

Engaging Youth with Science in New Mexico

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Abstract:

In order to provide more students in New Mexico with opportunities to learn about science and enjoy the outdoors, an adaptable curriculum has been created to reach youth throughout the state who may not have resources to extracurricular programs. Aimed primarily at Native communities, this project takes a hands on approach to learning about water quality and inspiring the next generation of conservation leaders.

Introduction:

New Mexico has an ongoing education crisis. In 2016, New Mexico was ranked 49th in the United States when it comes to quality of education measures (Nott, 2017), surpassing only Nevada and Mississippi. The report factored reading and math scores of fourth through eighth graders as well as high school graduation rates. The low ranking was nothing new for the state, with similar reports giving the state an F, C, and D- in 2010, 2011 - 2013, and 2014 - 2015 respectively (Nott, 2017).

In addition to education challenges, New Mexico also has an ongoing poverty crisis. According to the nonprofit Talk Poverty, New Mexico had the highest poverty rate in the nation in 2015 with 20 percent of the population living below the poverty line (TalkPoverty, 2015). The poor education and the poverty levels in New Mexico are intertwined - it is widely documented that people from low-income backgrounds often do not receive an adequate education - therein continuing the cycle of poverty (van der Berg, 2008). This is apparent in New Mexico with the state spending \$9,736 on average per pupil, compared to \$11,375 nationwide (Nott, 2015). With an ongoing budget crisis, extracurricular activities aimed at providing students with more opportunities to learn or get outside, or often the first programs to be cut.

Outside of New Mexico, children across the country are losing touch with nature and the outdoors due in large part to more time inside or in front of screens. Some estimates show that children between the ages of five to 16 are spending six and a half hours a day in front of screens up from just three in 1995 (Wakefield, 2015). A thirty year decline in hunting and fishing

licenses sold shows that less and less of the population is participating in these outdoor traditions - despite a slight uptick in recent years (Rathke, 2014). The sale of hunting and fishing licenses supports many conservation efforts, and reengaging Americans with hunting and fishing will not only reconnect people with the outdoors but sustain conservation programs as well. The New Mexico Wildlife Federation (NMWF), an affiliate of the National Wildlife Federation, aims to connect youth to the outdoors and introduce them to hunting, fishing, and hiking. NMWF also educates the public about conservation, the North American Model of Wildlife Conservation, and environmental issues.

The New Mexico Wildlife Federation recently began working with the Santa Ana Pueblo wellness center, assisting in their after-school program on roughly a monthly basis. Activities so far have included making a cloud in a bottle, identifying animal tracks, tying fly lures, and practicing fly fishing. While this is a great start, the opportunities to educate and connect children through similar venues is almost endless. In my role at NMWF I mostly create marketing materials and communicate with the public through online venues. As a small organization, all staff assists on various events and programs and I have helped at the Santa Ana Pueblo numerous times. I have never created a curriculum or program, and am not especially comfortable doing so given a fear of speaking in public and being uncomfortable around children in an educational capacity. Creating a curriculum NMWF can utilize at the Santa Ana after school program - and hopefully other Pueblos across New Mexico - will be a big challenge for me and a great benefit to these communities that often do not have the best access to educational resources.

As is often true at nonprofits, NMWF is understaffed and not always able to properly prepare for these programs which has impacted our work at the Santa Ana Pueblo. Through my leadership project, I will create detailed programs and lessons that we can use across multiple ages and at different Pueblos or after school programs across the state. This will make our work more efficient, our input into the community more valuable, and ultimately reduce the effects of Nature Deficit Disorder. Through these programs, NMWF will hopefully bridge a small portion

