area.

Figure 8: Cattle roam freely through the schoolyard.

The largest thing we saw in Ovitoto was the K.J. Kapeua Combined School. The school has a medium sized campus with about 500 students. There were several dormitories, classrooms, offices, and one large building that doubled as a cafeteria and auditorium. The cafeteria had several wooden tables and chairs that were spread across the floor and stage and would fit about 250 students. The tables and chairs were starting to fall apart, and looked old.

The walls were lined with large industrial sinks, but only one of them worked. The others were all disabled or broken. Most of the windows were shattered, and the ceiling was rotting from water damage in several places. A couple of the light fixtures were hanging precariously from the ceiling. The cafeteria needed a lot of repair work, but it was still usable. The building can be seen in Figure 10. The classroom, as seen in Figure 11, where the program took place was in much better condition. All of the windows were intact, and the ceiling had no major problems. The principal's office was also in good condition. In general, the physical state of the school was usable, but could benefit from repair work. The main entrance of the school can be seen below in Figure 9.

Figure 9: The main entrance of the Ovitoto K.J. Kapeua Combined School. The building on the far left was the building where EduVentures conducted their program.

Figure 10: Students being served breakfast at the cafeteria. The broken sinks can be seen lining the walls to the right and there is significant ceiling damage. Source: Tauno Iipinge, used with permission from EduVentures

K.J. Kapeua Combined School has limited educational resources. Only one of its computers functioned. In the classroom, one desktop computer was labeled as *computer*, but it was not operational. It was there just to show students what a computer looked like. The teachers rely on black boards and flip charts to teach students. The projector that EduVentures used was foreign to some students. It was unclear if students had their own notebooks and pens during the regular school year, since EduVentures supplied both.

Figure 11: Corris teaching students in the classroom. Source: Tauno Iipinge, used with permission from EduVentures.

Student Demographics

The school enrolls students from kindergarten up to 10th grade and is a boarding school. Most of the students were from Ovitoto, but some came from Katutura. All of these students were focusing their studies in agriculture or accounting to help their families manage cattle farms. Many of the students were related to each other and of the 18 participants, there were four main families.

Most of the participants of the program were between the ages of 14 and 19, but there were a few younger students as well. In planning the program with the school, EduVentures had stipulated that the students apply to the program by writing an essay telling EduVentures why they wanted to participate. The idea was to identify the most motivated students and to learn more about their interests. The students, however, were busy studying for exams, and the school's science teacher waived the essay and instead selected 18 students to participate in the EduMobile program on his own. The teacher's decision, understandable given the circumstance, complicated EduVentures' site visit. As we came to realize, not all of the 18 students wanted to

be a part of the program; some felt they had been forced to stay at school during the first week of the school holiday. Others, however, seemed interested in the EduMobile program.

Through our observations, the students' relationship to their environment, and Namibia's environmental issues was determined to be minimal. Few of the students were able to connect the environmental practices in the area, such as waste dumping and excessive water usage, with the consequences. For example, they knew that cattle had died from eating garbage and inbreeding animals was bad. Their knowledge was useful for them to understand how to keep their families' cattle alive and healthy, but the students did not have a deep understanding of the environmental issues that led to excessive litter or inbreeding. However, the students' familiarity with cattle did give EduVentures' a way to connect their topics back to the students' lives.

4.2.3 EduVentures' Pedagogical Approach

Corris Kaapehi, the project manager of EduMobile, and Maria Johannes, another EduVentures employee, developed and taught the lessons at Ovitoto. The two of them created a curriculum focused on biodiversity, heritage, sustainability, and climate change, which they used to frame their lessons. The curriculum was developed in cooperation with the students from Hochland High School and the Namibian Desert Environmental Education Trust (NaDEET). The high school students gave EduVentures feedback on the appeal of the curriculum, while NaDEET helped with the content of the curriculum. The Hochland students were instrumental in keeping the curriculum grounded and relevant to teenagers. However, EduVentures should have considered their vastly different backgrounds from the Ovitoto students. The Hochland students required a different level of education, and were not the best judges at foreseeing how the curriculum would affect rural students. The curriculum was approved by the Ministry of

Education (MOE), so EduVentures was able to use it as a framework for developing the EduMobile lessons. Corris can be seen helping students in Figure 12.

Figure 12: Corris helps students understand how to complete a project. Source: Tauno Iipinge, used with permission from EduVentures.

In designing the lessons, EduVentures placed a lot of emphasis on the interactivity of their program. The staff hoped to engage students through a variety of teaching methods. In order to give students a hands-on experience, EduVentures was hoping to engage students with class discussions, group projects, presentations, outside excursions, movies, and educational games.

4.2.4 Execution of Lesson Plan

A large portion of the lessons consisted the EduVentures staff giving long PowerPoint presentations. At times throughout the lectures, the staff would ask the students comprehension questions. These questions went largely unanswered by students, as they were shy about

speaking up in front of the class. The staff would go from student to student until someone offered an answer. While the staff hoped for rich student discussions about the topics at hand, we observed that students were uninterested in the subject. Often, students had their heads down on their desks, or were looking away from the front of the classroom. When asked to answer a question, students would hide their mouths and divert their eyes from the staff members. Students were shy to answer, especially since they had to speak in English. If a student mustered the courage and confidence to answer a question, but was incorrect, the rest of the class could be heard snickering at the student. As a result, here were never any successful group discussions between students and staff. Students never asked the staff content clarification questions, and the classroom was always staff oriented. The language, unsupportive students, and inexperienced teachers all led to the one-sided classroom dynamic.

There were a handful of times that the students worked in groups to complete staff assigned projects. By assigning projects, EduVentures hoped to solidify the students' understanding of the lecture topics. The students would have to discuss the topics amongst themselves in order to complete the project, which encouraged a student-centered learning style. During the projects, the students were asked to recall the concepts that had just been taught. For example, student groups had to collaborate to create a flipchart poster explaining environmental topics, such as food webs, green energy sources, sustainable development pros and cons, and assessments on local flora. There were four student groups, as there were four tables in the room. The student groups can be seen working in Figure 13.

Figure 13: A group of students work together to create a project flipchart poster. Source: Tauno Iipinge, used with permission from EduVentures.

The teacher gave instructions to students on how to complete the project, and then walked around the classroom to help facilitate student discussions and comprehension. Mostly, this method worked well to involve students in the content of the lesson. Many of the students leaned in towards their group partners to listen to and share ideas. Unlike during the lectures, the students were vocal about their thoughts, and seemed to enjoy working with their peers. A student leader emerged from each group who was responsible for marshaling the group. Despite the majority of students, some seemed uninterested in helping their group complete the project and would not offer any assistance. However, most students were willing to support their classmates.

After the students were done with their project, they presented it to the rest of the class. EduVentures called one student per group to present the group's project. They wanted the students to practice their presentation skills, improve their public speaking, and build their confidence. Student presentations shift the class dynamic from the staff to the students, and help

to form a student-centered education style. The presenters were shy and did not want to talk in front of the class. The student presenters did most of their talking while facing the flipchart poster instead of the audience. Often, they became flustered while presenting, and had to be prompted to continue by the staff. They seemed unprepared, especially in terms of what to say, and usually resorted to reading aloud the contents of the flipchart verbatim to the class. Presentations were hard to watch, as the audience could feel how uncomfortable each presenter was. It was clear that the students had little to no presentation experience. One presentation can be seen below, in Figure 14.

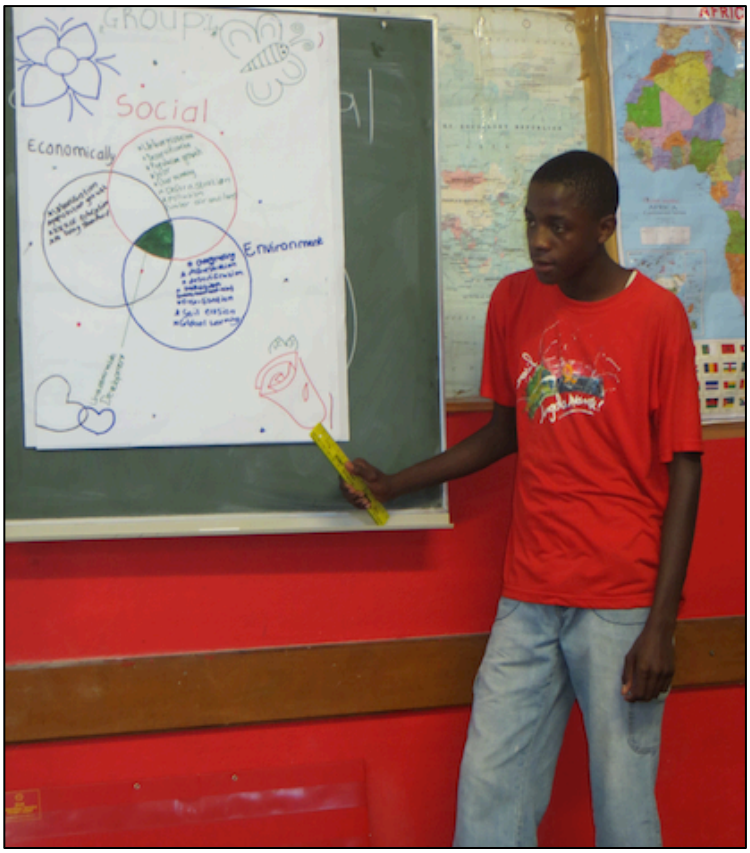

Figure 14: A student presents his group's work to the class. Source: Tauno Iipinge, used with permission from EduVentures.

EduVentures showed two movies during the class lectures, one on bottled water, and another on negative side effects of green energy production entitled *Climate Crimes*. They hoped that the movies would catch student's attention, as it was a break from the PowerPoint lectures. The movies were meant to provide material to the students in a fun and original way. The bottled water video was short and simple, but was only well received by a few of the students. Most of the students said that the video's English was too quick to understand. *Climate Crimes* was about an hour long, and many students had a hard time paying attention. The video was shown in midafternoon when the classroom was quite hot and stuffy. As a result of the heat and monotonous drawl of the video, many students starting to fall asleep. When quizzed about the movies, the students were able to offer answers to the first video, but not to the second. The students told us that both videos' English was too complicated for them, and that they couldn't even understand what was being said. Through the anonymous surveys discussed in Section 3.2.2, some students said that watching *Climate Crimes* was their least favorite activity of the day. Showing movies in class is not a student centered learning activity, and can be detrimental to the program's effectiveness.

EduVentures led an educational game on Tuesday afternoon. The game was held outside, and was meant to teach examples of sustainable development practices. EduVentures had played the game at a previous event, and knew that it excited students to learn about the content. The game split the class into two teams, which added a competitive edge to the learning. Both teams had a collection of pictures, each one representing a sustainable development practice. The students had to identify the correct card, and then run it to the staff. The first team to arrive with the correct answer won the round. The game combined educational material with physical activity, which was greatly enjoyed by the students. Many of the students listed the game as their

favorite activity of the day, and one said "[my favorite activity] was the game we played early because I was having fun with everyone." They were very interested in winning, which meant they had to be paying attention to the content being taught. The game was a more student centered activity because the students had to build the relationships between words and pictures themselves. They were also involved in the pace of the activity, since the game didn't progress until the teams answered.

The students also did well in the outdoor excursions that EduVentures held. The intent of the outdoor activities was to put students in their local environments, and inspire them to care about it. On Monday, the students spent a large portion of the day collecting samples of local flora and fauna. The students were split up into three groups for the collection activity, and went to different areas adjacent to the school campus. They used simple tools to do their collections, such as vials, labeling paper, and buckets. The only complicated tools were Sherman traps[6], microscopes, and GPS locators. They did a good job of balancing the fun with the scientific requirements of the trip, such as marking the GPS coordinates where samples were found. When we asked what their favorite activity of the day was, one student said "Working around and collecting animals. Because it was fun working around it's something that I never done before; it was nice very nice." The students enjoyed working outside. All of the samples were brought back to the classroom before lunch.

[6] Sherman traps work similar to mice traps, except they are shaped like a box and do not kill the trapped animal. They have a trap door that closes once small animals walk in to obtain the food that was placed as bait.

Figure 15: Students examine biodiversity specimens under a microscope. Source: Tauno Iipinge, used with permission from EduVentures.

After lunch, the students had to identify all of the samples they had collected. However, the staff did most of the work, as the students were not properly trained in biological classification. Each group had a microscope with which to examine specimens in detail. The students were untrained on how to use the equipment, but learned the fundamentals quickly enough to use them for the activity, as seen in Figure 15. The students were excited in the beginning of the classification activity, because of the variety of captured bugs. Some students were able to find scorpions, such as the one in Figure 16. However, since students were not able to identify many of the samples, the activity lasted several hours. One student told us that, "Classifying the collections into certain groups [was my least favorite activity of the day], it took a lot of time to do that" By the end of the activity, most of the students were losing interest.

Figure 16: A scorpion that students collected during Monday's biodiversity collection activity. Source: Tauno Iipinge, used with permission from EduVentures.

Wednesday was the field-trip day where EduVentures hoped to show students the environmental issues in the local community. EduVentures wanted students to see the issues that are present right around the school. The intent of the field trip was to inform students of the problems in their community, and encourage them to think of solutions.

Corris led the students on a two-hour walking field trip around the perimeter of the school, stopping to explain environmental issues as he saw them. First, he led them about five minutes from the school campus, and into some lightly vegetated area. The area was grassy and full of bushes and small trees. Corris found an example of an invasive species and explained its significance to the students, who were huddled in a circle around him. The students were interested by the invasive species, and were playing with its leaves and thorns. When Corris asked if students had questions, they asked about the details of the species, such as where it came from, and how to get rid of it. One student even suggested a possible solution for removing the invasive species. The level of student interaction with Corris was unprecedented thus far. Corris did a good job of explaining why the invasive species was detrimental to the community, which

sparked the students' interest, and made them eager to pay attention. The invasive species can be seen in Figure 17.

Figure 17: The invasive species that was explained to students during Wednesday's field trip. Source: Tauno Iipinge, used with permission from EduVentures.

Next, Corris found an example of soil erosion not too far from the first stop. This site was located in a sandy area that was likely a dry streambed. As Corris explained the causes and effects of soil erosion, the students got in a circle around him. The students in the front sat down so that the students in back could see. Almost all of the students were actively paying attention to Corris. He used a stick to draw diagrams in the sand of the streambed, and asked students questions about what he had just taught them. The students were able to offer correct responses to the questions, but did not have any follow up inquiries.

After explaining the soil erosion site, he led the students down the streambed, stopping to show local flora along the way. Eventually, the group left the streambed, and headed back into a grassy area. The group was heading towards the town' dumping site, which was about 20 minute walk away. As the students approached the site, a pickup truck full of trash pulled up and began

to unload its cargo into a large trash pile sitting on the ground. The trash pile had been burned before, but kept on growing regardless. There were pieces of garbage cast all around the site, making the area incredibly unattractive.

Corris led a discussion at the trash pile about waste management challenges, and how the trash at the dumping site could directly affect the students. At first, when asked to discuss possible solutions to the problem, students were quiet and offered no answers. However, after Corris prompted them further, they began to suggest options for dealing with the waste pile. We also helped encourage students to speak up during this conversation. One student suggested that the pile be burned again, while another suggested that a wall be constructed around the site to keep the trash from blowing into Ovitoto. Corris found ways to tie the waste management issue back to the students' lives, by asking the students how waste affected their cattle. The students knew that if cattle ate waste, then they would become sick, and would negatively affect cattle related profits.

After the completion of the waste management discussion, students were split up into three groups, and went out to the same areas from Monday's excursion. This time, the students were going to conduct a veld assessment[7]. EduVentures wanted the students to conduct a scientific and quantitative field assessment. The veld activity was meant to give students experience in conducting important fieldwork. However, the activity only engaged about a third of each group, and lost the interest of most of the students. There were only three primary roles that needed to be filled for each group. Once these roles were filled, the remaining students did not know how to engage in the activity, and instead laid on the ground and napped.

[7] A veld assessment determines what kinds of flora exist in a given area. In this case, students were to take 100 steps, and on each step, record what kind of flora was in front of their foot.

Figure 18: Students walking back from the dumping site. Source: Tauno Iipinge, used with permission from EduVentures.

As one would expect, in this first class visit, the pedagogical approach used by EduVentures had strengths and weaknesses. The staff led most of the lessons, with little active involvement of the students. The staff was in control of the class during all of the PowerPoint lectures, which accounted for the majority of the program time. One weakness of the program was that students were not able to contribute much to their own learning. While the field trip would have been a great opportunity to begin the program with relevant education, the students lacked the basic EE required to understand the issues that were pointed out during the activity. They did not have confidence to lead class discussions, or the opportunities to share with EduVentures what kinds of environmental issues they knew about in their community. Except when collecting flora and fauna, and during the field trip, the students were expected to pay attention and do as they were told. The class environment was strict, and students were scolded if they did not cooperate with the staff. For example, one student was told to leave the classroom for not wanting to present in front of the class.

A strength of EduVentures' approach was the ability to spend a lot of time trying to encourage students to develop their cognitive skills, such as critical analysis, presentation skills, creativity, and problem solving. Many of the questions EduVentures posed to students required them to think deeply about the topic at hand, and the presentations encouraged them to be creative and build their self-confidence. However, students rarely answered questions or presented well, so it was hard to determine how effective EduVentures was at developing students' cognitive abilities.

4.2.5 Club Formation

As part of the EduMobile program, EduVentures set up an environmental education club at K.J. Kapeua Combined School. EduVentures plans to set up a club at every school that EduMobile visits to encourage students to stay active in EE. They expected that students would need help forming the structure and goals of a club, so they dedicated a day of EduMobile to discuss club formation.

Club formation in this school occurred at the end of the weeklong EduMobile program, after the students had learned about various environmental topics. The formation of these clubs was facilitated by EduVentures, but was ultimately put in the hands of the students and their science teacher, who would eventually become the supervisor for the club. EduVentures also left the club with a sum of money to help them get off the ground and pursue a project on a local environmental issue.

