2011 Toyota TAPESTRY Awardees

Going Green in Brownfields: A New Diet for Mushrooms

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An investigation into Connecticut's brownfield sites has shown that significant areas of contamination are due to spilled petroleum products. Bioremediation might be one solution to the problem. Our 6th and 7th grade students want to test a fungus, the gray oyster mushroom, Pleurotus ostreatus, in petroleum-laced soil to determine whether the fungus can metabolize motor oil. As a result of their research, the students will create a public service video, explaining the hazards of spilled petroleum products in soil. They will also share their understanding of innovative bioremediation methods that use metabolic pathways of decomposer organisms like oyster mushrooms to clean contaminated soil.

Canaan Street Lake Turtle Study and Water Quality Testing Project

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When the ice leaves Canaan Street Lake this spring, science students at Cardigan Mountain School will undertake a study of turtles and the quality of the water in which they live. The data gathered through sampling of water and the capture of turtles will help our students develop hypotheses for factors that affect the turtle population. The turtles will be cast as "indicator organisms" of water and habitat quality in the lake. Our study will incorporate simple measuring tools as well as probeware for acquisition of digital data. Students will learn how to set up and perform a scientific study and collect data that will help them predict distribution and also infer overall health of the species within the lake. The water quality information will be shared with the local lake association and the State of New Hampshire.

New York City Biodiversity DNA Barcoding Project

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At the High School for Environmental Studies, students will research, design and implement a DNA barcoding project to identify and catalog the biodiversity of New York City. DNA barcoding is a new and efficient way of identifying animals and plants based on small fragments of DNA. Students will work in small groups to identify a plant or invertebrate species of interest. They will collect samples from all over New York City, extract the DNA from their samples, develop novel polymerase chain reaction (PCR) protocols to amplify the specific barcode region for their organism, send samples out for sequencing, perform comparative analysis using bioinformatics tools, and build a website to publicize their work. Throughout this process, students will develop a range of skills from traditional morphology identification to advanced molecular techniques while documenting biodiversity and answering ecological questions in their city.

The Effects of Climate Change on Birds of Staten Island

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In this project, students will create long-term studies of birds visiting the environmental areas of Staten Island's south shore. Students will identify and assess how weather and, climate in combination with biotic factors and abiotic factors affects the spatial distribution, abundance, and demography of bird species that breed and migrate in the southern shore of Staten Island. Students will begin their bibliographic research looking for increases in average temperature and variability of weather conditions on Staten Island, looking for climate patterns. The impacts of these changes on animal populations are not well understood, however they can be assessed through long-term studies. Living on Staten Island gives us a great strategic position to record temporal variability and bird migrations.

Bluebird Restoration Project

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The Biodiversity Restoration Project will be a joint effort of 4 classroom teachers and 1 ecology instructor mentoring and assisting 54 fifth grade students and 51 sixth grade students as they engage in scientific inquiry to research the impact of human management of a prairie and wetland ecosystem, known as Prairies and Ponds at Oakdale. Students will work towards increasing biodiversity of this amazing urban migratory stopover site by restoring habitat. Students will do this by surveying existing nestboxes for maintenance repairs, building and maintaining new nestboxes due to the absence of natural cavity nesting material. Additionally, students will continue to increase the biodiversity of native plant species to the restoration of an Oak Savannah.

How do we do it?

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This proposal will reveal that our school of "alternative kids" can make logical and fact-based "alternative choices" with our water. These will be choices to improve water quality of nearby streams, reduce runoff, naturally replenish groundwater, filter pollutants, and irrigate beautiful rain gardens. The beginning steps will involve students researching, constructing, and installing rain barrels as a water harvesting method. These rain barrels will serve as our reservoir to irrigate rain gardens on campus. Students will work with administration and custodial personnel to develop and maintain the rain gardens. In addition, students will have the opportunity to work with an engineer from the City of Gallatin, the storm water committee of Sumner County, Master Gardeners of Tennessee, and their own peers. Stating the uniqueness of our school is important Small classroom size creates a way for this project to become a needed one-on-one teaching experience. This uniqueness can allow a great opportunity for students currently working on the project to teach the newcomers. Current students can put knowledge gained into action by getting new students updated on the project's progress. Students will not only expand knowledge of "green" and sustainable construction, but will see the importance of helping their school, the immediate community, and their world.

