



NIWR/Maki Green Boxes

Inside this issue:

<i>Project Spotlight</i>	1
<i>Student Interview</i>	3
<i>Events List</i>	5

Through NIWR funding, Desert Research Institute’s Science Alive program (formerly the GreenPower program) has developed the “Sustaining the Colorado” Green Box and the “Watersheds” Green Box. “The funding provided by NIWR/Maki has allowed more teachers and students to engage in our programming and benefit from the high-quality STEM content the kits provide,” says Mackenzie Peterson, the Green Box administrator for Desert Research Institute (DRI).

Green Boxes are self-contained science education kits that teach a wide variety of environmental science topics for PreK-12 students. The curricula for the Green Boxes are developed in collaboration with DRI researchers. “We value the opportunity to work directly with DRI faculty to create classroom resources that are relevant and place based,” says Peterson. “Each kit also highlights the DRI researcher we worked with, all of whom come from diverse backgrounds. These individuals serve as role models for the

RFPs

If you have questions about submitting a NWRRRI proposal, e-mail Amy Russell (Amy.Russell@dri.edu).

For current RFP information, visit the NWRRRI website (www.dri.edu/nwrrri).



Teachers participating in an activity for the “Sustaining the Colorado” Green Box.

(Project Spotlight continued)

students and help them imagine themselves as STEM professionals.”

The NIWR/Maki Green Boxes were developed for middle school and high school students to spark their interest in water resources fields by giving them the opportunity to conduct experiments that are directly related to current environmental research. “Exposing these students to the issues that face our watersheds helps not only foster a sense of environmental stewardship, but also provides a peek into the realm of hydrologic research, policy, and conservation,” Peterson explains.

The response to the boxes has been very good. “The feedback from teachers has been overwhelmingly positive. Although both of the units focus primarily on southern Nevada, educators all over the state have found the content to be useful,” says Peterson. “The survey we provide to educators after they have used the kits captures information on student impact (such as



“Exposing these students to the issues that face our watersheds helps not only foster a sense of environmental stewardship, but also provides a peek into the realm of hydrologic research, policy, and conservation.”

– Mackenzie Peterson

increased participation and heightened knowledge in the subject area) and the degree of helpfulness to the instructor (such as lesson effectiveness and an improved understanding of the state-adopted science standards in focus). Both kits have been rated relatively high.”

The curricula of the NIWR/Maki Green Boxes emphasize various stressors that threaten the quality and quantity of water available for regional consumption. The activities in the kits support classroom curricula by encouraging students to ask questions and define problems, analyze and interpret data, construct explanations and design solutions, and engage in argumentation with their peers using evidence to support their claims. The kits also expose students to specialized equipment that they may not have access to otherwise, such as electrical conductivity (EC) meters and turbidity sensors. “Ultimately, the purpose of the kits is to provide students with a better grasp of the complexity of the Colorado River watershed and how humans are affecting the basin,” Peterson explains. “And having an opportunity to work with instruments similar to those used by researchers in the field provides them with real-life experiences that will help shape their understanding of water resources science.”



Each Green Box, such as the “Properties of Water” Green Box above, is a self-contained science education kit.

The “Sustaining the Colorado” Green Box outlines a sequence of labs to highlight how the salinity of the Colorado River system acts as an indicator of water quality. Students learn how to test water samples using an EC meter and evaluate the effects that various point/nonpoint pollution sources have on water quality. Students also assess how increases in human population and per-capita consumption of natural resources affect the environment, and they design a method for monitoring and minimizing the anthropogenic effects on the Colorado River basin. “It provides a thorough understanding of how water cycles through the earth’s systems and how this process is driven by energy from the sun and gravitational forces,” Peterson explains. “We have received many positive reviews from teachers, such as those from Brinley Middle School that noted how completing the lessons prepared the students for a trip to Lake Mead and helped their comprehension of the information provided during the field trip.”

