



WETLANDS CONSERVATION AND AWARENESS IN BENJAMÍN ACEVAL

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Wetlands Conservation and Awareness in Benjamín Aceval

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Authorship Page

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Abstract

There is a lack of wetland conservation knowledge in Paraguay. This project promoted wetlands conservation and awareness in Benjamín Aceval. There were classroom programs that reviewed wetlands knowledge and introduced science fairs. Contacts at the Escuela Agrícola San Francisco helped the team set up the science fair and communicate with the community. Nine schools and 400 students saw the classroom presentations. Three schools participated in the science fair, totaling forty-six students. WPI students run six wetland conservation activities. Science fair surveys collected information from participating students. Future recommendations include making the science fair an annual event, and incorporating more schools into the science fair.

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Executive Summary:

Purpose and Goals

The team worked to increase wetland conservation and awareness in Benjamin Aceval, Paraguay. There is a need for connection between human actions and how they affect the local wetlands. The team's goal was to spread wetlands conservation and awareness through a science fair for local students. This allows them to learn more in depth about a topic of interest in the wetlands, increasing their awareness of the environment.

Deliverables

There are three deliverables for this project:

1. Classroom Educational Program - The team developed a classroom educational program in Spanish to deliver to the local schools. The program consisted of a presentation that had two parts. The first consisted of information about the local wetlands. The second introduced science fairs and why they are important. This presentation was given in nine different schools and twenty classrooms.
2. Science Fair Guide - The team developed a guide on how to put together a project for science fairs. This guide included examples on what to include in the presentations, poster content, and ideas for project topics. The guide was given to all of the directors at each school that the team visited.
3. Science Fair - A science fair was held on Saturday April 13, 2019 at la Escuela Agricola San Francisco. All of the project topics at the fair were about the local wetlands. Three schools participated, forty six students presented, and there were eleven different projects. Along with the science fair, there were fun wetlands conservation activities for people to participate in.

Methods

There were three main methods that the team used throughout the project. The first was the classroom educational programs. The programs allowed for a review on wetlands information, as well as an introduction of the idea of a science fair. The second method was community interaction. The team collaborated with countless community members, from local conservationists to school directors. Lastly, surveys and interviews were used. These surveys and interviews allowed the team to obtain feedback about the fair.

Results

The team presented their educational program to around 400 students in 20 classrooms from nine schools in the Benjamin Aceval area. At the science fair, 46 students from three different local schools participated in eleven projects. Post-Science Fair surveys were given to the students who participated in the fair. These surveys were used to gauge the effectiveness of the fair in generating knowledge and interest in wetlands. In the end, all of the students had an overall positive experience with the science fair. Every student either “completely agreed” or “agreed” with the statement that they enjoyed the science fair and learned from the process. Through these surveys, the team was able to see how effective the fair was in promoting wetlands conservation and awareness. The success of this science fair opens up opportunities for more science fairs in the future. Now that it has been established, future teams can expand on the work done this year and keep improving the experience overall.

Recommendations

Based on the team’s experience with the science fair and student feedback, the team has four major recommendations:

1. Make the science fair an annual event
2. Incorporate more schools
3. Contact school directors, potential judges, and prize donors early in the term.
4. Designate volunteers to tally science fair results to determine the winners.

Resumen Ejecutivo:

Propósito y Metas

El propósito de este proyecto fue aumentar el nivel de conciencia sobre la importancia de conservar los humedales de Benjamín Aceval, Paraguay. Hay una necesidad de entender la conexión entre las acciones humanas y sus repercusiones en los humedales. La meta del equipo era difundir conocimientos sobre los humedales y su conservación, entre estudiantes de la zona, mediante charlas informativas y una feria de ciencias. Dichas acciones ayudó a estudiantes locales aprender sobre los humedales locales en detalle, y aumentó su nivel de conciencia sobre la importancia de los mismos.

Productos Finales

Tres productos fueron elaborados por nuestro equipo:

1. Un programa educativo para estudiantes locales - El equipo desarrolló e implementó un programa educacional en español, el cual se presentó a estudiantes de la zona de Benjamín Aceval y Cerrito. El programa consistió de una presentación dividida en dos partes. La primera parte consistió de información sobre los humedales y por qué son beneficiosos. La segunda parte brindó información sobre una feria de ciencias sobre humedales que se llevó a cabo el 13 de abril 2019. Se llevó a cabo la presentación en nueve escuelas de la zona de Cerrito/Benjamín Aceval.
2. Una Guía sobre Cómo Participar de Una Feria de Ciencias - El equipo desarrolló un guía para estudiantes y docentes que explica cómo preparar un proyecto para una feria de ciencias. La guía incluye información sobre qué se debe incluir en una presentación, un ejemplo de un poster, y ideas sobre diferentes temas sobre los que se podrían hacer una presentación. La guía fue distribuida entre todos los directores de las escuelas que visitamos.
3. Una Feria de Ciencias con Enfoque sobre los Humedales Locales - La feria de ciencias ocurrió el día sábado 13 de Abril del 2019, en la Escuela Agrícola San Francisco de Cerrito. Todos los temas presentados en la feria de ciencias se trataban de los humedales. Tres escuelas participaron de la feria, cuarenta y seis estudiantes presentaron sus proyectos, y once proyectos fueron expuestos. Durante la feria de ciencias hubo también otras actividades divertidas sobre la conservación de los humedales en las cuales participaron los estudiantes.

Métodos

Hubo tres métodos principales que el equipo utilizó para cumplir con los objetivos del proyecto. El primer método fue llevar a cabo el programa educativo. Dicho programa brindó información básica sobre los humedales, y introdujo el concepto de una feria de ciencias a los estudiantes. El segundo método fue interactuar y colaborar con la comunidad - el equipo interactuó con innumerable miembros de la comunidad, organizaciones que promuevan la conservación, y directores de escuelas y colegios. El último método fue el uso de encuestas y entrevistas con los estudiantes y profesores. Dichas encuestas y entrevistas dieron al equipo la oportunidad de obtener opiniones y pensamientos sobre la feria de ciencias que se llevó a cabo.

Resultados

El equipo brindó información sobre la importancia de conservar a los humedales a aproximadamente 400 estudiantes en 20 clases de nueve escuelas locales en Benjamín Aceval y Cerrito. En la feria de ciencias, 46 estudiantes de tres escuelas participaron con once proyectos. Al término de la feria de ciencias, cuestionarios fueron distribuidos a los estudiantes que participaron. Dichos cuestionarios se usaron para medir la efectividad de la feria de ciencias de aumentar el interés y conocimiento sobre los humedales.. Todos los estudiantes que llenaron el cuestionario comunicaron que tuvieron una opinión positiva de la feria de ciencias. Además, todos los estudiantes respondieron con un “Totalmente de acuerdo” o un “De acuerdo” a las frases del cuestionario, y dijeron que se divirtieron en la feria de ciencias, y que aprendieron en el proceso. El éxito de la feria de ciencias abre oportunidades para organizar más ferias de ciencias en el futuro. Ahora que la comunidad entiende cómo se participa de una feria de ciencias futuros equipos de trabajo podrán continuar construyendo sobre las bases establecidos este año, y pueden ir mejorando la experiencia de la feria de ciencias.