Foothill Elementary K-6 Environmental Science Program

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Foothill Elementary School (Sierra Unified School District) is partnering with the Bureau of Land Management, San Joaquin River Gorge Management Area to provide interactive, hands-on science investigations using public lands as an outdoor laboratory. Programs will be a combination of classroom, on-campus outdoor activities and field trips to local public lands and will be offered to students in grades K-6. All programs are correlated with state educational standards and are interdisciplinary in nature. However, the main focus of the programs will be on the local environment using native species and local cultures as case studies. These programs will link students to the local landscape and its rich cultural history, and foster a new generation of stewards by incorporating the principles of the Tread Lightly and Leave No Trace land use ethics. Programs are designed to provide students with more in-depth knowledge and understanding as they progress upward in grade level, building upon things learned the `previous year.`

Sopris Greenhouse Grant

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The Sopris Gardening Grant proposes to partner with the developmentally disabled community next door to us in Glenwood Springs to teach kids about science and gardening, where their food comes from and how it is grown, as well as provide kids an opportunity to grow their own food for the school cafeteria. Mountain Valley Developmental Services will provide a large unused space of their greenhouse for Sopris Elementary to build a series of 12 beds that are heated using solar thermal radiant heating, and they will also provide contact to clients who will help care for the gardens and teach, in a well supervised setting, young children about gardening. Sopris students will be guided through a plant biology/ gardening curriculum previous to their entry into the greenhouses where they will address the numerous required biology standards. Then students will care for the produce in the twelve 10 foot beds, set up a series of experiments using the soil and various fertilizers as variables, and they will measure and track the growth of the produce that will eventually end up in the school cafeteria salad bar (this will address standards about how to conduct science. Who says you can't grow your salad and eat it too?

Heat Island: Search for Solutions

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Working with a scientist, students will design and conduct a scientific investigation of the heat island effect. They will use RED data collection probes to collect local surface heating data, analyze satellite surface maps, analyze temperature data, and compare Wyckoff to communities classified as forest, rural, suburban, and urban. Students will research landscaping strategies to reduce the suburban heat island effect. Information will be disseminated to the community over public access cable television and the Internet. Students will also make presentations to various community groups.

Molecular Diversity of Bacterial Viruses

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This project aims to characterize bacterial viruses or bacteriophages and to determine their diversity. Potomac students will survey the school's 90 acre campus to identify phages and pinpoint their location. Using scientific inquiry, microbiology, and molecular techniques, they will purify phages, isolate the genetic material, and determine the nucleotide sequence of the phages. Students will complete the molecular analysis of their discoveries, using a bioinformatics approach of the isolated viral genome. This initiative is a partnership with The Howard Hughes Medical Institute (HHMI) SEA (Science Education Alliance) program and is an integral part of the National Genome Research Initiative. We have a unique

opportunity to improve students' interest in biological science as they take part in a national scientific mission, while maintaining an independent research discovery.

Where in the Forest is Alliaria petiolata?

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"Where in the Forest Is Alliaria Petiolata?" Is a hands-on learning experience in which students will collaborate with local ecologists and other experts, using 21st century tools including GPS and GIS, to solve a real world problem of managing the non-native invasive species Alliaria petiolata (garlic mustard) in the Monongahela National Forest. This project will facilitate on-site visits to public lands for students and provide experimental learning opportunities that will allow students them to become confident, responsible citizens who are active stewards of our environment.

Zoo Genetics: Key Aspects of Conservation Biology

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In an effort to expose students to the current use of genetics, we created a curriculum project called "Zoo Genetics" in partnership with Dr. Jean Dubach, wildlife geneticist. Using actual data from a Wildlife Genetics lab in our community, students can use DNA sequences, chromosomes, and genotypes in order to answer conservation questions. Students determine paternity among a group of dolphins, parentage in a pride of lions, and compare DNA to identify species of Australian possums and penguins. Students can do all of this using only our activities and without any expensive equipment that is usually not available to public schools.