The club was explained on Thursday and officially formed on Friday. On Thursday, EduVentures gave their lesson on how to build EE clubs. The presentation topics ranged from what an EE club is and does, to how to hold meetings and organize club events. The presentation

had lots of ideas for club activities and places to travel. However, their presentation may have been too detailed for students who were just starting to think about the idea of a club. EduVentures was giving details such as how much food to buy for a club trip, when the students were still struggling to understand the role of the club in the community. The science teacher at the school was present for some of the club formation discussion. He was able to get the students talking about the club, but was then quick to shoot down their ideas. The students wanted to find ways to fix the broken and leaking pipes around the school, but the science teacher told them that this was impossible, and gave a list of reasons why it could not be done without considering all potential solutions. This negativity damaged the class dynamic, and slowed the student discussion about forming a club.

However, after several hours of detailed lecturing and discussion with EduVentures, the students finally came up with five objectives for their club. The students wanted the club to focus on the local environmental challenges that had been discussed throughout the week, such as the waste management issue. Overall, the students seemed interested in the club and excited to help their community.

4.2.6 Role of WPI students

We accompanied EduVentures to Ovitoto to observe and assess the EduMobile program, as well as provide any additional assistance that they required. EduVentures was expecting us to help organize the students during the large group activities. They were aware that we would be assessing how the curriculum was implemented and were expecting to have a debriefing meeting when we returned to Windhoek to discuss the program's strengths and weaknesses.

While our main role was to evaluate their program, we were also tasked with assisting the staff. Our assisting role mostly consisted of helping control the students when the class was divided, and offer further explanation during the activities. Our group offered guidance to the students when they needed assistance. We spent a lot of our free time playing with the students and learning about them. On Tuesday, we played a full game of football (soccer) and tied at 5-5. They enjoyed playing with us, and it was a great bonding activity. We also brought a Frisbee with us, and spent a lot of time playing catch with it. The students learned how to throw the disc quickly. Figure 19 shows the students playing Frisbee with us, and Figure 20 shows one of our group members with them after playing. They also learned a game called Rodeo very quickly, despite its complicated rule set and English instructions, which led us to believe that the students knew English at a higher level than they showed in the classroom, and learned well through games and competition. By fulfilling our responsibilities to EduVentures and befriending the students, we were able to gain multiple perspectives on the program's success, as well as glean personal insight into the everyday lives of these students.

Figure 19: Ovitoto students playing Frisbee

Figure 20: K.J. Kapeua students and a WPI student

4.2.7 Challenges

The EduMobile program is the first of its kind and K.J. Kapeua Combined School was the program's debut test run. There were many challenges that EduVentures faced. The language barrier between the students and staff made it difficult to communicate. The students were not as well educated in the areas that EduVentures had expected them to be, which made many of the environmental topics confusing. Students struggled with their English, mathematics, and critical thinking skills. For example, most of the older students could not communicate complex ideas in English. Many of the students were not able to compute percentages out of a 100, and all of the students had trouble applying the content they learned to local issues. These challenges were exacerbated by the staff's lack of teaching experience. It is important for these challenges to be properly recognized, so that they may be addressed in future iterations of the EduMobile

program. While these challenges have been faced by other EE organizations, no one has had to address them in the same way that EduVentures has. EduVentures' EduMobile program is the first program that brings an environmental education to the student's home. The challenges were intensified by the new approach, and EduVentures should be commended for their efforts.

Communication Challenges with Local Students

Namibia's official language is English, but students are taught the language only after the second grade. We observed that in their everyday life, outside of school, English is not used and as such, students had trouble understanding and answering questions asked in English. The students' level of English presented a challenge for the retention of the content being taught, and our interactions with students. At the end of each day, we wrote simple questions about the day's activities on the black board, and had students give responses on a piece of paper. The questions were as simple as "What was your favorite activity today?" and "What was your least favorite activity today?" We were concerned that students wouldn't understand the questions due to their weak understanding of English, so we made sure to frame them as simply as we could. We offered students the chance to ask clarifying questions, but every time, every student said they understood them. However, there were many answers that we could not use for this project, because the students had trouble comprehending what our survey questions were asking. Most of the responses were nonsensical and contradictory. For example, students would give the same exact answer for their favorite and least favorite activity. After realizing that the students were having trouble understanding our questions, we tried to further simplify them. Despite making the questions very clear, many student responses were still incomprehensible. Full responses to all surveys can be found in Appendix J. When asked about what they liked the least from the

lesson on sustainability, five students mentioned a movie that was shown in English. They did not like it because the speaking was too fast, and they couldn't understand. One student wrote, "[…] I didn't like the movie we watched about bottled water because at times I couldn't understand the person who was speaking and it was difficult for me to answer the questions [you asked]."

Even though the official curriculum for secondary schools includes time dedicated to EE, students had been taught very little about this topic. When asked who had ever heard of the terms *biodiversity*, *sustainability*, and *climate change*, less than a third of the 18 students participating in the program raised their hands.

Challenges in the Execution of the Program

In one of our initial meetings with Corris and Maria, they both expressed that they were feeling nervous, since they didn't have any teaching experience. However, they were both confident of their knowledge on environmental subjects and their previous expeditions with secondary school students would allow them to run the program successfully. While they both knew the content very well, there were certain aspects of the execution of lessons and activities that could have benefited from experience in teaching. Good teaching practices such eliminating distractions and maintain order in the classroom, come with experience. Hopefully once Corris and Maria teach a few more schools, they will gain experience and insight that will help to improve the activities and lessons.

Since the participating students were from different grades, the EduVentures staff had difficulties explaining things at a level of complexity that was simple to understand for the younger kids, yet stimulating for the older ones. When discussing the second day of lectures with

a grade-9 student, she said, “Today the English was fine, but I couldn’t understand the content. The way they explained it was too complicated.” Adjusting the content complexity to be appropriate for all students is a difficult challenge to overcome.

We observed that sometimes the students successfully memorize a concept, but need a lot of guidance connecting it with others, and contextualizing it through their environment. The students’ inability to think critically led to difficulties in the program, as Corris did not know how to make students synthesize information into valuable conclusions. This is a common challenge in all teaching environments. In one activity, the students created charts comparing the percentages of certain types of flora in their community. The students were asked to make a conclusion from the percentages, and tell the class what the chart was showing them. All of the pertinent information needed to make a practical conclusion had been given to the students earlier in the lesson, but none of them were able to apply the information to their data. The students relied on Corris and Maria to walk them through the connections in the content step by step. Through the survey responses, we determined that some students had memorized the definitions of the terms explained in lessons, but did not actually understand them. The students could recite definitions, but were not able to apply their meanings to answer simple follow up questions. For example, students said that they understood the importance of biodiversity, but when asked what the importance of biodiversity was, had no answer. In another case, students were asked what sustainability meant. After answered a correct definition, they could not offer any sort of commentary on their school’s sustainable, or unsustainable, practices.

On more than one occasion, both program leads seemed overwhelmed by the number of students during the activities. The additional help we provided was necessary when the students were divided into groups during activities. One of the reasons why the staff seemed

overwhelmed was because they failed to involve all students. We realized that students without a role became bored and disengaged with the activity. Those students then typically began to talk to others, and distract them from the activity. This detracted from the lesson's effectiveness and the students' retention of the information.

We talked to the students to find out what they thought about the program. When we asked them what challenges they saw in the program, they were very polite, and told us that there were no challenges. Eventually, a few of the students admitted that they were shy in class because of the language barrier. Others confided in us that they were teased by other students, and were timid in class because they didn't want to be laughed at. At meal times, we tried to ask the students what they didn't like about the program. We suggested that maybe the lessons were boring and too complicated, but every time, most of the students smiled and said "Everything was fun. I liked it." A few students were willing to tell us that the lessons were long and boring, but not many.

4.2.8 Summary of EduMobile Program

EduMobile is EduVentures' new program, and it poses many new opportunities and challenges for the NGO, and EE in Namibia. The program is the first one that hopes to bring an in-depth EE experience to students across the nation. Corris and Maria had never taught a class before, and their inexperience was evident throughout the weeklong EduMobile debut at K.J. Kapeua Combined School. However, they are more than capable of gaining enough experience to mold the program into a terrific experience for students. The students' education level was lower than expected, especially in regards to their English and critical thinking abilities. The activities will be much more developed and polished by the end of the pilot phase, but in the

mean time they need work to improve student engagement and involvement. The combination of new teachers, students who needed a lot of guidance, and lackluster activities meant that the program did not go as well as originally hoped for in terms of student retention of content. There is a lot of work to do to make EduMobile the program that EduVentures had envisioned, but as K.J. Kapeua was just the first of twenty schools in the program's pilot phase, there is ample opportunity for EduVentures to transform and enrich EduMobile. The EduMobile program breaks the mold for traditional EE programs by bringing EE to the students' local environments, and represents a new step towards EE for all. Figure 21 shows the students and one of our group members on the last day we were at the school.

Figure 21: K.J. Kapeua students and a WPI student

One of EduVentures' goals is to inspire students to be environmentally involved in their community. EE is an incredibly rich topic, and there is too much information to fit into EduMobile's five-day schedule. EduVentures has selected broad yet interesting topics to teach

students, in an attempt to hook student's prolonged interest. During the duration of the five-day EduMobile program, the staff motivates the students to be environmental conscious. However, after the program concludes, there is the chance that students will forget the critical messages from EduMobile. If students do not retain the knowledge and lessons they learned from the program, then the program did not make major lasting impacts on the youth of Namibia. EduVentures must overcome this challenge, and find a way to motivate and encourage students to stay involved in EE long after the EduMobile program. They did this by promoting the concept of an environmental club, in which students are expected to continue to explore the local environment, make connections, identify environmental problems, and, with the help of an advisor or teacher, come up with a plan to address the problem. In theory, such an arrangement may work well, but as we describe in the next section, environmental clubs need careful and sustained nurturing.

4.3 Environmental Education Clubs

As mentioned in our case study, EduVentures will be facilitating the formation of EE clubs at each school its EduMobile program visits. These clubs will give students the opportunity to be involved with addressing the environmental issues in their local communities, while continuing to learn about topics such as biodiversity, sustainability, and climate change.

What separates EE clubs from other environmental literacy efforts is that clubs are dependent on the initiative and self-motivation of the students. As opposed to other EE programs, where an adult educator directs activities and discussion, clubs are almost entirely run by student leaders. In EE clubs, the adult supervisor only serves the role of consultant and club motivator, and has limited responsibility for actually leading club activities. These clubs receive

support from environmental organizations, as well as support from MET and MOE. Additionally, clubs are financially supported by organizations such as the African Adaptation Project (AAP) and the Namibia Protected Landscape Conservation Areas Initiative (Nam-PLACE). Recently, through coordination with the MET, AAP donated N$50,000 to several secondary school EE clubs to support.

To better understand how clubs can help promote environmental literacy and student activism, we interviewed the supervisors and members of five different environmental clubs. These clubs were based at the University of Namibia and four secondary schools: Hochland High School in Windhoek, Katji-na-Katji Secondary School and Linus Shashipapo Secondary School in the Kavango region, and Gabriel Taapopi Secondary School in the Oshana region. Figure 22 depicts the locations of these five schools.

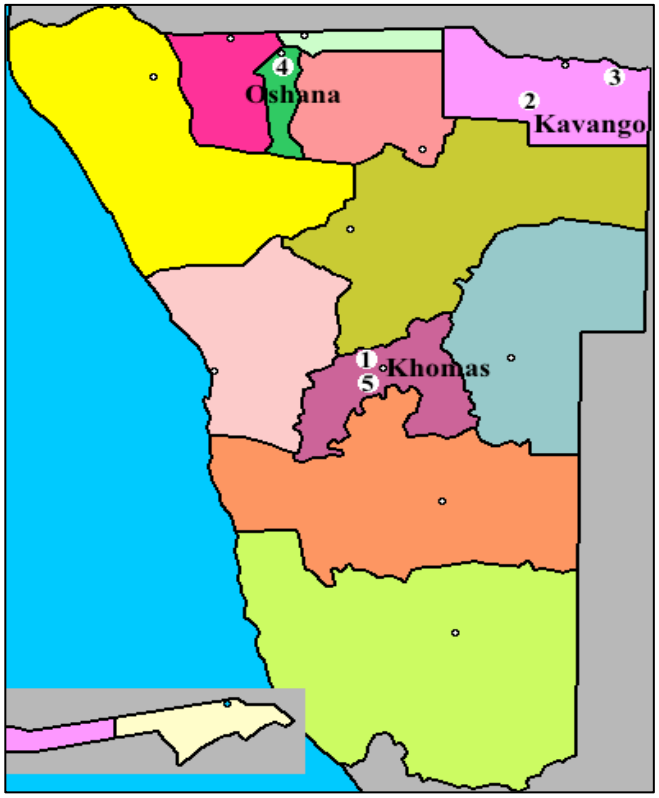

Figure 22: Map of School Locations (1-Hochland High School, 2-Katji-na-Katji Secondary School, 3-Linus Shashipapo Secondary School, 4-Gabriel Taapopi Secondary School, 5-University of Namibia).

Through these interviews we learned in detail about how the clubs are formed, how they operate, examples of club activities, and the challenges facing club development and success. For more in depth notes from our interviews with the club supervisors from Katji-na-Katji, Linus Shashipapo, Gabriel Taapopi, and the University of Namibia, see Appendices M, N, L, and K, respectively.

One uncertainty in EduVentures' plan to form EE clubs at rural schools is the unreliable track record of other EE clubs throughout the country. In many instances, the clubs we contacted had suffered many difficulties and had shut down for an extended period of time, only re-activating in recent years. In order to gain an understanding of how EduVentures EE clubs can avoid failure, we looked at examples of several successful clubs. In this case study, we will focus on the EE club at Hochland High School, which is one of the most successful clubs in the country.-The Hochland EE club has around 70 student members, ranging from grades 8 to 12. The club is active in both their local community and national community, having connections with several EE NGOs such as NaDEET and the GRTC. Additionally, the supervisor of the Hochland club, Liina Nantinda, is a well-known figure in EE in Namibia and is actively involved with NEEN. Through the example of Hochland High School we gained a comprehensive understanding of what a successful EE club should be. For more in depth notes from our interviews with Liina Nantinda and the students from Hochland High School EE club see Appendices F and O respectively.

4.3.1 Club Formation

Environmental education clubs have been formed as a result of many factors, including general student interest in the environment and realization of a significant environmental issue in

a local community. In some cases, EE clubs were started because of the previously mentioned funding opportunity from AAP. Clubs were also formed as a result of teachers who wanted to adapt their previous experiences with student-run environmental organizations at the secondary school level. In all cases, these clubs were started by agriculture or natural science teachers who had a passion for the environment. Hochland High School's environmental education club was formed in 2006 by Liina Nantinda, the current club supervisor.

Figure 23: Liina Nantinda from Hochland High School

Liina first became interested in the environment when she came across the topic of climate change in a book. Although she never had any formal environmental studies, Liina educated herself on the topic, and then shared what she had learned with the geography class she taught at Hochland High School. The topic of climate change was exciting to her students and they became interested in ways that they could do something to address the issue. Liina realized that climate change was an issue that occurs over long periods of time, and was an issue that should be addressed by school children, the environmental leaders of the future. At this time, Liina was contacted by an organization from the United Kingdom called the Connecting

Classrooms Project (CCP), which was involved in addressing climate change issues. CCP gave money to Hochland High School to start a tree-planting initiative, which enabled Liina to create an EE club and tackle this project. The club initially consisted of 20 students from her class, and also adapted the project of keeping the schoolyard free of litter through weekly cleanup efforts on Saturdays. Liina continued to develop the club, and utilized school assemblies to inform the student body of what the club was trying to accomplish and to motivate more students to join.

Today the club has around 70 members and is very active in their school community as well as nationally, as members have been interviewed several times by newspapers and TV stations about their projects. Liina's passion for EE was crucial in the forming of the club and keeping the students interested in their environment over the past seven years. One student from the Hochland EE club said, "[Liina] is a role model, [and] she always sets the first example". Hochland High School students become engaged in the EE club because they want to plant trees, go on trips, and meet important people from various ministries. Another influential factor in learner engagement was seeing the accomplishments and actions of their friends in the club. One Hochland student described the sense of accomplishment he was hoping for when he joined the club, "It would be so nice to grow up and realize I left a foot print on my school. You tell your kids that tree was built by me." At Hochland High School, involvement in an extracurricular activity is mandatory, and students choose to join the club because they want to have the same experiences as their friends.

4.3.2 Club Operation

Environmental education clubs are typically supervised by a faculty member whose job is to advise the students and keep the club active in the long-term. The supervisor's responsibilities

include aiding the student members in finding projects, organizing events, planning excursions, and teaching the students how to apply for funding. Most clubs also have student leaders, who are in charge of running the club and taking advice from the faculty supervisor. Student leadership positions typically include president and secretary, but vary from school to school.

Hochland's club has two student leaders, the head and deputy head, as well as another student who is in charge of organizing and maintaining the club's vegetable garden. The head and deputy head can be seen in Figure 24. In cooperation with the club supervisor, these three students are responsible for the direction and organization of the entire club. Club meetings occur once a week on Wednesdays and typically proceed as follows: The supervisor will start the meeting and tell everyone the general plan of what is going on with the club, along with any new business. From there, the student leaders will address the club and talk on any more specific club issues including brainstorming fundraising ideas, delegating gardening responsibilities, or planning the next school clean up. Finally, the floor is opened up for any club member to speak or present on any new ideas or issues that they would like to address. While general body club meetings happen once a week, the deputy head and head are in constant communication with the advisor, and meet with her when specific issues come up that need to be addressed.

Figure 24: Student leaders from Hochland High School (Left: Deputy head, Right: Head) Source: Tauno Iipinge, used with permission from EE club supervisor Liina Nantinda, see Appendix P)

The responsibility and confidence that are necessary for operating a club of 70 members has had a profound impact on the student leaders. Some of the major challenges they overcome on a daily basis include dealing with unmotivated club members and resistance from the school community, such as noncompliance with school's no-littering policy. Tackling these issues over the past years and maintaining their loyalty to the club's ideals have helped these students develop such traits as tolerance, patience, and discipline. In addition, student leaders gain substantial practice with their leadership and presentation skills just through regular club operation.

