4. Resurfacing: Communicating Audit Results to the Community

**Summary:**
Having completed a school water audit, students use their experience and data to engage in evidence-based reasoning. Students summarize overall results and develop specific, quantifiable recommendations on how their school could be made more water efficient. Students communicate results and recommendations through their choice of format: proposal, PowerPoint, video, photo story, graphs, newsletter, etc.

**Objectives:**
Students will:
- Review data, results and recommendations from all parts of their audit.
- Answer the big picture question: How can we reduce water use or use water more efficiently at school?
- Formulate a recommendation that addresses the question.
- Utilize data from their school water audit as evidence to support their recommendation.
- Explain how evidence supports their conclusion.
- Develop a means to communicate their results and recommendation that may include graphs of collected data or other support for recommendations.
- Research recommendation specifications and cost.
- Calculate water savings resulting from implementing the recommendation.
- Calculate cost savings resulting from implementing the recommendation.

**Materials/Supplies:**
Needed materials will vary depending on selected communication format, but may include:
- Colored pencils, pens, paper and rulers for graphs.
- Recorded observations and data from school water audit.
- Computer software for graphics and type of presentation format.

**Background for Teachers:**
There are many options for student groups to implement their communication plans. They may attend a School Board meeting and present a PowerPoint or read a proposal to the Board. Or, students may invite the principal and parents to attend a presentation. Students could also present to a community group, business organization or environmental group in the community and ask that the group
consider the feasibility of implementing the students’ recommendations. Please remember to include any sponsors, supporters, or volunteers who have helped you with the SWAP. They will be very interested in seeing the positive impact of their investment.

You may also wish to look for grants or other ways to get funding to implement one or more of the students’ recommendations.

Stating conclusions and making recommendations to conserve water at school requires that students utilize their water audit data as evidence to form a cohesive story about their experience and determine the results of their study. This culminating activity demonstrates the value of careful data collection and provides an opportunity to further develop critical thinking and problem solving skills. Students must engage in higher level thinking as they utilize their data to select the best answer to the big question. Having to address a practical problem may help some students who are unaccustomed to this level of analysis and synthesis.

Communication may be oral, as in a public service announcement; in written format, as in a formal proposal or newsletter; through graphs or videos, or some combination of these as in a PowerPoint or other presentation to a school board.

Students may need to conduct research to properly formulate their recommendations and complete their communication project. For instance, they may need to research plumbing appliances like toilets to find out the specifications and costs for the most water efficient models. The Environmental Protection Agency program, WaterSense, has information on high efficiency plumbing appliances and other topics that may be of interest. See their website: [www.epa.gov/watersense](http://www.epa.gov/watersense).

Students may also ask a plumber or water professional to visit the classroom and answer questions.

When calculating cost savings due to reduced water use, keep in mind that there is a cost to the school associated with water delivery and use AND there is a cost to the school associated with water waste. Depending on the recommendation (installing high-efficiency toilets, for example), there may be as much or more cost savings realized by reduced sewage costs as by reductions in water delivery costs.

Note: this lesson is written assuming that students have a recommendation about how to conserve water at school, but it may be the case that students are communicating about a water conservation measure that they were already able to implement and are now communicating about the results of that implementation.
For instance, they may choose to communicate about the difference installing new faucet aerators made.

**Preparation before the activity:**

- Review the results from all water audit sections.
- Identify and schedule resources such as computers and programs available for students to use to develop their communication pieces.
- Consult your water supplier to determine the cost of water delivery to your school.
- Contact your city water department to determine the cost of waste water for your school.

**Lesson Procedure:**

**Warm up:**

1. Arrange the class into their cooperative learning groups.
2. Have the groups brainstorm and list what they learned from doing the audit that most surprised them.
3. If time permits, have each group reenact the experience of their top learning in skit or pantomime form. Otherwise, have each group briefly share their list with the class.

**Activity:**

Results and recommendations can be communicated in many ways including, but not limited to:

- Writing Proposals.
- Creating a PowerPoint Presentation.
- Creating a Photo Story and/or Video.
- Writing a Water Conservation Oriented School Newsletter.
- Writing, recording and airing public service announcements.
- Creating posters or videos about water efficiency.

1. Remind students that throughout the audit, we have been thinking about the big question: How can we reduce water use or use water more efficiently at school? The final step in the process of answering this question is to communicate the students’ recommendations to school administration, water providers, city government, interested public, sponsors or supporters of the SWAP, and the student body.

