# What Does It Mean To Be Green?

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## Introduction

One week in late July, I found myself immersed in Environmental Education studies, wading streams and hiking trails in the Appalachian mountains with local experts: geologists, biologists and foresters. While the hours were long, the data collected was basic information about the land and waters based on health and quantity of indicator plants and animals—indicators so clear that a child could see them if taught. As I slogged up paths and sloshed upstream, I was acutely aware how rare it was to be with knowledgeable teachers who knew the land deeply, could read the movement of animals, the history of rocks and soils, the health of the waters and plants, and so clearly love the land they care for. At one time, many people would have had this deep knowledge, would have been raised to read the landscape through stories and songs. Now, we depend on scientists and other experts to explain to us what we should know how to read. Modern humans turn to the internet to interpret information instead of knowing how to read the signs, information that would have been passed from generation to generation as common folk-lore even a hundred years ago in this area. In not so ancient times, humans depended on knowledge about local flora, fauna, climate and geology, woven into a narrative, a worldview[1] passed down as part of the oral tradition. Such an interdependent worldview would hold humans responsible for keeping balance in the world.[2]

So in this digital age, should we teach the old folkways; why is it important to understand on a deep level our local ecosystem? How can we go about changing what might be 'hardwired' behaviors to once again learn to read the landscape? The question of why is the easiest to answer. It is clear that modern humans are not being responsible, and are using natural resources faster than they can be replenished.[3] The litany of human mistakes and outright unethical behavior in our treatment of the world we live in is depressingly long. According to Walter Dodds, in order to reverse pollution, conserve our resources and slow global warming, we need to exploit Biophilia, provide environmental education, information feedback, opportunity for local environmental choice and a voice in local decisions, which will increase commitment[4] to preserving natural areas and natural resources. These factors combined may override genetically encoded human behavior.

Our evolutionary and cultural behaviors are thought to be rooted in the need to control our environment.[5] However, our formative experiences shape our experiences of nature, whether we love the natural world, or more and more commonly now, fear it. A meaningful connection with nature is fundamental to the survival of humans as a species.[6] Suzuki notes that humans have a genetically programmed need to be with non-

humans,[7] so that longing already exists. When we isolate our bodies from the outside world, we are cutting ourselves off from an essential part of ourselves. To be only indoor animals, substituting real world experiences with digital experiences is unnatural. It is the virtual experience that is a perversion.

Psychologist Erik Fromme first coined the term "biophilia" in 1964 in reference to human attraction to living things. However, biologist Edward O. Wilson used the same term to describe the connection humans seek in the natural world[8], an innate love of nature.[9] Dodds notes that biophilia is a fundamental part of human nature and that any solution to the environmental crisis must exploit biophilia. But what of those "born-digital",[10] the generation for whom the experience is in the virtual world, not the natural world? Zoologist David Suzuki, writing about this alienation of humans from the natural world, calls this "...schism from nature potentially suicidal."[11] Richard Louv in his book, *Last Child in the Woods*, claims that isolation from the natural world reduces the human experience, narrowing both the physiological and psychological senses, causing what he terms "nature-deficit disorder"[12] echoing the work of earlier ecologists and educators. Decades before Louv, ecologist Paul Shepard theorized that children who were not exposed to nature during optimal periods in their development might never be able to relate to the natural world as adults.[13] Indeed, developmentally appropriate environmental education is crucial to preventing ecophobia.[14] According to Shepard, learning is keyed to certain encoded periods in the life of a human child when the child is receptive to linking myth to the natural landscape, constructing meaning.