Recomendaciones

En base a nuestra experiencia con la feria de ciencias tenemos cuatro recomendaciones:

1. Organizar una feria de ciencia anualmente
2. Incorporar a más escuelas en la feria de ciencias
3. Contactar a directores de colegios y escuelas, y potenciales jueces y organizaciones colaboradores sobre el evento de la feria de ciencias con más anticipación.
4. Designar a voluntarios para que determinen los ganadores de la feria de ciencias.

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1. Introduction

Paraguay is home to the largest territory of wetlands in the world. The territory is so large it expands across three countries; Brazil, Bolivia, and Paraguay. Wetlands of this size are home to a variety of ecosystems. Although large ecosystems are resistant to environmental issues, they are still affected. Large ecosystems can get divided into sections because of human actions. These human actions can lead to a decline in the health of ecosystems. In order to conserve Paraguay's natural ecological community, government management must continue. In the past years, Paraguay's sustainable and environmental protection ministry has shown progress (LOGROS, 2015-2018). However, only one percent of Paraguayan Pantanal wetlands are protected (Cerrado Pantanal, n.d.). The amount of protected wetlands needs to increase in order for these territories to remain. One way to promote government change is to educate the public on environmental issues. Conserving is knowing, and once citizens become knowledgeable of the issues at hand, changes can be made.

Educating the public on environmental issues starts with environmental education. Environmental education comprises five steps: awareness and sensitivity, knowledge and understanding, attitudes, skills, and participation (Environmental Protection Agency, 2016). Education allows for one to learn about the problem and implement a solution. The team will carry out environmental education in Benjamín Aceval, a municipality north of Asunción, the country's capital. Science fairs are one way to accomplish this hands-on learning initiative.

A science fair will enhance wetland knowledge given by previous IQPs. It has been shown that science fairs improve student understanding and attitudes towards learning (Schmidt, Kelter, 2017, p.126). By researching a topic they are interested in, students will be proactive

about their learning. They will be more willing to absorb knowledge about their wetlands and have the skills to share their newfound knowledge with their community. The students will also become enriched with their peers' research through the science fair presentations.

Through this project, a science fair will be incorporated into Benjamín Aceval's wetlands education. There will be a combined school science fair where 10 schools in the area will be invited to participate. In the end, the science fair will provide Benjamín Aceval students with an interactive way to learn about their wetlands.

2. Background

In this section the environmental awareness problems in Paraguay will be discussed. Initiatives the government and other organizations have pursued in order to conserve the wetlands will also be mentioned. Focus will be put on public education in order to conserve the wetlands through the younger generation of people.

2.1. Paraguayan Wetlands

Paraguay is a South American country located between Argentina, Brazil, and Bolivia. Inside its territory there are different ecosystems, such as wetlands, forests, and grasslands. Wetlands are characterized by the transition of water meeting land. "They include mangroves, peatlands and marshes, rivers and lakes, deltas, floodplains and flooded forests, rice-fields, and even coral reefs" (What are Wetlands?, n.d.). There are four different types of wetlands: peatlands, arctic wetlands, high altitude wetlands, and wetlands in dry regions. Wetlands serve to "improve water quality, manage stormwater, enhance habitat, [and] stabilize shoreline erosion"

(Environmental Concern Inc., n.d.). Conserving wetlands is a natural way of improving quality of life. Wetlands are home to a variety of wildlife and plants. This makes it extremely important to protect wetlands. The most known wetland in Paraguay is the Pantanal, the largest wetland in the world. It expands through Brazil, Bolivia, and Paraguay. Additionally, “the Paraguay River is like the main artery feeding the veins of the Pantanal’s body – if this artery gets blocked, the whole body breaks down” (Cowie, 2016). This means that if one part of the Pantanal is not cared for properly, the whole wetland could be destroyed. Luckily, many people have realized the Pantanal’s importance and have started to care for it. It’s important to bring awareness to these areas and even turn them into national parks.



Figure 2.1. The Pantanal Wetlands that stretch across Brazil, Paraguay, and Bolivia

Protection of national parks is key to the preservation of biodiversity. The amount of land Paraguay has allocated to parks and reserves is higher than the average for South America

(2.7%). It even exceeds that of the United States (2.2%) (Yahnke, 1998). However, this is still not enough. Even with all the progress, the government has achieved, Paraguay still has a long way to go. In fact, “40% of the total area of the upper Paraguay river basin in Brazil has already been deforested, and 30% of springs that feed the Pantanal are at ecological risk and require urgent action” (Cowie, 2016). People don’t realize the effects of deforestation on the local fauna and wildlife. According to the Mongabay organization, to conserve national parks government regulations must be implemented (Da Silva, 2015). If society expressed concerns about Paraguay's declining biodiversity, political changes could be achieved. These ecosystems are home to a variety of wildlife and plants. They should be allowed to keep their homes.



Figure 2.2. A Garza Bruja bird in a Benjamín Aceval wetland

Many of the Benjamín Aceval wetlands are part of el Río Verde (Petters, 2018). “These wetlands range in size from a small pond to a large lake” (Matthews, Cervoni, Ochoa, 2017). This area contains a lot of local wetland wildlife for people to observe. Ranging from a bird

sanctuary to vast fields of aquatic ferns, the wetlands are a diverse source of wildlife. Places like the bird sanctuary are accessible to the locals. These types of spots allow people to see the beauty and environmental importance of wetlands.

2.2. Environmental Awareness in Benjamín Aceval

This section discusses environmental aspects of the background knowledge. It goes in depth about environmental education and its implementation. Environmental awareness is knowledge of the consequences of one's individual actions. Residents who are conscious about their actions will care more about the wetlands.

2.2.1. Environmental Education

For people to become environmentally conscious, they must first want to learn about their environment. Environmental education can provide people with the knowledge needed to care about the environment. As mentioned before, the five parts of environmental education are: awareness, knowledge and understanding, attitudes, skills, and participation (Environmental Protection Agency, 2016). Awareness induces curiosity about the environment and can make people more receptive. Therefore, they are more open to learning about the topic. That's when knowledge and understanding must be implemented. Community attitudes will become understanding and empathetic towards nature. Once the participants take these things to heart, they will want to become more proactive. This is when the educator can aid them and teach them new skills. The skills should assist the community "to identify and help resolve environmental challenges" (Environmental Protection Agency, 2016). Lastly, the community has to integrate

environmental awareness into their daily life. By aligning beliefs, actions, and attitudes toward the environment, environmental preservation is easier (Blanco, Sanchez, Kunert, Martinez, Cabrera, Scribano, 2018). This is because people feel connected to their environment. When people are excited about the environment, they are more likely to act on preserving it. This will also be done in a holistic manner because they care. The students in the region will push for the change that involves everyone. If the students and community feel connected to their environment, they will treasure the connection and make it lifelong. For that reason, educating the younger generation is important. According to the Minister of the Secretariat of the Environment (SEAM), educating the younger generation is an “efficient mechanism to preserve and conserve the environment” (Educacion Ambiental, 2018) . The Ministro de Ambiente y Desarrollo (MADES) held educational workshops January 2019 for young adults to participate in; the objective was to awaken the audience’s interest in environmental conservation (MADES..., 2019). With time, MADES hopes to integrate environmental education into every classroom in every school in Paraguay.

