WETLAND CONSERVATION AND PUBLIC AWARENESS IN BENJAMÍN ACEVAL, PARAGUAY

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WPI

fundación paraguaya

Wetland Conservation and Public Awareness in Benjamín Aceval, Paraguay

An Interactive Qualifying Project
completed in partial fulfillment of the
Degree of Bachelor of Science at
WORCESTER POLYTECHNIC INSTITUTE

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Submitted On:
Tuesday, May 2nd, 2017

Authorship Page

All group members, Natalia, Marlon, and Ricardo, contributed equally to the project and the completion of this report.

Abstract

This project developed and presented a wetland conservation lesson plan to 300 students at seven schools in Benjamín Aceval, Paraguay and planned and hosted a wetland conservation workshop for these students. The lesson plan was developed using online research, interviews, and class observation. Using pre and post instruction questionnaires, student letters, and observations of student skits, it was determined that student knowledge, attitude, and skill improved by an average of 26% as a direct result of the lesson. The wetland conservation workshop gave 30 student participants the chance to learn from conservation experts who spoke about wetland species. Recommendations for a local conservation group, Karugua Ha'e Tekove, included a broader focus on the theme of conservation, visiting more local schools to spread awareness, and making the wetland conservation workshop longer in order to make time to visit local wetlands

Acknowledgements

Many individuals helped us successfully complete our Interactive Qualifying Project. We would like to thank these individuals.

- Dr. Robert Traver for advising our project, encouraging us, making sure we were always on track, and providing us with useful feedback on our writing.
- Mrs. Dorothy Wolf for advising our project, helping us connect with teachers and administrators at La Escuela Agrícola and helping us with the Spanish for our final presentation.
- Academic Director Romina Godoy and Professor Magdalena Guerra for connecting us with local Benjamín Aceval schools, introducing us to their directors, and providing us with transportation to some of these schools.
- Professor Martina Caballero for ensuring that we had everything necessary for our wetland conservation workshop hosted at La Escuela Agrícola.
- Dr. Martin Burt and La Fundación Paraguaya for sponsoring our wetland education event.
- Director Luis Cateura for donating the use of the "quincho" and the hotel meeting room for our wetland education event.
- Professor Reuben Penayo for allowing us to observe one of his life science classes at La Escuela Agrícola, and allowing us to present at another school where he teaches, Escuela Roa Benitez.
- Dr. José Petters for helping us plan our wetland conservation workshop and inviting local experts such as biologists, bird experts, and tree experts to present to the students.
- Karugua Ha'e Tekove for allowing us to observe a presentation and helping us plan and lead a wetland conservation workshop.
- Dr. Fátima Mereles for advising us and making sure that all of the information we were presenting was scientifically accurate.
- Director Celia Zamphiropolos of the Instituto Baha'i Miki Rutan for allowing us to pilot our wetland conservation lesson plan at her school and inviting us back for a conclusion event where we were able to observe work the students had done on wetlands.
- The students at La Escuela Agrícola San Francisco for making us feel welcome and helping us adjust to Paraguay.

Executive Summary

Background

There is a beginning level of environmental awareness in Benjamín Aceval, Paraguay; however, awareness about conserving the wetlands is weak.

Project Goals

The team sought to increase awareness of wetland conservation in Benjamín Aceval, Paraguay. The goal was to reach as many students as possible by visiting local schools, informing them about wetland conservation, and encouraging them to take action to conserve their local wetlands.

Deliverables

The team's two deliverables are:

1. Wetland Conservation Lesson Plan - The team developed a lesson plan in Spanish on wetland conservation. The lesson plan was appropriate for students ages 4-18, with different activities for each age group. The lesson plan was presented by the team at seven schools and a copy was delivered to a life science teacher at each school for future use.

2. Wetland Conservation Workshop - A workshop was planned and carried out at La Escuela Agrícola. Thirty students from local schools attended. Activities included interactive games and talks by professionals in conservation organizations. These professionals included biologists specializing in birds, trees, and reptiles.

Methods

The team utilized online research, interviews, classroom observation at the Escuela Agrícola, and meetings with key school administrators to connect with other local schools to arrive at these deliverables.

Results

The team presented the lesson to over 300 students in seven schools. The team utilized pre and post instruction questionnaires, content analysis techniques, and observation to assess the success of the deliverables. The questionnaires tested wetland knowledge, attitude, and skill and measured the changes in these three aspects from before the lesson was delivered to after. On average, 34% of students saw positive change in skill, 20% saw a positive change in attitude, and 23% saw a positive change in knowledge. Student letters were also analyzed and categorized using content analysis. These letters revealed that students are already environmentally aware.

Additionally, many letters expressed ideas and topics covered in the team's lesson plan. For example, 63.7% of students discussed proper trash disposal, a topic mentioned in the lesson plan, in their letters. Student skits were also analyzed and rated using the group's collective observations. The skits revealed that most students know what to do to help wetlands. For example out of 27 students, 10 students suggested government involvement, 8 suggested individual actions that help wetlands, and 9 suggested group cleanups. Lastly, 30 student participants attended the wetland conservation workshop the team conducted. This workshop gave the students access to professionals such as biologists and conservation experts. Students were able to listen to these experts give talks, ask them questions, and engage in discussion.

Recommendations

Based on the results, the team recommends: a more general focus on conservation of the environment, rather than solely wetlands, to appeal to more students. The team also recommends that the local conservation group, Karugua Ha'e Tekove, visit more schools in Benjamín Aceval, perhaps all schools, to continue to spread wetland conservation awareness to students. Finally, the team recommends that the wetland conservation workshop be longer, possibly overnight, to be able to include more activities, such as visiting a local wetland.

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1. Introduction

In the heart of South America there is a country called Paraguay. It is a small country, about the size of California, largely landlocked, but overflowing with natural resources and ancient beauty. Paraguay is bordered by Brazil to the northeast, Argentina to the south, and Bolivia to the northwest. The topography ranges from booming urban cities, like Asunción, to the wild wetlands teeming with a myriad of species from the mighty jaguar to an imperceptible parasite. The people of Paraguay are almost as diverse as the wildlife. Thanks to the warmth of the culture, people of many creeds, clans, and colors claim the title of Paraguayan. Like anywhere else, the country has exceptionally rich citizens and exceptionally poor citizens. Many of the poor citizens live in rural areas and work the land to make a living. The wilderness of Paraguay is vast and full of opportunities for agriculture and expansion, but it is also the home of a delicate ecosystem.

West of the Paraguay River lies the Gran Chaco region. The Gran Chaco region spans eastern Bolivia, western Paraguay, and northern Argentina. It is bordered on the west by the Andes Mountains, but the northern and southern borders are not very clearly defined. The northern boundary is commonly thought to be the Izozog Swamps in Bolivia while many say that the southern boundary is Salado River in Argentina. The Gran Chaco "accounts for sixty percent of the land territory, but only two percent of the overall population" in Paraguay (Central Intelligence Agency, "The World Factbook: SOUTH AMERICA: PARAGUAY"). Although the region is relatively unpopulated by humans, its wildlife habitats are extensive ranging from dry savannahs to wetlands. In the eastern part of the region, one can find the "highest average annual rainfall – 52 inches" and it is in this region, where the wetlands are found (Martin, 2015).

One of the most pressing concerns of the Gran Chaco Region is the status of the wetlands. Though they house a fraction of the human population, these wetlands are crucial to the integrity of Paraguay's ecosystem. Unfortunately the forests and wetlands of the Gran Chaco have been reduced due to fragmentation and deforestation. (Campos-Krauer, Wisely, 2011). As a result, many species that call the wetlands home have been pushed toward extinction. As Professor Mereles states, "fragmentation and habitat reduction are two different phenomena, but occur simultaneously" (Mereles, Rodas). Deforestation and fragmentation remove portions of the natural habitats. These smaller sections become isolated and less likely to survive, thereby, potentially causing significant ecological damage (Mereles, Rodas). The wetlands of Paraguay have been gradually shrinking due to expansion of large companies and farmers looking for more land to work. If the wetlands continue to be threatened, they will fail to fulfill their function in the ecosystem. Failure could lead to severe problems for all members of this ecosystem in and around Paraguay.