(Continued on the following page)

(Project Spotlight continued)

The “Watersheds” Green Box provides a series of experiments designed to help students understand the effects of humans on local hydrology. The experiments cover a range of disciplines including geology, chemistry, earth science, botany, and biology. These lessons are intended to provide students with an understanding of the Colorado River watershed. Students analyze geoscience data to understand how changes in the earth’s surface can change other earth systems. They also assess water properties and their effects on surface properties. Students learn about the mechanical and chemical properties that affect weather and erosion in the Southwest. “We also received feedback from Dayton High School that the ‘Watersheds’ Green Box helped the teachers expand their own

knowledge base, which allowed them to enhance and extend their lessons,” Peterson adds.

As possibilities for new Green Box topics become available, the Science Alive team works to bring them to Nevada’s classrooms. “We are currently working with Dr. Markus Berli to create an erosion Green Box for elementary school students and with Dr. Seshadri Rajagopal to create a drought-themed box for middle school students, both of which are poised to be circulating the state by the beginning of the 2018-2019 academic year,” Peterson says. “Our hope is that the Green Boxes heighten the visibility of DRI in Nevada’s classrooms and provide a snapshot of the work our researchers conduct.” ■



The “Hydroponics: A Solution” Green Box guides students through lessons that focus on the components that plants need to survive.

Student Interview: Harshad Oswal

We asked graduate research assistant Harshad Oswal about his current studies and plans for the future. Here’s what he had to say:

1) What sparked your interest in water resources research?

My undergrad major was in civil engineering and I learned a lot about global water scarcity issues and conflicts, and I became interested in learning more about the water sector and techniques to improve water quality. Fortunately, I had the opportunity to work on some practical and challenging projects in the water domain, such as the treatment of heavy-metal-contaminated brine and the fate of trace organics in wastewater treatment. My interest in water research further increased after understanding the positive contributions that scientists

can make and will make to conserving a vital resource—water.

2) What do you find most interesting about water resources research, particularly working in an arid/semiarid environment such as Nevada?

Water scarcity is a critical issue and the importance and value of water are even greater in arid/semiarid regions such as Nevada. Applications for water reuse, such as for indoor farming, are attractive but they need to be tested first. To me, water resources research is most significant and interesting in places where water is a scarce resource.

3) What kinds of research are you currently working on and what have you learned so far from this research?



I’m currently working on the NIWR project “Wastewater Reuse and Uptake of Emerging Contaminants by Plants” with Dr. Kumud Acharya and Dr. Daniel Gerrity, and I’m studying

(Student Interview continued)



“Water scarcity is a critical issue and the importance and value of water are even greater in arid/semiarid regions such as Nevada. [...] To me, water resources research is most significant and interesting in places where water is a scarce resource.”

– Harshad Oswal

the uptake of emerging organic contaminants (i.e., trace organics) and antibiotic resistance genes (ARGs) by plants irrigated with reclaimed water (i.e., treated waste water). Wastewater treatment plants are not designed to remove trace organic contaminants, and therefore these contaminants are present in effluent wastewater. The concern with using reclaimed water is that it may cause indirect human exposure to trace organics. Reclaimed water is known to be a reservoir of ARGs, so using reclaimed water may increase the prevalence of ARGs. Therefore, this research is applicable to a broad spectrum of the concerns about using reclaimed water for irrigation.

4) What do you hope to learn more about from the research you are doing?

I have learned a lot about microbiology, which I never thought would happen. There is still a lot more to learn and I am enjoying the process. Because my research deals with plants, I have been learning new things about

plant physiology too. I hope that by the end of project, my knowledge and experience in these two fields improve. I also hope to learn more about different water reuse applications, such as direct/indirect potable water reuse and other nonpotable water reuse applications.

5) Do you have a preference for lab work or fieldwork, and if so, why?

I have spent most of my time doing lab work. I think it is easier to plan and manage conditions in the lab than in the field, so I prefer lab work. That said, I would love to have more fieldwork opportunities to gain experience.

6) What are some of your other research interests? Do you have any goals for incorporating those interests into your work as you continue in your career?

