The Ecological Society of America's SEEDS Program

SEEDS Field Trip

Jornada Basin LTER Site, New Mexico

October 6th-9th, 2011

Contents

Introduction

The 2011 SEEDS Fall Field Trip took place from October 6 – 9, 2011 in south central New Mexico at the Jornada Experimental Range LTER. The SEEDS program supported 22 undergraduate students from 18 colleges and universities to participate in the fall field trip. The field trip theme was "making science accessible and relevant to society". The group learned about the unique history of the Jornada LTER with both academic and government interests, which makes the focus of their research applied and connective in nature, informing global arid land management. An agenda of the field trip can be found in Appendix A. The complete list of field trip participants, including mentors and volunteers can be found in Appendix B.

Students prepared for the field trip by doing the background readings and getting to know one another on the SEEDSNet Jornada "group" http://esaseeds.ning.com/group/jornadafieldtripgroup. During the field trip, students worked in one of four groups to prepare a written summary and presentation of the portion of the field trip to which they were assigned. These summaries were combined to create the field trip report, found below.

Unique aspects of this field trip included an exposure to a wide variety of types of institutions (academic, federal agency, nonprofit organization), the housing accommodations in our luxury "tent city", the hospitality of our hosts including the home cooked meals, and the hands on experience with heavy equipment. The field trip was a great success, as indicated in the group energy during the field trip, and in the follow up evaluations, found in Appendix C.

Group 1: Jornada History
Leiloni Begaye (leader), Landon Collins, Victor de Jesus-Reyes, Monica Erviti, Michael Hanft, Ezra Mutai

We headed out after out orientation to the Jornada site in two vans on sandy roads. Our first stop was at an ancient river bed. There we caught sight of our first oryx, the African antelope that was introduced to southern New Mexico a long time ago. From the presentation of Dr. Kris Havstad we created a timeline including the following important dates and events:

- 1.5 million years ago – Rio Grande deposits pumice rocks in the sediment of the future Jornada basin Long Term Ecological Research (LTER).
- 3000 years ago – Jornada Mogian found villages near the Jornada Basin LTER site.
- 1493 – Columbus brings livestock to America on his second voyage.
- 1500's – Spanish Settlers bring livestock to southwest
- Early 1600's – Spanish settlers trade cattle and horses with Native Americans

- 1620's – First reports of overgrazing in southwest
- 1880's – Detroit and Rio Grande Livestock Company has 20000 heads of cattle and horses
- Late 1800's – Railroads increase cattle trade throughout the US
- 1888 – First vegetation map of the Jornada del Muerto shows both grass/shrub species
- 1890's – Drought causes cattle business to bust in southwest
- 1912 – Jornada LTWE founded as part of the USDA (five months after NM statehood)
- 1915 – 2nd Vegetation Map shows 50% grasses and 50% shrubs
- 1950's – Drought drives shrub encroachment
- 1987 – Kris Havstad starts working at Jornada Basin LTER
- 1998 – Most recent vegetation map shows 8% grasses
- 2011 – ESA SEEDS field trip visits Jornada Basin LTER

Next, we had a talk from Dr. Curtis Monger, an expert in pedology. He had three main sections of his talk, using the soil profile to illustrate these points.

1.) Soil is a substrate providing nutrients and water to the plants. Although the soil composition is relatively similar throughout the basin, there is negative heterogeneity because of differences in topography. These differences change the amount of water/wind certain areas receive, creating microclimates that impact vegetative makeup.

2.) Secondly is soil memory which can remember things by erosion, the soil profile is 1.5 million years old. Also this profile has many layers that date back to the ice age over 20,000 years ago. Along the historic river, mammal fossils were discovered as well.

3.) The third and the final soil factor Dr. Monger talked about was carbon. He demonstrated the production of carbon dioxide gas by reacting Hcl with causic rock i.e. calcium carbonate which produces carbon dioxide gas as one of the products. Microorganisms play an important role in combining calcium carbonate plants is one of the sources of carbon. There is more carbon in organic matter as compared to other carbon sources.