In Paraguay, one's socioeconomic status can affect the scientific information that one can access. The majority of the population lives in poverty and is generally more focused on surviving daily life, than wetland conservation. As a result, efforts to preserve the environment are not as effective as they could be because they miss a major demographic. Organizations like the Campo Iris Nature Reserve have had some success in protecting parts of the Chaco and have been recognized by the Paraguayan government. Their recognition has given Campo Iris Nature Reserve the title and privileges of a "Private Nature Reserve" (Campo Iris Nature Reserve). Despite their success, there are two caveats. The first, the majority of the land they protect is in the arid part of the Chaco and focused on the animals contained within those regions. Secondly, most of the area they protect is miniscule in comparison to the entire Chaco, and they run into

the underlying dilemma: the general public does not know that there is a problem to begin with, and if they do they aren't aware of how severe the situation is. Money is always a factor to consider, but the more important obstacle to overcome is making the information easily available and understandable.

It was the goal of this project to inform Paraguayan students about the importance of wetland conservation in the Chaco region. A scientifically accurate and interactive lesson was delivered at schools in the Chaco region, specifically in Benjamín Aceval. An informative wetland conservation workshop for students was also planned and carried out.

2. Background

2.1. Paraguay

Over the past half century, Paraguay has gone through major economic and ecological changes that have led to a rapidly changing environment. In 1945, it was estimated that the forest cover that had once been a healthy eighty-five percent dwindled to forty-five percent and then dropped again to twenty-two percent in 1984 (Moline, 2001). Current estimates say that only ten percent of primary forest remain, a growing concern for environmentalists and the agriculturally dependent community (Moline, 2001). Similar to the forested regions, the Chaco is at risk from a number of threats ranging from commercial development to average citizens looking for a place to call home. With more development and more houses the natural environment disappears.

2.2. The Paraguayan Chaco

El Gran Chaco, also referred to as the "Region Occidental", is a subtropical area in Paraguay. The Chaco "can be divided into three eco-regions: the short but nearly impenetrable dry thorn scrub forests of the Alto Chaco, the extensive palm savannahs and marshes of the Bajo Chaco and the periodically flooded forests and wetlands of the Matogrossense Chaco" (Moline, 2001).

Land transformation is an issue that affects the Chaco. Specifically, deforestation and fragmentation are affecting the ecosystem and biodiversity of the area. Deforestation is the act of clearing a vast area of its trees. Fragmentation involves breaking up a forest into smaller, more separated areas of trees. Fragmentation is done to allow room for new roads, buildings, and other manmade structures. Just like deforestation and fragmentation, the loss of wetland habitats is also a significant problem in the Chaco. The effects of land transformation include vulnerability to climate change, loss of habitat, and potential extinction of different species of plants and animals.

Biodiversity in the Chaco region is constantly affected by environmental changes. Many of these changes are largely due to cattle ranching and crop production. Vast amounts of land are transformed to grow more crops (D'Angelo, 2012). In addition to crop production, cattle ranching also contributes to the destruction of Chaco lands. This destruction refers to the effects of deforestation, fragmentation, and loss of wetlands in areas chosen for development of ranches (Campos-Krauer, Wisely, 2011). Areas that have normally served as ecosystems with habitats or sustenance for a diverse range of wildlife are left empty.

The Chaco houses several groups of animal wildlife. Mammals are a large part of this ecosystem. Some of these mammals include jaguars, pumas, ocelots, giant anteaters, otters,

armadillos, and many others. The Chaco is also home to many reptiles. The list includes turtles, snakes, caiman, geckos, skinks, and iguanas just to name a few (Fitzgerald, Cacciali, Scott, Aquino, Smith, 2016). The Chaco is especially important for bird life. For migratory birds especially, the Chaco serves as breeding and nesting grounds.

Furthermore, plant life is an important aspect of the Chaco. Plant life in the Chaco can range from vegetation to shelter for wildlife to natural water filtration in the wetlands. Some of the larger areas of plant life are the shrublands (matorral), palm groves, thorn forests, and the grasslands (Riveros, 2017). In these areas there exists several different species of trees including the quebracho, trebol, urunday, guayaibi, yuqueri, and guayacan (Riveros, 2017). However, large numbers of these trees and other plant life are cut down to make room for development. At the same time, the need for more crops has reduced the amount of native plant life in the Gran Chaco region.

The spread of agriculture is due to high demand of soybeans. Paraguay is one of the largest producers and distributors of soybeans in the world. In 2014, the country produced 8.1 million metric tons (USDA Foreign Agriculture Services). In that same year, the area of land under soybean crops was estimated to be 3.1 million hectares (approximately 7.7 million acres) (USDA Foreign Agriculture Services). This estimate is expected to increase by about 3% by the end of 2017 (USDA Foreign Agriculture Services). This expansion of agriculture means additional land needs to be cleared to grow new crops. The rapid growth of agriculture especially affects the Chaco. During the first 5 months of 2014 alone, over one thousand acres of forests, most of them being in the Eastern Chaco, were completely destroyed (MacDonald, 2014). The loss of thousands of acres is an annual trend in the region. This trend is expected to increase as the demand for soy continues to grow.

Another cause of land transformation in the Chaco is cattle ranching. Cattle ranching is the process of raising cattle for meat, milk, or leather. Land is required to effectively cattle ranch. Forests are not conducive to raising cattle. Deforestation and fragmentation methods are used to clear the land. These methods include bulldozers and controlled fires to remove trees and other undesired features. Naturally these methods result in a loss of immense quantities of plant life and wildlife habitats.

2.3. Benefits of Wetlands

Wetlands, including those found in the Gran Chaco region, provide many economic benefits. Wetlands stimulate local economies "by producing resources, enabling recreational activities and providing other benefits, such as pollution control, [improving drinking water quality], and flood protection" (United States Environmental Protection Agency, 1997). Additionally, "while it can be difficult to calculate the economic value provided by a single wetland, it is possible to evaluate the range of services provided by all wetlands and assign a dollar value" (United States Environmental Protection Agency, 1997).

Wetlands have the potential to improve drinking water quality by acting as filters. When water from a river or stream enters a wetland, the flow of the water slows and moves around the plants in the wetlands (United States Environmental Protection Agency, 1997). Some of these plants then absorb excess nutrients from "fertilizers, manure, leaking septic tanks, and municipal sewage" (United States Environmental Protection Agency, 1997). Although small amounts of these nutrients are necessary to maintain the biodiversity in the habitat, an excess can cause harm to species living there. This natural filtration mechanism removes nutrients before the water leaves the wetland, making the water safer for drinking, bathing, swimming, and other daily

activities (United States Environmental Protection Agency, 1997). One example of this natural filtration system is the Congree Bottomland Hardwood Swamp in South Carolina. This wetland naturally removes the nutrients at the same level that a five million dollar water treatment plant would (United States Environmental Protection Agency, 1997).

Wetlands also serve as flood control mechanisms. This greatly benefits Paraguay as the Chaco is prone to flooding. In December 2015, heavy rains caused by El Niño caused 150,000 people in Paraguay, Argentina, Uruguay and Brazil to evacuate their homes due to intense flooding. The flooding was the most severe in Paraguay as 86% of those displaced were Paraguayan. Wetlands "can play a role in reducing the frequency and intensity of floods by acting as natural buffers, soaking up and storing a significant amount of floodwater" (United States Environmental Protection Agency, 1997). A normal wetland can "typically store about three-acre feet of water, or one million gallons" (United States Environmental Protection Agency, 1997).

Wetlands can also be popular for many recreational activities such as "hiking, fishing, bird watching, photography, and hunting" (United States Environmental Protection Agency, Economic Benefits of Wetlands, 1997). If further developed, the wetlands in the Chaco could generate more revenue from all of these activities as both locals and tourists would enjoy them. Wildlife sanctuaries in the wetlands also generate revenue, and they "also provide employment opportunities, including such positions as surveyor or park ranger" (United States Environmental Protection Agency, 1997).

2.4. Benjamín Aceval

In Paraguay, there is a rural city, Benjamín Aceval. The city is mostly covered by wilderness, and it contains a variety of life and several wetlands. Although it is mostly wilderness, there are still several homes and establishments throughout the city. Some of the more important establishments in the city are several schools. Distance varies between each of the schools, as some can be at ends of the city and other can be next door neighbors. These schools either solely teach basic education or also specialize in some subject. This section will review these mentioned aspects of Benjamín Aceval.

Benjamín Aceval has a variety of life. Life ranges from people to wildlife to livestock. An abundance of livestock can be noticed along the highway as a result of the popularity of farming. Farming is especially prominent in Benjamín Aceval due to the amount of available land to support livestock. The wildlife is easily found in the city. Animals like frogs, lizards, and even howler monkeys can be found in some of the areas with more trees.