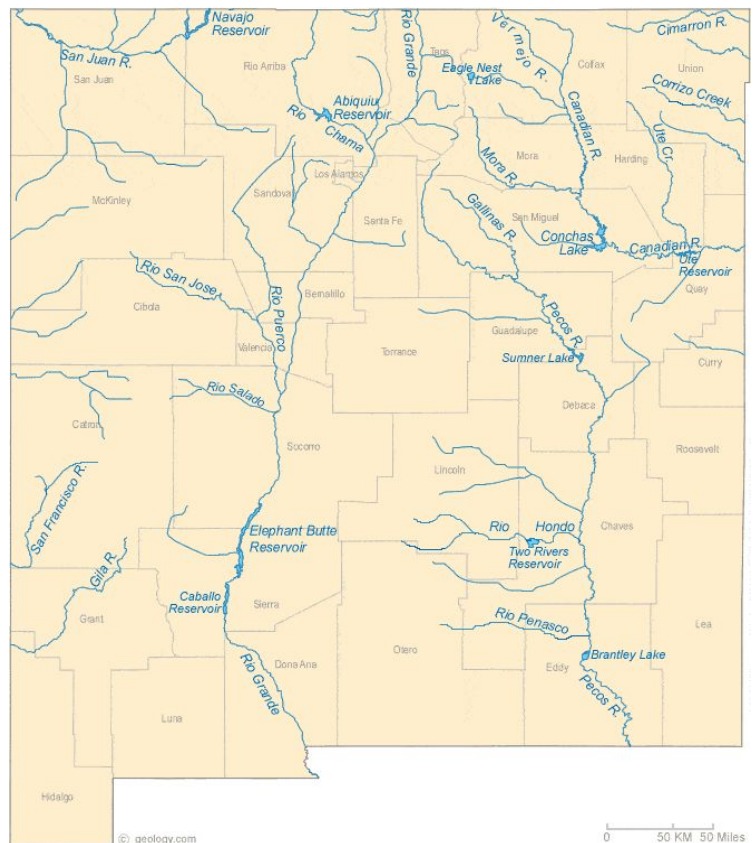
of the gap between the lack of resources for education and the needs of often underserved communities in New Mexico. This project aims to work with elementary age students in third through fifth grade and can work for an hour long program, or be stretch for half a day depending on facilities and amount of students present.

In addition to teaching students about science and the importance of water quality and conservation, I hope to encourage more young people to get outside and experience the outdoors in new ways.

Project Details:

One of the main issues in New Mexico is water - lack of it and quality of various water sources. RiverSource, a nonprofit that partners with NMWF often does water quality testing with students to enhance their understanding of the importance of clean water and how watersheds connect with each other throughout the state. By seeing their work in action, I have developed thoughts on how to engage students of all levels.

Many water quality tests can be done with a simple kit and can be translated to many age groups. Testing for pH, turbidity, oxygen, and temperature can indicate whether a waterway is healthy or not. This experience will be hands on and engage students in understanding the source of their water and why healthy water matters. These are fairly simple tests that can be completed by a wide



age group - depending on the education level of the students, leaders can adapt how technical the explanation of the results needs to be.

Project Overview:

Begin the session by asking students the following questions and writing the answers down where everyone can see them:

- What are some things you use water for?
- What activities do you like to do in water? (rafting, swimming, fishing)
- Who else besides humans need water?

At this point in the discussion, the students will look at birds, animals, fish, and plants of New Mexico. The New Mexico Department of Game and Fish has laminated posters of common fish and animals in New Mexico, they will be asked to donate some for this program so students can identify the different flora and fauna that also need water to survive. Ideally the students will be broken up into groups of four to five so they can get as close to a one on one experience with the project leader - in this case NMWF staff - as possible and ask as many questions as they want. This portion will take 5 - 10 minutes.

After selecting animals, fish, and plants they know and can identify, return to follow up questions.

- Do you know where your water comes from?
 - Utilize map to ask them where they live and where they think their water comes from
 - Introduce basic concept of ecosystems - how everything is tied into each other. This will allow teachers to tie this lesson back into the core curriculum and keep inquiry going past the day's activities.
 - Discuss connections between all the waterways
- What do you think could pollute our water or make it dirty?

- How could a polluted river in northern New Mexico impact water in southern New Mexico?
- Discuss the birds, plants, and animals identified previously. Ask the students where these organisms live and how they could be impacted by polluted water from across the state.

Indoor Option for Activity:

To show how waterways and rivers can come together, the class will pour water onto fake sand (created with cornmeal previous to class time) and see how the river flows. Can students force the water to go any which way? Students will be encouraged to put “trash” in the water and see how far it can travel from where it started. Pebbles, rocks, and animal and fish figures can be used to add to the water scenes (model river idea from sciencebuddies.org). This exercise will emphasize the connection between different waterways and how pollution can impact them. It will also show how the flow of water can often be unpredictable so it is important to keep our water trash free as it is impossible to tell where it will end up.

Another option for this activity, as provided by AIP cohort Ashley Hill, is to use soy sauce to mimic oil, sprinkles as litter, oregano for agricultural runoff, and have a clear bucket at the end to show the impact of the pollution. These supplies are also available at any convenience store, making supplies easy to find.