> *"Learning in this sense does not mean preparation by logical operations...It means a highly timed openness in which the attentiveness of the child is predirected by an intrinsic schedule, a hunger to fill archetypal forms with meaning."*[15]

Specifically, Shepard viewed ages 8-12 as the optimum period for concrete learning about the natural world, what he called Earth matrix. This would be the perfect period to link Creation stories, Fables, Legends and Myths to Science, something that can be easily fostered by educational programs that provide exploratory experiences as well as contemplative time outside in the natural world.[16] In the next period (ages 13-15), the human child struggles to create an identity separate from parents (dependence/independence), but in the late teens (16-19), the child begins to work on eco-and socio- kinships and makes the leap to understanding cosmology.[17] So, it seems to me to be quite clear that the answer to the "How?" question is to provide concrete experiential exposure to the natural world during a child's elementary years, as well as an outdoor rite-of-passage during the late teen years in order to link the elementary years nature experience to the young-adult tasks of service and civic responsibility. And so, the deep acquisition of knowledge about the local ecosystem becomes an easy and natural constructivist progression, from wonder to simple inquiry about the earth and sky, to the

hard sciences and mathematics using art, literature and music to balance the deductive sciences with an inductive response.[18,19]

> *"Successful education has the power to make the world strange again. Without any stake in the places where we live, we walk through days in which there are trees but no tree in particular, we drive along roads that could be anywhere, never registering the mountains to the east and lake to the west that determined, in fact, exactly where that route would run. Such casual familiarity is the opposite of intimacy and attentiveness."*[20]

Daniel Philippon in *Conserving Words: How American Nature Writers Shaped the Environmental Movement*, posits that writers were influential in creating five separate environmental movements by influencing reader's attitudes and beliefs about the importance of nature [21]. Each writer reflected a perspective that appealed to readers, whether forest and game management, the idea of nature as a garden, or the preservation of pristine wilderness areas. So too, do artists influence viewers. Artists of the Rocky Mountain School, such as Thomas Moran[22] and later, photographer Ansel Adams focused on presenting grand and sweeping vistas of the American West which promoted wilderness areas. Close study of the local landscapes we traverse through make them once again new and beautiful as we rediscover the land on which we live. It is that sense of wonder that we as teachers seek to foster, a curiosity about life that can be transferred to other systems, locales, and cultures as we mature. If as Suzuki posits, mutual attraction (love) may be the very structure of the universe, manifesting in living things as innate behavior dictated by our genetic code,[23] then the curiosity we encourage through developmentally appropriate activities will lead to true appreciation and acceptance of diversity.

> *"It is time to invent moral reasoning of a new and more powerful kind, to look to the very roots of motivation and understand why, in what circumstances and on which occasions we cherish and protect life.... We are human in good part because of the particular way we affiliate with other organisms....they offer the challenge and freedom innately sought. To the extent that each person can feel like a naturalist, the old excitement of the untrammeled world will be regained. I offer this as a formula of reenchantment to invigorate poetry and myth..."*[24]

**Rationale**

When I talk with students about basic needs such as air or shelter, it evokes only mild interest since these areas of need are not within their control. To introduce sustainability, a complex and largely abstract subject to students would be beyond the interest and comprehension of many children. But water and food--children understand food and

water. Food is vitally important for students at my school. We are an urban school with over 85% poverty as measured by the number of students who receive free or reduced-price meals. Many of our students are "school-nourished" meaning that if they do not eat at school, they may not eat anything nutritious that day. A charity provides late-afternoon snacks during the school year, so they do not go home hungry. During the summer, the school is a Federal Feeding Site, providing free breakfasts and lunches to our students. I plan to use food as a hook to create interest, and foster inquiry into habitat, seasonal fruits and vegetable growing, and how that relates to sustainability. My goals for the seminar are two-fold. The first would be to become better educated on the subject of sustainability, the science as well as the global economic and social issues that surround the subject, so that when opportunities for developing essential questions and deeper research occur, regardless of grade-level, I can facilitate those lines of inquiry. The second would be to teach about sustainability by example, through the use of a kitchen garden, covering topics ranging from creating habitats, garden planning, to composting.

