9

Education Program Updates

SUMMER 2010 MEDIA BUY

Station/Program	Time	# of Paid Spots	Rate	Bonus Spots	Total Buy
KASA-2					
Week of 6/28					
Bonnie Hunt	Mo-Fr 11a-12p	5	$30.00		$150.00
Judge Pirro	Mo-Fr 12-1p	5	$30.00		$150.00
People's Court	Mo-Fr 1-2p	5	$30.00		$150.00
Jeopardy/Fam. Feud	Mo-Fr 2-3p	3	$30.00		$90.00
Deal/5th Grader	Mo-Fr 3-4p	3	$30.00		$90.00
America's Funniest Vids	Mo-Fr 4-5p	2	$50.00		$100.00
Saturday Matinee	Sat 3-5p	1	$30.00		$30.00
Bonus	Mo-Su 5a-4:59a	0	$0.00	24	$0.00
Week of 7/5					
Bonnie Hunt	Mo-Fr 11a-12p	5	$30.00		$150.00
Judge Pirro	Mo-Fr 12-1p	5	$30.00		$150.00
People's Court	Mo-Fr 1-2p	5	$30.00		$150.00
Jeopardy/Fam. Feud	Mo-Fr 2-3p	3	$30.00		$90.00
Deal/5th Grader	Mo-Fr 3-4p	3	$30.00		$90.00
America's Funniest Vids	Mo-Fr 4-5p	2	$50.00		$100.00
Saturday Matinee	Sat 3-5p	1	$30.00		$30.00
Bonus	Mo-Su 5a-4:59a	0	$0.00	24	$0.00
Week of 7/12					
Bonnie Hunt	Mo-Fr 11a-12p	5	$30.00		$150.00
Judge Pirro	Mo-Fr 12-1p	5	$30.00		$150.00
People's Court	Mo-Fr 1-2p	5	$30.00		$150.00
Jeopardy/Fam. Feud	Mo-Fr 2-3p	3	$30.00		$90.00
Deal/5th Grader	Mo-Fr 3-4p	3	$30.00		$90.00
America's Funniest Vids	Mo-Fr 4-5p	2	$50.00		$100.00
Saturday Matinee	Sat 3-5p	1	$30.00		$30.00
Bonus	Mo-Su 5a-4:59a	0	$0.00	24	$0.00
Week of 7/19					
Bonnie Hunt	Mo-Fr 11a-12p	5	$30.00		$150.00
Judge Pirro	Mo-Fr 12-1p	5	$30.00		$150.00
People's Court	Mo-Fr 1-2p	5	$30.00		$150.00
Jeopardy/Fam. Feud	Mo-Fr 2-3p	3	$30.00		$90.00
Deal/5th Grader	Mo-Fr 3-4p	3	$30.00		$90.00
America's Funniest Vids	Mo-Fr 4-5p	2	$50.00		$100.00
Saturday Matinee	Sat 3-5p	1	$30.00		$30.00
Bonus	Mo-Su 5a-4:59a	0	$0.00	24	$0.00
KASA-2 Totals		**96**		**96**	**$3,040.00**
KOB-4					
Week of 7/1					
Eyewitness News 4	Mo-Fr 6-7a	1	$200.00		$200.00

Station/Program	Time	# of Paid Spots	Rate	Bonus Spots	Total Buy
NBC Today Show	Mo-Fr 7-9a	1	$225.00		$225.00
Eyewitness News 4	Mo-Fr 6 - 6:30p	1	$350.00		$350.00
Eyewitness News 4	Sa 7-9a	1	$75.00		$75.00
Bonus	Mo-Su 5a-4:59a	0	$0.00	4	$0.00
Week of 7/5					
Eyewitness News 4	Mo-Fr 6-7a	1	$200.00		$200.00
NBC Today Show	Mo-Fr 7-9a	1	$225.00		$225.00
Eyewitness News 4	Mo-Fr 6 - 6:30p	1	$350.00		$350.00
Eyewitness News 4	Sa 7-9a	1	$75.00		$75.00
Bonus	Mo-Su 5a-4:59a	0	$0.00	4	$0.00
Week of 7/12					
Eyewitness News 4	Mo-Fr 6-7a	1	$200.00		$200.00
NBC Today Show	Mo-Fr 7-9a	1	$225.00		$225.00
Eyewitness News 4	Mo-Fr 6 - 6:30p	1	$350.00		$350.00
Eyewitness News 4	Sa 7-9a	1	$75.00		$75.00
Bonus	Mo-Su 5a-4:59a	0	$0.00	4	$0.00
Week of 7/19					
Eyewitness News 4	Mo-Fr 6-7a	1	$200.00		$200.00
NBC Today Show	Mo-Fr 7-9a	1	$225.00		$225.00
Eyewitness News 4	Mo-Fr 6 - 6:30p	1	$350.00		$350.00
Eyewitness News 4	Sa 7-9a	1	$75.00		$75.00
Bonus	Mo-Su 5a-4:59a	0	$0.00	4	$0.00
Week of 7/26					
Eyewitness News 4	Mo-Fr 5:30-6a	2	$100.00		$200.00
Eyewitness News 4	Mo-Fr 6-7a	1	$200.00		$200.00
NBC Today Show	Mo-Fr 7-9a	1	$225.00		$225.00
Bonus	Mo-Su 5a-4:59a	0	$0.00	4	$0.00
KOB-4 Totals		**20**		**20**	**$4,025.00**
KOAT-7					
Week of June 28					
Good Morning America	Mo-Fr 7-9a	2	$240.00		$480.00
Regis and Kelly	Mo-Fr 9-10a	2	$85.00		$170.00
Nightline	Mo-Fr 11:05-11:35p	2	$90.00		$180.00
Action 7 News	Sat 6-9a	2	$115.00		$230.00
Bonus	Mo-Su 5a-4:59a	0	$0.00	8	$0.00
Week of July 5					
Good Morning America	Mo-Fr 7-9a	0	$240.00		$0.00
Regis and Kelly	Mo-Fr 9-10a	3	$85.00		$255.00
Nightline	Mo-Fr 11:05-11:35p	2	$90.00		$180.00

Station/Program	Time	# of Paid Spots	Rate	Bonus Spots	Total Buy
Action 7 News	Sat 6-9a	2	$115.00		$230.00
Bonus	Mo-Su 5a-4:59a		$0.00	7	$0.00
Week of July 12					
Good Morning America	Mo-Fr 7-9a	2	$240.00		$480.00
Regis and Kelly	Mo-Fr 9-10a	2	$85.00		$170.00
Nightline	Mo-Fr 11:05-11:35p	2	$90.00		$180.00
Action 7 News	Sat 6-9a	2	$115.00		$230.00
Bonus	Mo-Su 5a-4:59a		$0.00	8	$0.00
Week of July 19					
Good Morning America	Mo-Fr 7-9a	2	$240.00		$480.00
Regis and Kelly	Mo-Fr 9-10a	2	$85.00		$170.00
Nightline	Mo-Fr 11:05-11:35p	2	$90.00		$180.00
Action 7 News	Sat 6-9a	2	$115.00		$230.00
Bonus	Mo-Su 5a-4:59a		$0.00	7	$0.00
KOAT-7 Totals		**31**		**30**	**$3,845.00**
KROE-13					
Week of 6/28					
News 13	Mo-Fr 6-7a	5	$50.00		$250.00
News 13 @ Noon	Mo-Fr 12-12:30p	2	$100.00		$200.00
News 13	Mo-Fr 4:30-5p	2	$100.00		$200.00
Jeopardy	Sat 6-6:30p	1	$125.00		$125.00
Sat Early News	Sat 5-6p	1	$125.00		$125.00
Bonus	Mo-Su 5a-4:59a	0	$0.00	11	$0.00
Week of 7/5					
News 13	Mo-Fr 6-7a	5	$50.00		$250.00
News 13 @ Noon	Mo-Fr 12-12:30p	2	$100.00		$200.00
News 13	Mo-Fr 4:30-5p	2	$100.00		$200.00
Wheel Weekend	Sat 6:30-7p	1	$125.00		$125.00
Sat Early News	Sat 5-6p	1	$125.00		$125.00
Bonus	Mo-Su 5a-4:59a	0	$0.00	11	$0.00
Week of 7/12					
News 13	Mo-Fr 6-7a	4	$ 50.00		$200.00
News 13 @ Noon	Mo-Fr 12-12:30p	2	$100.00		$200.00
News 13	Mo-Fr 4:30-5p	2	$100.00		$200.00
Jeopardy	Sat 6-6:30p	1	$125.00		$125.00
Sat Early News	Sat 5-6p	1	$125.00		$125.00
Bonus	Mo-Su 5a-4:59a	0	$0.00	10	$0.00
Week of 7/19					
News 13	Mo-Fr 6-7a	4	$50.00		$200.00

Station/Program	Time	# of Paid Spots	Rate	Bonus Spots	Total Buy
News 13 @ Noon	Mo-Fr 12-12:30p	2	$100.00		$200.00
News 13	Mo-Fr 4:30-5p	2	$100.00		$200.00
Wheel Weekend	Sat 6:30-7p	1	$125.00		$125.00
Sat Early News	Sat 5-6p	1	$125.00		$125.00
Bonus	Mo-Su 5a-4:59a	0	$0.00	10	$0.00
KRQE-13 Totals		**42**		**42**	**$3500.00**
KOB-AM					
Week of 6/28					
	Mo-Fr 6a-7p	9	$90.00		$810.00
Bonus	Mo-Su 5a-4:59a		$0.00	9	$0.00
Week of 7/5					
	Mo-Fr 6a-7p	8	$90.00		$720.00
Bonus	Mo-Su 5a-4:59a		$0.00	8	$0.00
Week of 7/12					
	Mo-Fr 6a-7p	8	$90.00		$720.00
Bonus	Mo-Su 5a-4:59a		$0.00	8	$0.00
Week of 7/19					
	Mo-Fr 6a-7p	8	$90.00		$720.00
Bonus	Mo-Su 5a-4:59a		$0.00	8	$0.00
KOB-AM Totals		**33**		**33**	**$2970.00**
KRST-FM					
Week of 6/28					
	Mo-Fr 6a-7p	10	$68.00		$680.00
Bonus	Mo-Su 5a-4:59a		$0.00	10	$0.00
Week of 7/5					
	Mo-Fr 6a-7p	8	$68.00		$544.00
Bonus	Mo-Su 5a-4:59a		$0.00	8	$0.00
Week of 7/12					
	Mo-Fr 6a-7p	10	$68.00		$680.00
Bonus	Mo-Su 5a-4:59a		$0.00	10	$0.00
Week of 7/19					
	Mo-Fr 6a-7p	9			$612.00
Bonus	Mo-Su 5a-4:59a		$0.00	9	$0.00
KRST-FM Totals		**37**		**37**	**$2,516.00**
TV Totals		**189**		**188**	**$14,410.00**
Radio Totals		**70**		**70**	**$5486.00**
Grand Total		**189**		**188**	**$19,896.00**

BREAKDOWN BY STATION:
KASA-2 192 total spots from 6/28 to 7/23 = $3,040
KOB-TV4 40 total spots from 7/1 to 7/30 = $4,025 (much higher-watched programs)
KOAT-TV7 61 total spots from 6/28 to 7/23 = $3,845
KRQE-13 84 total spots from 6/28 to 7/23 = $3,500
KOB-770AM 66 total spots from 6/28 to 7/23 = $2,970
KRST-FM 74 total spots from 6/28 to 7/23 = $2,516

PREPARED BY: Eric N. Martinez, Account Executive, Cooney-Watson & Associates, Inc.

Summary of Individuals Reached by Education and Outreach Program
January 1, 2010 – December 31, 2010
(provided by Cooney-Watson)

Media Buy:

Station	People reached	Frequency of viewing
KKOB-AM	83,200	6.8
KRST-FM	48,100	6.2
KOAT	430,724	2.4
KASA	357,906	4.5
KRQE	437,451	3
KOB-TV	348,600	3.9

Website:
785 visits with 1,928 pageviews
Average 2.46 pages per visit
Average time on site 01:43
56% of visitors came from search engines
24% came from referring sites
20% directly typed in the address
83% were new visitors in 2010
top search keyword phrases were: keep the rio grand, middle rio grande stormwater, stormwater team, keeptheriogrand, what pollutes the rio grande

Most popular pages:	Visits
/faq.htm	346
/news.htm	230
/residents.htm	163
/about.htm	151

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RIVER Xchange

Key Tasks -- Update

January 19 – MRG SQT approves funding
January 21 – Letter of Agreement signed by Cooney Watson and New Mexico Water Conservation Alliance
January 23 – 14 partnerships secured, involving NC, MA, CT, ID, VA
North Star Elementary, Albuquerque – (4) 5th grade classes
Navajo Elementary, Albuquerque – (3) 5th grade classes
Maggie Cordova Elementary, Rio Rancho – (2) 5th grade classes
Rio Rancho Elementary, Rio Rancho – (2) 5th grade classes
Sandia Vista Elementary, Rio Rancho – (3) 5th grade classes
January 29 – teacher workshop Rio Rancho
February 4 – teacher workshop Albuquerque

February 8 – Begin Unit 1: Understanding a Watershed
Our Rivers
Tributary Role Play activity
Guest speaker: Nonpoint source pollution (Enviroscape)
Bernalillo County Public Works, Anthony Chavez
U.S. Bureau of Reclamation, Joe Alderete
February 19 – begin SQT exhibit rotation – Maggie Cordova
March 5 – exhibit to Rio Rancho
March 15-19 – APS/RRPS spring break
March 25 – exhibit to Navajo
March-April SBA testing

March 29 – Begin Unit 2: Water in Our Society
Pass the Jug activity
Every Drop Counts activity
Guest speaker: Drinking Water
City of Rio Rancho, Marian Wrage
ABCWUA/Experiential EE, Katie Babuska
Guest speaker: Wastewater
City of Rio Rancho, Marian Wrage
ABCWUA, Ben Zimmerman
Guest speaker: Commercial Uses of the River (Agriculture)
Sandoval County Cooperative Extension, 4-H, Steve Lucero
Bernalillo County Cooperative Extension, 4-H, Cassidy Beyerly
April 9 – exhibit to Sandia Vista

April 18 – Begin Unit 3: River Ecosystem

Food web

If I Owned the Ecosystem activity

Guest speaker: Macroinvertebrate Mayhem

New Mexico Museum of Natural History & Science, Michael Sanchez

Bernalillo County Office of Environmental Health, Matthew Cross-Guillén

April 23 – exhibit to North Star?

