The Ecological Society of America's SEEDS Program

SEEDS Regional Field Trip

Central Arizona-Phoenix LTER

Arizona State University

November 6th – 9th, 2014

Dr. Nancy Grimm with the SEEDS participants at one of the LTER study sites

Overview:

From November 6-9, 2014 the SEEDS program was proud to host its second regional field trip with the help from the Central Arizona-Phoenix Long Term Ecological Research Site (CAP-LTER) and Arizona State University. Participating in this field trip where 15 undergraduate minority students from six SEEDS Campus Chapters in the Southwest; Arizona State University (our host), Northern Arizona University, University of Arizona, New Mexico State University, University of New Mexico, and Stanford University. Also with the group was Dr. Stefan Sommer, SEEDS Chapter Faculty Advisor from Northern Arizona University.

Field Trip participants had the opportunity to explore critical study areas managed by the CAP-LTER and its partners. When you think about Phoenix, AZ it's amazing to think that such as large city was established in the middle of the Sonoran desert. With an increasing urban population, the city of Phoenix has to go above in beyond to provide water resources for all of the area's residents and the CAP-LTER has been at the forefront of that research. This trip was designed to have our students think about the water issues affecting the Southwest US.

The SEEDS program would not have been able to complete this field trip without the help from Dr. Nancy Grimm, director of the CAP-LTER and Amalia Handler, PhD candidate at Arizona State University, also, we would also like to thank SEEDS Alumni and ASU graduates students; Jorge Ramos and Jessica Guo – without everyone's help this would not have been the amazing experience that it was for our students. Thanks!

In true SEEDS fashion, the report and experiences that you are about to read was written 100% by our students, please understand the different writing styles.

SEEDS Regional Field Trip Report from the students:

Team 1 (Thursday Night & Friday Morning): Josh Scholl, Ayla Martinez, Maria Eller and Annette Enriquez.

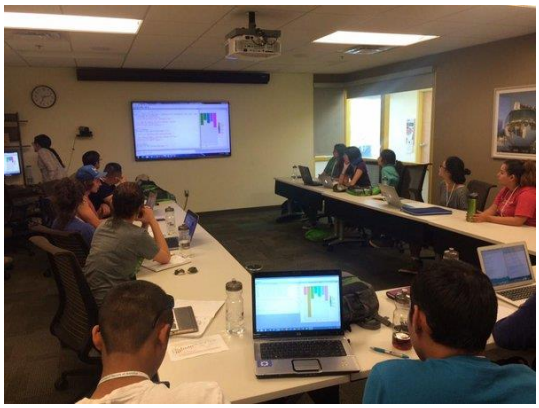
On Thursday night, SEEDlings congregated in the hotel lobby in search of Fred Abbott and to embark on their first mission. It was hot and Annette creepily smiled at guy in suit who she thought was Fred. The temperature in Phoenix was 85 degrees leading Ryan to confuse PEEDS with SEEDS and joining PEEDS, a pediatric group. We were initially acquainted awkwardly in the hotel lobby. Then we jumped in the vans and went to Wriggly hall on the ASU Tempe campus where we ate Chipotle.

After we were finished eating the delicious Chipotle meal, we had introductions after dinner. Human bingo was employed next to solidify the introductions. There is some question as to whether the bingo game was rigged, because the home team scientist (Nancy Grimm & Jorge Ramos) took home both awards! Once we settled down, Fred began the SEEDS presentations. He informed us of how extensive the SEEDS program is with its 91 chapters spread across the continental U.S., Puerto Rico, and Hawaii. Nancy introduced the Central Arizona-Phoenix Long-term Ecological Research (CAP LTER). CAP LTER is one of only two urban LTERs, the other being in Baltimore.

Friday morning, we rose with the sun, had breakfast, and left to our first field site for data extraction. The site we visited first was the Indian Bend Wash. CAP LTER site manager Dr. Stevan Earl introduced Indian Bend Wash as part of the Central Arizona Phoenix Water Management System. The three instruments we used were the LICOR apparatus to measure soil CO_2 respiration, the PMS pressure bomb to measure water potential, YSI probe to measure Dissolved oxygen, specific conductivity and temperature. We then employed these fancy devices to tackle cutting edge ecological questions; at Rio Salado at the Salt River too.