I teach grades K-5 in a more or less fixed schedule that includes a period for checking out books, so the actual direct instruction time is 25 minutes once a week, perhaps less if the students are working on a guided activity. Often teaching has to be broken up into two-week lessons, with the first being primarily direct instruction and the second, a lesson that features a quick review and a guided or independent activity. In the K-2 Media classes, supporting independence in reading is facilitated through a study of Literature and Art. In Grades 3-5 classes, the focus is on learning to locate and use information. Media also works closely with grade-level studies in International Baccalaureate Organization Primary Years Program's six units of study.

The structure of IBO's PYP revolves around six themes[25],"Who We Are", "How We Organize Ourselves", "Where We Are in Place and Time", "How the World Works", "How We Express Ourselves" and "Sharing the Planet", through which the core curriculum is taught and a global perspective explored. The key is to provide structured opportunities for inquiry and research using what IBO calls "Key Questions" that relate to the form, function, cause, change, connection, perspective, responsibility, or a reflection of the topic. As the students progress through the grade levels, they spiral back to the basic focus of inquiry in these six units, but study different subjects by exploring Central Ideas. For example, the unit "How the world works" is "An inquiry into the natural world and its laws; the interaction between the natural world and human societies; how humans use their understanding of scientific principles; the impact of scientific and technological advances on society and on the environment."[26] They will revisit this unit throughout the six years of the PYP, each time using the central idea to delve into deeper forms of expression.

The length of each unit is 6 weeks; however, Special Area teachers will see classes only 4-6 times, depending on the length of the term, holidays or other scheduled events. This is important to note, as all Special Area teachers have a curriculum to teach and state

standards to follow. In addition to our own curriculum, we are required to cover core content. The amount of time in which to make an impact is limited. What I propose to do is use the subject of Sustainability as a theme that is woven through six IBO Primary Years Programme (PYP) units, a connection that will serve as a place to begin a discussion on the topics of society, art, and science.

What I propose is essentially 4 lesson sets presented between October 2010 and June 2011 that present some facet of Sustainability within science, art, literature or society using the school garden, information and activities inspired by the Sustainability seminar. In addition to the lessons, there will be topical book displays, posters or prints and realia related to the unit on display in the Library Media Center. In the IBO unit Media lessons presented below, I describe specific ideas that I plan to tie to the study of Sustainability.

**Strategies for Media/Information Skills Classes**

The three North Carolina Standard Course of Study (NCSCOS) sub-topics that I would like to cover in my unit relate to plants, ecosystems and nutrition. Since we are an International Baccalaureate (IBO) World School the focus of lessons is global. In Media Classes, students would be guided to form essential questions about their IBO units of study, and to research topics related to sustainability. In order to teach the units of study as they appear during the academic year, I am collaborating with the After-School Enrichment Program (ASEP) to maintain a 3-season kitchen garden. In addition, corporate volunteers plan to donate their time and materials to create the garden space, so that when Grade 3 is ready to study plants, the summer vegetables will have just been harvested and the fall bed readied for planting. Third Grade will be able to participate by tracking germination and plant growth in the Fall garden in their journals. In early January, when the greens and root vegetables are overwintering in the garden, 1st Grade will be studying Food Groups. In the Spring, 4th Grade students will assist in the design of the garden as part of their Nutrition unit. Students in all grade-levels that participate in ASEP will have access to the produce of the garden to take home, as well as to the two classroom kitchen areas for cooking. These students will also act as garden guides for their grade-level classmates.

These units of study will depend heavily on collaborative teaching with home-room teachers, ASEP instructors and volunteers. I will provide materials. Seedlings will be provided by Jail North's greenhouses, Solid Waste management employees and community garden volunteers. Home-room teachers will use science curriculum and materials provided by the district. ASEP lesson materials will have come from inexpensive or free resources, such as the National Gardening Association website. Volunteers and community helpers will bring their own materials for lessons. As a Media Specialist, I will provide access to Internet resources, reference and traditional non-fiction print materials, in addition to creating storytime programs and Big6 research

lessons that support students' interests. It will be my job as a Media Specialist to find funding, collaborate on instruction, coordinate resource sharing, design lessons and teach research skills using topics within Sustainability to enhance understanding of global issues.

