

CREATING SUSTAINABILITY EDUCATION PROGRAMS AT THE PARADISE CREEK NATURE PARK

**Lesson plans for paradise – Education and encouragement for Portsmouth
students to become environmental stewards**

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Abstract.....	2
Introduction.....	2
Our community partner.....	3
Class goals.....	3
Science education in Virginia.....	3
Precedent.....	4
Our Approach.....	5
Conclusion.....	5
Future work.....	6
Lessons Learned.....	6
Lesson plans.....	7
Elementary school.....	7
Brett Rappaport - “Notable Animals in the Paradise Creek Nature Park” : The ecosystem and food web of the Red Fox.....	7
Julie Duval – “A bird’s life” : Experimenting the three steps of a bird’s life & understanding the obstacles a bird has to overcome in order to survive.....	8
Julie Duval – “The animal specialists” : Discovering the animals living in the watershed and around, observing them using measuring instruments and formulating scientific hypotheses.....	9
Julie Duval - “War game” : Discovering the trees of the park and knowing how to recognize their leaves.....	10
Middle school.....	11
Angie Cerimele - “Water quality and testing” : How to test the quality of water in living systems.....	11
Monica Wilson - “Wetland Experiment” : Life science & biology.....	12
Monica Wilson - “Adopt a Twig” : Life science & biology.....	13
Angie Cerimele-Life Cycle: Matter All Connected.....	14
High school.....	17
Matt Menezes - “The stewardship circle” : Introducing local students to the PCNP and to its conservation.....	17
Matt Menezes - “Wilderness 101” : Making the outdoors more accessible with key woodland skills.....	19
Monica Wilson - “Building a Wetland Filter”.....	21
Bibliography.....	22

ABSTRACT

On behalf of Robin Dunbar, Deputy Director of Education and Public Outreach Manager of the Elizabeth River Project, we created a series of lesson plans for the Paradise Creek Nature Park (PCNP). The Park is a 40-acre preserve in Portsmouth, Virginia, built through collaboration of the Elizabeth River Project, community businesses, and the people of Portsmouth. Paradise Creek is part of the Elizabeth River, one of the main waterways that empties into the Chesapeake Bay via the James River, and has long been a major artery for commerce, as well as supporting a thriving community. In the last few decades, the Elizabeth River has become one of the most polluted rivers in the United States, but efforts by the Elizabeth River Project aim to make the waterway safe for swimming and fishing by 2020. The Learning Barge, designed by Phoebe Crisman of the University of Virginia, first took up the educational role of the Elizabeth River Project. The barge offers local children an opportunity to learn hands-on lessons about the river and efforts to restore it. The PCNP takes this endeavor further, creating a new landmark in the community that symbolizes the restoration efforts. The lesson plans included in this project present information about the park, the Elizabeth River system, and conservation as a whole. These lessons are tailored to elementary, middle, and high school students. Our group draws from environmental conservation efforts and outdoor education programs, as well as the Virginia Standards of Learning, to create programs that are relevant and accessible to different age groups. Included here is a synopsis of that precedent research, a description of the park’s role in the community and its potential impact, and the lesson plans to begin community education programming in the Paradise Creek Nature Park.

INTRODUCTION

The Paradise Creek Nature Park provides an opportunity for outdoor activities to educate the community, and more specifically children, in ecology and environmental conservation. Although the park is currently under development, the Elizabeth River project is making progress with the help of generous donors. So far they have constructed more than two miles of trails, an entry road, “green” parking, and an Earth Works Mound from which visitors can survey the park. Along the trails park visitors can enjoy beautiful wildflowers and flourishing young trees. Since there is not much natural overgrowth present at the park, this has made it easier to visualize how and where park tours will be given, specifically atop the Earthworks Mound, in the pavilion area, and along trails that are not attached to the main Otter and Osprey Trails (Figure 1). Along the trails, new signage will make important park elements easily identifiable. Small flag posts currently outline the structure of the wetland, under construction as part of the restoration process. The park is working to bring wildlife to the area with bird boxes, flowers, and new plants to provide habitats for local birds, mammals, and insects. Phase II plans include construction of outdoor classrooms, a kayak launch, a playground, and composting toilets.

What does it take to restore an urban river?

- Reforested shores
- Restored wetlands
- Industry partners
- It takes YOU!



Figure 1 : Map of the Paradise Creek Nature Park

Our community partner

Robin Dunbar and the park staff commissioned our group to design lesson plans to deepen park experiences of community youth. Robin Dunbar is known for dressing up as Princess Elizabeth and spreading a message of environmental awareness through local schools. The Elizabeth River Project is an independent non-profit organization created in 1993. It oversees the design and programming of the park as part of its larger organizational mission to clean up the Elizabeth River. It aims to engage local businesses, schools, homes and governments to improve the health of the river and its surroundings. Our project will thus benefit the whole community. The ERP has a “no finger pointing” policy, no blame is assigned to anyone; this is a collaborative project, and will be more likely to succeed if we can enlist more people in the pursuit of restoration.

Class goals

We are interested in this project because we believe school children are the key constituency in reversing the trend of environmental degradation and the detrimental culture of consumerism and overconsumption. Kids today are the key audience to target when it comes to conservation because they are impressionable; they are still building their connection to the environment on a daily basis. Children have not yet formed bad habits or ingrained routines of waste--they look for role models and acceptable actions--and we hope to instill in them positive environmental values and favorable ecological practices. Our goal is to prepare these kids to be the future stewards of our environment.

Our project consists of designing lesson plans for school kids in primary, middle and high school. We want to make these lesson plans as entertaining as possible to really engage the students. Creativity and hands-on activities such as scavenger hunts, crayon/colored pencil drawings, and water sampling will help the spirit of conservation come alive. To ensure that our lessons fulfill academic requirements in life science and biology, we will use the Virginia Standards of Learning to make our lessons relevant and meaningful. Our major goal with the use of these lesson plans is to offer relevant activities so educators can make use of our work as a part of their teaching programs in conjunction with programs in the park.

Science education in Virginia

The Standards of Learning Framework outlines specific skills and lessons that teachers are expected to include in their curriculum. The *Science Standards of Learning* for Virginia Public schools identify academic content for essential components of the science curriculum

at the different grade levels. Standards are partitioned into kindergarten through grade five, grades six through eight, and grades nine through twelve. A core set of courses- Earth Science, Biology, Chemistry, and Physics- are introduced throughout a student's science schooling from kindergarten through grade six. The Standards of Learning in each grade level progress in complexity as students advance. Our lesson plans target the following curriculum topics:

- Scientific Investigation, Reasoning, and Logic
- Life Processes
- Living Systems
- Earth Resources
- Earth Pattern, Cycles, and Change

PRECEDENT

Environmental education is a critical function of public parks. One of the primary appeals of the Paradise Creek Nature Park is its capacity to directly immerse the children of Portsmouth in environmental science and sustainability topics, which has been shown to be a fundamental part of early education. We explored several different examples of research and educational programs that demonstrate the importance of this type of learning and show how it can be implemented.

Dr. Nicole Ardoin of Stanford University partnered with the NatureBridge Institute in Australia to produce the Environmental Education Research Bulletin. In this document, Dr. Ardoin evaluates environmental education practices in Australian schools and in community parks to find the most effective methods. Her findings focused heavily on what motivates students and makes them retain information and appreciate their lessons. She found that environmental education benefited from a sense of place, and that lessons in a park or outdoor setting contributed to a sense of community. A sense of place essentially means a feeling of immediate connection to one's surroundings, a sense that one is an integral part of one's environment. The NatureBridge team found that education in these outdoor settings also increased students' motivation toward activism and environmental awareness, and that assessments several weeks later found consistently high levels of emotional investment in conservation. When it comes to younger students, interactive teaching styles led to greater engagement and greater retention. This involved conversational teaching and discussions, whereby the best teachers were found to lead by example.

We have adopted many of these suggestions in our own project, designing lesson plans that encourage verbal interaction and tactile interface and that rely on student participation. When it came to environmental science, the NatureBridge team found that technology-supported lesson plans often ran into difficulties, and that students learned best in interpersonal, inquiry-based activities. Given the limited technological resources of the park, this stipulation poses no challenges, and in fact has encouraged us to develop field activities for students that are solely dependent on the richness of the park and the knowledge and personality of staff. Finally, going beyond the classroom or park, Dr. Ardoin also found strong effects of culture on students' perceptions of the environment. This reinforces the importance of the PCNP as a point of cultural cohesion and a place where perspectives can change. The community has shown signs of developing support and excitement for the park, which bodes well for the success of our program. Community investment will lead to a positive feedback cycle whereby students will come to the park excited to learn, and leave empowered to help their environment with immediately applicable lessons.

