

Environmental Stewardship on St. Paul Island, Alaska

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Abstract

The Planet Stewards Program is invaluable for connecting teachers and informal educators who are passionate about instilling the value of environmental stewardship in students. A team from the Aleut Community of St. Paul Island Tribal Government developed a curriculum for middle school students at the St. Paul Island School in Alaska about marine debris issues that helped them find small-scale solutions within their community. We created original lesson plans that utilized materials from marine debris experts around the world, and coordinated with them to provide virtually visits to students from the school to talk about their work. Piloting this curriculum required high levels of communication and collaboration with teachers at the St. Paul Island School and the Covid-19 pandemic provided challenges. As a result, our first attempt to deliver the curriculum was done in a hybrid format in which the teacher was in the classroom with the students on St. Paul Island, and presenters visited the classroom virtually via video conference to talk to students and lead classroom activities. We learned many valuable lessons about working with teachers and students in a small rural Alaskan community, and hope to pass along those lessons for teachers and informal STEM educators in other parts of the country.

Our story

Our staff within the Ecosystem Conservation Office, the research and resource management department within Tribal Government, consists of talented scientists and resource managers. Within the Tribal Government, we assist teachers in their efforts to offer the best education and opportunities possible to their students. As informal STEM educators working for an Alaska Native Tribal Government, we are particularly grateful for the opportunity to connect with and learn from other teachers – their input and creativity helped us to develop and propose a project that could hopefully engage and inspire the students of St. Paul Island, Alaska. We work closely with teachers at the St. Paul Island School and recognize that as a small public school in rural Alaska, teachers' resources are limited.

They are also asked to perform many tasks, going above and beyond for their students. We coordinate with teachers to bring our skills into the classroom, sharing our knowledge with students through conducting hands-on activities, and providing mentorship for students as they grow. While the environmental issues facing small, rural communities may vary across the country, we hope that teachers can be inspired by the lesson plans we developed to create curriculum that can inspire their students to find local, small-scale solutions to large environmental problems. We also hope we can share lessons learned for informal STEM educators in how to work with teachers and public schools and small communities.



Figure 1: Scenes from the May 2019 marine debris cleanup, where community members worked together to remove over 19,000 lbs of marine debris from St. Paul Island's shorelines.

Photo Credit: Ocean Media Institute



Figure 2: Some pieces of marine debris, such as the trawl net pictured here, were so large and heavy that four wheelers were required to drag them off the beaches. Photo Credit: Ocean Media Institute



Figure 3: The debris removed during the May 2019 cleanup was taken to the landfill and sorted by category before being weighed. Photo Credit: Veronica Padula

associated negative impacts on the marine environment, we encouraged students to propose solutions that could potentially be achieved within their community. Fortunately, our team was able to travel to St. Paul Island in July 2021, during a brief period of Covid relief. We took advantage of that time on island to conduct cleanups both around the town and along the beaches. The team of students removed more than 200 lbs of litter and debris!

We developed unique lesson plans, but we also pulled resources and materials from various experts to supplement the information provided. We also invited experts to virtually visit

Planet Stewards allowed us the opportunity to work with students to take action against marine debris, an issue that threatens the marine ecosystem of St. Paul Island. The Tribal Government conducts major marine debris cleanups, removing almost of 25,000 lbs of debris from the island's shoreline within a single cleanup event.

These cleanup events are critical to the protection of the island, but leave Tribal Government with a new issue, which is the disposal of the collected marine debris. Plastic recycling is not available on a remote island like St. Paul, and plastic either becomes part of the landfill, or we must find a method of barging the waste off the island, which can be expensive and logistically difficult.

Our project set out to make students aware of the plastic waste issue and formulate methods of addressing it directly within their community. Along with lesson plans that provided students with more background about marine debris, plastic waste and their



Figure 8: Students examine a sample of sand for microplastics during the July 2021 marine debris camp. Photo Credit: Veronica Padula



Figure 9: Another day of marine debris cleanup during the July 2021 marine debris camp. Photo Credit: Veronica Padula

students and tell them about their work, which was an extremely unique component to this curriculum.

We combined lessons about environmental issues with lessons about technologies that could potentially inspire solutions to the issue. For example, students on St. Paul Island are very interested in emerging technologies, such as 3D printing. We saw an opportunity to harness that interest and develop a project that combined environmental stewardship and technology concepts. While St. Paul Island does not have an active plastic recycling program on site, machines have been designed that can shred plastic items and turn them into 3D printing thread. The project for the students involved learning about marine debris, the problems with plastic and waste management, and challenging them to design solutions to the issues related to marine debris and plastics.



Figure 6: Recycling bins set up for the start of recycling club.