2. Clarify the objectives of this communication effort:

   - To inform others of the credible results that have come about through the students’ efforts.
   - To provide feedback to supporters that verifies the impact of their contribution.
• To motivate others to make changes to the school system that will improved water efficiency.
• To inspire others to examine their water use and look for ways to use water more efficiently.

3. Communicate the expectations for the communication piece that each cooperative group will produce:
   • Include The Big Question
   • Briefly tell the story of the portion of the water audit to which the recommendation relates (i.e. those who are recommending toilet upgrades should not tell the story of the athletic field audit).
   • State the recommendation.
   • Graphically illustrate water savings via graphs that show water use data before and after the recommendation is implemented.
     a. The before data will come from the water audit activities and represents the current state of water use.
     b. The after data may come from the water audit activities (such as, in the case of a recommendation to install aerators) or it may be projected data based on research of the recommendation.
   • Implementation details i.e. equipment or parts specifications, cost of implementation.
   • Projected yearly water savings and projected cost savings.

4. In their cooperative groups, have the students review all of their data, conclusions, and recommendations and select the one recommendation that is both feasible and would provide the greatest water savings. The feasibility criterion means that the project is not too expensive or difficult for the school to actually consider implementing it.

5. Direct each group to develop an outline of their communication piece that meets the stated expectations.

6. Allow the students to conduct research as needed to develop or compile the content for their communication piece, and to develop their data graphs as needed.

7. Instruct each cooperative group to decide how they will style or format their communication piece i.e. as a video, a poster, a PowerPoint presentation, a newsletter, a public service announcement (PSA), etc.

8. Help the groups to develop a communication delivery plan that specifically
identifies the target audience (which radio station for PSAs, names of attendees for oral and video presentations, names of recipients of written pieces) and any special arrangement or communication tasks that need to be completed in order to ensure successful delivery.

9. Give the students sufficient time to complete a draft of their communication piece. Provide them with feedback for their work.

10. Provide time to revise their work based on your feedback.

11. Encourage students to practice oral presentations, deciding who will say what and when. They will need to practice and may make changes to the presentation based on the experience.

12. Advise students to brainstorm questions that people may ask about their presentations or proposals and prepare their answers. Students may want to review data sheets to answer some of these questions.

13. Deliver the students’ communication pieces according to their communication delivery plans.

14. Compile and review feedback from the communication recipients.

15. Celebrate!

**Wrap-up**

In their groups, have students discuss and write answers to the following question: What feedback or responses did they receive from their communication piece and how do they feel about those responses? Students will report their answers to the whole class.

**Assessment via Notebooking/journaling:**

Students write a one page letter to a friend about their experience of participating in the school water audit program. Their letter should include a brief description of what was done, what they discovered or learned and how they felt about the experience. Would they recommend it to their friend?

**Relevant Web sites**

- [www.epa.gov/watersense](http://www.epa.gov/watersense)
- [http://www.youtube.com/watch?v=CBbjdnKivRA](http://www.youtube.com/watch?v=CBbjdnKivRA)
Appendix 4.A

Sample Student Proposal Letter

School Name
School Address

February 25, 2009

Arizona Cooperative Extension
4341 E. Broadway Road
Phoenix, AZ 85040-8807

Dear Project WET Committee:

My biology class conducted a water audit on water use at our school. We have discovered that the toilets are incredibly inefficient. Our school is a small school; there are four toilets on campus. Eddie, our toilet expert, has researched how much water these toilets waste.

Based on the data, we concluded that approximately 63,000 gallons are being used each school year in flushing toilets. Our school has older toilets which use 5 gallons per flush; the water efficient toilets use 1.6 gallons per flush.

New toilets aren’t pricey. For every 8,000 gallons used, the district pays around $29. The district would save $155 a school year by purchasing these toilets. That is roughly half the cost of a new toilet. The toilets would pay for themselves in four years.

In total, the new toilet would use 20,160 gallons preschool year. The toilets would be saving 42,840 gallons every year, and the district $155 every year! We researched Home Depot’s toilet selection and Jeff, from the District Maintenance Crew, made a recommendation. The new toilet is a white, Champion 4. It can be purchased at The Home Depot for 4268; that would be the best choice of a toilet. Home Depot charges $120 to install, but the Maintenance Department will install it for free! We are requesting a total of $581 to purchase 2 toilets that are the most frequently used. Please seriously consider our request.

Thank you for the opportunity to improve our water efficiency at our school!