I am really interested in finding sustainable, energy-friendly, and cost-efficient ways of capturing nutrients from water and reusing them. I aspire to become a professor and would love to work in that field.

7) What is one of your favorite movies or books and why?

I love The Lord of Rings trilogy. I believe the movie far exceeded the graphics and storylines of any other movie at that time. The vast number of characters and their bonding, as well as the scenic beauty, all are wonderful.

8) If you had six months with no obligations or financial constraints, what would you do with the time?

I would roam around the world and learn about different cultures. Travelling is the most exciting thing to me. Six months wouldn't be enough! ■



For the NIWR project “Wastewater Reuse and Uptake of Emerging Contaminants by Plants,” Oswal is irrigating spinach plants (shown above) with reclaimed water to determine their uptake of emerging contaminants.

Upcoming Events

AWRA Summer Conference: The Science, Management, and Governance of Transboundary Groundwater
July 9-11, 2018
Fort Worth, TX
www.awra.org/meetings/FortWorth2018/index.html

AGU Chapman Conference: Hydrologic Research in the Congo Basin
September 25-27, 2018
Washington, D.C.
chapman.agu.org/congo-hydrologic-research/

2018 Fall Week of Water Events
September 24-28, 2018
Reno, NV
www.nvwra.org/2018fallweekofwater

2018 GSA Annual Meeting
November 4-7, 2018
Indianapolis, IN
www.geosociety.org/GSA/Events/Annual_Meeting/GSA/Events/gsa2018.aspx

2018 ASA and CSSA Meeting: Enhancing Productivity in a Changing Climate
November 4-7, 2018
Baltimore, MD
www.acsmeetings.org/

2018 AWRA Annual Conference
November 4-8, 2018
Baltimore, MD
www.awra.org/meetings/Baltimore2018/index.html

NGWA Groundwater Week
December 3-6, 2018
Las Vegas, NV
groundwaterweek.com/

2018 AGU Fall Meeting
December 10-14, 2018
Washington, D.C.
fallmeeting.agu.org/2018/



2018-2019 SSSA International Soils Meeting: Soils Across Latitudes
January 6-9, 2019
San Diego, CA
www.sacmeetings.org/

2019 NWRA Annual Conference Week Activities
January 28-31, 2019
Reno, NV
www.nvwra.org/2019-ac-week

2019 Water Rights Seminar (in conjunction with 2019 NWRA conference)
January 28-29, 2019
Reno, NV
www.nvwra.org/2019-water-rights-seminar

2019 Nevada Well Drilling Regulations & Forms Class and Water Well Drilling Exam Tutorial
March 6, 2019
Reno, NV
www.nvwra.org/2019-march-well-regulations-workshop

NWRRI - Desert Research Institute

Success and the dedication to quality research have established the Division of Hydrologic Sciences (DHS) as the Nevada Water Resources Research Institute (NWRRI) under the Water Resources Research Act of 1984 (as amended). As the NWRRI, the continuing goals of DHS are to develop the water sciences knowledge and expertise that support Nevada's water needs, encourage our nation to manage water more responsibly, and train students to become productive professionals.

Desert Research Institute, the nonprofit research campus of the Nevada System of Higher Education, strives to be the world leader in environmental sciences through the application of knowledge and technologies to improve people's lives throughout Nevada and the world.



www.dri.edu/nwrri

For more information about the NWRRI, contact:

Amy Russell, Business Manager
702-862-5471
Amy.Russell@dri.edu

Kumud Acharya, Director
702-862-5371
Kumud.Acharya@dri.edu

Banner photo: A sailboat on Lake Tahoe by Nagaraju.ramanna
[CC BY-SA 3.0 (<https://creativecommons.org/licenses/by-sa/3.0/>)], from Wikimedia Commons

Events list, page 5: Teddy-bear cholla (*Cylindropuntia bigelovii*) at the Cholla Cactus Garden, Joshua Tree National Park, by Doug Dolde

Newsletter written and compiled by Nicole Damon.