Group 2: Debra Peter's Presentation and Career Panel

Ashley DeLeon (leader), James Hunt, Aleah Henderson, Victoria Kahle, Abigal Johnson, Jason Harris,

Intro:

During the 2nd session of Fri Oct. 7 Debra Peters (credentials – USDA etc) who has a research position with the USDA and is an administration figure for the Jornada Basin LTER spoke to us about the vegetation history and expanded upon the desertification process on the Jornada Basin. After lunch in the amphitheatre, located in the Chihuahuan Desert Nature Park, a career panel composed of SEEDS representative Joey Johnson, New Mexico State University professor Heather Throop, SEEDS alumni and second year graduate student at NMSU Brenda Nieto, non-profit director Dr. Stephanie Bestelmeyar, and the aforementioned Debra Peters shared with us their experiences and advice regarding our aspired careers in ecology.

I:

Debra Peters began the session by discussing the general location in which we were in. The grassland plot in which were located desigrated the Donna Anna Mountains to the Southwest, the Rio Grande River to the west, Oregon Mountains to the South, the Franklin Mountains to the West. Peters mentioned that the first vegetation map occurred in 1858 at which point the desert was dominated by grasses. In comparison, Peters talked about the vegetation presently; Black gramma, sporabola, aristida, and mesquite plaint life. The second map was formed in 1915 where the desert was half shrub could be described as half shrub and half grass. However, in 1998 imagery was used to remap the Jornada Basin and the desert was 8% grassland. For further understanding of the arid location, it was clarified that the shrub dominant shift began 1915, which was catalyzed by the 1950 drought. However, in order to initiate grass restoration the climate would have to abide by certain conditions: 3-5 consecutive wet years. In addition, it is possible that to reach a point where grasses cannot be restored due to respective environmental conditions and ecological processes. Conclusively, Peters ended her discussion with it is important to understand small scale processes so that these concepts can be applied to large scale ecosystems.

II:

A large scale ecosystem, for example, can be the mountains in which the amphitheatre was located. The event that took place within the amphitheatre was the career panel, which was in the structure of a question and answer session. The first question, asked by Victor, was “Describe what you do, how you got there, and what your favorite part of what you do is.” The panelists discussed how they all uniformly expanded their horizons, got involved with various organizations and events, which led them to find their true ecology-related passion. The second question inquired about the skills required for an ecology-related position. The panelists all agreed that networking, effective communication, patience, enthusiasm and diligence were all quintessential attributes and skills to further a career in ecology. The third question asked about any advice to inspire students wishing to pursue a career in ecology. The panelists agreed to starting early, having multiple strengths, to be open to partake in a diverse range of internships and jobs so as to be a well rounded and competitive individual, and to persevere with what you want to do. The fourth question was “How can ecology contribute to make a positive change in the world?” The panelists expounded upon obtaining a better understanding of how the world works through research so as to influence policy, but most importantly expanding outreach and education programs so as to influence the younger generation and construct knowledge of environmental conservation because ultimately they are the future. The fifth question related to the hope for the future of ecology. The panelists agreed upon a better understanding of the world so as to advance ecology, making general citizens aware of ecology so as to influence policy and increase finding, and the restoring the intimate connections and relationships with nature instead of technology with people. Then, the panel had an open discussion and students asked questions relating to graduate school.

Conclusion:

Overall a plethora of information regarding ecology was ascertained by us, the SEEDS students, which is invaluable and will be used to further each of our careers. In addition, we must remember that apart from being scientists we are also citizens of the world, and as citizens we must remember that a “modern society will find no solution to the ecological problem unless it talks a serious look at its lifestyles” - Pope John Paul II.

Group 3: Asombro Institute for Science Education

Joey Johnson (leader), Stacy Ortego, Danielle Perryman, Arjun Potter, Joshua Scholl and Brittany Stallworth

After a scrumptious meal amongst the shadows of mountains that make up the Chihuahuan Desert Nature Park, Dr. Stephanie Bestelmeyer introduced SEEDlings to the Asombro Institute for Science and Education. "Asombro means wonder in Spanish," announced Dr. Bestelmeyer passionately, "and at the Asombro Institute we do our best to expose K-12 students to hands on experiences of theoretical concepts."