My primary inspiration is literature; it is through stories that I will form connections between nature, landscape and science. Stories such as Janet Steven's *Tops and Bottoms* and Victoria Perla's *When Santa Turned Green* will be the backbone of K-2 lessons until the end of 2nd Quarter, when I will begin teaching Non-Fiction conventions. In Grades 3-5 the focus of Media lessons shift to information skills, reference and Non-fiction sources. Grade 4 lessons will use primarily electronic resources such as videos from Discovery Education on nutrition, although there may be an opportunity for one or more lessons focused on alternative energy. At the beginning of the academic year, there may be an opportunity to open a discussion on water rights or other aspects of sustainability, but as that is one of Grade 5's first research units, the research questions may be more related to gathering background information rather on deeper global ethical issues. A list of materials and an annotated list of resources is included at the end of this curriculum unit.

Ideal teaching activities would begin with a real-world or simulated problem, or a question that needs to be answered (Problem-based Inquiry). I will be giving Multiple Intelligence assignments, providing alternative ways of answering the key questions. The primary method of instruction will be direct, using "interactive" read-aloud stories to allow students to actively learn by talking as well as listening. Informal Questioning will be used as both formative assessment and ice-breaker. Thinking-Aloud, using "I wonder..." statements is another strategy that will be used to start discussion. I plan to have students pose their own questions for the Questions & Answers (Inquiry) board as well as asking some of my own. Observation activities such as a gallery walks and picture walks, silent periods during which students are allowed to closely examine art prints or picture book art, followed by a think-pair-share discussion (Multi-stage Sequential Debriefing) will be used. The research method employed by this school district is Big6. Cooperative Learning during the science and art activities will feature small groups of students working together to learn. I will be integrating technology to enhance the learning experience when possible, through the use of multimedia and the interactive white board. And finally, active learning also includes discussion, writing and reflecting; in a K-2 class this would either be dictated by students or written and illustrated on story paper, while Grades 3-5 would make entries in daybooks/journals.

Student Activity 1| Science Grade 3 Plant Growth & Reproduction

*Background*: Once upon a time there were no flowers. The world had many vascular and non-vascular seedless plants that reproduced asexually or sexually, but in seedless plants that produce sexually, the sperm are dependent on water as a medium through which to

travel to female. The evolution of an encapsulated seed, with its own store of energy, near the end of the Cretaceous period greatly increased the survival rate of plant species.[27] However, the seed cones and pollen cones of gymnosperms are on separate parts of the plant, if not on separate plants. Then angiosperms developed on the fringes of that world, in areas of ecological instability and with their appearance changed the world. Keys to the success of angiosperms are the perfect flower with the combination of the male and female reproductive parts on the same stalk, the evolution of the petal and fertilization that does not require a water medium.[28] Plants can either self-pollinate or cross-pollinate. The male parts are known collectively as the stamen, and are made up of filaments topped by anthers which contain pollen. Pollen grains contain the male sperm cells. The female parts are known collectively as the carpel and consist of the stigma, style, ovary and ovules. Animals or wind transfer the pollen from the anthers of the stamen to the stigma of the pistil. The pollen travels down the style to the ovary. The mature ovary becomes the fruit; the mature ovule is the seed. Petals form the corolla, protected by the calyx, the sepals of the calyx make up the outermost part of the base of the flower. A complete flower will have all four components attached at the receptacle: sepal, corolla, carpel and stamen.[29]As angiosperms evolved petals 100 million or so years ago, they attracted species that provided pollination services, which increased genetic diversity. Between 70 and 100 million years ago, "the great radiation" occurred, when the number of angiosperms exploded. The rise of angiosperms supported evolution of animal species that needed more energy with plentiful and more diverse food sources.[30,31]