May 21 – wrap up program

Field trip/service learning project

Willow Creek Open Space, Keep Rio Rancho Beautiful, Jennifer Scacco

April 16 – Sandia Vista

April 27 – Rio Rancho

May 7 – Maggie Cordova

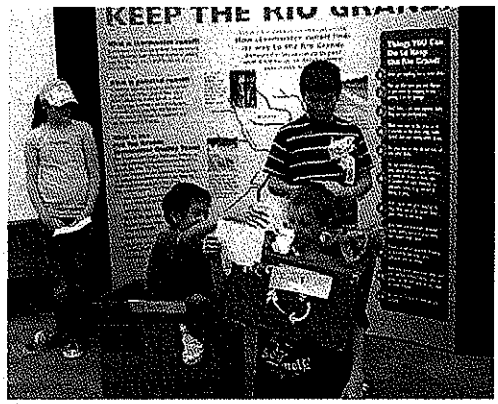
Candelaria Farms/shrub nursery, City of Albuquerque Open Space, Bill Pentler

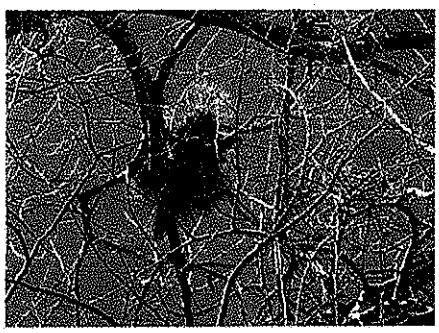
February 25 – North Star (2)

March 11 – North Star (2) – cancelled due to bad weather

March 25 – Navajo

TBD reschedule – North Star (2)





(Porcupine)

Marisa's Student Page – Pen Pal of Eleanor in Holden, Massachusetts

The First Flush!

I learned that the first rain in a long time is called the first flush.The first flush is not the best.We might think it is good for our soil it isn't.It isn't because when our cars pollute the air or oil on the ground or say our dog poops and we don't pick it up it well get washed down into our water drains and that well be bad. It would be bad because if goes into the water drains it well go into the rivers.

3/11/2010

I also learned that our water and the pollution in it goes down the drains.Also known as the storm drains.The polluted water that goes down it goes to a place that cleans the water then it goes into the river also known as the Rio Grand.In that little cleaning area they use small bugs to eat the pollution thats in the water. Those bugs are very important to the cleaning of the water.

Eleanor said
at 3:29 pm on Mar 8, 2010
That's interesting Mirisa

NM-Marisa said
at 9:14 pm on Mar 9, 2010
Wow! Thanks Eleanor!

Eleanor said
at 11:02 am on Mar 17, 2010
AWESOME I DID'T KNOW THAT MARISA

Eleanor said
at 11:04 am on Mar 17, 2010
i DID NOT KNOW THAT IF A DOG POOPS IT WAS BAD

Eleanor's Student Page – Pen Pal of Marisa at Navajo Elem.

Hello my name is Eleanor and I go to school in Holden Massachusetts. We are learning about water and why it is important to preserve it. Recently I learned that only 1% of water is drinkable. That is what I learned today!

Watershed Model Activity

Today we had a lesson with Mr. Lafley on watersheds. We made an illustration of a watershed and we saw how when it rains it all collects in the center of two hills. Then Mr. Lafley put food coloring on the edges and we all took turns spraying the food coloring which trickled down as we sprayed it. Now I will tell you exactly what a watershed is. A watershed is a tributary that water flows through to join a larger lake, river, or ocean.

Next I will tell you about how topography can change Wachusett Reservoir. Topography can change Wachusett Reservoir by having the water go down slower because of some of the bumps in the hill.

Now I will tell you how some things can pollute the reservoir. 1.) If a truck that is carrying oil or gasoline gets hit by something or bumps into something some gasoline or oil could trickle out of the container. And say a gallon poured out and slid down to the

reservoir, that would ruin 1,000,000 gallons of H2O, (which is water) and there are only 65,000,000,000 gallons of water. If you think about it that is a lot of water.

And that is what we learned about with Mr. Lafley today!

Rivers

Today we had a lesson with Mr. Lafley on how our local watershed can connect with a larger watershed. It can by following smaller rivers to either ponds, other rivers, and reservoirs then eventually the Atlantic Ocean. When I found out it could be carried to the Atlantic Ocean I was so surprised.

Now I will tell you about how the water here can impact other countries. It can impact other countries by say a car had some gas leaking out of it, it could go downhill into Chaffin Pond. Then it could eventually get into the Atlantic Ocean, after that it could harm all the sea creatures and the other countries.

Lastly, i'll tell you how pollution from Chaffin Pond can pollute the watershed it can by getting into the Atlantic Ocean and it could kill of the fish. That's why there are smaller fish than a while ago. Also the fish died because the fishermen out there caught all the little fish.

And that's what I learned with Mr. Lafley today!

P.S [what ocean watershed is your school apart of?]

Tributary Role Play

Today I learned how to play tributary role play. I learned that in the end of Fall and early Winter, tributary's [small rivers] tend to go extremely slow. In the Summer there is one thousands gallons of water after another. But in the Spring, OMG, the Spring is seven thousand gallons of water after another, it's crazy. So that is what I did in class yesterday!

Extra Information About Tributaries

~ Water travels from higher elevations to lower elevations
~ Fastest at the beginning of Spring
~ Slowest at the end of fall beginning of Winter

Guest Speakers

Yesterday two guest speakers came in. They talked to us about where our drinking water comes from, and the average amount of water used in a shower, bath, and many other things.

First they told us that last year over 80 million gallons of water was used just by leaking, dripping faucets, and running water too. Then they told us that water tanks in Holden can hold up to 300-700 gallons of water.

Another thing they told us is that there are 1,000 fire hydrants in Holden. That is what I learned today with the two guest speakers!

Hannah said
at 6:20 pm on Mar 9, 2010
good job!

NM-Marisa said
at 9:16 pm on Mar 9, 2010
That is good and interesting Eleanor!

NM-Marisa said
at 11:47 am on Mar 11, 2010
Know that I read it again I am really starting to think.

Eleanor said
at 11:01 am on Mar 17, 2010
great job

Eleanor said
at 11:05 am on Mar 17, 2010
THANKS FOR COMMENTING GUYS

NM-Marisa said
at 11:50 am on Mar 23, 2010
Good job Eleonor!

NM-Jesus said
at 12:40 pm on Mar 23, 2010
eleanor i like it because it puts a picture in my mind

Maddy said
at 12:19 pm on Mar 29, 2010
that is interesting

RIVER Xchange

Innovative, Long-term Outreach Project for Upper Elementary Students Integrates Water Resources Topics with High Tech Pen Pal Partnerships

2010 Report

July 16, 2010

Presented by
Experiential EE, LLC

experiential ee

EXECUTIVE SUMMARY

RiverXchange is an innovative, long-term outreach project that integrates water resources topics with computer technology, writing, and a hands-on curriculum to meet specific, measurable goals. For the past three years, upper elementary grade classes in New Mexico have become "high tech pen pals" with upper elementary grade classes across the U.S. or world to learn about the geography, culture, and ecology of each other's rivers. The curriculum includes a field trip/service learning project at the Rio Grande (or local river), hands-on activities from *Project WET* and the *Rio Grande Bosque Education Guide*, and guest presentations by local water resources professionals.

In Spring 2010, RiverXchange provided a means for 28 fourth or fifth grade classes to explore *The Big Water Questions* in depth. The number educated was 585 students (331 New Mexico, 254 partners) and 28 teachers (14 New Mexico, 14 partners). Each of the 14 New Mexico classes – seven from Albuquerque and seven from Rio Rancho – was partnered with a fourth or fifth grade class in another U.S. state. Together, students learned about their own local river, watershed and water resource issues and posted what they learned (text, photos, videos) on shared private wiki websites. This sharing enabled them to learn about similar water resource issues in a distant watershed.

In total, the 2010 project required $17,800.00 in cash and $11,155.00 in in-kind contributions/resources. All components of the project were provided free of charge to New Mexico teachers. Technical support was provided free of charge to partner teachers. All participating teachers loved the project and most will be able to participate again in 2010-2011.

This year's highlights/innovations included:

- Added more guest speakers
- Created separate local field trips for Albuquerque, Rio Rancho
- Added service learning component to field trip
- Rotated stormwater exhibit through all New Mexico classes
- Created wiki template for teachers
- Scheduled all guest speakers during New Mexico teacher workshop
- Held online wiki training for partner teachers
- Created three online student surveys
- Created separate online teacher surveys (New Mexico and partner)
- Distributed U.S. Geological Survey water posters to all teachers, free of charge
- Distributed Middle Rio Grande Stormwater Quality Team materials to all New Mexico classes
- Recognized teachers' efforts by notifying superintendents/principals

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PROJECT DESCRIPTION

Purpose of Project

The goals of RiverXchange are to deepen students' and teachers' understanding of and appreciation for their local river ecosystem, motivate participants to protect local water resources by conserving water and keeping source water clean, and provide a high quality, high impact outreach opportunity for funding partners and in-kind partners. We want students to gain a personal connection to their own river ecosystem and a sense of pride in it, as well as a personal connection to another river ecosystem and the students who live near it.

As organizers of children's water festivals and other water resources outreach in Albuquerque, Rio Rancho and Santa Fe, we realized years ago that few New Mexico elementary teachers were routinely incorporating water concepts beyond specific facts required by standards and benchmarks. Our response was to create RiverXchange -- a long-term project that is so unique, we hope it will entice teachers to use water as a theme to teach standards and benchmarks throughout the entire school year. As with our water festivals, RiverXchange frames its outcomes as "guiding questions" which are known as *The Big Water Questions,* described below.

The Big Water Questions

The long-term goal of RiverXchange is that students understand these questions and can formulate logical, fact-based answers by the time they finish elementary school. Most questions were developed by children's water festival Steering Committees from Albuquerque, Santa Fe and Rio Rancho. We believe that students who can synthesize water facts to understand larger water questions and issues will have the proper critical thinking skills and foundation for further discussion in middle and high school so that they will become informed citizens and voters on water issues. *The Big Water Questions* are integrated into all aspects of our water resources outreach projects.

- Why is water so important to life?
- How do all living things depend on each other?
- What is the water cycle?
- What is a watershed?
- Where does my drinking water come from?
- Where does my wastewater go?
- What makes water dirty?
- How much water does my family use each day?
- Who are the other water users in our society?
- Who owns our water?
- How can *I* protect our water?

Background

RiverXchange began in 2007-2008 as a pilot project of the New Mexico Water Conservation Alliance (NMWCA) and the National Great Rivers Research and Education Center (NGRREC), featuring partnerships between two fourth grade classes in Albuquerque, New Mexico, and two fifth grade classes in Godfrey, Illinois. Jessica Pascoe of NGRREC developed the project name, and coordinated activities for the classes in Illinois. Amelia White, the New Mexico coordinator, developed the basic curriculum, which integrates language arts, social studies, math and science

standards through hands-on activities to teach water resources topics. Each coordinator then arranged field trips bringing the classes to a video teleconferencing facility to share what they learned with their partner class, three times during the school year. The goal was to create an opportunity for teachers to learn how to utilize technology and integrate water resources topics into the curriculum, providing a sophisticated and fun way to motivate their students.

After the pilot project, we realized that the use of live video teleconferencing would not enable the program to grow, so after much research, we decided to use a web-based technology called a wiki. This technology enabled us to overcome limitations such as the high cost, availability and time zone logistical problems associated with video teleconferencing. In contrast, wiki technology is free and accessible to anyone who has access to a computer. We also realized that a website format would actually be a better forum for discussion, making it easier to share pictures and in-depth student writing, creating a record of the learning experience for students to reflect on, and giving kids experience with important computer technology. So in Spring 2009, we updated the curriculum and new goals were established to improve students' skills and confidence in the areas of communication, computer technology, organization and analysis. This year (year three), the curriculum remained much the same, but we focused on improving the wiki experience by creating a template for all wikis, and developing an online training for our partner teachers.

For Spring 2010, we opened up the project to both fourth and fifth grades but received a much greater response from fifth grade teachers, probably because the curriculum aligns better with their science standards. Our hope continues to be that the curriculum will easily integrate into a teacher's routine, especially since nearly all U.S students must now go to a computer lab every week or two. In addition, we hope this project will give upper elementary teachers more confidence to incorporate science and water topics into the curriculum.