A large number of wetlands exist in this city. The city contains a forest like wilderness with several lakes and plant life. This wilderness contains most of the wetlands in Benjamín Aceval, but many homes and businesses can sometimes be found very near a wetland. These wetlands range in size from a small pond to a large lake. Several wetlands can be found a short distance from the highway that runs through Benjamín Aceval known as the Ruta Transchaco. However, many establishments are unaware of how close they really are to the wetlands. This lack of awareness can damage wetlands as a result of trash or development.

Different types of schools exist in this city. These types include basic education or specialty. Basic education schools teach typical subjects like Math, Science, English, and Spanish. Vocational schools still teach the subjects mentioned, but also have a larger focus. This

larger focus can be a specific area like environmental protection or hotel service and agriculture. Additionally, the presence of these focuses helps identify schools that would more likely benefit from environmental education.

Schools can also sometimes be found near the wetlands. This is because most schools in Benjamín Aceval are found along the Ruta Transchaco. The schools are either far apart from each other or connected. The main reason for connected schools is to split responsibilities for different grades. For example, one school will teach preschool through 6th grade, while the connected school will teach 7th grade and above. The schools are generally very small with most having no more than 200 students. As a result, Benjamín Aceval contains several schools. However, since most schools can be reached along the Ruta Transchaco, the opportunity to spread conservation awareness to citizens is created.

2.5. Karugua Ha'e Tekove

The concept of promoting wetland conservation by visiting local schools is not new in Paraguay. In fact, that mission has been pursued for almost a year now. There is a group centered in Benjamín Aceval that focuses on the conservation of the wetlands and subsequent health of the ecosystem. The name of this group is Karugua Ha'e Tekove which translates to Wetland Is Life. The group first made its mission known in August of 2016 (Karugua Ha'e Tekove, 2016). Dr. José Petters, a specialist on birds of the wetlands, founded the group. Since then, Petters has recruited like-minded young people to help spread the message of conservation across Paraguay.

Conserving the wetlands is no easy task. It requires multiple approaches to be successful. In addition to visiting schools to deliver presentations, the Karugua group also hosts events like cleaning days, wetland fairs with informational booths, and attends international environmental

events like the Green Expo. They also have an established presence on multiple social media platforms (Karugua Ha'e Tekove, 2016). During school visits, the group uses PowerPoint presentations to convey information to students. The cleaning days are all-day events that allow various people to participate. Wetland fairs can take many forms, but the most common is a series of informational booths set up near or in a wetland. Crowds are invited to visit booths and learn about various topics. There are also activities for children like drawing pictures of their favorite wetland creature or landscape. The Green Expo and similar events allow environmental organizations around the world to share their progress and learn more about effective conservation tactics.

The primary issue the Karugua group has is not lack of recognition, but rather the inactivity of citizens. The group has been featured on the news for their efforts to protect the wetlands. Thanks to their use of social media, many are familiar with their efforts. Unfortunately, a problem arises when citizens see the work the Karugua group does and do not take action. In one of the videos posted on YouTube explaining what Karugua Ha'e Takove is and why it is important, there is a shot of a sign that says "Don't Throw Your Trash Here" surrounded by a mountain of trash. The message is received by many and simply ignored due to convenience.

Karugua Ha'e Takove is more than a group that simply tells people not to throw their trash in the wetlands, they give people a reason to listen. Using audiovisuals, they show how carelessness is endangering the various wetland species. They make wetlands somewhere people want to be and not just land to be filled in with trash and put to more lucrative use. By hosting trips into the wetlands to see birds, trees, and others wildlife they make wetlands attractive to all from science teachers to passersby with some free time.

2.6. Environmental Education

Environmental education is defined as "a process that allows individuals to explore environmental issues, engage in problem solving, and take action to improve the environment" (EPA, 2017). The concept was developed in the mid-20th century and has "been defined and redefined over the last twenty-five years" (Thomson, Hoffman, n.d.). The first person to define the concept of environmental education was Dr. William Stapp in 1969. Since then, "a holistic view of Environmental Education was adopted and acknowledged by 175 countries at the first United Nations Earth Summit in Rio de Janeiro on environment and development (Talero, 2004).

In 1978, UNESCO defined five key concepts of environmental education that still apply today. These practices include: awareness, knowledge, attitude, skill, and participation. These key practices were developed as part of the Tbilisi conference, "the world's first Intergovernmental Conference on Environmental Education" (Thomas, Hoffman, n.d.). The Tbilisi, along with the Belgrade conferences, have provided a basis for environmental education.

In addition to the aforementioned concepts, the Australian Government defines five principles of environmental education. These five principles are:

1. Environmental education must involve everyone
2. Environmental education must be lifelong
3. Environmental education must be holistic and about connections
4. Environmental education must be practical
5. Environmental education must be in harmony with social and economic goals and accorded equal priority

(Department of the Environment and Energy, 2000).

These principles can be applied across the globe because they are applicable to all. If applied successfully, these principles will ensure a sustainable future (Department of the Environment and Energy, 2000).

There are many key practices of environmental education. Some key practices include "using resources displayed in the classroom, carrying out tasks asked in assemblies, [or groups], and [encouraging involvement in conservation] projects organized by outside agencies" (Palmer, 2002). Specifically the "[creation] and use of didactic materials (education materials other than books) such as environmental theme posters, masks of animals and trees, and the development of environmental games, stories, and theaters" are especially useful in environmental education (Moline, 2001). Environmentally themed songs sung in the classroom and the use of recycled garbage in art projects are other practices that have proven successful (Moline, 2001). The use of these materials brought "awareness, appreciation, and understanding of plants, animals, endangered species, and bird migrants" (Moline, 2001). Celebrating environmental holidays such as Earth Day and Arbor Day by doing environmentally themed projects is another key practice that has proved successful, especially in rural areas with younger school children (Moline, 2001).

Another recent practice in environmental education is the use of the media. Through "newspapers, magazines, radio, and television, people gain awareness" (Talero, 2004). The media helps the public gain awareness as "we now see more environmental magazines, newsletters, and journals, along with TV and radio programs" (Talero, 2004). These practices support the end goal of environmental education programs – knowledge followed by action (Thomas, Hoffman, n.d.).

Efforts to implement environmental education programs in rural Paraguayan schools, specifically in Benjamín Aceval, is a new initiative. Many schools in the area, such as Instituto

Baha'i Miki Rutan and Escuela Parroquial Santa Rosa de Lima already have strong environmental focuses. The conservation group Karugua Ha'e Tekove has a plan to spread conservation awareness to the city. One aspect of this plan includes visiting schools and working with students to help them take action to help the environment. Although efforts to implement environmental education in Benjamín Aceval are present, measures can be taken to propel these efforts forward.

3. Methodology

This section of the report describes the methods to develop and present a lesson on wetland conservation to schools in Benjamín Aceval, Paraguay. This section also describes the planning and execution of a wetland conservation awareness event for all the schools. To assess this environmental education lesson, pre and post instruction questionnaires were used, student work was evaluated, and feedback was given by Paraguayan educators and local conservation groups. A Gantt chart was used to layout the project schedule.

3.1. A Lesson Plan, its Delivery, and its Revisions

A lesson plan is a guide that outlines the structure and format of a lesson. Regardless of how well a lesson plan is designed, it always works out differently when one begins to deliver it. A lesson plan meets reality when it is actually delivered. The delivery of the lesson plan required the actual development of the lesson plan, development of pre and post instruction questionnaires, connecting with schools, tailoring, and leading interactive activities. The lesson plan demonstrated the importance of wetland conservation, specifically in Benjamín Aceval. The

team provided a lesson plan that Paraguayan teachers can use each year. Each teacher can either use it as is, or modify the activities to fit their students' needs.

3.1.1. Development of Lesson Plan

The lesson plan on wetland conservation in Paraguay was developed using a template for an environmental education lesson plan from an online source. The completed lesson plan can be found in the Appendix A. It includes objectives, goals, intended audience, duration, location, content, methods, interactive activities, materials, and evaluations. The materials and activities included in the lesson plan could all be done without using technology. The visual aids were all posters made with construction paper. Instructions and photographs on how to make these posters were included. Detailed descriptions of three activity options for different age groups were also included. These activities include a song about the wetlands with hand motions for younger children, the discussions and acting out of skits about different environmental scenarios, and writing letters about conservation to the mayor or school director.

To ensure that these activities were appropriate for Paraguayan school children, interviews with Reuben Penayo, science teacher at both La Escuela Agrícola and Escuela Roa Benitez and Romina Godoy, Academic Director, La Escuela Agrícola and teacher, Escuela Parroquial Santa Rosa de Lima were conducted on March 25th, 2017. The group also observed one of Penayo's life science classes at La Escuela Agrícola on March 23rd, 2017 to determine typical teaching practices in rural Paraguay.

