

Websites

2008 Earth Day E-Packets

Don't forget to sign up for your free 2008 Earth Day E-Packet! This year's packet is focused on Climate Change Educational Resources. The Electronic Packet will feature the best of climate literacy and climate change on-line educational resources. The E-Packet is great for teachers, community leaders, non-profits and parents! If you signed up for an E-Packet last year, no need to sign up again, you will automatically receive one each year! You will receive your E-Packet in early April. Sign up at:

<http://www.epa.gov/region8/ee/epacketform.html>

EE-Link

EE-Link, by far the most extensive EE site on the internet, offers links to a huge range of resources for EE professionals, classroom teachers, and the public, including grant opportunities, job listings, resource materials, information about the environment, etc.

<http://eelink.net/pages/EE-Link+Introduction>

Climate Classroom

National Wildlife Federation's new Climate Classroom website. This website is designed to help parents and teachers talk to students of differing ages about global warming. Its features include guidelines for parents, proposed new national global warming educator guidelines, age-adapted sources of useful curricula, a downloadable slide presentation for kids, presenter's guide, and more. For more information visit:

<http://www.ClimateClassroom.org>

Green.org

Earth Force is proud to announce that we have launched a new website called Green.org. GREEN.org is designed to help educators and young people make lasting improvements to your watershed by offering an online monitoring database and community action tool.

<http://www.green.org>

Bioregional Outdoor Education Project

A program of the Four Corners School

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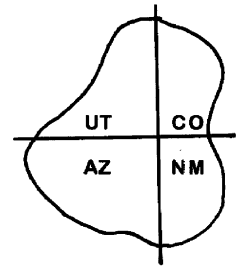
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LESSONS FROM THE BIOREGION

Newsletter of the Bioregional Outdoor Education Project

A Program of the Four Corners School of Outdoor Education

The Colorado Plateau:



Our Bioregion

Volume 9, Number 3 Spring 2008

A Sense of the Southwest

By: Dr. Steven Semken, School of Earth and Space Exploration, Arizona State University

At ASU I developed and teach a course called *Situating Earth and Space Sciences (SESS) in the Southwest*: an introduction to place-based, culturally-infused, science content, and teaching methods for in-service teachers. One of the most enjoyable things about this course is that it is open to teachers from any grade level and any subject. The only prerequisites are a sincere interest in Arizona and the Southwest United States; the intent to learn the content and methods taught in the course and to find ways to apply these to one's own teaching; and a willingness to share any prior knowledge of or interesting experiences in Southwest places.

Here I present the lesson plan for the first session of the course, in which the participating teachers encounter the idea of "place," the basic geography and elements of natural landscapes in the Southwest, and the important scientific concept of Earth systems.

There are two "textbooks" for SESS, *Exploring Geology* (Reynolds et al., 2008) and *The Southwest Inside Out* (Wiewandt & Wilks, 2004). These terrific books serve mostly for follow-up reading after each lesson. If any of the terms used in this lesson plan are unfamiliar to the reader, their explanations can be found in these books. SESS students also make use of many other sources, online and in print, some of which are referenced at the end of this essay.

All of the lessons in SESS are organized according to a modified version of the *5E instructional model* (Bybee et al., 2006), which teaches science as inquiry through a five-step cycle: Engage, Explore, Explain, Elaborate, and Evaluate. The most important point about 5E, which modeled on the ways that scientists actually do science, is that *student exploration of a concept should always precede a teacher's explanations of it*. The lesson presented here follows 5E, although the Evaluate stage is delayed until the end.

(Continued on page 2)

Why This Newsletter?

You may be wondering why you have received this free copy of **Lessons From The Bioregion**. This newsletter is part of the overall **Bioregional Outdoor Education Project**, which is focusing on **Our Bioregion: The Colorado Plateau**. FCS launched the Bioregional Outdoor Education Project (BOEP) in April, 1999 with a mission:

"To promote understanding and appreciation of the Colorado Plateau through core-based, interdisciplinary, experiential curricula in grades K-8 through a Roving Teacher Education and Mentoring delivery system."

This newsletter is published three times per year (Fall, Winter, and Spring) to keep all elementary schools on the Plateau informed about the BOEP. You can find back issues on the Web at www.boep.org, and more information about the project.

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About the Bioregional Outdoor Education Project

Our Mission

“To promote understanding and appreciation of the Colorado Plateau through core-based, interdisciplinary, experiential curricula in grades K-8 through a Roving Teacher Education and Mentoring delivery system.”

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A Sense continued from page 1

Let's begin the lesson here. Keep in mind that SESS is a university course aimed at practicing teachers; each teacher takes and modifies whatever content and methods he or she can use to suit his or her own grade level, subject, and students. This lesson required about 2.5 hours of class time (including occasional breaks) to complete.

A Sense of the Southwest

Engage:

The instructor asks: *What is the Southwest? How can we describe or portray it meaningfully but concisely?*

Explore:

Each teacher takes a blank sheet of paper and portrays “The Southwest” (the phrase is not given further elaboration) as a *concept sketch*, which is a simple sketch that is also annotated with labels that identify features, processes, interrelationships, and concepts (Johnson & Reynolds, 2005). The concept sketch can be of any form that the teacher wishes: a map, an aerial view, a montage of images, etc. It need not be artistic or precise, but the teacher should give some thought about what things he or she considers to be characteristic of “The Southwest,” and put all of these things into the sketch, with labels identifying them. This exploration is intended also to serve as an icebreaker activity.

The instructor gives the class about 15 minutes to complete the concept sketches, then asks each person to present and explain his or her sketch to the class. As we view them, we can consider and briefly discuss:

- *Where* we have located “The Southwest,”
- *What* things we chose to define and characterize it, and
- *How* we might synthesize these things into a meaningful, useful, but concise description of “The Southwest.” It may be useful to make a list of these things on a whiteboard or notepad.

Explain:

The instructor proposes a description.

- *We'll consider “the Southwest” to be comprised of the interior southwestern region of the United States, and adjoining areas of Mexico.* (Obviously, the landscape does not change abruptly at the national border!) See **Figure 1**.
- *The Southwest is a natural region built of physical and biological features such as mountains, mesas, streams, deserts, grasslands, forests....* (If you have some nice landscape images to show to the class, by all means do!)
- *...and the Southwest is also a cultural region built of places, which are localities imbued with meaning by human experiences in them.* See **Figures 2 and 3**, which compare places known to and named by two different Southwestern cultures: indigenous and modern.

Our approach to the study of Earth and space science in this course is *place-based*: as we explore natural landscapes, we will also pay attention to the cultural meanings and significance of the *places* in these landscapes.

(Continued on page 7)

2008 BOEP Conference Summary

Celebrating the Colorado Plateau: Tracing Our Connections

was our 8th annual conference, held on February 29 – March 2, 2008. It attracted 75 educators from around the Colorado Plateau, and even one from New Hampshire. During the weekend participants could choose from 30 presentations hosted by 35 presenters. The weekend kicked off with a pre-conference workshop Friday on integrating writing with science, presented in conjunction with the Bisti Writing Project and a grant from the New Mexico Department of Public Education. Friday evening was the official beginning with a Share Fair of 10 exhibitors from around the Plateau, followed by an amazing evening with author Craig Childs, who quickly drew us into his amazing world of exploring the Colorado Plateau!

