

Final Report

Community Environmental Education in Virginia

December, 2010

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Grant Year 2009

NOAA Grant #NA09NOS4190163

Task 4



Virginia Coastal Zone
MANAGEMENT PROGRAM



This project was funded by the Virginia Coastal Zone Management Program at the Department of Environmental Quality through Grant # NA09NOS4190163 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, under the Coastal Zone Management Act of 1972, as amended.

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Product #1

Title: Public Climate Change Education Training Module

Percent total project budget: 40%

The Virginia Office of Environmental Education completed the development of a scripted Public Climate Change PowerPoint Presentation for Virginians. Staff also revised the “*25 Ways to Help Virginia’s Environment*” to produce “*5 Ways to Help Virginia’s Environment*.” Other complementary materials developed included an Air Pollution & Environmental Quality Resources page for the Virginia Naturally web site, updates to the carbon footprint and climate change information, and hosted and conducted outreach training to non-formal educators on Air Quality & Climate Science.

Staff coordinated development of the scripted “Introduction to Climate Science for Virginians” through review of existing literature related to climate literacy and consulting climate communications specialists from NOAA, NASA, and the private sector. The presentation also went through two rounds of review by VOEE staff and CZM staff before it was shared at a Leadership Summit focused on Air Quality & Climate Science.

The proposed “10 Ways for Virginians to Reduce CO₂” morphed into “*5 Ways to Help Virginia’s Environment*” and focused on sharing information about reducing personal ecological footprints. Reducing ecological footprints leads to reductions in carbon footprints and the idea of the ecological footprint has been accepted as a teaching tool and communication strategy across the Commonwealth.

Staff developed the revised the Carbon Footprint webpage on Virginia Naturally and created the page Air Pollution & Environmental Quality Resources page because carbon and additional greenhouse gas emissions fall within the realm of air quality. Resources listed related to carbon footprints and climate change represent the best available information found related to these topics as was found during the development of the scripted PowerPoint Presentation.

Staff coordinated and conducted a Leadership Summit focused on Air Quality & Climate Science which reached 48 experienced non-formal educators. The summit included the presentation of the “Introduction to Climate Science for Virginians” as well as additional content related to climate adaptation planning and the link between criteria air pollutants and climate change. The “Introduction to Climate Science for Virginians” presentation was also repeated at the Virginia Environmental Education Conference and reached 35 formal and non-formal educators.

Deliverables/Product Format:

A climate change education module was developed including: an *Introduction to Climate Science* Power Point presentation (separate attachment) and script (see Appendix A) for a general public audience; a “10 Things Virginians Can Do to Reduce CO₂” brochure became “*5 Ways to Help Virginia’s Environment*” (see Appendix B); and, an updated Carbon Footprint page on the Virginia Naturally website titled “Air Pollution & Environmental Quality” (see Appendix C).

Final products have been included in the Appendices where appropriate. The final *Introduction to Climate Science* PowerPoint has been included as a separate digital file.

Product #2

Title: Capacity Building Reports on Delivering Environmental Ed.

Percent of total project budget: 40%

The mission of the Virginia Office of Environmental Education (OEE) is to build capacity for delivery of effective environmental education across the Commonwealth. To achieve this, during this grant the OEE Director coordinated an assessment and revision of the state's master plan for Environmental Education – "A Business Plan for Environmental Education in the Commonwealth of Virginia." The addendum to the plan (see Appendix F), includes major strategies for improving environmental education in Virginia.

Work included analysis of a detailed survey was distributed to Virginia Naturally partners and two focus group discussions to evaluate progress being made in achieving the objectives of the master plan for environmental education.

Progress in achieving specific goals such as development of outdoor classrooms at every school or meaningful field experiences for every student is moving more slowly than projected. Several factors contribute to this situation. Local funding is inconsistent and programs are often grant-based or are small components within budgets. Community-based programs are well-suited to participation in education programs that address local environmental challenges, but Virginia has less than adequate resources to support "local" program and delivery networks.

Challenges resulting from inconsistent support show up as:

- 1) High turnover of professional staff among education providers,
- 2) Various levels of experience and professionalism among educators,
- 3) Local organizations that shift missions to "follow the money."

Progress in the area of capacity building, the primary work for the Virginia Office of Environmental Education, is being made. OEE's mission is to "build capacity for delivering high quality, science-based EE." The term "capacity building" is used to describe the activities of those working to improve and strengthen the field of environmental education. Efforts include those recognized by the National Environmental Education Advancement Project and the North American Association of Environmental Education:

- 1) Increasing networking and communication among educators.
- 2) Training and follow-up to support state and local EE providers.
- 3) Leveraging resources in support of EE programs.

Highlights of work completed by OEE includes (see Appendix G):

Increased networking and communication. Virginia Naturally web page and bimonthly newsletter disseminates resources and promote "best practices" to nearly 1,000 partner organizations (2,000 individuals), with 11,700 visits and 1,200 downloads monthly.

Training and follow-up to support local EE providers. Training was provided to 932 community educators at 20 workshops. The OEE Community Educator worked with community environmental education leaders to strengthen the five regional EE teams in the coastal zone. Collaborative stewardship projects included water stewardship project and outdoor classrooms. Regional teams are meeting periodically and their projects (membership, meetings and stewardship programs) are supported by VOEE. The EE Leadership Program is cultivating a high-caliber of professionalism for non-formal educators.