With the LICOR device, we determined that the carbon dioxide concentration (in ppm) is increased due to high temperature, microbial communities, distance from water, the amount of sunlight and shade, the presence and absence of vegetation and the species of the vegetation. With the PMS instrument, we were able to measure water potential in plants, by measuring how much pressure it takes to squeeze water out of a piece of leaf or stem. We took two trials of four trees and learned that there were several factors that affected the water potential. One of these factors was the plant's distance to water. We learned that the trees closer to water had a higher water potential. However, this changed depending on the time of day, because there tends to be higher water potential in the morning. Other factors included native versus invasive species and growth rate, in which greater growth rate caused higher water potential. The final piece of equipment was the glorious YSI probe, which allowed us to measure dissolved oxygen, temperature, and specific conductivity. Jorge was very adamant that we knew what that the difference between specific conductivity and conductivity was that specific conductivity corrected for changes in temperature. From testing different locations, we discovered that dissolved oxygen was affected by temperature, flow, and depth of water. In addition, the dissolved oxygen changed with the presence of vegetation and organisms. From an urban park to an accidental wetland adjacent to a highway, we explored, tested, and enjoyed the different aspects of water in the Phoenix area.

Team 2 (Friday afternoon): <u>Patricia Susanto</u>, Brian Lopez, Anna Mifsud and Jason Miranda.



After a long day of data collection at two CAP-LTER research sites, we went and had a delicious lunch at Engrained Cafe on ASU campus. The food was good and it was interesting to eat at a sustainable cafe on campus.
After lunch, Jessica Guo, a graduate student, taught us about data analysis. She showed us how to use the R program to input our results from the data collection we had taken earlier that day. The program was very challenging, especially for the students without any statistics/programming experience. However, it introduced an important part of research and showed that programming skills is a valuable skill for field work.

The next activity was the career panel and it was much more engaging for everybody. During the career panel, we heard from a variety of professionals in the environmental field who all shared their professional stories and paths they took to get to their careers.

"I like how the professionals all said how they took a break after their undergrad. I liked the different trajectories each panelist had and they highlighted the values found in writing, communication, reading, and math skills."

- Ana Mifsud (Stanford University)

Ron Trooper's talk on Tradition Ecological Knowledge followed…

"This was my highlight of the day because I did not really know anything about Traditional Ecology Knowledge and I found that I really valued its concepts. I liked how it bridged a new culture into ecology and brings up different point of views...very inspired by what Ron presented."

- Patricia Susanto (Arizona State University)

"It was very cool to hear Ron's talk especially since he was a professor from Harvard, which is a place where Westernized Science is taught highly and is highly regarded in the academic world."

- Ana Mifsud (Stanford University)

Following Ron's talk we had dinner then went on a social night hike.

"It was a nice hike with the full moon. It was good having it right after dinner and I liked how rugged it was and learned a good place to go hike. (Mormon Trail.) I will definitely have to go back because I liked the view."

- Brian Lopez (Arizona State University)

"The thing that I loved about this wonderful experience was the amount of hands-on work that we did on the field. I got to use some pretty expensive yet amazing 'gadgets.' Also, I liked all the places we got to see and analyze. It gave us the opportunity to explore and observe our surroundings and work on our critical thinking skills to figure out the fascinating things around us."

- Jason Miranda (Northern Arizona University)

Team 3 (Saturday Morning): <u>Samantha Fox</u>, Tamn Nguyen, Ryan Peraita and Kaden Walksnice.

The first stop was Lake Saguaro Reservoirs, one of the four reservoirs in the Salt River system. Nancy Grimm elaborated how important the reservoir was to the overall system. The manmade reservoir also carries non-native fish, trout. The system seems to be having a hard time keeping up with boat traffic and proper temperature for trout. Maybe a better solution could be narrowing their efforts to either recreation, hydroelectric power, or a new species of fish that would better suit the reservoir ecosystem (rather than all three).
Potential Q: What is the carrying capacity of the city of PHX under the current water system? And will the city be able to sustain itself if the population grows exponentially in the next ten years?

The second stop was Sycamore creek. The entry way to the creek and recreations area was heavily utilized with human recreational activity. We liked how we were using the non-invasive sampling by simply observing the environment, rather than hands on experimenting. While observing we saw quite a bit of pollution, such as trash and even a toilet seat in the river. We were able to observe nature and see people enjoying it, this was fun to see how the recreation area was able to show people how awesome nature can be. One thing our group thought would better the ecosystem would be to have more physical signs or a regulation of the heavy population. If heavy traffic of the area continues, the bank will continue to get wider by erosion and soon the different vegetation levels could change; what was the upland may become the new bank. The mesquite

bosque could eventually be the river's edge, and this could affect the area as a whole, including the ability of humans to have a place to observe and enjoy nature.

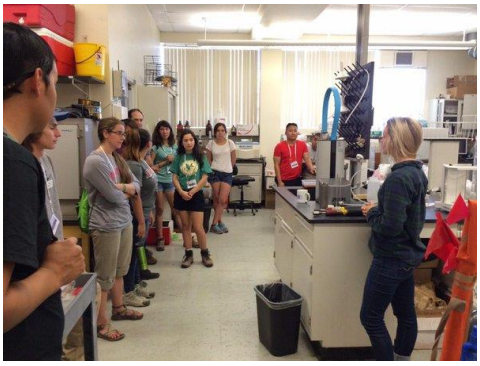
Our last stop for Saturday morning was to see a small part of the Salt River canal system. Due to time we did not get to fully understand the information that was stated and did not get to understand the overall description of the GMP of the canal. The process of how the Salt River connects to the canal was pretty interesting and complex. Nancy Grimm addressed: what are the consequences of taking water and putting it in AZ where there is natural a lot less water?