The next morning kicked off bright and early with concurrent sessions featuring *Seasons and Moon Phases* with Clark Planetarium, *Navajo Stick Game* with current BOEP teacher Olson Juan, and *Grand Canyon Rocks!* with staff from Grand Canyon National Park.

After lunch, which many folks ate outside as it turned into a gorgeous spring afternoon, a group of conference participants headed over to the Edge of the Cedars Museum for their session *Living with the Land*. This was the first year the Museum has been able to participate and from the reviews of the session, it was worth the wait. We hope to have them back next year again. Also, during the afternoon, participants got the chance to build and fly a kite with former BOEP teacher Steve Lasslo. Sticking with the crafty theme, many participants walked away with a ton of books they could make with their students using techniques of current BOEP teacher Rosie Boone's *Handmade Books*. In case people were feeling lost at this point Dave Meyers from the Farmington Museum did his ever-popular *Basic GPS and Geocaching* workshop, and the booty was found!



At Edge of the Cedars S.P. and Museum



Saturday evening wrapped up with the film *The Snowbowl Effect*, about the controversial plan to use reclaimed water to make snow for the Arizona Snowbowl ski area just outside Flagstaff, AZ in the San Francisco Peaks. The idea of showing this movie was to spawn a discussion of how to bring current issues into the classroom, and discussion it did spawn!

Sunday morning kicked off with concurrent sessions highlighted by BOEP teacher Joan Cooley's *Herbal Medicine* workshop, which drew a standing room only crowd and a very practical workshop entitled *Parent Involvement Through Educational Field Experiences* with Raymond Romero who was new to BOEP, but we hope to be working with him and his school in the future. Finally, we went back to the theme of current issues with an activity-based *Effects of Global Warming on the Colorado Plateau* workshop hosted by two current BOEP teachers Phyllis Oldman and Wanda Deswood.

A BIG THANK YOU goes out to all the presenters who really make for a great conference with all the hard work and preparation they put into their workshops!

Some preliminary results for the evaluations received back from participants showed the following: (Scores are based on a Liekert Scale with 1 being low and 5 being the highest, with 44 evaluations being returned)

I feel renewed energy toward teaching because of participating in the conference. **4.6**

I feel more confident about teaching about the Colorado Plateau because of my experience at the conference. **4.5**

I enjoyed the interdisciplinary approach of this conference. **4.7**

I have a better understanding of Place-based education because of this conference **4.5**

This conference was valuable to me as an educator **4.7**

The average response for all sessions to the question “*I learned new things from this session that I can apply to my teaching*” was **4.5**, with a 3.8 being the lowest score and 5 being the highest.

Next year's BOEP Annual Conference will be held March 6 – 8, 2009 and is open to ALL educators on the Colorado Plateau. You don't have to be a participating teacher or past teacher to attend this conference, which has become the premier place-based conference on and about the Colorado Plateau. 🍏

A Sense continued from page 10

8. Explain why Earth scientists have found it useful to model Earth as a global system of geosphere, atmosphere, hydrosphere, and biosphere.
9. Distinguish the Basin and Range, Transition Zone, Colorado Plateau, and Southern Rocky Mountains on any relief map or synoptic image of the Southwest region.
10. Sketch profiles showing how topography changes as one traverses the Southwest.
11. Match examples of familiar Southwest landscapes (such as the National Parks in the region) to the specific physiographic provinces in which they are located.
12. Summarize the major types of ecosystems that occur in the Southwest, and account for their patterns of occurrence across the region.
13. Broadly characterize and compare the four physiographic provinces of the Southwest by their topography, climate, hydrology, and ecology.

Note: Full-color, higher-resolution versions of all of the Figures in this article can be downloaded for free at <http://semken.asu.edu/boep0803.html>.

About the Author

Dr. Steven Semken is an assistant professor in the School of Earth and Space Exploration at Arizona State University, and a member of the BOEP Advisory Board. He is an ethnogeologist and geoscience education researcher who works at the intersection of Earth science, cognitive science, and geography. His research and teaching interests are situated in the naturally and culturally diverse places of the Southwest United States. His e-mail is semken@asu.edu.

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News From The Education Director

By Jon Orris, BOEP Program Manager

Upon my return from my annual migration to Death Valley the snow has finally begun to melt, so spring is arriving on the Colorado Plateau! Spring is a time of contrasts within the natural world—it is the time of new or rebirth, the greening, and emergence—whereas within most schools spring signals the end of the school year, testing, and anticipation of vacation.

This year the snowshoes got a good workout mostly in Utah and Colorado, but they did venture south into New Mexico for some fun in the New Mexico snow. The BOEP snowshoes are available for teachers to borrow during the winter to use with your classes. Just contact the main office to reserve your dates.

This year's conference entitled, [Celebrating the Colorado Plateau – Tracing Our Connections](#), was once again a success. While this year's attendance was down a bit, it still was more than expected considering BOEP is only working with 20 teachers in three states due to funding, down from last year of 44 teachers in four states. Plans for next year's conference, which will be held March 6-8, 2009, have already begun, as we will be again returning to the Blanding Campus of the College of Eastern Utah. More about the conference can be found elsewhere in this newsletter.

Participating BOEP teachers are going to be conducting the second Draw & Write activity with their students in the coming month. BOEP is conducting this research as part of our work on Learning Progressions. The Draw & Write is also an excellent tool to use as a way to gather information from your students in a pre and post situation, or as an evaluation tool. Please refer back to Dr. Rebecca Monhardt's article in the Fall 2007 issue of this newsletter for more information (can be found on the BOEP website at www.boep.org).

Now that the snow has begun to melt and the days are getting warmer, its time to make that commitment to get your students outdoors into nature's classroom here on this amazing place we call home. We sometimes take our own backyard for granted and often assume we know most everything about it, but that often is not the case. There is always a lot for us to learn. So get your students out there, but be prepared and help prepare your students for situations that might arise when they might be out exploring our place in the future! 🍏

Grants

The NEA Foundation

<http://www.neafoundation.org/grants.htm> supports a variety of efforts by teachers, education support professionals, and higher education faculty and staff to improve student learning in the nation's public schools, colleges, and universities.

Learning & Leadership Grants: provide opportunities for teachers, education support professionals, and higher education faculty and staff to engage in high-quality professional development and lead their colleagues in professional growth. The grant amount is \$2,000 for individuals and \$5,000 for groups engaged in collegial study. The next application deadline is **June 6, 2008**.

Student Achievement Grants: provide \$5,000 to improve the academic achievement of students by engaging in critical thinking and problem solving that deepen knowledge of standards-based subject matter. The work should also improve students' habits of inquiry, self-directed learning, and critical reflection. (These grants replace the Foundation's Innovation Grants program, which has been discontinued.) The next application deadline is **June 6, 2008**.