Angiosperms are so necessary to human survival that there are genetic modification projects[32] sponsored by agribusinesses to increase yields on cash-crops such as corn, soy and cotton. Scientists are working to breed or genetically modify plant roots to survive drought, liberate nutrients and protect themselves against toxins.[33]

The study of parts of plants will be introduced in the Library Media Center using internet websites, a subscription database service (Discovery Education) and picture books. Students will plant bean seeds and create compost boxes in their homerooms. Students will also observe plants in the garden and the Root-Vue (cut-away) garden box maintained by ASEP.

*Objectives:* Students will study plant growth and reproduction

*Lesson 1 Procedures:*

1. Students will brainstorm what they know about plants using a KWL chart.
2. Teacher will introduce a plant life-cycle video, asking students to make note of any vocabulary that is new to students, or that they remember from previous year.
3. Together, as a whole group, students and teacher will add to the KWL chart. Teacher will emphasize questions students posed that have yet to be answered.

*Lesson 2 Procedures:*

1. Using the KWL chart created by the class, the teacher will review vocabulary and inquiries posed by students.
2. Teacher will introduce lab, purpose and method (Observation and Analysis). Teacher will review behavior expectations and procedures.
3. Students will examine flowers to determine whether they have perfect or imperfect flowers, complete or incomplete flowers. Students will sketch what they see in their daybooks, and make inferences.
   Key questions posed by teacher during guided discussion: What did you see? Would your flower be able to make seeds? Based on your flower, what do you predict other flowers would be like? Additions will be made on the KWL chart.
4. Teacher will read Ruth Heller's *Reason for a Flower* or Eric Carle's *Tiny Seed*.

*Lesson 3 Procedures:*

1. Teacher will introduce subject of pollinators including bees.
2. Students will discuss what they know about pollination, pollinators and will review/amend their KWL chart.
3. Teacher will read April Pulley Sayre's *Bumblebee Queen* and *Buzz on Bees* by Shelley Rotner.
4. Students will observe insect activity in the garden, noting numbers and types they see and discuss the roles of the insects they observed.

*Closure:* Students will reflect in their daybook about the parts of plants they had during lunch. They may also reflect on the natural resources used to deliver that meal to their tables or what the abundance of cabbage moths indicate.

Student Activity 2| Health Grade 1 Food Groups

*Background*: Every 12 minutes a child will die from hunger. More than 800 million people live with hunger and its associated problems daily. The problem is not food just production; there is enough food produced to feed each person on the planet. The solution to world hunger is having an understanding what populations are affected and why.[34] Factors that affect food supply include energy, areas of rapid population growth, transportation, climate and water. There is growing competition for arable land, because aquifers are shrinking.[35]Many of the underfed are the poor who live in rural areas of developing countries. These people have limited financial resources or land. Natural disasters or political unrest are two other factors that limit resources. In urban areas, malnutrition and obesity go hand in hand, as the poor eat inexpensive food that has low nutritional value.[36] Ironically, in predominately rural North Carolina, the rate of food insecurity, or hunger, is higher than the national average.[37] The problem for most poor is the limited availability of fresh seasonal produce in urban poor areas within reasonable

walking distance.[38] The problem of inadequate food source isn't always production, but distribution.

Large-scale crop production has its own problems. We need to develop agriculture that requires less water, fertilizers, fuel and land. Solutions include policy changes to restrict growing food crops for biofuel and protect farmer's land tenure, scientific or technological changes that save water, breed drought and water-tolerant high-yield crops, and practices that include double-cropping[39] and no-till planting.[40] Promoting sustainable local-seasonal agriculture, home and community gardens would be part of the solution[41], as well as teaching about nutrition using school gardens. Practices that do not harm other natural systems through pollution also need to be adopted.[42,43] In the case of my own students, availability of fresh produce as well as basic knowledge about nutrition are two problems that can be addressed within the unit.