3.1.2. Pre and Post Instruction Questionnaires

Two key parts of the lesson plan are pre and post instruction questionnaires. To develop questionnaires that would accurately measure the success of the environmental education program, the group consulted various sources. A pre-existing "Environmental Attitudes" questionnaire was taken from the source "Measuring the Success of Environmental Education Programs" and adapted to focus on wetlands. The questionnaires included ten questions: 3 testing knowledge, 4 testing attitude and 3 testing skills. The post questionnaire was developed to have questions that directly corresponded to questions on the pre-questionnaire. Those taking the questionnaires circled an answer. There were five choices: Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree. The purpose of the questionnaires was to measure the change in knowledge, attitude, or skill of students before and after the delivery of the lesson plan, therefore evaluating its success (Thomas, Hoffman, n.d.). The evaluation function of the questionnaires will be further discussed in section 3.4.

3.1.3. Connecting with Benjamín Aceval Schools

In order to visit different schools, connections with their directors had to be made. When these connections were made, best times to deliver the lesson plan at each school were determined. Like the survey technique called snowballing, connections with these schools were made using a similar technique. Once one connection was made, more connections stemmed from that connection and so on. In Benjamín Aceval, whether or not we could visit schools was based on the connections we made. Many school directors know each other and, oftentimes, teachers work at two different schools.

The lesson plan was delivered at seven schools in Benjamín Aceval. These schools included Instituto Ba'hai Miki Rutan, La Escuela Agrícola San Francisco, Colegio San Francisco Javier, Colegio Parroquial Santa Rosa de Lima, Colegio Eugenio Mazenod, Colegio Roa Benitez, y Colegio Don Buenaventura Ayala Amarilla. Modifications were made after each instance based on teacher feedback and observations of Paraguayan learning styles. More posters were created to serve as visual aids and the questionnaires were better explained to avoid confusion among the students. These changes were applied to the next presentations.

The first school visited was Instituto Baha'i Miki Rutan located in Cerrito. This connection was made because the son of Professor Magdalena Guerra, English professor at La Escuela Agrícola, attends this school. She was able to introduce us to the director, Celia Zamphiropolos who agreed to let us give our lesson. Guerra also introduced us to Ceasar Arguello, the director at Colegio San Francisco Javier, who allowed us to present at his school. Two other connections were made through Romina Godoy. In addition to being the Academic Director at La Escuela Agrícola, she teaches at Colegio Parroquial Santa Rosa de Lima. Her sister, Cynthia Godoy, is the director at Escuela Eugenio Mazenod, a primary school. The two schools are physically connected so the team was able to present at both the same day. Professor Reuben Penayo, science teacher, La Escuela Agrícola, also teaches at Colegio Roa Benitez. He introduced the team to the director there. His sister works at a nearby school, Colegio Don Buenaventura Ayala Amarilla, where the team was also able to present the lesson. The one remaining school where the team delivered the lesson was La Escuela Agrícola.

3.1.4. Tailoring the Lesson Plan

Regardless of any lesson's design, it needs to be adjusted to the learners. At each school, there were learners of different ages, backgrounds, learning styles, and level. After observing students as they filled out the pre questionnaire and during the lecture portion of the lesson, the lesson plan was then adjusted accordingly. For example, if by the team's observation, students seemed to have better reading comprehension and writing skills, the letter writing activity was ideal. If the group of students appeared to be more outgoing and willing to participate, the skit activity was a better fit. If the students were more shy, the skit activity was adjusted and turned into a class discussion so that students who were uncomfortable coming to the front of the classroom to present were not forced to. Additionally, when the team presented to a younger group of students, the song activity was deemed a better fit.

3.1.5. Leading Interactive Activities

The letter writing activity was piloted at the first school. At the next school, the skits activity was piloted and modifications were made after observing classroom behavior during the beginning of the lesson. Some students were very outgoing, while others were very shy. After other presentations, the team found that many students in Paraguay do not enjoy public speaking. To compensate for this, the team read the scenarios aloud, had the students discuss the scenarios with each other and then had volunteers come up to act out the skits. This change proved effective. Several students volunteered to come and act out their scenarios. The song activity was piloted with the youngest group of students. The students were first taught the songs followed by the hand motions that corresponded with each word. The hand motions were then done to the

song faster and faster. This proved a successful activity for younger children as they were engaged.

3.2. Project Schedule

The Gantt chart shows the project calendar. This chart provides the project timetable and activities. The timetable is fifty days, from March 12th to May 2nd. The activities include meetings with Director Luis Cateura, Professor Magdalena Guerra and Academic Director Romina Godoy, three important figures at the Escuela Agrícola San Francisco. Additional activities include development of the pre and post instruction questionnaires, the lesson plan, observation of a conservation presentation by Karugua Ha'e Tekove and all of the different dates when the group delivered the lesson plan. The Gantt chart also includes the workshop at the Escuela Agrícola and a closing event at Instituto Baha'i Miki Rutan. The Gantt chart can be found in Appendix B.

3.3. Evaluating the Success of the Lesson Plan

Successful environmental education programs increase involvement in conservation (Thomson, Hoffman, n.d.). The team investigated whether through interactive exercises students became "more sensitive to their environment, able to recognize problems, reach a sophistication in using problem solving skills, and inclined to participate in action activities to deal with environmental problems" (Stapp, 1974). Such exercises included songs, interactive skits, and letter writing. The student letters were then analyzed and categorized based on common themes using the content analysis technique. The team evaluated the success of the lesson plan using

results from questionnaires, student letters, student skits, and feedback from teachers and conservation groups such as Karugua Ha'e Tekove.

The key indicators of the lesson plan's success were the pre and post instruction questionnaires. For each of the ten questions on the pre questionnaire, there was a question on the post questionnaire that was asking the same question, but with different wording. To consider the lesson plan successful, there had to be a positive change between the corresponding questions on the pre and post instruction questionnaires. These results will be further discussed in section 4.

3.4. Planning a Multi-School Environmental Awareness Event

The predominant approach of environmental education is knowledge followed by action (Thomson, Hoffman, n.d.). Currently, "most programs in conservation education are oriented primarily to basic resources; they do not focus on community environment and its associated problems" (Stapp, 1997). Additionally, "few programs emphasize the role of the citizen, in working, both individually and collectively, towards the solution to problems that affect our wellbeing" (Stapp, 1997). In order to continue fostering wetland awareness in Benjamín Aceval, Paraguay, the team collaborated with Karugua Ha'e Tekove and planned a wetland awareness workshop.

3.4.1. Planning Student Workshop

A workshop is an event that provides the opportunity for individuals to interactively learn about a topic. Successful workshops require careful planning. Planning requires one to first organize an itinerary and invitations and then acquire essentials for an event such as a workshop.

Essentials include location, equipment, and food. This section will cover the aspects of establishing a successful wetland conservation workshop for students from Benjamín Aceval schools.

3.4.2. Itinerary and Invitations

An itinerary is an important aspect of a workshop. Itineraries help create order for everything that happens. Therefore, an itinerary was needed. To develop the itinerary, the team met with Dr. José Petters on April 9th, 2017 to discuss the date, duration, and schedule of activities.

The team decided on a date and time when the workshop would be held. A suggestion was to hold the workshop on Saturday, April 22nd, for a duration of 12 hours, from 7:00 A.M. to 7:00 P.M. Further consultation with school staff at the Escuela Agrícola led the team to reduce the duration. Academic Director Romina Godoy and Professor Magdalena Guerra, recommended the workshop be reduced to 7 hours, from 8 A.M. to 3 P.M. This time was suggested because it would be difficult to get high school aged students to wake up early and participate for 12 hours straight.

Activities for the workshop were discussed. One of the activities included separating students into teams. Each team represented a wetland plant or animal. Some of the suggested teams included: Jacare (Caiman), Kurija (Anaconda), Carau, Camalote, Totora, Jui (frog), and Capybara. Some of the other activities suggested were presentations given by experts. Some of the experts Petters invited were part of conservation groups such as Defensores del Chaco, Paraguay Salvaje, and Fauna y Vida. Game ideas included puzzles and songs. Another set of activities that needed to be discussed were meals. Since the duration of the workshop was seven

hours, it was decided that a breakfast and lunch would suffice. The breakfast, bread and coffee, was provided by the Hotel Cerrito, and for lunch, the team provided hot dogs. The final activity discussed was a closing act, where each team would give a short presentation on their respective plant or animal. This would serve as a way to properly summarize the topics learned throughout the workshop.