2.2.2. Paraguayan Education

The education system in Paraguay tends to be lecture-based, without hands-on work: “The majority of lessons are delivered to the students as lectures. Students are unfamiliar with teaching methods that promote hands-on activities and field trips” (Zarate, Claus, Farias, 2018). However, this differs from school to school. Paraguay contains three different types of educational systems; private schools, public schools, and schools for indigenous families. The private schools require a tuition payment, whereas the public and indigenous schools are free of

cost. Depending on the type of school, different languages will be spoken in an educational setting. Public and private schools will speak either or a combination of Spanish and Guarani, the native language of Paraguay. The indigenous schools will typically speak either only Guarani, or the local native dialect. For example, the schools in the Qom community speak the Qom language.

2.2.3. Local Environmental Initiatives and Organizations

Change begins in the common people's hands. Non-profit organizations such as Organización Paraguaya de Conservación y Desarrollo (OPADES), World Wide Fund for Nature (WWF), and GUYRA fight for the conservation of habitats and wildlife. They support national forest programs, as well as local educational workshops at different schools. With events like these, the community is made aware of these diverse homes for wildlife and fauna. This allows one to learn more about their environment and the consequences of damaging it, bringing awareness to the locals that their actions have consequences in the wetlands.

Another organization in the area that helps in environmental friendliness is the Karugua Ha'e Tekove. Karugua is a non-profit that aims to connect youth and young adults with their wetlands. These environmentally active youth and young adults aim to involve more of Benjamín Aceval in wetland conservation. They do so by teaching the youth about environment wellness (Karugua Ha'e Tekove, 2016). Another project to improve environmental awareness is the "Residuos sólidos, Educación Ambiental, Roles y competencias del MADES" (Caazapá: Capacitan, 2018). They inform students of job opportunities in the environmental department, the Ministerio del Ambiente y Desarrollo Sostenible (Caazapá: Capacitan, 2018). These sessions

open a discussion about environmental problems and the best strategies to combat them. It is important that the younger generations understands environmental conservation can be a future career. This career path can pave the way for younger people to confidently pursue similar jobs.

A study done last year by a Fundacion Paraguaya intern, Victoria Blasco, discovered that 83% of students surveyed at a school in Cerrito, believed recycling, reusing and reducing was a way to help the environment of the wetlands (Blasco, 2019). Her survey showed that most students were interested in learning more about how to protect the wetlands and believed that recycling what one of the ways to keep plastic out of them.

2.2.4. Previous IQP Contributions

From previous wetland education IQPs, Paraguayan students have become more knowledgeable about their wetlands. They learned information from how wetlands work to the ecosystems that reside in them. The 2018 IQP recommended “Other wetland topics of interest for the future include: conservation, cleaning, importance, types, origin, characteristics, and general information” (Zarate, Claus, Farias, 2018). This is because many locals lack the connection between their actions and the wetlands. As a result, the Paraguayan wetlands continue to be destroyed. There are groups of people, like conservationists, who understand connections between actions and how they affect the environment. For the most part, however, there is a disconnect. Students lack the integration skills for what they can do in order to keep their wetlands healthy. They need help to make these connections in order to sustain the wetland ecosystems.

The IQP's from 2017 and 2018 worked with seven and nine schools respectively. The schools have a variety of student ages: "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" (Matthews, Cervoni, Ochoa, 2017). Some students from these schools have participated in previous Wetlands Conservation IQP projects. Exposure to previous WPI projects will help when working with the students. Previous experience with WPI programs will make communication easier.

Schools in Benjamín Aceval have worked with WPI student programs/events/information sessions before. Because of this, the community trusts the team to work with their students. The trust from the school makes it easier for visitors to develop a program and work with the schools. Once approval from the director is granted visitors are free to interact with teachers and students to develop a program.

With a couple of years of environmental education, the students are ready to take a step forward. Their education can now be enhanced to make the wetlands knowledge stick with them for a long time. There are many ways to enhance the value of education. A possible way to enhance the value of the students' education is through hands-on activities. Through this, students can gain a deeper, more meaningful understanding of their wetlands.

2.3. Science Fairs and Poster Presentations

This section will describe the educational aspects of science fairs and poster presentations. There are educational programs that can be implemented to familiarize students

with presentations. Logistics of planning a science fair will also be discussed. Along with science fairs, this section will discuss the benefits of general poster presentations.

2.3.1. Project Presentations and Public Speaking

As previously mentioned, the students of Benjamín Aceval do not have a diverse education. With a lecture based education program, project presentations are not familiar territory for students. Presentations are incredibly beneficial to students. Both presenters and listeners gain a variety of knowledge from presentations. While presenting, “students learn how to speak in front a group, a broadly applicable professional skill” (Weimer, 2013). All of the work that goes into preparing presentations deepens understanding of the topic. When presenting to their peers, the students also get to enlighten others. The listeners become enriched with the knowledge their classmate gained. Through these presentations, more knowledge can be spread across a classroom or school.

While there are many benefits to presentations, public speaking intimidates many people. In a study, aspects of public speaking that generated the most fear were identified: “Audience responses (30%), inability to self-regulate (23%), disfluency (8%), performance evaluation (7%)” (LeFebvre, LeFebvre, Allen, 2018). It is crucial to introduce public speaking to the students in a non-threatening way.

2.3.2. Benefits of Science Fairs

Science fairs have many benefits for the students who participate in them. Since science fairs are not lecture based, students engage more in their learning. It has been shown that science fairs “increased student understanding of science inquiry, and positively influenced the attitudes

of the majority of students in the study toward STEM courses and careers” (Schmidt, Kelter, 2017, p.126). The students of Benjamín Aceval do not have to pursue STEM to benefit from this. Regardless of their path, science fairs enhance student learning about their surrounding wetlands. Students here have been getting a variety of wetlands educational programs from previous IQPs (Matthews, Cervoni, Ochoa, 2017) (Zarate, Claus, Farias, 2018). With a base of wetland knowledge, a science fair takes the education a step further. The hands on work from creating a project has a larger impact than classroom lectures.

There is little to no information about science fairs occurring in Latin America. This could be because science fairs are not practiced. It could also be because science fairs do not occur on a large enough scale to be written about. Either way, the team plans on introducing the idea to the schools in Benjamín Aceval. If the idea goes over well, then science fairs could become more prominent in the future.

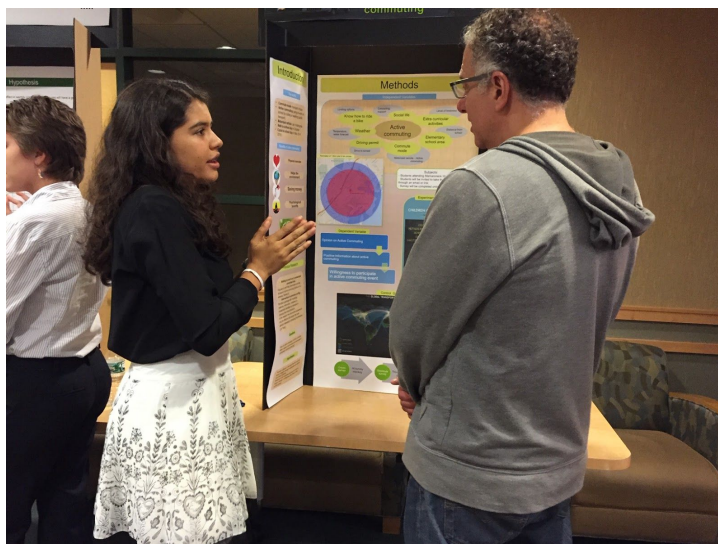


Figure 2.3. An example of a science fair presentation

2.3.3. Logistics

When organizing a science fair, it is important to tailor to the needs of the students (Schmidt, Kelter, 2017, p.131). Tailoring to the students' needs and ages keeps the whole experience positive. When planning the event there are many logistics to take into consideration. It is crucial to plan at least one month in advance with the date and location (Barrett, 2017). Once the date and location are planned, goals for the fair should be set. With set goals, the fair is able to be evaluated once it is finished (Barrett, 2017). Clear, measurable goals allow future improvements to be made if goals aren't met. From the goals, project topics will be decided and assigned. Once again, projects should be tailored to the students and ages for optimal success. It is also important to take education level into consideration. This ensures that projects are not too hard or too easy. Once the fair is over, all aspects should be evaluated for maximum improvement.