The Asombro Institute is a non-profit organization dedicated to environmental science education. About 3,000 K-12 students frequent educational programs and field trips organized and executed by the "Wonder" Institute every year! These outreach events provide students with insight to contemporary ecological research being conducted on large scales at the Jornada Basis Long Term Ecological Research Site and re-produced in the Chihuahuan Desert Nature Park by the Asombro team. In addition, the Institute entertains their participants with unique ecology research experiments and small field work stations such as their phenology station. Here participants are provided with a detailed perspective of plant physiology and important physical characteristics that plants transition through as season pass. Students also participate in data collection, which in the case of the phenology station, is related to the national phenology network. This network uses data collected from numerous locations across the nation to assess trends and make important predictions and suggestions to promote environmental sustainability and habitat conservation.

Funding for Asombro's numerous educational incentives comes from multidisciplinary grants written by the non-profit's dedicated staff. Currently, the Asombro Institute is operating under the support of some 17 grants ranging from small 300 dollar grants to a prestigious $125,000 NSF grant received in partnership with the Jornada Basin LTER. Of course, with a lot of grants comes a great amount of responsibility and paperwork. Consequently, leading staff members of the non-profit organization find themselves spending a significant amount of their time writing reports and applying for additional funding to keep the positive momentum flowing. Nevertheless, all staff does find the time to enjoy the perks of their native desert environments and relish illuminating light bulbs in the minds of the next generation.

Finally, the Asombro Institute is fortunate to have access to a magnificent geographic locale and they are exemplary in their use of it. Their site has a conservation easement on it and the Institute has been given governmental permission to employ and promote it as a perceptual living classroom.

From the diverse desert plants to colorful reptiles, birds, bugs, and mammals, the Chihuahuan Desert Nature Park offers a phenomenal setting for environmental science education. Furthermore, the Asombro Institute for Science and Education is a stellar role model for SEEDS clubs around the nation dedicated to similar goals and composed of equally passionate ecologists.

Poem/Rap:

Listen up y'all
Cause this is it
The beat that we're banging
Is Asombrolicious

Through their science education
Asombro reaches out to the nation
It connects kids with the wild
to tease out a smile

Now to fund their activities
and conserve their natural masterpiece
there's Doctor Bestelmeyer
a talented grant writer
who together with her team
brings in the green

And yes their site is worth gold
with species that are bold
from the praying mantis
to funny lizard antics

The site is full of opportunity
(or children to experience ecology)
from experimental plots
that manipulate water flow
to riveting rocks
that make students' eyes glow

Group Four: Goodbye Jornada Basin, LTER and White Sands Monument

Natalia B. López (leader), Erin E. O'Brien, Michelle A. Nelson, Alisha Woodson

It was a very sad morning at the Jornada Experimental Range because it was time to break camp and continue on with our activities of the day. After the delicious breakfast made by the Jornada crew, everyone took turns to add a line to what would be the Jornada Basin Thank You Poem. It turned out great and the Jornada crew liked it, Khris added a line to the poem which made it even more special. We left the cold desert and went on a two hour (approximately) drive to the White Sands Monument, New Mexico. During the bus ride Brittany showed us the game "Sha-boo-yah role call" and it was very fun and dynamic.

When we arrived to the White Sands Monument at the Tularosa Basin, we went to the administration office to learn about managing dunes and the different experiments that are taking place given by Hilda Raiser and John Meyer. John Meyer taught us the composition of the sand at

the desert, which is gypsum rock, $Ca_2SO_4 \cdot 2H_2O$. Its elevation is about 1,200 meters, the park is about 275 square miles, 40% more or less of the field; precipitation is about 10 inches per year. The White Sands Monument dunes are the largest gypsum dunes in the world, with 45 to 50 feet tall dunes that travel 12 to 15 feet by wind or avalanche. It is located the due that is an evaporative area.