Nominate a Young Environmental Leader for a \$2000 Barron Prize. Nomination Deadline: April 30, 2008

The Gloria Barron Prize for Young Heroes seeks nominations for its 2008 awards. The Barron Prize honors young people (ages 8-18) who have made a significant positive difference to people and our planet. Each year, 10 national winners each receive \$2,000 to support their service work or higher education. Half of each year's winners are chosen for their work to protect the environment. <http://www.barronprize.org/>

The Partners for Fish and Wildlife Program (Partners) is run by US Fish and Wildlife scientists. Partners is a voluntary partnership program that provides technical and financial assistance to non-Federal landowners and schools to improve fish and wildlife habitat. Partners funding for schools can provide essential start up money (\$5,000) for educational programming designed to get students outdoors and to improve wildlife habitat (whether on school property or nearby natural areas). For more information visit: http://www.fws.gov/southwest/es/NewMexico/PFW_home.cfm

News From Participating Schools

Outdoor Education at Wingate Elementary School

By Barbara Yazzie

During the week of January 13, 2008, our three 3rd grade classes completed an experiential science learning activity entitled, "Writing Wild". Facilitated by 3rd grade BOEP Science teacher, Barbara Yazzie, our students were allowed to venture outdoors for a unique place-based lesson based on BOEP methodologies.

Instructions to the students were to apply their observational skills through their five senses to complete a science – poetry/ writing assignment. Prior to the introduction of the lesson, education technician, Mrs. Idella Kyasyousie had designated six stations with clipboards for the students. The wintry setting allowed the students to appreciate nature in our part of the world (i.e. the Colorado Plateau). Our students pondered over what type of animal footprints were made, how the winter water cycle was evident in its frozen state as ice, marveling over the sparkling glitter of snow drifts, and how dormant deciduous trees compared to a dried out evergreen trees.

Students were allowed to explore the winter wonderland with their peers. They yelled with excitement over a discovery they made together. The kinesthetic learning styles of the students were met as students moved from station to station. The handy clipboards at the stations were used by the students to write any and all phrases using descriptive language about nature's appearance. With this lesson there were no right or wrong answers. As a result, our students thoroughly enjoyed outdoor education. Discipline problems were fewer because there were no desks to sit still in and no rules on being quiet. This interdisciplinary approach to teaching science and language arts resulted in a poetic explosion of student free-form writing. Here are a few creative sampling of the outcome:

Snow Drifts

*Snow Drifts,
Look like little hills,
Balls on the snow,
Big, large, small sizes,
Little, tiny sizes,
Some thick ice,
So glittery,
Snow Drifts
Looks like frosting.*



Students working on their Writing Wild assignment

Icy Patch

*Smooth and slippery,
Clear but cracked,
Cold,
Frozen,
Very slippery,
sliding on the ice,
Millions of bubbles
Can crack easily,
Icy patch on sidewalk.*

You may visit the BOEP website to find other science lesson plans to fit your students' needs. That is, if you DARE to leave your classroom for the great American outdoors (true to the mission of BOEP). 🍏

Round Rock BOEP Echo

By Joan Cooley

This year the fifth graders had the chance to learn a little differently by using more hands-on, place-based, lessons in their curriculum thanks to my participation in the BOEP program. During the year we did many activities and I will list just a few of them. We started the year with the class picking a cottonwood tree that we would observe periodically throughout the year. When we started school the tree was fully leafed out in green, but as the days shortened and grew cooler, the leaves began to change color and fall off. During the winter the tree appeared to "sleep", but as spring began we are starting to see buds on the branches.

(News continued on page 5)

Colorado Corner continued from page 6

Rosie also presented at the annual conference on Book Making, which was a huge hit. Teachers in her session walked away with numerous examples of books they can make with their students.

Up in Silverton at the **Silverton School, Paul Joyce** was continuing his water unit with his middle and high School students, doing activities about western water law and population growth. His Middle School students were busy working on their science fair projects.

On March 20 I got to visit and help a former BOEP teacher, **Dominic Schiavone at Escalante Middle School in Durango**, run a snowshoe trip for 60 seventh graders from his school. We made the trip up to Andrews Lake at almost 11,000 ft, where the students participated in building a snow shelter, and using avalanche beacons, tracking, and finding mouse-micro-habitats. It was fun to see all the students out enjoying activities from BOEP teachers.

We are looking forward to the spring so we can spend more time outdoors and enjoy the wonderful Colorado Plateau! 🍏

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So farming and STAR School is what I have decided will be our next endeavor outside. I have shown them what could be, through the pictures, now we will begin to see what it takes to be a successful farmer. Our next trip will be to my village of Hotevilla, which is well known for its terrace gardens. In Hopi culture usually the men are responsible for tending and working the fields, but at Hotevilla we are unique in that the women also have gardens that they tend to. The location of the gardens is on the side of the mesa just below a natural spring called Hotevilla, which is where the village gets its name. We will be living up to our name STAR because what we will be doing is cleaning up the gardens for the elder women of the village for spring planting. Most of what gets planted down there are crops that need a lot of water, so usually it is not traditional crops, but things like chili, amaranth, cucumbers, mint, etc. We

Workshops

Project Archaeology Teacher Workshop. June 9-10, 2008, 8:30am-5:00pm. Colorado History Museum, Denver. One graduate credit through Utah State Univ. Registration deadline: June 1. Practice the basics of scientific inquiry using authentic archaeological data. Your students will apply archaeological concepts as they investigate a Ute Rockshelter using primary data sources such as maps, artifact illustrations, historic photographs, and oral histories. Use the curriculum to fulfill many core requirements in social studies, science, mathematics, language arts, and art, while your students are discovering archaeology and history through engaging hands-on activities. Designed for upper elementary teachers. Receive full instruction in archaeological science for the classroom and complete

New Mexico Corner continued from page 11

Lake Valley Navajo School is a great school. **Juanita Becenti's** students are doing great things in language arts using BOEP. They made a REAL-e book called *It's "Snow" Secret* using pictures and poems of winter scenes. Juanita noticed how many of the testing questions correlated with what they have learned across the curriculum this year using the philosophy of bioregional outdoor education. She is sure their test scores will be much higher than they would have been using the methods she used in the past. **Olson Juan** is working with the dorm students incorporating fun, outdoor, hands-on activities into their after school activities. They all enjoyed the animal bingo, learning the Navajo names for many animals. It was great watching them help each other, and repeating the names in English and Navajo. They now seem to be more in tune with their environment. 🍏

are also going to begin the process of preparing garden areas here at STAR School. We tried this last year but we got a late start, so early preparation is key. I hope that they what they take away from this experience is an understanding of self-sufficiency they can provide for themselves if the grocery store is no longer available.

I hope that my experience with teaching students from another culture will help those that are in the same situation as I. Use what you know or are passionate about and take it to your students. I have found if you enjoy something and you share it will your students, they will be more engaged, more excited about learning, and more happy in general. Besides if you share with them more of your life they will be more willing to share some of theirs with you. I wish happy teaching to all my colleagues out on the Colorado Plateau and beyond. I hope this inspires you to plant something with your children. 🍏

curriculum guide called "Project Archaeology: Investigating Shelter." Contact: Mary Derbish, 720-254-4493, mderbish@hotmail.com.

Renewable Energy for Educators-How to Implement Renewable Energy Curriculum into Your Classroom. June 23-26, 2008. Carbondale, CO. 2 Credits Extended Studies (through Mesa State College). Tuition - \$400 (includes cost of credits and all materials). Lodging/Meal plan - \$250. Locals Lunch Only plan - \$50. For more information, visit <http://solarenergy.org/workshops/reeducators.html> or call (970) 963-8855.

News continued from page 5

One purpose for creating habitat for the birds was to increase presence of natural predators to insects on the campus. This is most probably a successful effort as house sparrows not only eats seeds, but also will eat predatory insects and their larvae. The house finch is even more helpful, as it is known to consume aphids from plants as well as the seeds of nettles, keeping down the spread of these thorny plants. If these birds can be encouraged to nest near our school, it would be very helpful to our outdoor gardens.