3. Methodology

The methodology section discusses the methods used to put together the science fair. This includes the contacts for the local schools and organizations that assisted in success of the project. It also includes the planning of classroom programs used to review wetlands information and introduce the concept of science fairs. Once the programs were implemented, more specific science fair logistics were planned for execution of the fair. At the end of the fair, surveys and interviews were used to evaluate its success. This was beneficial for the current team, and potential future teams.

3.1. Contacts in Cerrito and Benjamín Aceval

To complete the deliverable in seven weeks, communication with la Escuela Agrícola started in Worcester. One of the first contacts was Romina Godoy, the principal of academics at la Escuela Agrícola. Before the team arrived in Paraguay, Romina reached out to local schools about the project and put together a list of schools for the team to visit. Along with Romina, Professor Magdalena Guerra at la Escuela Agrícola was a key contact for the team. She was crucial in coordinating school visits and being a resource for all questions. Magdalena also assisted in forming connections with Director Hugo Florentin and Engineer Amalio Enciso. Hugo and Amalio were key components to booking la Escuela Agrícola as the science fair location. These contacts at la Escuela Agrícola ensured proper project guidance and logistical success.

There were a variety of local people and groups that contributed to the logistical success of the project as well. The first was Gabriella Allen. Gabriella is a Poverty Stoplight Extensionist who guided the visits to the schools. She also assisted in speaking with Directors and sat through the team's presentations. Gabriella ensured success within the schools of Cerrito. Another local contact was Victoria Blasco, the previously mentioned Asunción student. Through these local people, the team was able to spread more information and excitement about wetlands conservation and awareness.

3.2. Classroom Educational Programs

In order to spark interest in wetlands conservation, the team needed to spread enthusiasm. This was done through educational programs held in the classrooms of Cerrito and Benjamín Aceval. In total, nine schools were visited, and approximately twenty classrooms were presented to. This means the team reached roughly four hundred students throughout the presentation process. For more information on the schools, please see Appendix B.

3.2.1. Development of the Programs

The classroom education programs consisted of two parts. The first was a review of basic wetlands information that has been presented by previous IQP groups (Zarate, C. M., Claus, C. T., & Farias, 2018). The work of the previous IQP was used as a model, and modified by this team. People are more attracted to visuals. This meant that by adding in photo or video aspects to presentations, the audience will be more engaged. Visual aids are incredibly stimulating for audience members; "...if you can make your point by showing it to your listeners rather than describing it, they are more likely to remember it" (Spencer, 2018). To keep the students interested, photos of the local wetlands were used in the presentations. One of these photos was obtained from the WPI Native Plant Conservation group (Appendix H). It showed a polluted wetland, full of plastic bags and other trash. This scenery was photographed during the conservation group's first trip to the wetlands. The internet was also consulted to retrieve photos of local wetland animals. In the middle students were asked to engage in a singing activity. The group searched for a popular children song and adapted it for it to be about the wetlands

(Appendix I). The presenters would sing the song first, and then the students were asked to join in for the second and sometimes third run through the song.

The second part of these programs included information about science fairs. This included a basic overview of what a science fair is and the benefits it has to education. Within this, examples of two different types of projects were given; observational and explanatory experiments. Then the students saw examples of science fair project content and poster formats. At the very end, the students were all invited to the science fair that the team organized.

3.2.2. Implementation of the Classroom Programs

To implement the classroom programs, there were many steps to be taken. First, the team had to get to the schools. This was done with assistance from Magdalena Guerra or Gabriella Allen. Once the team arrived at the schools, there was a brief meeting with the school director. The director was given a review of the team's goals and presentation. The director was also presented with a science fair guide and parental consent forms for the students. The guide was created by the team for the students to help guide the project process. The parental consent form was a permission slip for the students to give to their parents to sign. It explained what the science fair was and gave the students permission to participate and complete feedback surveys. Next either the director or science teacher brought the team to a classroom to present. Anywhere from 1 - 6 classrooms were presented in at each school. The students' ages ranged from 9 to 17 years old. The smallest class size that was presented to was 12 students. The largest was 40 students. Once in the classroom, the presentation was given off of a projector or a regular laptop.



Figure 3.2 Implementation of Classroom Programs

3.3. Planning a Science Fair

Organizing an event as large and complex as a science fair requires careful planning. The first step is deciding on a day and time. After discussions with project advisors, the date of Saturday April 13th, 2019 was decided on for the science fair. Since this was the first science fair, it was thought to be best to make it just a morning event. The time was finalized to be from 9:00 - 11:00 on April 13th.

Once the date and time were decided, location became the next priority. Since the team had such good access to resources at la Escuela Agrícola, the school was the ideal location. In order to secure la Escuela Agrícola as the location, Hugo Florentin and Amalio Enciso were consulted. Director Florentin allowed the team to use the campus for free on the desired date of

the fair. It was decided that the “quincho” on campus was the best place to host such an event. Once Director Florentin was on board, Amalio assisted with logistics planning. He coordinated the food and drink that would be provided the day of the science fair. Amalio also helped locate computer monitors and other resources for the science fair itself.

With all of the important details worked out, invitations for the schools were the next step. With the help of Profesora Magdalena Guerra and Dorothy Wolf, an invitation was crafted. The invitation addressed each school and laid out the details of the science fair. The letter was approved and signed by Directora Romina Godoy, then distributed to the schools.

In order to have a successful science fair, there must be judges and prizes. There were four judges who each evaluated five presentations. In order to organize the teams, each presentation was assigned a letter from A - J. The judges were then assigned to five different letters, so they could judge the corresponding presentations. Each Judge was assigned their presentations in the following manner:

Judge 1: A, B, C, D, E

Judge 2: F, G, H, I, J

Judge 3: A, C, E, G, I

Judge 4: B, D, F, H, J

The judges were given a rubric to grade the presentations with (the rubric used can be found in appendix F). The rubrics were explained to the judges and any questions they had were answered. Then, the judges were given an hour to listen and evaluate the given presentations. The total pointage that could be earned from these rubrics was 27 points. The rubric was split into 2 categories; the first referenced the content in the presentation and the second referenced

the other presentation qualities. Best overall presentation awards were given for first place and runner up based on this rubric. The evaluation scores were tallied up and combined for a score out of 54.