The Appalachian Mountain Club offers a number of environmental education programs to children and youth in the Appalachian region. Their mission statement emphasizes the importance of exposing people to nature in order to inculcate a sense of love and responsibility toward natural spaces. Among their many activities, the AMC runs a "Youth Opportunities Program" for inner city youth, mostly out of Boston and New York City. While the PCNP is not equipped to provide the same high-intensity, several-day camping trips that AMC conducts in the mountains, some of the lessons of the program are still invaluable to the creation of our own education curriculum. This program is in line with an initiative by the Federal Bureau of Land Management called the Diverse Youths Outing Project. These projects all aim to change the way that inner-city youth, who often live in environments totally devoid of nature, relate to their natural surroundings. The city of Portsmouth has a per capita income of \$16,507, with 16.2% of its population below the poverty line. As such, this is the perfect environment to implement a program like the YOP or the DYOP. These programs use the woods to teach young people self-reliance and facilitate teambuilding and leadership development.

While the PCNP is too small to sustain several-day backpacking trips or intense alpine hiking, it has the advantage of being nearby and very accessible. Young people from the city can receive an introduction to outdoors skills like fire safety, first aid, and species identification, which will demystify nature and make it more accessible. This has the added benefit of increasing their sense of investment in nature, which tends to lead to a greater sense of responsibility for one's self, one's community, and one's environment. While the park and watershed are the primary beneficiaries of our education project, the community stands to benefit as well. If young people walk away from Paradise Creek with a greater sense of their community as an ecosystem, they will take their role as stewards more seriously. AMC found substantial increases in self-confidence, sense of community, and critical thinking skills in the participants that spent time in outdoor education programs. We can introduce skills that will allow young people to go further in their outdoorsmanship, while cultivating values of collective responsibility that will mold them into better citizens of the Portsmouth

community.

Our design entails a series of lesson plans, tailored to different age groups that will be used for community education programming at the park. These lessons will be geared toward elementary, middle, and high school students, respectively, and will focus on several important elements of the park. Our main topics of focus include environmental stewardship, the flora and fauna of the park, outdoors skills, ecology and biodiversity, and habitat awareness. Each lesson will take one to two hours, and include supplemental lessons for the classroom as well as lessons to be led in the park itself. They are each structured to be as accessible as possible for the teachers to understand:

- Standards
- Objectives
- Materials
- Activity
- Assessment

The classroom lessons will help expand students' understanding of the park so they have greater context for their experience when they arrive. The park-based lessons will make use of the hands-on, dialectical learning that Dr. Ardoin and the NatureBridge team advocated to make the park experience come alive.

OUR APPROACH

Each group member researched the Virginia Standards of Learning for elementary, middle, or high school students, and prepared lesson plans for their respective age group. The state of Virginia has a set of SOLs specifically for Environmental Science education, so our lesson plans focus on the themes these SOLs set forth. The expectations of the state include scientific literacy, an understanding of ecological systems, and the role of humans in a changing natural environment. We have read extensively in this class about the advent of the anthropocene, the age in which human activity fundamentally affects systems on earth. While the Virginia SOLs make no specific mention of the anthropocene, our lesson plans take for granted that this shift is in progress and seek to teach students about the systems we now influence and how we can temper our impact. Our design sets out to maximize students understanding of the park and their sense of investment in this new fixture of their community.

Again borrowing from Dr. Ardoin's findings, our lesson plans seek to maximize student engagement by encouraging participation. This includes interactive science experiments, art projects, hands-on wilderness skills, and structured discussions about environmental conservation. These students arrive with ample experience with traditional, sit-and-be-lectured education, and by breaking that mold we can make our message more accessible and improve retention. Our design focuses on making the park a special place in the minds of students, a place they will associate with exciting departures from mundane classroom environments. Per the findings of Dr Ardoin and the NatureBridge, the park lesson plans create an atmosphere of individual participation and collective wonder. We will direct this energy into environmental consciousness, supporting the children of Portsmouth as they take ownership of their habitat. By cementing this association during structured activities, we will encourage them to take advantage of the park in their private lives. This benefits the park enormously by increasing community presence, which will open the park up to more investment and donation, as well as a higher profile, which will lead to even more usage. This also benefits the community, raising property values and creating a space for people to gather and share experiences in nature. Finally, it benefits the students by giving them an opportunity to learn life lessons in a novel and stimulating environment.

CONCLUSION

As a team, we have integrated the diverse features of the park, from local species to hands on activities with local resources, to create a fun and exciting learning environment for all ages. Our lesson plans are fitting for all seasons and timed for day trips from local schools. Using the Virginia Standards of Learning for elementary, middle, and high school grade levels, staff will guide students in lessons on living systems, resources, stewardship, natural environments, life cycles and other science SOL themes. Our team has also performed background research on park educational plans. The NatureBridge Institute in Australia has documented the benefits of outdoor education plans for children, helping increase awareness through interactive teaching styles that we can apply at Paradise Creek Nature Park.

As far as measuring and assessing our work, we have collected and shared facts, Standards of Learning, previous lesson plan ideas, as well as any relevant information that will be vital for creating lesson plans and allow us to gain a better understanding of the whole park in order complete our future goals. Our group set deadlines for when lesson plans should be completed and the amount each person must complete by a certain date. Group meetings have been set up before these deadlines to make sure all team members are on task and on the same page. Our collective Google documents traced the progress we made as a group from the early weeks in the semester to the present. Ultimately, with the finalization of a variety of lesson plans, students will not only be immersed in the material, they will find a new home in Paradise Nature Creek Park. We want to allow each and every visitor to become stewards of the environment and cultivate a newfound love for nature and conservation in all surrounding areas.

FUTURE WORK

Our lesson plans do not specifically address the organizational structure of this program. Specifically, we left open the question of teaching staff: who will be presenting these lesson plans to the students? The staff could consist of mostly teachers already in the school system, or it draw on volunteers from the community. Either way, before the program gets under way, the PCNP needs to set its expectations for teacher qualifications and training needs. Volunteers could attend a summer training session that requires prospective instructors to review lesson plans and review safety guidelines in the park with children. These sessions can also cultivate new ideas that will allow teachers to engage with children and immerse them in the material entirely. Interviews and hiring for prospective positions will most likely be left up to Robin's discretion, as well as the ratio of teacher educators/volunteers needed.

In the near future we could continue to refine the lesson plans to reflect the educators and audiences at the park. After a year or two, the PCNP can evaluate the effectiveness and popularity of these lesson plans, making adjustments as necessary. These questions will partially hinge on those conducting the lessons, and PCNP will have to select these people with an eye to Ardoin's findings on deep personal engagement. Working at the park as a volunteer or employee as an environmental educator would require:

- Experience in working with children,
- Basic knowledge of life science
- Love of working outside

We are also continuing to research and make more lesson plans at each school level that address a wide range of expectations. The park should contact with the local school educators to find out what their expectations are going into the park and what they want their students to get out of the PCNP experience. This will inform selections and training for park educators, as well as helping tailor the lessons to local schools' expectations.

LESSONS LEARNED

One of the difficulties we encountered was developing a precedent analysis. It was difficult to find environmental education programs and lesson plans that we could use as a pool of ideas to create our own lesson plans. This is mainly because some things we found were not applicable to the particular context of the Paradise Creek Nature Park. All parks are not created equal and don't provide the same possibilities in terms of type of environment for children to play and learn in. Furthermore, not all parks offer activities aimed at educating school kids within state-outlined standards. We had to do thorough research but also rely on our imagination to come to lesson plans that would fulfill academic requirements of the Virginia Standards of Learning while entertaining students. The Virginia Standards of Learning provided us a framework in which our activities should fit, which was constraining but also helpful because it helped us focus on the essentials. The SOLs gave us boxes to check and expectations to hit, the work in previous parks gave us inspiration for how to make these lessons come alive.

At this point we are still unsure about two things: the people who will actually teach the lessons and the source and amount of funding necessary. We haven't thoroughly investigated issues with funding, but if we had to do this again, we would probably take this more into account from the beginning. One way to increase funding that we could have initiated from the beginning was to invest more time into collecting donations from community partners to assist in the implementation of our educational program. Given the PCNP's experience in fundraising and community partnership thus far, they will probably have apparatus in place to pursue these avenues. As for the teachers of the lesson plans, we still have some uncertainty and have designed lesson plans generalizable to different situations. We have considered high school students as volunteer teachers for primary and middle school students, in addition to the park's staff.