Financial Support and Project Management

The New Mexico Water Conservation Alliance (NMWCA) serves as the fiscal partner for RiverXchange. NMWCA is a nonprofit 501(c)(3) corporation comprised of municipal and industrial water conservation professionals dedicated to water conservation education and networking. Fundraising, design, planning and implementation of RiverXchange was carried out by Experiential EE, LLC, a local project management consulting firm owned by Katie Babuska. Amelia White (contractor to Experiential EE, LLC) and Katie Babuska co-coordinated this project. The project timeframe was December 1, 2009 through June 30, 2010.

Major Sponsors

- Middle Rio Grande Stormwater Quality Team
- Southern Sandoval County Arroyo and Flood Control Authority
- PNM
- Lockheed Martin/Sandia National Laboratories

In-kind Partners

- Albuquerque Bernalillo County Water Utility Authority
- Bernalillo County Environmental Health
- Bernalillo County Cooperative Extension, 4-H
- Bernalillo County Public Works
- City of Albuquerque Open Space
- City of Rio Rancho
- Friends of Rio Rancho Open Space
- IDEAL-NM
- Keep Rio Rancho Beautiful
- Middle Rio Grande Stormwater Quality Team
- New Mexico Museum of Natural History & Science
- Sandoval County Cooperative Extension, 4-H
- U.S. Bureau of Reclamation

Major sponsors provided $17,000.00 in cash contributions. Sponsors and partners were recognized in many ways including on our website (www.waterfestnm.com), in presentations and in newspaper articles. In-kind contributions/resources from our sponsors to support New Mexico classes, valued at $10,236.00, were in the form of classroom guest speakers, field trip docents, staff training and internet software resources by IDEAL-NM, workshop space, exhibit loan and classroom resources. In-kind contributions/resources to support partner classes, valued at $1,050.00 were in the form of classroom guest speakers and field trip docents. They also received cash contributions of at least $800.00 from parents for field trip bus transportation. **In total, the 2010 project required $17,800.00 in cash and $11,286.00 in in-kind contributions/resources.** Cash contributions covered all costs for New Mexico teachers as well as technical support/training for partner teachers. Expenses included:

Substitute teachers for the workshop
Bus transportation for the field trip
Portable toilet rentals for the field trip
Curriculum and field trip supplies and materials
Coordination services

Participant Selection

This year, we opened up the project to fifth grade teachers as well as fourth, because the New Mexico state science standards lend themselves particularly well to our curriculum. Ultimately, we received far more responses from fifth grade teachers (only one New Mexico fourth grade teacher participated), so we our plan in 2010-2011 is to focus on fifth grade. Participation included 155 students and seven teachers from Albuquerque, 176 students and seven teachers from Rio Rancho, and 254 partner students and 14 partner teachers participated. In total, 585 students and 28 teachers participated.

Our partners this year were almost all teachers who had previously participated in RiverXchange, and a few recruited other teachers from their schools. U.S. partnerships came from Connecticut, Idaho, Massachusetts, North Carolina, and Virginia. These partner teachers are exceptionally

motivated professionals, who came to the project with significant knowledge of water resources topics and a willingness to participate even though we could not cover the cost of their field trip or provide a live workshop.

Participating schools and partnerships

Maggie Cordova Elementary - Rio Rancho, NM	Squadron Line Elementary - Simsbury, CT
Maggie Cordova Elementary - Rio Rancho, NM	Parkwood Elementary - Jacksonville, NC
Sandia Vista Elementary - Rio Rancho, NM	Parkwood Elementary - Jacksonville, NC
Sandia Vista Elementary - Rio Rancho, NM	Parkwood Elementary - Jacksonville, NC
Sandia Vista Elementary - Rio Rancho, NM	Dawson Elementary - Holden, MA
Rio Rancho Elementary - Rio Rancho, NM	Parkwood Elementary - Jacksonville, NC
Rio Rancho Elementary - Rio Rancho, NM	Crimson Point Elementary - Kuna, ID
North Star Elementary - Albuquerque NM	Brunson Elementary - Winston-Salem, NC
North Star Elementary - Albuquerque NM	Brunson Elementary - Winston-Salem, NC
North Star Elementary - Albuquerque NM	Brunson Elementary - Winston-Salem, NC
North Star Elementary - Albuquerque NM	Central Elementary - Simsbury, CT
Navajo Elementary - Albuquerque NM	Dawson Elementary - Holden, MA
Navajo Elementary - Albuquerque NM	Rappahannock County Elementary - Washington, VA
Navajo Elementary - Albuquerque NM	Squadron Line Elementary - Simsbury, CT

Curriculum

A key component of the RiverXchange project is its hands-on curriculum. It was developed to help students reach for deeper meaning through hands-on learning, and then demonstrate understanding by sharing their knowledge through a high tech pen pal partnership. Designed to be implemented over the course of an entire school year, the curriculum was actually implemented the last two years in only 14 weeks, during the spring semester. This compressed schedule was due to the timing of funding.

The curriculum uses **water** – and specifically the local river -- as a theme to teach curriculum standards and benchmarks in science, social studies and language arts through computer technology. Many elementary teachers think of water as a science topic only and do not integrate water topics in other core subjects. RiverXchange shows teachers how easy and fun it is to use water as a theme and also satisfy multiple teaching requirements at the same time. From our perspective, the local river/watershed offers a logical and interesting focal point for learning about key water resources issues.

Through the curriculum, students examine many aspects of their river through hands-on activities in the classroom and a field trip to the local river or tributary. Each class shares what they are learning with their new pen pal class every week or two via a private wiki which can be edited by either class. Through RiverXchange, students take pride in sharing their knowledge of

their local ecosystem, and learn from their peers about another river ecosystem. Comparing the two (usually very different) places gives students a broader understanding of the importance of a river ecosystem to human and other life. Students gain the unique opportunity to share personal experiences and ask questions about a distant place. Teachers feel this kind of personal connection is a big deal for kids – many of whom have never traveled beyond their city limits.

The basic year-long curriculum was developed in 2007-2008, with some modifications made each year. The curriculum is divided into three units. Each unit incorporates our outcomes in the form of *The Big Water Questions*, as shown below:

Unit 1: Understanding a Watershed

- What is a watershed?
- Where is my watershed?
- What is the water cycle?
- What makes water dirty?
- How can *I* protect our water?

Unit 2: Human Connections to the River

- Where does our drinking water come from?
- Where does our wastewater go?
- Who are the other water users in our society?
- Who owns our water?
- How much water does my family use each day?
- How can *I* protect our water?

Unit 3: River Ecosystem

- Why is water so important to life?
- How do all living things depend on each other?
- Who are the other water users in our society?
- How can I protect our water?

The hands-on activities in the curriculum come from Project WET's *Curriculum and Activity Guide* and *Discover a Watershed: The Watershed Manager Educators' Guide*, and from the *Rio Grande Bosque Education Guide*, published by the New Mexico Museum of Natural History and the Rio Grande Nature Center/State Parks. All activities are correlated to specific New Mexico state standards and benchmarks for science, social studies and/or mathematics. Also, all activities -- because they involve students posting written information on the wiki -- address the language arts standards for writing. Teachers also have the option to address the oral communication standards such as "demonstrating competence in speaking to convey information" by having students do videos, podcasts, or live webcam sessions. **For the complete RiverXchange Curriculum, including the New Mexico Standards and Benchmarks addressed by the activities, see Appendix 1.**

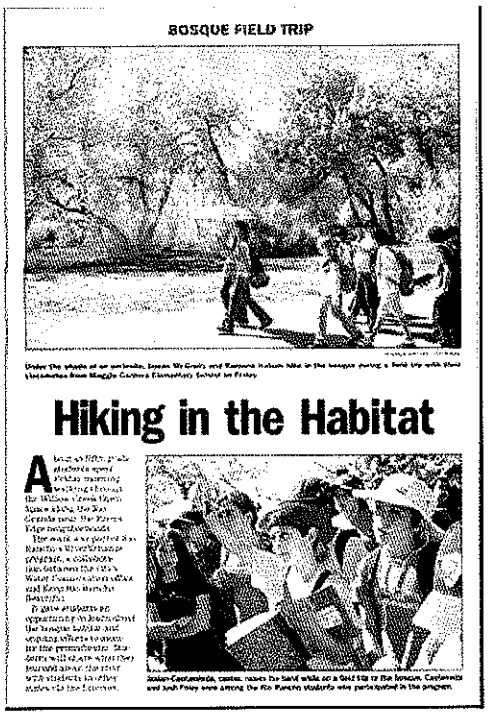
Field Trip/Service Learning Project

We require that all classes go on at least one field trip to their local river. For New Mexico classes, we also incorporated a service learning component this year, but this was optional for partner classes. We coordinated separate field trips for Albuquerque and Rio Rancho students, primarily to help Rio Rancho students understand and appreciate their own stretch of the Rio Grande.

Albuquerque students were taken to Candelaria Farms, which is operated by the City of Albuquerque's Open Space program. Located just north of the Rio Grande Nature Center, this amazing piece of undeveloped land in the middle of the city serves both as wildlife habitat and a shrub nursery. Each class spent about four hours at the site where their service learning project was to transplant seedlings into larger containers for eventual planting in the bosque. Students walked to nearby ponds to look for creatures living in the bosque, and learned how important the bosque is to wildlife.

Navajo Elementary students re-pot native Golden Currant seedlings at Candelaria Farms.

Rio Rancho students were taken to Willow Creek Open Space in Rio Rancho. Outreach educators from the City of Rio Rancho, Keep Rio Rancho Beautiful, and Friends of Rio Rancho Open Space served as docents. Located off Route 528 in the Willow Creek subdivision, this beautiful public area is relatively unknown to city residents. Each class spent about four hours at the site where their service learning project was to create and throw seed balls as part of a native plant re-population program. Students were taken on a hike near the river to observe wildlife, and learned about the importance of the bosque to wildlife. They also visited a groundwater monitoring well where they learned about the data being collected and how groundwater rises and falls. We asked teachers to point out the large stormwater ditch/arroyo that follows the road off Route 528 to this open space site, and talk about how pollution ends up in the river. RiverXchange received some good public exposure through two newspaper stories (*Albuquerque Journal* 5/8/10, and *Rio Rancho Observer* 5/12/10) about the Rio Rancho students' field trip, although the *Journal* incorrectly reported the project's sponsors.



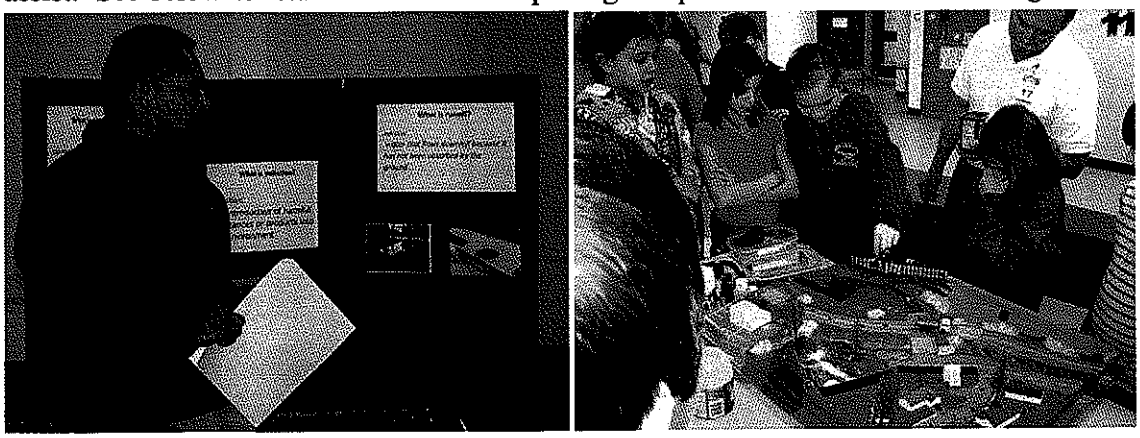
BOSQUE FIELD TRIP

Hiking in the Habitat

Bosque bound

Guest Speakers

Teachers are strongly encouraged to invite guest speakers into the classroom to help carry out the curriculum. Throughout the curriculum, a teacher has the option in many cases of doing a hands-on activity with students herself/himself, or inviting a guest speaker to the classroom to present the activity. All New Mexico teachers took advantage of all guest speakers, which they said really helped to minimize their work load and reduce stress. Guest speakers -- usually water resources professionals -- often introduced technical information that was completely new to the teacher. In other words, teachers learned a lot, too! **See Appendix 2 for a list of all guest speakers for New Mexico teachers.** We did not assist partner teachers with finding guest speakers but we did provide them with names of organizations in any state that may be able to assist. See below for student comments. Spelling and punctuation are unedited/original.



Anthony Chavez (Bernalillo County Public Works, left) and Joe Alderete (U.S. Bureau of Reclamation, right) help students in Albuquerque and Rio Rancho learn about nonpoint source pollution.