The club supervisor also plays a substantial role in club operation and maintaining the club's success. At Hochland, Liina is not only a role model for the students, but also puts in an incredible amount of work into coordinating activities and projects for the club. All of her work for the club comes with no financial remuneration. Some of the things she does are organizing club projects with the MET and MOE, and arranging for club members to attend educational

conferences such as the NEEN conference, which she herself coordinated in 2014. A re-occurring characteristic we noticed amongst all EE club supervisors we spoke to is their ability to motivate and encourage their students. Liina motivates her club members by relating activities to things they witness in their everyday lives and explaining how these things directly affect their wellbeing. One example is the club rule that if you live close enough, you must walk to school and not get a ride by car. The students affected by this rule experience the direct benefit of saving money on taxis and petrol, and become aware that by walking to school they are minimizing their carbon footprint and reducing green house gas pollution. One Hochland club member described the importance of the motivational role of the club supervisor,

> "In order to motivate a person to become active for the entire time, a long period, you really have to show that person 'why is she doing this.' To show that person why she is doing this is not an easy job, so it takes a lot of hard work. I would have dropped out a long time ago, but then I realized no, that this club is the only one that has showed me how to become a true leader and save the world."

Liina also motivates and engages her students by only allowing active students to take part in trips to EE centers, such as the GRTC and NaDEET. The opportunity to visit one of these centers is exciting and empowering for club students, motivating them to stay involved with the club and educate other members. Despite her extensive commitments to her EE club, Liina has balanced her teaching and club duties by depending on the student leaders to take responsibility, although this was a challenge when the club was first started. Also, she stressed the importance of involving other teachers in the club. Additional teachers help to spread out the supervisor responsibilities, as well as ensure that if one teacher leaves the school, the club can be maintained and will not fail due to lack of leadership. The club receives support from the entire school faculty including teachers from different departments and the principal. Additionally, the

club is greatly supported by EduVentures and the MET, which provided the club with computers and the first Internet access at the school.

4.3.3 Club Activities

Club activities vary greatly from school to school and region to region. However, one common thread among all EE clubs is a centralized project that requires the continuous involvement of the club members. Often this centralized project is a school garden that is taken care of by the students. School gardens are a way for students to get involved with the club and also offer leadership opportunities for those who want to be in charge of the delegation of weeding and watering responsibilities. Also, the maintenance of a garden demands dedication and accountability from club members. If one student fails to fulfill their responsibilities, especially over school vacations, the garden could fail, resulting in a major loss for the club. The Hochland club maintains an orchard of fruit trees and a vegetable garden, where they grow spinach, tomatoes, carrots, and potatoes. The purpose of this garden is to teach students the basics of sustainable agriculture, and encourage them to start gardens at their own homes so that they can be self-sustainable. One Hochland High School student recommended, "Basically, this whole enviro club should start on something, you should have a reason for doing it. For us, it was the garden, because it keeps us busy, it gives us something to work on."

Other Hochland EE club activities include community clean up projects, attending educational conferences, taking trips to conservancy areas such as Etosha National Park, and writing booklets on environmental topics. Attending the NEEN conference and the eleventh session of the Conference of Parties (COP 11) to the United Nations Convention to Combat Desertification were two very important events for the Hochland EE club students. At the 2014

NEEN conference, students were exposed to the variety of EE efforts going on throughout the country. Additionally, various presentations on preserving the nation's coast taught the students a new aspect of their environment that they are not usually exposed to, and educated them on how and why it should be protected. Attending COP 11 to the United Nations Convention to Combat Desertification was another informative event for the students, and their participation was recognized nationally. The Namibian newspaper interviewed students on their experiences at the conference, and one student commented,

> "We really learned a lot from just attending the session. We got to interview delegates from different countries in which we asked them about the strategies they use to fight desertification in their respective countries. I hope in the future that we can be able to make use of those strategies in the near future,"

These experiences made significant impacts on the students, both in their awareness of environmental issues and their confidence as student leaders in the environmental education community.

Figure 25: Hochland High School EE club students showing off their *My Carbon Footprint* shirts to promote their new educational booklet. Source: (Ministry of Environment and Tourism, 2012)

The Hochland EE club is involved in writing booklets on environmental topics. Their first booklet, *My Carbon Footprint*, was written for students, teachers, and communities to learn what a carbon footprint is and ways to reduce greenhouse gas emissions. The booklet also focuses on sustainable energy and water usage. The cover page of this booklet can be found in Appendix Q. The Hochland students that we talked with were interested in making a booklet on their accomplishments through the EE club over the past four years, so that new club members or clubs at other schools can learn from their experiences. These experiences would include descriptions of their various community projects, their involvement with EE centers, and their participation in EE conferences like NEEN and COP. Writing these booklets helps students by requiring them to reflect on the actions they've taken in their community, and increase their own self-awareness to the importance of environmental issues.

The various activities and events that EE clubs participate in help increase the environmental literacy among their students by supporting the things they learn in their formal school curriculum. Liina Nantinda described how the EE club at Hochland plays a huge part in students' education, "There is just theory in the books, now is the practical part which is very important, because you can have the theory here, but if you are not doing something, then that is zero for me." Witnessing something with your own eyes makes a much more significant impact than simply learning about it in the classroom. These hands-on activities support the lessons taught in the classroom, and allow the students to realize how the content of their course work can be applied to real world scenarios.

4.3.4 Challenges to Club Success

Despite the opportunities that environmental education clubs can offer students and their communities, clubs face many challenges. The fundamental challenges facing EE clubs are leadership transition, funding, and stigma. Since clubs in secondary schools lose students every year due to graduation, it's necessary for them to educate the younger students on how to run the club. In some cases failure to effectively transition the club led to disbandment. Many clubs have addressed this challenge by holding special meetings near the end of the year for the sole purpose of transitioning leadership from the older students to the younger students. Also, some clubs attempt to spread leadership among all four classes to avoid such drastic loss of organization when one class graduates.

A major challenge that EE clubs across Namibia face is proper funding. The clubs we contacted throughout our study had all received N$50,000 in funding from the AAP, but this opportunity was only available to a limited number of schools that submitted proposals. EE clubs across Namibia require funding for many of their activities including educational trips and hosting community events. Lack of funding has the potential to close environmental clubs, although many clubs are reaching out to environmental organizations such as AAP and Nam-PLACE for support. The club at Hochland High School was originally funded by the school department and CCP, using money to maintain the vegetable garden and plant trees. Presently, the club is funded by the AAP, and also does fundraisers to support club activities. One of the club's fundraisers occurs on Valentine's Day and allows students the opportunity to wear casual clothes, instead of their uniforms, to school for a small fee. The money the students pay to wear casual clothes is donated to the club.

Another challenge that EE clubs face is the stigma facing environmental protection efforts. This stigma involves conflict of interest with parents, resistance of communities, and ridicule from their peers. A common disagreement with parents is the amount of time that students spend outside of school with the club. This issue is further exacerbated when a club goes on educational trips to conferences or conservancy areas, taking the students away from home for days at a time. The Hochland club has addressed this issue by having a club application that requires the parents to sign and give consent for their child to take part in club activities.

Due to low environmental literacy levels in some communities, EE clubs face resistance when attempting to educate the broader community on sustainable practices. In one example, an EE club was attempting to educate the community on sustainable tree farming, and teach them why trees are so important to human existence. However, tree farming and firewood sales were the major sources of income in this community, so the idea of preserving trees was not well accepted. The resistance from the community caused conflict between the EE club students and their parents and neighbors, and while there were no serious confrontations, the message of sustainability had little traction in changing attitudes.

Similar to this issue, students in the Hochland High School EE club told us that often times they will be ridiculed by their peers for taking part in trash clean ups and recycling efforts. This ridicule was a result of general unawareness of environmental issues, and a misunderstanding of how clean up efforts can benefit the livelihood of all community members. The students described the situation,

> "During the course of picking up papers, people call you sorts of names, like garbage girl, garbage boy, all those things, and then you have to go through all that, and you have to ignore those things. It's kind of bad. Or they come, and they're like 'you're from the club right?' and you say 'yeah', and then they throw the paper on the ground and like, 'okay, pick it up' 'Its kind of discouraging, if you don't have the heart for it, it just breaks you."

Situations like this prove the importance of keeping students motivated in the club and reassuring them of the importance of their work. Most importantly, club members need to become self-motivated, and change their own attitudes about the importance of the environment. Liina told us how changing attitudes has been the most significant challenges she has faced throughout her experience with EE, "It doesn't take one day to change someone's attitude or lifestyle, [and] you must be patient." She realized that, to successfully change the attitudes of club members, she needed to be part of the change herself, and lead the students by example.

In conclusion, environmental education clubs give students the opportunity to continue learning about the environment outside of school as well as take an active part in protecting the local environment. The EE club experience helps students develop their leadership skills and confidence, and gives their education a new meaning by allowing them to see how their studies can be applied to real world scenarios. New EE clubs, like those that EduVentures is hoping to form, can learn from the many challenges and successes that others have experienced. The Hochland High School EE club especially serves as a model for other clubs to develop properly and reach their full potential. In this chapter, we have discussed the opportunities and challenges that confront an NGO like EduVentures as it seeks to develop environmental literacy among students in the rural areas of Namibia. In the next chapter, we will distill what we learned into detailed recommendations for the future of the EduMobile program.

5.0 Recommendations & Conclusions

Based on our experiences with environmental educators, our sponsor, and environmental club students, we have collected and analyzed an extensive amount of information. From working with EduVentures we developed recommendations for their new EduMobile program. From interviews with supervisors and students from environmental education clubs we have identified recommendations to implement and sustain environmental clubs. These clubs are key vehicles for developing not only environmental literacy, but critical thinking and professional skills, and have the power to impact students to make them agents of change.

5.1 Recommendations for the EduMobile Program

The EduMobile program positively impacted the students of K.J. Kapeua Combined School. The program represents a new environmental education (EE) strategy, as the students are learning in their local environments, and not that of research centers. The program is only in its pilot phase so several aspects of the program can be improved to increase its effectiveness and appeal. These recommendations come from the pre and post program questionnaires, careful observation, our daily surveys, and discussions with the EduVentures staff, the students, and the science teacher working at K.J. Kapeua Combined School.

We recommend that EduVentures take advantage of the school pre-visit and meet with students to better understand their interests in the local environment and educational background in order to tailor the lessons to the students' experiences.

Before EduVentures brings their program to a school, they conduct a pre-visit and discuss the program with a science teacher. To best achieve their goals for the program, we suggest they gain an understanding of the local issues so that the curriculum can best be modified to the

students' local environment. EduVentures can use time during the pre-visit to learn as much as possible about the local environmental challenges of the area. By getting a sense for the biodiversity, climate change, heritage, and sustainability issues present in that area, EduVentures can best determine how to make their activities relatable to the students. The biodiversity collection and field assessment activities could be greatly improved if the EduVentures staff already had an idea of what organisms lived in the area. Becoming more familiar with the flora and fauna ahead of time would help make sure that the classifying and analysis activities go smoothly, and to ensure that students have confidence in the educator's ability. Moreover, earlier and more extensive coordination would allow EduVentures to help the science teacher get a better sense of the issues that the future club could address.

We recommend that the science teacher be present for the whole EduMobile program in order to aid the EduVentures staff, teach the program, and form the environmental club.

The local science teacher at each school has more experience teaching students, and can be an effective asset for EduVentures to utilize. The teacher was able to motivate students to engage in group discussions during the club formation presentation. He was only present during this presentation, because he is likely to be the advisor of the environmental club after EduVentures departs. However, the teacher should be given a stipend to attend the entire EduMobile program. This would prepare the teacher to motivate and encourage members of the EE club, as well as help EduVentures maintain control of the classroom. The teacher could also learn about how to write a funding proposal or how to plan the details of a trip through the program. The teacher's presence in the classroom would help EduVentures teach their lessons as well as give him the skills to successfully lead the club.

In order to maximize content comprehension and retention EduVentures, should simplify the lessons of the EduMobile program.

To allow for the greatest content retention from the modules, we suggest that EduVentures simplify their lessons. From our observations and discussions with students, and analysis from the pre and post questionnaires, the content appeared to be too complicated for many students to understand. When asked if it was the English or the content that was too challenging, several students complained that the content was too confusing and the English in the movies shown in the lectures was too fast. To combat this issue, EduVentures should modify their presentations by adding more images and removing the text heavy slides, as well as replacing fast-English-speaking movies with more suitable videos. In addition, they could add more games that convey the content instead of a lecture. The students were very engaged in one game we played to teach about sustainability and it helped them get a better grasp of the key concepts that EduVentures had taught earlier in the morning. By enforcing the concepts with pictures or games, the content retention could be increased, ultimately increasing the effectiveness of the EduMobile program.

We recommend that EduVentures develop a workbook for the students to replace the printed PowerPoint slides.

Another way to increase the effectiveness of the program would be to provide a workbook for the students, instead of a packet of the printed PowerPoint slides. A workbook would allow the students to write the definitions and key concepts themselves and would reduce the amount of paper required for the program, making it more sustainable. This would make the students more responsible for the information and would keep them more engaged in the lesson.

This could also include the images that explain the key concepts from the modules, so that students can refer back to what they had previously learned.

We recommend that EduVentures modify their club formation strategy

EduVentures gave too many details about club structure in their club formation presentation. Reducing the dependence on text, adding more images, and lessening the amount of content should simplify the PowerPoint slides. If the information is simplified and images are included, the students will be able to understand the idea of a club, and subsequently be able to take initiative to form a successful EE club. The information on EE club development could be included in the workbook, so the students have a reference when forming the club with their peers. Instead of giving the students all of the complicated details, an in depth club formation presentation, or guide, should be given to the school's science teacher. In general, keeping the formation strategy simple is advantageous so that EduVentures is able to dedicate their time to the important issues, instead of re-explaining the basics multiple times during the week.

We recommend that EduVentures take measures to increase student engagement by adding more games to their lessons.

Student engagement in the classroom is an issue that can be addressed through the addition of games. As the game played at K.J. Kapeua Combined School showed, games keep students engaged. Games provide a break from the monotonous lecture approach and allow students to be competitive. The competitive nature of students helped them learn the content being taught, since their score in the game is linked to their understanding of the material. The active nature of games allows students to be more directly involved in their learning, and reinforce the lesson content in a fun way.

In order to develop successful EE clubs, we recommend EduVentures stay in regular communication with the club.

One critical aspect of a successful club is that its members are self-motivated and actively engage in club activities. EduVentures could help encourage and maintain this motivation by consistently checking and providing helpful feedback on the club's activities and accomplishments. A positive attitude is difficult to impart on younger students. However, with EduVentures' assistance and support, club supervisors can expose students to their local environmental issues and instill a sense of pride and responsibility in them. Additionally, EduVentures can help the club with any questions that arise as it experiences growing pains, or has logistical complications. EduVentures can stay in contact with clubs through email, phone calls, and yearly visits. Ultimately, it is vital that incoming students change their attitude once they become a club member, and take it upon themselves to be active contributors to environmental preservation.

We recommend that EduVentures provide some training for the future EE club advisors.

EduVentures should provide training sessions for future EE club advisors, so that they may become motivated to take on their new role. The most important aspect of successful EE clubs is having a supervisor who is highly motivated and passionate about the environment. Liina Nantinda, the supervisor for the Hochland Club, embodies these traits. EduVentures has seen through their interactions with Liina that a strong supervisor can make a club extremely successful. Club supervisors must be able to engage their students and motivate them to stay active. Engaging students can be done by relating club activities to their personal lives, and reminding them how important the club's efforts are to protecting the environment. Club

supervisors are responsible for ensuring the sustainability of the club in the long term. This can be done by involving students in club leadership, and by developing an effective system through which information and positive attitudes can be passed down from class to class. The supervisor of a successful EE club should create a club environment that allows students to be self-motivated, and realize why environmental preservation is important in their own lives, as well as in their communities.

5.2 Supporting Environmental Education Club Start Ups

Through our analysis of the Hochland High School club, and interactions with environmental educators, we realize that environmental clubs are a solution to one of the biggest challenges in EE – sustaining EE after students complete programs. However, clubs cannot be successful unless they receive the appropriate scholastic support from educators and financial support through government funding.

Besides NGOs like EduVentures, the Ministry of Environment and Tourism (MET) can have a supporting role in EE club initiatives. Clubs are not funded directly by the ministry. International NGOs or foreign governments approach the MET, and request them to co-fund short-term environmental projects. These projects are the sources of funding for initiatives like clubs. However, they only form these relationships with the MET. Frans Kamenye also mentioned that the attempts from the Ministry of Education MOE to include EE in the school curriculum have not been successful. Thus, the MET, realizing the importance and necessity of EE, uses the relationships they have formed with Namibia's EE organizations to fill in the void of EE in the country.

We recommend the MET to alert clubs to funding opportunities as they become available.

A few years ago, the MET was approached to co-fund a new project, which would fund initiatives to subside the effects of climate change. The Hochland High School EE club was alerted of this funding source by the MET, and the club successfully competed for funding by submitting a proposal. The club was able to receive 50,000 N$ (5,000 US$). The money has been crucial to their success. We found, through our interview with Frans Kamenye, that these opportunities are not always advertised. Environmental clubs should have access to potential funding sources and be given training on how to write the necessary proposals.

We recommend that a national committee be selected to evaluate EE efforts and make general recommendations to improve the overall quality of EE in the country.

While more environmental education initiatives are being developed, no systematic evaluation of EE efforts has been undertaken. The MET, in collaboration with the MOE, could appoint a committee composed of environmental educators and teaching authorities. The MOE's role in EE is small, as it only supports clubs by providing transportation to certain events. This is an opportunity for the Ministry to have a bigger role. The committee could look at EE programs and delve into critical subjects like how successfully are organizations creating an interest that goes beyond a weeklong program, how can student club activities lead to beneficial community impacts, and what role could the MET or MOE play in the EE process besides funding. By evaluating programs, not only can EE organizations receive valuable feedback, but also the MOE can get a better understanding of the status of EE in Namibia. This knowledge could be what the MOE needs to create the necessary reforms in the education system – reforms that would appease the discontent shared by many environmental educators regarding the lack of enforcement of EE in school curriculums.

We recommend EE organizations to share ideas, successes, and challenges through platforms other than the NEEN conference, like social media.