In our Precedent Analysis and Process Plan, we talked about the importance of having and maintaining a strong connection with the River Star Schools and River Star homes in the area. More marketing and advertisement from the park could leverage this connection to provide outside investment to the community education program. This could begin with various merchandise such as magnets, more elaborate and catchy signs, stickers, flags, and apparel.

We have learned these past few weeks that willingness to create change is not enough, and that we should focus even more on the "practical" aspects of our project such as the funding & budget, and the people we would need to recruit for the lessons to be taught. It is still unsure the amount of dependence that the school system will have on these lesson plans as part of the SOL curriculum, and if they will be implemented into the school system, and if so, how. These aspects are essential to the realization of our project. While questions remain with respect to implementation, we have been very successful in our mission to create lesson plans for the PCNP, and hope to see them in use soon, fostering community devotion to the park and ecology as a whole.

LESSON PLANS

Elementary school

Brett Rappaport - "Notable Animals in the Paradise Creek Nature Park" : The ecosystem and food web of the Red Fox

Standards:

2nd-5th grade

- 2.5 Students will investigate and understand that living things are part of a system
 - a) Living organisms are interdependent with their living and nonliving surroundings
 - b) An animal's habitat includes adequate food, water, shelter or cover, and space
 - c) Habitats change over time due to many influences
- 2.7 Students will investigate and understand that weather and seasonal changes affect plants, animals, and their surroundings
 - a) Effects of weather and seasonal changes on the growth and behavior of living things
- 3.6 Students will investigate and understand that ecosystems support a diversity of plants and animals that share limited resources
 - a) Aquatic and terrestrial ecosystems
 - b) Populations and communities
 - c) The human role in conserving limited resources
- 3.10 Students will investigate and understand that natural events and human influences can affect the survival of species
 - a) The interdependency of plants and animals
- 4.1 Students will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations in which
 - a) Distinctions are made among observations, conclusions, inferences and predictions
 - b) Hypotheses are developed as cause and effect relationships
- 4.5 Students will investigate and understand how plants and animals, including humans, in an ecosystem interact with one another and with nonliving components in the ecosystem
 - a) Plant and animal adaptations
 - b) Organization of populations, communities and ecosystems and how they interrelate
 - c) Flow of energy through food webs
 - d) Habitats and niches
 - e) Changes in an organism's niche at various stages in its life cycle
 - f) Influences of human activity on ecosystems
- 5.5 Students will investigate and understand organisms have distinguishing characteristics that play a vital role in the organisms' ability to survive and thrive in its environment
 - a) Classification of organisms using physical characteristics, body structures and behavior of the organism
 - b) Traits of organism that allow them to survive in their environment

Objectives:

The students will learn to identify the fox by footprints, scat, and sight

The students will learn about the prey and predators of the fox.

The students will learn how the fox's habitat changes by season.

The students will learn why the fox is an important part of the environment.

Materials:

Binoculars, Sketch Pad, Colored Pencils, Walking Shoes

Activity:

Hello kids, welcome to the Paradise Creek Nature Park! (Give details about the park's creation and mission.)

Does anyone know what this animal is? (Show pictures of the red fox.)

This is the red fox! They can be about 16 inches tall and about 3.5 feet long. What kind of animal do you think it is related to? (Dogs)

Unfortunately, red foxes are very shy creatures that are mostly active at night, but they have been spotted in this park! Let's walk a little down the pathway to learn more about the red fox and its habitat.

Foxes have great hearing and can hear rustling of small animals digging underground. Let's put our ears to the ground and see if we can hear anything moving around!

-Talk about the colorations of the fox and how it changes over the seasons.

-Observe the habitat of the fox.

They sometimes find and enlarge an old woodchuck burrow to live in, or a hollow log, near the stream bank, a rockpile, cave or dense shrubbery. Look around and see if you see any of these places where a fox could potentially be!

-Talk about what the fox eats.

Red foxes are omnivores. They eat meat, mostly small animals like shrews, moles, squirrels, rabbits, woodchucks, etc. (Keep an eye

out for any of these potential fox prey!)

Foxes also eat fruits, berries, acorns, grasses and other vegetation. Do we see anything around us that looks edible for a fox? Do we see any scat that could have come from the fox?

-Explore the interrelationships the fox has within the nature park.

Foxes eat previously dead animals, keep populations of small rodents and snakes down.

Usually have between one and ten baby fox pups, who leave the den when they are about 7 months old

-Talk about what eats the fox.

No known predators, except hawks and owls that sometimes eat young foxes

-Discuss how humans impact and endanger the fox and why it is important to protect this species.

Foxes sometimes eat domestic cats and dogs.

Humans and their hunting dogs are the only things known to kill mature foxes

What can we do to protect the fox and its habitat?

Assessment:

Ask the students to draw a picture of the fox.

Ask the students to list what the fox eats

Ask the students to list the predators of the fox

Ask the students to name three ways to protect fox habitat

<http://www.dgif.virginia.gov/wildlife/information/?s=050049>

http://www.fcps.edu/islandcreekes/ecology/red_fox.htm

Julie Duval – “A bird’s life”: Experimenting the three steps of a bird’s life & understanding the obstacles a bird has to overcome in order to survive

Objectives and background information:

Paradise Creek Nature Park is full of birds of all kinds and sorts, among which the American Robin & the Canada Goose which seem to be the most numerous birds in the park. The purpose of the role-play is to allow the children to put a name on common species they often see, and to learn more about the fauna of Virginia. It will also teach them in an entertaining and playful way about the life cycle of birds and their behavior in general.

The Canada Goose can only be observed in Virginia during winter, as it starts migrating toward the north of Canada at the beginning of spring. It is primarily herbivorous, even though it can eat small insects and fish from time to time. Its diet is made of all sorts of grass and grains like wheat, rice and corn. In the water, it feeds from silt and seaweeds. As for its reproductive behavior, the Canada Goose usually lays 3 to 8 eggs and the male and female both watch the nest. Once their goslings are born, they protect them and don't hesitate to chase violently potential threats like blackbirds and even humans. The Canada Goose is rarely preyed on, however it can be taken by coyotes, gray wolves, snowy owls, golden eagles and bald eagles. In 1999, lethal culls have been engaged by the US Department of Agriculture in urban and populated areas, because people complained about the obtrusiveness of these animals and the waste they reject.

The American Robin can be observed in the Park year-round. Its diet consists of 40% of invertebrates - earthworms, beetle grubs, caterpillars and grasshoppers - & 60% of wild and cultivated fruits and berries. Its «running and stopping» behavior is very characteristic of the specie. Hawks, cats and snakes, mostly threaten this bird and its eggs are even more vulnerable. It has from 2 to 3 broods per season - from April to July. Its eggs are very recognizable, as they are a light blue color.

Standards:

Preferably grades 2 to 4. Baseline reading comprehension necessary.

2.4 The student will investigate and understand that plants and animals undergo a series of orderly changes as they mature and grow

a) Animal life cycles

3.10 The student will investigate and understand that natural events and human influences can affect the survival of species

4.9 The student will investigate and understand important Virginia natural resources.

b) Animals and plants

Precedent:

Role-play inspired by an activity proposed to school kids ages 6 to 11 in the Miribel-Jonage Park, France.

Duration:

This role-play can be more or less long, according to the time the teacher wants to give to it. The minimum time it would take would be one hour (15 minutes for each step) but it can also be played in 2 or even more.

Materials:

Boxes to collect insects, images of American Robins (male & female) and of Canada Geese (male & female), fake eggs or images of

eggs, little cards explaining a few facts about the birds (Diet, Breeding, Migration) & mostly the threats it can encounter during its life

Vocabulary:

Life cycle; diet ; breeding ; migration ; threat ; reproduction ; nesting

Activity:

First step of the life cycle (15min) : children will be given a little time to collect insects in the nature in the box their teacher will give them. They can imagine they are birds and have to feed themselves and their babies.

Second step of the life cycle (15min) : children will be separated in little groups of two, and given the images of male and female birds and the fake eggs. They will have to build a nest with what they can find in nature (branches, moss...). Once built, they can put their birds and eggs in the nest.

Third step of the life cycle (15min): children are given time to look at the fact cards about the birds and acknowledge the threats the birds have to face.