Leveraging resources in support of EE programs. The VOEE manager participates on decision panels with various funders: NOAA BWET, the Virginia Environmental Endowment, Region III EPA, and the Chesapeake Bay Restoration Fund to review education priorities, identify gaps and reduce duplication of effort. The office also facilitates opportunities between stakeholders and sectors through participation on various boards such as the Virginia Resource-Use Education Council, the Virginia Association of Science Teachers, the Virginia Science Education Leadership Association, the Chesapeake Bay Education Workgroup, the Virginia Asthma Coalition, Virginia Water Monitoring Council, the Children's Health Network and EPA Region III Roundtable.

Timeframe: Start: October 2009 End: September 2010

Product #3

Title: Meaningful Community Education Training/Workshops

Percent total project budget: 20 %

Workshops, events and meetings focused on helping the Virginia CZM Program meet its goals and priorities related to water resources. In 2008, more than 1,000 people were directly trained by OEE. Topics covered in FY 09 included: surface and ground water quality, cultural and historical water uses, nutrient sources and controls, domestic wastewater treatment, as well as management and protection of freshwater, riparian, wetland, beach, and estuarine habitats.

3 citizen-educators in the Pleasure House Lake community of Virginia Beach and 16 community educators in the Middle Peninsula were trained in facilitating the community-based Water Stewardship Campaign which addresses water quality and water conservation issues. Citizen-educators in the Pleasure House Lake community went on to engage 15 households in personal stewardship efforts over the 8-week program. Implementation of this community-based water stewardship program in Pleasure House Lake also helped address an impending TMDL for Pleasure House Lake and Lake Joyce in Virginia Beach.

Through workshops and training, this task helped implement Virginia's Chesapeake Bay community education and restoration commitments to increase opportunities for citizen participation in restoration activities, helped local and regional environmental educators deliver high-quality, meaningful environmental education and identified opportunities to disseminate Virginia CZM products and information to the education community, e.g. through presentations, lessons and local education and outreach initiatives.

Deliverables/Product Format:

Description of workshops offered (see Appendix E), including materials provided (see Appendix F) and numbers of participants. List of community education programs provided by professional development workshop participants in return for their training.

Timeframe: Start: October 2009 End: September 2010

Appendix A. Introduction to Climate Science Script

Script for *Introduction to Climate Science for Virginians*

This script is designed to be read and followed through the ***Introduction to Climate Science for Virginians*** presentation as if the reader was delivering the presentation. This script includes cues to advance the slides.

Please contact David Ruble with the Virginia Office of Environmental Education at David.Ruble@deq.virginia.gov for any questions about the presentation and script.

Introductory Slide (Slide #1)

In my role as a science educator, it is my job to share the highest quality research available for a given topic. In this presentation about climate science I have reviewed research from well-designed experiments, considered alternate hypotheses, and have distilled research results in a manner that is readily accessible to the public and policymakers.

The goal is to help better understand the state of the science, including the levels of certainty and uncertainty. This presentation will not address policy questions that are raised when discussing climate topics.

I'm not going to address questions of about climate change adaptation vs. mitigation policies, cap and trade vs. carbon tax, what constitutes a "dangerous" level of greenhouse gases, nor will I discuss matters of intergenerational ethics or international treaties. These are important policy discussions best discussed with decision-makers and all stakeholders involved.

Clearly, for those sorts of topics, it would be difficult to make well-informed decisions without some understanding of the underlying climate science as well as public policy, economics and social science. << click >>

Approach for the Day (Slide #2)

The approach for the presentation is to: << click >>

1. Summarize some of the key scientific findings, with discussion of time and space scales. << click >>
2. Provide reference materials for further inquiry << click >>
3. Give Virginia examples of climate concerns << click >>

Terms to Know (Slide #3)

Some terms you will be introduced to today to provide us a common vocabulary: << click >>
Science << click >> Climate << click >> The Greenhouse Effect << click >> and the Milankovitch Cycles? << click >>

What is Science? (Slide #4) << click >>

Science is “the systematic observation of natural events and conditions in order to discover facts about them and to formulate laws and principles based on these facts.” << click >>

“Science is a way of learning about the natural world and the knowledge gained through that process.” – This is from a State of Virginia science text book << click >>

“To do science is to search for repeated patterns, not simply to accumulate facts.”

Let me draw attention to some key words in these definitions. << click >>

Science is a means of systematic observation and a search for repeated patterns. Science is not a random collection of opinions.

<< Pause >> << click >>

“Science is a way of learning about the natural world.” << click >>

Terms to Know (Slide #5)

Next we’ll take a look at climate. << click >>

What is Climate? (Slide #6)

What is Climate? << click >>

“Climate is the average, year-after-year conditions of temperature, precipitation, winds, and clouds in an area.” - This is from Prentice Hall, Science Explorer.

And another definition provided by the U.S. Global Change Research Program is << click >>

“Climate is determined by the long-term pattern of temperature and precipitation averages and extremes at a location.” << Pause >>

Specific words to keep in mind when looking at these definitions of climate are: << click >>

Year-after-year conditions with long-term patterns focusing on: << click >>

Temperature and precipitation in a specific location.

This brings us to the question of << click >> is the planet’s climate changing in significant ways?

(Slide #7) << click >>

Scientists agree that warming of the climate system is occurring due to observations of increases in global average air and ocean temperatures; widespread melting of snow and ice; and rising global average sea level.

This is from the Intergovernmental Panel on Climate Change 2007 Assessment Report.

But what keeps our planet warm to begin with? << click >>

This brings us to our next term – the Greenhouse Effect (Slide #8) << click >>

Why is the Greenhouse Effect important? (Slide #9) << click >>

The greenhouse effect helps maintain a consistent temperature on the planet Earth which makes our planet livable. So the greenhouse effect is a good thing for our planet.