Photo Credit: Jessica Fratis



Figure 4: St. Paul Island students learned about how marine debris impacts marine ecosystems during the Bering Sea Days event in September 2019. In the lesson pictured here, students were part of a marine food web where microplastics (another form of marine debris) could be ingested by smaller organisms and get amplified through food web dynamics. Photo Credit: Veronica Padula



Figure 5: Students created art installations to help bring awareness to the marine debris issue. Photo Credit: Veronica Padula

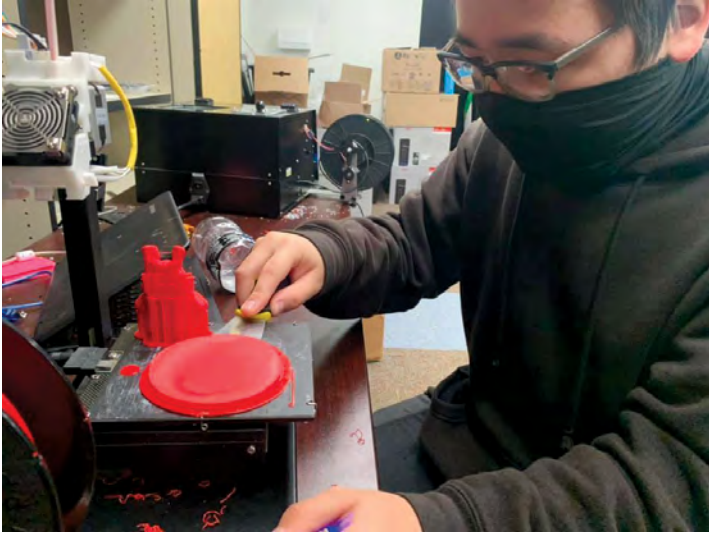


Figure 7: Students experiment with 3D printing.

Photo Credit: Ethan Candyfire

The reward for all of their hard work was to provide them with a ProtoCycler (desktop filament extruder) that could recycle plastic waste items into 3D printing thread and encourage them to create objects from the recycled plastics on 3D printers. Ultimately, we wanted the students to feel empowered to make a difference within their community with regards to plastic waste and protecting their environment.

The Covid-19 pandemic presented many challenges in the execution of this project. We were not able to interact with the students in the way we had hoped – St. Paul Island is a small and remote community, with limited access to health care and a number of Elders that are high risk with Covid-19. Travel to St. Paul was limited, and so we could not visit the island to deliver the lesson plans laid out in this project in person. Classes were remote and this presented

its own challenges as internet on St. Paul Island is unreliable, resulting in many students being unable to access learning materials from home. Teachers were forced to rethink and reevaluate lesson plans and teaching methodologies. It would have been too much for us to ask the teachers to conduct these lessons with their students, even remotely. A key lesson we took away from this is that ongoing communication with teachers was critical, but even more critical is showing teachers our support in all ways possible, including showing patience, not placing the goals of our project over those of the teachers in providing quality educational experiences.

We were fortunate that by the winter of 2021, school was back in session for the St. Paul Island students, and we could join their class remotely. We had a marine debris class session every Friday from January to April, where marine debris experts visited students virtually, and the teacher led various activity lessons with the students. The students attempted to use the ProtoCycler and 3D printers several times, and created several amazing 3D printed objects.

They often had to trouble shoot issues with the technology but the students were very good at finding solutions. A key lesson we took away from this hybrid model of teaching was that we needed to be adaptable within our lesson plans. If the internet was not cooperating and our virtual visitor could not speak to the class, we ensured that the teacher had been provided with enough materials to conduct another lesson with the students, ensuring their progress throughout the marine debris curriculum.

Links to the curriculum:

Module: Introduction to Marine Debris <https://drive.google.com/file/d/1GZsQ3xYoYLPk1AxbG4c2pyPqdkJkDTK/view>

Link to Marine Debris Module 2 <https://drive.google.com/file/d/1BiCaZyHgPCcrp4oH25zbOrxkxSxczTYd/view>

Conclusion

The challenges of working with remote communities were certainly highlighted in this project and reinforced during the pandemic. This was our first attempt at sharing the marine debris curriculum with students in a remote fashion, and we spent a good portion of our time trouble-shooting the technology and adjusting the lesson plans. We hope to repeat the effort at the St. Paul Island School in the future and collect data about the impact on students. It is clear that students in remote and rural communities often do not have access to unique educational opportunities or lessons with a local impact. It is up to a coalition of caring adults, from teachers to parents to scientists, to put in the extra effort to ensure students in underserved communities are offered opportunities to enhance their educational experiences. While it may be difficult, and things may not turn out the way one imagines, it is always worth the effort. There may be a student in your orbit that becomes inspired and who may one day find the solution to the world's toughest environmental problems because someone took the time to reach out to their community and introduce them to something new.

About the Author

Veronica Padula is the Assistant Director of the Ecosystem Conservation Office, the research and resource management branch of the Aleut Community of St. Paul Island Tribal Government. Her graduate research focused on the impacts of marine debris in the Bering Sea Ecosystem. She worked with an amazing team of educators to develop the marine debris curriculum discussed here: Haley Edmondson, Herminia Din, Quin Fitzpatrick and Katy Nalvin. Veronica can be reached at vmpadula@alaska.edu.

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