At the end of the session, the teacher can take some time to get some feedback from the kids (15min)

- Which insects have you collected? Are they adapted to the diet of your bird?
- Did you find it easy to build a nest? Which materials have you used to build it?
- What about the threats?
- Explain the process of migration
- Talk a little bit about their experiences with birds : have they already seen a nest (remind them that they should never pick up the eggs in such a situation), do they have birds at home (as pets or in their garden for example), do they have a cat which brings them birds back, etc.

Julie Duval – “The animal specialists” : Discovering the animals living in the watershed and around, observing them using measuring instruments and formulating scientific hypotheses

Standards:

Preferably grades 4 and 5.

4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

c) Appropriate instruments are selected and used to measure length, mass, volume, and temperature in metric units

5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) Items such as rocks, minerals, and organisms are identified using various classification keys

4.9 The student will investigate and understand important Virginia natural resources. Key concepts include

b) Animals and plants

Precedent:

Role-play inspired by an activity proposed to school kids ages 8 to 11 in the Miribel-Jonage Park, France.

Duration:

May vary but doable in 40 minutes.

Objectives and background information:

The Park hosts lots of different species of animals, including box turtles, fox, osprey, garter snakes and a horned owl. 16 different species of fish live in the creek and crabs can also be spotted. All of these animals can be interesting to look at for children, and they could interact with the harmless ones, like turtles. It may also be a good occasion for them to learn how fragile these creatures are and to be very careful not to hurt them.

For the boldest of the kids, it could also be an occasion to learn how to catch and hold crabs!

The purpose is also to let the children go on an adventure to find animals to watch and measure. This activity requires the teacher to leave them totally independent for the duration of the lesson, but in an area small enough so that he can still watch them.

They will be able to observe the animals but also to take note of the type of environment they need to live in and define if they are mammals, reptiles, insects, birds, etc. To make it even more entertaining, this lesson will also be a role-play: the kids are animal specialists and have to investigate for the «High Authority of the Protection of Nature». As scientists, they will have to formulate hypotheses according to what they saw, and conclusions will be drawn as a group at the end of the investigations.

This activity would be more enjoyable for the school kids if practiced around the creek where they could find a wider diversity of animals.

Materials:

«Investigation booklets» containing a page for each animal they can find: name, picture (which they can draw), size, weight (if they can't measure it properly, just say if it is big or small, and if they think they would be able to pick up this animal by themselves), natural

environment in which it is found (describe it: was it in water? if yes, which temperature was it? etc.), which category it belongs to (mammals? birds?) ; Pencils ; Photos of the animals they will be able to see around the area ; Instruments of measurement : thermometers, rulers, etc.

Vocabulary:

Natural environment; Creek ; Wetland ; Fresh water/Sea water ; Hypothesis ; Investigation ; Conclusion ; Mammal ; Reptile ; Insect ; Bird

Activity:

The teacher are told that they are nature specialists and given booklets and instruments of measurement to conduct their investigation. Photos of different animals they can find are shown to them and the area where they are going to stay is briefly and simply presented. School kids are divided in groups of 2 or 3 and start their investigation, totally freely. They are given as much time as possible to do so and fill in their investigation booklets.

At the end of the lesson, follow-up discussion:

- Ask the kids which animals they found and ask them about their hypothesis (where do they think this animal is used to live, do they think it's a reptile and if so why, etc.) and try to establish conclusions with the whole group
- Ask them also how they conducted their research: which animals did they measure, why couldn't they measure some of them, which difficulties did they encounter, etc.

Julie Duval - "War game" : Discovering the trees of the park and knowing how to recognize their leaves

Standards:

Preferably for grade 2.

2.8 The student will investigate and understand that plants produce oxygen and food, are a source of useful products, and provide benefits in nature. Key concepts include

- a) Important plant products are identified and classified

4.9 The student will investigate and understand important Virginia natural resources. Key concepts include

- b) Animals and plants

Objectives:

The activity is a game of War, but with leaves replacing the cards. It will allow school kids to familiarize with the trees surrounding them. They will also be able to learn the vocabulary that can be used to describe a leaf and the different types of leaves existing in the park.

Precedent:

Game inspired by an activity proposed to school kids 5 to 11 at an ecological center (providing kids with resources around the protection of the environment as well as with indoor and outdoor activities) in Montpellier, France.

Duration:

30 minutes.

Materials:

None

Vocabulary:

Simple leaf ; Compound leaf ; Stem ; Node ; Petiole ; Blade ; Vein ; Leaflet

Activity:

School kids are divided in two teams and each team is asked to pick up 10 different leaves (or as much leaves as they want, as long as they're different and that each group has the same number of them).

The War game starts. Group 1 chooses a leaf and describes it to the other group without showing it. Group 2 can ask questions. Then group 2 checks in its deck if it has the leaf matching the description. If it's the case, it shows it to the other group and they both proceed to verification:

- if the group doesn't have the same leaf or the leaf they proposed is different means group 1 gets a point and it's group 2's turn to describe their leaf
- if the group has the matching leaf, then it's «War» and no one gets a point

During the game the teacher will help them with the appropriate vocabulary to describe their leaf.

Time for a follow-up discussion:

- Find the trees corresponding to the leaves found. The teacher can help them with that and take profit of this time to describe the different trees in the park to the kids.

- This activity can lead to the elaboration of a herbarium or to various art activities with leaves and flowers.

Middle school

Angie Cerimele - "Water quality and testing" : How to test the quality of water in living systems

Standards:

6.7- the student will investigate and understand the natural processes and human interactions that affect watershed systems. Key concepts include water monitoring and analysis using field equipment, including handheld technology.

6.5- the student will investigate and understand the unique properties and characteristics of water and its roles in the natural and human-made environment. Key concepts include the importance of protecting and maintaining water resources.

Background Information:

Talk about the importance of an ecosystem that is made up of both abiotic, non-living factors, as well as biotic, living factors, that consist of a community of various living organisms in a particular area.

Ask the group if they can name any of the abiotic factors that affect an ecosystem:

- light
- temperature
- water quality
- soil
- gases

What are some biotic factors?

- any living component affecting another organism such as:
 - an organisms predator
 - an organism's prey/food
 - the food an organism consumes
 - producers, consumers, decomposers

Ask the students how the health of an environment can relate to the water quality in a particular area. Discuss how poor water quality can affect living organisms daily life activities.

What can cause contaminated, polluted water?

- changes in the land that can cause runoff pollution that affects organisms downstream
- type of pollution called Nonpoint-source Pollution (NPS) due to the fact the pollution comes from many sources (think about an example of this, like a factory discharge, etc.).
- higher run-off is caused by harder rains where water runs off land at a faster rate and causes not only nutrients and sediments to be removed, but pollutants such as gas and oil, pesticides, and bacteria. What does this do to the water quality? (answer: it pollutes water easier, and these substances are transferred to bodies of water).

What are the four main NPS pollutants?

- Sediment-soil that rainwater carries into bodies of water
 - Negative effects: lowers light aquatic plants need, covers habitats, and can carry pollutants from farmland such as pesticides
- Toxic chemicals- for example pesticides and herbicides and other harmful pollutants damage aquatic and plant life
- Nutrients-in particular nitrogen and phosphorus put too much nutrients into bodies of water that cause a damaging increase of algae. When bacteria decompose this influx of algae, the oxygen level is decreased and organisms are impaired, and sunlight is also blocked. Runoff causes 19% of the total nitrogen pollution that can be found in the Elizabeth River (http://www.elizabethriver.org/what_you_can_do/WYCD-Drain.aspx).
- Pathogens- these can cause disease and enter water via human or animal waste.

Discuss with the students what they can do to help stop runoff of NPS pollutants. Answers varying from, try to keep debris such as leaves and litter out of the street so it doesn't go down the storm drain. Discuss steps to become a River Star Home.

Vocabulary :

abiotic, biotic, ecosystem, NPS pollutants, pollution, runoff

Materials :

Water quality testing kit (includes PH kit, thermometer, secchi disk used to test transparency of water, net, a field-test kit for nitrate and phosphorus levels and chloride concentration kit if budget allows) ; Handout for students; Writing utensil

Activity :

- Split students up into groups to work together to fill out the handout
- Divide equipment up into different groups, and after a certain time that allows them to complete their tasks, switch equipment so they can fill out the other half of the handout.
- Have groups discuss their results and compare the answers provided to what they observed. Discuss any discretion in the

results.

Duration: 45 minutes to an hour

Assessment :

Where does water that runs off streets and lawns go?

Describe ways that water can become polluted.

Name the NPS pollutants and how they can cause poor water quality.

What can you do to help keep the Elizabeth River clean?