But how did we discover the Greenhouse Effect? What is the Greenhouse Effect?
When was the Greenhouse Effect discovered? << click >>

Greenhouse Effect (Slide #10) << click >>

Discovery of the Greenhouse Effect has been attributed to Joseph Fourier in 1824. << click >>

In 1858, John Tyndall successfully experimented on various gases and determined that << click >> water vapor, carbon dioxide, ozone, and methane could all hold & radiate heat. << click >>

By 1896, Swedish scientist Svante Arrhenius had established the idea that “considered the radiative effects of carbon dioxide (carbonic acid) and water vapor on the surface temperature of the Earth, and variations in atmospheric carbon dioxide concentrations.”

In other words, Arrhenius had discovered a link between levels of CO₂ in the atmosphere and surface temperature. http://earthobservatory.nasa.gov/Features/Arrhenius/arrhenius_2.php

<< click >>

What is the Greenhouse Effect? (Slide #11)

Read the slide...

And for a visual, this is how it looks... << click >>

Sun / Atmosphere / Earth Slide (Slide #12)

We have the Earth, the Sun, and the Atmosphere with << click >>

Greenhouse gases which make the surface of the Earth habitable. << click >>

Radiative energy comes from the sun with some of it entering the atmosphere and some bouncing off the atmosphere back into space. << click >>

This energy is absorbed by the land and ocean surface and re-radiated back into the atmosphere. << click >>

Energy that hits one of the greenhouse gases is absorbed and then re-radiated back towards the surface of the earth and into the atmosphere.

Understanding the greenhouse effect lets us know how the Earth remains habitable. << click >>

Terms to Know (Slide #13)

Next we'll look at something called the Milankovitch Cycles (everybody say Milankovitch). << click >>

What are the Milankovitch Cycles? (Slide #14) << click >>

The Milankovitch Cycles are named after Serbian astronomer Milutin Milankovitch who began observing how the earth moved in relation to the stars during his internment in World War I. << click >>

Milankovitch theorized that changes in the movement of the Earth could have effects upon the surface climate of the planet. << click >>

Mathematically, Milankovitch observed and identified that the earth moved in three different directions which are labeled Eccentricity, Obliquity, and Precession (or Wobble)

Lets take a look at a video that demonstrates these three cycles << click the link to show the videos >>. << click >>

And as a recap...

Eccentricity – Orbital shape (Slide #15)

Eccentricity follows about a 100,000 year cycle in which the earth changes from a circular to an elliptical orbit. When earth is in a more circular orbit, the planet experiences a more constant effect from the sun; when in an ellipse, temperature differences between seasons is more pronounced << click >>

Obliquity – Axial tilt (Slide #16)

Obliquity follows a roughly 41,000 year cycle in which the tilt of the earth changes from 22.1° to 24.5° which affects the intensity of the seasons. Tilt of the earth affects temperature differences between seasons. The greater the tilt, the greater the temperature differences. << click >>

Precession – Wobble (Slide #17)

Precession follows about a 25,000 year cycle in which the earth 'wobbles' like a spinning top. << click >>

Vostok ice core graphs (Slide #18)

So now we know that greenhouse gases have been linked to surface temperatures. We know that the earth goes through three patterns of movement. Now we can ask, is there a relationship between the Milankovitch Cycles and Greenhouse Gases. << click >>

The graph we are now looking at is from data made available from the Vostok, Antarctica research station. Ice cores have been pulled from the center of the East Antarctic Ice Sheet and provide a timeline of past events into four previous glacial periods. Please note that the timeline as read from left to right goes back in time from present day to 420,000 years ago.

Looking at the available data, we can see some common trends between << click >> carbon dioxide, methane, and temperature. << click >>

Upon closer inspection we begin to see a pattern that repeats itself about every 100,000 years. This falls in line with eccentricity or the orbital pattern of the Milankovitch Cycles. << click >>

Please also note that carbon dioxide levels range from 180 to about 280-300 ppm. In the historic records CO₂ has never exceeded the 280-300 parts per million (ppm). Earth's current level of CO₂ exceeds 380 ppm. << click >>

Slide #19

We can tell from the ice core data that there is a link between greenhouse gases and the Earth's temperature. But is this a uniform change that all parts of the world are experiencing at the same time? << click >>

Climate change responses are not geographically uniform. We often show globally averaged temperatures, but we should not lose sight of the fact that climate's response to changes is not geographically uniform.

For example, there are well established physical reasons to expect that continents will tend to warm more quickly than the ocean and that the Arctic will warm roughly twice as fast as the tropics. There's more confidence on larger scales than smaller scales – so we can't say if Richmond will warm more or less than Kansas City, for example.

This image is a model-simulated change in seasonal average surface air temperature from the late 20th century (1971-2000 average) to the middle 21st century (2051-2060). The left panel shows changes for June July August (JJA) seasonal averages, and the right panel shows changes for December January February (DJF).

The simulated surface air temperature changes are in response to increasing greenhouse gases and aerosols based on a "middle of the road" estimate of future emissions. Warming is projected to be larger over continents than oceans, and is largest at high latitudes of the Northern Hemisphere during Northern Hemisphere winter (DJF). << click >>

Why worry about these changes? (Slide #20) << click >>

Because life on Earth depends on and is shaped by the affects of climate. << click >> << Pause >>

Individual organisms survive within specific ranges of temperature, precipitation, humidity, and sunlight. << click >> << Pause >>

Organisms exposed to climate conditions outside their normal range must adapt or migrate, or they will perish. << Pause >> << click >>

Let's look at an example of bird migration in Texas.