Information on nutrition and food group classifications is made available online through the United States Department of Agriculture's (USDA) websites *Nutrition.gov* and *MyPyramid.gov*. According to the USDA, there are 6 food groups: Grains, Vegetables, Fruits, Milk, Meats & Beans and Oils. The USDA divides grains into whole and refined and encourages Americans to eat at least 3 "ounce equivalents" of whole grains each day.[44] While the amount of food the USDA recommends varies by age, gender, and physical activities, most 1st grade students should eat 1-1.5 cups of vegetables and 1.5 cups of fruit per day. Three cups of milk or the equivalent, 5 teaspoons of oils and 5 ounces of protein are recommended for children of this age range. In each of the food groups there are healthy and un-healthy choices as well as 30-minute physical activity component.[45]

*Objectives:* Students will be able to classify types of food. Students will be able to analyze a selection of food and its relative nutritional value

*Lesson 1 Procedures:*

1. Teacher will read *My Sister ate 1 Hare* by Bill Grossman and Kevin Henkes, *Bread and Jam for Frances* by Russell Hoban, Bebe Campbell Moore's *I Get So Hungry* or *Gregory the Terrible Eater* by Mitchell Sharmat.
2. Students will discuss what they know about food, as well as healthy and unhealthy choices using a KWL chart.
3. Using grocery store fliers, students will cut, sort and paste food choices into a simple construction paper graphic organizer that has 3 divisions: Fresh, Prepared, Junk.

*Lesson 2 Procedures:*

1. Teacher will introduce the work of photographer Peter Menzel using both print and non-print sources including his books *Hungry Planet, What the World Eats, What I Eat*.

2. Teacher will instruct students to notice food groups, amount of processed foods and amount of food.
3. Students will compare the diet of an American family with a family in Somalia, Bolivia, Bhutan. Teacher will assess using structured questions such as:
    a. Which family eats the most fresh vegetables and fruit?
    b. Which family has the least amount of food per week?
    c. What are two consequences of eating a lot of food that comes in bags, boxes, and bottles?

*Lesson 3 Procedures*:

1. Students will observe the over-wintered garden, what is growing and what vegetables they recognize.
2. ASEP students will lead the tour (Exposition with Interaction) and discuss what they learned and how the vegetables are being used at home.

*Closure:* Students will discuss what they learned during the unit in a multi-stage sequential debrief and complete the KWL chart. Students will discuss whether they have made any changes in the food choices they make.

Student Activity 3| Health Grade 4 Nutrition

*Background:* In Charlotte and other major metropolitan areas, there are urban zones considered "food deserts" where fresh produce, meat and dairy are either not available or not affordable. The combination of availability and affordability is what researchers consider when determining whether healthy food is accessible. [46] There is a correlation between food deserts and higher rates of heart disease and diabetes.[47] Encouraging convenience stores to stock produce and urban farmer's markets to take Supplemental Nutrition Assistance Program (SNAP) electronic benefits transfer (EBT) cards are two solutions. A more empowering solution is to encourage and support community and individual home gardens.[48] Taking control of food not only allows students to make decisions that affect their own health, but also allows them to take positive action against climate change.[49]

These lessons will focus on two of the three links between agriculture and health,[50] systems and output. Agricultural systems affect the environment and agricultural output affects consumer health. The development of chemical fertilizers changed modern agricultural practices, creating specialized large-production farms. The practice of growing one or two crops exclusively creates a number of ecological problems including decreased biodiversity and increased pollution of air, soil and water.[51] Since most of the American diet comes from just 15 crops and 8 domesticated animals,[52] the wisdom of limiting diversity of our food source is debatable.