Student handout :

TEST	Why this test is important and what it shows about water quality	Method used to measure
PH		
Temperature		
Turbidity		
Macroinvertebrates		
Nutrients		
Salinity		

Teacher copy:

TEST	Why this test is important and what it shows about water quality	Method used to measure
pH	To measure how acidic or basic something is -many organisms maintain a healthy lifestyle within certain pH levels	Using test kits or probes-pH usually 6.5-8.5 in natural water systems
Temperature	Certain organisms thrive in a range of temperatures before it is detrimental to habitats and ecosystems	Thermometer
Turbidity	Is the water clear or transparent? Unclear water can affect photosynthesis and mucky water can plug up fish gills	A secchi disk on a measured rope is dropped into the water off a boat and measured when it can no longer be seen
Macroinvertebrates	These are organisms that live on the bottom of the surface. The water quality can determine if these are present or not	Use a net to scoop the bottom of the surface and spread out on a surface to analyze specimens
Nutrients	Too much nutrients cause algae to increase in large amounts which is negatively affects the ecosystem	Field test kit to measure levels of nitrogen and phosphorous
Salinity	Amount of salt dissolved in the water determines what type of organisms and plants can sustain in the environment	Chloride concentration kit

Monica Wilson - "Wetland Experiment" : Life science & biology

Standards:

6th grade

6.7-Living Systems

6.9- Earth Resources

6.5 f- the importance of protecting and maintaining water resources

Objectives and background information (from DOE) :

Students will:

- Determine how wetlands act as a buffer zone between dry land and bodies of water.
- Analyze and discuss how destroying wetlands can cause serious flooding.
- Learn how wetlands help trap excessive amounts of pollutants and silt.

Background Information

A wetland is transitional area between dry land and a body of water that is wet for all or part of the year. The wetland soil is saturated and supports plant life that is adapted to wet conditions. There are many different types of wetland habitats, and they are classified according to the salinity of their water; the duration of water coverage (i.e., all the time, when the tide is in, or during the rainy part of the year); the vegetation they supports (grasses, shrubs, or trees); and their sources of water. Sources of water include streams, rivers, ponds, lakes, bays, and oceans. Groundwater exists among pieces of soil, sand, and gravel; in cracks in bedrock; and in porous rock such as limestone. There are many benefits to wetlands. They stand as a habitat for a wide variety of wildlife. Wetlands can filter nutrient and sediment pollution out of rain runoff, and hold existing soil to prevent erosion. They can reduce flooding too, by soaking up water in a moderate water flow.

Goals of the Lesson :

Students will:

- Describe relationships among precipitation, runoff, and wetlands.
- Relate the importance of wetland functions to their own needs and daily lives.

Duration :

45 minutes

Setting :

Classroom

Materials :

Modeling clay ; Long shallow pan ; Sponge ; Watering can ; Cup of soil ; Jar of muddy water

Activity :

Introduction: Review with the students what they have learned about wetlands and their functional values. Show the class photos the different types of wetlands such as freshwater and salt marshes, swamps, and bogs. Ask students to think about the types of animals and plants that might live in each type of wetland.

Present a pre-made wetland using a pan with modeling clay, representing land covering half of the pan sloping toward the bottom of the pan and nothing in the other half of the pan. This represents a body of water.

Ask students, "What would happen if you poured water (rain) on the land (clay)? (Should runoff quickly into the body of water)

Place a sponge in the pan at the base of the clay representing a wetland as a buffer zone between the land and the body of water. Pour water on the land again and ask the students what happens with the wetland added? (The wetland slows the runoff down and it lessens the amount of water reaching the body of water because some water is trapped in the wetland.)

Now is the time to explain that wetlands are shallow basins that collect water and slow the rate of flow down, which helps to prevent flooding and soil erosion.

Ask, "What might happen if a wetland is destroyed and houses and communities are built in this space?" Make note that this happening a lot in our world today.

1. Pour the water out of the pan from the last experiment and use a clean sponge. Spread soil over the land and pour a jar of muddy water onto the land to represent polluted water. Ask, "What happens to the runoff?" (Its trapped in the sponge.) Ask the students to compare the water in the jar to the water that ends up in the body of water? (The water in the jar is much more dirty and polluted.)
2. Remove the sponge and repeat the experiment. What happens to the runoff now? (It reaches the body of water more easily and quickly; the water is a great deal more dirty and polluted.)
3. Make note that without wetlands, tremendous amounts of silt and pollutants end up in bodies of water.

Conclusion

1. Ask students how muddy water affects fish, wildlife, and plants.
2. How can the lack of wetlands affect people?
3. How can we prevent undesirable events from occurring?

Assessment :

1. Have students work in groups of four to make their own wetland models and use them to explain to peers what would happened if their local wetlands were destroyed.
2. Implement: Quiz/test on wetland and their importance.

Monica Wilson - "Adopt a Twig" : Life science & biology

Standards :

6th grade

6.7-Living Systems

6.9- Earth Resources

Goals of the Lesson :

Students will:

- Explore leafless twigs
- Identify leaf buds as the sights where leaves will begin to grow
- Become knowledgeable of how trees regenerate their leaves each year

Duration :

45 minutes

Setting : Outdoor wooded area

Materials :

- a handout with pictures of the different tree types planted at PCNP
- Pencil
- Composition book
- 12-inch piece of yarn
- 3 X 5 inch index card
- Waterproof markers
- Hole punch

Activity:

Students are to observe the forested edges of the playground. This activity needs to be completed in early spring before leaves begin to emerge. Students will be given boundaries to observe for this activity. They should be instructed to find a twig within the given area they will adopt. It will be explained that leaf buds must be present as proof that the twig is alive. The students may work individually or with a partner. When they have found their twig they are to draw it carefully with pencil in their notebooks and date the drawing. Students are also instructed to loop a piece of yarn around the twig that they have chosen. Students should then return to a central meeting location of the park to make a nametag for their twig. The tag will list the student's name, and the name of their twig. It is recommended students make colorful decorations. Students should return their twigs and tie their name tags through the two holes to the ends of the yarn that is loosely looped over the twig.

Conclusion and Assessment:

1. This lesson is the first in what should be an ongoing series of lessons that deal with the adopted twig. This is why notebooks are important in this ongoing lesson.
2. Students will revisit their twigs once a month til the end of the school year to remove tags in June. Each park visit should include a drawing to be added in their notebook along with creative writing about how the twig continues to look through each season.

Angie Cerimele-Life Cycle: Matter All Connected

Source:

http://www.doe.virginia.gov/testing/sol/standards_docs/science/2010/lesson_plans/life_sci/life_sys/sess_LifeSci-6a.pdf

Standards:

LS.6: The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of the environment. Key concepts include

- a) the carbon, water, and nitrogen cycles;
- b) interactions resulting in a flow of energy and matter throughout the system;
- c) complex relationships within terrestrial, freshwater, and marine ecosystems; and
- d) energy flow in food webs and energy pyramids

Also: LS.5: The student will investigate and understand the basic physical and chemical processes of photosynthesis and its importance to plant and animal life. Key concepts include

- b) transformation of water and carbon dioxide into sugar and oxygen.

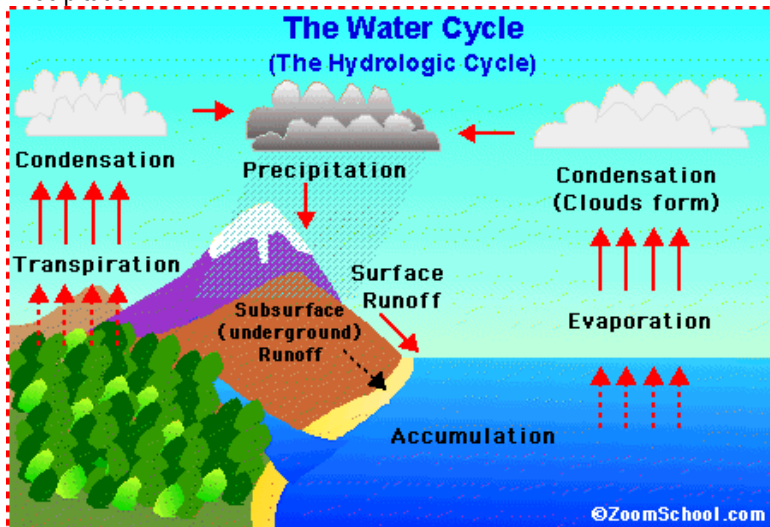
c) photosynthesis as the foundation of virtually all food webs.