Annually, the Audubon Society conducts large citizen surveys of birds providing a great snapshot of bird locations. Observing this information over time shows trends in bird migrations and locations. << click >>

Interpreting these data show that “more than half [of the species tracked] are spending the winter about 35 miles farther north than they did 40 years ago.” << click >>

This could be a reaction to average January temperatures rising about 5 degrees Fahrenheit in the U.S. over the four decades covered in the study. << click >>

“This is as close as science at this scale gets to proof” of animals responding to climate change, according to Greg Butcher with the Audubon Society. << click >>

And although “researchers don’t know for a fact that it is warming. When one keeps finding the same thing over and over ... we know it is not just a figment of our imagination.” << click >>

Finally, “In some cases, species’ ranges have shifted 100 miles or more in recent decades, according to the study.” << click >>

This is more than a North American phenomenon. << click >>

Avian migration phenology and global climate change (Slide #21)

In England, professor Peter Cotton noted changes in bird migration over the course of 30 years. << click >>

Specifically he found that, “There is mounting evidence that global climate change has extended growing seasons, changed distribution patterns, and altered the phenology of flowering, breeding, and migration.” << click >>

He also noted that, “Over the past 30 years in Oxfordshire, U.K., the average arrival and departure dates of 20 migrant bird species have both advanced by 8 days.”

So we know that something is happening to wildlife and that climate may be a factor in these changes. << click >>

So what about Virginia? (Slide #22)

What record do we have of change in Virginia? << click >>

We have access to historic month-to-month temperature averages from NOAA back to the year 1895. << click >>

We have frost date and growing season length changes available through NOAA and Virginia Cooperative Extension. << click >>

Finally, we can look at changes in the Sewell’s Point tide gauge over time. << click >>

Slide #23

Tides rise and fall, daytime temperatures are higher than nighttime temperatures, summer temperatures are warmer than winter temperatures... there are many things in nature that go up and down over time in a fairly regular manner.

There are also things that can increase or decrease to alter the rhythm << click >> such as atmospheric greenhouse gas levels since the 19th century.

Simply add together the linear trend and the regular cycle shown in this schematic and you get the yellow curve << click >>... a curve with a clear upward trend over the long term, but one that contains shorter term downward periods.

To my eye, the yellow curve resembles area-averaged measures of temperatures and other climate variables we see both in observations and in climate models when forced by increasing greenhouse gas levels. << click >>

Bottom line: Both human-induced trends and natural variability can and do occur at the same time. The existence of one does not preclude the other.

With this in mind, let us turn our eyes toward the Virginia temperature record. << click >>

Virginia temperature 1895 – 2010 (Slide #24)

Each point you see here is an average monthly temperature point from January 1895 through January 2010 progressing from left to right.

This is a lot of information and we need some way to make sense out of it all. << click >>

Slide #25

By running some basic statistics, we can plot a line to show us any patterns that may show up in the data.

From this level of detail, we can see that there is something happening between 54 degrees and 56 degrees.

So we'll zoom in a little further to look at our line. << click >>

Slide #26

Which shows a general pattern of temperature increase for Virginia since 1895.

But what about the last 8 years of cooling? Surely, that disproves any temperature increase that is happening. << click >>

Slide #27

So using the Virginia temperature data, we can plot a line which plots the data for every 10 years. This shows that since 1895, Virginia's temperature has varied over time, but continues to follow an upward pattern. Notice that the lowest monthly average temperature rises over time. << click >>

What about frost dates? (Slide #28)

The date farmers and those with green thumbs eagerly await in the Spring and dread in the Fall. How has this changed? << click >>

Last Frost of Spring for Richmond, VA (Slide #29)

This is a record of dates for the last frost of spring for the Richmond, Virginia, area since 1935. << click >>

Slide #30

Again, if we fit a line to this data, we see the average frost date moving from around mid-April towards the beginning of April. << click >>

Slide #31

Taking this data and applying a 10-year average we can see again that the frost date has varied since 1935, but it continues to move a little earlier in the year.

What about the first killing frost of fall? << click >>

First Frost of Fall for Richmond, Virginia (Slide #32)

Let's take a look at the fall data as well. << click >>

Slide #33

Applying another line, we see the first killing frost of fall being pushed from the end of October to just before Veterans Day in November. << click >>

Slide #34

Using a 10-year average, we again see some variability, but a continued push of the first killing frost of fall from the end of October to the beginning of November. << click >>

Slide #35

But we can't cherry pick individual frost dates as our sole explanation for a shifting climate. This is the same for blizzards and heat waves – no one event will move the curve << click >> but cumulative extreme weather events can begin to adjust what is considered to be a 'normal' climate.

I had an HVAC technician come by the house the other day to do some work on my air conditioning unit because the house wasn't getting cool. He mentioned that he had been working on systems all summer long – even brand new systems – that couldn't keep up with this summer's heat. He said that the computer program used to size the units only plan on needing to cool one or maybe two 100-degree days each year.

With multiple 100-degree plus days in a row becoming more common, there may be a need to revise the assumptions the computer uses to size new heating & cooling systems. << click >>

Slide #36

What about Sea-level-Rise in Virginia? Is this a new or changing concern?

For this, we can look at data collected from the Sewells Point Tide Gauge. << click >>

This tide gauge is located at a U.S. Naval Base alongside Willoughby Bay in Norfolk. << click >>

Which is located here in Hampton Roads. << click >>

Easily accessed records from this tide station begin in 1928.

Here is a graph of recorded average sea level from 1928. << click >>

Sewells Point, Virginia (Slide #37)

Looking at this graph, we can see that average sea level has risen close to a foot-and-a-half foot since 1927. Also, notice that the lower average sea level << click >> since around 1990 exceeds the upper average sea level that we know of from 1928 to about 1935. << click >>

Sea Level Rise (Slide #38)

Sea level is a multi-faceted topic. As ocean temperatures warm they expand and, all else being equal, sea level will rise. We understand this process and models simulate the elements of the process fairly well.