Where did the Oil go?: Exploring the Gulf using Molecular Biology

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The Deepwater Horizon oil spill has had a major impact on the ecology of the Gulf of Mexico and the area round Mobile Bay. Our project will measure which marine bacteria are degrading the crude oil and how the bacteria community has changed a year out from the spill. We will compare the Mobile Bay ecosystem to the open waters of the Gulf of Mexico. By employing current molecular biology techniques we can

avoid direct culturing of bacteria and observe their genetic makeup via PCR. We will also collect abiotic factors form the marine samples to better understand the niche in which these bacterial community arise. Students will get to help understand first hand how the ecology of the Gulf has been affected and learn the scientific methods of exploring the depths of the ocean.

Increasing Food Production on the Urban Farm

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It's actually 2 projects linked in a class called **Food and Environment**. We are going to be growing different organic vegetables (starting with lettuce), taking tissue cultures of the best plants, (according to growth, taste, and health of plants), and also collect genetic information on these plants. The project will include soil data and farming techniques as well once we get some plants to work with.

Restoration of the Showy Lady's Slipper Orchid

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The showy lady's slipper orchid (Cypripedium reginae) is a critically imperiled plant in New Hampshire. It is threatened in Vermont and has a precarious future in much of the northeastern USA. Our students in grades 5-8 will use our school's small tissue culture laboratory to raise large numbers of showy lady's slipper seedlings with the goal of repopulating them into the local/regional environment in specifically targeted sanctuaries. Since the showy lady's slipper spreads very slowly in the wild, using plant tissue culture will allow the production of large numbers of seedlings quickly and inexpensively. Our school will enjoin local and regional schools, garden clubs, and nature centers as partners in establishing and long-term monitoring of our targeted sanctuaries as an effective approach for restoring this terrestrial orchid to its natural habitat.

Mighty Engineers

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Two years in a row, the students at Ramona Convent Secondary School have built six different biomes; desert, rain forest, tundra, taiga, deciduous forest, and grassland on the school's property. This year, we propose to install solar panels to each of the biomes to reproduce the humidity, temperature and other critical elements of each environment. The solar panels allow us to change the climate conditions to better understand the changes that take place in today's world. Once the installation is complete, the science students in various grade levels begin group studies that last throughout the year.

Diversity of Woodland Birds in the Seabeck Area

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Using sound scientific principles coupled with state of the art technology our student researchers in a two hour Science/English class, will identify and study of the phenology of both the expected species of birds, based on a 2009 survey done by the Kitsap Audubon Society. Student researchers will specifically record the migration patterns and will compare this to known timelines. The question the students are researching is: Do we see a phenological disjunction in migration patterns and expected species associated with climate change and human development? Student researchers will create an interactive web page that includes both original art of the observed species, photographs, and field data regarding bird number and phenology. Students will keep detailed statistical data as well as anecdotal journals that will help them to write timely and informative web pieces of non-fiction as well as fiction inspired by their explorations.

Making Biodiesel to Help My School Community Go Green

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Students from a Chicago Public high school will design and construct a 50-gallon batch processor to convert waste cooking oil into biodiesel fuel using a chemical reaction. The waste oil will come from the school cafeteria, culinary arts program, and surrounding businesses. All of the design, construction, operation, and testing requirements will be performed by students. A reaction byproduct will be used to make hand soap for sale by the school store. Students will modify a small bus or van to run on biodiesel fuel. The project promotes collaboration between the academic and vocational departments while encouraging community outreach. It supports a national movement for schools to "go green" while teaching essential skills needed to compete for jobs in the emerging green economy.

Accessible Water Science

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Students will collect water samples from a pond, a river, and the ocean. After measuring temperature and salinity they will compare the properties of the three different bodies of water. They will also compare their data with Dr. Amy Bower's at the Woods Hole Oceanographic Institution, used in the study of ocean currents. The students, who are visually impaired, as is Dr. Bower, will use a variety of adapted equipment to record and analyze data.