Background Information: The Earth was formed billions of years ago and much of its matter has been used in cycles, and each specific matter, carbon, water, and nitrogen, move through their own special cycle that passes through both abiotic, the non-living factors of the environment, and the biotic, living organisms of the environment.

The Water Cycle:

Key words to use on poster (In no particular order):

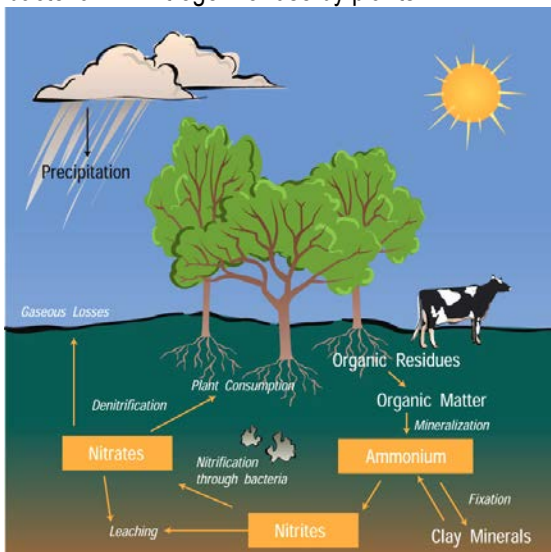
- Runoff
- Groundwater
- Evaporation
- Condensation
- Transpiration from plants
- Precipitation



Source: <http://www.kathimitchell.com/water.htm>

The Nitrogen Cycle (in no particular order):

- Nitrogen in the air
- nitrogen in the atmosphere
- nitrogen up take by plants
- nitrogen in animal proteins
- nitrogen in decaying matter and waste
- bacteria "fix" nitrogen for use by plants

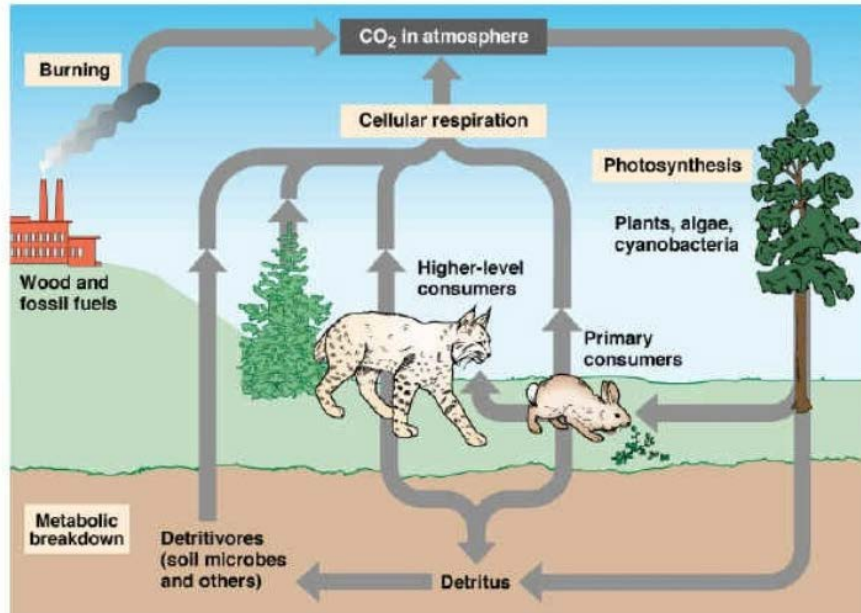


source: <http://www.windows2universe.org/earth/climate/images/nitrogencycle.jpg>

The Carbon Cycle (in no particular order):

- Carbon dioxide in the air

- Photosynthesis
- respiration
- burning fossil fuels
- decay organisms
- combustion



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Source: <http://image.slidesharecdn.com/thecarboncycle-120220163358-phpapp01/95/slide-1-728.jpg?1329777349>

Materials:

- Markers/Crayons
- Pencils/Pens
- Construction Paper/Poster Paper (whichever is desired)

Goals of the Lesson:

At the end of the lesson the student should be able to draw the different parts of the three main cycles and explain what goes on at each step for: Water Cycle, Nitrogen Cycle, and Carbon Cycle.

Duration: 45 minutes to an hour

Setting: Classroom or outdoors-can be catered to both

Activity:

1. Count the students off by the number 3 and give each group one poster.
2. Have all students of the respective number meet together, and assign each group number with a cycle. For example, all 1's will draw a water cycle, all 2's will draw the nitrogen cycle, and 3's will draw the carbon cycle.
3. Distribute materials for each group to use, including markers/crayons/pencils/pens etc.
4. Each poster should have the main ideas and key words roughly incorporated on the poster with graphics if possible.
5. After all groups have finished drawing their respective cycle, have all the students come back together and each group present their cycle, explaining what they drew.
6. Have students either answer assessment questions found below on the back of the poster or collectively in the group.

Conclusion:

1. Students should be able to explain each part of the three different life cycles discussed during this lesson plan.
2. Some other ideas besides using a poster to get across these points are:
 - a. Have kids act out the different parts of the cycle
 - b. Use varying objects/plants/sticks found on the ground to incorporate into the posters or visualization of the cycles.
 - c. Kids can develop a song/rap/poem to help them remember each part.

Assessment:

1. How are living things connected through these cycles? Why are these cycles important?
2. What role does bacteria have in the nitrogen cycle?
3. Describe the different types of organisms that are needed during the various cycles.
4. How is water important to every living thing?
5. How is all matter connected?

High school

Matt Menezes - "The stewardship circle" : Introducing local students to the PCNP and to its conservation

Objectives:

To introduce local students to the Paradise Creek Nature Park. To raise issues of biodiversity, community engagement, water conservation, and the role of the students in promoting a more eco-conscious community.

Materials:

Maps of the park; Binoculars ; Good walking shoes

Activity :

Lead the students on a loop through the park. Each "Watchable Wildlife Marker" represents a stopping point, where the facilitator will speak about a different aspect of the park and prompt discussion with students. Sections of the trail are as follows.

1. Area 1- Songbird Trail

a. Types of trees

- i. American Holly- Evergreen, grows to 50 feet, distinctive spiny leaves
- ii. Sweetgum- deciduous, grows 60-130 ft, these leave the spiny gumball seedpods
- iii. Loblolly Pine- evergreen, grows to 100 ft, home to many songbirds, who use its needles for nesting materials
- iv. Sweetbay Magnolia- deciduous, 60-100 ft, large cream flowers attract birds and mammals to eat the seeds

b. Types of wood animals

i. Raccoon- one of the first animals white settlers encountered upon arrival in Virginia, John Smith recorded the Powhatan term *arouchgunc* as the name for this small scavenger. Raccoons are hardy omnivores, and thrive in most environments across North America. Their dexterous hands, black face masks, and intelligence are all distinctive features.

ii. Muskrat- a large, semiaquatic rodent that lives in wetlands or brackish water across North America. They can survive in sulfurous water that results from coal runoff, and have persisted in the Elizabeth River despite pollution problems.

iii. Red Wolf- smaller and more slender than northern Grey Wolves but larger than coyotes, the Red Wolf once ranged across the southeastern United States, but was declared extinct in the wild by 1980. In 1987, reintroduction efforts began in North Carolina, and now they are beginning to extend their range back up the coast.

c. Importance of biodiversity

i. Biodiversity is a reinforcing feedback loop, that can either engender greater complexity and health or rapid decline. A variety of species form interdependent relationships, supporting the creation of more life, more food, more nutrients, and ultimately more life. When imbalances are introduced, like toxic chemicals or overzealous human predators, this biodiversity is damaged, which leads to a reduction in available life, food, and resources, and causes an ecosystem to wither. By protecting fragile species and reintroducing plant and animal species that support the environment, we can reverse the cycle and set the river on course to restoring itself.

d. Why is it important to restore wetlands?

i. Erosion- the introduction of oysters and marsh grasses helps anchor the soil of the banks and prevent erosion. This allows larger trees to take root in more stable soil, creating new habitats as well as generating food and oxygen.

ii. Carbon filtration- the presence of increased plant biomass is important globally to combat excess carbon dioxide. In the Elizabeth river, submerged plant life like marsh grasses and tree roots help filter carbon and increase dissolved oxygen. More oxygenated water is essential for fish to live in the river, and will also control algae and bacteria growth, which have the propensity to choke out other species.