Additionally, the Earth's crust is still slowly responding to coming out of the last ice age – perhaps you've heard of "post-glacial rebound". Basically, some places are slowly rising and others sinking as the ocean basins' geometry changes as the crust adjusts to having less ice piled on high latitude land. Estimates of this effect must also be factored into sea level projections.

The amount of water stored on land changes in several ways that affect how much is in the ocean. For example, people pump water out of aquifers and then impound it behind dams, and mountain glaciers can melt or grow.

But perhaps the biggest wild card for the future is what will happen to the Greenland and Antarctic ice sheets. And the state of the science is such that there is no quantitative consensus as to how they will respond or the timing of their responses. If the ice sheets were just big ice cubes, they'd be easier to understand and we could model them with some confidence. But they're "dynamic" – they flow and move and all the physical factors that regulate their behavior are not fully known... so sizable uncertainties remain. It's an active research topic.

Current climate modeling does not account for the melting of the Greenland or Antarctic ice sheets.

The rise in sea elevation gives cause for concern due to the consequences of sea level rise such as << click >> Coastal Erosion, Coastal Inundation or (Flooding), and Storm Surge

What do these things look like? << click >>

Here is a comparison of Coastal Erosion in a historic context. **(Slide #39)** << click >>

In Virginia, we have found a high level of accuracy of Captain John Smith's maps of the Chesapeake Bay. Because of this it is useful to compare the 1607 map to a 2007 map of the Bay.

[Let the video play] – describe what images the video is showing.

Take notice of the receding shoreline on the Eastern Shore. This is due to a combination of shoreline erosion and sea level rise. << click >>

Coastal Inundation (Slide #40)

Coastal inundation is defined as when water is covering normally dry land.

Inundation events are among the more frequent, costly, and deadly coastal hazards that can impact coastal communities in the U.S. In fact, riverine and coastal inundation causes the highest number of natural-hazard-related deaths. With coastal states << click >> supporting 81% of the U.S. population and generating 83% of U.S. gross domestic product, the potential for catastrophic loss from inundation events is greater in these states than in other areas of the country. Future inundation risks may be exacerbated by local changes in climate and sea level.

This map shows potential inundation with a three and a quarter foot rise in sea level for part of the Hampton Roads area. << click >>

Several coastal communities are already facing challenges with inundation and more frequent flooding from smaller storm events. << click >>

If flooding from smaller storm events is becoming more of a problem, then storm surge combined with inundation poses additional risk for our coastal communities. << click >>

What exactly is Storm Surge? (Slide #41) << click >>

A Storm surge is an offshore rise of water associated with a low pressure weather system, typically a tropical storm or hurricane. Storm surges are caused primarily by high winds pushing on the ocean's surface. The wind causes the water to pile up higher than the ordinary sea level; often resulting in a greater amount of flooding than is typical for an area. << click >> << Pause >>

What does this mean for Virginia? (Slide #42) << click >>

We're facing rising temperatures, rising sea levels, and a changing growing season.

What does this mean for the world at large? << click >>

How will the Earth's climate change? (Slide #43) << click >>

Scientists agree globally that wet areas will get wetter and dry areas will get drier. The frequency of extreme weather events may increase, and sea level will continue to rise at potentially higher rates. << click >>

How is science addressing these changes? (Slide #44) << click >>

Scientists are taking better and more comprehensive observations << click >> such as the Argo project. << Pause >> << click >>

The Argo Project deploys sampling floats that descend to a cruising depth, drift for several days, ascend while taking salinity and temperature profiles, and then transmits the data to satellites. These data are then used by scientists to study how the oceans are changing and to better inform climate predictions. << click >>

As of August 2010, over 3,000 floats for the Argo Project are deployed and sampling the planet's oceans. << click >> << click >>

Scientists are also developing improved climate models and developing regional assessments based on local observation data in order to provide better regional climate predictions.

While scientists are staying busy with this research, what can we do to get involved? << click >>

Next Steps (Slide #45)

Learn more << click >> online through NOAA's Climate Services portal at www.climate.gov. << click >>

This site has additional education resources and access to primary data about climate. The Virginia temperature graph we looked at earlier was generated based on data downloaded from this portal. << click >>

Review the Virginia Plan generated by Governor Kaine's administration. << click >>

This report generated action items that the state could take to address future impacts of Climate Change. The report was generated by a broad spectrum of experts and citizens across the Commonwealth. << click >>

Finally, do something. (Slide #46) << click >>

We recommend you first assess your personal carbon and ecological footprint to learn what impact your lifestyle is having on the planet. << click >>

The Carbon Footprint measures the amount of CO₂ emissions your lifestyle produces. EPA has a great household emissions calculator – just be sure to have your utility bills and other energy use information available to get the most accurate measurement from the tool. << click >>

The Earth Day Network offers an Ecological Footprint tool which measures how much nature in acres your lifestyle uses. It is another assessment tool which takes into account personal living choices in regards to food, transportation, and housing. << click >>

Finally, be active in your community. Contact your elected officials to find out what they are doing to address climate change. If you live in a coastal community, be sure to ask about future impacts of storm surge and coastal inundation. << click >>

Let's Recap (Slide #41)

We've had a busy session going over this material and I want to recap the key points of the day. << click >>

We've reviewed the nature of science. Had an overview of climate and specifically looked at what we know about natural cycles. << click >>