The four prize categories were “Best Project,” “Best Project Runner Up,” “Most Creative Project,” and “Most Creative Project Runner Up.” Each participating student also received a participation certificate. There were two groups for judging and the prizes: elementary and secondary. Coordination of judges and prizes was done through Victoria Blasco. With her connections through her friends in Karugua Ha’e Tekove, Victoria successfully reached five organizations; Organización Paraguaya de Conservación y Desarrollo Sustentable (OPADES), Guyra Paraguay, World Wildlife Fund, Karugua Ha’e Tekove, and Club de Observadores de la Naturaleza. From these organizations, two of them provided judges or prizes for the science fair. OPADES provided two judges and Guyra Paraguay provided books as prizes. Karugua Ha’e Tekove also attended the fair. Club de Observadores de la Naturaleza provided leaders and materials for drawing activities at the science fair. In the end, the team also purchased notebooks, United States keychains, and other useful school supplies as prizes.

The last aspect of the science fair day that was planned were additional wetlands conservation activities. To engage science fair observers once they were done viewing posters, the team planned various activities. With the help of other WPI students, four different wetlands conservation activities were planned; Trivia and Pictionary, Native Plant Conservation station, Leach Field visits, and a drawing station. The trivia and pictionary were an interactive way to learn more fun facts about the local wetlands. The Native Plant Conservation station was set up at the science fair. Here the students could learn more about specific local wetlands plants. The

Leach Field team was able to lead groups down to view the actual leach field. Students were able to view how the leach field works through a green filter model created by the team. The drawing station was set up at some picnic tables by a local nature club. Students could sit and draw wetland plants and birds to hang up in the quincho. These stations were meant to help promote wetlands conservation and awareness in interactive ways for visitors.

3.4. Executing the Science Fair

The morning of the science fair, students arrived at 8:00 am to set up their presentations. The “quincho” and grass area surrounding the quincho had been set up the day before (Friday April 12th). As students arrived, WPI students guided parking and the walk to the quincho. As participants arrived, they sign in at a registration table and were given their table number. The team was around the quincho to assist with setup and logistics questions. Around 9:15, the judges started making their rounds to evaluate their assigned presentations. The four judges were Directora Romina Godoy, Profesora Fátima Mereles, Sara Gomez, and Cristhian Fretes. At 10:15, the WPI students started to lead the conservation activities for visitors. The activities continued throughout the rest of the fair. At 11:15 the awards, prizes, and participation certificates were distributed by Fatima Mereles and the team.

3.5. Surveys and Interviews

After the science fair was done, surveys and interviews were conducted for feedback. These were given to the students that participated in the science fair. The surveys gauged the effectiveness of the fair in engaging the students in wetlands conservation. It inquired about

whether or not the students felt they had enough guidance throughout the process as well. For the full survey, see Appendix B. The interviews were conducted in groups, and feedback was recorded and then categorized.

The interviews and surveys were analyzed by the team using a five-part method to ensure that all information is analyzed. The five stages of analysis include: “Material-oriented formation of analytical categories, assembly of the analytical categories into a guide for coding, coding of the material, quantifying surveys of material, and detailed case interpretations” (Flick, Kardorff, Steinke, 2004, 253-257). This set of steps ensured that all relevant information gets taken into consideration. These steps also helped keep the analysis consistent.

3.6. Ethics

Participation in surveys and interviews was one hundred percent voluntary. To protect subjects who decide to participate, the surveys were anonymous. During interviews, interviewees were asked for consent to use their name before quoting them. No information or interaction with the students placed them, the teachers, or their families in any psychological or physical harm.

3.7. Timeline

This is the ideal project timeline that the group will work with. The seventh week will be used as a buffer week as needed. The timeline can be adjusted once in Paraguay.



Figure 3.3. Timeline for project completion

4. Results and Discussion

The Results and Discussion section states and discusses the results of the project. This includes information about 4 different parts of the project: Science Fair; Judges, Awards, and Prizes; Activities Fair; and Student Survey and Interview Results.

4.1. Science Fair

The science fair was split into elementary and secondary divisions. The secondary school division was comprised of 10 teams between 2 schools. The elementary contained 1 team from 1 school. In total there 11 teams of students presented at the science fair, which totaled to 46 students. These teams ranged from two to four members. 3 schools participated in the science fair. 35 spectators were in attendance of which members of 3 well known organizations in the community are included. The first place team for “best overall project” scored 50/54. There was a 3 way tie for runner up with scores of 47/54.

Because there was a large age range, the presentations were split into two sections. This was a great decision because the younger students do not have the same skill set as older ones. Having the two sections allowed for the younger students to not be drowned by the older ones when it came to prizes and awards. The courage the elementary students showed allowed them to win first place “best overall project” due to their ability to show up when no one else their age did. It was an opportunity for the younger kids to get involved with their community as well. This reinforces the idea that every voice matters, no matter how small. In the secondary school category, there was one first place winner and a three-way tie for second. The large number of winning teams from well-informed judges is a testament to how much the students had learned. There was value in the students’ projects being presented to knowledgeable judges and well known organizations. The students were able to deepen their knowledge of the wetlands by conversing with those from the nature organizations that attended the fair. These people are vast sources of knowledge that the students were able to learn from. This is useful in building up the students’ confidence to share more information about the land that surrounds them. Having 11 projects at the fair meant that there was a wide variety of wetlands topics for attendees to learn from. This allows for wealth of knowledge amongst the community. Three schools participating in the 2019 fair showed an improvement in participation in comparison to the 2018 conservation workshop. Roughly 70 people were impacted by the science fair which means the community will have more knowledge they are able act upon in the future.

4.2. Judges, Awards, and Prizes

Judging started at 9:20 am. The wetlands team had to ask the other judges to wait and ultimately replaced one of the judges that arrived too late. Judging took an hour with the Judges being rushed. The judges were asked for their rubrics at 10:30 am. This ideally left 15 minutes to tally scores and write names on award winner certificates. However, this task took longer than expected, close to 45 minutes. The prizes and award certificates were distributed at 11:15 am. After awards and prizes were handed out pictures of all the winners were taken alongside the judges and the wetlands conservation team.

In the future judges should be asked to arrive 30 minutes before the start of the fair. This will allow the science fair to start on time and any following activities to be on schedule as well. This will also allow for the judges to be able to have extra time to evaluate presentations if needed. The judges should be given a time to have the rubrics submitted. This will allow for adequate time in counting scores and organizing prizes and certificates. Additionally, volunteers should be asked to help with counting scores as it may take more time than expected. This will also allow the organizers to help with crowd management and anything else that may occur. The volunteers that help determine scores should then give the organizers the names of the winners.

4.3. Activities Fair

The wetlands conservation activities ran smoothly on the day of the science fair. Considering that the team only had one week to prepare the activities, they were successful and beneficial. The activities were organized, entertaining, and interactive.

Overall, the activities were a success. Since they were so last minute, they could have been executed better overall. The Native Plant station allowed many students to drop by and learn about the plants in the local wetlands. The Leach Field station benefited the students and the leach field team. The team was able to show off their hard work, and the students got to learn more about how water is cleaned before flowing into the wetlands. In the end, the activities added an extra fun component to the whole day. People who did not participate in the science fair were still able to participate in the day. This allowed for more awareness about wetlands conservation to be spread.



Figure 4.1. The drawing station during the science fair

4.4. Student Survey and Interviews Results

From the open ended survey questions inquired about extra help students may have needed with their projects.

- 31 students felt they received help or a lot of help from the students in the wetlands group.
- 3 students commented more help was needed in order to understand the science fair set up or find scientific credible sources.
- 3 students stated that more time was needed in order to prepare for the project

Students also gave feedback about whether the science fair could have been carried out better.