Warbler Awareness

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The students at Stuard will work on various projects to heighten public awareness about one of Parker County's endangered species, the Golden Cheeked Warbler, and its dependency on the survival of the Ashe Juniper. The students will create a webpage, brochure, park awareness signs, video to a composed song, and a public art show about the Warbler. The other aspect is discovering how variables can affect germination of the Ashe Juniper tree. We will accomplish this by harvesting the berries of the Ashe Juniper and differentiating the seeds based on a scarification process which will place the seeds in three different categories. One group of seeds will be digested by goats, another will be manually removed from the berry, and the last group will remain intact. The purpose is for the students to discover the percentage of successful germination of the Ashe Juniper. This is followed by the length of time for that seedling to become a mature tree and produce the strippable type of bark that the Warbler needs for its nest.

Illuminating Ecosystems

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The Illuminating Ecosystems project will have student scientists perform DNA Barcoding, a type of DNA analysis, to explore and identify plant and animal species in their local environment. In the context of a year-long science methodology course, students will use their data, and acquire further tools and techniques of molecular biology with the aim of exploring ecological questions. Students will publish some of the DNA sequence data collected in online science databases.

SMORE: Students Monitoring Ocean Response to Eutro…

Dolores Garay

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This project partners middle and high school classrooms in coastal Texas, Georgia, and Arctic Alaska with marine researchers from the University of Georgia to monitor and compare human impact on coastal oceans. The focus of this project is eutrophication, which is caused by inputs of excessive nutrients like nitrogen and phosphorus into aquatic systems. SMORE creates a platform for transforming the abstract concept of anthropogenic impact on global change into a learning experience from a different view- the ocean.

Alternative Energy Resources in the Columbia Basin

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Our project uses environmental science to teach English across curriculum to a high population of English Language learners in our school. Students actively engage in scientific research, inquiry, and hands-on activities to learn about sources of renewable energy found in our own backyard. Students and teachers embark on a journey to discover the science behind hydropower, wind power, and solar power.
Students research the history of the area and the role of the Columbia River in the development of the Columbia Basin. They apply the scientific method to make hypotheses, design, build, and test wind turbine and solar panel prototypes.

Using Student Interest in Technology to Develop Inquiry Skills

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The Interpretive Trail project will tap into student interest in technology to act as an impetus for this inquiry-based project. This technological perspective will motivate students to develop investigations that will shape their understanding of ecosystem concepts and inspire curiosity of the natural world. Students will map out an interpretive walking trail along existing pathways on school grounds and apply the technology skills necessary to develop an interactive web site which will host downloadable pod casts for the ultimate walking trail experience. Student-created pod casts will cover topics related to forestry, agriculture, ecosystems, watersheds, and land use to both educate and create an environmental awareness for the community. A class wiki will be utilized to showcase student pages that will house pod casts,

video, and interactive Google maps designed to educate the public about the local environment, including suggesting steps that members of the community can undertake to decrease their environmental footprint. Culminating activities will include a "Trail Day" where students will invite elementary-aged students to listen to downloadable podcasts as they walk the trail.

F.I.S.H. (Factors Influencing Submerged Habitats

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130 seventh-grade students at DC Everest Middle School will utilize an interdisciplinary approach to investigate first-hand factors that affect a local aquatic habitat. Students will investigate water quantity, water quality, water temperature, sedimentation, riparian habitat, and interactions of aquatic and terrestrial species (including humans) at a small area near where the Eau Claire River flows into the Wisconsin River. Each of five science classes will make quarterly visits to the study area to obtain data essential for the base-line study and then work cooperatively to develop and present their research findings to 6th grade students at the end of the 2011/2012 school year.

Belchertown Biodiversity…Let's Get Outside!