Sincerely,

Students
Appendix 4.B

*Sample Graphs*

Projected Water Savings from use of Faucet Aerators at Two Different Schools

### Annual Projected School X Water Savings with Faucet Aerators

- **Classroom**:
  - Without Aerators: 400,000 gallons
  - With Aerators: 200,000 gallons
  - Water Savings: 150,000 gallons

- **Bathroom**:
  - Without Aerators: 300,000 gallons
  - With Aerators: 100,000 gallons
  - Water Savings: 200,000 gallons

### Annual Projected School Y Water Savings with Faucet Aerators

- **Classroom**:
  - Without Aerators: 300,000 gallons
  - With Aerators: 150,000 gallons
  - Water Savings: 150,000 gallons

- **Bathroom**:
  - Without Aerators: 250,000 gallons
  - With Aerators: 100,000 gallons
  - Water Savings: 150,000 gallons
Appendix 4.C

Sample Graphs
Projected Water Savings from Installation of Pre-rinse Spray-head in Two Different School Cafeterias

Pre-rinse Spray Head Projected Annual Savings, School A

Gallons

Pre-rinse Spray Head Projected Annual Savings, School B

Gallons

The University of Arizona Cooperative Extension
SWAP Conserves Water & Builds Citizens

“I want to show my little brother how great his big sister is. And I want to make a good role model for him and my baby sister. That's pretty much what I want to do.” Alyssa, 8th grade.

Isn’t that pretty much what we all want to do? Alyssa’s simple and pure statement was not about her plans to save the world, solve the crisis of the day or cure cancer. Alyssa, an eighth grader at Southwest Elementary School in Phoenix, Arizona, was talking about her participation in a school water audit. Water conservation specialists take notice! Teen-age water, sloths waiting stop watches and buckets might just be “cool!” Or “hot.” Or “whatever.” Terminology aids, the word it is out that conserving water may be the best way to distinguish yourself in front of younger siblings. How did that happen? Is being smart and preserving valuable resources now okay? Even for girls? I guess so!

Alyssa and her fellow students have recognized that in Arizona’s desert environment, we have enough water to use, but not enough to waste. 566 kindergarten through 5th grade Southwest Elementary School students participated in a two week school water audit project. All 6th, 7th, and 8th grade students participated. The audit plan was based on the Water Audit activity in Project WET's Arizona Conserve Water Educators' Guide. Students measured water use at their school and wrote proposals about how to conserve water. One proposal was selected for funding and implementation. The winning proposal noted that the school had a hand washing station with

The key to the success of this project was that students were given a chance to actually make a change for the better at their school.
Appendix 4.D
Sample Newsletter Format – Page Two

The proposal suggested retrofiting the station with sensors or push buttons. After consultation with a plumbing distributor, metered valves (push buttons) were selected as the best fix and funding was made available for the retrofit by The University of Arizona’s Water Sustainability Program. Before school closed for summer vacation, the plumber came and metered valves were installed. To recognize the efforts of the school administration, teachers and students, the school received a plaque identifying it as an Exemplary Water Conservation School.

Before the retrofit, approximately 220,325 gallons of water flowed through the hand washing station during the school year. Assuming that each student washes his or her hands once per day using the new metered valves, it is anticipated that 54,087 gallons per year (25% of the pre-retrofit amount) will now flow through the hand washing station. A City of Phoenix Water Services Department official estimates that the school will save nearly $1,000 per year in water and sewage fees! Actual usage and savings will be monitored during the coming year. This kind of water usage is not unique to Southwest Elementary School, showing that schools provide an opportunity for significant water conservation.

Overview of Results
School Water Audit at Southwest Elementary School

<table>
<thead>
<tr>
<th>ITEM</th>
<th>MEASUREMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of students that participated</td>
<td>366</td>
</tr>
<tr>
<td>Length of student project</td>
<td>2 Weeks</td>
</tr>
<tr>
<td>Number of teachers involved</td>
<td>11</td>
</tr>
<tr>
<td>Grades involved</td>
<td>K, 2, 3, 4, 6, 7, 8</td>
</tr>
<tr>
<td>Middle school subject areas involved</td>
<td>science, math, art, writing</td>
</tr>
<tr>
<td>Teachers indicating that their “students are more aware of the importance of water conservation due to participation in this project”</td>
<td>100%</td>
</tr>
<tr>
<td>Galons estimated to flow per year through hand washing station before retrofit</td>
<td>220,325</td>
</tr>
<tr>
<td>Galons estimated to flow per year through hand washing station after retrofit, assuming each child washes hands at station once per school day</td>
<td>54,087</td>
</tr>
<tr>
<td>Savings per year in water and sewage fees estimated by City of Phoenix Water Services Department official to result from retrofit</td>
<td>$1,000</td>
</tr>
</tbody>
</table>

However, water conservation is not the primary goal of conducting a school water audit, benefits in the areas of math, science, writing, critical thinking and team work are the real goals. The activity also can be extended to meet academic standards in social studies and the arts. All teachers involved in the Southwest Elementary School water audit said that their students had become aware of the importance of water conservation because of their participation. The key to the success of this project was that students were given a chance to actually make a change for the better at their school. The lesson that they can be powerful actors in their world is the most important lesson of all – I believe that recognition is what really made Alyssa proud.