- 4 students believed the fair was perfect the way it was
- 15 students thought the science could have used more organization
- 10 Students thought more school and students should have participated

The questionnaire also included questions with answers ranging from “completely disagree” to “completely agree.” The following tables are the results of those questions.

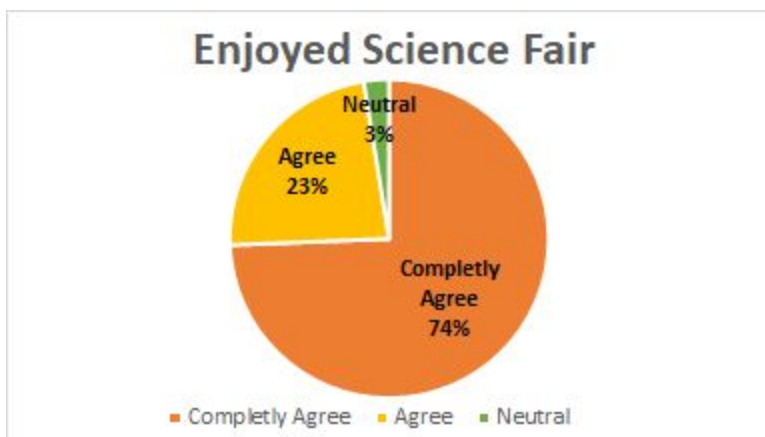


Figure 4.2. Pie chart of student responses to survey question

	Completely Agree	Agree	Neutral	Disagree	Completely Disagree
Q1. Enjoyed science fair	29	9	1	0	0
Q2. Learned from the science fair	13	23	1	2	0
Q3. The science fair project supported the work done in class about wetlands	23	14	3	0	0
Q4. Informational presentation in the classroom from the team helped with the project	24	13	3	0	0
Q5. Science fair guide was helpful	20	18	1	1	0

Figure 4.2. Student Questionnaire Responses

	Yes	No
Saturday was a good day of the week for the fair	27	12

Figure 4.3. Student Questionnaire Responses

Responses to all questions in the survey ranged from Completely Agree to Disagree. First question showed most students, 93% of responses, either Completely Agreed, or Agreed with the statement (Fig. 4.2). This question addressed students enjoyment of the science fair. The second question addressed the knowledge obtained from participating in the science fair. Responses showed 23 students agreed with the statement, 13 students completely agreed, and 3 students responding neutral and 2 disagreeing with the statement. The fourth question

addressed the performance of the informational presentation. Most students either completely agreed, with 24, or agreed, with 13, while 3 felt neutral about the presentation. The fifth question addressed the efficiency of the science fair guide that was distributed in the schools. Most of the responses fell again under completely agree, with 28, or agree, with 18, with one student responding neutral and one responding with a disagree. Not all students answered all the questions in the survey. Their responses were still taken into account. Therefore, not all questions will have 46 responses. Additionally we have to take into account students who were sick or did not attend school that day.

A variety of feedback was collected through the interviews. The students struggled finding scientific resources online. Most students got their information from Wikipedia and could not find information that pertained only the Paraguayan wetlands. They also enjoyed working in teams, it made it easier to deal with the simultaneous school work and students could divide tasks. While many students loved the activities happening next to the science fair, many felt like they could not participate in them as they had to take care of their station at the science fair. Supporting data from the questioner the interview showed students would have liked more schools to participate. They believe there a sense of rivalry and bias between different schools. A collaboration event could give them the chance to meet and work with other students at different schools

Overall students loved the science fair. While most students didn't completely agree with the learning about wetlands from science fair they did speak about how they would have liked to speak with the professionals and Fátima Mereles. A student from Escuela Agrícola also wrote that our group, "They helped because through them my interest in learning more about the

wetlands awakened.” An interview with sister Natalia Galeano also demonstrated how much her students had enjoyed the science fair: “They loved the science fair and were asking when they could go again.” This demonstrates the overall positive impact that the fair had on the students and community.

5. Conclusion

The team reached their goal of spreading wetlands awareness through a science fair. The deliverables for the project of the classroom educational programs and the science fair. The science fair was a success, bringing together students from three local schools. This project was able to expand on previous IQP work through implementation of proactive learning. The students were able to take their education into their own hands by researching their science fair project. The feedback from the students shows that their interest in the matter has increased. Increasing interest is often the hardest part of environmental awareness. Before the science fair, students who participated did not show interested in attending conservation presentations or speaking with professionals on this subject. After the science fair students were interested in the subject. They wanted to have the opportunity to speak with the professional judges and learn more about wetland conservation.

As the results showed, students and teachers greatly enjoyed the science fair and would like to see it happen again next year. The community and organizations that were contacted also demonstrated excitement towards next year's science fair.

6. Recommendations

As a result of the project, the team has developed recommendations. There will be two sets of recommendations. The first will be for future teams and the second will be for the community.

6.1. Future Organizers

The first recommendation is to use the team's counterpart for most of the communication with the schools until your team is welcomed into the community. Additionally, have your connections reach out to schools as well; they will be more receptive of you this way.

Another recommendation is to have separate times for the science fair and the activities. This will allow the students that had presentations to also enjoy the activities that occur.

6.2. The Community

The first recommendation is to continue having an annual science fair. The science fair served as a way to raise students interest in the Wetlands. In conjunction with other activities this event could be key to raising environmental awareness.

The second recommendation is to incorporate more schools into the science fair. This can be done by encouraging the teachers and students to participate. Many schools that did not participate this year mentioned that they did not have enough time to prepare. If the fair were to happen next year and there was more preparation time, those schools would participate. Additionally, it should be taken in consideration the indigenous community students level of comfort when presenting and speaking in castellano. In most cases Castellano is not their native

language. These students might need more support when it comes to preparing to the science fair in order to feel comfortable and proud of their work.

For future organizers there are some recommendations on how to organize a science fair. It is recommended students contact the school directors, potential judges, and prize donors as soon as they start planning. Schools will need time to prepare the students for the science fair. The organizations will need time to make judges and prizes arrangements.

When it comes to determining the winners designated volunteers should be in charge of tallying presentation results. Although the task may seem simple, it takes time the team should be using to focus on the students, judges, and guests. The team also recommend contacting the municipality through Karugua Ha'e Tekove. The science fair will be more official and obtain bigger prizes and judges if they are involved. Judges should be asked to arrive 30 minutes before the presentations begin so that they can be given instructions. This way it doesn't cut into the science fair presentation time. They should be given a rubric to base their scores off of and also allowed to have room for comments. This worked well when determining the winning teams. No less than two judges should rate each presentation. If possible, there should be more judges at each presentation to get a better sample size. During the science fair the judges should be given a time that they need to have their evaluations completed by. This way each team's points can be counted and there's time left to organize the prizes and awards.

Appendix A: Post-Science Fair Interview Questions

Hello! Thank you for participating in the science fair on April 13th! We want to create a feedback document for future recommendations for the science fair. Is it okay if we record you so that we don't miss any feedback you give us? Your answers will remain anonymous.

1. How much time would you have liked to have had to work on your project?
2. Is there any organizations you would have liked to collaborate with?
3. Would you have liked for the event to be a whole day or just morning?
4. In an event like this, what kind of prizes would you like to see?
5. Would you recommend the science fair to your classmates?
6. Are you interested in learning more about the wetlands?