The class hopes this spring to be able to incorporate more bird observations and research into their studies with the binoculars, field guides, and birding scopes provided by the BOEP program. Perhaps they could find other ways of attracting useful and colorful birds to the STAR School campus. 🍎

3-R's

Theresa L. Begay-Library Assistant
Round Rock Elementary/Jr. High School

Hello, My name is Theresa Begay, from Round Rock, AZ. I am an employee of Red Mesa Unified School at Round Rock, which is a small community about thirty miles north of Canyon De Chelly and forty-seven miles south of Red Mesa School District. I am a full time mother of six boys, full time student at NAU, and of course a full time employee. I love to work with kids of all ages but I really prefer grades Kindergarten to eighth grade. I just want to be honest and tell you that I was talked into be coming a member of BOEP by a co-worker who attended the Summer Institute. Anyway, I told myself anything for the students I work with, so now I am enjoying what I learned during the Fall Institute.

I started a project here with the fifth graders called the "3-R's" (reuse, reduce, recycle). Many of the students are excited about the project. The lesson is going very well and what I want the students to learn is that: Earth is not trash or to be trashed.

We studied and defined the "3-R's". Students went and researched what the "3-R's" are all about in the library. The students then split into two groups of four and one group of three. They all picked one of the 3-R's and went to do their research. So when the students are done with their research we are going to put their information on poster boards and put them up for the rest of the school to see.

It is hard to work with students on topics or even start a project because classes only come in once a week, but we are all excited about our outcome of 3-R's project. The students are learning about how Mother Earth can be saved for future generations.

Over all, being a parent, working with students, and a community member, I really feel we have to clean up our community. Many places around the community I live in have trash dumped all around. Also because we do not have a recycle center, many community members just take their old appliances down to the wash and dump their trash. This has to stop soon. What many communities need around the reservations is recycling centers and official dumps to take their trash.

What I am waiting for is any candidate running for the Navajo Nation President, or U.S. President to say, "LET US ALL JOIN HANDS AND CLEAN UP MOTHER EARTH", before she gives up on us all. 🍎

Planting in Service To All Relations By Dawn Quamahongnewa-Mapatis, Star School

Greetings from the STAR school in Northern Arizona., where I teach 3rd and 4th grade. I am Hopi, of the Tobacco Clan, from Hotevilla, AZ. I was born and raised on Hopi, and it is through this lens that I view life. As a Hopi, I have been taught that the Hopi way of life is a life of stewardship for our planet Earth, which made the connection to BOEP and me easy, because it's all about place, you know, the Colorado Plateau.

Now that you know my background, I'll tell you about STAR School. It is located outside the largest city on the Colorado Plateau, Flagstaff, AZ. We serve mostly Navajo students, but we have a few Anglo children and one Hopi student, who happens to be in my class and is my clan relative! I have been teaching at the STAR School for two years now. The STAR in STAR School stands for Service To All Relations, we pride ourselves in the fact that our school utilizes the place-based model for teaching our students. Like I said, it's all about place! So, much of our teaching takes us outside, perfect right?

So I am a Hopi, but most of my students aren't, so what do I do as far as culture and language go? So I thought that I would find some sort of common ground that both Hopis and Navajos share, which happened to be farming. Since the Hopi are well known for their techniques in dry farming and are well known farmers in general, I thought it would be perfect to share with these younger generation Navajos about farming. So what I have done is to bring the knowledge I have about farming and share with my students the wonder of growing crops in a semi-desert landscape. Through our Learn and Serve program we have taken a field trip to the Hopi Health Care Center to view a photo exhibit, currently housed there, that documents Hopi farming. Some of the photographs date back to the 1890's. This was an interesting trip for my students because they were able to see the extent to which my people farmed - all without irrigation.

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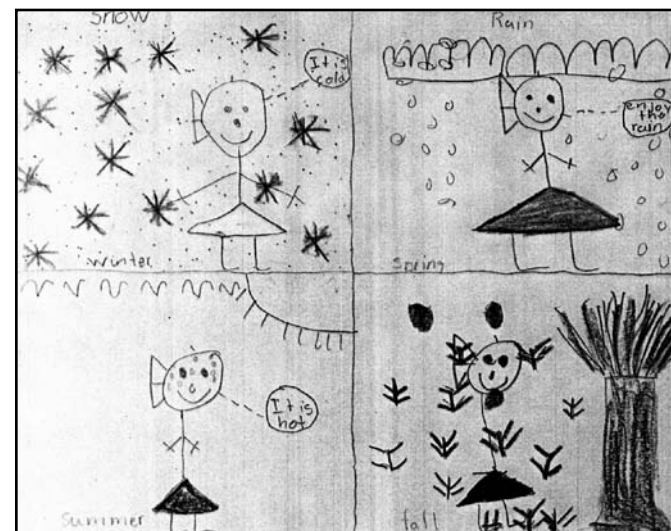
News continued from page 4

We also did our share of cloud watching this year and the students picked out shapes in the form of spaceships and rabbits. This cloud watching and imagining helped us with inspiration for our nature journals.

Kristen (AZ, RC) did a compass lesson with my students. They started with the basics of the different parts of a compass, followed by how to set the compass, before heading outside to put what we learned to practice in a variety of compass courses.

As I mentioned earlier we created our own nature journals that we use when we were out on one of our many nature walks. The students got a chance to draw pictures of Mother Earth changing the color of her clothing during each new season. We also wrote about the rocks, plants, land formations, animals and birds we saw on our walks. We also did an in-depth study of herbal plants by comparing and contrasting two at a time, with a more extensive study later on. We studied the Tumbleweed plant (ch'll deeni'ni') and its usefulness to livestock. It was a challenge to write a poem about it. The words the students came up with were sticky, sharp, dry/dead, pointy, and pokey.

After doing a basic study of a variety of local herbal plants, we began our more in-depth study of their uses among the Dine' people. We started by collecting some examples and pressing them. We then created a survey to use with school employees, relatives, consultants, and general community members to find out what they knew about these plants. It was a great way to get the students out into the community to learn. One of the main questions we were looking at was to find out the medicinal uses of the plants. This lesson is on-going, as we are just getting bits of information here and there. One interesting story that our class learned from a local elder was about Cliffrose. He told us that Cliffrose got its Navajo name from the story of where Changing Woman was found. It is said that First Man found her underneath the plant and used the plant to make a diaper for her.



A seasonal change drawing from Ms. Cooley's class

Lately we have been studying water and doing a variety of water related experiments that I got from the BOEP Resource Manual. Also Kristen has been very helpful in providing some additional water related lessons. We are having a good school year thanks to the help of BOEP. 🍎

Seasonal Change

By Idella Kyasyousie, Wingate Upper Elementary

With the weather warming up, it's a great time to take the kids outdoors. This week we took the students outdoors on a nature walk. We talked about the weather, temperature, and how the seasons are changing. We also identified different types of animal tracks the students found in the mountains. Our class created Nature journals, where they drew what they saw on our walk. Some students drew different types of garbage they saw and how it pollutes our environment. They are also learning about different types of animals that inhabit the Colorado Plateau.