To have participants attend any event, invitations are key. Invitations were needed for this workshop. With the help of the local group, Karugua Ha'e Tekove, the team prepared an invitation. This invitation was distributed to each school. All the schools where the team delivered the lesson plan were invited. Approximately 40-50 students were expected to attend.

3.4.3. Essentials of a Workshop

Location and equipment are vital for the establishment of an event. This meant the team needed to find a location to hold the workshop. During the meeting with Petters, these necessities were discussed. The Escuela Agrícola was an ideal location. Certain areas of the school were available for reservation. Two specific areas of interest were an outdoor pavilion, known as the "quincho", and a conference room in the Hotel Cerrito. After a meeting with Director Luis Cateura and Professor Martina Caballero, the Escuela Agrícola agreed to donate both of these areas and the equipment needed for the workshop. The equipment included a speaker with microphones, a screen projector, and cooking materials. Food prices were estimated based on costs from a nearby grocery store. With the prices of the Hotel Cerrito breakfast and lunch estimate, the team developed a proposal to present to the Fundación Paraguaya to cover the costs of the food. The proposal was approved.

The wetland conservation workshop served as a conclusion for the group's work in Benjamín Aceval. All of the students who participated had heard the team's lesson plan at their respective schools and wanted to learn more about the wetlands. Therefore, the target audience for the workshop was students interested in conserving the environment, specifically wetlands, in Benjamín Aceval.

4. Results and Discussion

A project can yield many results. Oftentimes, some results are expected and others are not. As a result of the team's project, over 300 students in Benjamín Aceval schools became more informed about wetland conservation. Many students were even willing to take action to save wetlands. To measure the success of the lesson plan, pre and post instruction questionnaires were used, student letters were categorized, and student skits were analyzed. To evaluate the success of the wetland conservation workshop, the team determined whether the original objectives of the workshop were met.

4.1. Questionnaire Results

As previously mentioned, the questionnaires had questions measuring knowledge, attitude, and skill. The graph in Appendix C displays the results according to the questionnaires. It can be seen that approximately 34% of students had a positive change in skill level as a result of the lesson, while 48% saw no change in their skill level. It should also be noted that 20% of students had a positive change in attitude as a result of the lesson, while 47% saw no change in attitude. Additionally, 23% of students had a positive change in knowledge as a result of the lesson while 68% had no change. From these results, it can be inferred that students already had

a solid understanding in knowledge, attitude, and skill about wetland conservation. A probable cause for this is the presence and activity of Karugua Ha'e Tekove, as many students were familiar with the group.

4.2. Student Letter Categorization

One of the aforementioned methods for determining the success of the lesson was the letter writing exercise. The premise of the activity was that students write a letter to their principal or mayor expressing their ideas on conservation. The letters addressed a variety of issues from how trash is handled to governmental actions to actions students could take themselves. The content of 102 letters were analyzed and put into a matrix. This matrix contains the general points mentioned and determines the topics that were mentioned most often. As was expected, most letters had multiple topics mentioned, but some topics appeared more frequently than others.

There were three topics that had the highest frequencies. The first, with a frequency of 63.7%, was collecting trash or disposing of trash correctly. Many students said their school or a small group could go into the wetlands to pick up trash. Mishandled trash was a large part of the lesson when talking about problems in the wetlands. This led the team to believe that its popularity in the letters was directly correlated to its mention in the lesson.

The second most popular topic, with a frequency of 34.3%, was sharing information or hosting discussions. This topic was more common in the letters addressed to the mayor rather than the principal, but found in both. For example, in his letter, one student asked his principal if his class could break into small groups and go door to door telling people about how to protect the wetlands. Another student asked the mayor if conservation experts could host informational

sessions for the community. The frequency of this response surprised the team in a positive way. In forty-five letters, the team's lesson was referred to or directly used as an example of what the community needed in order to positively impact the environment.

The third most popular topic, with a frequency of 21.6%, was to not burn trash. Students were aware of the negative impact litter can have on water sources and wildlife as well as the effect that burning trash can have on air quality. Though the presentation included this particular issue, it did not go into great detail on how burning trash could affect the air. This was just one instance where the students demonstrated more environmental consciousness than the team expected. The remaining nine topics and their ranks can be found in the graph in Appendix D.

4.3. Student Skit Analysis

The skits activity from our lesson plan resulted in some trends similar to the letter writing activity. Skits were conducted at the following schools: Escuela Agrícola San Francisco, Colegio Parroquial Santa Rosa de Lima, Escuela Roa Benitez, and Colegio Don Buenaventura Ayala Amarilla. This activity started out with the team reading out pre-written scenarios related to wetland conservation. Questions on how one would respond to these scenarios followed. A list of skits can be found in the lesson plan in Appendix A. Students were then asked to discuss the scenarios in groups and respond verbally to or act out their responses. More often, verbal responses were given or contained in the acting out of skits. Responses included government involvement, individual actions, and group actions. This section will review the range of ideas across schools as they differed in commonality.

One of the three common trends was government involvement. Ten out of a total of twenty-seven responses fell under this trend. These responses were for scenarios that illustrated

environmental damage from companies or littering. Results showed seven responses for government enforcement and four for law making. Problems with current laws was a topic the team covered in the lecture, so this emphasis may have led to the frequency in response. A particular student responded with the idea to speak to the Secretary of Environmental Affairs of the country. The idea was to possibly criminally charge companies that decide to release toxic waste into the wetlands.

Another common theme found in the responses was individual action. A total of eight responses fit this specific category. Six responses related to scenarios that involved trash while the other two related to wetland filling. One student said they would notify authorities in the case of littering. Two students stated they would give a presentation to the community on environmental protection. The last five students said they would pick up trash themselves. From these five, a particular student acted out their response where they picked up trash that someone else dropped. This response was one of the three that was not solely verbal.

Group involvement was the final common theme noticed with a total of nine responses. Scenarios that obtained these responses involved problems too large for one individual to handle. A scenario describing a large amount of trash near a wetland received six responses. Four students suggested the organization of community members to go pick up trash at this wetland. Organizing groups for trash pickups was an idea also mentioned by the team during the lesson. The other two responses suggested signs to prevent littering. Another scenario where a company released toxic waste into a wetland also received two responses for signs. These signs would be set to prevent this form of pollution. The final response was for a scenario where a company attempted to fill a wetland for development purposes. This idea stood out from others. The

student suggested the formation of a human blockade as a form of peaceful protest to keep the company from destroying the wetland.

4.4. Wetland Conservation Workshop

After visiting seven schools in Benjamín Aceval and delivering the lesson plan, the group wanted to provide students the opportunity to continue wetland conservation education through an interactive half day workshop. The three key objectives for the workshop were achieved. The first was the creation of a network between the schools to increase awareness of conservation efforts. The second was to connect the Karugua group with more young people in the area to introduce them to potential recruits. The third was to give local students the opportunity to learn from wetland specialists about the status of the wetlands and what they can do to protect them. Of the seven schools the team visited, five were represented with a combined total of 30 students.

Networking is a time tested tactic used to increase impact, broaden circles, and establish advantageous relationships. In this case it served all three purposes. The event allowed students from five schools to interact and form connections in a non-academic setting. These connections made at the workshop could potentially lead to collaboration between schools. This collaboration could make the ideas expressed in the letter writing activity, such as large groups of students going into the wetlands to clean or student led informational sessions, a reality.

As previously mentioned, the Karugua group is largely populated by high school students who are interested in environmental conservation. The event served as an ideal venue for Karugua to introduce itself to such students and vice versa as the students who attended the workshop clearly had further interest in environmental conservation.

Thanks to the resources of the Karugua group, specialists on various wetland species including amphibians, reptiles, birds, and trees were present at the workshop. Each expert made a short presentation on their area of expertise. Students were then able to ask questions and engage in discussions. Ultimately, these presentations gave students more detailed descriptions of the roles each species has in the wetlands.

Some outcomes, although not explicitly stated in the preparatory stages, were accomplished nonetheless. The first of these was that students concluded that every wetland species is equally important. This was likely an objective of the Karugua group from the onset. The second outcome was giving the Karugua group "the push they needed" to actually host the event and become more accessible to students interested in wetland conservation (J. Petters, personal communication, April 9, 2017).