2. Area 2- The Bridge

a. River Star Businesses—the river star program began in 1997, and seeks to build partnerships between Elizabeth River restoration projects and local businesses. Consultants from the River Project outline recommendations to help businesses abate pollution, help reintroduce native species, or facilitate staff volunteering events. The program has created or conserved over 1200 acres of habitat, and abated over 280 million pounds of pollution. The River Star distinction helps businesses identify themselves in the community as stewards of the river, and raises the profile of the restoration project.

b. Shipyard- the Norfolk Naval shipyard is one of the oldest and largest naval construction facilities in the country. It was

significantly expanded during World War II, and came to be responsible for substantial pollution of the area. This is one of the three “superfund” sites designated by the EPA as a source of major contamination on the Elizabeth River. However, since 2004, the Shipyard has been recognized as a Model Level River Star for its efforts at cleaning up its waste sites. The Navy continues to partner with the Elizabeth River Project to support cleanup and restoration efforts.

c. Discuss Community engagement, why businesses must buy in for it to be successful

i. Much of the pollution in the river comes from local industrial sources, and no amount of cleanup efforts can succeed unless these businesses also change their practices.

ii. By incorporating local employers into the restoration effort, the ERP further ties the health of the river into the economy of the region, by returning it to a state where fishing and recreation can take place.

iii. The River Star distinction indicates the commitment of local businesses to the project, which engenders support in local citizens. If people see their employers doing their part to help the river, they will be inclined to do so as well.

3. *Area 3- The Wetlands*

a. Fish, amphibians, etc living in the water

i. Striped Bass- average about 4 feet in length and 100 lbs, these fish can live for up to 30 years and have been introduced in many places outside their natural range (Atlantic Coast of North America) for their value as sport fish.

ii. Mummichog- also known as mud minnows, live in brackish water like the Elizabeth River up and down the coast. These fish are extremely hardy, and have continued to survive despite pollution of the Elizabeth River.

iii. Marsh crab- small, purple or brown crabs, whose population has grown substantially due to overfishing of its natural predators like the Striped Bass. Their increased presence causes erosion because they consume marsh grasses that anchor the bank.

b. Birds that feed on them, interconnectedness of ecosystem

i. Osprey- large, diurnal, fish-eating raptor, can grow up to two feet tall with a six foot wingspan. They nest near any body of water with sufficient fish to eat. Like owls, they have a reversed hind toe, allowing them to grasp their slippery prey.

ii. Herons- The Great Blue Heron is the largest heron in North America, and ranges across the continent. They are common wading predators, using their long, sharp beak to stab at its prey through muddy, marsh water.

iii. Double Crested Cormorant- about 28-35 inches tall, black, with yellow or orange face skin. These birds hunt by swimming and diving, but do not have waterproof feathers, so they have to dry them out. They used to be threatened by use of DDT, but have since recovered

c. Water toxicity, sludge removal

i. Bacteria are introduced by human and animal feces, and in large numbers can choke out other forms of life.

ii. PCBs, or polychlorinated biphenyls, are chemicals that run off from transformers, capacitors, and electric motors, often used in heavy industry. These chemicals cause cancer in animals and humans and are partly responsible for the Virginia Department of Health’s fishing ban in the river.

iii. PAHs, or polycyclic aromatic hydrocarbons, are dumped as waste from coal-based industries, either coal-fired plants or coal importing facilities.

iv. Watershed Action Plan

1. Dredge sludge from the bottom of the river

2. Restore and conserve wetlands and shore reefs. This means bringing plants like trees and rushes, as well as oysters, back to help anchor the banks against erosion. These plants will also help increase dissolved oxygen.

3. Increase dissolved oxygen, which supports large fish and invertebrates, and reduce nutrients, which support bacteria

4. Make the river swimmable and fishable by 2020. This means increasing dissolved oxygen to a level that can support large quantities of large fish life. This also means reducing ambient nutrient levels so that large quantities of bacteria cannot flourish. Furthermore, it means a reduction in toxins like PAHs or PCBs, which can only come through conscientious effort on the part of river companies and industry.

4. *Area 4- Earthworks Mound*

a. Overlook the park, recap importance of biodiversity, interconnectedness of the system.

i. Today we discussed the species of tree, mammal, fish, bird, and invertebrates that all live and coexist in this ecosystem. All of these living things are interdependent, relying on one another for energy, nutrients, habitat, and decomposition. We humans are also part of this system, we take energy and resources from it, and we introduce potentially harmful substances or physically destroy the habitat. If we want this system to continue to exist for our benefit, we must understand our relationship to it and the consequences of our actions. By learning more about the system we are a part of, we can learn how to have a place in it that enhances our lives without jeopardizing the long term health of the environment.

ii. You are all part of this ecosystem, part of this community, and your part is particularly important. This park represents all of the natural spaces that we have a responsibility to safeguard, as well as an opportunity to enjoy and learn from. With ownership must come stewardship, and the things you’ve learned today will help you gain more from the park,

living with nature as both her beneficiary and her guardian.

Matt Menezes - "Wilderness 101" : Making the outdoors more accessible with key woodland skills

Objective :

- To introduce basic outdoor safety skills, including:
 - first aid
 - campsite construction and fire safety
 - Bear/Mountain Lion deterrence

Materials:

1. First Aid Kit
 - a. Splints
 - b. bandages
 - c. Disinfectant
 - d. Antivenin
2. Tent/Rain Fly
3. Rope
4. Bear Bag
5. Kindling
6. Fire wood
7. Rocks/sand
8. Ignition (matches, lighter, etc.)

Activities :

Part 1, First Aid:

Objective: Students will learn how to correctly identify and treat minor injuries they or their companions may sustain during outdoor activities. Having foreknowledge of these injuries and their treatment prevents panic in a delicate situation, which can cause more harm than the initial injury. This also helps students understand rudimentary lessons of anatomy that can be applied in case of the need for first aid in any situation.

Section 1-Wounds and Lacerations.

- In the event of a minor wound with little bleeding, a simple once-over with a disinfectant such as an alcohol swab or hydrogen peroxide will serve, followed by administering a Band-Aid or similar covering. This prevents infection while protecting the wound while it heals.
- In the event of heavy bleeding lay the victim on the ground with his head supported. Elevate the wound above the heart, and tie a tourniquet around the wound. A tourniquet is a tight bandage, often a rag, made tighter by a stick or rod tied in with the bandage for leverage. This prevents blood loss while allowing clots to congeal and seal the open blood vessels. It is important in these situations to keep the victim conscious, so speak to them calmly, asking them to relate exactly what transpired. This will allow you to identify the source of the wound, and whether the victim is at immediate risk of infection. Particularly if the wound came from a protruding metal edge, the victim may be at risk of contracting tetanus.
- If this is the case, seek help from park rangers and arrange a trip to the hospital as quickly as possible. If bleeding does not abate within a few minutes, do the same.
- Once bleeding subsides, disinfect the wound as above, but keep the tourniquet bound to keep bleeding down. Make sure the victim remains hydrated, as blood loss can lead to weak limbs and fainting, which only increases the likelihood of reinjury.

Section 2: Sunburn and Heatstroke

- In this instance, preventative care is easy and very effective. Always use sunscreen of minimum spf 30, carry plenty of water, and limit direct sunlight.
- Signs of heat exhaustion or heatstroke include clammy skin, difficulty speaking or walking, fainting, headache, vomiting, and obvious sunburn.
- If the victim exhibits any of these symptoms, or complains of delirium or cramping, immediately find shade and seat them upright. Encourage the victim to drink water slowly but regularly, and monitor their heart rate and breathing. Accelerated or erratic pulse and shallow breathing are signs of heatstroke, and if their condition does not subside within a few minutes, contact park rangers or seek other emergency medical assistance

Section 3: Toxins and Poisons

- Some plants, like poison ivy and poison oak, secrete toxins that cause nasty, itching rashes on most human skin. As with the sun hazards, the best way strategy is knowledge and preventative measures. Learn to identify these plants (below) and avoid touching them with bare skin. Also, when walking in unknown areas, wear long pants or at least high socks to protect your legs from the underbrush.

Poison Ivy

- If infected, resist the urge to scratch. This will irritate the skin by working the toxic oils deeper in with your cells, and also has the potential to spread it to other parts of your body. Over the counter creams can be quite effective at reducing these infections, and can be picked up at CVS or elsewhere after your adventure

- In addition to poisonous plants, Virginia is home to three species of venomous snake: the Northern Copperhead, the Eastern Cottonmouth, and the Timber Rattlesnake. Below is an excerpt, provided by the Virginia Herpetological Society, on these snakes, their ranges, and proper bite treatment.