During our group collaboration, we discussed not only the ecological implications of the water issues of the Phoenix area, but also how these issue play into the socio-economic systems of water as a natural resource. What would be the cons. Of taking water from CO to AZ, potential Political battle, AZ to expanses and grows to rapidly. Promote growth in AZ because its cheap, cheap water for sale, water should not be that cheap in an area of server u since the early 1930s

Natural limited resource, what will happen if the pop X2 in the next ten year how will they bring water into the system?

Team 4 (Saturday Evening): <u>Mariah Ashley</u>, Emmett Tsosie, and Chelsey Trejo

Saturday afternoon consisted of touring life science research labs at Arizona State University. There existed a diversity of graduate students and research; this gave us insight into possible opportunities after graduation. The first lab we explored is run by Professor Sharon Hall. This lab is studying the relative amounts of nitrogen in urban soils using core sampling methods. Caitlin, a senior researcher in this lab, is specifically looking the effects of heavy metals in urban settings. Second, we toured the "Elser Lab" which is focused on phosphorus sustainability in fresh water bodies. They are also interested in trophic levels, specifically relating to nutrient availably in aquatic systems. Eutrophication is caused by high levels of nutrients in these systems which lead to abundance of algal blooms. Current research in this lab is looking at the affects algal blooms have on daphnia populations.



In John Sabo's lab, Robin, a graduate student, described her current work on amphibians. She is looking at the dynamic between bull frogs, an introduced species, and native frog species in the San Pedro River system. She is interested in studying the competition of tadpoles between said species, and how they influence this particular river system. Later, Amalia, a SEEDS MEMBER/GRADUATE STUDENT/AWESOME PERSON and our guide at ASU, invited us to her lab where she analyses water and soil samples from the Phoenix region to determine nitrogen concentration. She is "jazzed" about the nitrogen cycle and its importance in urban ecology. "Woo!" – Chelsey/Emmett/Mariah.

Last but not least, Jessica G., taught us the value of knowing how to fix and operate different field equipment. She uses statistical analysis (a great skill) in her work and emphasizes the importance of knowing how to use programs like "R". Overall, each grad student shared their unique experience at ASU and the paths that led them to where they are today. As undergrads, this was very helpful as we begin to explore potential career and grad school options.

After touring various ASU Life Sciences laboratories we were off to the rooftop greenhouse on the tenth floor of the Life Sciences bldg. As we took the elevator to the 7th floor, we were told that we would have to walk the rest of the 87 steps of stairs in this particular bldg. Once we arrived on the roof, we noticed (first the AMAZING ARIZONA SUNSET) then different types of trees and various plants that were present in the walkways. There were cubicles of greenhouse spaces that were for students that wanted to partake in a research project using one of these rooms. The only requirement was that the student must request a space on this rooftop greenhouse in advance, outlining what they were going to research, and the time span expected to complete the results or goals of a particular project. As we observed the rooms on this rooftop greenhouse there were various research projects that were being conducted.

"The next tour on the agenda after the rooftop greenhouse was the Tour of the Reptiles, LSA 1st Floor. For some particular reason I, [Emmett], was not particularly interested in such, because as in indigenous person, a Navajo, I do not particularly like to look at reptiles, specifically snakes. The first observation was using one of my five senses, my sense of smell. As I entered this building I could smell the snakes. In my Navajo tradition we as a people are not supposed to capture, bother, or kill such creatures. It is considered or seen as taboo, which we are thought as a young person not to look at such, especially a snake ingesting its prey. Such a thing can begin to bother our throat and larynx area. Also, this will begin to inhibit our breathing in some way or another in the future. Another area of concern was the taking of pictures of snakes, which we as Navajos should not be doing. As I walked further down the hallway in this building I noticed different types of frogs and fish in jars that were preserved like pickles. In another showcase there were different types of birds, locust, and butterflies. In the last showcase there were skeletons of lizards and birds. There was a lesson on sacred traditional knowledge and in the Navajo perspective, we are taught to have respect for all living things, insect or creature. However, the scientific community would not be as far as it is if it wasn't so "dissecting". How do we balance this scared traditional knowledge with current science trends? Ecology and the ideas of sacred traditional knowledge, in our perspective share many of the same core values. Such as an admiration for nature and the pursuit of natural knowledge. When we tie western and scientific worlds, we can create a more sustainable future, but first we need to bridge the gap."

- Emmett Tsosie (Northern Arizona University)