5. Recommendations

After completing this project and analyzing the results, the team gave recommendations. The first recommendation the team gave was for Karugua Ha'e Tekove or a future team to continue visiting schools and focus more on general conservation rather than solely on that of wetlands to appeal to more students. The second recommendation given was for Karugua Ha'e Tekove to connect with more, possibly all, schools in the Benjamín Aceval area. The team found that the schools were very receptive of the lesson. The last recommendation that the team gave was to host a wetland conservation workshop – such as the one hosted with Karugua Ha'e Tekove at the Escuela Agrícola – every year. The workshop could potentially be longer, even overnight so that the students can actually go visit their local wetland.

Appendix A: Lesson Plan

La Conservación de los Humedales en las Escuelas de Benjamín Aceval

Plan de Lección para alumnos de 6-16 años

Escrito por Natalia Cervoni, Marlon Matthews y Ricardo Ochoa

El Índice de Contenidos

Plan de leccion

El Prefacio

El propósito de este plan de lección es para darle materiales a los maestros de alumnos de edades 6-16 para que puedan enseñar una lección sobre los humedales. La mayoría de los ejemplos y materiales tienen un enfoque en Benjamín Aceval, pero los conceptos pueden traducir a otras regiones.

Plan de Lección

I. **Título**
   A. La Conservación de los Humedales en las Escuelas de Benjamín Aceval

II. **Metas**
   A. Aumentar conocimiento sobre los humedales y métodos que estudiantes pueden usar para protegerlos
   B. Inspirar los alumnos a tomar acciones para conservar los humedales

III. **Objetivos**
   A. Informar los alumnos de las escuelas en Benjamín Aceval sobre el estado de los humedales
   B. Enseñar los alumnos de las características de los humedales
   C. Informar los alumnos de los beneficios de los humedales
   D. Informar los alumnos sobre las acciones que pueden proteger los humedales

IV. **Audencia**
   A. Alumnos de las diferentes escuelas de Benjamín Aceval
      1. Alumnos de 6-10 años
      2. Alumnos de 10-16 años

**Nota: las actividades para los alumnos de 6-10 años son diferentes de las actividades para los alumnos de 10-16 años

V. **Duración**
   A. 45 minutos

VI. **Localización**
   A. Salon de clase

VII. **Contenido**
   A. Cuestionario
   B. Introducciones
   C. Lista de los temas que serán discutidos durante la charla
      1. Características de los humedales
      2. Estado de los humedales del chaco
      3. Fauna/Vida salvaje
      4. Beneficios de los humedales
      5. Lo que puedes hacer para proteger los humedales
      6. Falta de leyes que protegen a los humedales
      7. Interacción/Discusión
      8. Cerrar/Cuestionario
   D. Características generales de los humedales

1. Tierra
2. Sedimento
3. Plantas
4. Animales
    a) Peces
    b) Pájaros
    c) Mamíferos
        (1) Capibara
        (2) Jaguar
        (3) Ocelote
        (4) Oso hormiguero

E. Breve resumen del estado presente de los humedales del chaco
    1. Enseñar mapa de los humedales que designan claramente las regiones que existen hoy en día y que han sido perdidas
    2. Enseñar imágenes de humedales saludables y no saludables; enseñar basura y decirles a los niños sobre formas apropiadas para deshacerse de la basura

F. Introducir la fauna
    1. Caballos, nandus, jaguares, etc.

G. Beneficios de los humedales
    1. Valor económico
        a) Turismo
        b) Filtración de agua
        c) Protección de inundaciones
        d) Actividades recreacionales
    2. Importancia del ecosistema
        a) Compara con el bosque
        b) Recursos naturales
            (1) Plantas medicinales
            (2) Fuente de alimentación

H. Falta de leyes que protegen los humedales
    1. Compara la protección del bosque y la conservación de la fauna

I. Mencionar el grupo Karugua ha'e Tekove
    1. Otro grupo en Benjamín Aceval que luchan para la conservación de los humedales
    2. Si tienes más preguntas sobre los humedales visiten su página de Facebook https://www.facebook.com/karuguahaetekove/

VIII. **Métodos**

A. Diseña las cartulinas (*Ejemplo de cartulina para empezar)*

1. Cartulinas con imágenes de la flora y fauna
    a) Esta cartulina es para enseñarle a los estudiantes la diferente vida que uno puede encontrar en los humedales
    b) Pueden agregar todas las imágenes en una cartulina o hacer una para la flora y otra para la fauna
    c) Fotos se pueden encontrar en la internet y luego imprimir
    d) Otras se pueden dibujar
        (1) Recomendado dejar a los estudiantes hacer los dibujos como actividad durante los días antes de la lección
            (a) Se necesitará marcadores y estudiantes trabajando en grupos
2. Cartulina con imágenes de humedales
    a) Necesitaran imágenes de un humedal saludable y una no saludable
        (1) Esta cartulina es para comparar las diferencias entre el humedal saludable y el no saludable
        (2) Dibujos o fotos
3. Cartulina con un mapa de los humedales
    a) Esta cartulina es para ensenarle a los estudiantes en donde se encuentran
4. Cartulina con imágenes de la cadena alimenticia (*Exemplo Incluido abajo)*
    a) Dibuja animales alrededor de un humedal con plantas adentro

(1) El número de animales y plantas en la cartulina dependerá de cuantos quiera incluir la clase, pero cada animal y planta debe ser única.
(2) Cuando estén completos los dibujos, los estudiantes pueden dibujar líneas que conectan a los animales con otros animales o plantas que se comen.

B. Distribuye la primera parte del cuestionario
    1. Pídele a los estudiantes que escriban su nombre.
        a) Esto es solo para poder comparar las respuestas de cada estudiante en el primer cuestionario con el último cuestionario
        b) Los nombres serán omitidos después para que los cuestionarios se mantengan anónimos.
C. Introduce quien eres y el tema de la lección
    1. Menciona los temas en la lista rápida de la sección del Contenido
D. Empieza la lección hablando sobre las características de los humedales
    1. Lista de algunas características en la sección del Contenido

IX. **Actividades Interactivas**

A. Alumnos de 6-10 años
    1. Actividad 1: Canción sobre los humedales

B. Alumnos de 11-16 años
    1. Actividad 1: Sketches
        a) Recomendado para clases con menos de 30 alumnos
    2. Actividad 2: Escribir Cartas al Intendente
        a) Recomendado para clases con más de 30 alumnos

**Nota: Seleccione una de las actividades listados arriba quieres hacer con los alumnos

X. **Materiales**

A. Lápices
B. Papel
C. Cartulinas con fotografías de los humedales, animales, y plantas acuáticas
    1. Instrucciones para hacer carteles están incluido
D. Marcadores
E. Mapa de Benjamín Aceval que incluye los humedales (incluido)

Xl. **Evaluación**

A. Una encuesta antes de la presentación y una encuesta después de la presentación

XII. **Materiales para aprobar la lección**

A. Cuestionario
B. Lectura
C. Actividad (selecciona una)

Cuestionario para antes de la lección
Conservación de los Humedales

Instrucciones: Esta encuesta es anónima. Esta encuesta está diseñada para determinar actitudes sobre el medio ambiente. No hay respuestas correctas o incorrectas, sólo las diferencias de opinión. Escoja la opción que más refleje su opinión.

1. El Chaco es una importante para Paraguay, aunque poca gente visita esta área

Totalmente de acuerdo De acuerdo Neutral No de acuerdo Totalmente no de acuerdo

2. Los humedales contienen una variedad de vida, como plantas acuáticas, árboles, mamíferos, pájaros y peces.

Totalmente de acuerdo De acuerdo Neutral No de acuerdo Totalmente no de acuerdo

3. Aunque existe vida importante en los humedales no tengo suficiente tiempo en mi día para ayudar a conservar el medio ambiente

Totalmente de acuerdo De acuerdo Neutral No de acuerdo Totalmente no de acuerdo

4. Las actividades de los seres humanos causan destrucción a los bosques a la cantidad que a los humedales.

Totalmente de acuerdo De acuerdo Neutral No de acuerdo Totalmente no de acuerdo

5. El gobierno debe aprobar leyes para obligar a los ciudadanos a proteger a los humedales.

Totalmente de acuerdo De acuerdo Neutral No de acuerdo Totalmente no de acuerdo

6. Yo sé cómo escribir una carta al gobierno sobre conservación del medio ambiente.

Totalmente de acuerdo De acuerdo Neutral No de acuerdo Totalmente no de acuerdo

7. Hablo con mis padres y otros adultos sobre cómo conservar el medio ambiente

Totalmente de acuerdo De acuerdo Neutral No de acuerdo Totalmente no de acuerdo

8. Yo sé cómo tirar la basura para que no dañe al medio ambiente

Totalmente de acuerdo De acuerdo Neutral No de acuerdo Totalmente no de acuerdo

9. Los humedales tienen muchos beneficios que ayudan a la gente del Chaco

Totalmente de acuerdo De acuerdo Neutral No de acuerdo Totalmente no de acuerdo

10. Me interesara ir a visitar los humedales del Chaco

Totalmente de acuerdo De acuerdo Neutral No de acuerdo Totalmente no de acuerdo

Adaptado de: Thomson, G., Hoffman, J., & Staniforth, S. (n.d.). Measuring the Success of Environmental Education Programs. Ottawa: Canadian Parks and Wilderness Society and Sierra Club of Canada.

