

Lowell Elementary Students Understanding ArcView GIS and Water Resource Management

Abstract

Arizona State University and the Bureau of Reclamation help Lowell Elementary students understand water resource management using ArcView. The Lowell students will be divided into teams of two per project to study the Phoenix Metropolitan water quality. The students will write research questions, make hypothesis, and do GIS analysis using ArcView to answer their questions. With the help of the Bureau of Reclamation resources, the students will be able to do more of a scientific analysis to research what could be causing their findings. The students will also be able to use the library, the internet, and interviews for more information. In the analysis phase, Reclamation will bring in a water quality specialist for one of the classes so that the students can ask questions and discuss their findings. Each team will write up their findings, create a presentation, and present their work to the Bureau of Reclamation.

The Bureau of Reclamation, Phoenix Area Office (PXA0) has partnered with Lowell Elementary and Arizona State University to help teach the students about water resources using the GIS tool ArcView. Nancy Crocker who runs the Service Learning Math and Science Internships at ASU, wrote for the Great Communities ASU/Motorola grant which has funded the GIS service learning internships. Ms. Crocker chose Lowell Elementary because of the GIS computer lab provided by the City of Phoenix, AuThenTiCity program. Reclamation became aware of the GIS program at Lowell after seeing an article in the ArcNews. Because water is so important in the southwest, Reclamation has done many outreach programs to educate the public on water issues. This was a great opportunity to work with ASU and Lowell to help teach the students about water in Arizona using GIS. The collaboration between federal government, the university and the elementary school has proved to be a great partnership, benefiting all partners.

Partnerships like this do cost money and time. First, an initial meeting was needed between ASU, Lowell and Reclamation to determine how we can help teach GIS to the students. It was important to the coordinators to give the students "real-world" experience and an opportunity to see all the different careers that use GIS. A couple of classes were also dedicated to educating the students about the Bureau of Reclamation and informing them about the importance of water conservation. Twice a week for one hour during the spring semester Reclamation employees along with ASU interns assisted Ms. Beacom's class with their ArcView projects. The students became familiar with the data and also practiced new commands. A class was dedicated to teaching the students on how to make a hypothesis. After developing their hypothesis, they created team projects over a period of several weeks. A salinity expert critiqued the work and gave suggestions about their hypothesis and maps. Lastly, they had a field trip to the Bureau of Reclamation to present the findings they've been working on all semester.

The 7th and 8th graders from Ms. Paula Beacom's Science class have been using ArcView 3.2 software since the start of the school year and have become very proficient. Well data from the Arizona Department of Water Resources along with other base data such as streams, lands use, population, etc. was used to create their project. After playing with the data and becoming familiar with it, the first assignment was to create a hypothesis on Total Dissolved Solids (TDS) using the provided data. A subject area expert, Tom Poulson, an engineer at Reclamation visited the class and gave a short overview on what TDS is and where it comes from. They learned how to use the software to analyze the

results of the water quality findings and mapped the results. The students used the Arizona Department of Water Resources' well data to determine whether their hypothesis was supported. After analyzing all the data, they came to a conclusion. Then, the subject expert critiqued the student's maps and the validity of their hypothesis and they made the necessary adjustments. One of the most important lessons taught was that it was okay for their hypothesis not to be supported. He stressed that having an unsupported hypothesis was just as important as one that was supported. Mr. Poulson explained that this is how the "real-world" learns and comes to conclusions. They mapped their findings and shared their analysis with the Bureau of Reclamation in a PowerPoint presentation. Some examples they explored were how population, lands use and proximity to rivers affected TDS levels in groundwater. Figure 1 shows the analysis done by Mario and Elijah titled, "Will your TDS levels be higher if you live closer to the Salt River?" The conclusion was that their hypothesis was correct since they stated that TDS would be high near the Salt River than if you lived further. Mario and Elijah learned from Mr. Poulson that TDS was very high near the river since the Salt River had higher TDS due to salt springs.

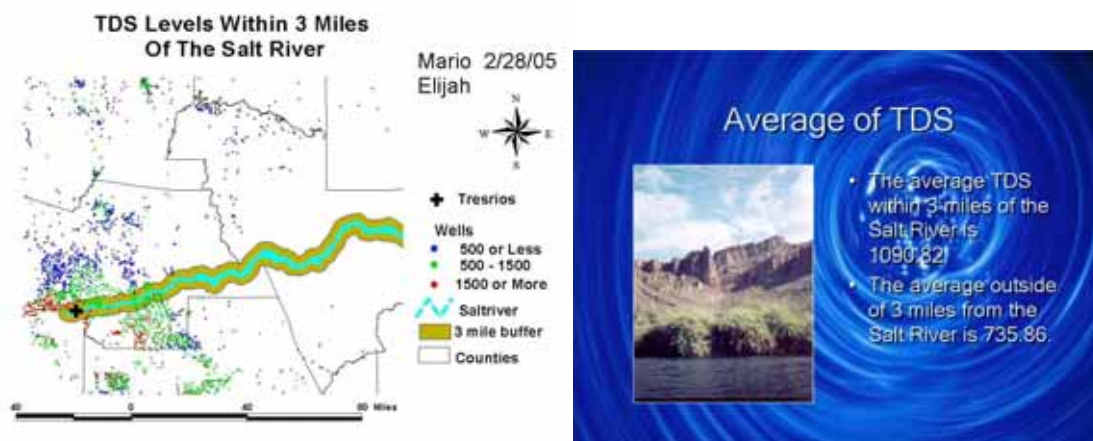


Fig. 1

The Bureau of Reclamation has been fortunate to have an Area Manager that has always been a supporter of outreach projects and believes in educating our children on the importance of water resources. Reclamation's mission is to manage water in the west and one way to do that is to educate young people about water. This was also an opportunity for the students to showcase their talent and smarts. In addition, the students had their "very important" analyses and mapping recognized by the professional

world and enjoyed a sense of pride and accomplishment. Figure 2 shows Isabel and Sandra sharing their analysis and maps in PowerPoint with Reclamation employees.



Fig. 2

Reclamation will also reap results by seeing how important it is to get involved with outreach projects like this because it does make a difference. I know that these kids will go away with more knowledge and increased confidence because of this interaction. In Figure 3, Carol Erwin, Reclamation's PXAO Manager congratulates the students by presenting them with certificates for all their hard work.



Fig. 3

Partnering with the Arizona State University to assist Lowell Elementary 7th and 8th graders in learning about water resources while gaining experience in GIS has been a fun and rewarding experience which has benefited everybody involved. Teaching these students about how important water is in the West is part of the mission of the Bureau of Reclamation. It is the responsibility of corporations, government and educational institutes to work together in encouraging our future scientists to learn about the world around them.

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References

Bureau of Reclamation, Phoenix Area Office

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Contact Information

Primary Author

Vivian A. Gonzales

Bureau of Reclamation

P.O. Box 81169

Phoenix, AZ 85021

(602)216-3966

vagonzales@lc.usbr.gov

Co-Author

Jeremy Scott Dandron

Bureau of Reclamation

P.O. Box 81169

Phoenix, AZ 85021

602.216.3920

jdandron@lc.usbr.gov