Appendix B: Post-Science Fair Survey

Encuesta Posterior a la Feria de Ciencias

Por favor díganos como le gusto la feria de ciencias sobre los humedales. Las respuestas serán anónimas.

Circula la mejor respuesta para las 5 declaraciones:

Disfruté participar en la feria de ciencias	Totalmente en desacuerdo	En desacuerdo	Neutral	De acuerdo	Totalmente de acuerdo
Aprendí mucho de los humedales por participar en la feria de ciencias	Totalmente en desacuerdo	En desacuerdo	Neutral	De acuerdo	Totalmente de acuerdo
Participar en la feria de ciencias apoyo y agregó a lo que aprendí sobre los humedales en la clase	Totalmente en desacuerdo	En desacuerdo	Neutral	De acuerdo	Totalmente de acuerdo
La presentación que los estudiantes de EEUU dieron sobre la feria de ciencias me ayudo con mi proyecto	Totalmente en desacuerdo	En desacuerdo	Neutral	De acuerdo	Totalmente de acuerdo
El guía de feria de ciencias que los estudiantes de EEUU me dieron me ayudó a crear mi proyecto	Totalmente en desacuerdo	En desacuerdo	Neutral	De acuerdo	Totalmente de acuerdo

Escribe tus pensamientos:

1. ¿Es sábado un buen día para tener una feria de ciencias? ¿Sería mejor otro día?
2. ¿Le ayudaron los estudiantes de EEUU suficientemente con la presentación? ¿Qué pudieron haber hecho diferente para ti?
3. ¿Cómo se podría haber mejorado la feria de ciencias?

Appendix C: Information of Visited Schools

Schools Visited:

- Colegio Nacional Cerrito
- Instituto Ba’Hai Miki Rutan
- San Francisco Javier
- Esc. Parroq. Subv. Eugenio de Mazenod
- Col. Parroq. Subv. Santa Rosa de Lima
- Padre Domingo Massi
- Colegio Nacional Dr. Benjamín Aceval
- Centro Educativo Virgen del Carmen
- Escuela Agrícola San Francisco
- Colegio Nacional Dr. Manuel Pena.

Schools that Participated in the Science Fair:

- San Francisco Javier
- Padre Domingo Massi
- Escuela Agrícola San Francisco

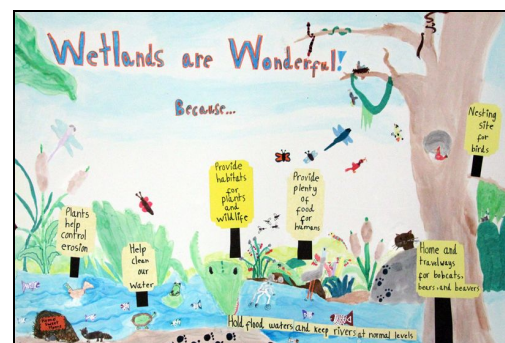
Appendix D: Science Fair Guide

Una Guía de la Feria de Ciencias de los Humedales (13 de Abril)

1. La Presentación

- La forma de la presentación es un póster 61 x 91 cm sobre un aspecto de los humedales.
- Se puede usar papeles, marcadores, lápices de colores, bolígrafos, fotos, dibujos, todos materiales que tenga acceso a.
- Ejemplos de un póster para una feria de ciencias:

Exposición de un proyecto de ciencias



2. Ejemplos de temas del póster:

- ¿Cómo filtran el agua los humedales?
- ¿Qué tipos de plantas existen en los humedales?
- ¿Qué tipos de animales existen en los humedales?
- ¿Cómo se compara los humedales locales con los humedales que existen en otro lugar? ¿Similitudes, diferencias?
- ¿Que está contaminando los humedales?
- ¿A qué amenazas se enfrentan los humedales?

3. El Contenido de las Presentaciones

- *Introducción:* ¿Cuál es la importancia de vuestro proyecto? ¿Qué información necesaria el público general para que pueda entender el proyecto? ¿Qué han descubierto otras personas o qué han hecho sobre el tema escogido?
- *Declaración del Problema / Pregunta de Investigación:* ¿Qué es lo que quieres averiguar con este proyecto?
- *Metodos:* ¿Qué es lo que hiciste para responder a la pregunta? Explica los detalles. (cuándo, con qué, con quién)

- *Resultados:* ¿Qué paso al llevar acabo el experimento? ¿Cuales fueron los detalles de los resultados?
- *Conclusiones:* Indique en qué contribuye su proyecto o invención de la feria de ciencias al área en la que trabajó. ¿Qué es lo que aprendiste de la investigación? ¿Cumplió con sus objetivos?

4. Habilidades de las Presentaciones

- Tener confianza al hablar
- Crea notas para mirar al presentar
- ¡Se entusiasta!
- Práctica su presentación con su grupo o solo.

¡Si tienes preguntas, pregunta a su profesor que se ponga en contacto con nosotros!

Appendix E: Science Fair Information Sheet

Información: Feria de Ciencias Sabado 13 de Abril 2019

Queridos estudiantes,

El Sábado 13 de Abril la feria de ciencias abrirá en la Escuela Agrícola San Francisco a las 8 de la mañana para que los estudiantes se registren y monten su estan. A las 9 los estudiantes empezaran a presentar a los jueces y al público. Las presentaciones van a ser mínimo de 4 minutos y un máximo de 10 minutos. Durante esta sesión el público va a ser invitado a preguntarle a los estudiantes sobre sus proyectos. Las presentaciones se acabarán a las 11 y los premios se entregarán después. El grupo de marketing preparara un selección de “meriendas” que estará a la venta. No se olviden de traer dinero o su propia comida para este evento. No queremos que ninguno de los estudiantes tengan hambre. También les queremos recordar que se arreglen y se vistan formales para a presentación.

Horario


8:00 - 8:30 am	Registración y montar su estan
9:00 -11:00 am	Estudiantes presentan
11:00- 12:00pm	Premios
12:00 pm	Recogida de posters y estans

Appendix F: Judging Rubrics

Evaluación:**Feria de Ciencias en Escuela Agrícola San Francisco**

	No se menciona	Se menciona en la presentación, pero no contiene mucha explicación	Parte de la información se comunica	Información se comunica	Toda la información necesaria se comunica claramente y concisamente
Introducción: Importancia del Tema/ Interés	0	1	2	3	4
Pregunta: Qué es lo que se quiere averiguar	0	1	2	3	4
Metodos: Se describen las acciones tomadas y los materiales usados en este proyecto	0	1	2	3	4
Conclusión: Que se aprendió/ Nuevas preguntas	0	1	2	3	4

	Existe	Tiene una cualidad	Tiene dos cualidades	Tiene todas las cualidades
Poster: <ul style="list-style-type: none"> • Esta bien organizado • Se comprende el contenido • Visualmente atractivo 	1	2	3	4
Profesionalidad: <ul style="list-style-type: none"> • Habla con vocabulario formal y profesional • Actitud del estudiante es formal y profesional • El estudiante está bien vestido 	1	2	3	4

<p>Creatividad:</p> <ul style="list-style-type: none">• Idea del proyecto es única• Organización del poster/visual es creativa para poder enfatizar la importancia del tema.	1	2	3	
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Appendix G: Conservation Activities Information

Piccionario

Directions: Split the group up into two teams. Make a score chart for each of the teams on the whiteboard to keep track of how many points they earn.