Actividad 1 - Canción sobre los humedales
Para los alumnos de edades 4-8

Letras:
"Hu-me-da-les, hu-me-da-les,
con-sér-va-los, con-sér-va-los.
Man-tener-los lim-pios, man-tener-los lim-pios.
Ka-ru-gua, Ka-ru-gua."

Movimientos:
**Cada movimiento entero es repetido (un movimiento antes y después de la coma)* **
Humedales, humedales--
Para esta parte, el movimiento entero es: (1) empezando con las manos abiertas a nivel de tu pecho con las palmas hacia ti, en cada mano junta las puntas de los dedos y abre las manos de nuevo (*Repite movimiento 1 antes de empezar movimiento 2*), (2) entonces voltea las palmas mirando al suelo, y pon una mano justa sobre la otra, mueve los antebrazos en diferentes direcciones para afuera hacia tus lados mientras mueves todos los dedos. Al final del movimiento, los dedos de tu mano izquierda tienen que estar apuntando a tu izquierda, y los de tu mano derecha apuntar a tu derecha.

Conserva los, conserva los
Para esta parte, el movimiento entero es: Empezando con las manos abiertas justo a los lados de la boca con las palmas hacia tu cara, cierra las manos para hacer un puño. Después, mueve los codos hacia afuera y arriba, a la misma vez baja los antebrazos hasta que estén paralelos con el suelo y la frente de los puños están casi tocando (*Movimiento de los antebrazos será parecido a las manos de un reloj con el pulgar siempre hacia ti*) y mientras bajas los antebrazos voltea los puños para que las palmas están hacia el suelo.

Mantenerlos limpios, mantenerlos limpios
Para esta parte, el movimiento entero (*después de repetir todo el movimiento)* es: Empieza con la mano izquierda al nivel del pecho con la palma hacia arriba y el antebrazo paralelo con el suelo y con la mano derecha en una manera similar sobre la otra con las palmas tocando. Después, mueve solo el antebrazo derecho, con la palma de la mano siempre hacia abajo, para afuera hasta que los dedos apunten para en frente (*Movimiento parecido a la mano de un reloj).*

Karugua, Karugua
Para esta parte, el movimiento entero es igual al movimiento de la primera parte de la canción (*Humedales, humedales)*

Actividad 2 - Sketches
Para los alumnos de edades 9-16

1. Ves a un amigo tirando basura en un arroyito el cual sabes llegará a los humedales ¿Qué haces? ¿Cómo le dicen que lo que está haciendo está equivocado? ¿Y qué hacen si no te quieren escuchar?

2. Una compañía local ha estado contaminando las aguas de los humedales con sus desechos tóxicos Tú y tus amigos quieren que la compañía se detenga. ¿Qué es lo que les dicen al dueño de la compañía para hacerlos cambiar su forma de ser? Escribe una carta explicando porque la compañía necesita hacer mejor.

3. Escuchaste que una compañía estaba construyendo casas y para hacerlas llenaron con tierra un humedal que ya existía. Sabes que la vida allí sufrirá/morirá si continúan. ¿Cómo le dices a esta compañía y a la gente de este pueblo sobre el impacto que tendrá en los humedales si este proyecto ocurre?

4. Tú y algunos amigos están cerca de una aguada. Miran basura por todos lados y no les gusta. ¿Qué pueden hacer?

5. Tus padres te piden que tires la basura de esta semana. El lugar para correctamente deshacerte de la basura está lejos de tu hogar y sabes que quemar la basura sería más fácil. ¿Qué es lo que haces? ¿Porque?

Actividad 3 - Escribir Cartas al Intendente
Para los alumnos de edades 12-16

Instrucciones: Para esta actividad, los alumnos necesitan un lápiz y una hoja de papel. Los alumnos van a escribir una carta al intendente pidiéndole que ayude a enforzar las leyes protegiendo a los humedales. Si un alumno ha ido al humedal aquí en Benjamín Aceval, puede describir sus experiencias. Aquí hay un ejemplo del formato de una carta.

Mcal. López esq. Mayor Nolasco Rojas.
Benjamín Aceval
Presidente Hayes Paraguay

Señor Intendente Oscar Morales,

(Explica quien eres, por qué le estas escribiendo y que es el problema) Mi nombre es _____ y soy un estudiante en _____. Le escribo una carta para solicitar su ayuda a fin de poder salvar los humedales de Benjamín Aceval. Los humedales están desapareciendo y es porque no hay tantas leyes que los protegen de cosas como basura o el rellenar con tierra para hacer casas.

(Explica por qué es importante resolver este problema y que quieres que el haga para ayudar) Es importante que salvemos los humedales. Si desparecen, los animales y plantas se morirán. Además, tendremos menos fuentes de agua para tomar. Le solicito su ayuda para crear más leyes para que gente eviten tirar la basura en los humedales y evitar el relleno de los mismos de tal forma ayudar y cuidar a los humedales y seres vive.

(Dale las gracias y dile que esperas ver con su ayuda) Desde ya, muchas gracias por su tiempo y por todo lo que hace por Benjamín Aceval. Espero contar con su ayuda para que haya más humedales saludables.

Atentamente,

Nombre

Grado

Nombre de la escuela

Cuestionario para el final de la lección
Conservación de los Humedales

Instrucciones: Esta encuesta es anónima. Está diseñada para determinar actitudes sobre el medio ambiente. No hay respuestas correctas o incorrectas, sólo las diferencias de opinión. Escoge la opción que más refleja su opinión.

1. Estoy a favor del ahorro de áreas salvajes remotas, como el Chaco, aunque pocas personas viven allí o no tienen la oportunidad para viajar allí.

Totalmente de acuerdo De acuerdo Neutro No de acuerdo Totalmente no de acuerdo

2. Los humedales son caracterizados por el agua, los sedimentos, y las especies de plantas y animales que viven allí.

Totalmente de acuerdo De acuerdo Neutro No de acuerdo Totalmente no de acuerdo

3. Si una planta o un animal no es de utilidad para los seres humanos, entonces no necesitamos perder nuestro tiempo tratando de protegerlo.

Totalmente de acuerdo De acuerdo Neutro No de acuerdo Totalmente no de acuerdo

4. Los humedales tienen las mismas importancias que los bosques.

Totalmente de acuerdo De acuerdo Neutro No de acuerdo Totalmente no de acuerdo

5. El gobierno debe aprobar leyes para proteger los humedales, de modo que todos sean obligados a protegerlos.

Totalmente de acuerdo De acuerdo Neutro No de acuerdo Totalmente no de acuerdo

6. Yo podría escribir una carta a mi alcalde para urgirle a alocar más recursos para conservar los humedales.

Totalmente de acuerdo De acuerdo Neutro No de acuerdo Totalmente no de acuerdo

7. Estoy interesado en conversar con mis padres y otros adultos en la comunidad sobre la conservación para ayudar a conservar los humedales, específicamente los del Chaco.

Totalmente de acuerdo De acuerdo Neutro No de acuerdo Totalmente no de acuerdo

8. Yo sé dónde se bota la basura y me puedo cometer a tirarla en el área correcta para que la basura no termine en los humedales, donde puede ser peligroso para los animales que viven allí.