Today in class a guest speaker came and we learned about water pollution. Water can be contaminated with a lot of things, like gases, trash, and even dirt. Farmers who put pesticides on their crops are polluting the water. When it rains, the runoff picks up the pesticides and carries them into the river. People who are too lazy to get the oil changed properly in their car, often put the oil down the storm drain, which really does not go to the waste water treatment plant. It leads to the river, where all the pollution goes that is put down the storm drain. Like people who litter, for instance. Your friend throws a candy wrapper on to the ground, and where does it go, you ask? Why to the river, of course! Everything that is on the ground eventually goes into the river. Dog waste, which lots of people think is good for the soil, is really not, because they're carnivores. So, those people don't bother to pick up dog waste, and it goes into the river. To sum it all up, we must all try to protect our water. -- Melissa, Grade 5, Winston-Salem, NC

Yesterday we had somebody come in and talk about the Rio Grande water shed. The guest speaker had a model of a town with rivers and forests. Everyone got salt shakers. Some had sand, while others had substances that we were pretending to use as fertilizers and bug repellent. Someone had a little bottle filled with muddy water. We pretended that was the oil from the cars. Then we dumped all of those things where they would be in real life. The land was so dirty! Then we squirted the town with water to make it rain. The water made the fertilizers, sand, etc. flow into the river. You wouldn't believe how polluted the river was! Then, we tried again with less of the fertilizers, bug repellent, sand, and oil. It was amazing how just a little bit could make such a big difference. The presentation was called, "Why the River Runs Brown". We also learned some definitions. Do you know what you call it if it doesn't rain for a long time and then it starts raining again? The first rain after a while is called the First Flush. We also learned about how we could help the environment (taking shorter showers, etc.) - Mason, Grade 5, Albuquerque, NM

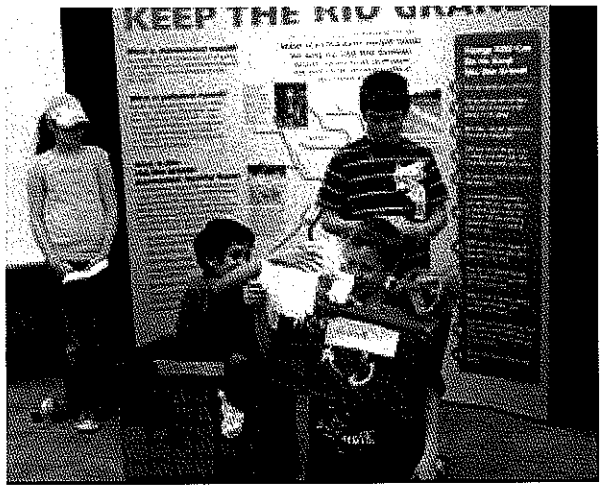
I learned about our water shed yesterday. I learned that most people produce so much fertilizer, pesticides and oil in between rainfalls (witch aren't often) that it greatly pollutes the lakes, rivers, ext. and that after the first flush the pollution goes to about 3/4 of the original pollution, and after the second flush there is about 1/4 the original pollution. I also learned that we are trying to cut down on the pollution problem. -- Chris, Grade 5, Albuquerque, NM

Stormwater Exhibit Rotation

One of our new sponsors, the Middle Rio Grande Stormwater Quality Team, owns a large (8'x8') portable exhibit about stormwater and what the public can do to help keep the Rio Grande clean. We coordinated with New Mexico teachers to rotate the exhibit through each school for about two weeks at a time. The exhibit was displayed in a school lobby, library, hallway, cafeteria stage and an unused classroom. In all cases, we set up the exhibit the same day we met with participating RiverXchange classes to talk about the exhibit. We shared that our hope was that students would become "stormwater ambassadors" at the school.

Teachers were encouraged to use the exhibit in any way they wanted. While most teachers said they did not have the time to do something special, teachers at Maggie Cordova Elementary in Rio Rancho created an incredible learning opportunity for their RiverXchange students as well as their entire school. Students were divided into groups of four or five with the task to write a short skit about what they learned. Costumes were fashioned out of ordinary materials. The small groups then performed their skit for all other classes at the school. With 1,000 students in this school, it took over two weeks to finish the job!

In addition, New Mexico teachers were provided with graphs about pollution in the Rio Grande which show gross floatables and sources of *e. coli*, and they were strongly encouraged to view *Keep the Rio Grand* video clips on the Middle Rio Grande Stormwater Quality Team's website (http://www.keeptheriogrand.org/downloads.htm).



Maggie Cordova Elementary students perform their stormwater skit for another class.

Teacher Professional Development Workshop

RiverXchange kicked off this year with two teacher workshops: January 29 for Rio Rancho teachers and February 4 for Albuquerque teachers. The workshops included training on how to implement the activities in the curriculum, and how to create and manage a class wiki. We also collected signed permission forms which gave parents information about the project to help them decide whether to allow students to participate. For New Mexico teachers, all aspects of this project (including substitute teachers for the workshop day, workshop materials, guest speakers, field trip bus transportation, and on-going technical support) were provided free of charge.

At the workshop, New Mexico teachers were introduced to the curriculum and guest speakers. They had the opportunity to try out some of the Project WET activities in the curriculum, and received the *Project WET Curriculum and Activity Guide*. Guest speakers from various agencies in Bernalillo and Sandoval Counties were on hand to schedule classroom presentations on drinking water, wastewater, water quality and historic uses of the river. Albuquerque teachers met with the Albuquerque Open Space Education Coordinator to schedule their service learning field trip to Candelaria Farms, near the Rio Grande. Rio Rancho teachers met with educators from the City of Rio Rancho and Keep Rio Rancho Beautiful to schedule their service learning field trip to Willow Creek Trail, a City of Rio Rancho Open Space property on the Rio Grande.

Albuquerque and Rio Rancho teachers learn the wiki technology at our teacher workshops.

Wiki Technology

One of the most important aspects of this project was teaching teachers how to how to use the wiki technology. A wiki enables users to edit any page or to create new pages within the wiki web site, as opposed to a blog, which is simply one page consisting of posts organized chronologically. We chose PBwiki as our web-based communication network because it offers excellent technical support, plenty of storage space (an important consideration when uploading graphics, photos and video clips), and the option of deciding who gets access to the wiki and what level of access.

Prior to the workshop date, all teachers were introduced to the RiverXchange teacher wiki, which was created to serve as the chief communication tool between project coordinators and participating teachers. It contains important documents, instructions, curriculum and hands-on activity lesson plans, as well as serving as a template for all teacher wikis. It also saves coordinators a lot of effort (compared to emailing) because teachers are automatically notified when we make changes to the site.

At the teacher workshop, New Mexico teachers learned how to use PBWiki by creating their own class wiki. Coordinators showed teachers how to organize their site, starting with a main page and adding links to pages for each activity in the curriculum, as well as a page about appropriate wiki behavior for students. Next, teachers learned how to manage access to their private wikis by creating accounts for students as writers, and adding parents and administrators as readers. Then each teacher created links on the sidebar to individual pages for each student, where they would write about their learning experiences and directly communicate with a partner in the other class. By the end of the day, New Mexico teachers invited their partner teachers onto their class wiki. From that point forward, we provided technical support to all teachers, making sure that each teacher was able to do the essential tasks, such as creating student pages and uploading photos. In addition, we encouraged all teachers to solicit technical assistance from their school's computer/IT coordinator by adding this individual to the approved list of wiki users.

Online Partner Training

One of the challenges we have faced since adopting the wiki format is providing adequate training for our partner teachers. While they are exceptionally motivated teachers, it is difficult for any of us to learn a new technology. This year, we enlisted the assistance of IDEAL-NM, a

joint program of the New Mexico Public Education and Higher Education Departments that provides eLearning services to New Mexico PK-12 schools, higher education institutions, and government agencies. In December, we attended a short course at their facility to learn how to use Blackboard, SoftChalk and Wimba Classroom, and they agreed to provide us a portal to use these technologies.

We used Wimba Classroom, a virtual classroom environment similar to web teleconferencing, to hold an online training where partner teachers could log in at an appointed time to participate in a live discussion and demonstration of the basic wiki procedures. Through this technology, participants can see and hear the presenter in a video module, see the presenter's computer screen as they demonstrate procedures, and communicate with the presenter to ask questions. Participants can also be seen and heard by the presenter if they have a webcam; otherwise, they can talk with the presenter by dialing in to the software from their telephone, or chat in a text window. With the Wimba Classroom open in one window, we asked teachers to have another window open with their own wiki, so that they could try out the procedures as we demonstrated them. Teachers who had previously participated in RiverXchange told us that the training did help them understand the wiki technology better.

Although the online training was much better than what we were able to offer in 2009, online communication was somewhat awkward, especially with a large group of participants logged on at once. Next year, we may try to hold more than one training session – perhaps one main session for all partner teachers, then a follow-up session for each participating school. We hope that these follow-up sessions will give teachers the opportunity to see the procedures more than once and to ask further questions in a smaller-group format. We also plan to mail a package of written instructions to teachers.

Teacher Participation

While we asked and hoped that all teachers would follow the entire curriculum, we knew that the year-long curriculum would be difficult to implement in just 14 weeks, especially during the spring semester which typically includes large interruptions (e.g., snow days, spring break, state testing). As with last year's program, this short time frame was due to the timing of the funding, which became available in December 2009. In fact, the only teacher criticism of RiverXchange has been that it is very difficult to carry out in 14 weeks/semester. Coordinators spent many hours providing technical assistance by email or telephone, resulting in a greater overall success rate with the wikis – over 70% of teachers had a moderate to high level of activity on the wiki. The great news is that 100% of New Mexico classes went on the field trip, scheduled all the available guest speakers, and posted at least some information on the wiki. Our vision for the future is that individual teachers will participate in the program year after year, gaining expertise with the technology and the subject so that they are able to offer an increasingly richer experience to their students.

This year we created a template for each wiki, based on what worked best for teachers last year. On the main page, there are links to a page for each activity, where teachers could post photos and commentary about what they did. On the sidebar, there are links to each student's page, where they wrote about what they learned from the activities. Each student was assigned to a specific partner, so they could read and comment on each other's pages. **For examples of these**

class wiki pages, see Appendix 3.

There were many challenges that prevented teachers in different situations from fully utilizing the curriculum and the wikis. Since the project occurred during the spring semester, when standards-based assessments (SBA) take up two or three weeks of time, many teachers simply could not find enough time to do all the activities. Many of our partners in other parts of the U.S. missed a week or more of school due to severe weather and school closings. As before, we observed varying levels of participation, ranging from teachers who completed and documented nearly all the activities, to those who updated the wiki only a few times. About 30% of the wikis show that both partners were highly active, with lots of information and student writing posted. On about 50% of the wikis, one partner was more active than the other, and only about 20% of wikis show minimal activity by either partner. From regular conversations with teachers, we know in most cases they actually implemented the hands-on portion of the curriculum, but struggled with technological difficulties or lack of time to get students into the computer lab.

EVALUATION

Another key component of the RiverXchange project is its specific, measurable goals. First, we want students to be able to synthesize what they have learned in each unit. Second, we want students to understand and be able to formulate logical answers to *The Big Water Questions*. These outcomes are difficult to measure but we think we are moving closer than ever. In addition to reviewing individual student writing on each class wiki, this year we added three online student surveys and separate online teacher surveys (New Mexico and partner).

Student Surveys

We created three student surveys – one for each unit – that included fun activities followed by a quiz. **See Appendix 4 for a computer screen shot of each survey.** Unfortunately, we were not able to customize these surveys to distinguish between answers from New Mexico students and partner students. Answers in red are the correct answer.

Survey Results: Unit 1

1. **What is a watershed?**

A shed in the back of your house where you keep your water.	9.1%
A lake or a river.	19.3%
An area of land that drains to a river or lake.	71.6%

2. **What is the name of your watershed?**

   Answers varied

3. **Where does your river start (headwaters) and end (delta or mouth)?**

   Answers varied

4. **How much precipitation does your area receive each year?**

Less than 10 inches.	30.3%
11-30 inches.	29.2%
31-50 inches.	30.3%
51-70 inches.	6.7%
More than 70 inches.	3.4%

5. **How can YOU protect your water from pollution? (mark all correct answers - there may be more than one!)**

Pick up trash.	93.3%
Never throw anything down the storm drains.	8.9%
Pick up dog poop.	82.2%
Flush medicines down the toilet.	5.6%
Take oil to be recycled instead of dumping it on the ground.	86.7%
Use extra fertilizers and pesticides right before it's going to rain.	10.0%
Take your car to a car wash instead of washing it at home.	32.2%
If your car is leaking fluids, just wash them off the driveway into the gutter.	22.2%

Student Survey: Unit 2

1. **From what source(s) does your community pump its drinking water? (mark all correct answers - there may be more than one!)**

Glaciers and icebergs	8.1%
Aquifer (ground water)	70.3%
Ocean	10.8%
Lake(s)	54.1%
River(s)	73.0%
Clouds	10.8%

2. **How can you conserve our precious drinking water? (mark all correct answers - there may be more than one!)**

Drink less water	13.9%
Take shorter showers	91.7%
Drink bottled water, soda or juice instead	22.2%
Water plants when it is cool so less evaporates	16.7%
Fix leaks in your faucets, toilets, and outdoor water pipes	83.3%
Turn off the water when brushing your teeth	86.1%

3. **Where does your household waste water go, after it goes down the drain in your house?**

Into the storm drains.	8.1%
Straight into the river or the ocean.	16.2%
To a sewage treatment plant.	54.1%
To a septic system (could also be correct)	18.9%
It evaporates.	2.7%

4. **Which water rights rule applies in your area?**

Riparian Rights – people who own land bordering a water source get to use that water however they choose.	75.7%
Prior Appropriation (first in time, first in right) – whoever was using the water first has first rights to the available water	24.3%

5. **Who (or what) are the other water users in our society, besides people's homes? (mark all correct answers - there may be more than one!)**

Wildlife and plants.	70.3%
Swimming pools and playing fields.	62.2%
Factories, power plants and mines.	56.8%
Farmers.	78.4%
Hospitals.	59.5%
Schools.	59.5%

6. **If you did the activity Every Drop Counts, how many gallons of water did you use on the day you had the biggest water use?**
   Responses varied.