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Recognizing the biodiversity of any area is the first step to understanding the vital services provided by an ecosystem, as well as equally crucial citizenship, aesthetic and restorative values. Belchertown Biodiversity will involve students, preK-12, in an initial survey of Lake Wallace. We will measure and map the trees and do aquatic monitoring of the Lampson Brook watershed. Data will be used estimate ecosystem services, such as annual carbon sequestering, and to gain an understanding of the role aquatic organisms play in maintaining a healthy watershed. This project will partner Elementary and Middle/High School teachers to write and integrate field trip lessons, tied to core curriculum goals and state frameworks, into regular lessons throughout the year. Student data and artwork will be presented to the public as "Belchertown Biodiversity: Field Guide to the Trees and Pond Life of Lake Wallace." This project will give our nature-deprived students the information and experiences they need to know and care about their local, and therefore global, environment.

Educating Students on Sustainable Organic Agriculture, Environmentally Friendly Practices, and the Effect of Phosphorus Run-Off on a Neighboring Canal

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This exciting research project provides authentic hands-on cooperative learning experiences for students in which they will investigate a real life environmental science community problem. This research, investigating the issue of algal bloom in a neighborhood canal system, will engage students in problem solving and scientific reasoning, by addressing two major questions; "Is there a correlation between algal bloom in the canal system and the use of fertilizers?" and "Does organic farming reduce the impact of phosphorus build in the soil?" This research will reinforce students' knowledge of science concepts, technology skills, and enhance understanding of the scientific method. Students will have the opportunity to share the results of the research with parents, teachers, and the community through brochures, classroom presentations, and several Farmer's Market and Farmer's Pot (Prepared food samples).

The Hydrosphere Network

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Students from the advanced placement (AP) environmental science class, led by the project director Graeme Marcoux, will develop an organization entitled The Hydrosphere Network. The goal of this organization will be for students to educate their classmates and the public about the need and the means for the protection of Salem's connection to the hydrosphere. The AP environmental science students will work with other students from within the school and district, Salem Sound Coastwatch, the city planning department, the conservation commission and other network members to monitor, protect and remediate as many ecosystems with a connection to the hydrosphere as possible in the city of Salem. A website will be developed by students to communicate information regarding the ways in which humans are connected to the hydrosphere and the environmental status of different ecosystems within the city of Salem with a connection to the hydrosphere.

Bringing Back Our Bay One Eelgrass Blade at a Time

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Our project looks to study, using students and the community, the mitigation potential of eelgrass, Zostera marina, on ocean acidification. Our plan is to use our greenhouse to set up controlled experiments where students can manipulate water quality parameters, particularly CO2 concentrations, and study the effects the grass has on the water. We also plan on monitoring the same water parameters in areas of our local bay that have grass now, do not have grass and then areas we restore with grass. Our hope is to show that eelgrass will reduce the impacts of ocean acidification.

Stream Monitoring of Decker's Creek

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A small stream, Decker's Creek, contaminated by acid mine drainage is the focus of multiple investigations in which 9-12th grade students monitor water quality and its influence on the biotic organisms in this ecosystem. Students will partner with a local non-profit organization, Friends of Decker's Creek, to monitor stream quality and educate the Morgantown community regarding environmental concerns of this watershed. Students will design research investigations, collect and analyze data on site, and form conclusions based on their findings. The final stage has them present their research in a forum of their peers and professors from our local university develop a commercial for our local community. Information will also be shared at a local city council meeting.

Living Roof from Seed to Seed

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Reclaimed water is increasingly being used for irrigation where water supply is scarce. What are the effects of high-nutrient reclaimed water on the growth of native plants? Biology students at Flagstaff Arts and Leadership Academy will collect local grass seeds from a field adjacent to the school. They will compare seedlings grown in tap and reclaimed water, and observe competition from non-native weeds. The results from this study can inform local government and land managers in our area that are using reclaimed water in parks and at the local ski resort. The students will then create a green roof of local grasses and wildflowers over the central campus patio to serve as a living tapestry of our native ecosystem.

Saving Our Whales/Saving Ourselves

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Studying Our Whales/ Understanding Ourselves is a curriculum that draws upon a comprehensive study of the anatomy and physiology of the great baleen whales of the North Atlantic to teach lessons that reach beyond whale biology. By learning about parallels between humans and whales, students will learn about taxonomy and evolution, and about the common threads that unite all organisms in the biosphere. Students will team with scientists to learn research methods, and students will produce short, instructive videos that will be disseminated at museums and on educational websites.