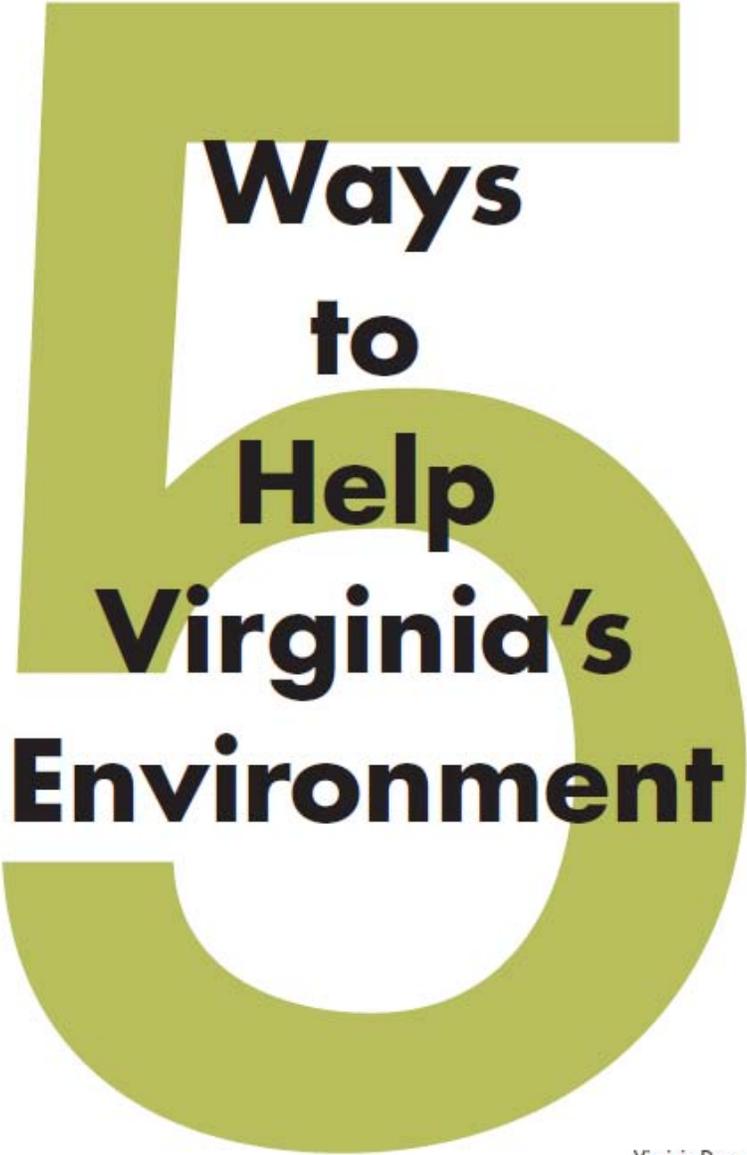
We also had a refresher on the greenhouse effect and you got to learn about the Milankovitch Cycles; the main physical processes that keep our planet habitable and that historically have altered Earth's climate. << click >>

Finally, we reviewed some Virginia examples of how we see climate changing and some additional personal steps we can take to learn more about our changing world and what we can do about it. << click >>

Closing Slide (Slide #42) (Contact Information)

I thank you for your time and now would like to address any questions you may have about the presentation.

Appendix B. 5 Ways to Help Virginia's Environment



**Ways
to
Help
Virginia's
Environment**



Virginia Department of Environmental Quality

Food, Home, Transportation, Purchasing, and Community Choices

5 WAYS TO HELP VIRGINIA'S ENVIRONMENT

Your daily living choices directly affect the air you breathe, the water you drink and the natural areas you love in Virginia. Every choice matters — from simply what to eat for breakfast to more difficult ones like what you drive and where you live. Are you willing to make choices that will improve Virginia's environment and economy? It's easy. Choose five actions from the suggestions below and commit to start doing them today!

1

FOOD CHOICES

What you eat and where it comes from has a significant impact on natural resources and Virginia's economy.

The shortest distance between a farm and your dinner table means fewer transportation emissions that pollute the air we breathe.



- Buy local fruits, vegetables and other products.
- Buy Virginia grown food. These labels can help you find local products.
- Choose grass-fed meat which creates more open space and reduces potential run-off from feed-lots.
- Choose food that's fresh which uses less packaging and needs less storage. Less packaging means we can keep more items out of our landfills.



More information on filling your belly from farm to fork while conserving natural resources and improving Virginia's economy can be found through the Virginia Grown and Virginia's Finest programs at www.vdacs.virginia.gov/vagrown/index.shtml and www.shopvafinest.com/.

2

HOME CHOICES

Where you live and what type of home you live in can have far reaching impacts on your lifestyle and Virginia's environment.

- If you're relocating, find a home close to the stores and services you visit often so your travel time is less. Visit www.walkscore.com to find out how walkable your neighborhood is.
- Restore and maintain a historic home to reduce urban sprawl, make use of existing built environments and preserve part of Virginia's history. Learn more about maintaining historic properties at the Department of Historic Resources website www.dhr.virginia.gov.
- Add insulation and install faucet aerators to make your home more energy and water efficient. Find out more in the Virginia Energy Savers Handbook at www.dmme.virginia.gov/DE/ConsumerInfo/energysaverhandbook.shtml.
- Minimize or eliminate the use of chemicals in landscaping. Chemicals such as fertilizer used in inappropriate amounts or out of season, may end up in local streams and rivers that we use for recreation and drinking water.
- Select native Virginia plants suited for your area in place of lawns. They require less water and chemicals. Read more at *A Virginian's Year-Round Guide to Yard Care: Tips and Techniques for Healthy Lawns and Gardens* at the Department of Conservation and Recreation website at www.dcr.virginia.gov/soil_and_water.
- Follow tips from the Department of Forestry to plant or maintain trees to provide shade in the summer and light in the winter to help reduce your cooling and heating bills. More information on tree stewardship can be found at www.dof.virginia.gov/consERVE/index.shtml



5 WAYS TO HELP VIRGINIA'S ENVIRONMENT

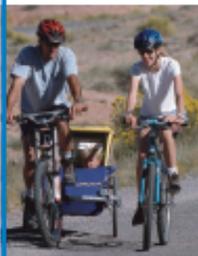
3

TRANSPORTATION CHOICES

What you drive and how far you commute affects the air you breathe.