Connections between environmental educators are vital for the development of EE, considering that global and local environmental issues are constantly changing. The annual Namibia Environmental Education Network (NEEN) conference is currently the only platform for educators to network, share ideas, and learn from each other. Educators can benefit from constant connections provided by platforms like social media. Social media could be used to share new challenges, and successful approaches to overcoming them. Currently, many organizations have their own Facebook pages, but they don't take advantage of features like Groups. For students to apply and attend EE programs, their teachers must have some previous knowledge about the organization presenting it. However, this is rarely the case in rural communities, where EE is not as common. EduVentures' EduMobile program is the first of its kind in Namibia, since it is reaching rural communities in their own environments. Shared connections could allow organizations to reach out to more rural schools. Additionally, a new program, like EduMobile, can share the challenges it experienced while exploring new grounds. A more connected Namibia will be a more prepared Namibia.

Critical questions that should be answered by the EE community

There are many critical questions that we could not answer in our time in Namibia. The EE community should consider these when developing new programs, or improving existing ones:

1. How can students be motivated to independently sustain their EE?

2. If schools are not teaching EE, how can EE organizations reach those schools and supplement their education?
3. What can EE organizations do to address the resistance that rural communities have towards the changes that come with EE?
4. How can teachers be supported to sponsor environmental clubs?

5.3 Concluding thoughts

Our sponsor, EduVentures, has a unique program, in which environmental education is taken directly to students in rural schools and their local environments. The main challenges it faces are the low levels of environmental literacy, making the curriculum relevant to learners and their communities, and the difficulties of explaining abstract concepts in English. Despite these challenges, the opportunities are worth pursuing and include impacting a community in a way that hasn't been achieved in the past, and breaking ground for future EE organizations. Many educators are aware that through their livelihoods and traditions rural communities directly experience the impacts of a changing climate, drought, desertification, and biodiversity loss. Successful initiatives could help protect Namibia's vast biodiversity, help prepare its citizens to be resilient to a changing climate, and, most importantly, develop students into critical thinkers who have a nuanced and intimate understanding of the environment as well as the self-belief to take action to improve the quality of life of their country.

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Appendices

Appendix A: Interview with Vilho Absalome

Date: April 25, 2014
Ministry of Environment and Tourism, Namutoni Education Center Manager, previous NaDEET educator
Contact Information: Email: absalomevilho@yahoo.com
Office: 067229201
Cell: 0814183437

NaDEET Experience:

Can you briefly describe the education program at NaDEET?

- Structured similar to school curriculum
- 4 topics: water usage, energy usage, biodiversity, and waste management
- Information is presented in a way that the learners and teacher will realize how important the topics are in their school curriculum, simplified and practical

How are students selected to participate in NaDEET's program?

- Anyone can participate in a NaDEET program, either through school groups or adult programs.
- Different curriculums for primary, secondary, older community members
- Program adapts depending on learner background
- Younger kids, more practical activities like drawing or hands on activities
- Also look at different types of schools and what school will be visiting the program
- Most schools that come are returning groups and have identified that NaDEET is useful

How do learners relate to their environment?

- Pre-survey form for incoming students: Very simple questions, multiple-choice, use of pictures
- Most first time students have no clue about environmental issues
- Pre-survey helps them determine what needs to be taught in lesson
- Practical examples:
    - Ex. Showing them the night sky, and teaching them how by shutting off lights they save energy and also preserve the night sky
- Also give students a post-survey to see what they have learned, students often answer with the underlying themes of the week and have a great sense of pride in their environment

What is the approach to teaching these environmental topics?

- Teaching approach changes depending on grade level, and location of school (villages, urban, etc.) This effects language usage and the complexity of the discussions

- If normal teaching is a problem, then the program shifts to a lot more hands-on activities, most of education at the center uses hands-on, practical examples, but also utilizes some lectures when possible
- Structure for the week: Themes for each day, Sustainability, Natural Resources, etc.
- Go out for field visits and have them describe the things they see, have them tell the teacher what they think about things in their environment and how they relate to them
- Themes are always the same but the approach changes based on school and learner background
- With older students they focus on critical thinking, leadership skills
- They also wrote a book called "Its Time to Work" which is aimed at secondary school students and teaches them about professions skills and how to be successful in their careers

How do you address the issue of language?

- Utilizing the teachers to translate, very important to have teacher present
- First get the teachers interested in the program, so that they will be willing to help if the learners have difficulty understanding a topic

How do the learners' communities relate to this influx of environmental literacy?

- Solar cooking is one of the focuses at NaDEET and learners bring this knowledge home to their families, also, in the program for older community members, a solar cooker is given to family after completion of the program
- Learners (with a sense of pride and excitement) tell their parents what they learned at NaDEET and raise interest among the community
- NaDEET hosts a program for community members where they can come and learn more about what the learners have told them
- New outreach program where NaDEET will go directly to communities for educational programs
- Most community members are parents of learners who went to the program
- Difficulty with communities: sometimes community members sell their solar cookers as a source of income, NaDEET thought this was an issue at first, but realized it was ok because someone is still using it, still frustrated that people attend the program just to get something for free that they plan on selling

How did you become involved with NaDEET?

- Interned at NaDEET for 6 months during his last year at the Poly, and was then asked to work there

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Ministry of Environment and Tourism Experience:

Can you describe the work you do for the MET?

- Working alone at EE center, not a whole lot has happened there
- People think that the center is a place just for game drives and to see animals

- He is center based so he stays at his center and schools come to him
- EE center used to be more active but now it mostly just hosts students for one day, used to have full week long program
- Teachers think it is a campsite for students at Etosha, but he wants to let people know that is actually a place for a full educational program
- It's been difficult to teach programs because schools come with their own agenda and it's hard to teach them topics that are not in their agenda

What is the structure of your program?

- Three day program, Friday through Sunday
- Wants to make center into sort of a NaDEET satellite location and do a similar program
- His primary responsibility has been developing the program as opposed to doing a lot of teaching
- Focusing on natural resource use and biodiversity around Etosha
- Still uses pre-surveys to determine their relationship with their environment and what issues are relevant to them
- Uses mostly hands on activities
- First half day, introduce them to what the environment is in the first place, and ask them what the environment means to them, same patterns as at NaDEET, younger students have no idea, and older students are more aware
- Give students a mission to complete on the game drive so they are not just out there looking at animals
- Hands-on Activity: The Most Dangerous Animal and the Pyramid of Life:
    - Ask students what the most dangerous animal is, tell them he has it in a box, there's a mirror in the box so they look back at themselves and realize that humans are the most dangerous animal.
    - Then shows pyramid of life activity, which has blocks of the food web stacked up from natural resources, to plants, to different animals, and then humans on top, who need all of these things. When he pulls out bottom block (representing that some natural resource or animal has been used up) the whole pyramid falls, showing that we depend on all these things, and that humans are the problem, while we blame all of our problems on animals or resources
- Students are doing the activity themselves and realizing all these things themselves with minor guidance from the educator. Activity is very effective and teachers often take this back to their classrooms.

What are your future plans for the development of your program?

- Wishes program could last much longer so he could teach them a lot more things. Needs to create more awareness that his center is not a campsite and is an actual educational program center.
- Teachers sometimes think that EE programs are taking time away from their classes, but program should be seen as school away from school with new topics

What is the role of the teacher?

- A lot of times teachers are learning things for the first time as well

- It is clear that many teachers were just never aware that all of these things are going on
- Teachers are vital when dealing with language issues, as described at the NaDEET center

What do you do to make sure students keep thinking about environmental issues after the program?

- Give teachers information booklets and invite them to come back with new students
- Starting to get schools to book a whole weeklong program and bookings for the long weekend program

What kind of communication do you have between other EE Centers?

- 2 other centers in Waterberg and Luderitz
- Work together to develop their programs as well as working with NaDEET

What kinds of motivational things do you do so students share what they learned at your center?

- Mostly just through talking with the teachers and encouragement
- No t-shirts, caps, etc.

Appendix B: Interview with Stephanie Bradley

Date: April 25, 2014
Educator at NaDEET
Contract information: Email: StephanieRBradley@gmail.com

How do you get students involved in your programs?

- CCF takes school groups to the camp or travels to schools for a day program for broader outreach. Next week, they are getting students from Okakarara Secondary School to bring to the CCF camp for a few days to discuss bird conservancy and other EE topics.

How do you keep students engaged and combat the language barrier?

- Games and visuals are the way to combat language issues. Also have tons of pictures for reinforcement. Have English and local language on pictures or visuals is a great way to get the message across as well.

What is CCF's learning approach?

- Sometimes have student groups come for 2-5 days, which helps with being able to repeat concepts so they are understood. Usually they try to have games and other visuals while keeping the content as simple as possible. Other times its lectures or having the cheetah be in front of the students. Any type of activity where the students are active helps the concepts stay in their minds.

What are some challenges you see in EE?

- It's hard to reach more students when ages 0-7 aren't in schools. There are no EE opportunities for that age group. Secondary school students are the main target, which isn't too late but more could be done to reach more of the nation's youth.

Other comments from conversation:

- Working with communities important to spread EE messages and help them understand the fundamentals of why it's important. You have to go to these communities and try to show them how they benefit from preserving biodiversity.

Appendix C: Interview with Vicky Enjala

Date: April 26, 2014
NaDEET Educator
Contact Information: Cell: 0813648312

How do you engage students?

- We have different hands on activities, (All of our activities are hands on) something fun but educational, align with school curriculum, nothing new, but new topic
- Programs are learner centered, don't pretend to know at all, they are just sharing information and having fun

"Our programs are learner centered instead of teacher centered. We don't stand there and say we know it all, we are just sharing information, we explain it in such a way that the kids understand it, but they have fun doing it. When you motivate them to do that, they start engaging and not being shy".

How do you accommodate your program for various age groups?

- Different programs for different age groups
  - Upper primary grades 5-7
  - Secondary grades 8-12
  - Adult Program
  - Educators program
- Tailor teaching approach not topics. They always teach the same topics but whether they go very in depth or present it as just an introduction depends on the grade level

How do you make your program relevant to learners?

- Activity: Path of the Sun
- Start with basics, and then continue discussion based on learners interests and what they can relate to
- Very difficult process of gauging program to be advanced enough for educated students and simple enough for new students
- Some students come in and don't know what the environment is
- They relate the teaching topics to the things the students can see, or at least the things they can interact with in their every day lives

How do the students that come into NaDEET relate to their environment?

- Categorize schools → farm schools, private schools etc.
- Some spend their holidays in national parks so they are aware but some have no idea
- First give students a questionnaire, ask them the basics, what is the environment?
- Gives NaDEET an idea of what students know and what still needs to be taught. They have an idea of what they need to teach them, but they need to be flexible to adapt to any group of students that come in. Very difficult!
- Take the first day to learn about who students are and what they know, should they teach climate change or a specific aspect of climate change that the learners can relate to?

- Evaluate them when you see them.

Do you have students coming back year after year?

- We try to get grade 7 learners so they go through the upper primary program and then the secondary program. Want them to learn something new. Program is standard and doesn't change if you keep going to the same program for a certain grade level
- Also want grade 6 so that the learners can implement what they learn from NaDEET in their schools before they leave.

What is the role of the teacher during your program?

- They ask that the students' teacher attend the class with them
- Establish to the teachers that it is not vacation, teachers must be there for the kids for every activity
- Really emphasize that the schools send a teacher who is going to learn from the program, and interact with the kids, and motivate them to learn

What do you do to make sure students pass on what they learn? How do you make sure students stay motivated when they go home?

- Evaluation and assessment is a very tough thing to successfully do
- Have learners write a letter to themselves, and then send this letter to them a few months later, are they doing the things they said they would?
- NaDEET is a sustainable setting so its sometimes difficult for students to apply what they learn to their home lives. Can be very distracting at home and easy to slip back into old habits
- New outreach program in 3 communities, will educate them, and leave communities with a homework assignment to see how much they are willing to do over a 2 year period

"What happens in Namibia is the fact that people want to get, you give, they get, all the time, once you leave, they sit back and wait for you to come back and give again"

- Want communities to do things on their own
- Can tell their programs have been successful because they have returning school groups, that come back year after year. They go back, teach their classmates, they make recycled bricks, they do clean up campaigns.
- If the teacher does not motivate kids when they go back, then the students will sit back and do nothing. Very important that the teachers lead by example. When they go back, the teachers will be leading the kids. Students think their only responsibility is to go to class and finish school, so without the teacher encouraging them to continue the things they learned at NaDEET, they would not do anything.
- Its up to them to change their attitude and apply their new knowledge and skills. They need to like doing it or they wont do it at all.
- Need them to be self-motivated. It is really up to the people themselves to be motivated, and they need to realize why certain things are important to them. NaDEET can show them how some things might apply to them but they really need to realize it for themselves.

- We are educators and we can share the information but they choose what to do with it.
- It is up to the individual to change their mind set

Why isn't EE spreading and being effective?

- A lot of it has to do with networking, NaDEET is very small and has limited capacity
- A lot of NGO's are doing a lot of great things, but the government has a lot more power and needs to be better at providing funding and helping networking efforts
- Some communities are resistance to change and new ideas
- Sometimes people need a little push, no one is telling them these things
- Lack of networking, and resistant to change, people love free stuff, but will not pay any money even if it will help them in the long run
- People want to get and get and get and don't want to do.
- People need to start taking and then giving back, meet each other half way
- Really a whole mentality that needs to change
- Some people get it and are trying, but they are selfish and only do things for themselves
- Why would I waste my time being sustainable?
- Work with the communities as a whole group of individuals, maybe 30 people will show up, but from then they will pass on the information to the rest of the community
- First outreach in May, people showed interest so hopefully they are genuine
- How can you tell people about not wasting water if you do it yourself, believe in what you are doing, then you will be able to convince other people

Appendix D: Interview with Frans Kamenye

Date: April 30, 2014
Head of Education for the Ministry of Environment and Tourism
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With your position of Head of Education in the MET, what role do you have in the funding process for environmental clubs/schools?

- We don't fund the clubs directly, but they're funded through projects that operate under the ministry. Projects like AAP (Africa Adaptation Project) – they're the ones who funded the Hochland High school. It was done via the ministry. Since we have a database of EE clubs, [AAP] came to us to ask which clubs we usually work with, and then they sponsored them. The government doesn't usually pay clubs directly. We don't do that. We facilitate funding.

At the NEEN conference, many presenters said one of their biggest challenges was that they didn't have enough funding for what they wanted to do. Let's say a club is founded at a given school, would they be aware of how to get funding?

- In the case of the AAP, it was advertised. We went around and said 'there's this funding of 50,000 NAD for gardens or things related to climate change.' Otherwise, people are not aware of the funding on their own. Sometimes they approach us explaining that they have a project and asking for help. We tell them 'don't worry, we can find someone for you.' We've actually funded directly once. In 2010 we funded a fence for a school. However, that was done because the minister went to visit the school, and was asked there if they could have a fence. Otherwise, people don't know unless they're told.

We were talking to Liina, and she mentioned that the way her club got funded by submitting a proposal to AAP. Is that usually the way clubs get funding – through the submission of a formal proposal?

- The proposal was done because it was advertised – because we called for proposals. We said 'guys, there's this money. Come up with something that's interesting, to adapt to climate change, and we'll fund it.' There's another project called NAM-PLACE (Namibia Protected Landscape Conservation Area Initiative). They're also doing the same thing. They're going around identifying communities, and sponsoring them with gardens. They're busy with a project in the south: a very big garden. They're busy constructing the sheds. Sometimes they come through us to ask us about the schools.

How are clubs funded in general? Does the funding come from a variety of sources, or a major one?

- There are various sources. What we do is tell them okay guys you should come up with a way of fundraising. Don't use the government as a way of primary funding, because it is not sustainable. The funding will not be there all the time. There are bigger projects that are more important than a club. But, the only way is through projects that operate in those areas. They identify the schools, and then they do the funding, but we help them identify the schools.

Are projects like AAP and NAM-PLACE initiatives from the government, or do other people come and work with the ministry?

- They're under the UNDP (United Nations Development Program), so they are co-founded with us. MET gives a part of the funding, and UNDP gives a big chunk. They are short projects. AAP, for example, is funded by the Japanese government and the UNDP, and lasted for about 3 years. NAMPLACE also lasted about the same time. There are always new projects coming up, and they always find a way to help schools.

Do these projects usually approach the MET, or do the MET searches for them?

- We work together. If they're doing awareness, they come to us because we do a lot of that.

Besides co-founding these projects, is the ministry doing anything else to provide monetary support to schools and other small organizations?

- No, not directly. During the AAP period, when some schools were given money, others schools came later asking for help. We couldn't help fund, but we shared skills or help them buy equipment for their garden. It is very rare to see ministry funds go directly to schools, though.

In the absence of funding, does the ministry help organizations or clubs find other ways to complete their objectives?

- There are many different ways, but such a case hasn't happened yet. As far as I can recall, there have always been projects under the ministry. We do not want to create dependency. If there was to be a club, and they had an initiative, there would be many ways in which we could help. So far, however, clubs are being formed because we go visit the clubs.

How does the ministry approach that? Is it simply asking schools that you visit to form a club?

- At the high school that hosted the NEEN conference, there was no club. We told them to create one and take initiative on EE. If there isn't one being formed, we tell them that we might assist them. Some clubs are formed by our colleagues that are out in the field. We haven't been in the situation in which there was no projects giving funding.

The NEEN conference was great for connections. Besides that conference, is there any other platform in which EE organizations can connect?

- Besides the NEEN, no. Well, during NEEN, people get nominations to be networking representatives of a region. These NetReps meet twice a year, but I'm not sure if that happens. We also have events like the World Environment Day, but it is different than the conference, as it is just a celebration that has a few speeches. Otherwise, I'm not aware of any other platform where we call people to meet and discuss environmental issues.

One of the presenters mentioned that one of the challenges is that there is no evaluation system in place for EE. Is there anything the ministry is planning on doing to evaluate EE in the future?

- Currently we are busy formulating how to evaluate awareness activity. It is a bit difficult, unless you do pre- and post- evaluations. At NEEN, we didn't do pre-evaluations, so we don't know if people took the message. It will take time evaluating awareness activities. We are working with Raili from NACOMA. She's helping us create evaluations. She's been doing this for more than ten years. The problem is that we go to a school and spread awareness, but we leave and don't know if the message stayed. So, we are busy coming up with a system.

Is the evaluation you just mentioned just for ministry activities, or is it going to be shared with EE organizations?

- Just for the ministry. We find that this is very hard, though. We just wait money going around to schools, without going back to check if they are practicing what we taught them.