Caves and the Secrets They Hold to Climate Change

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This project will engage science students in an outdoor laboratory experience designed to build skills and understanding in doing the scientific method, field data collection, then processing and interpreting that data. Caves are natural archives as proxy indicators revealing paleoclimates that determine past environmental change. Caves often survive for thousands, sometimes millions of years. Water containing dissolved calcium and carbonate reaches a cave ceiling and over time precipitates as calcite forming cave speleothems. By carefully calculating the chemical composition of growth rings (via the amount of oxygen 18 isotope) found in cave formations (stalagmites and stalactites) from these unexposed structures of rock, students will infer past regional climate patterns. Caves (caverns) form from dissolved acidic groundwater. By measuring the air temperature, humidity, and water pH of the cave as modern analogues, these cave characteristics will be studied to better understand the chemical composition of the rainwater in order to better understand the temperature and rainfall rate at the time of the speleothem formation. Quantitative skills will be reinforced by this research experience in which students will be involved in identifying a specific environmental concern that can be addressed quantitatively, gathering data, and interpreting their results by statistical analysis to determine environmental change over time.

This is Crappie

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The "This is Crappie" project is a study of project director; Melanie Shaver's class in collaboration with Nancy Trollinger's math class, the North Carolina Wildlife Resources Commission, American Fisheries Society, local fisherman and businesses. "This is Crappie" will study local Crappie population dynamics, and lead to open inquiry projects for participating students. Students will use (in collaborations with NCWRC) shocking boats to collect and sample the Crappie population on Lake James, through the use of sophisticated lab equipment they will age and determine growth ratios for the fish. Students will use the data that they collect to create open inquiry investigations of the lake (how to improve the fishery, best methods for catching crappie, etc), they will create a website to post their information and water quality information about the local lake. Students will present their findings (poster sessions) at the Southeastern American Fisheries conference and a school wide Crappie Day. Students will gain insight into how fisheries biologist work in the field and lab, to maintain viable Black and White Crappie populations.

Ala Wai Watershed Project

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The Hawaiian Islands are the most isolated, populated land mass on the planet. With global climate changes and a growing population, raising the environmental awareness and protecting our renewable resources becomes increasingly important. The University of Hawaii CCRT and Iolani School are collaborating on the design and implementation of the Ala Watershed Project. The Ala Wai Watershed Project has three main objectives: (a) to provide Iolani AP Biology students with an opportunity to perform scientific research while gaining a deep sense of appreciation and stewardship for the environment, (b) to mentor students within our immediate community and foster their interest in science, and (c) to develop an internet based Portal on which Ala Wai Watershed schools can share their respective data over subsequent years. Through collaborative research efforts we hope to identify historical trends from mountain-to-sea, draw data based conclusions and inspire future generations of scientists.

Biome Detectives: A Habitat Inquiry Study

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The primary objective of the Biome Detectives program is to improve literacy skills and science process skills through the investigation of how plants and animals adapt to climate, and how life forms are affected by changes in their environment. In a school-wide project in partnership with the National Park Service and the United States Fish and Wildlife Service, over 500 students in grades K-5 will be involved in surveying four biomes in California: Mediterranean, desert, forest and coastal. Students will take real and virtual field trips to these biomes to collect data on local plant and animals, geology, and analyze weather trends. Through a student-to-student mentorship program, they will build and maintain a desert and aquatic biome to study the characteristics of native plants and animals specific to the area. To investigate the impact of natural and human-related changes to the environment, students will design and conduct controlled experiments both in and out of the classroom.

Bees in Bladen

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Our project, Bees in Bladen is an educational and research endeavor for students at East Bladen High School. Our students will learn the fundamentals of beekeeping including bee entomology, hive management and marketing of hive products. We hope to have students the state beekeepers association and test to become journeyman beekeepers. Students will survey local flora and evaluate for bees. Students will launch an educational campaign promoting bee friendly plants and bee friendly farming techniques. We will also be involved with a bee friendly wildflower garden and an apiary on our campus. This will be completed with a Special Interest Class in the fall and spring semester.