Student Survey: Unit 3

1. **How are river ecosystems important to humans? (mark all correct answers - there may be more than one!)**

Humans use rivers for agriculture and/or transportation.	87.5%
If our river ecosystem is polluted, we won't be able to go swimming in the river.	41.7%
If our river ecosystem is healthy, it is better for fishing and for our drinking water.	83.3%
They don't matter - we don't really need the river for anything.	8.3%

2. **What are some ways to tell how healthy a river is? (mark all correct answers - there may be more than one!)**

If the river is full of dirt, it is NOT healthy.	58.3%
If there are bugs in it, it is NOT healthy.	4.2%
If there are lots of different kinds of water bugs, it IS healthy - certain types of bugs can't live with pollution.	79.2%
If there are lots of different animals and plants (especially native species) living in and around the river, it IS healthy.	75.0%
Even if the river looks clean and smells ok, it might still not be healthy, because there are some kinds of pollution we can't see or smell.	75.0%

3. **Why are aquatic insects (water bugs) important to the river's food web?**

Lots of other animals feed on them, either in their larval or adult form.	95.8%
They are not important, they are pests and make the river gross.	0.0%
Plants eat them.	4.2%

4. **Name three of the most important animals or plants in your area that depend on your river, and describe how each one needs the river to live.**
   Responses varied. Examples:

   Some animals, macroinverterbates and other organisms need clean water to live. The water needs to be clean because intolerant macroinvertabrates such as Mayflies, stoneflies and caddiesflies. They need clean water to survive.

   Fish need to be able to swim and drink the water. trees need the water from the river or our forest will look like a desert and that means less oxagen for us. and all so the animals can live there.

   Silvery minnow -- needs clean river water. porcupine -- needs Bosque. Bosque needs the river. cottonwood -- needs river water/flooding.

5. **Name three things that are different between your river's ecosystem and your partners' river ecosystem.**

   Responses varied. Examples:

   Mines in North Carolina and hers is in New Mexico. They have different animals, insects and other organisms. They get less rain than we do and their climate is warm and dry.

   We have cottonwoods. They have other trees. The Rio Grande is long but is isn't very wide. Their river is really wide. The Rio Grande ecosystem where we live does not have crayfish.

Teacher Surveys

We created one survey but were able to have New Mexico teachers and partner teachers answer it separately. This way, we were able to understand differences among the two groups.

Teacher Survey Questions

1. What was the most valuable part of RiverXchange for you and your students?
2. How important/valuable was the pen-pal component of the project to your students' learning experience?
   a. Not very important b. Fairly valuable c. Extremely valuable
3. Frequency of communication:
   a. Not at all b. Not very much c. Fairly often d. Very often
4. How much did your students post on the wiki?
5. How much did you hear from your partners?
6. What barriers or difficulties did you encounter in implementing this project (i.e. classroom time, computer time, funding, your technical comfort level)?
7. What was the impact of the field trip on student learning?
8. What was the impact of the guest speakers who visited your classroom?
9. What else could RiverXchange coordinators do to help teachers succeed with the project?
10. What would you do differently next time, or what advice would you give teachers who are new to this project?

Survey Results

New Mexico teachers

- Guest speakers, water resources topics, pen pal component, field trip all very valuable
- Project was really fun for teacher and students
- Semester time frame was difficult
- Computer lab time was difficult
- Technology learning curve was a bit of a challenge to some

Partner teachers

- Pen pal, technology very valuable
- Really fun for teacher and students
- Computer time was difficult
- Semester time frame was difficult

Wiki Content Review

As described in the *Teacher Participation* section of this report, classes varied in the amount of writing/postings. This relates to the amount of time they spent in the computer lab. In a few cases, teachers used RiverXchange writing time as homework, so students worked from home and from school. We noticed some frustration if one class wrote a lot while the partner class wrote very little. Clearly, the more often students communicated on the wiki, the more fun they seemed to have. We learned that the pen pal component was valuable for a class even if the partner class didn't post very often or at all, because the more active class gained more skills overall and could read and comment on each other's writing.

Overall, students did an excellent job explaining what they learned. Students with stronger writing skills often "graduated" to incorporating graphs and photos, while students with weaker writing skills spent most of their computer lab time doing basic writing. Some teachers required their students to edit their writing before posting, but most teachers had their students complete a writing task and move on to the next one.

We have learned from teachers that the lack of student posting does not mean that no learning or participation in the project took place. On the contrary, teachers loved this project but admitted that adequate computer time and the demanding curriculum were difficult to accomplish. Even so, almost all of them told us they want to participate again next year!

Student Writing

RiverXchange utilizes web-based technology to provide an immediate and on-going communication link between project coordinators, teachers and students. The project is able to show impact because students regularly write about what they are learning. Students' comments (examples below) reveal their understanding of many issues, including our project outcomes (*The Big Water Questions)*. These broad questions purposefully require students to synthesize everything they know in order to answer them. Spelling and punctuation are unedited/original.

> *I learned where all of the "brown stinky stuff" and the "yellow liquid" go (after the toilet). First it goes through a thing that separates the big stuff from the little stuff. Then it goes to a tank that separates water from sludge. Then the sludge goes to a separate tank were microbes eat most of the sludge and produce methane gas (farts) that can create electricity. the rest of the sludge goes to the landfill. The water goes to a chlorine tank then into the river. – Kyle, Grade 5, Albuquerque, NM*
>
> *So just remember so you can be able to have enough water for everyone to have some to use, you have to use not to much or to little you have to use the exact amount of water. So that is what I learned while playing Pass The Jug –Jessica, Grade 5, Albuquerque, NM*
>
> *Yesterday(3-1-10), we had a guest speaker come into our room and talk to us about watersheds. A watershed is a piece of land in which snow melt and rain drain into a stream, channel, river, or other body of water. They told us that because of this, pollutants (mainly pesticides) get washed up into the river. Then, they showed us a model that looked somewhat like Albuquerque. They they gave us salt shakers filled with a colored powder (I suspected it was Kool-aide) , and told us to sprinkle them onto the model. These represented the*

pesticides, waste, loose dirt, and oil on the ground. Then, they gave us spray bottles, and told us to squirt the model, pretending to rain (this was the watershed) . All the powder drained into the river, turning it a red- brown color. The guest speaker told us that this was what happened to the Rio Grande, during the first rain of the monsoon season. How horrible to learn that were polluting are river!!! Especially when its our drinking water! -- Megan, Grade 5, Albuquerque NM
The other day I learned that our river is three times over polluted than any river should be. That is why our state should be more aware of their actions like picking up after their dogs, and pick up trash that's near them...So I hope at least some people can learn and realize what I have so they could pass it on and we'll have a cleaner and nice river to look at instead of a river full of trash...it would be nice to have people take responseability for their actions –Kristin, Grade 5, Albuquerque, NM

I have never been to the river and I am really excited to go on our field trip. I have only driven past it on my way to the West Side. –Julia, Grade 5, Albuquerque, NM

Today in class a guest speaker came and we learned about water pollution. Water can be contaminated with a lot of things, like gases, trash, and even dirt. Farmers who put pesticides on their crops are polluting the water. When it rains, the runoff picks up the pesticides and carries them into the river. People who are too lazy to get the oil changed properly in their car, often put the oil down the storm drain, which really does not go to the waste water treatment plant. It leads to the river, where all the pollution goes that is put down the storm drain. Like people who litter, for instance. Your friend throws a candy wrapper on to the ground, and where does it go, you ask? Why to the river, of course! Everything that is on the ground eventually goes into the river. Dog waste, which lots of people think is good for the soil, is really not, because they're carnivores. So, those people don't bother to pick up dog waste, and it goes into the river. To sum it all up, we must all try to protect our water. -- Melissa, Grade 5, Winston-Salem, NC

How does the water cycle relate to weather? Rain falling is part of the water cycle and the amount of rain changes the amount of water in the Rio Grande and that changes the speed of the water. Speeds of the water and when: in the spring the water goes pretty fast because of the snow mealting and water rushing into the river, in the winter it goes really slow and is less full because it is so cold that it rarely rains,during the monsoon season it goes really fast because we get a tonof flash floods. If you are wondering what a flash flood is it is when it rains really hard for about five to ten minuets and we get at least one inch of rain. Do you guys get flash floods? Most of the wast water in new Mexico which is pee and poop goes to a treatment plant and gets cleaned then sent to 3 places: 1 to golf courses,2 the cemetery, and 3 the Rio Grande And there be more in the future. -- Jared, Grade 5, Rio Rancho, NM

In science class, we've been talking about water rights. There are two ways that we stuided that water could be shared. One way is called the Riparian Rights or Common-Law Doctrine. This rule states that the first person to live on property with water on it, can use as much as they want, but they must prove that they have a good reason to use the water. I think that this rule is reasonably fair. I think this because I do think that if you have a good reason to use the water like to suport a family or farm, I believe that that would be fair. The second rule is called the Prior Appropriation Doctrine. This rule states that who ever moves on to a

porperty with water first, no matter what their perpouse is, they can use as much water as they want. I think that this rule is unfair because if a greedy person moves on to a property first, and uses all of the water up for no good reason, all of that water will be wasted, giving other people who move there no water when they might really need it. This is also why I think it is important to save the 3% of drinkable water on our planet. -- Benjamin, Grade 4, Holden, MA

TEACHER RECOGNITION

We acknowledged the exceptional commitment made by our teachers by sending a letter to the associate superintendent in each New Mexico school district and to the principals at our partner schools (with copies to teachers). We emphasized that RiverXchange teachers provide their students with a gifted education by participating in this project, and we commended the principals at these schools for allowing their teachers to take on such a big commitment. All teachers received a set of U.S. Geological Survey water posters (free of charge) and a certificate of participation. New Mexico teachers also received promotional materials from the Middle Rio Grande Stormwater Quality Team.

TAKING IT TO THE NEXT LEVEL

RiverXchange offers teachers the opportunity to integrate water resources issues on a level that works *for them*. For some teachers, RiverXchange provided a little extra push that motivated them to do something really special to explore in depth these and other environmental issues. Rachael Helfrick and Heather Larson, our partner teachers at Dawson Elementary (Holden, Massachusetts), who were partnered with Sandia Vista Elementary and Navajo Elementary in New Mexico, were inspired to organize a school-based children's water festival where students presented activities to over 300 of their schoolmates and parents at several stations. Spelling and punctuation are unedited/original.

On Thursday, April 15th, we had the Water Festival. I was at Tributary Role Play with Reilly and Matt F. People came and we told them about flooding, tributaries, and pollution. There were other stations, too. There were the Water Olympics, Water Cycle Bracelets, and many more. After most of the people left, we went and did some of the stations. Jepardy was most people's favorite. The Water Cycle Bracelets had different color beads that stood for differentparts of the water cycle. Evan had his own display about how the Great Sphinx eroded and how we could reduce the erosion. The Water Festival was really fun, and we had written stories about the life of a water droplet for it. We had to give the water droplet a personality, so a lot of personification (When you give something human-like qualities)was used. I had a lot of fun, and I hope my classmates did, too. It's important to raise awareness of wasting water. -- Wendy, Grade 4, Holden, MA

NEXT STEPS

1. We hope to secure funding for 40-50 partnerships: 10 in Santa Fe County, 15-20 in Albuquerque, 15-20 in Rio Rancho. To date, we have funding from these organizations:
   U.S. Bureau of Reclamation (15 partnerships)
   Santa Fe County (10 partnerships secured for each of two years)
   Middle Rio Grande Stormwater Quality Team (10 Albuquerque partnerships)
   The Southern Sandoval County Arroyo and Flood Control Authority (SSCAFCA) will issue a Request for Proposal in the next few months. We will submit a proposal with the hope of securing funding for another 10-15 partnerships.
2. We will target our marketing to fifth grade teachers, and we will recruit all teachers by August so that the project can kick off in early September and run throughout the entire school year.
3. We will look for new ideas for the field trip and service learning projects, to reduce the field trip burden/load on any one docent.
4. We will expand the guest speaker pool, to prevent overload on our current pool of guest speakers.
5. We will add the option of non-Project WET activities to the curriculum, so that we are better able to include teachers who have not already attended a Project WET workshop.
6. We will create full class wikis for all teachers prior to the teacher workshop. This will reduce the amount of time and technical demands on teachers, allowing us more time to make sure they understand how to do the important basic wiki tasks.
7. We plan to provide improved technical support for all teachers, including a package of written instructions on basic wiki procedures.
8. We will encourage our funders to add the RiverXchange website link (http://www.waterfestnm.com/teachers/curriculum/riverxchange.php) to their websites.
9. We will look into expanding classroom resources about stormwater and water quality, such as DVDs and exhibits.
10. We will look into ways to provide more support for partner classes, such as funding to cover the cost of their field trip transportation.

APPENDIX 1: CURRICULUM

RiverXchange Unit 1 – Understanding a Watershed (3 weeks)

At the end of this unit, have students click the Test Yourself! link on your Front Page to take the quiz

Try to complete this unit before SBA testing begins.