In 1911 Fritz Haber succeeded in synthesizing ammonia from molecular nitrogen[53], a critical plant nutrient, into fertilizer. A few years later, Carl Bosch developed a way to synthesize ammonia on an industrial scale and the Haber-Bosch process[54] paved the way for monoculture. Monoculture refers to dedicating large tracts of land to the production of one type of plant, often a specific variety. If genetic diversity in crops is limited, then so too are the other dependent relationships in the food web, both beneficial and predatory. An increase of farm-land contributes to habitat loss. Dependence on synthetic fertilizers to support monoculture creates a cycle of increasing fertilizer, insecticide and herbicide use that strips the soil of nutrients and poisons workers,[55] the fields and watershed. [56] The development of feedlot animal husbandry increases disease, pollution and overgrazing. Drugs used in the production of such meat products are suspected in antibiotic resistance in humans.[57] The cost of such agricultural practices may cost the human species dearly if we eat ourselves into extinction.

Sustainable practices such as no-till farming and organic farming connect consumers to the land and to the community. Movements like Community Sustained Agriculture, Slow Food and Community Gardens revitalize the land[58], increase biodiversity and create relationships that strengthen the social networks within communities,[59] increase knowledge and understanding of practices that sustain natural systems, foster social and political change and provide much needed fresh seasonal produce.[60]

*Objectives:* Students will analyze primary sources and make observations and inferences about nutrition and food. Students will discuss how foods provide both energy and nutrients. Students will design a garden that includes a variety of flowers, vegetables and fruit.

*Lesson 1 Procedures:*

1. Depending on whether the unit has been introduced in the homeroom or not, the teacher will review or introduce unit topic using *Elementary Video Adventures: Body Science*.[61]
2. Students will review the 5 food groups, by creating a chart in their daybooks of the daily recommended servings from each food group.

*Lesson 2 Procedures:*

1. Students will be divided into groups, provided with a digital camera and given instructions to capture 3 images of lunch trays.
2. Cameras will be traded. Students will review the three images in the camera, comparing them to the chart in their daybook and will rate each tray selection (poor, better, best) based on representation of food groups in proper proportion.
3. Students will discuss their findings and conclusion in their daybooks.

*Lesson 3 Procedures:*

1. Using sequenced questions and summarization (Socratic Method), teacher will review plants role as producers.
2. Students will view segments of *Green Earth Club: Farming and Food Production*.[62]
3. Students will reflect on the key questions in their daybook as part of a multi-stage sequential debrief: What is the relationship between soil and healthy food? What are the positive and negative effects of monoculture? How does biodiversity help farmers?

*Lesson 4 Procedures:*

1. Teacher will review key questions from previous lesson.
2. Teacher will show FreeRange Studio's *Mouth Revolution*[63] *or Store Wars* to provoke thinking (Dialectical approach).
3. Students will list key points of video and identify bias.
4. Teacher will divide students into groups, distribute a garden rubric (Several are available on http://rubistar.4teachers.org), graph paper, yardsticks and rulers, seed catalogs and challenge students to design a garden that reflects their understanding of biodiversity as well as healthy food choices.

*Closure:* Students will compare designs and select the best from each class to present to ASEP. Students who participate will also receive potted seedlings from ASEP to take home.

Student Activity 4| Art and Social Studies Grade 5

*Background*: Environmental Education and Environmental Conservation share common roots.[64] Sparked by events such as the California gold rush and aided by the technology such as the Transcontinental Railway and the Erie Canal, Americans surged West and it was in this time of great change that both the Conservation movement and Environmental education were born. Writers such as John Muir, Walt Whitman, Henry David Thoreau, Aldo Leopold and Theodore Roosevelt appealed to different audiences,[65] but their message to preserve and manage nature produced the same result— the creation of protected wilderness areas. Simultaneously, Plein Air painters of the Hudson River and Rocky Mountain Schools such as Albert Bierstadt and Thomas Moran[66] were celebrating through their art both Nature and the ordinary man. It is through lenses of these artists and metaphors employed by these writers that their values about nature were transmitted and it is those values that guide environmental educators and conservationists today.