Besides supporting organizations and clubs, what efforts is the government doing to directly combat Namibia's environmental issues?

- There is a lot. Our primary aim is to allow people to use resources and survive, but in a sustainable manner. The ministry is trying to come up with projects to helps people's lives. Not just creating parks and protected areas where no one can go into. What we do is encourage people to preserve what we have. Sometimes we introduce wildlife into places that don't have them anymore – like conservancies. We have about 77 of those, and they are bearing fruit. Besides education, these are some tangible things that we are doing. We are also promoting community-based tourism, where we encourage people to work with private tourism companies to establish more tourism. We are trying to preserve the environment, but also benefit our people.

In the conference, we heard a lot of discontent with the amount of EE in the school's curriculum. I'm not sure how much influence the MET has on the curriculum, but can you speak of some of the efforts that the MET is doing to either increase the amount of EE, or enforcing more the amount that there already is?

- I don't have much of an answer to that. When I came to work in this subdivision, people here were working on a policy to implement more EE in the school curriculum, but I don't know the status on that right now. The Director of Ceremonies of the conferences was contracted some years ago to draft that policy, but I don't know what happened. It never went far; I think it is still in the process. However, we don't have any say in imposing the learning. We are trying to do it by helping the EE organization network. We have some topics in school that deal with some environmental issues, like agriculture, but it is not clear-cut on environmental issues.

Many of these environmental educators at the conference had training because they had been doing it for a while, and some had attended educator programs in other countries. Does the MET have anything in place to help educators be better at teaching?

- No, not that I know of. At least we facilitate NEEN. We pay for all the NEEN activities – nobody besides us. There is also another conference, the AESA conference. Here, people have the opportunity to go to other countries. We pay for people to attend, too: the chairperson or organizer and some others. They go and learn from others. Otherwise, we don't do anything else besides facilitating this kind of networking. We actually do not give them training.

What are some recommendations, or advice, that you think could solve the underlying issues behind the failures of EE?

- I think EE has been so far, so good. Currently, only the Polytechnic is offering formal EE training. UNAM is not. Even also at the school level as well, because right now it is only something you do in passing. I wish EE was something integrated in the whole system.

What about for people from rural areas? How are they responding to EE?

- They are too reluctant, because people are more concerned about their stomachs. IF you don't give people food they don't participate. They don't like our ministry because they think we are just stopping them from hunting, or harvesting fruit. Everything is about the food. That is why we are trying to approach it in a different way. 'Here's the environment for you, use it sparingly, or use it thinking about tomorrow.' However, they are more concerned about what they are going to eat tomorrow.

How are you addressing that issue?

- By coming up with ways for them to know that they can also benefit form saving. Years ago, the government isolated wildlife and made it for only for game hunting for tourists. So, people didn't like the wildlife anymore. The government then introduced some wildlife for them, and put some limitations – like you can only hunt 10 kudus per year. They only way is just to give them ownership. Through that they develop responsibility. Some people don't care about anything, though. 'Ahh, it's not mine, who cares. No one will care if I cut this tree.' They don't care, and it's their upbringing. If they are molded form early ages to care for certain things it will be better. People are driving, and they are drinking coke. They just throw the can out the window, with the excuse that they are creating jobs for the person who picks it up. That is why educating the learners can help our future.

Some schools do not have as much EE, but they might have a teacher that knows a little bit about it. They might know that there are some organizations that can help them. Do these teachers approach the MET asking for help being connected?

- Yes. Many times. They always call us asking for help completing their projects. Sometimes they call us trying to create a garden, asking for money for the seeds. But we tell them to find their own way. We tell them to call this organization and give them more directions. At times, we connect them ourselves. Sometimes we invite schools to talk to one of our three education centers. They pay only minimal fees and we pay for their transport. Otherwise, it's a bit hard. This is not Europe or USA, where people are raised caring about the environment. It is hard to change someone's attitude when they have been living like that their whole life.

It's obviously a long process, but have you seen progress in the time you have been working here?

- I think it's almost the same as when I started working 2011. I won't say there is progress. But there are no evaluations, so we don't know if there has been change. Without evaluations, we can't tell if their mentality has changed. Some things have changed. One of the clubs used to have nothing in their garden, and now they have big orchard trees.

What do you think must happen to improve EE right now?

- There must be a policy that forces them by law to include EE in schools. Without the law, no one will care.

Appendix E: Interview with Robert Logan

Date: April 30, 2014
Training director at the Gobabeb Research Center
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Application:

- CV, Letter, Essay about theme (1 page). Almost explicitly on letter, because 80% of essays were plagiarized from things you could find online.
- Around 50 applicants and they select 30.

How do you select a theme?

- Combination of whatever's happening around Namibia, and what GOBABEB is doing. For example, "every world heritage site has a main monitoring organization. GOBABEB is the main monitoring organization for the Namib Sand Sea."

What do the students want? Why do they go?

- They've heard from other people that have visited, that they just have a lot of fun. They get to go out into the desert, and it's an exciting trip that they get to do. I don't know if they're just interested in env science. It came up a lot in the letters, too. We were hoping to get essays saying 'I want to do this program because I'm interested in this topic.' However, many essays for this upcoming YES said they wanted to go because they had never left a 50 km radius from home. A lot of the learners, some of them get really excited because they know about GOBABEB. They've heard on the news. Often times we don't get them excited about env science until they are actually at GOBABEB already.

They had very little knowledge of env science and there was a huge language barrier. Do you deal with these issues as well?

- Yes, especially for schools in the North. We've got two schools coming to visit us. Windhoek schools are fine, from Erongo are fine. Almost all schools from the north have problems with English. We go slowly and go simply. The big thing we're trying to get right now (we're three white foreigners at the training section for now). We had Namibians working but they just left to do their Master's. We're trying to get actual Namibians. We do all of our instructions in English. The youngest age we recruit is grade 8. Teachers are often helpful. Not much you can do except take it slow and simple. Three biggest things for the future regarding that challenge: full staff Namibian, Namibian interns, trying to find funding for future YES.
- I really like the club idea. In the past we followed up more than we are able to now. We used to have a woman who worked at in swakop and everyone else was based back in gobabeb. She was a great contact at the level of individual schools in swakop. She could talk to them after the program.

What are some of the methods you use to teach?

- Everything we do we try to keep simple. The most fancy thing we have for kids is a movie. We realize that we're only there for a few days. The biggest things are teaching them there are many fascinating living things in the dessert. We try to get them excited about the 80+ species of endemic beetles at the dunes. We do that by just getting them outside. I'm a researcher project: we'll take them into the field about what is science, a hypothesis. Then we'll split them into three groups, one goes to the sand dunes, the river, and the gravel plains. They try to hypothesize which will have the greatest biodiversity and highest abundance. They set up pitfalls one day, and then collect the animals and insects. They come back the next day, and then identify what they collected with a little booklet. They point is not them to be experts in the traps, or to know the scientific names of the beetles. We just want them to know that there's interesting stuff there, and for them to do things that are simple enough that they can understand that they can do them back home without any fancy equipment. We try to encourage the teachers, too. We get really wary of trying to use technical things. The kids get really excited about them, but then they can't use them at home. That alienates them even more from science. Half of the content we try to get across is not 100% science. They looked at variable rainfall to see if there was any type of pattern. The conclusion was that there isn't. There could be a period of 4 years when there is no rainfall. A severe draught like that should be expected. We're way more excited to get them thinking critically like that, than to get them in a lab and doing more 'science-y' things.

To what extent is the program skill development, as opposed to transfer of knowledge?

- Everything I've talked about so far is the primary and secondary schools, but we have programs for university students, and that is more of the research. There's a huge content focus there, but it doesn't have much to do with that. However, if a school only visits for a day, they're only there for a few hours. We don't have a lot of time to do projects, so we just give them a tour of the station, and the sand dunes. We just try to teach them about the animals and desert ecology. When we have less time, we definitely focus more on content. These short trips usually get kids excited and they come back later to do longer programs.

To what extent is the program tailored to their local area?

- We've though about that a bit. When our staff comes in and we train them, we have a big document that has a bunch of activities and a bunch of programs that vary in length (1,2,3,4,5 days). They're for upper primary, junior secondary, and upper primary. If people are interested in some activities more than others, we can focus on solar cooking, sustainability, etc or focus a little bit more on desert ecology. Anecdotally, from my experience, it is very difficult to adapt things when people come to the center. The things [programs] we do right now, work best when our staff has had the chance to do them over and over. When we do have school groups come and they want to change the program, there is often miscommunication. For example, one school came in recently, and the teacher told us they were going to do a science fair. The school wanted to use Gobabeb's extensive research library for the learner's research. We had never done that before, and we thought it was an awesome idea. We figured out what the teacher wanted. He wanted to get information on all the different projects. He wanted to use books and the computer, since they didn't have much Internet access back at school. We created a three-hour

activity, in which we split them up into groups. They were each going to have Gobabeb staff members in each group to help them. However, when they got there, we realized that the projects they wanted to do didn't have much to do with env science. Some of the students wanted to build car parts, or other engineering projects. We found out that things like this happen a lot. If we try to plan from far away, coordinate with teachers, what ends up happening is what we are capable of doing, and what we end up doing is very different. Then we end up trying to improvise. All the activities we do, we've created them with Namibian learners in mind. In terms of content, it's very difficult for us to adapt it to different schools.

For secondary school programs, do large groups of students of different grades come in together?

- We have programs that are grades 5 and up. Usually, a teacher contacts us, and requests to bring their class, so it's only one grade. Or they will bring the enviro club, and that will usually be grades 10 to 12. We'll have, on average, between 10 and 30 students per program.

One of the challenges we ran into was that the students they had were from grades 6 or 10, and it was too wide of a target audience. I wanted to ask if you had dealt with that before.

- We haven't really. Usually the groups are plus or minus a year. It might happen that learners from different schools come in at the same time. Even if they're the same grade, some schools have different education. For this upcoming YES, we have a couple schools from the rural north, and a couple from Windhoek. Judging by the quality of the applications, their education and grasp on env science will be vastly different, and we haven't dealt with that before. At least not in the pst year that I've been here.

Do you have anything planned to deal with that now, or are you waiting to see what happens?

- Well we split them into groups so that there's an equal number of boys and girls in each group, but also to make sure there are an equal number of learners from different schools. We hope that that helps that issue, but besides that we don't know what's going to happen.

So the students have to apply, which shows some kind of initiative, but does the program leave space for them to show initiative, or do they just take a back seat and learn from the program?

- The schedule for the upcoming YES is the following: they arrive on Sunday; Monday they get tours and introductions; Tuesday is fieldwork, lunch, and fieldwork; Wednesday, Thursday and Friday are the same. When they go out there, what we try to do is play this invisible hand, where they're the ones who do it all. We introduce them to the general question and the tools they need to answer it. We show them how to use pit traps, and a plant press, etc. Then we have them pick which tools they need to use to answer the question. In order for us to carry our message across, we plan everything in advance, but we make it seem to them as if they are the ones leading the program and coming up with the ideas. Even if we know that it's something that we have given a tremendous amount of thought to.

You mentioned that at the end of the YES there is a post survey.

- Well it's not a post survey. We might try to make them do posters for their school this year, but the main thing we do: each group does a 20-30 minute role-play presentation, instead of a boring PowerPoint. Last year we had a group of students presenting on browsing in the river, and some of them played goats on the ground. They even had an inflatable dinosaur. All the posters and stuff they need, they do by hand, using the same resources they would use back at their schools. They practice their presentations a couple times in front of other groups to get feedback. At the final presentation we invite guests, and the entire Gobabeb staff. This year we will even have NBC (Namibia Broadcasting Channel) news come in, which we think is going to really excite the kids. We give them almost complete license on the presentation. We only give them feedback. Their first run-through, they're usually a little boring, because they're used to just getting lectured at school. Once they get into their head that we want them to have fun, they do really well.

Through those presentations you will get a good idea if the take home messages were actually understood. Do you have any other way in which you measure the success of the program? Whether it's solely evaluating content retention, or if they had fun.

- To be honest, at this point we don't have any definitive evaluations. The biggest thing is that most of the kids that come get excited about Gobabeb. They get personal emails and phone numbers of staff members. A lot of them stay in touch. We actually ran into a student yesterday. He's a guy who wanted to be a lawyer before participating in a YES, and ended up wanting to change to environmental scientist. After the YES, he took the initiative to organize a group of around 150 students to visit Gobabeb. We know they get more interested in the environment, but we don't know if they're doing better in the classrooms. That would be cool to know, though.

There's the example of the learner who was influenced enough to pick a different career. Does the program usually have that sort of influence? Do you know if people go to work, or just university?

- The program is very young, so the group that went last year is just starting university. We wish we could keep in touch with more of them, to see what we're doing. That's something we haven't had much time to do. I mean, there's a learners here that went to the YES last year, and she asked me 'what would I do if I became an environmental scientist? Would I be doing the same kind of activities we did at Gobabeb? Would I have to Gobabeb or would I go else where?' We get asked those questions a lot, but we're not sure if it's actually changing their decisions.

You mentioned that sometimes the teachers don't have too much knowledge about the environment. In your presentation you said there was some teacher training. Could you elaborate more on that?

- We don't really have a formal education program for teachers. We just try to get them as involved as possible with what the learners do. We have 6 or 7 teachers coming to the next YES. We're putting two of them in each group. We're going to sit down with them at the very beginning, run through all the logistics, and see where we can get them involved. They have spent a lot more time working with learners of this age group. We

also try to get them really involved so they can start an environmental club when they get back to their school. They are usually more interested than normal, since they organized the trip. I'm not a huge fan of this, but sometimes the teachers get so excited about the program, that they want to answer questions along with the learners.

Do the students have to pay anything?

- They pay nothing from the YES. We used to get funded for another program that was shorter, but now it's only the YES. We have around 60 beds for people to stay in, so even tourists can come in and pay. We also have tents for rent, or they can bring their own tents. We also have a kitchen where they can cook for themselves, or a caterer that cooks for them. There's a lot of different price ranges. School groups do get discounts, and we just break even with what they pay. We had one group a couple of weeks ago cancel because they couldn't afford it, but they didn't even try to work with us. Every other time, we usually help them to work around it, and almost every time they were able to come.

Appendix F: Interview with Liina Nantinda

Date: April 30, 2014
Supervisor for the Hochland High School Environmental Education Club
Contact Information: Cell: 0811491547
Email: NantindaL@yahoo.com

How was the club started? Can you take us through the process of how the club was started?

- Club started in 2006 at Hochland HS
- She joined the school in 2003
- Heard about climate change in 2006 and taught about it in her geography class, students were very interested and decided they wanted to plant trees
- Connecting Classroom Project – This project was started in the UK was involved in climate change issues. They gave the Hochland club financial support to plant trees, then the Hochland club raised funds to give trees to other schools for planting
- Club started with 20 learners, but grew very quickly
- 3 learners from the club got the chance to attend a children's conference in Cameroon on desertification and climate change
- When they came back they wanted to try to involve more schools
- In 2007, the Hochland Club tried to organize a meeting in Windhoek where schools could come together to try to create their own environmental clubs
- Tried to raise funds for the meeting, MOE supported them
- Came up with the "My Carbon Footprint" project in 2009, she and a colleague wrote the booklet with help of the students, MOE funded the printing of the book, booklet was given to communities
- City of Windhoek funded them for their cleaning campaigns
- One club student attended the Agenda 21 conference and became an ambassador, started doing work in the community
- Environmental club has a drama group that performs for the City of Windhoek, MOE, and Ministry of Agriculture on environmental topics
- Most of the activities they do are planting fruit trees, idea is to reduce dependence on South African produce

What personal experiences did you have that made you interested in started the club?

- Books
- Personal satisfaction
- Realizing climate change was an issue that the youth should address

How did you motivate students to join your club and be active?

- She was a geography teacher, and started talking about environmental topics in her class
- Also reached out to students during school assemblies, telling them what the club wanted to achieve at the school
- To get more learners to join the environmental club, she got the MET to fund the printing of t-shirts and caps, she used the apparel as incentive for students to join and stay active

- By taking students on trips to EE centers, then there is no way for them to leave the club, and they become very motivated to be active, these experiences make students feel privileged and give them a sense of responsibility

What were some of the growing pains / challenges faced throughout club development?

- Many students joined the club in a short period of time, but it was not possible to take every student to the EE centers, students feel bad about not being included and sometimes leave club
- Can only bring active member to conferences, meetings, etc. This is used as an incentive for students to stay motivated and engaged

What problems do you face with attitude? Challenges from the rest of the school?

- Very few issues, but with littering, some of the people that are littering outside the school are sometimes members of the club. They need to be willing to change their own life styles.

How do you change attitude?

- She can tell she's making a positive impact
- Positive remarks from parents, parents thank her because students are practicing what they learn at school, at home, exampes: water usage, and sustainable energy use
- Parents are very supportive

Did you ever have problems with parents when you first started?

- No

Could you walk us through how a club meeting is run? What happens at meetings?

- Meet on Wednesdays for general club meetings, and meet on Tuesdays to discuss gardening responsibilities
- Highlight difficulties that the learners are experiencing
- "To change somebody's lifestyle is not easy"
- Leaders also share their difficulties with others, who is not doing their proper job
- Meeting is entirely led by students leaders, but Liina is present but does not do a lot of talking, she is there for support

Do you have separate meetings with the student leaders?

- Yes, but informal, meet to figure out course of action when specific issues come up
- Principal is very supportive of environmental club

What has kept you involved and interested in the club?

- School management is very supportive of her, teachers from different departments
- Other clubs at school, but enviro club is only club that is representing the school on a national level
- She also gets great personal happiness from working with the club, because of the great support from the other faculty members and from the MET

Have you had a formal EE?

- No, not formally just from reading books

How do you balance responsibilities?

- It is fine, we mandate duties
- When she first started the club it was a challenge but this group is very active and when she gives them an assignment they can complete it on their own with very little help from her
- The club almost runs itself because of how active the learners are
- She steps in to make sure things are going smoothly

What kind of support has she needed, received?

- When she is not around (she travels a lot) a colleague of hers steps in to support the learners in the club
- There are other faculty members active in the club

What sort of things to do other faculty members do for the club?