Each team sends up one person to the board. They both are told to draw one of the things on the list below (i.e. they both need to draw a frog), and are given 60 seconds to draw it. The first team to guess what their representative is drawing wins 1 point! The game will continue until the first team reaches 10 points.

Sapo (frog)
Serpiente (snake)
Planta acuatica (aquatic plant)
Garza (Heron)
Libelula (firefly)
Mosquito (mosquito)
Lagartija (lizard)
Mariposa (butterfly)
Arana (Spider)
Pescado (fish)
Carpincho (capybara)
Pato (duck)
Augila (eagle)
Cocodrilo (crocodile)
Rio (river)
Camalote (type of plant...they know what it is)
Cangrejos (crabs)
Tortuga (turtle)
Omnitorico (platypus)
Arbol (tree)

Trivia

Directions: Have the kids split up into groups of 2. Let them choose a team name and write it on the whiteboard (or have them write it on the board). Read off the trivia questions, and the first team to answer the question right wins 1 point (marked with a tally under their team name). The team with the most points at the end of the trivia game gets some candy (1 or 2 pieces each).

- 1) ¿Qué es un humedal?
 - a) Tieran cubiertas en agua
 - b) Tierras húmedas
 - c) Hogares a una variedad de animales
 - d) **Todos**

- 2) ¿Que son ejemplos de humedales de agua dulce?
 - a) pantano
 - b) marisma de agua dulce
 - c) Bog
 - d) **Todos**

- 3) ¿Cuales son más comunes en el mundo?
 - a) **Marismas de agua dulce**
 - b) Salada
 - c) Son igual de comunes

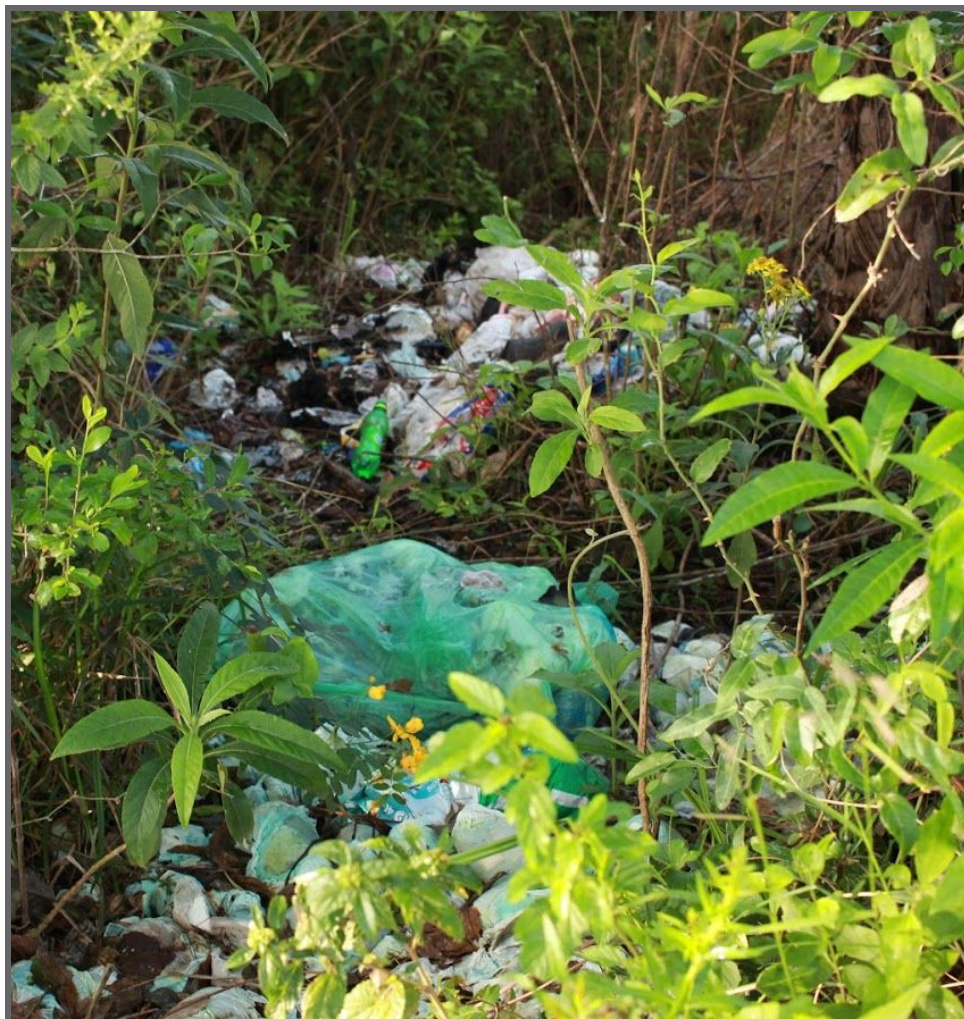
¡Las marismas de agua dulce constituyen ~ 90% de los humedales!

- 4) ¿Qué porcentaje de la tierra forman los humedales en Paraguay?
 - a) 20%
 - b) 40%
 - c) **60%**
 - d) 80%

- 5) ¿Qué necesidades de vida proveen los humedales a los animales?
 - a) Comida
 - b) Agua
 - c) Refugio
 - d) **Todos**

- 6) ¿Qué tres animales podrían encontrarse en un humedal?
- a) **Castor, Pato, Cangrejo**
 - b) Caracol, Rana, Dinosaurio
 - c) Ciervos, Jirafas, Mosquitos
 - d) Rata almizclera, Araña, llama
- 7) ¿Cuál de estos NO es un animal en peligro de extinción que vive en humedales?
- a) carril de la chapaleta
 - b) Cocodrilo americano
 - c) ratón de la cosecha del pantano de sal
 - d) **pargo**
- 8) ¿Qué categoría de forma de vida NO forma parte de la cadena alimentaria básica?
- a) Productores
 - b) **Recicladores**
 - c) Consumidores
 - d) Descomponedores
- 9) ¿Qué es un cultivo que a veces se cultiva en humedales?
- a) Arroz salvaje
 - b) Menta
 - c) Arándanos
 - d) **Todas**
- 10) ¿Qué importancia tienen los humedales para las personas y la vida silvestre?
- a) **Filtran y limpian el agua**
 - b) Matan toda la vegetación de la zona
 - c) Los humedales NO son importantes para las personas ni para la vida silvestre
 - d) Todas las anteriores
- 11) ¿De qué manera las personas dañan los humedales?
- a) tirar su basura en los humedales
 - b) drenarlos de su agua
 - c) Matar los animales
 - d) **Todas las anteriores**
- 12) ¿Dónde podemos encontrar humedales?
- a) Russia
 - b) Paraguay
 - c) Florida
 - d) **Todo el mundo**
- 13) ¿Cuáles son las formas en que las personas pueden ayudar a proteger y preservar los humedales?

- a) Limpiar la basura
- b) Proteger los animales
- c) Compartir esta información con sus amigos, familias, y comunidad
- d) **Todas las anteriores**

Appendix H: Polluted Wetland Photo

Appendix I: Wetlands Song Lyrics

A la melodía de “Había un Sapo”

Los humedales, -dales, -dales,
Son importantes, -tantes, -tantes,
Tierra con agua, agua, agua
Hay muchas partes, partes, partes

Puede conservar, -servar, -servar
las plantas
Limpia basura
Conservar hoy, hoy, hoy!

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