Week 1. **Our Rivers (introducing the classes)** **~30 min classroom time, 30 min student computer time** ***Where is our watershed?***	**As a class:** • Post map(s) showing your location (identifying city, county and state), and your river from headwaters to ocean. Major local tributaries (such as Pecos, Conejos, Alamosa for the Rio Grande) should be identified. Major geographic regions of your state should be discussed. • Post a map showing your watershed (see USGS website for finding your watershed). Look up watershed address on USGS website http://water.usgs.gov/wsc/map_index.html Lots of other good information at http://ga.water.usgs.gov/edu/ • Post pictures of your area and discuss climate of different regions along the river. **Students:** • Have each student make a post on their own page, telling what the climate is like in their area, whether they have been to the river and (if so) what they like to do there, and a fun fact they think is cool. They can also comment on their partner's page and ask questions in the comments section.	**4th Grade Standards:** **Social Studies:** II-A.1 Apply geographic tools of title, grid system, legends, symbols, scale, and compass rose to construct and interpret maps. II-A.2 Translate geographic information into a variety of formats such as graphs, maps, diagrams, and charts. II-A.3 Draw conclusions and make generalizations from geographic information and inquiry. II-B.1 Identify a region as an area with unifying characteristics (e.g., human, weather, agriculture, industry, natural characteristics). II-B.2 Describe the regions of New Mexico, the United States, and the Western Hemisphere. II-C.2 Understand how visual data (e.g., maps, graphs, diagrams, tables, charts) organizes and presents geographic information. II-D.2 Describe the four provinces (plains, mountains, plateau, and basin and range) that make up New Mexico's land surface.	**5th Grade Standards:** **Social Studies:** II-A.1 Make and use different kinds of maps, globes, charts and databases II-A.2 Demonstrate how different areas of the United States are organized and interconnected II-A.5 Employ fundamental geographic vocabulary II-A.7 Use spatial organization to communicate information II-A.8 Identify and locate natural and man-made features of local, regional, state, national, and international locales II-B.1 Describe human and natural characteristics of places II-B.2 Describe similiarities and differences among regions of the globe and their patterns of change II-D.1 Explain how the four provinces of New Mexico's land surface (plains, mountains, plateau, basin and range) support life
Week 2. **Tributary Role-Play – Blue Beads, Project WET** **~30 min classroom time, 30 min student computer time** ***What is a watershed (drainage basin)?*** ***What is the water cycle?***	**As a class:** • Students act out the movement of water from headwaters and tributaries into the main river. Discuss seasons and weather (for example, in Albuquerque we receive only 9 inches of precipitation per year, mostly in summer). Discuss the water cycle (especially runoff) and weather. Introduce the concept of a watershed. • Post VoiceThread or video of students playing the game. **Students:** • Ask each student to make a post on their page about what they learned, and answer the questions "Where does the water in our river come from?" and "How does the water cycle relate to weather?" Have them post a comment on their partner's page.	**4th Grade Standards:** **Science:** IV-B.2 Describe how weather patterns generally move from west to east in US. IV-B.3 Know that local weather information describes patterns of change over a period of time (e.g., temperature, precipitation symbols, cloud conditions, wind speed/direction). V-A.1 Know that science has identified substances called pollutants that get into the environment and can be harmful to living things.	**5th Grade Standards:** **Science:** III-A.4 Describe how human activity impacts the environment IV-B.1 Understand that water and air relate to Earth's processes, including how the water cycle relates to weather, and how clouds are made of tiny droplets of water, like fog or steam IV-B.3 Know that most of Earth's surface is covered by water, that most of that water is salt water in oceans, and that fresh water is found in rivers, lakes, underground sources, and glaciers V-A.1 Describe the contributions of science to understanding local or current issues (e.g. watershed and community decisions regarding water)
Week 3. **Watershed Model – Branching Out, Project WET (NM – Guest Speaker)** **1 hour classroom time, 30 min student computer time.** ***What is a watershed?*** ***What makes water dirty?*** ***How can I protect our water?***	**As a class:** • Talk with students about the Big Water Question "What is a watershed?" and how every place in the world is part of a watershed. Reemphasize runoff as an important part of the water cycle. • *Outside NM (Branching Out, Project WET):* Build a paper model of a watershed and spray with water ("rain") to demonstrate drainage in a watershed. *Extension:* Make houses, farms and roads out of modeling clay to put on the model. Talk about oil, automotive fluids, soap from washing cars, fertilizer and pesticides, animal waste and trash. Simulate how *non-point-source pollution* gets into the river, by sprinkling cocoa powder in different places on the model to represent these types of pollution, then making it "rain" again. • Generate a list of ways to reduce non-point-source pollution ("How can *I* protect our water?") • Each class posts their list, and pictures. **Students:** • Each student posts on their page, answering the questions "What is a watershed?" and "What makes water dirty?" Ask each student to also comment on another student's post.	**4th Grade Standards:** **Science:** V-A.1 Know that science has identified substances called pollutants that get into the environment and can be harmful to living things. **Social Studies:** III-D.1 Explain the difference between rights and responsibilities, why we have rules and laws, and the role of citizenship in promoting them.	**5th Grade Standards:** **Science:** III-A.4 Describe how human activity impacts the environment **Social Studies:** II-B.1 Describe human and natural characteristics of places. II-B.2 Describe similarities, differences and patterns of change among regions of the globe. II-C Describe how man-made and natural environments have influenced conditions in the past.

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RiverXchange Unit 2 – Water in Our Society (5 weeks)

At the end of this unit, have students click Test Yourself! link on your Front Page to take the quiz

Try to finish this unit by the end of April.

Week 4. **Drinking Water – Guest Speaker** **~1 hour classroom time, 30 min student computer time** ***Where does our drinking water come from?*** This may be combined with wastewater presentation (as in Rio Rancho), or Pass the Jug	**As a class:** • Invite a guest speaker to explain/demonstrate where your drinking water comes from and how it is treated to make it safe for drinking. Ask them to discuss current issues surrounding the sustainability of your water supply (including requirements of downstream users), and how the location of your community was historically influenced by availability of water. • Post photos, Voice Thread or video of the guest speaker/demonstration. **Students:** • Each student posts on their page about what they learned, answering the question "Where does our drinking water come from?" Have them look at their partner's page and compare – does their water come from an aquifer, or the river?	**4th Grade Standards:** **Science:** V-A-1 Know that science has identified substances called pollutants that get into the environment and can be harmful to living things. **Social Studies:** II.C.1 Explain how geographic factors have influenced people, including settlement patterns and population distribution in New Mexico, past and present. II.C.2 Describe how environments, both natural and man-made, have influenced people and events over time, and describe how places change. II.E.2 Describe how geographic factors influence the location and distribution of economic activities. II.F.1 Identify the distributions of natural and man-made resources in New Mexico, the Southwest, and the U.S. III.C.1 Compare and contrast how the various governments have applied rules/laws, majority rule, "public good," and protections of the minority in different periods of New Mexico's history. III-D.1 Explain the difference between rights and responsibilities, why we have rules and laws, and the role of citizenship in promoting them. IV-A.4 Discuss how resources and goods and services can be used in alternative ways, and sometimes, allocated to different users. IV-A.6 Understand that conflict may arise between private and public entities. IV-C.1 Identify patterns of work and economic activity in New Mexico and their sustainability over time (e.g., farming, ranching, mining, retail,	**5th Grade Standards:** **Science:** III-A.3 Know that changes in the environment can have different effects on different organisms (e.g. some organisms move, some survive, some reproduce, some die) III-A.4 Describe how human activity impacts the environment IV-B.3 Know that most of Earth's surface is covered by water, and that fresh water is found in rivers, lakes, underground sources and glaciers. V-A.1 Describe the contributions of science to understanding local or current issues (e.g. watershed and community decisions regarding water use). **Social Studies:** II-A.2 Demonstrate how different areas of the United States are organized and interconnected II-A.8 Identify and locate natural and man-made features of local, regional, state, national and international locales. II-B.1 Describe human and natural characteristics of places. II-B.2 Describe similarities, differences and patterns of change among regions of the globe. II-C.1 Describe how man-made and natural environments have influenced conditions in the past. II-C.2 Identify and define geographic issues and problems from accounts of current events. II-E.1 Explain how physical features influenced the expansion of the United States. II-F.1 Understand how resources impact daily life. IV-A.1 Understand the impact of supply and

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		transportation, manufacturing, tourism, high tech). IV-C.2 Explain how New Mexico, the United States, and other parts of the world are economically interdependent.	demand on consumers and producers in a free enterprise system. IV-A.2 Understand the patterns of work and economic activities in New Mexico and the United States (e.g. farming, ranching, oil and gas production, high tech, manufacturing, medicine). IV-B.2 Identify the influence of bordering countries (Canada and Mexico) on United States commerce.
Week 5. **Wastewater – Guest Speaker (or Field Trip!)** **~1 hour classroom time, 30 min student computer time.** ***Where does our waste water go?***	**As a class:** • Invite a guest speaker to talk about waste water, or contact your local Water Authority for a tour of the facility. Ask them to talk about how wastewater is treated, how treated wastewater can be recycled (such as watering golf courses), *how our treated wastewater is put back into the river and used by downstream communities (Mexico and TX)*, and the difference between the sewer system and the stormwater system. • Post Voice Thread, photos or video of the guest speaker/field trip. **Students:** • Have students post on their page about "Where does our wastewater go?" and comment on their partner's page.	**4th Grade Standards** **Science:** V-A-1 Know that science has identified substances called pollutants that get into the environment and can be harmful to living things. **Social Studies:** III-C.1 Compare and contrast how the various governments have applied rules/laws, majority rule, "public good," and protections of the minority in different periods of New Mexico's history. III-D.1 Explain the difference between rights and responsibilities, why we have rules and laws, and the role of citizenship in promoting them. IV-A.4 Discuss how resources and goods and services can be used in alternative ways, and sometimes, allocated to different users. IV-C.1 Identify patterns of work and economic activity in New Mexico and their sustainability over time (e.g., farming, ranching, mining, retail, transportation, manufacturing, tourism, high tech). IV-C.2 Explain how New Mexico, the United States, and other parts of the world are economically interdependent.	**5th Grade Standards:** **Science:** III-A.3 Know that changes in the environment can have different effects on different organisms (e.g. some organisms move, some survive, some reproduce, some die) III-A.4 Describe how human activity impacts the environment V-A.1 Describe the contributions of science to understanding local or current issues (e.g. watershed and community decisions regarding water use). **Social Studies:** II-A.2 Demonstrate how different areas of the United States are organized and interconnected II-A.8 Identify and locate natural and man-made features of local, regional, state, national and international locales. II-B.1 Describe human and natural characteristics of places. II-B.2 Describe similarities, differences and patterns of change among regions of the globe. II-F.1 Understand how resources impact daily life. IV-A.2 Understand the patterns of work and economic activities in New Mexico and the United States (e.g. farming, ranching, oil and gas production, high tech, manufacturing, medicine). IV-B.2 Identify the influence of bordering countries (Canada and Mexico) on United States commerce.

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Week 6. **Pass the Jug – Project WET** **~30 min classroom time, 30 min student computer time** ***Who are the other water users in our society?*** ***Who owns our water?***	**As a class:** • Students act out different ways of allocating water rights to all the water users in our society, and learn about the history of water rights in their community. Talk about water rights issues going on today, especially the buying and selling of water rights. • Post photos of students doing the activity. **Students:** • Students post about what they learned ("Who are the other water users in our society?") and comment on their partner's page.	**4th Grade Standards** **Social Studies:** I-C.1 Explain how historical events, people, and culture influence present day Canada, Mexico, and the United States (e.g., food art, shelter, language). II-F Identify the distributions of natural and man-made resources in New Mexico, the Southwest, and the United States. III-C.1 Compare and contrast how the various governments have applied rules/laws, majority rule, "public good", and protections of the minority in different periods of New Mexico's history. III-D.1 Explain the difference between rights and responsibilities, why we have rules and laws, and the role of citizenship in promoting them. IV-A.3 Describe different economic, public and/or community incentives (wages, business profits, amenities, rights for property owners and renters) IV-A.4 Discuss how resources and goods and services can be used in alternative ways, and sometimes, allocated to different users. IV-A.5 Explain why there may be unequal distribution of resources (e.g., among people, communities, states, nations). IV-A.6 Understand that conflict may arise between private and public entities. IV-C.1 Identify patterns of work and economic activity in New Mexico and their sustainability over time (e.g., farming, ranching, mining, retail, transportation, manufacturing, tourism, high tech). IV-C.2 Explain how New Mexico, the United States, and other parts of the world are economically interdependent.	**5th Grade Standards:** **Social Studies:** I-B.4 Identify the interactions between American Indians and European settlers, including agriculture, cultural exchanges, alliances, and conflicts. II-A.2 Demonstrate how different areas of the United States are organized and interconnected. II-B.2 Describe similarities, differences and patterns of change among regions of the globe. II-C.1 Describe how man-made and natural environments have influenced conditions in the past. II-C.2 Identify and define geographic issues and problems from accounts of current events. II-E.1 Explain how physical features influenced the expansion of the United States. II-F.1 Understand how resources impact daily life. IV-A.1 Understand the impact of supply and demand on consumers and producers in a free enterprise system. IV-A.2 Understand the patterns of work and economic activities in New Mexico and the United States (e.g. farming, ranching, oil and gas production, high tech, manufacturing, medicine).
Week 7. **Commercial Uses of the River (NM – Guest Speaker)** (Choose different	**As a class:** • NM students learn about local agriculture and methods of irrigation. Part 1: Act out different irrigation methods. Part 2: Build models (optional). *Part 3: Learn about why*	**4th Grade Standards** **Social Studies:** I-C.1 Explain how historical events, people, and culture influence present day Canada, Mexico, and the United States (e.g., food art, shelter, language). II-B.3 Identify ways in which different individuals	**5th Grade Standards:** **Science:** III-A.4 Describe how human activity impacts the environment V-A.1 Describe the contributions of science to understanding local or current issues (e.g.