After the students observe how water can flow, the students will be guided through water sampling. Water from different sources should be collected prior to class. One water sample should be from tap water and one from a local river or lake. If possible, rainwater or agricultural runoff would be ideal for this activity. Students will work in small groups to test the different water samples for pH, oxygen, turbidity, and temperature. Leaders will ask the students what they think each result could mean for the water, an example question being “we need oxygen to breathe, do you think that means water needs it too?” The results of the water testing will then be explained to the students.

Once completed, ask the students:

- How were the water samples different?
- Were you surprised by any of the findings?
- Which one would you rather drink?

Outdoor Option for Activity:

Students will be encouraged to engage with their surroundings and identify any animals, birds, fish, or plants they see. NMWF staff and tribal or community leaders will guide students along the walk pointing out wildlife and plants of interest. Once the group has reached the river or lake, students will be encouraged to pick up rocks and collect water. First students will identify any aquatic insects they see either under rocks or by looking through insect viewers in water samples. Program leaders will explain the significance of the insects found - or lack thereof.

After observing insects and wildlife, the students will be guided through water sampling. Same tests will be completed as the indoor activity. Guides will ask the students what they think the results mean and explain student findings.

At the end of all activities, students will write down or draw what they learned and ask any last questions they might have.

Reflection & Conclusion:

As of yet, this project has not been implemented. The school year with the Santa Ana Pueblo will end in May. My leadership goal is to implement this program fully into Santa Ana and hopefully one additional Pueblo by the beginning of the school year. Meetings are set up with educators from the Sandia and Pojoaque Pueblos to gauge their interest in utilizing this program in some capacity.

Peer feedback in this class has been the most useful of any class I've taken so far. Tips and advice from my peers - especially those who are teachers - has been instrumental in giving my project a more clear purpose and structure that will be easily adapted into various public schools.

Throughout this course, I have often questioned if I have the skills necessary to be a leader. I think that part of being a leader requires being outgoing, which I do not tend to be. I have been very nervous about approaching more people for this project. As someone who is still fairly new to New Mexico, I am questioning if I really have the knowledge needed to truly provide something of value to community members who have been here for generations. Yet whenever I explain my project idea to a coworker or outside partner they are excited about the possibilities. People working with students value education and people attempting anything new to engage young people and teach them something outside of what they see on a screen. This has helped me be more confident in my ability to complete this leadership project.

Next Steps:

My immediate next steps are continuing to reach out to leaders in the communities I hope to work in. Due to conflicting schedules I have only had preliminary contacts with student leaders in other Pueblos, but the outline of my project has been well received so far. As mentioned above, my next meetings include sitting down with educators at the Pueblos of Sandia and Pojoaque. The goal of this program is to lay the groundwork for expanding educational programming, but each program will be tailored to the needs of the community.

For this project to meet its full potential, NMWF will need to secure additional funding. By getting more Pueblos and after school programs on board, I am hoping to pitch the program to government agencies and foundations that supply grants. While many of these supplies are inexpensive and should last for multiple sessions, staff time and travel expenses add up and will need to be covered.

I am confident I will be able to achieve my goal of implementing this program in additional communities by the fall. As more contacts are made and sustained, the program will hopefully grow and include additional hands on activities.

Citations:

Berg, S. V. (2008). *Poverty and Education*. Paris: International Academy of Education and the International Institute for Educational Planning.

geology.com. (n.d.). *New Mexico Lakes, Rivers and Water Resources*.

Louv, R. (2008). *Last Child in the Woods: Saving Our Children from Nature-deficit Disorder*. Chapel Hill: Algonquin Books of Chapel Hill.

Nott, R. (2017, January 8). *New Mexico ranked 49th in national education report*. Retrieved from The Santa Fe New Mexican:

http://www.santafenewmexican.com/news/education/new-mexico-ranked-th-in-national-education-report/article_f44b5730-26d1-544a-bab9-b375a984f6ae.html

Rathke, L. (2014, November 22). *New hunters emerge after national decline*. Retrieved from <http://www.usatoday.com/story/news/nation/2014/11/22/new-hunters-emerge/19407695/>

Talkpoverty.org (2015). *New Mexico 2015 poverty numbers*. Retrieved from <https://talkpoverty.org/state-year-report/new-mexico-2015-report/>

Wakefield, J. (2015, March 27). *Children spend six hours or more a day on screens*. Retrieved from <http://www.bbc.com/news/technology-32067158>

Science Buddies Staff. (2014, October 27). *Go with the Flow: Model Rivers with Cornmeal, Sand, & Water*. Retrieved from

http://www.sciencebuddies.org/science-fair-projects/project_ideas/Geo_p045.shtml