The value of nature can be discussed in terms of utilitarian (recreational, cultural, aesthetic, religious, or scientific) or intrinsic values[67] and such exploration can lead to the introduction of a particular writer or artist, an greater appreciation of self and place or a deeper understanding of ethics of environmentalism.

*Objective:* Students will close their biomes research unit by reflecting on the concept of personal action.

*Lesson 1 Procedures:*

1. Images of Moran's landscapes will be projected on board at the beginning of the lesson.
2. Teacher will read *Yellowstone Moran* and ask students to discuss what Moran's response was to his exposure to the landscape of Yellowstone.
3. Teacher will review action component of IBO PYP unit:
    a. Action should always be initiated by the learner.
    b. The nature of "action" is that it is significant and has meaning for the individual.
    c. Action can be personal or public, social, artistic, spiritual or political.
4. Teacher will present a brief biographical slideshow of the work of Cousteau, Fossey, Goodall, Muir, Roosevelt, Suzuki, Whitman and others.
5. Students will reflect on what action they will take in response to the new information learned in their biome research

*Closure:* Students will share their reflections.

**Conclusion**

Environmentalist Lester R. Brown urges readers to adopt a sustainable lifestyle as well as work for political and economic changes, applying social pressure to national as well as local organizations.[68] As "viral" media transfer and social networks clearly illustrate, cultural evolution is faster than biological evolution; the aggregate effect of many humans applying and disseminating newly learned information is powerful. Dodds notes that such a cultural evolution could be part of the solution to the global environmental crisis[69] by providing both a way to disseminate information quickly as well as an information feedback loop, using technology to support real-time local conservation, preservation and education efforts, so learn local; think global.

**Materials for both classroom and garden**

Chart paper or Interactive whiteboard
Compost
Composition books, 1 per student
Computers with internet access
Construction paper, 9”x18”
Graph paper
Gloves, 1 pair per student
Glue
Flowers
Garden stakes
Garden rake, a short-tined rake
LCD Projector
Magnifying lenses, 1 per team
Markers, permanent
Mulch
Newspaper grocery fliers, 1 per child
Peat pots
Pencils, #2 and colored
Potting mix
Plant catalogs
Plant markers (or wooden paint stirrers and popsicle sticks)
Plant stakes
Rain gauge
Root-Vue Planter (available through Carolina Biological Supply)
Rulers
Scissors
Seeds and/or seedlings
Spade
Story paper
Trowels
Twine
Water hose with adjustable spray nozzle or watering cans
Wheat straw bales
Yardsticks or retractable measuring tape

**Resources to inspire Teachers**

*American Experience: Walt Whitman*. Film. Directed by Mark Zwonitzer. London: Pbs (Direct), 2008.
A PBS documentary on the life of Walt Whitman.

Brown, Lester R. *Plan B 4.0: Mobilizing to Save Civilization*. New York: W.W. Norton & Co., 2009.
Brown's book contains detailed information about human systems that affect global warming, pollution and energy consumption.

Dodds, Walter K. *Humanity's Footprint: Momentum, Impact, and Our Global Environment*. Columbia: Columbia University Press, 2008.
The impact of human society on the environment in social and scientific terms.

Jeffery, Robert. "Going Green: Message of Hope." *IB World*, January 2010.
An interview with David Suzuki about the importance of environmental education.

Krezel, Cindy. *Kids' Container Gardening: Year-Round Projects For Inside and Out*. Second edition ed. New York: Ball Publishing, 2010.
Easy container gardening activities for children.

Lanza, Patricia. *Lasagna Gardening: A New Layering System for Bountiful Gardens: No Digging, No Tilling, No Weeding, No Kidding!* First Edition ed. Emmaus, Pa.: Rodale Books, 1998.
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