activities depending on area) **~1 hour classroom time, 30 min student computer time.** ***How have humans changed our rivers?*** ***How have rivers impacted human settlements and culture?***	*Native Americans in parts of NM had to leave their homelands in 1400 A.D.* • Outside NM – choose an activity relevant to your area. • Post photos of students doing the activity. **Students:** • Students post what they have learned about agriculture and irrigation, and personal experiences if their families are involved in farming. Have them compare what is on their partner's page (agricultural methods and different uses of rivers in other areas) and comment or ask questions.	and groups of people view and relate to places and regions. II-C.1 Explain how geographic factors have influenced people, including settlement patterns and population distribution in New Mexico, past and present. II-C.2 Describe how environments, both natural and man-made, have influenced people and events over time, and describe how places change. II-E.1 Describe how cultures change. II-E.2 Describe how geographic factors influence the location and distribution of economic activities. II-E.3 Describe types and patterns of settlements. II-E.4 Identify the causes of human migration. IV-A.4 Discuss how resources and goods and services can be used in alternative ways, and sometimes, allocated to different users. IV-A.5 Explain why there may be unequal distribution of resources (e.g., among people, communities, states, nations). IV-A.6 Understand that conflict may arise between private and public entities. IV-C.1 Identify patterns of work and economic activity in New Mexico and their sustainability over time (e.g., farming, ranching, mining, retail, transportation, manufacturing, tourism, high tech). IV-C.2 Explain how New Mexico, the United States, and other parts of the world are economically interdependent.	watershed and community decisions regarding water use). **Social Studies:** I-B.4 *Identify the interactions between American Indians and European settlers, including agriculture*, cultural exchanges, alliances, and conflicts. II-A.2 Demonstrate how different areas of the United States are organized and interconnected. *II-A.3 Identify and locate natural and man-made features of local, regional, state, national and international locales .* II-B.1 Describe human and natural characteristics of places. II-B.2 Describe similarities, differences and patterns of change among regions of the globe. *II-C.1 Describe how man-made and natural environments have influenced conditions in the past.* II-E.1 Explain how physical features influenced the expansion of the United States. II-F.1 Understand how resources impact daily life. IV-A.1 Understand the impact of supply and demand on consumers and producers in a free enterprise system. IV-A.2 *Understand the patterns of work and economic activities in New Mexico and the United States (e.g. farming*, ranching, oil and gas production, high tech, manufacturing, medicine). *IV-C.1 Understand the basic economic patterns of early societies (e.g. hunter-gatherers, early farming, business).*
Week 8. **Every Drop Counts – Project WET** **~1 hour classroom time, +1 week homework, and**	**As a class:** • Students record their personal water use for *one week* and brainstorm ways to conserve water. • Make graphs of water usage in different categories, compare students' water use, compute average	**4th Grade Standards** **Science:** I-A.1 Conduct multiple trials to test a prediction, draw logical conclusions, and construct and interpret graphs from measurements. I-B.1 Communicate ideas and present findings about scientific investigations that are open to	**5th Grade Standards:** **Science:** I-A.1 Plan and conduct investigations, including formulating testable questions, making systematic observations, developing logical conclusions, and communicating findings I-A.3 Use graphic representations (e.g. charts,

30 min computer time ***How much water does my family use each day?*** ***How can I protect our water?***	water use, convert from gallons to liters or vice versa (because other countries use metric system). See Water Meter Wrap-Up • Each class posts graphs to summarize data, and a list of ways to conserve. **Students:** • Each student posts about what surprised them at the end of their observation. Ask them to answer the question "How can *I* protect our water?" focusing on conservation and what they are personally willing to do.	critique from others. **Social Studies:** III-D.1 Explain the difference between rights and responsibilities, why we have rules and laws, and the role of citizenship in promoting them. IV-A.3 Illustrate how resources can be used in alternative ways and, sometimes, allocated to different users. IV-A.5 Understand and explain how conflict may arise between private and public incentives (e.g., new parks, parking structures). IV-C.1 Identify patterns of work and economic activity in New Mexico and their sustainability over time (e.g., farming, ranching, mining, retail, transportation, manufacturing, tourism, high tech). **Math:** 2.A.1 Represent and analyze patterns and simple functions using words, tables, and graphs. 2.C.2 Model problem situations and use graphs, tables, pictures, and equations to draw conclusions (e.g., different patterns of change). 2.D.3 Find and analyze patterns using data tables (e.g., T tables). 4.A.2 Understand the need for measuring with standard units and become familiar with the standard units in customary and metric systems. 4.A.6 Carry out simple conversions within a system of measurement (e.g., hours to minutes, meters to centimeters). 5.A.1 Organize, represent, and interpret numerical and categorical data and clearly communicate findings: choose and construct representations that are appropriate for the data set; recognize the differences in representing categorical and numerical data. 5.A.2 Design investigations and represent data using tables and graphs (e.g., line plots, bar graphs, line graphs). 5.B.2 Use the concepts of median, mode, maximum, minimum, and range and draw	graphs, tables, labeled diagrams) to present data and produce explanations for investigations. I-C.1 Use appropriate units to make precise and varied measurements. I-C.2 Use mathematical skills to analyze data. III-A.3 Know that changes in the environment can have different effects on different organisms (e.g. some organisms move, some survive, some reproduce, some die) III-A.4 Describe how human activity impacts the environment V-A-1 Describe the contributions of science to understanding local or current issues (e.g. watershed and community decisions regarding water use). **Social Studies:** *II-F.1 Understand how resources impact daily life* IV-A.2 Understand the impact of supply and demand on consumers and producers in a free enterprise system **Math:** II-A.2 Describe, represent and analyze patterns and relationships. II-C.2 Understand and use mathematical models such as graphs. II-D.1 Represent and create patterns of change from everyday life using numerical or pictorial representations. IV-B.1 Solve measurement problems using appropriate tools involving length, perimeter, weight, capacity, time, and temperature. IV-B.2. Select and use strategies to estimate measurements including length, distance, capacity, and time. V-A.1. Construct, read, analyze, and interpret tables, charts, graphs, and data plots. V-A.2. Construct, interpret, and analyze data from graphical representations and draw simple conclusions using bar graphs, line graphs, circle

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		conclusions about a data set. 5.B.3 Use data analysis to make reasonable inferences/predictions and to develop convincing arguments from data described in a variety of formats (e.g., bar graphs, Venn diagrams, charts, tables, line graphs, and pictographs). 5.C.1 Propose and justify conclusions and predictions based on data. 5.C.2 Develop convincing arguments from data displayed in a variety of formats.	graphs, frequency tables, and Venn diagrams. V-A.3. Display, analyze, compare, and interpret different data sets, including data sets of different sizes. V-A.4. Organize and display single-variable data in appropriate graphs and representations. V-A.5. Organize, read, and display numerical (quantitative) and non-numerical (qualitative) data in a clear, organized, and accurate manner including correct titles, labels, and intervals or categories including charts and tables V-A.6. Formulate questions and identify data to be collected to correctly answer a question.

RiverXchange Unit 3 – River Ecosystem (3 weeks)

At the end of this unit, have students click the Test Yourself! link on your Front Page to take the quiz

Try to complete by the end of the school year!

Week 9. **Macroinvertebrate Mayhem, Project WET (NM–Guest Speaker)** **~1 hour classroom time, 30 min student computer time** ***Why is water so important to life?*** ***How do all living things depend on each other?*** ***Who are the other water users in our society?***	**As a class:** • Students role-play aquatic insects and learn about their importance in the ecosystem. Many animals depend on these insects for food. Some aquatic insects are sensitive to pollution, so scientists can tell how healthy a river ecosystem is by looking at which types of insect larvae are living in the water. • Each class posts photos, video or Voice Thread of students doing the role-playing game. **Students:** • Each student posts what they learned about why aquatic insects are so important in the river's food web. Focus on the questions "Why is water so important to life?" and "How do all living things depend on each other?"	**4th Grade Standards** **Science:** III-A.1 Explain that different living organisms have distinctive structures and body systems that serve specific functions (e.g., walking, flying, swimming). III-A.2 Know that humans and other living things have senses to help them detect stimuli, and that sensations (e.g. hunger) and stimuli (e.g. changes in the environment) influence the behavior of organisms. *III-A.4 Describe the components of and relationships among organisms in a food chain (e.g., plants are the primary source of energy for living systems).* *III-B.1 Know that in any particular environment some kinds of plants and animals survive well, some survive less well, and others cannot survive at all.* III-B.2 Know that a change in physical structure or behavior can improve an organism's chance of survival (e.g., a chameleon changes color, a turtle pulls its head into its shell, a plant grows toward the light). III-B.3 Describe how some living organisms have developed characteristics from generation to generation to improve chances of survival (e.g., spines on cacti, long beaks on hummingbirds, good eyesight on hawks). *V-A.1 Know that science has identified substances called pollutants that get into the environment and can be harmful to living things.*	**5th Grade Standards** **Science:** III-A.1 Identify the components of habitats and ecosystems (producers, consumers, decomposers and predators). III-A.2 Understand how food webs depict relationships between different organisms. III-A.3 Know that changes in the environment can have different effects on different organisms (e.g. some organisms move, some survive, some reproduce, some die). III-A.4 Describe how human activity impacts the environment III-B.1 Know that plants and animals have life cycles that include birth, growth and development, reproduction, and death and that these cycles differ for different organisms. V-A.1 Describe the contributions of science to understanding local or current issues (e.g. watershed and community decisions regarding water use). **Social Studies:** II-B.1 Describe human and natural characteristics of places II-B-2 Describe similarities, differences and patterns of change among regions of the globe. II-C.2 Identify and define geographic issues and problems from accounts of current events. II-F.1 Understand how resources affect daily life.

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Week 10. **Food Web** **~1-2 hrs classroom time, 30 min student computer time** ***Why is water so important to life?*** ***How do all living things depend on each other?*** ***Who are the other water users in our society?***	**As a class:** • Give students a list of local species, highlighting key native species (such as cottonwood or coyote), and invasive species (such as saltcedar or raccoon), as well as endangered species (such as silvery minnow). For NM, see Bosque Ecosystem Species List.doc • Assign each student an animal or plant from the list, and have them research what it eats and where it lives. (Make sure plants and insects get assigned, they are key parts of food web) • Create a large food web poster as a class, showing which species are connected with others ("How do all living things depend on each other?"). **Students:** • Each student creates a post on their page about their animal or plant, describing any experiences they have had with these plants or animals, how it interacts with other plants or animals in the ecosystem, and how it depends on the river. • Encourage students to comment on each other's posts, creating a discussion about issues such as changes in the ecosystem made by humans, and steps being taken to restore habitat.	**4th Grade Standards** **Science:** III-A.1 Explain that different living organisms have distinctive structures and body systems that serve specific functions (e.g., walking, flying, swimming). III-A.2 Know that humans and other living things have senses to help them detect stimuli, and that sensations (e.g. hunger) and stimuli (e.g. changes in environment) influence the behavior of organisms. III-A.3 Describe how roots are associated with the intake of water and soil nutrients and green leaves are associated with making food from sunlight (photosynthesis). *III-A.4 Describe the components of and relationships among organisms in a food chain (e.g., plants are the primary source of energy for living systems).* III-B.1 Know that in any particular environment some kinds of plants and animals survive well, some survive less well, and others cannot survive at all. III-B.2 Know that a change in physical structure or behavior can improve an organism's chance of survival (e.g., a chameleon changes color, a turtle pulls its head into its shell, a plant grows toward the light). III-B.3 Describe how some living organisms have developed characteristics from generation to generation to improve chances of survival (e.g., spines on cacti, long beaks on hummingbirds, good eyesight on hawks).	**5th Grade Standards** **Science:** III-A.1 Identify the components of habitats and ecosystems (producers, consumers, decomposers and predators). III-A.2 Understand how food webs depict relationships between different organisms. III-A.3 Know that changes in the environment can have different effects on different organisms (e.g. some organisms move, some survive, some reproduce, some die). III-A.4 Describe how human activity impacts the environment. V-A.1 Describe the contributions of science to understanding local or current issues (e.g. watershed and community decisions regarding water use). **Social Studies:** II-B.1 Describe human and natural characteristics of places II-B-2 Describe similarities, differences and patterns of change among regions of the globe. II-C.2 Identify and define geographic issues and problems from accounts of current events. II-F.1 Understand how resources affect daily life.