"Flora and Fauna Survey of a Shrinking Coastal Sage Scrub Habitat"

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This project will study the native, non-native and endangered species of both flora and fauna in an area of Coastal Sage Scrub that surrounds Summit Intermediate School in Etiwanda, CA. What is significant about this vegetation is that it is unique to Southern California and has both high species diversity and endemism (species not found elsewhere). Sadly, due to intense urbanization, only fragmented pockets of this endangered habitat can still be found throughout Southern California, so it is vital that remaining fragments such as this one are surveyed appropriately to document its composition of plant and animal species. The fact that this area of Coastal Sage Scrub is within easy walking distance of our school creates a fantastic research opportunity for our students to study and learn about this quickly disappearing native vegetation.

They are Wild. They are Here. They are Yours..Connecting Kids with their National Wildlife Refuges and other Local Habitats

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In this school-wide interdisciplinary project students will conduct authentic investigations through the citizen science Urban Bird Project and through their original inquiries related to our overarching research question, "What observations can be made about birds and trees in our schoolyard, local park, and local refuge habitats as seasons change?" In the fall our Refuge Student Leadership Team will collaborate with a park ranger to design digital scavenger hunts for their peers who will visit the refuges in the spring. Students will identify problems that exist in the refuges and local habitats such as invasive species and will assist AmeriCorps with the removal of invasive plants. A nature photographer will work with upper grade students at the school and guide nature photography trips to the local refuges. Students will share their learning through blog entries, video podcasts, audio podcasts, documentary films, music videos, and photo slideshows. At the end of the year we will host a Rock the Refuge Night for our families.

Student Water Initiative in Michigan - - The Harper Woods "SWIiM" Team (AKA BOB & FLO Go To Middle School)

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Student scientists with the Harper Woods Middle School Student Water Initiative in Michigan (The "SWIiM Team") will construct and deploy scaled down buoy models that collect a unique 24/7 continuous stream of weather and water quality data in shallow, protected areas of water - bays, creeks, estuaries. Our Detroit-area SWIiM Team will then work with various water experts from universities, parks, and state and national water stewardship foundations to interpret and disseminate the data to stakeholders across the region and the United States.

Returning Home – a Place for Trout

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The brook Trout, West Virginia's only native trout, have been extirpated from the Eastern Panhandle of West Virginia due to degradation of habitat and poor water quality. "A Place to Call Home" will engage 7th grade students from Wildwood Middle School in the feasibility of re-introducing Brook Trout into Jefferson County (WV) streams. By examining the question "Can Brook Trout Return Home to Jefferson County?" students will study and observe the life cycle and habitat requirements of brook trout, evaluate the multiple factors that influence water quality, use technology to conduct and communicate research, study literature which describes a "sense of place", make a difference in their community through service learning, practice basic fly fishing skills and promote community investment in a new park. With support from community partners students will develop technical science skills and communication skills to examine the life cycle and habitat needs of brook trout while discovering local natural resources. Ultimately the goal is to achieve what West Virginia author George Constantz calls "the power to see wonder in a common place."

Thunder Bay River Water Shed Project

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Created and developed by students wanting to preserve their local freshwater resources, this project has grown to involve a long list of classrooms and community partners. Our research is focused on understanding how these invasive species are changing our freshwater ecosystems. We have created a time series research project that monitors several locations on the Thunder Bay River watershed. We test each site twice a year (Fall and Spring), and post that data at on our project website. The students evaluate their data and develop their own research question based on the data and observations they have collected to create their own freshwater investigation.