Every gallon of gasoline burned produces 19.4 pounds of carbon dioxide.

- Carpool. Even once-a-week carpooling can cut vehicle emissions by half a ton per year. Visit www.rideshare.com/ to find carpooling information available for your area.
- Ride your bike, walk or take some form of mass transit to work or school. Participate in Bike to Work Day www.virginiadot.org/programs/bicycling_and_walking/bike_to_work_day_2009.asp.
- Impress your boss with your eco-consciousness and ask if there are any days you can work from home to reduce vehicle emissions and increase productivity.
- Combine errands and plan an efficient route to save you time, fuel, and reduce emissions.
- Keep your vehicle tuned up for the best fuel efficiency. Proper tire pressure, changing the air filter regularly, unloading the junk in your trunk and eliminating rooftop storage all increase fuel efficiency. Find out more about fuel efficiency at www.fueleconomy.gov/.



4

PURCHASING CHOICES

What you purchase and how long you use it directly impacts Virginia's landfills and space needed for waste.

In 2008, Virginians disposed of 9.9 million tons of solid waste – that's equivalent to the weight of over 46,000 diesel train engines.

- Buy only items that you need. Before purchasing an item ask yourself, "Why do I want this? How often will I use it? Can I get along without it?" Buying what you don't need means those items may end up in our landfills.
- Acquire secondhand or remanufactured items instead of new items to reduce the energy and emissions associated with production of new goods. Remanufactured goods use 85% less energy to produce. Find out more at www.freecycle.org.
- Buy goods and food with little or no packaging when possible. Packaging ends up as trash in our landfills.
- Use reusable shopping bags for all your purchases (not just food) to reduce the amount of paper and plastic bags.
- Avoid buying water and other beverages in plastic bottles. Plastic bottles end up in Virginia's waterways and are carried to the Chesapeake Bay and then the ocean. Volunteers collected 180,000 plastic beverage containers in the Potomac River watershed during the 2009 cleanup!
- Go to www.deq.virginia.gov/recycle/homepage.html for more information on recycling in Virginia.



5 WAYS TO HELP VIRGINIA'S ENVIRONMENT

5

COMMUNITY CHOICES

How you get involved in your community and local decision making can help preserve and protect Virginia's natural resources.

You don't have to be a scientist to make a difference in protecting Virginia's natural resources. Virginia has 42,769 square miles of land and while the government monitors an extensive range of this area, total coverage is virtually impossible. Your help is invaluable. Our citizens' efforts help fill in data gaps, provide educational opportunities for their communities and protect valuable natural resources.



- Become a Volunteer Citizen Water Monitor. Collect water samples from your local stream or river that the Department of Environmental Quality can use to find out the health of Virginia waterways. Visit www.deq.virginia.gov/cmonitor to sign up.
- Become a Virginia WildlifeMapper. Collect wildlife-related information in your community to help the Virginia Department of Game and Inland Fisheries to monitor wildlife habitat in the Commonwealth. Find out more at www.dgif.virginia.gov/wildlifemapping/index.cfm.
- Get involved in your local government comprehensive planning to incorporate environmental protection. Visit the Virginia Municipal League (www.vml.org) or Virginia Association of Counties (www.vaco.org) for information on your county.
- Stay informed on decisions in state government through the Virginia Regulatory Town Hall at www.townhall.state.va.us/.

How big is your footprint?

It depends on the shoe you wear.

There are two types of footprint calculators that have become popular these days. Both generate a number based upon personal lifestyle choices but the difference is what the numbers represent. The Carbon Footprint measures the amount of carbon emissions your lifestyle generates while the Ecological Footprint measures the amount of nature (acres) needed to support your lifestyle.

What's your ecological footprint?

How much nature does your lifestyle consume? Go to www.vanaturally.com/vanaturally/ecological_footprint.html to access calculators and resources to evaluate how the food you eat, the place you live, and the way you travel impacts the environment.

What's your carbon footprint?

How much carbon dioxide and other air pollution does your lifestyle produce? Go to www.vanaturally.com/vanaturally/carbon_footprint.html to access calculators and resources to evaluate how the place you live, the way you travel, and the resources you use effect this greenhouse gas.



Appendix C. Air Pollution & Environmental Quality new webpage

http://www.vanaturally.com/vanaturally/comm_air.html

Community Education

Air Pollution & Environmental Quality Resources

The air we breathe is directly impacted by daily living choices such as how we travel, where our energy comes from, and actions in our own backyards. While air quality has improved dramatically since passage of the Clean Air Act in 1970, there continue to be health and environmental consequences of poor air quality such as asthma and acid rain. Follow resources below to learn more about air pollution and actions you can take to improve air quality.

Criteria Air Pollutants

A few common air pollutants are found all over the United States (sulfur dioxide, ozone, carbon monoxide, nitrogen dioxide, and fine particulate matter or PM). These pollutants can injure health, harm the environment and cause property damage. The Virginia Department of Environmental Quality's Office of Air Quality Monitoring takes the lead on monitoring these pollutants in Virginia.