- Littering is a big issue, so faculty members stand outside to make sure learners are not littering, also do inspections in classrooms to make sure no one is littering.
- Overall the support is there from the whole school
- Some staff members are not supportive, and not interested, but not a conflict
- Also support from EduVentures and the MET, they gave them computers to gain experience with technology, and use them to educate learners, "My Carbon Footprint" book is available on a digital copy
- MET provided school internet connections through the club, another incentive for students

How much of the club is teaching, any portion of the club that is lectures?

- Just activities, the club supports what they learn about in their regular classes.
- "There is just theory in the books, now is the practical part which is very important, because you can have the theory here, but if you are not doing something, then that is zero for me"
- Activities relate to curriculum

Do you feel the environmental education in the curriculum is enough?

- No it is not enough

Do you try to encourage other teachers to tell their students about environmental issues?

- Yes, I did EE and education for sustainable development, learned from seminars in Sweden and South Africa
- Was supported by MOE to travel to different schools and educate teachers on why teaching about environmental issues is important

How has your understanding of club potential changed over the years? Of environmental clubs, student-centered learning? What have you learned throughout supervising the club?

- It has changed my lifestyle, and taught me to be friendly to more people
- "It doesn't take one day to change somebody's attitude or lifestyle, you must be patient"
- I have learned that I need to lead by example, and adhere to the things I am teaching the learners
- Learned to deal with younger students
- Environmental club teaches how to change your inner person, your attitude

Was it difficult to change attitudes when the club first started?

- Yes it was very difficult at first
- I realized if I want something to happen, I need to also change
- I need to come down to the level of the learns, if I see a piece of trash on the ground I should also pick it up and not wait for a learner to do it
- At first it very difficult for me because I thought this is not part of my job, but now I realize that I have as much responsibility as the students have
- Now I love what I do, sometimes I even water the garden myself, during holidays I help water the garden myself
- "I should also be part of the change"
- I used to be the one that did not recycle, but now I am the one who separates the papers from the trash
- I am a teacher, why should I do this? In the process you are learning something that you must be part of the change

How long did it take before you started to see attitude changing in the club?

- It has been a gradual change

Looking back over the past 7 years what have been the biggest challenges the clubs faced? Or advice you could a new club that is just starting?

- Funds
- You need at least a small capital to run a club

From your experience is it difficult for new clubs to get funding?

- No, it is not hard, you just need someone is very much committed
- The person should not work alone, you must be able to contact other people who are involved in EE. Need to be able to get advice, it is not hard
- Even sometimes just getting advice on writing your proposal, and how to follow up your proposal
- Many organization have money that is not being utilized because no one approaches them for support

Is Agenda 21 is that a funding for your club?

- No, it is a program under UNEP, United Nations Education Program
- Get most of our funding from MET, N$50,000

Is there a time limit on the funding you got from the MET?

- Depends on the proposal, on what they said they wanted to do with the money

- Other clubs must have been given a time limit because of what they wrote in their proposal
- Also do fundraising, valentines day fundraiser: students can pay to not wear their school uniforms and money goes to the club
- Money helps fund visits to other schools, also to buy seedlings, and to have a come together at an EE center
- The moment you are taking these learners out, they will be more active

How many students in club?
- 70
- Wants to split older and younger students into two clubs

Can you tell us about the COP 11?
See other notes, many COPs on different topics, attended all proceedings for two weeks
Students got to see president Barrack Obama at COP 15 on climate change, attended from support from MET

Do you work mostly with the MET or MOE?
- MET for funding, does not work with MOE much besides for transport, they provide them with drivers

How much of the club is about student development versus teaching about the environment?
- Shocked EduVentures did not give club students a chance to participate at NEEN conference
- Why weren't her students co-presenters?
- When it comes to presentations, it is something they have developed (and become good at)
- Last year they gave a presentation in Okahandja, presented at a meeting at the Center of Expertise, a meeting run by the UN
- "I couldn't give a better presentation myself, even to use the PowerPoint pointer, it was so amazing, I couldn't believe my eyes"
- Their ability to search for information on computers
- "Sometimes we undermine them, that is why I like just to guide them here and there, they should be on their own"
- If I just tell them the highlights, I can go home, and they will do it on their own

Do you have any sort of system in place to transition the club leadership?
- I was wondering what I should do the other day because the four (four of the most active members of the club) must past down their knowledge
- Yes, but only in a meeting in August
- The meeting is then, so that the grade 10 learners can focus on their exams
- Only one meeting and that is it, but I do not think it is enough
- Older learners need to train younger learners how to use the laptops and make presentations

Appendix G: Interview with EduVentures staff

Date: March 18, 2014

What is the status of the EduMobile truck? What is the status of the SMART board?

- Not finished yet. In construction still and needs finishing touches.
- Not delivered yet. Should come sometime soon. Model is E70. Hopefully we will have it within the time that you are here.

How will we be traveling to schools?

- We will use cars to get there and teach with simple tools in the classroom. Bringing our own classroom supplies and everything we need for the program.

Do you have any teaching experience?

- No, only experience through leading expeditions, but not in the classroom setting

What is your plan for lessons?

- Of the 4 modules, 2 will be taught at each school. Sustainability always taught the second day, but the first day will be one of the other 3. PowerPoints already complete and ready to be turned into SMART files. Lesson was approved by the Ministry of Education.

What is the planned teaching style for the program? Activities, lectures, etc.?

- Games and mini group projects scattered throughout the lessons to help teach the material and get students involved.

What are the logistics of the next two months that we will be working with you?

- First three weeks will be preparing. Students are in exams right now so we are visiting during their holiday. We will not be traveling to schools until April 13th. At each school for a week. Also attending Namibian Environmental Education Network Conference April 24-27 in Swakopmund. There you will have the opportunity to talk to educators, science teachers, and students.

Have you worked with any other organization or groups in the development of this program?

- Students from urban school helped ensure the content was at the level it should be and was being presented in an interesting way.

Will we have time to talk to the students about our own research?

- Yes, during meal times and break times you can talk to them about whatever. We will be camping near the school so after the lesson we will be able to spend time with the students.

Appendix H: SMART Lesson Development Guide

We produced two main deliverables for EduVentures. First, as EduVentures was new to SMART Notebook, we helped them create the first drafts of the SMART files to be used with the SMART board. These files were not used to teach students during our time in Namibia, as they were still drafts, and the SMART board had not been delivered yet. However, when the SMART files have been revised, they may be found on EduVentures' SMART Exchange account.

Our second deliverable was a guide on how to develop SMART files. The guide covers a lot of material, including arbitrary image capture, simple image editing, software recommendations, SMART Notebook tips, and more. The guide was designed primarily for a digital format, but could also exist as a booklet. The digital format includes video explanations and is very clear. The paper format could include still images taken from the videos and be supplemented with descriptive captions. While EduVentures will use this guide as a reference when developing future SMART files, the guide will also be distributed to the EE clubs, so that they may learn how to use the SMART Notebook software effectively. This will prepare schools for EduVentures' long-term goal of providing SMART boards to teachers in rural areas. The digital version of the guide is being hosted at EduVentures' website, at http://www.eduventures-africa.org/how-to-smart

Much of the material that is covered in the SMART lesson development guide can be readily found online. We decided that instead of just referencing several online articles on how to create effective SMART lessons, we should create our own, which could be more practical for EduVentures. In addition, the SMART lesson development guide is going to be shared with the rural schools that EduMobile visits. For that reason, it was important that the guide was very specialized towards those communities. We believed that we could create a highly specialized version, and that it would more relevant than a set of generic online tutorials.

Appendix I: Observations from EduMobile First Pilot Phase School: K.J. Kapeua Combined School

K. J. Kapeua Combined School Daily Activities and Observations

Day 1 Biodiversity:

Activities:

- Principal gave a welcoming speech
- Corris gave an opening speech then distributed Appolonia's questionnaire.
- 30 mins for Questionnaire to be completed by students
- Corris taught biodiversity lesson with Maria's help.
    - Switched back and forth between English and Herero.
- Activity 1: learners were divided into 4 groups and told to make a food web basically with non-living and living organisms. Many learners were confused on what non-living things were. Had trouble connecting the lines. Some had no difficulty brainstorming connections while others had a more difficult time. Corris ended activity with good explanation of how the chains were supposed to be connected. Importance was well explained.
- Back to lesson explained consumptive society. Consequences and losses slide also had good feedback.
- Field Visit: 3 learners put into groups to go set up pit fall traps and Sherman traps. Also given tubes/bottles to collect specimens. Marked location with GPS and students were really eager to go out there and set up traps themselves. Fearless in collecting insects, frogs, scorpions, spiders… etc. After lunch learners classified insects with a microscope and magnifying glass.

Observations:

- Grades 8-10 and ages 14-17 students from school stayed in hostel while program running. *younger than we originally thought. One learner is grade 7*
- Questionnaire took them longer than we thought. Most students could write English but not well.
- Generally good student involvement and responses to Corris' questions. Corris focused on one side of the classroom and next time should turn his attention to the entire class. Reasons for importance not well known for any of the topics covered. Corris moved slowly through the slides with maybe too lengthy elaborations on topics but the students were responding early on so it seemed okay? Corris spent maybe too long on pictures and their explanations while it may have been better to have the learners explain what they thought they saw. Talked about inbreeding/incest quite a bit in terms of Cows and Cousins. Students were reactive to answer that one for some reason…
- Technical terms such as morphology got to be confusing for learners. Their English at times wasn't that good so Herero was necessary. Generally gave accurate descriptions when prompted by Corris except any number guess they had was way off.
- Students got tired as the lesson dragged on. Corris had activities and the students were mostly engaged however once the lesson reached two hours students seemed less

interested. Going outside to the field visit was a good change of pace but several changes should be made to PowerPoints so there is a break with less text heavy slides and condensing of information.

Day 2 Sustainability:

Activities:

- Started day off by quizzing students on knowledge of yesterday's biodiversity lesson.
- First Activity: Sustainability Venn diagram with Sustainable vs Unsustainable development. Students generally were more active for this activity however they were talking to friends not really focused on the project at hand. Many were confused on the exact directions although Corris and Maria explained it three times. As a result activity lasted longer than planned for and a lot of answers were repeated. Students when presenting could not clearly explain their thoughts or understanding. Need to figure out a way to leave instructions shorter/clearer and available to students (not just in stupid packet).
- Back into the lesson students were losing interest. Corris kept forgetting where he was on the slides/appeared to be unprepared on what to say for a handful of slides. Students typically said yes to his questions although in reality unsure if they understood what was going on.
- Videos need to be put on the slides/not right edition of Sustainability Slides? They also need a better audio system.
- Corris/Maria talked to students about Sustainable efforts.
- They questioned students after lesson to analyze their retention.
- Card Game: Kids had to race and make matches with questions asked by Maria. Students very active and excited about this game. Super competitive. One girl fell…
- Movie about "Climate Crimes" after lunch. Corris stopped it a few times. Corris quizzed them after on really specific questions. Corris at end tried tying it back to Namibia's issues which was good.

Observations:

- Took a lot of prompting from Corris/Maria to get them to respond to anything. Mostly hid their faces and looked down. Maybe changes to slides by condensing/simplifying the information could make the early retention better?
- Corris noted that he went back and forth between Herero and English when teaching. Poll of the students showed that they wanted him to speak Eng. more often. Also spent too long on certain slides/went too slow in terms of lesson length. Long lesson = bored students.
- A few kids were late which prompted the science teacher to call them out later in the day/scold them.
- Energy concepts need to be explained more concisely. Took up way too much time. A few slides need to have the amount of words cut in half at least… if not more.
- Maria needs to stop skip slides mid-way through Corris explaining things. It's confusing/distracting
- Hydro-animation movie didn't work because Corris was using the wrong set of slides.

- If Corris wants to pose questions from the slides have slides with the question on it. Students got confused a couple times. If he had a better understanding of the PowerPoint and the small details he wants to mention then this wouldn't be an issue.
- Students lost focus on waste production slides.
- I called out the other half the room to answer Corris' questions because he only was addressing one table… Other half vocal when called on to participate.
- Reactive for RRR section.
- Kids have a garden. Students more responsive after short breaks but some kids late coming back.
- If Maria doesn't want the kids readings ahead (Maria called out a kid) then don't give them a novel of the PowerPoint presentations…
- Overall it was a biased movie that showed a lot of different ways the good hydro/biofuel alternatives talked about in the lesson were bad for biodiversity. Conflicted with the previous message they were trying to send. Students fell asleep. Maria fell asleep/was on her phone. Then she was calling out kids/getting mad. Complaint from students that the videos were "too fast", "English hard to understand"
- Generally the lecture was too complicated. The movies were too fast/the Eng. wasn't clear enough for the level that the students could comprehend. Or for other students the Eng. was fine but the concepts were over their head. Movie didn't do anything but take up time.

Day 3 Field Visit:

Activities:

- First as a big group look at bigger issues then break into smaller groups from Monday to do transects to analyze veld (plants in the area). Students were told to bring water/wear good shoes. Maybe 2/3 actually did what they were told the day before.
- On the adventure Corris first pointed out all the trash. Some students seemed a little embarrassed while others appeared to give zero shits. Students didn't have a clue really how trash was dealt with. Some said small holes in their yard had trash.
- Discussed invasive species and native species. Students didn't understand those concepts at all at first. Mostly discussions were in English but all side conversation was in Herero. Tried to get students to discuss what they could do about the invasive species in their area.
- Corris discussion on waste management. Trash was put in a field in a pile. No real apparent system. Students unsure of how to make a difference. Trash blown around and generally a mess. Students were semi engaged except for a few. Corris tied it back to RRR. Tried to get students to come up with ideas for these types of action plans but no real good response. None of them seemed to have a good enough understanding to be able to apply what they learned in the lessons to the practical things in their field visit.
- 100 Step Activity: Analyzing Veld and plant biodiversity. Only 3 students were actively engaged the entire time. The rest of them were playing in the dirt. The little girl in year 7 who wasn't really in the program was a huge distraction to the other girls. The only people actively involved were the kid stepping, Corris who was analyzing the plants, one kid who collected the unknown samples, and another who recorded all the data. On the whole this activity was boring/hot since it was done before lunch time. Next time maybe

go early in the morning or later in the afternoon cause the kids were not paying full attention or really any attention by step 50… Activity needs to be better structured to include all students (6) and to have them engaged.

- After lunch identification of unknown plants began. It was a struggle because there were not that many books and too many students. As a result many were distracted. Corris' group only got things classified when he was around. If he was floating only one student was reading the book to classify the plants. During my lunch discussion two girls called the morning "boring" and said that the "English I understood but the lesson no." This carried on into the identification as many of the students didn't know what was really going on.
- Science Teacher came in to talk to students about the opportunities around their school for improvement. Talked about how change can be started with the students' own actions. Clean up campaigns. Science Teacher had some good ideas to give to students on how to get their friends involved. It was a good change of pace and the students were more engaged with him than at any other time with Maria or Corris. He was able to keep control of the classroom better than they did and managed to get real answers out of the students.

Observations:

- Students generally active and engaged during this field trip. A handful of the boys seemed distracted from the beginning. All students encouraged to bring their notebooks but only a few actually did that. Soil erosion discussed and Corris did a good job of drawing pictures in the dirt to help get his point across. When talking about Acacia trees almost all students interested. A few were looking at books that were brought along. Students were eager to ask questions/give answers to some of Corris'
- Had to review sustainability again because most of the students didn't understand. Same 3 students were answering Corris and the rest needed a refresher.
- Side note a ton of these kids are all cousins. Like 3 big groups of cousins…
- Corris began to do all the writing for the further classification of plants seen in the 100 step activity. Not interactive for the kids and kept getting distracted then coming back for entire activity.
- On the whole the day was not productive to good learning. The lack of structure and guidance for the students lead to distractions and time wasted for progress of classification of plants. The calculations along with the second half of the activity also took a long time as students couldn't figure out percentages out of a hundred… Nate did all of Appolonia's groups calculations. Making the graph and poster kids were semi interesting but needed a LOT of help from Corris/Maria to get them to any sort of presentable state. At this point Corris was speaking mostly Herero. Maria was consistent with Eng. with the kids. The learners were dragged up to present this last part of the project. One girl walked out because she was frustrated with the day's progress. Sets a bad tone for program when Maria said if she left she couldn't come back. Only one kid actively was answering the questions/trying to explain the poster but this same kid does all the things so Corris was getting put off the rest of the students wouldn't come present. Students generally assumed they were wrong if he elaborated their point making it seem like the students are always wrong.

Day 4 Club Formation:

Activities:

- Corris took general poll of the students to see who wanted a club and all but a few hands were raised. When he quizzed the students on general feedback things he got decent responses although from the same 5 students.
- Maria started enviro club discussion/lesson. None of the students knew what EE club was/had never had one at the school. Discussed what challenges and Maria was realistic with organization although negative… Not helpful to be negative at first. Maria only talked to half the class. PowerPoint needs work…. Way too much text and Maria spoke too fast/covered details that went way over the students' heads. A detailed PowerPoint should be presented to the Science Teacher but not the students. None of them understood it. Half weren't paying attention while the other half were generally attentive. Students had no clue what the roles of president, VP, treasurer, secretary were. But were generally excited to come up with ideas.
- Kids came up with decent objectives and goals for the program but needed quite a bit of direction. Put goals on a poster then presented them to the class. Students slowly getting better at presenting although still talking directly into the board or into their hands. Quiet kids finally presented which made Corris happy.
- Roman compiled the notes and we helped develop them into 5 solid goals for the club. Tried to get the students to put those objective concepts into sentences was worse than pulling teeth… Early on the 5 vocal students gave good answers but when we called out the distracted/quiet students we got little/no response or responses that were too specific. Some students were forced to give an answer when Corris physically stood behind them and was demanding anything as a response. We had to encourage that there were no wrong answers and tried to give the students some confidence when they were right or on the right track. After about an hour we had goals.
- We made them decide the roles of exec. Maria told the students that EDV would help them set up a club. Mini last survey had decent results

Observations

- PowerPoint has ridiculous animations for the text.
- Maria could have been better prepared. She needs to simplify her delivery of information. Used too many big words that went over students' heads. The explanations were lengthy and not simple/concrete. Too many ifs.
- Students seemed confused at what was being presented to them when she was facilitating the discussion. Money/fundraising section many kids checked out of the conversation completely. None of them knew research centers and only half took notes when Corris listed a bunch of them.
- Kids also have no idea what to do about gaining more information on going places to learn about the environment. Don't have a school bus for club travel which makes it a bit more difficult. Garden isn't a real thing…
- Corris began helping Maria out with explanations which made things go smoother. Instead of printing the lessons make smaller simpler packets???
- Maria scolded the kids on taking notes better and paying attention yet when Corris was presenting she was barely paying attention. Cause that makes sense.