I asked the students to locate our area on the map and asked if it was part of the Colorado Plateau. Many of the students realized that most of the Navajo reservation is on the Colorado Plateau. One student asked if the Hopi reservation was on the Colorado Plateau, so we looked it up instead of me just telling them, "Yes".

For our weekend homework, I asked the students to examine the outdoor environment that they would then visit and describe on Tuesday. We planned another nature walk to compare environments.

It has been an exciting experience integrating BOEP into our curriculum. It gives the students and I more chances to go outside and learn new things. I believe children learn more with hands-on activities and receive a better understanding that will benefit them in their future endeavors. We all enjoy the outdoors, so what better way to teach our students how to appreciate nature then to take them outside. 🍎

STAR School is For The Birds

By. Steve Babcock, STAR School

I just wanted to make everyone aware of the Bird Habitats that the seventh and eighth grades at the STAR school have been putting together. In response to a bird activity that they did earlier in the school year, the students decided to include bird feeders and houses in their study of microclimates. They built feeding platforms and birdhouses beneath a Juniper tree that is outside a large window next to their classroom. This has markedly increased the number of bird visits to our classroom. During the winter months they were able to observe these visitors from the classroom window. Most of the birds that were attracted were sparrows and finches of various types. I personally observed house finches and house sparrows at the feeders.

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Regional Coordinators Corner

Utah Corner

Due to funding constraints we are not directly working with any Utah Schools this year. If funding becomes available in the future we will resume working with Utah Schools.

However there are still plenty of BOEP activities happening in Utah!

We had a good turnout of Utah teachers to the conference this year, including **Steve Lasslo** with **Pinnacle Canyon Academy** in Price, who presented this year on *Kite Building*. His sense of humor and dedication to his students really showed through during his presentation. We also had several past employees join us including **Patty McCourt** who was a past New Mexico intern, now teaching in Vernal, and **Andrea Stoughton** who was the last Utah Regional Coordinator and now the principal at **Moab Charter School**. Also from the Charter School, **Peggy O'Reilly** who participated in BOEP two years ago, and brought along some new teachers at the school.

It was great to see past participants and staff again as well as some new faces! We also had Utah teachers from Escalante and Vernal, who have not been in the program, yet! BOEP hopes to be working full-time in Utah again next year.

Arizona Corner

Kristen Trejos, Regional Coordinator

No matter how long the winter, spring is sure to follow. –Proverb

What a winter we have had! After many years of dry winters the snow, rain and cold temperatures were a welcome sight. Yet cycles will do as they are inclined, and spring is next in the line-up of seasons. My travels continue as well, with all the usual stops along the well traveled path through northeast Arizona.

The teachers of **STAR School** have been giddy with their resource center purchases. The materials have helped BOEP teachers **Dawn Mapatis** and **Steve Babcock**, as well as fellow STAR School teachers who are being mentored in anticipation of joining the BOEP this summer. Mrs. Mapatis's 3rd & 4th grade class continue their geology studies identifying the three major groups of rocks around their schoolyard, and acting out the parts of the rock cycle. Mr. Babcock, working with Mr. Tomas's 7th & 8th grade class, is helping to facilitate lessons on water and watersheds.

Up the road, **Round Rock Elementary** and **Jr. High** teachers

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Colorado Corner

Jon Orris, Regional Coordinator

Spring has finally started to hit the Eastern portion of the Colorado Plateau in Colorado, although there is still a lot of snow in the mountains. The anticipated runoff is about 170% of normal and it looks like our rivers will have big runoff this year. They started spilling water on the San Juan in February, and have a plan for several months of spill on the Dolores River.

In **Paradox Valley School**, **Rosie Boone** has had a busy winter with her K-2 class. They were doing some state history and then learning about family relationships. On March 14 the class made a 45 minute trip up the switchbacks out of the Paradox Valley and into the LaSal Mountains near the town of Old LaSal to go snowshoeing! Three parents and myself accompanied the class for the day of activities. We did activities relating to the Sun and the effects of different colors on the snow, as well as microhabitats where we learned how animals keep warm on those long cold winter nights. We also did the Pinion Jay activity to demonstrate how these birds cache and then find their seeds months later. After lunch the students got a chance to dig some pits to see the different layers of snow and to see just how deep the snow still is...almost 4 feet in some spots!

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New Mexico Corner

Becky Kerr, Regional Coordinator

I think everyone in New Mexico is excited to have spring on the way. This has been a very cold and snowy year. The students enjoyed snowshoeing, which they could not in the past since we do not often get that much snow, but I think we all are having fun now being able to go outside without as many layers of clothing. Be careful of the wind though! I am sure that this spring there will be much better nature observers at Wingate Elementary and Lake Valley Navajo School. The teachers who are participating in the BOEP program this year have expanded the minds of their students. The students are much more aware of their surroundings and the importance it plays in their lives. This has been a great year; it is hard to believe it is almost over. I cannot wait for the river trip!

Wingate teachers provided an awesome in-service for their staff on March 14th. All of the BOEP teachers participated.

Lorrain Kahn, **Wingate Lower Elementary**, had a fantastic PowerPoint presentation, explaining how she uses BOEP in her classroom, and how it fits into the standards for New Mexico. The teachers, 75+, then divided into 4 groups. Each teacher attended two of the four sessions offered. The first group

(Continued on page 11)

Arizona Corner continued from page 6

Theresa Begay, **Roselind Begay**, and **Joan Cooley** are inundating students with cultural lessons in a variety of ways. In Navajo culture class Mrs. Cooley's students are reading a fantastic place-based novel entitled "Navajo Long Walk" by Nancy M. Armstrong. This historical fiction book documents the story of a young Navajo boy in 1864 as he leaves Arizona and marches nearly 300 miles east to Ft. Sumner. Mrs. R. Begay is sharing her experiences as a Navajo culture teacher with parents and students alike. In preparation for the BOEP conference both Mrs. Begays taught students about the materials, symbolism, and cultural significance of the Navajo cradleboard. They highlighted the connection of the cradleboard to the natural world and opened the eyes of students at RMES. Mrs. T. Begay is continuing on her mission to teach the importance of recycling and brainstorming ways she can help incorporate practices into everyday life.

Even further up the road, **Red Mesa Elementary** and **Jr. High** teachers are drying out in the spring sunshine. **Ray White**, previously in Round Rock, has moved over to the RMES campus full-time to help out students in the health office there. **Lucy Benally**, teaching 7th & 8th grade reading, has just wrapped up a winter long study of poetry which was inspired by her participation in the New Mexico Winter Institute hosted by the Bisti Writing Project and a grant from the New Mexico Public Education Department. Students blossomed under this unit, and on my last visit they continued to share their work with me. Down in the elementary building **Wanda Deswood** and **Phyllis Oldman** are recovering from science fair season but still incorporating BOEP skills in their everyday lessons. Combining classes for *Sunny Side South*, both 3rd grade classes learned thermometer skills and honed their prediction, observation, and documentation skills. Individually, Mrs. Oldman's class has been looking at local birds and local geology while the students of Mrs. Deswood's class have been journal making fools.

Many of the lessons I have observed in my last few visits have been inspired by sessions attended at the 8th Annual BOEP Conference. I would like to take this opportunity to acknowledge and applaud AZ BOEP teachers on their participation in the BOEP Conference. Successful presentations were well received by the more than 75 attendants on a lovely March weekend, and obviously many ideas were taken away and implemented right away!