<http://www.virginiaherpetologicalsociety.com/documents/vhs-venomous-snakebite-info.pdf>

Poison Oak

Part 2- Campsite Construction and Etiquette

Camping and backpacking are thriving recreational activities in Virginia and elsewhere that allow people to immerse themselves in nature and live outdoors. These sorts of activities relieve stress and allow people to reconnect with their natural world, often giving a greater appreciation for its delicate beauty and engendering a responsibility to protect. In order to take advantage of the many natural parks and trails around Virginia, students must learn how to make camp and the proper etiquette for interacting with the forest and their fellow adventurers. They must also learn how to gather wood and safely handle fire, from building a fire and managing it to ensuring it is extinguished. Thousands of acres of forest burn every year when campers are negligent in their fire safety. This will not happen to your students if they learn well!

· Making Camp

- o Students will work in teams of four to erect tents on the flat green near the earthworks mound. Remind students to lay a tarp first to prevent dew seepage, and to stake down their frame so the wind doesn't blow away. A rain fly is necessary to keep many tents dry. These work best when staked as taught and wide as possible.

- o If piped water is not available, the campsite should be in near walking distance of running water. Small, fast-moving streams are preferable, but regardless water should be filtered to prevent Giardia and other infections. This can be achieved with iodine tablets, physical filters, or boiling. Water is important for drinking, cooking, and cleaning, so make sure your group has ample supplies.

- o If cars are available, keep all food in cars when not in use. Otherwise the smell will attract unwanted visitors, like possums, raccoons, and bears. If camping in known bear country (most of the Appalachians qualify) without a car, you must bring a bear bag to keep your food safe. Bear bags are smell-proof containers that can be purchased at sporting goods stores, and are filled with food then suspended from a tree. Practice throwing the full bear bag over a branch and tying it off to the roots with the rope.

· Waste management

- o If no toilets are available, indicate an area appropriate for bathroom activities. Preferably this area will have soft soil to easily dig temporary pit toilets, and if possible should be downstream from the campsite.

- o All campsites should leave no trace. Bring plenty of garbage bags (grocery bags will usually serve) and hike all waste back out with you. This is a not only good manner for future campers, but it is important for wildlife safety. Animals can suffocate on plastic wrappers, and some packaging materials are toxic and slow to decompose. Also, leaving foodstuffs consistently around campsites will attract the same unwanted visitors described above, and may make a site popular for such guests, making it less hospitable for human guests.

- o Finally, leave-no-trace camping expresses lifestyle values that should extend beyond camping. The ethos of use no more than you need and strictly control waste production is one that would benefit everyone if it were extended further.

· Fire Safety

- o Many commercial campsites have fire pits pre-dug and lined with sand. When these are not present, it is necessary to construct one. Use the existing fire-pit to demonstrate structure.

- o Fire pit should be surrounded by stones, with cleared ground inside. The stones should sit high enough to shelter the embers from the wind.

· To Build a Fire

- o Have students arrange small sticks in the center of the fire pit in a pyramid shape.

- o It is important as the fire is getting started to allow it plenty of air, as well as upward-angled fuel that it can follow as it rises.

- o Have students experiment with different types of kindling; twigs, grasses, leaves, toilet paper, newspaper, etc to identify which is most effective.

- o Once kindling catches, feed the small flames small sticks and twigs, increasing in size as fire gains strength.

- o Once a small blaze is going, add larger sticks, arrange logs in similar upward-facing pyramid pattern as sticks earlier.

- o Once a fire is lit, it will continue to burn as long as fuel is added. Remember the upward-angling for fuel efficiency

· Some Caveats

- o If there has been rain or snow recently, gathered wood will be wet.

- o Avoid this problem by gathering extra wood when it is dry and storing it in a dry place, such as a car or under a tent rain fly

- o If wood is wet, place it near hot fire, which will dry it out

§ This can also be done with clothes, but be mindful that fabric will burn when left on hot rocks near the fire for too long

- o Campfires consume more wood than one might expect, and wood is much easier to gather in daylight. Be sure to overestimate your wood needs, you can always burn the leftovers tomorrow night.

- Fire cleanup
 - o When the camp is ready to go to bed, the fire must be properly extinguished
 - o Pour water or dirt onto the embers, then turn them over with a stick and repeat the process at least twice. Dry embers blown away in the middle of the night can start fires in the underbrush and endanger campers, wildlife, and the forest itself

Part 3- Dances with Lions, Coyotes, and Bears, Oh My!

Humans, to our occasional surprise, are not the only big, loud, scary mammals that live in the world. In Virginia, black bears and mountain lions also call the woods their home, and can be as reluctant to share their space with us as we are to share with them. This being the case, there are a few simple precautions that students can take to keep themselves safe and minimize their intrusion in these creature's lives.

- The War Dance
 - o Choose one student to be the "bear," other students will be hikers.
 - o Predatory mammals like bears and mountain lions prefer prey that is weak and won't put up a fight
 - o Tell students to get as big as possible, wave their arms, and shout at the bear
 - o Stand with the student between you and the "bear" with the students facing the bear. Tell them if the bear is able to hear and follow your instructions, they will get eaten
 - o Speak loudly, slowly, and clearly to the "bear" with basic Simon-says instructions. IF the bear is performing them correctly, students must shout louder, wave more, become bigger. Continue until the bear can't hear you anymore and therefore has been scared away.
- Full Retreat
 - o Sometimes a bear or a mountain lion will be interested in eating you, and sometimes they want you away from their young. If getting big and loud has no effect on the bear, or aggravates it, there is a decent chance you stand between a mother and her cub. This is the last place you want to be, and merits full retreat
 - o Back slowly away at an angle, keeping an eye on the bear and putting distance between you.
 - o If the bear charges, better always to run downhill. Bears' powerful back legs will cause them to lose their balance if sprinting downhill, giving you the chance to strafe sideways and escape.
- Bears and Hikers
 - o Line up the class on one end of a field, and choose one or two "bears" leaving the rest of the "hikers" on the sideline. The objective is for the hikers to evade the bears and make it to the other side. If the bears catch them (tag with two hands), they are eaten and become part of the bear, and play as bears for the rest of the game. Play continues until one hiker remains.

Monica Wilson - "Building a Wetland Filter"

Suggestions for Instructor:

Depending on materials available, this lab can be run as a demonstration (with students assisting) or in teams of students (each creating their own wetland filter). If working in student teams, give students the opportunity to create their own filter system (what they think will work best) using the batting, soil, and gravel. Have the student teams present their wetland filter and explain why they built it the way that they did. Then have the team pour the contaminated water as the whole class observes to see if the filter works. Which filter worked? Why/why not? The recommended order would be:

- Gravel/stones (representing bedrock)
- Clay (representing hydric soil)
- Cotton batting (representing the wetland plant root system)
- Topsoil (representing the topsoil)
- Additional gravel (representing alluvial material).

Allow students to think about the order on their own, but try to guide them and as what each material represents and to the order that is actually found in a wetland

Objective:

Students will create a simulated to understand how wetlands filter and clean the water as it travels through the wetland.

Materials:

- Clay (can use natural clay or modeling clay)
- Topsoil or potting soil
- Cotton batting
- Small stones
- Vegetable oil
- 2-liter pitcher
- Large box or pan

Activity:

Students will work in teams, as one member will record the observations and decisions that will be written on the team lab sheet. The following materials will be collected: pan/container, 12-inch x 12-inch square of cotton batting, one section of clay, 2 cups of topsoil, and 4 cups of gravel.

The wetland filter should only take up one-half of the provided container. It should be in the middle of the container. Teams should decide how to build the wetland filter and also what each material represents in nature (e. g., what does the clay represent? the cotton batting?). This should also be recorded on the team lab sheet.

Once the orders have been decided on and why, begin building the wetland. Remember to only use one-half of the container for the wetland. The container must have one-fourth on each end for the water filtering. Once finished, each team should present their filter to the class and explain the order that was used.

Now it is time to test each filter one at a time, as the class observes. A designated team member will fill a 2-liter pitcher with 1 liter of tap water. Add a small amount of topsoil and 2 capfuls of vegetable oil. Stir well. As the mixture is being prepared, each team must place a small block under one end of their container to create a slight slope that allows water to flow. As the class watches, slowly pour the contaminated water at the high end of the container. All teams will test their filter systems. Record all observations.

Conclusion & Assessment:

1. What happened to the contaminated water?
2. Which filter systems worked best? Why? Which filter systems did not work well? Why?
3. Using this filter model, why are wetlands important in today's world?
4. Why should we preserve wetland areas?

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