- Mostly correct answers were given when the kids were quizzed on things later since they finally were starting to take notes on what was happening in class. Not all were easily willing to answer however. Maria tried to get more kids motivated to answer but she failed epically. Kids seemed very reluctant to answer her questions and responded better when Corris posed questions or Roman did.

Appendix J: Survey Results from K.J. Kapeua Students

The following are survey questions and answers about the first day of the EduMobile program.

Question: What did you think of today's activities?
Answers:

1. Very good
2. I think about activities that we did
3. Very good
4. Our activities of today were good bcause we were having things to write and to collect by group
5. We had lots of fun collecting and grouping animals
6. Good! Because I learned on how to treat animals and plants and care about them
7. In what nice because I learn more abot about biodiversity which I wasn't knowing it
8. It was very fantastic and 9 learned a lot out of it
9. They were pretty cool and they were so so awesome I will like to do it again
10. It was good
11. Today's activities was fun and learn that learning about biodiversity is something good
12. it was good and I learned more about biodiversity
13. It was good I have fun
14. I think that it was amazing
15. I think that as in our community we have any which is not the same and why must we have them or importance
16. Good great
17. Today activities it was cocastic and fantastic

Question: What was your favorite activity? Why?
Answers:

1. Classifying because in that process you learn names of different animals and plants
2. My favorite is different types of living things and non living things and because I want to know about them.
3. Catching a butterfly because it was fun chasing after a butterfly.
4. It was to collect some biodiversity
5. Collecting the pit traps because it was easy to dig and burry it
6. To go out to the field to collect living organisms

7. Is the one grouping animals in orderand family because I was practicing or giving more information on it
8. The one of classifying animals and plants according to their categories, characteristics. Because I learned what kind of animal is invertebrates, vertebrates it class, order and what kind of family it is.
9. Working around and collecting animals. Because it was fun working around its something that I never done before it was nice very nice
10. Biodiversity - Because it was very clear and straight to me
11. My favorite activity was collecting the different plants and animals because I like working around the environment
12. When we went in the field
13. Looking for animals and plant
14. My favorite activity was to collect insects and the different habitats
15. Biodiversity because we learn a new of all living thing and why must we have different animals in a place
16. The food web, because I learned from my mistakes
17. My favorite activity was biodiversity because we learn the variety of living things

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Question: What is the most important thing you learned from today's biodiversity lesson?
Answers:

1. Collecting because when collecting some animals are hurting and some plants and stiking that mean they have thornes
2. The least favorite thing is to collect different things
3. It was the traps because in our traps we did not get anything. That is not good at all.
4. Answering the pre-questionnaire because I did not know some questions
5. Also pit traps because at some places where we had to dig a pit there was big stones so we could not dig there
6. Plants to observe plants bush, trees and grass to know their names
7. The one of ollecting animals and plants because it was too sunny
8. The one of posters because although I learned something out of it I didn't learned much as the other one
9. Non of them were very nice to me
10. Biodiversity - Learn how to clasify things and how to deal with the environment
11. Classifying the collections into certain groups, it took a lot of time to do that
12. There was no activity that I did not like, because I was learning more
13. Playing because you must help each other
14. By finding things that are not at a place where they should be
15. None of it
16. Collecting those insects I didn't like the most
17. Biodiversity because we learn about variety of living thing

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Question: Would you like spending your free time learning about biodiversity issues in your community?
Answers:

1. Yes
2. To have a time to your community
3. Yes
4. Yes
5. Yes
6. Yes because I need to know how each living organisms on earth are important and why it is important and what it produce to the economy of the country
7. Yes beause I will try to tell them how not animals living in forest should be treated they ecosystem, genetic and species are classified
8. Yes
9. Yes
10. Yes
11. Yes
12. Yes
13. Yes
14. Yes
15. Yes
16. Yes
17. Yes

Question: How do you think you could preserve biodiversity around your school?
Answers:

1. Soo that learns came easily classify living and non-living organisms in the school
2. Because we learned
3. To find more information about biodiversity
4. By not killing some animals
5. I can perserve biodiversity in our school by reusing, recycling, and reducing
6. By collecting the living organisms and identifying them and caring about them about their way of living
7. Decrease consumption because the more people on a area the more biodiversity will occur
8. By learning learners about biodiversity in their free time because is very important and without it, it will lead to many danger causes.
9. By having a environmental club at our school so that we can learn the others biodiversity, sustainability and other stuff

10. By telling others what to do and not to do to the environment
11. I could tell the other learners what I learned from you guys
12. By introducing EduVentures to them
13. By telling my friends
14. By telling the children not to kill the small animals
15. Yes because we will know many things
16. Just by opening up an environmental club for my school. Even telling them by how important it is
17. By not cutting down the tree or fire grass

Question: How could you get your other classmates involved?
Answers:

1. By introducing them about how the project teaches you and the involved them by telling them and classifying for them different living organisms according to their characteristics
2. By biodiversity
3. By telling them biodiversity is nice
4. By telling them so them so that they can not do some thing that they are doing
5. By telling them what we were told, they might be interested and join it
6. To tell them how important the living organisms are important and how to care about them
7. I will introduce biodiversity to them which is the variety of living things and tell them how to preserve it and use sustainable manner to biodviersity
8. By letting them know what is biodiversity and why it is important
9. I will just create a environmental club at school so we can learn them about all of this things to that we learned today until Friday
10. By talking with them about what I have learn from this and understand
11. I would tell them why its important to learn about biodiversity
12. Tell them about biodiversity and its importance
13. By telling them / learn them
14. Tell them what we did in the holiday
15. I will come tell them many of things which is happening but we don't know
16. First thing by talking to them and by showing them just what I saw today
17. I will tell them about this things because it give bad harmful to environment

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The following are survey questions and responses from the second day of the EduMobile program

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Question: What was your favorite activity today? WHY?
Answers:

1. Sustainability, because it was interesting.
2. the game that we play because in that game it was nice/fun
3. it was the recycle movie because I enjoy very much learning how you could recycle thing instead of throwing it away
4. when we were learning about sustainability and the activity we did it was cool!
5. sustainability because we learn about not wasting water
6. playing the game because I like games especially building puzzle as we did today
7. watching movie because I learned something
8. environmental
9. when I was listening to the things we help use with electricity
10. is when corris and maria were asking question on yesterday's lesson on biodiversity
11. sustainable development because I understood it very well
12. activity today it was the two movie that we watched because I was listening to all the words that were spoken
13. it was the game we played early because I was having fun with everyone
14. the game we played outside because it was very fun we enjoy it
15. sustainable development because I learned how sustainable development works
16. the game that we played with maria because it kept my body fit
17. story of bottled water
18. the game because out of it I leraned the bad and good influence and how sustainability is formed

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Question: What did you not like today? WHY?
Answers:

1. The first movie because I think it was just kind of movi and I think it was not part of school.
2. is those girls that were copying people/beat people
3. is the climate movie because there people wanted to build a dam without other opinion that was bad
4. one because it was my first time to learn more or go deep into sustainability
5. I was feeling bad because we made our environment harmful or "badly"

6. today I didn't like movie we watched about bottled water because at times I couldn't understand the person who was speaking and it was difficult for me to answer the questions
7. nothing because it was important
8. interested on whole topic
9. I like the last movie where people kill and cut down trees. I feel sad
10. the video of bottles and the other one of climate change after lunch
11. the game we have because it was nice and you can learn from it
12. it was the game we played outside because my team lost
13. I like everything actually but the most was the gae
14. what I did not like today was the story of bottled water because it was boring and fast
15. watching a movie because it let me to sleep
16. the running of the game because the guy that we were running with us is a sprinter
17. the story of the climate because I think I didn't understand at all
18. the movie because I could not hear what the man was saying. I could only identify through pictures

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Question: What is the most important thing you learned from today's sustainability lesson?
Answers:

1. enviroment sustainability it included human and education
2. the most important thing I learned was about climate
3. I learned how often you could sustain your environment through many things
4. the importance of the three types of sustainability social economic and environmental
5. different hydro power
6. I learned that I should care about my environment and to use it in a sustainable way
7. climate change
8. is that we must have sustainable in our community to develop our villages and to have educated people in our community
9. not to leave tap that is leaking
10. on how sustainabilty is important tot the economy of the country and is to environment
11. enviro and social sustainability
12. not wasting water
13. I learn most people/us must be care for our country and do what is right for our country
14. history of burning fossil oils
15. how to prevent it sustainably
16. I learned how to use resources so that they can last for ever or reduce reuse and recycle
17. the environmental sustainability how important it is to the community
18. three types of sustainability

Question: Name one issue in Ovitoto that you want to fix

Answers:

1. water is waste
2. to fix the pollution in water/toilets
3. is that people must stop throwing thing in dam and overgrazing on the same land over and over again
4. the cutting down of trees this will lead to deforrestation in our area to introduce solar power
5. urbanization
6. broken taps
7. water
8. water which is flowing it can make our economy poor
9. the water I have problem we must have windmill
10. water pollution
11. lack of health centers
12. our school
13. telling people not cut trees down most of them in this area they are cutting down trees
14. leaking taps
15. overgrazing
16. the running of taps
17. the water issue
18. fix leaking pipes

Question: How could you promote sustainability at your school?
Answers:

1. [Blank]
2. to talk to them and sit and talk in a group
3. by letting them know what is sustainability and why it is important
4. by explaining them the importance of sustainability
5. by not wasting water, threw away water, fix pipes that are leaking
6. by practicing it and letting other learners to do so
7. garden
8. that everything that we waste is touching to our economy
9. we need solar panels
10. by telling them how important it is and start to care about it
11. I will make a club of studying sustainable development and more
12. by closing taps that are open
13. by having a club and we all learn together
14. fixing leaking taps
15. by showing them how it helps the future generation
16. I will just open a committee with school kids and help to fix the tap that are running because we should not wait only from the gov or school

17. by sorting ourselves into groups where by we will collect rubbish and fixing leaking taps
18. by learning about the importance of sustainability

The following are survey questions and responses about EE clubs

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Question: How can an environmental club help your school?
Answers:

1. By eduation the school learnes about what's right and wrong towards the environetal surroundings and how to keep their environment healthy and safe
2. By coming up with a meeting with the committee and start up a cleaning campaign
3. An environmental club can help our school by a cleaning campaign and committee
4. By helping us how to keep our environmnt and help us cleaning our school
5. It can can help to clean the school and setting up telling the people that is not good throwing papers around. And it will incarice other and at the end the school will have many people to countdown
6. By coming up with cleaning group from the learners of the school / By learning as the importance of the 5 Rs
7. It can help them by fixing taps that are broken and picking papers around
8. To talk with our principal so that can help us
9. This can help my school as it will educate the others about the consequences of littering and dumping as well as lots of things
10. It will help our school not to throw trash on the ground and not to waste water all those things
11. It can help with many things like taking up waste, and we can have a health place at our school
12. If they think about it and bring someone to come look the school
13. By cleaning waste materials which affect the school or show a bad image on our school or by sustaining water at school which they will close the tap
14. It can tell us about the thing that is best of for the environment in order to do it out at the house
15. By telling them not threw papers away/not throw away lolipop stick
16. Just by starting this cleaning up campaign to collect trashes every weekend
17. It help especially there is some people who don't care they just throw papers down open taps and leave them like that
18. It helps more or less the hough cleaning the environment and the panther what with all that is going to herper in the future

Question: How can you help the environmental club?
Answers:

1. I will help the club by doing what they are educating me and in that way the club will be more encouraged to proceed
2. By letting them know what issues are in the environment and being responsible for them
3. I can help the club by teamwork and working together
4. By telling my friends to keep the school or environment and also something also
5. By telling them that don't give keep on with your club and incarice others
6. By promoting it's name in the school
7. By giving them advice and when they need some thing just to give them
8. With more money
9. By correcting members in the group when they are littering, dumping and etc. and they should lead by example
10. I will help the club by telling them that we must teach the others not to do wrong things and also keep our school name on top as high as we can
11. I will encourage all people that one in and to ask the for me to join them with helping them any thing they do.
12. It will contribute same many to the school
13. By encouraging other learners not to throw waste on the school or tell them how not to waste the water e.g. closing tap while brushing
14. By telling them that is good of the environment
15. To make up a campaign or going out to the community with posters
16. By giving more guidelines on this club
17. by telling them what to do and what they must not do the environment
18. by giving it support from te community and the whole generations

Appendix K: Interview with Disney Andreas

Date: April 11, 2014
President of the Environmental Society at the University of Namibia
Contact Information: Cell: 0816390153
Email: Disney.andreas@yahoo.com
Club Email: environmentalsociety@unam.na

School details:

- University of Namibia
- Number of students: unknown

Supervisor information:

- Two supervisors
- One is a guidance instructor, and he is the primary instructor
- There is also a teacher / lecturer who helps out sometimes, but is not always available

Why/How the club was started?

- The club has been active since 2012.
- They have had the club longer, but it wasn't active previously

How is the club structured?

- There are 100 active members
- 13 executive members

What activities does the club do?

- Promote environmental awareness, especially global warming.
- Campaign for environmental issues.
- Give issues to EE clubs at High Schools
- In constant cooperation with Hochland. UNAM invites Hochland to come to events
- Host discussions with environmental experts
- Improving recycling by working with Rent-A-Drum
- Work with MOE and MET and other various companies, all for different projects

What are some of the challenges that the club faces?

- Funding is a big challenge.
- Spreading leadership out among all four classes

What impact does the club have on students and communities?

- No information

What general advice would you give to new clubs that are just getting started?

- Send out inspirational SMS to group members.

Appendix L: Interview with Mr. Kaholongo

Date: April 10, 2014
Supervisor for the Gabriel Taapopi Secondary School EE club
Contact Information: Cell: 0812179000
Email: jkaholongo@gmail.com

School details:

- Gabriel Taapopi is a secondary school in the Oshana region (Grades 8-12)
- Number of students enrolled: unknown

Additional supervisor information:

- There are two advisors, a geography and environmental studies teacher, and an agricultural teacher

Why/How the club was started?

- The Gabriel EE Club has been active for 3 or 4 years
- The name of the school's EE club is the 'Carbon Footprint'
- The club started because the two supervisors saw a need for the club. The main focus of the club is to spread global warming awareness, and to reduce people's carbon footprint.
- The club has between 50 and 60 members
- The club received N$50,000 in 2012, but could not use all of it

How is the club structured?

- There is a chairperson, and a secretary. For the most part, the adult supervisors delegate jobs to members in the club, and then those members find ways to achieve the task.

What activities does the club do?

- Maintaining a vegetable garden that provides fresh vegetables to the community
- Run fundraisers for multiple environmental themed school activities
- Clean the school and community
- Plant trees

What are some of the challenges that the club faces?

- Funding is limited. The club received the N$50,000 in 2012, but was not able to spend it all due to time limit restrictions
- The money that they were able to spend went towards gardening equipment and trees.
- They held a large event for the community, where they spread knowledge about environmental issues. However, this event could only be held once, due to funding problems.
- Transportation is also costly, and the lack of funding is cutting into the club's ability to travel.
- The club does not know where to go to find funding opportunities.
- The older students hold a lot of responsibility in the club, and do a lot of the work. The club needs to transfer the knowledge of the older students to the younger students. They

hold special meetings for this to take place, but since the meetings are during exams, attendance is always low.

What impact does the club have on students and communities?

- The club held the one time (due to funding) community event, and felt like it has spread general environmental literacy around the community.

What general advice would you give to new clubs that are just getting started?

- "Haha, its not that easy".
- The club's advisor says the most important thing is to make sure students understand how important the environment is.
- It is also important that the club is fun, and that member feel important.
- Wearing a t-shirt from the club made the students feel important

Appendix M: Interview with (John) Nyundu Kandjebo

Date: April 9, 2014
Supervisor for the Katji-na-Katji Secondary School EE club
Contact Information: Cell: 0812314980
Email: nyundum16@gmail.com

School details:

- Region: Kavango
- School Type: Combined school / Grades 3 to 12 / Not a hostel school
- Students: Most come from the surrounding area / enrollment is 883 students

Additional supervisor information:

- Mr. (John) Nyundu Kandjebo
- Education: Graduated from the College of Education in 2010
- Motivation: He was involved in an EE program there, and wanted to bring that experience to his students.

Why/How was the club started?

- School previously had an EE club, but it failed because all of the active members graduated.
- The club was re-activated in 2012 with 10 students, and now has 30 students.
- The club was able to restart because they applied for funding, and received N$50,000 from the MET
- The money was used to plant an orchard and to purchase gardening equipment

How is the club structured?

- Student Leadership: Chairperson and a Secretary. Both of these students are 11th graders, going into 12th grade.
- Student Initiative: Student leaders run meetings and are in charge of organizing activities of the club. Students organize watering responsibilities for their orchard and organize their annual Arbor Day

What activities does the club do?

- Keeping school yard clean
- Maintaining a garden and planting trees, involves the planning of the garden and how to maximize soil usage
- Teaching the community about how cutting down trees is bad. They do this through an annual Arbor Day where they plant trees with the community and teach them about sustainable tree harvesting practices
- Also teach their school community about the problem, and hope school students will transfer the knowledge to their parents and the greater community. They do this through after school presentations and by distributing awareness posters
- Run cleaning campaigns in their community. They cleaned a kilometer of road during one of these events.

- Educating themselves on solar cooking to save trees and electricity and gas and then pass this knowledge on to their parents and other community members
- Attending Environmental Educational conferences
- Exchanging ideas with other environmental clubs from different schools and different regions when possible

How much of the club is centered on student development versus just teaching about environmental issues?

- Club is mostly focused on informing the students of environmental issues and imparting them with environmental knowledge
- However, club has many opportunities for personal development of the students
- Student leaders (Chairperson and Secretary) get extensive experience with presentation and leadership skills. They have a great amount of responsibility for running the club, as the supervisor's role is just as a consultant and to educate the club on new topics
- General club members also get presentation and leadership experience because they are required to present to the club and sometimes the school when they come back from Educational Conferences or other events
- Club members learn responsibility and understand the idea of being accountable for each other through the upkeep of their garden and their orchard

What is the relationship of the club with the community?