As a final note I remind you all to mark your calendars for Earth Day 2008. I encourage you to incorporate Earth Day ideas into your spring curriculum and hope that they bloom into everyday practices for you and your students. For more ideas try the following resources:
<http://www.worldwildlife.org/earthday2008/>
<http://www.eeweek.org>
<http://www.theteachersguide.com/earthdaylessonplans.htm>
<http://www.epa.gov/earthday>

New Mexico Corner continued from page 6

enjoyed **Tim Ossowski**, **Wingate Middle School**, while he shared his knowledge of Topographic maps and the teachers made a three-dimensional map of their own. The teachers then did the Writing Wild activity with **Cyndy Taliman**, also with **Wingate Lower Elementary**. She wanted everyone to go outside, but the wind was extreme, so she brought natural items into the gym for the teachers to explore. The other three groups were lead by teachers from **Wingate Upper Elementary**. Group two had a fun time learning how to integrate language arts into science with **Barbara Yazzie**. She used the knowledge gained at the New Mexico Winter Institute and taught the teachers about journal making, and how to use the pictures taken to inspire students to write poems. **Idella Kyasyousie** showed teachers about using technology in the classroom. She took advantage of the smart board in the library, explaining its use, to show others how to make a PowerPoint presentation and use her new QX5 microscopes for PC's. The microscopes are great, allowing students to take pictures of magnified items that teachers can then help them incorporate into a PowerPoint presentation of what they observed. **Emma Martel** shared how she is using hands on lessons to teach her social studies class. She started a unit on Natural Resources, and it took off into making pinwheels, learning about limiting factors using pennies and graphs, global warming using an open and closed 2-liter bottles soil and a light bulb, and other activities. It was an eye opening experience for her when she realized how much better the students understand and remember the information using these activities instead of a text book.



Emma Martel working on mining a cookie during the Wingate in-service

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A Sense continued from page 9

Figure 9 is a simplified map of the major types of ecosystems that occur across the Southwest:

- *Deserts*, in which patterns of life are influenced by water scarcity
- *Semi-deserts*, which are slightly less arid. Two common semi-desert ecosystems are grasslands or *steppes*, and sparse, grassy forests, called *savannas*.
- *Mountain forests*.

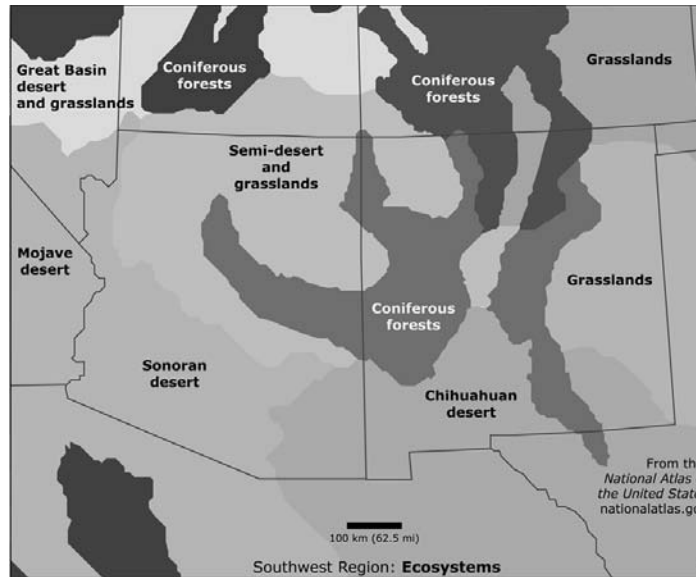


Figure 9

Explain:

The natural Southwest is commonly subdivided into four physiographic provinces: Basin and Range, Transition Zone, Colorado Plateau, and Southern Rocky Mountains. Each of the physiographic provinces has its own distinct patterns of topography, rocks, climate, surface and ground water, and ecosystems. See Figure 10.

Physiography refers to regional variations in topography and the types of rocks that occur at the surface.

The physiographic provinces are:

- *Basin and Range Province*: roughly parallel, alternating valleys (basins) and mountain ranges; no major rivers originate here; largely desert.
- *Rio Grande Rift*: A long, narrow chain of basins extending up into the Southern Rocky Mountains; generally considered a northeast extension of the Basin and Range
- *Colorado Plateau Province*: high elevation, low relief; mostly horizontal rock layers carved by erosion; few rivers begin here; largely semi-desert or forest.
- *Transition Zone*: between Basin and Range and Colorado Plateau; low to high elevations; high relief; several tributaries of the Colorado River originate here; mostly forest or semi-desert.
- *Southern Rocky Mountains Province*: mountainous: high elevation, high relief; rugged mountains; headwaters for Colorado River system; mostly forested.

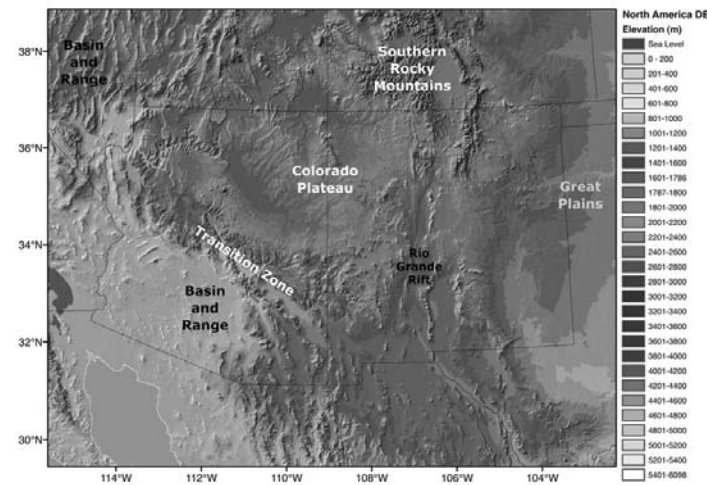


Figure 10

Google Earth, geographic software that can be downloaded to any computer for free at <http://earth.google.com>, provides an easy and delightful way to tour all of the physiographic provinces of the Southwest (and the rest of the planet!) from one's own computer. Start by entering the name of your home place in the box under "Fly to" in the upper left corner of the screen. Click on the magnifying glass and you will go there! Using the slider bars, steering wheel, and directional arrows in the upper right corner, you can move in any direction, and can even tilt the landscape to a horizontal view!

Elaborate:

Time permitting, instructor and students can discuss interesting place-based extensions of the ideas presented in the lesson above, such as:

How do patterns in rock, air, water, and life in the natural Southwest influence human habitation and the cultural Southwest?

Did physiography influence where and how the first Southwesterners lived?

Where does our water supply originate?

"Water is life" in the Southwest; is the supply sustainable?

Evaluate:

Having completed this lesson, you should be able to:

1. Identify the extent of the Southwest region on any base map or image of western North America.
2. Distinguish and sketch the natural and cultural features in a Southwest landscape.
3. Distinguish a *place* from a physical location.
4. Summarize the criteria commonly used to define an *arid* region such as the Southwest.
5. Explain why the water supply in the Southwest is considered to be "unreliable."
6. Characterize the kinds of plants and animals that are suited to life in the Southwest.
7. Find, describe, and sketch dynamic processes involving rock, air, water, and life in a Southwest landscape.