See Alyssa and her classmates on YouTube at http://www.youtube.com/watch?v=Ci8bjdnKivRA.
Appendix 4.D
Sample Newsletter Format – Page Three

SWAP Details

Description
The School Water Audit Project is an applied science activity that engages students in all of the steps of scientific inquiry through participation in a meaningful, real-world project. Students are challenged to propose ways in which their school can be more water efficient. But in order to do this, they must first conduct a school water audit and analyze the results. Students may have followed experimental procedures in the past, but part of the deep learning associated with this Project comes from having the students develop their own replicable procedures and apply those procedures.

By participating in the Project from start to finish, students gain a deeper understanding of scientific methodology than ever before. Because the Project integrates science, math, and writing, it can meet academic standards in all of these areas. It may also be extended to include an art component.

Not just another school water audit!
Two crucial elements distinguish this Project from many other school water audits: (1) students write proposals about how to conserve water at their schools and (2) the school or students implement at least one of the student proposals.

These elements move the project from an academic exercise to a real-world application that may have long-term environmental and behavioral results.

Keeping it real. The University of Arizona’s Arizona Project WET is committed to excellent and effective water education. Water efficiency in Arizona is important. In order to enable schools to complete the School Water Audit Project, the Water Sustainability Program of The University of Arizona has made funds available to implement selected student proposals. We believe that students will be more engaged in the Project if they believe that they can make a difference at their school. We want to promote student empowerment by helping students to see their ideas come to life. We believe that student participation in this Project can have significant educational outcomes, develop young leaders and result in real water efficiency. The University of Arizona Project WET also provides a lesson outline, teacher workshops and, upon request, may be able to provide consultants for teachers and students on landscape, cafeterias and other topics.

Student Proposals

★ Clarity
★ Evidence of student participation in a school water audit.
★ Explanation of how water efficiency can be achieved.
★ Statement of anticipated water savings.
★ Flexibility of implementation within the 2008 – 2009 school year.
★ Likelihood that implementation will actually result in improved water efficiency.

Proposals will be evaluated as received. Excellent proposals will be funded immediately. Funding is limited and may run out! Proposals will be accepted from November 14, 2008 through March 21, 2009. Funding announcements will be made no later than April 22, 2009.

Mini-Grant Announcement

Here’s what you can get: You are invited to apply for a mini-grant of up to $1,000. The funds can be used to complete projects to make your school more water efficient.

Here’s what you do:

• Students conduct a school water audit and analyze the results.
• Based on what they learned from their school water audit, students write proposals about how to make water use at their school more efficient. Proposals can be written by individual students, student teams, or a class can write one proposal together.
• The teacher selects up to two student-written proposals for submission.
• Teacher meets with principal to review proposals for feasibility of implementation.
• Teacher requests Proposal Application Form from Nancy Crocker and completes it.
• Principal signs off on Proposal Application Form.
• Teacher mails or faxes completed Proposal Application Form and student proposals to Nancy Crocker.

Proposal Selection Guidelines is in green box above.

Nancy Crocker
Phone: 602-827-8200 ext. 338
Fax: 602-827-8292
Email: NCrocker@calo.arizona.edu
ARIZONA COOPERATIVE EXTENSION
THE UNIVERSITY OF ARIZONA
COLLEGE OF AGRICULTURE AND LIFE SCIENCES
TUCSON, ARIZONA 85721

KERRY SCHWARTZ
Director, Arizona Project WET
Associate Specialist, Dept. of Agriculture Education, Water Resources Research Center

MARY ANN STOLL
Program Coordinator, Water Sustainability Program, Maricopa County

CANDICE RUPPRECHT
Senior Program Coordinator, School of Natural Resources and the Environment, Water Resources Research Center

NANCY CROCKER
Senior Program Coordinator, Water Sustainability Program, Maricopa County

CONTACT:
KERRY SCHWARTZ
kschwart@ag.arizona.edu

This information has been reviewed by University faculty.
cals.arizona.edu/pubs/water/az1505.pdf

Other titles from Arizona Cooperative Extension can be found at:
cals.arizona.edu/pubs