Hildy Reiser talked to us about the work she does at White Sands, and how and why she collects data on the sand dunes. She told us the different kinds of vital signs collected on the dunes, such as movement, meteorology, soil hydrology and dune reformation. The White Sands researchers use techniques such as LiDAR to map the dunes which they then share with other research groups around the world - like good scientists! White Sands are located in the Tularosa Basin between the Sacramento and San Andres mountains. The lowest point in white sands is Lake Lacero, which used to be Lake Otero, which covered the entire basin. White Sands covers 300 square miles.

The dunes are stabilized by the water table, which lies only 1 to 2 feet below the surface. The dunes wick up the moisture are held in place this way. There are over 25 species of plants and animals unique to White Sands which have gone through rapid evolution. Many species of insects and smaller animals show a white color morph. Fourteen new species of moth have been identified outside the visitor's center in the last three years alone!

After the orientations we went dune sliding! We took advice from a wise young child who was also visiting the basin and he taught us how to slide. To dune slide one must wax its sled so you can build up speed, sit on the sled and away you go! We think that the group enjoyed that the most.



Appendix A - ESA SEEDS Field Trip Itinerary

Jornada Basin LTER

"Making science accessible and relevant to society"

October 6th – 9th, 2011

http://jornada.nmsu.edu/

Field Trip Goals:

1. To highlight the **unique integration of researchers** from a government agency (US Department of Agriculture) and academic institution (New Mexico State University) in the name of long term ecological research that is highly applicable to societal issues, namely arid land management.
2. To highlight the multi-scale research at the Jornada that requires the synthesis and **integration of projects**, disciplines, and scales so that the research can be applied not only in the American Southwest, but also to arid lands around the globe.
3. To help students further **build a network** of students and professionals in the ecological sciences.
4. To provide students with an **on-site opportunity** to learn more about ecology research and its application, and potential careers in the field. An opportunity that we expect students will share with students from their own campuses.

Thursday Oct. 6: Arrival

6:00p.m.	Arrival to Jornada LTER
7:00 p.m.	Welcome Dinner *(Campfire)*
8:00 p.m.	Welcome and Orientation: Debra Peters and Kris Havstad (USDA, Jornada LTER) and SEEDS staff

Friday Oct. 7: Jornada Basin LTER

7:30 a.m.	Breakfast and pack lunches (*Jornada HQ kitchen)*
8:30 a.m.	The historical legacy of Jornada Basin USDA and LTER – Kris Havstad
9:30am	Multiple Stressors Site project. Desert soils and below ground systems – Kris Havstad and Curtis Monger
10:30 a.m.	Integrated basic and applied research across spatial and temporal scales in arid lands – Debra Peters
12:00 p.m.	Lunch and Career Panel discussion: (*Jornada Amphitheater*)
2:00 p.m.	The Chihuahuan Desert Nature Park: Environmental Science Education – Stephanie Bestelmeyer (Asombro Institute for Science and Education)
5:00p.m.	Student journal writing
6:00 p.m.	Dinner (Ranch style BBQ)

Saturday Oct. 8: White Sands National Monument

7:30 a.m.	Break down campsite *(shuttle group 2)*
8:00 a.m.	Breakfast and pack lunches (*Jornada HQ kitchen)*
9:30 a.m.	NPS White Sands National Monument: Managing the Dunes – Hildy Reiser
10:00 a.m.	Dune Sliding, lunch on own
1:30 p.m.	Depart for El Paso, TX
3:30 p.m.	Hotel Check-in
4:30 p.m.	Student journaling groups meet
6:00 p.m.	Dinner

7:30 p.m. Group presentations
Journal writing report summaries; Evaluation; Wrap up

Sunday Oct. 9: Departure

5:30 a.m. Breakfast
6:00 a.m. Departures; Transport to El Paso, TX airport

APPENDIX B – Field trip participants

SEEDS Field Trip ♦ Jornada Basin LTER
October 6 - 9, 2011 ♦ Las Cruses, New Mexico

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