(Continued on page 14)

A Sense continued from page 2



Figure 1

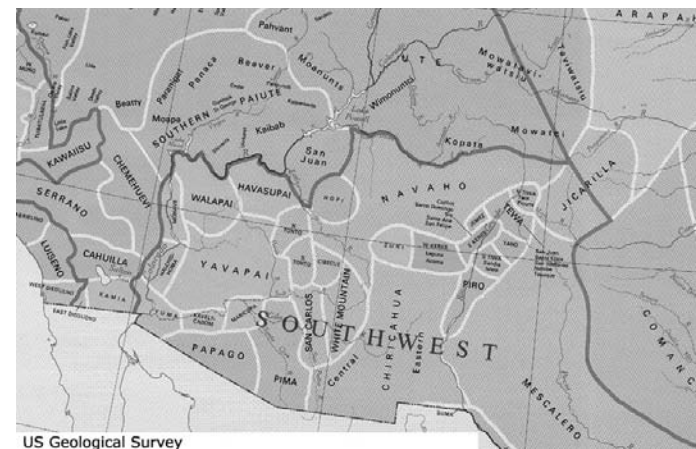


Figure 2

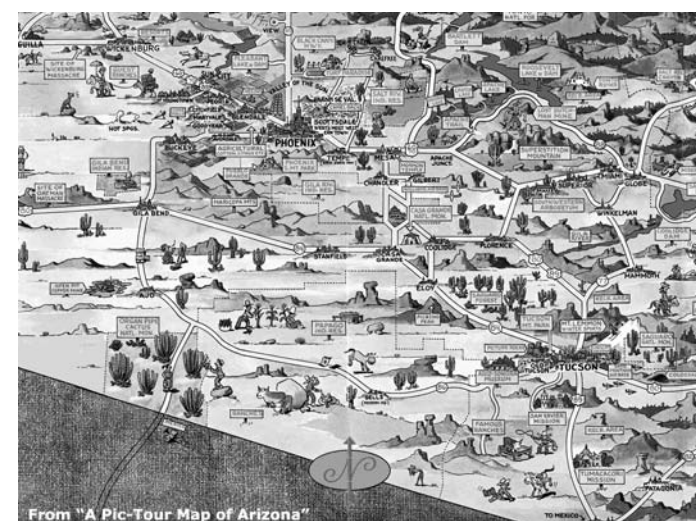


Figure 3

Elaborate:

The instructor asks: *Why should we be concerned with places in a science class?*

Time permitting, this could stimulate an interesting class discussion. Alternatively, the instructor can go on to point out that in many Southwestern cultures, places are valued settings or organizing points for teaching, as noted in this quotation from the late Ndee (Western Apache) elder, Dudley Patterson:

"Wisdom sits in places. You must remember everything about them. You must learn their names. You must remember what happened at them long ago. You must think about it and keep thinking about it" (from Basso, 1996, p. 127).

Written works and quotations on the Southwest, by authors such as Edward Abbey, Keith Basso, Craig Childs, Gary Nabhan, Simon Ortiz, Anne Zwinger, and many others constitute a rich source of place meanings and can help illuminate ideas about Earth science. It is fun to find good quotations, excerpts, and poems, and add them to your place-based lessons.

Scientific exploration and research have also added great meaning to Southwest places, as shown by the example of John Wesley Powell, 19th Century geologist, ethnographer, and explorer of the Grand Canyon and surrounding places:

"The [Grand Canyon] expedition was not made for adventure, but purely for scientific purposes, geographic and geologic...." (From Powell, 1895, Preface).

Think of the explorations and studies of Earth scientists in the Southwest as among the many different ways that people have experienced and come to know this region.

Engage:

We recognize the Southwest as a region defined both by natural attributes and by cultural attributes. Let's now focus our scientific exploration on the natural Southwest.

The instructor asks: *What are the essential natural characteristics of the Southwest? Whether as a long-time or recently arrived inhabitant of the Southwest, what comes to mind when you think about its natural environments? How would you describe the natural Southwest to someone who has no prior knowledge of it?*

Explore:

The class, individually or in small groups, takes about 5-10 minutes to brainstorm and write down as many meaningful responses to these questions as possible. Different groups may share and compare their lists.

After the brainstorm subsides, each group can in turn report out one item from its list, while the instructor records all of the responses on the board. After all of the responses have been reported, the class can group similar items and simplify the list as much as possible.

(Continued on page 8)

A Sense continued from page 7

Explain:

Hopefully, the class has converged on a concise description similar to the one the instructor will now present.

- *The natural Southwest is characterized by:*
- *rugged, rocky landscapes...*

By the way, a *landscape* is defined as “a distinct association of landforms, especially as modified by geologic forces, that can be seen in a single view,” and a *landform* as “any physical, recognizable form or feature of the Earth’s surface, having a characteristic shape, and produced by natural causes” (Jackson, 1997).

- *...dry air (i.e., an arid climate)...*

There are various ways to define *aridity*, such as: average annual precipitation less than 25 cm (10 in) in a place; or that evaporation exceeds total precipitation; or that water stress is a controlling factor for plant and animal life; etc.

- *...scarce and unreliable water...*

“Unreliable” means that there is too little water on average, but occasionally there can be too much at once!

“There are two easy ways to die in the desert: thirst or drowning” (Childs, 2000, p. xiv).

- *...and diverse, arid-adapted forms of life.*

Many think that deserts are “wastelands,” but the Southwest is actually one of the most biodiverse regions in North America (Stein, 2002). Remember that we *humans* are also part of the living environment in the Southwest, and human cultures here have also been diverse and (more or less) adapted to aridity.

While presenting this Explanation, I illustrate each of the above points with an appropriate image: a rocky Arizona landscape, a dust devil crossing the desert, a montage of a dry river bed and a flash flood, a sea of desert wildflowers, and a montage of an Ancestral Puebloan ruin and metropolitan Phoenix.

Elaborate:

The instructor continues with the theme of *rock, air, water, and life* introduced above, by showing an image of a local place in which all four of these things are visible (a good example would be a river flowing through a rocky Southwestern landscape, beneath a blue or cloudy sky; with trees or shrubs, and perhaps some animal life, along its banks).

The instructor asks: **How do rock, air, water, and life interact in this landscape?**

The class can examine the image and make notes of all the ways they can find that rock, air, water, and life act and interact to both constitute and change the local landscape. For example:

- Rock is formed and uplifted to create the landscape
- Running water flows down slopes in the landscape
- Running water erodes rock in the landscape
- Running water transports and deposits pieces of rock
- Rock partially dissolves in water
- Dissolved rock nourishes plant life
- Water supports plant and animal life

- Plant life shelters and nourishes animal life
- Plant life absorbs CO₂ from, and releases O₂ and H₂O into, the air
- Water precipitates from air and evaporates back into air
- Flowing air (wind) carries tiny bits of rock
- Water infiltrates downward into porous rock....and so on.

The instructor can expand this discussion by noting that many of these interactions of rock, air, water, and life constitute natural processes such as weathering, erosion, precipitation, percolation, transpiration, etc. These processes are powered by heat from the Sun, or heat from Earth’s interior, by gravity, or by metabolism.

The instructor now asks: **How do rock, air, water, and life act and interact globally?**

The class should visualize how the natural processes operating in a local Southwestern environment “scale up” to operate across Earth, and whether rock, air, water, and life in the Southwest interact with rock, air, water, and life elsewhere on Earth.