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Week 11. **If I Owned the Ecosystem – Bosque Education Guide** Outside NM, this will have to be adapted for your local ecosystem - a more generalized lesson plan is available at http://na.fs.fed.us/spfo/pubs/misc/eco/index.html. **~1 hour classroom time, 30 min student computer time** ***Why is water so important to life?*** ***How do all living things depend on each other?*** ***Who are the other water users in our society?***	**As a class:** • Through role-playing various wildlife species or professions, students make decisions about the use of natural resources within an ecosystem. Outside NM, see http://na.fs.fed.us/spfo/pubs/misc/eco/If_You_Owned_the_Ecosystem.pdf. **Students:** • Each student posts about what they learned, focusing on "Who are the other water users in our society?" and "Why is water so important to life?"	**4th Grade Standards:** **Science:** III-A.4 Describe the components of and relationships among organisms in a food chain (e.g. plants are the primary source of energy for living systems). III-B.1 Know that in any particular environment, some kinds of plants and animals survive well, some survive less well, and others cannot survive at all. **Social Studies:** II-C.2 Describe how environments, both natural and man-made, have influenced people and events over time, and describe how places change. IV-A.3 Describe different economic, public and/or community incentives (wages, business profits, amenities, rights for property owners and renters) IV-A.4 Discuss how resources and goods and services can be used in alternative ways, and sometimes, allocated to different users. IV-A.5 Explain why there may be unequal distribution of resources (e.g., among people, communities, states, nations). IV-A.6 Understand that conflict may arise between private and public entities.	**5th Grade Standards** **Science:** III-A.1 Identify the components of habitats and ecosystems (producers, consumers, decomposers and predators). III-A.2 Understand how food webs depict relationships between different organisms. III-A.3 Know that changes in the environment can have different effects on different organisms (e.g. some organisms move, some survive, some reproduce, some die). III-A.4 Describe how human activity impacts the environment V-A.1 Describe the contributions of science to understanding local or current issues (e.g. watershed and community decisions regarding water use). **Social Studies:** II-B.1 Describe human and natural characteristics of places II-F.1 Understand how resources affect daily life.

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APPENDIX 2: GUEST SPEAKERS

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New Mexico Classroom Speakers – Albuquerque

RIVER FIELD TRIP/SERVICE LEARNING PROJECT
City of Albuquerque Open Space
Bill Pentler Phone 452-5222 Email wpentler@cabq.gov

UNIT 1
Watershed model
Bernalillo County Public Works
Anthony Chavez Phone 848-1544 Email anchavez@bernco.gov

UNIT 2
Drinking Water
ABCWUA/Experiential EE
Katie Babuska Phone 975-0036 Email katie@experientialee.com

Wastewater
ABCWUA
Ben Zimmerman Phone 873-7058 Email bzimmerman@abcwua.org

Commercial Uses of the River (Agriculture)
Bernalillo County Cooperative Extension, 4-H
Elliott Sachse Phone 243-1386 Email esachse@nmsu.edu

UNIT 3
Ecosystem (Macroinvertebrate Mayhem)
Bernalillo County Office of Environmental Health
Matthew Cross-Guillén Phone 314-0324 E-mail matthewc@bernco.gov

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New Mexico Classroom Guest Speakers – Rio Rancho

RIVER FIELD TRIP
Keep Rio Rancho Beautiful Phone 896-8389 Email jscacco@ci.rio-rancho.nm.us
Jennifer Scacco

UNIT 1
Watershed model
U.S. Bureau of Reclamation
Joe Alderete Phone 462-3578 Email jalderete@uc.usbr.gov

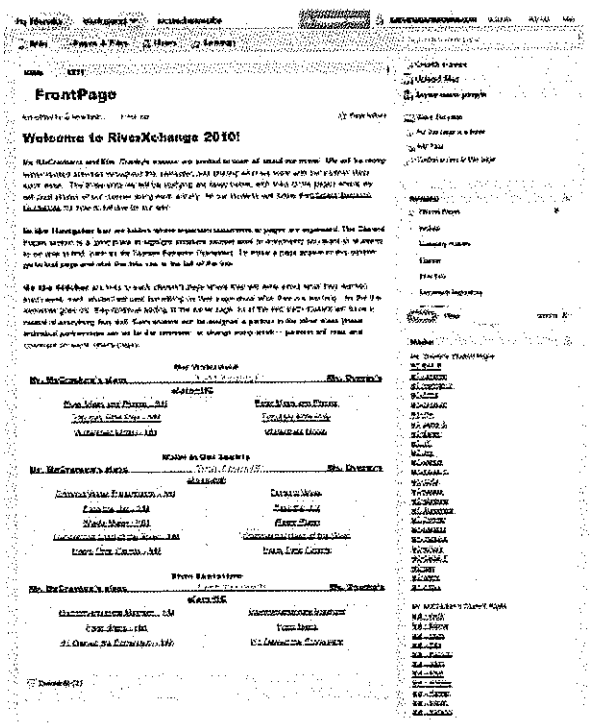
UNIT 2
Drinking Water
City of Rio Rancho
Marian Wrage Phone 896-8737 Email mwrage@ci.rio-rancho.nm.us

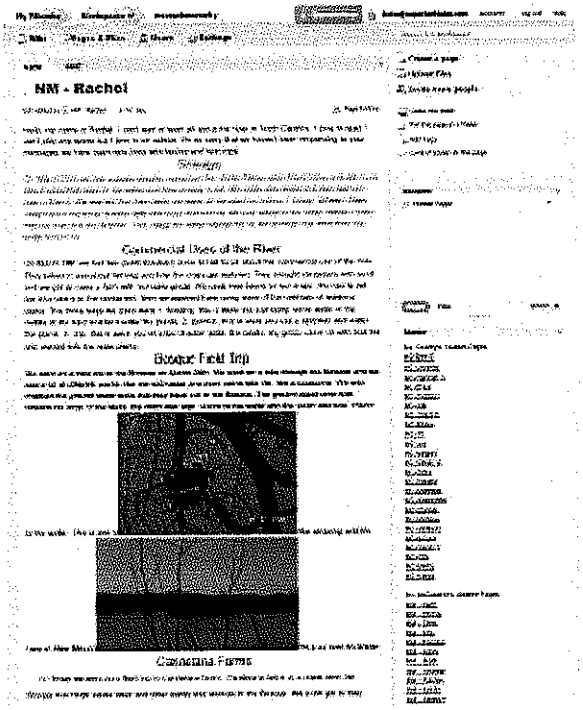
Wastewater
City of Rio Rancho
Marian Wrage Phone 896-8737 Email mwrage@ci.rio-rancho.nm.us

Commercial Uses of the River (Agriculture)
Sandoval County Cooperative Extension, 4-H
Steve Lucero Phone: 867-2582 Email smlucero@nmsu.edu

UNIT 3
Ecosystem (Macroinvertebrate Mayhem)
New Mexico Museum of Natural History & Science
Michael Sanchez Phone 841-2853 E-mail michael.sanchez1@state.nm.us

APPENDIX 3: SAMPLE CLASS WIKI PAGES





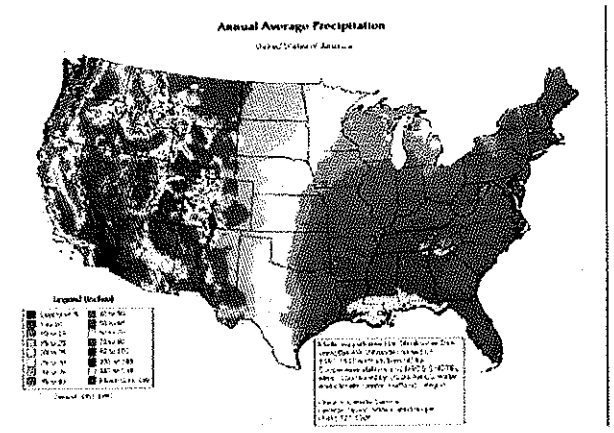
APPENDIX 4: STUDENT SURVEYS

Unit 1

Greetings, RiverXchange students!

1. Try out your map skills ...

Answer the questions below by clicking on the picture.



What part of the U.S. gets the MOST rain each year?

Skip

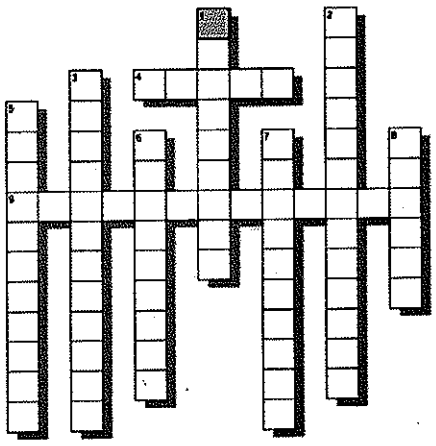
Value: 0

Re-start

2. Do you know these *water words?*

Solve the crossword puzzle.

Condensation
Delta
Desert
Evaporation
Headwaters
Pollution
Precipitation
Runoff
Transpiration
Tributary
Watershed



Across

4.) The mouth of a river, which is triangle-shaped like a Greek capital letter Delta

9.) All the water that falls from the sky, in solid or liquid, such as rain, snow, or hail.

Down

1.) Oil or poison in the environment.

2.) The process by which water comes out of the leaves of plants, primarily through openings in the leaves, and goes into the air.

3.) The process by which water changes from vapor

Finish.

3. Now **test your knowledge** about Watersheds!
4. If you have time, you can play this fun game... **Water Showdown!**

Greetings, RiverXchange students!

1. Watch this great cartoon - **The Story of Groundwater**!
2. Play this fun **WaterSense** game!
3. Do you know these *water words*?

Acequia

Aquifer

Arroyo

Conservation

Dam

Infiltration

Levee

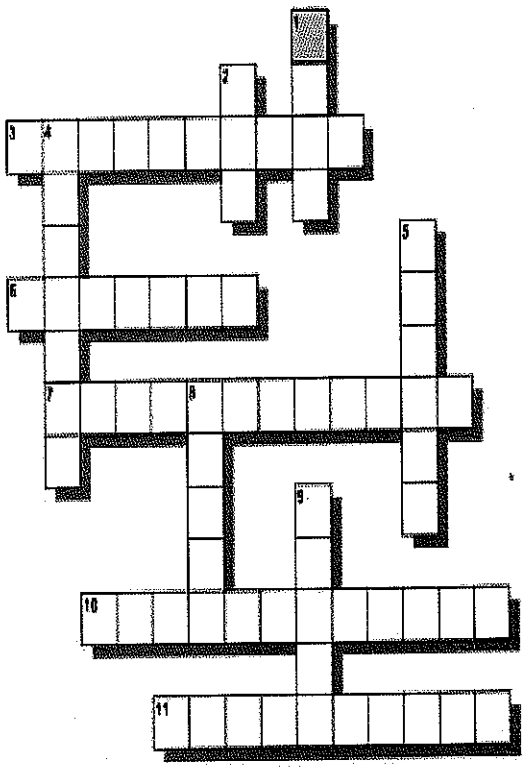
Locks

Wastewater

Water Table

Well

Solve the crossword puzzle.



Across

3.) The top surface of an aquifer (how far you have to dig down to find water).

6.) The place underground where water is (a layer of permeable rock, sand, or gravel saturated with water)

7.) The process of water sinking down into the

Down

1.) A deep hole that goes down to the water table for people to get water from underground.

2.) Barrier built across a river to hold water back, sometimes used to generate electricity.

4.) A name for ditches used in New Mexico to

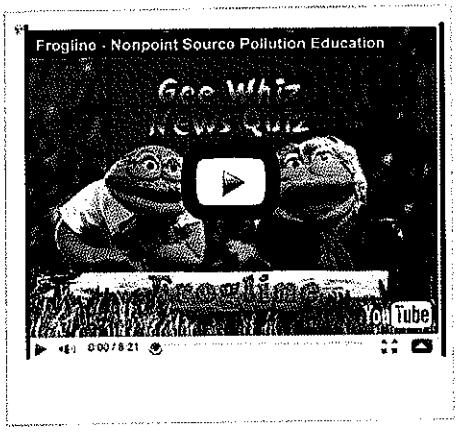
Finish

4. Now **test your knowledge** about Water in Our Society!

Unit 3

Greetings RiverXchange students! Test your River Ecosystem knowledge:

1. Watch Frogline News to learn about how frogs are affected by watersheds.



2. Do you know these *Water Words*?

Bosque

Ecosystem

Erosion

Exotic Species

Floodplain

Habitat

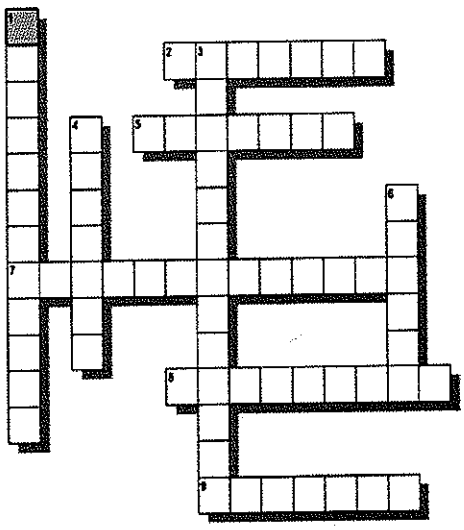
Native Species

Riparian Zone

Sandbar

Wetland

Solve the crossword puzzle.



Across

2.) Area such as a marsh or swamp that is covered with shallow water or where the soil is very wet all the time.

5.) The process in which a material (such as a river bank) is worn away by water or wind.

7.) A species that naturally

Down

1.) The area around the banks of a natural body of fresh water.

3.) A plant or animal introduced from a different area that competes with native species. They sometimes become invasive and take over an area.

Finish

3. Now <u>test your knowledge</u> about River Ecosystems!