Totalmente de acuerdo De acuerdo Neutro No de acuerdo Totalmente no de acuerdo

9. Los humedales tienen muchos beneficios para la salud, la economía, y la biodiversidad.

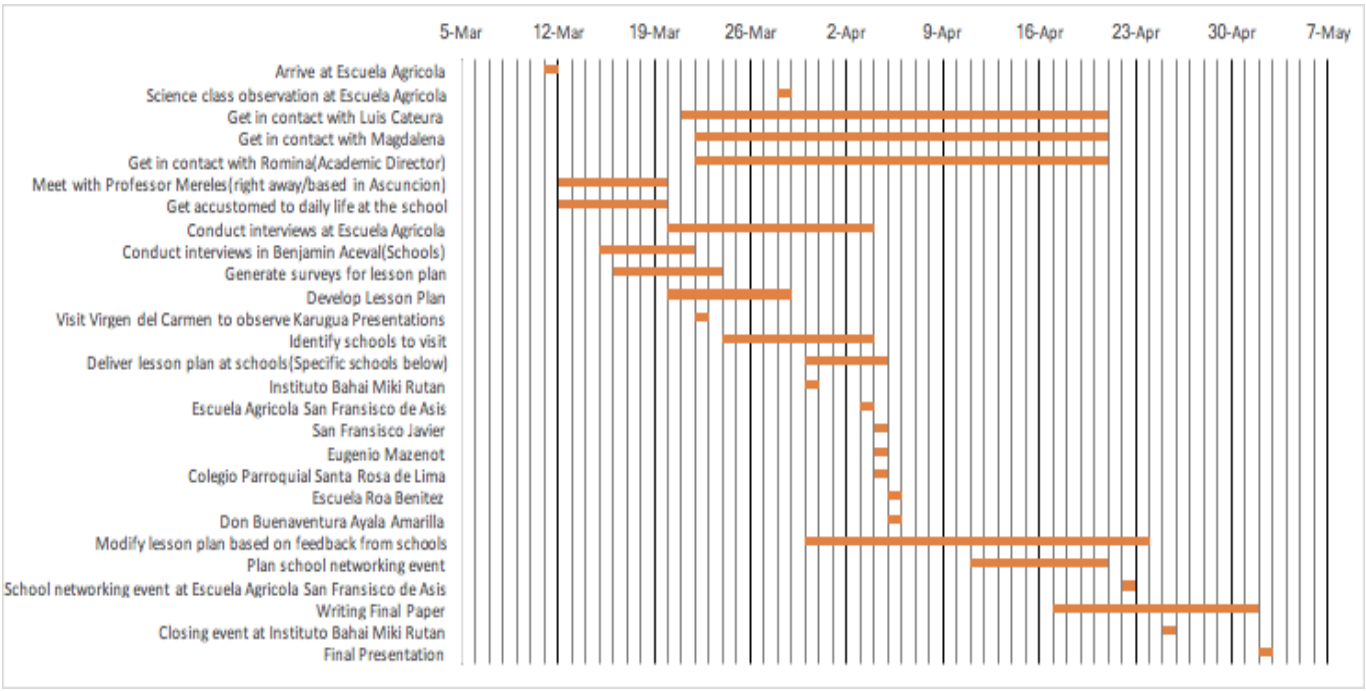
Totalmente de acuerdo De acuerdo Neutro No de acuerdo Totalmente no de acuerdo

10. Yo podría organizar un grupo de mis amigos para ir a los humedales a recoger basura.

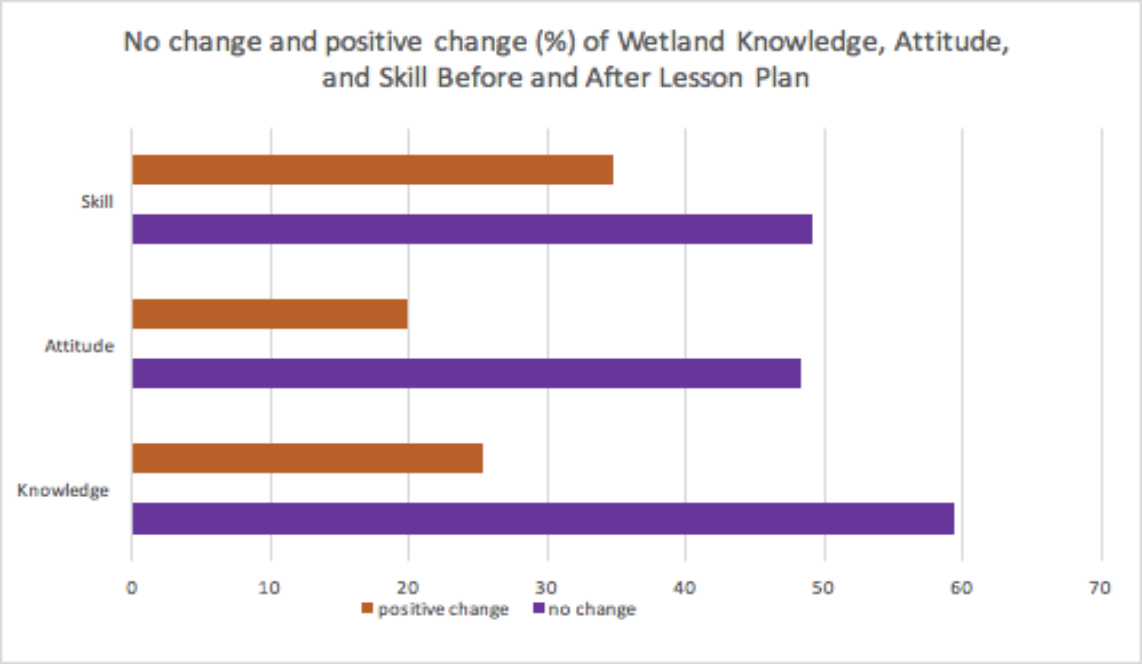
Totalmente de acuerdo De acuerdo Neutro No de acuerdo Totalmente no de acuerdo

Adaptado de: Thomson, G., Hoffman, J., & Staniforth, S. (n.d.). Measuring the Success of Environmental Education Programs. Ottawa: Canadian Parks and Wilderness Society and Sierra Club of Canada.

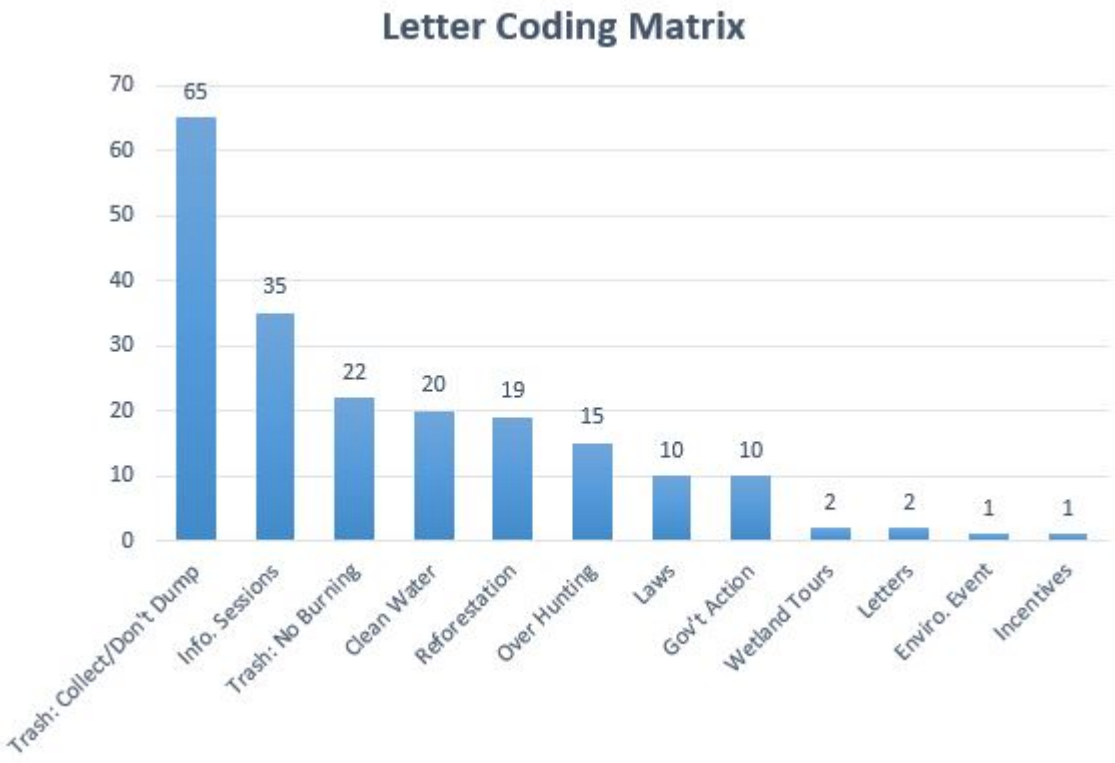
Appendix B: Gantt Chart of Project Timeline



Appendix C: Questionnaire Results



Appendix D: Student Letter Categories Graph



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