Sustainable Food

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This project will allow students to follow the production of sustainable crops from the laboratory to harvest. Students will use an outside research garden, funded by the Toyota Tapestry grant, to develop the best agricultural practices. The majority of students that attend MHS live in an urban setting. Currently 33% of the school population receives free-or-reduced lunch. These students at Millbrook have limited experiences beyond the walls of their homes and school. An experiential learning activity, in the outdoor research garden and in a laboratory, will significantly strengthen students' cultural capital to begin the process of study in the life sciences and the agri sciences. There are three distinct stages in this scientific investigation. Using the IB Programme inquiry process, students will research irrigation techniques, conventional production methods, raised bed construction techniques, inorganic fertilizer rates, and organic fertilizer methods.

Stay CALM and the Frogs Get to Live!

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Stay CALM and the Frogs Get to Live! is a collaborative educational partnership between elementary school students and the California Living Museum. The goal of this project is to involve students in the establishment of a frog exhibit at the museum while studying the life cycle of amphibians, sampling pond water for pollutants, and raising environmental awareness within the community. Through this partnership, students will have direct access to biologists, environmentalists, living organisms, and advanced technologies which will assists them through this study and prepare them for complex scientific studies as they continue their education. This hands on, data driven, community science project will provide an immense amount of scientific knowledge to our students, and a frog exhibit for our local community to enjoy for years to come.

Field Science for the Real World

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Northwest Passage High School will partner with the Wildlife Science Center in Forrest Lake, MN to create a hands-on, real world biology experience using wolves as the "textbook." Students will work hand-in- hand throughout the school year with biologists and researchers studying wolf behaviors and assisting with reproductive research. Students will document and blog on the experiences every week.

Capturing Sunshine, Rainfall and Imaginations in the Desert

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Capturing Sunshine, Rainfall, and Imaginations in the Desert will engage students in experiential learning, student driven research and cross-age teaching. Tucson has an abundance of sunshine (193 sunny days annually) and a scarcity of rainfall (12 inches annually). Understanding and utilizing these resources efficiently is an essential component to living sustainably in the desert. The purpose of this project is to engage students in the practice of solar collecting and rainwater harvesting as they relate to supporting a sustainable life styles in the desert. Students will build solar arrays and water harvesting systems and teach others how to do the same.

Population Dependency Within Karst Origin Stream

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Located at the edge of the Barren County High School campus is a small creek formed by the penetration of the water table at the edge of nearby Beaver Creek karst plain. “Population Dependency within Karst Origin Stream” project will entail digitally mapping, cataloging and monitoring of the aquatic species in correlation with water conditions on a bi-weekly basis to determine seasonal migration and biodiversity patterns to see if this creek serves as a thermal refuge for iotic species. The project is a collaboration between six science classes in four grade levels and will be lead by science teacher Catherina Wiley.

Plant Natives: Conservation through Native Species Propagation

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Our primary goal for this project is to propagate native plant species in our proposed greenhouse/outdoor classroom to demonstrate the restoration of a local ecosystem with native vegetation. A secondary, but equally important, objective is to propagate and distribute native plants to students and local businesses to include in their home or commercial landscaping. Along with both objectives comes educating school and community groups about the importance of planting natives through scheduled presentations, a published Trail Guide, a video documentary, and web page.

The Effects of Modern Food Production and Waste Disposal on Human & Ecological Health

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The production and transportation of food and the disposal of food waste is directly linked to human and ecological health and is, ultimately, contributing to climate change. By studying the food that comes through our school cafeteria, our 7th and 8th students will gain a better understanding of how human health is tied to ecological health and climate change. This will be accomplished by: 1) chemically analyzing the food for the presence of petroleum-based hydrocarbons (TPH) and a commonly-used herbicide, atrazine 2) monitoring the wild birds in locations where there is a prevalence of TPH 3) composting the cafeteria's organic waste 4) designing experiments with the compost in which we will investigate its contents, microlife and the degradation of TPH and atrazine.

Flandreau Indian School Prairie Restoration Project

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Studying and understanding the impact of Native grasses and species on the prairies of South Dakota is fundamental to managing a sustainable ecosystem. Furthermore, such knowledge is critical to development and maintenance of a healthy state environment, and the recognition of strong cultural elements therein is important to issues of ethnic pride and self-esteem for Native people. A prairie grass project, planted at Flandreau Indian School (FIS), addresses these issues.