- One of the most important issues in the community is that people cut down trees and sell them for money. This is one of the most important sources of income for the community.
- Because the club is educating the students on why cutting down trees is harmful to the environment, the interests of the club and community do not align and results in disagreements
- These disagreements occur at parent-teacher meetings where the issue is usually brought up
- There have been no serious confrontations, i.e. students being removed for school or community members taking action against the club, but in general the community is very resistant to the clubs suggestions and it is a very slow process of educating the community on sustainable practices
- Parents do not listen to the students when they try to teach them about the issue of non-sustainable tree harvesting because the parents feel they know much more about trees than the students
- Students are involved with their parents' tree businesses, but only in the form of helping to sell the products, they are not involved in the harvesting of the trees. Incoming students are very unaware of environmental issues and for the most part take the natural resources and environment for granted. This is a result of growing up with parents who are also unaware of the environments importance. Students need practical or hands-on examples to be convinced that environmental protection is important

What are some of the challenges that the club faces?

- Bringing up the new class is a challenge for the club. They find that the older kids lift a lot of the weight in the club, and when they graduate, there is no one left to pick it up.

- When students go on break, there is no one left to maintain the garden. This means that when the students return, there is a lot of work to be done, and often there is irreparable damage to the garden.
- There is not enough funding for the club. The original funding that the club received in 2012 is all gone. Travelling is expensive, and the club needs more money. They are contacting organizations for funding.

How do you overcome issues with the language barrier?

- Because of the variety of local languages, and the difficulty of translating environmental topics into local languages, the teacher has difficulty teaching the students
- They have overcome this issue a few ways: Depending on older learners who understand the topic to teach the younger learners. Describing the word of topic in local languages BUT then bringing it back to English and associating the local language description with the English description so learners can make a connection between the two

Can you talk to your students and ask them about their personal experiences with the club?

- Laura Johannes a grade 7 learner who joined the club in 2012. She said she gained experience through this club by dealing with the fellow learners when it comes to picking up papers and watering plants in the garden.
- Rosalia Kangumbe a grade 11 learner who joined the club said she feels very good and she gained experience in this club and she very sad to complete because she's going to miss the club very much
- I also talk to Kapitango Benjamen who's completing this year. He became a chairperson and he gained experience and confidence talking to the fellow learners and he felt like a true leader. The good things they all said is that they learn a lot about the environmental awareness. The bad thing is that it's very hard to change existing attitudes and perceptions to adapt new ideas and responsibilities.

What general advice would you give to new clubs that are just getting started?

- Keeping students motivated is very important. Only allow the active members to go on trips and collect club t-shirts.
- Change the learners attitude once they join the club to adhere to the club's mission and goals

Email Correspondence:

"evening Martel! I received your email and sorrry to reply abit late iam busy with examination marking. hope you good. we have 883 student at our school, and my best advice to the new environmental clubs to change their attitude once they join the the club to adhere to the activities that are involve in the club. the most imported project we started with was to educate our learners to use solar cooking to safe trees and electricity and gas, also learners to plan and do vegatable garden for food and learning.the most best way for us is for our learners to attend enviromental educational conference for them to see and learn more . also to exchange ideas with other environmental clubs from different schools and different region apart from our own. what do they feel or gain from

the club? i manged to talk to 3 of my learners today Laura Johannes a grade 7 learner who joined the club since 2012. she said she gained experience through this club dealing with the fellow learners when it comes to picking up papers and watering plants in the garden. i also ask Rosalia \Kangumbe a grade 11 learner who joined the club she feels very good and she gained experince in this club and she very sad to complete because shes going to mis the club very much i also talk to Kapitango Benjamen whos completing this year. he became a chairperson and he gained experince and confidencial talking to the fellow learners he feel like a true leader. the good things they all said is that they learn alot about the environmental awareness . the bad things is that its very hard to change existing attitudes and perceptions to adapt new ideas and responsibilities"

-Nyundu Kandjebo

Appendix N: Interview with Fran Samende

Date: April 9, 2014
Supervisor for the Linus Shashipapo Secondary School EE club
Contact Information: Cell: 0812725640
Email: fransamende@yahoo.com

School details:

- Linus Shashipapo is a Secondary School in the Kavango region
- It is a hostel school
- Number of students enrolled: unknown

Why/How the club was started?

- The EE Club was started in 2011, with 50 students, by Mr. Wycliff
- The club started because the Ministry of Environment and Tourism had an opportunity for schools to win funding money for environmental education
- The Linus EE Club started as a way to get that funding, and received N$50 000
- Mr. Wycliff eventually left for a new school and the current supervisor took his position in the EE club

How is the club structured?

- No information

What activities does the club do?

- Planting trees
- Gardening
- Advising the community on local environmental issues through drama performances
- Annual trips to local game reserves. Sometimes they do projects with the reserves
- Worked with Ministry of Youth, Sport, and Culture to teach the community how to use a solar cooking pot

What are some of the challenges that the club faces?

- The club loses active members when they graduate in 12th grade. The club is trying to bring in new, motivated underclassmen to replace the graduating seniors. The annual trips, and t-shirts attract the attention of younger students and help bring them into the club.
- The initial funding that the club received is running out. The transportation for trips is too costly for students to pay by themselves.

What impact does the club have on students and communities?

- The community and students have a better understanding of local environmental issues than before.

Follow up questions (no response received)

- Ask your students to reflect on their personal experiences, including positives and negatives.
- How many student leaders are there?
- What is your future plan for funding?
- What is the best advice you could give to a new club?
- If there was an EE-club network, what kind of activities would you like to do with multiple clubs?

Appendix O: Interview with Hochland HS EE Club Students

Interview with Students from Hochland High School EE Club

Date: April 4, 2014
Student leaders from the Hochland High School Environmental Education Club

Additional school / club details:

- Hochland High School is a secondary school in Windhoek that has had an established EE club since 2006.
- The club has about 70 members across grades 8 to 12.
- The club has two leaders, a Head and Deputy Head.
- The club supervisor is Liina Nantinda

Findings

The following is a set of findings from the hour and fifteen minute discussion we had with the four students from the Hochland High School EE club. We met with four 12th graders who were all very active in the club.

1. **It is important for EE clubs to be fun, as well as provide work for students to do all year long.**

   One student from Hochland High said that he joined to go on all of the fun trips that the EE club does. The club needs to attract students to join, and the trips fulfill that role. The students also need to stay busy, or they will lose interest in the club. Students say that they feel responsible for taking care of the garden. This feeling of responsibility helps to give students ownership over the EE club, and keep them motivated to stay active in the club.

2. **The Hochland Environmental Club Students had a club before EDV contacted them.**

   We discovered that the EE Club had been in existence almost as long as EduVentures has been. The club was formed by a passionate teacher who decided to start a club at her school. The club has flourished since and has their own garden. They go on trips and are in contact with the Ministry of Education so they have the opportunity to meet important people. All of this was done before EDV contacted them to help create the modules for their EduMobile Program. EduVentures has never founded an EE club.

3. **There are some negative connotations to being a member of the club**

   The members of the Hochland High School EE club must put up with name calling, teasing, and bullying. The negative attention is not something that students want, and may be discouraging more students from joining EE clubs. This finding showed us that there are more challenges to being in a club than just resources and interest. In developing the clubs at the two schools we visit we will have to warn them and prepare them to deal with potential obstacles such as teasing. The Hochland students deal with it by ignoring the bullies and said it got better when primary students who were educated came up into the secondary school. This is one thing we can recommend to the new clubs

to address this challenge.

4. **Every EE Club Needs a Strong Leader**
   According to the students, a strong leader is one of the most important things in a successful EE Club. Their EE Club leader is a history teacher who founded the Hockland's EE Club 7 years ago. Ever since, she has been incredibly active and passionate about EE. Her students say that her best and most important qualities are her passion, her leadership, her ability to lead by example, and always keeping everyone involved. The club needs a supervisor like her in order to be successful. Other clubs should have a strong leader to help ensure that their club stays active.

5. **A long term project is equally important**
   Students mentioned that their garden allowed them to always have a task, and avoid the club becoming "idle." The students also talked about a book that they wanted to write, which included all activities they had done with their EE club, which would serve as a resource for both the younger members, and new EE clubs. They emphasized the importance of this, as the opportunity to impact others kept them excited and motivated.

6. **Hochland High EE Club Wants to Help Create New EE Clubs**
   There is not enough student involvement in Environmental Conferences, say members from the Hochland High EE Club. At a conference last year, Hochland High students were the only youth representatives. They are not happy about it, and want more EE Clubs to start at new schools. Beyond creating new clubs, Hochland would like to work with other clubs. "It would be nice to interact with other schools, because you never know what you will find in another school." said one Hochland EE Club member.

Student Responses to Discussion Topics

Preliminary Questions:

1. **Introduce ourselves and the project: Name, where we are from, what we study, other activities**
2. **Ask them to introduce themselves one-by-one**
   The four students gave their names. Three were local to Windhoek, and the fourth was originally from Angola. They are all looking to study architecture in college.
3. **Who is currently in an environmental education club?**
   Everyone

Discussion Questions:

4. **How did you first become involved with EduVentures?**
   EduVentures contacted the EE club when EduVentures wanted to create the curriculum for the EduMobile program.
5. **What did you want out of it?**
   Students wanted to plant trees, go on trips, and meet important people from the Ministry. Students also join because their friends joined.
6. **Has it met your expectations?**
7. **Does anyone supervise the club?**
   Yes.

a. **What does the teacher supervisor do?**
   The supervisor runs the meetings, stays in contact with the Ministry, plans trips, and motivates students. The supervisor also helps make sure that the club survives even after students graduate.
b. **Is there incentive for the teacher to continue running the club?**
   There is no financial incentive for the supervisee to run the EE club. She does it because she is passionate.

8. **What kinds of activities does the club do? What activities/projects is the club planning to do in the future?**
   Currently, the students' main focus is on maintaining the school garden. Students also pick up trash around the school and community. They help to keep the school neighborhood clean by keeping watch for people who would liter. The club goes on trips to different parks in Namibia, such as Etosha. The club also goes to conferences and presents their work. They have released a book on their carbon footprint. The graduating class plans to create a book detailing all of the work the club has done over the years. The book is meant for the younger students to use and learn from.
9. **What do you like about the club? What has it done for you personally?**
   The students like the club because it is fun. The trips tend to excite students about joining the club. The activities also help to attract students. Students also joined because their friends had joined
   a. **Career opportunities? Professional experience? Leadership?**
      The students feel like being part of the club helped them gain leadership experience. They also learned how to be loyal, patient, and disciplined.
10. **How often does the club meet? Weekly meetings, monthly?**
    The club meets officially once a week on Wednesday. The Head and Deputy Head spend time with their adviser every day.
    a. **Can you walk us through a meeting? How does it work? How is the club managed? What is the structure of the club?**
       The supervisor starts the meeting, and tells everyone what is going on. Then the Head and Deputy Head have a chance to talk to everyone, and finally, the floor is open for general discussion.
11. **How much contact do you have with EduVentures on your activities?**
    There is little to no contact with EduVentures for regular club activity. EduVentures brought members of the club into the EDV office for advice on the EduMobile curriculum.
12. **What kind of challenges have you faced as a club?**
    The club has faced a few main challenges. One is the negative connotation of being involved with the club. Some members are teased by other students. The parents are wary of the members spending too much time in the organization. Another challenge is the member participation. Some members drop out if their friends leave.
13. **What impact do you think this club has on your school?**
    The club has helped to make the school cleaner, and raise student awareness about the environment.

14. **How has the club impacted your community?**
    The club has a project where members stand outside and stop people from throwing trash on the ground.

Network Questions:

15. **If you had the option to communicate with other clubs, what would you share? Projects/ideas/meet just for fun**
    The students were very excited about being involved with other clubs, but didn't offer much in the way of project ideas concerning multiple clubs.
    a. **Would you want to help other EE clubs get started?**
       The students expressed interest in helping EE clubs start at other schools.
16. **What would be the easiest / most effective way to communicate with other clubs?**
    The students suggested that Internet communication would be the best way to communicate with other clubs. They suggested that in rural areas, the Ministry could loan an Internet enabled laptop to the supervisor of the EE club for communication purposes.
    a. **Email, Facebook, cooperative events, etc.**
       The students said Facebook could be the best way for kids to communicate, since they use it anyway.
17. **If given the opportunity to give advice to another club what would you say is the most important aspect of club management?**
    A passionate supervisor is the most critical part of club management, according to the students.

Direct Quotes

The following is a set of quotes that we felt were important and memorable. Students' names have been left absent from this report to protect their anonymity.

- "The nice thing about the club is the education. We really learned a lot on how to save the planet by simply switching the light bulb for a minute or so. Imagine if every single person in the household would do that. We'd save a lifetime. There would surely be enough energy for everyone."
- "In order to motivate a person to become active for the entire time, a long period, you really have to show that person 'why is she [the adviser] doing this' To show that person why she is doing this is not an easy job, so it takes a lot of hard work. I would have dropped out a long time ago, but then I realized no, that this club is the only one that has showed me how to become a true leader and save the world."
- "She (Ms. Nantinda) is always in contact with other teachers at other schools, trying to get them to be active and get them to come up with their own environmental club."
- "The other thing is like, during the course of picking up papers, people call your sorts of names, like garbage girl, garbage boy, all those things, and then you have to go through all that, and you have to ignore those things. Its kind of bad."
- "Or they come, and they're like ' your from the club right?' and you say 'yeah,' and then they throw the paper on the ground and like, 'okay, pick it up.'"
- 'Its kind of discouraging, If you don't have the heart for it, it just breaks you"

- “When we would have trips, parents would complain and say ‘no my children this and that’. So the application was for parents to read and be aware of the things that go on”
- “if you compare the time when we started to now, there has been a change, but not a big change, yeah, people used to liter, people don’t liter now. ‘cause now the kids, cause the thing is, we advise most of the primary school to learn how to not litter so that when they're in high school, they think about it more. When they get to high school, it makes things much easier for us.”

Appendix P: Photo Usage Consent Form

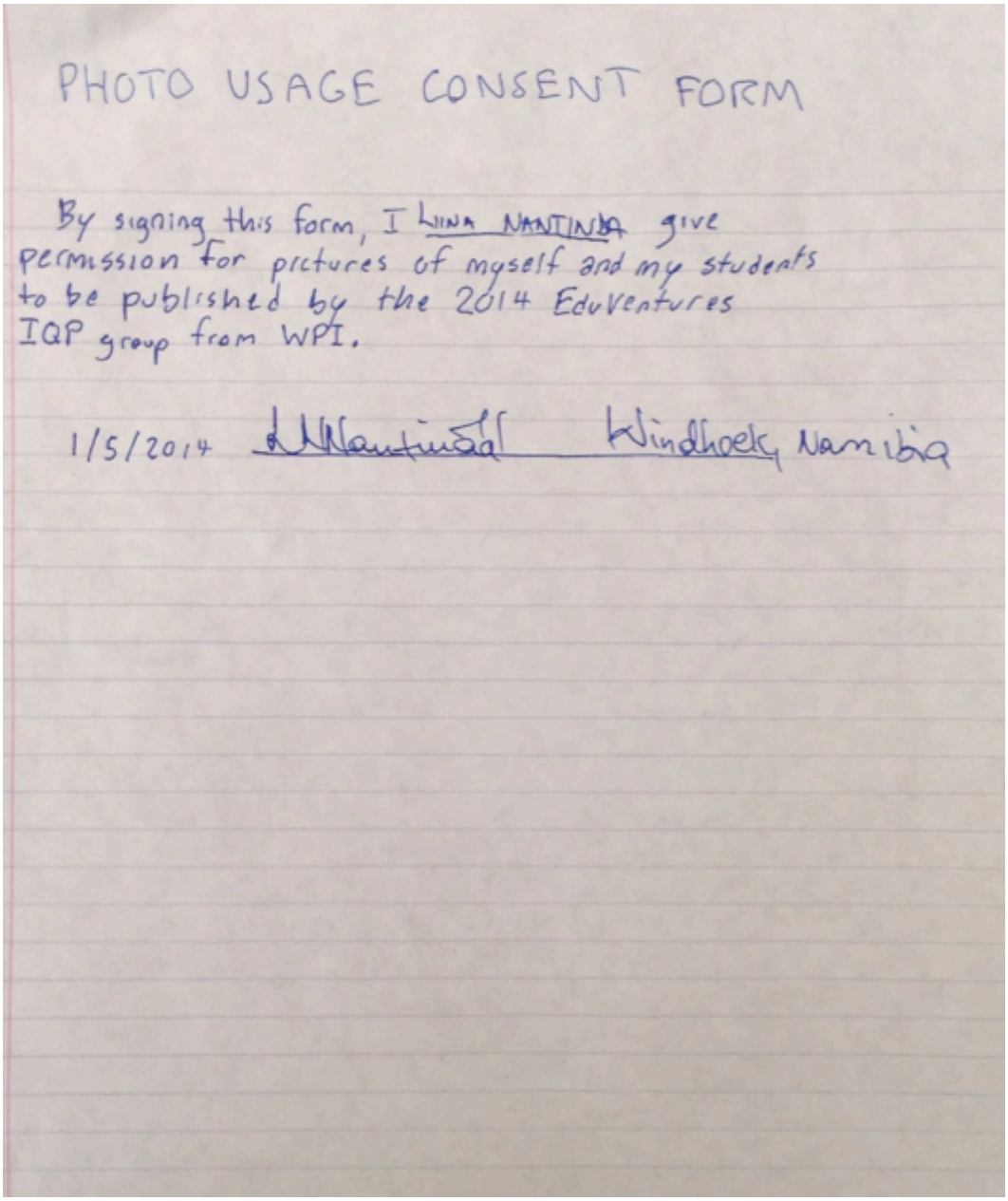

PHOTO USAGE CONSENT FORM

By signing this form, I LIINA NANTINDA give permission for pictures of myself and my students to be published by the 2014 EduVentures IQP group from WPI.

1/5/2014 L Nantinda Windhoek, Namibia

Appendix Q: Hochland H.S. EE Club's *My Carbon Footprint*