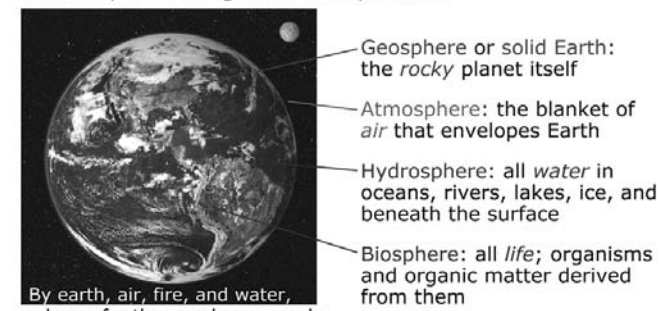
Explain:

- *Rock, air, water, and life are interconnected in local environments, and are part of a global Earth system comprised of the:*
- *geosphere or solid Earth:* rock and materials derived from rock (e.g., mud, soil)
- *atmosphere:* air; the blanket of gases around Earth
- *hydrosphere:* water, ice, and water vapor
- *biosphere:* living organisms and the organic matter formed by them

Because the Earth is so vast, complex, and old, Earth scientists have found it useful to understand and study it as a *system*: a set of interacting, interdependent, interconnected parts that make up a whole. See **Figure 4** for an illustration of the global Earth system.

Rock, air, water, and life are interconnected in local environments,

and are part of the global Earth system of:



From *Between Sacred Mountains*, Rock Point Community School, Navajo Nation

Figure 4

(Continued on page 9)

A Sense continued from page 8

The Earth systems idea has interesting parallels with the classical concept of the “four elements,” common to many Indigenous as well as Euro-American cultures.

“By earth, air, fire, and water, a home for the people was made” (Rock Point Community School, 1982, p. 12).

Systems are all around us. The class can be challenged to find other good examples (e.g., metropolitan area, automobile, human body).

Engage:

The instructor asks: **What regional patterns in rock (landscape), air (climate), water, and life are found across the Southwest? Are these patterns interrelated?**

Explore:

Figures 5 through 10 are maps of the different Earth systems as they occur across the Southwest. In this Exploration, which can take 20-30 minutes, small groups examine and compare these maps to look for patterns in topography, and how these may influence patterns in climate, surface and ground water, and ecosystems.

Figure 5 is a digital elevation map of Southwest *topography* (“the lay of the land”). Topography is often described in terms of high or low *elevation*, and high or low *relief* (vertical differences between highlands and lowlands; the higher the relief, the more rugged the landscape). Note that the Southwest can be subdivided into different areas of high and low elevation and relief.

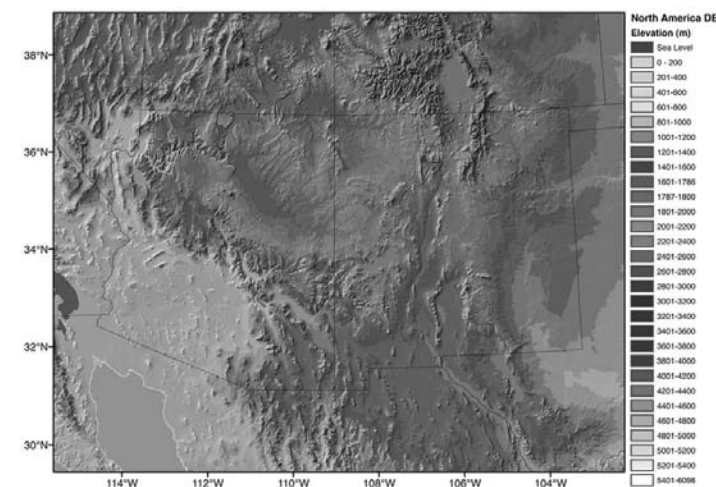


Figure 5

Figure 6 depicts the average annual precipitation across the Southwest. In general, the Southwest is dry, but some places are drier than others. How does aridity compare to topography?

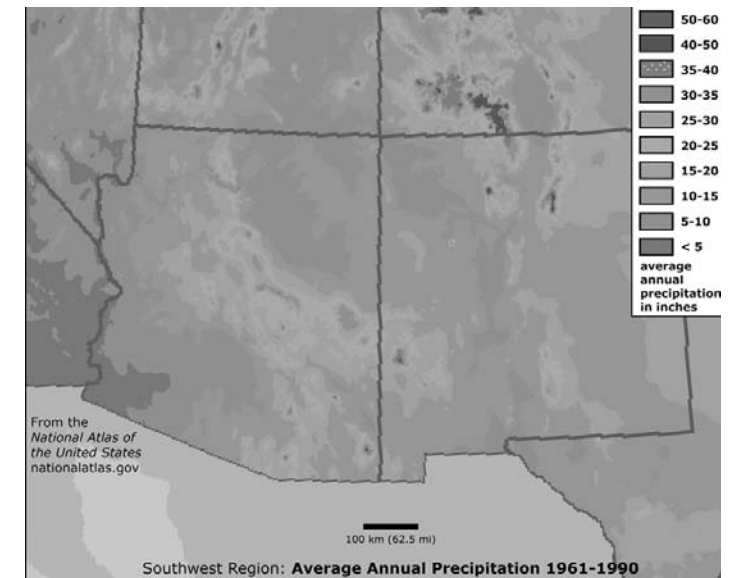


Figure 6

Figure 7 is a map of the major rivers (and some artificial lakes) that flow (at least some of the time) across the Southwest. The relationship between the sources and courses of these rivers, and topography, should be quite clear.

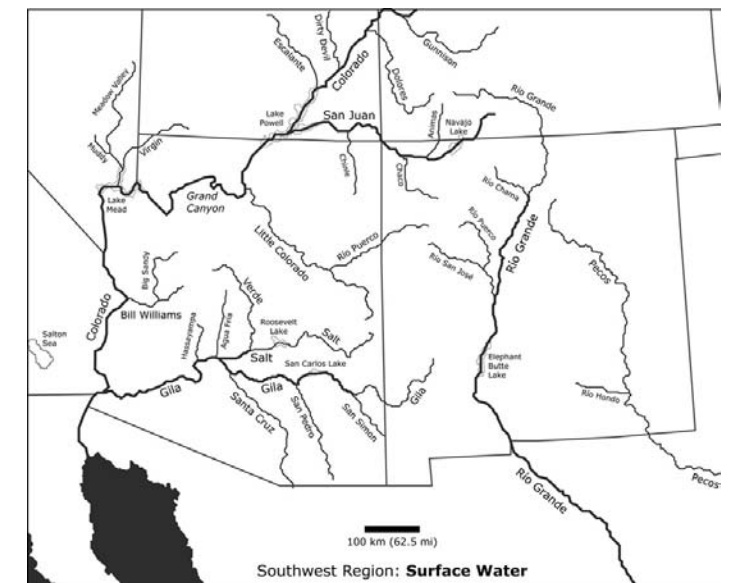


Figure 7

Figure 8 is a map showing the distribution of major regional *aquifers*: subsurface reservoirs of *ground water*, which is retained in tiny pore spaces between grains in rock or loose sediment. Note that each of the major aquifers depicted on this map is isolated from each of the others; water does not flow between them. Does the distribution of these aquifers correspond to the topography of the Southwest in any way?

(Continued on page 10)