Fresh, Clean Air: Protecting Air Quality in Virginia

Teacher activity guide that includes an introduction to air quality issues in Virginia, PowerPoint Presentation with script, and five additional Virginia focused activities.

On the Air – Curriculum

The On the Air curriculum facilitates the understanding of air pollution by studying: Criteria Air Pollutants, the Air Quality Index, Ozone, Particulate Matter, the Health Effects of Air Pollution, Community Sources and Solutions of Air Pollution and Climate Change. Each unit consists of the following: activity description, curricular ties, time needed, learning objectives, materials needed (kit), teacher preparation, teacher background reading, teacher demonstration procedures, activity procedures, technology connections, student handout, student packets and student worksheets. Materials are suited for 6th – 8th grade middle school classrooms.

Virginia's Air Resources

Look up in the sky. Air seems boundless and, for that reason, it is a resource often taken for granted. Above the state of Virginia alone rests over one trillion tons of it. But, just like water, not all of it is usable to you. Explore issues in air quality through this online chapter from Virginia's Natural Resource Education Guide.

Air Pollution: What's the Solution?

Welcome to Air Pollution: What's the Solution? An educational project for students, grades 6 - 12, that uses online real time data to guide student discovery of the science behind the causes and effects of outdoor air pollution. Through this project, students will focus on outdoor air pollution; what it is what factors contribute to its formation and the health effects from breathing polluted air. Students will use data and animated maps from the Internet and monitor for the presence of air pollution.

Air Quality and Transportation Curriculum

Air curriculum series which includes 54 lessons and activities for grades K-12 focusing on the relationships between air quality and transportation. Lessons and activities are hands-on and involve a variety of demonstrations and research-based education opportunities.

Atmospheric & Marine-Based Interdisciplinary Environmental Health Training

The AMBIENT curriculum air module is comprised of a number of segments for use by middle and high school teachers. Some of these segments can be taught independently and others are meant to be used

together in a certain order in the classroom and in the field. The segments are presented roughly in order of planned presentation although it is noted when a segment can be skipped or used out of order.

Key topics include:

- Human-made pollutants, natural processes, and air quality
- Vulnerability of young people and other sensitive subpopulations
- Asthma and respiratory ailments
- How to determine the extent of a problem (such as an outbreak of asthma) in a community
- How to choose an appropriate response to the problem
- Interpretation of mapping data
- Simulation and measurement of asthma and air pollution
- Creative reading and writing uses breath as a healing intervention and as a metaphor
- Critical reading and role playing of the different international viewpoints on the impact of air pollution and the value of a human life

Clean Air Campaign

Curriculum series includes 20 Elementary, 10 Middle, and 40 High School activities. Lessons are correlated to the Georgia Performance Standards and require a site registration for access to all of the lessons and activities.

In the Air

A full spectrum of environmental education materials that can be used to educate and help K-12 students and adults better understand airborne toxics issues in their communities. Funded by the U.S. Environmental Protection Agency and developed by the Missouri Botanical Garden's EarthWays Center. Five modules have been developed (K-3, 3-6, 6-8, 9-12 and adult). All materials are available free of charge, downloadable from the website. Activities are designed to be used in a variety of settings and all have been comprehensively reviewed.

Global Ozone Project – GO₃

In the GO₃ Project high school students throughout the world measure ground-level ozone on a continuous basis and upload their results to the Google Earth map. Measurements are made with high accuracy using sophisticated ozone monitors constructed by the students from kits and tested and calibrated on a frequent basis using a transfer standard.

Air Quality and Climate Science

Air issues are often complicated and controversial. Air pollution affects the biosphere and projections of impacts involve complex models of dynamic ecosystems and climate science. Multiple governments—federal, state, regional and local-- have differing interpretations of these complex models and responsibilities for projected impacts.

NOAA Climate Services

National Oceanic and Atmospheric Administration's Climate Services web portal which houses primary climate data, resources for understanding climate, and educational material for teaching about climate.

Climate Literacy: The Essential Principles of Climate Sciences Introductory guide to climate science and science literacy produced by NOAA.

Governor's Commission on Climate Change Report

Report based on the findings of Governor Kaine's Commission on Climate Change focusing on Virginia impacts and responses needed to address climate change.

[Global Climate Change Impacts in the United States](#)

Report generated by the U.S. Global Change Research Program highlighting potential regional climate impacts to the U.S.

[Climate Change Data Clearinghouse](#)

VIMS database resource cataloging biological, physical, and miscellaneous data related to climate change.

[Ecological Impacts of Climate Change](#)

National Academies of Science primer on climate change with accompanying PowerPoint Presentations highlighting potential regional changes throughout the continental U.S.

[NOAA Climate Program Office](#)

National Oceanic and Atmospheric Administration's Climate Program Office which houses information related to climate observations & monitoring and climate research & modeling.

[EPA information on Climate Change](#)

[Environmental Protection Agency overview of climate science, U.S. Climate Policy, health & environmental effects of climate change, and what citizens can do about climate change.](#)

What you can do to reduce CO2 emissions

Download *5 Ways to Help Virginia's Environment* and use these tools to measure your progress at reducing your carbon footprint at home and in the office.

[Personal Emission Calculator](#)

EPA has developed tools to help individuals (and households) reduce greenhouse gas emissions and take action. Businesses and organizations interested in educating their employees and members about what they can do at home to help protect our climate can also use these tools.

[Carbon Footprint Calculator](#)

The SafeClimate carbon footprint calculator allows you to determine carbon dioxide emissions from major sources: home energy consumption and transportation by car and plane.

[Your Recycling Program and Climate](#)

EPA and its partners have developed several professional tools to help organizations determine the greenhouse (GHG) impact of their purchasing, manufacturing, and waste management actions.

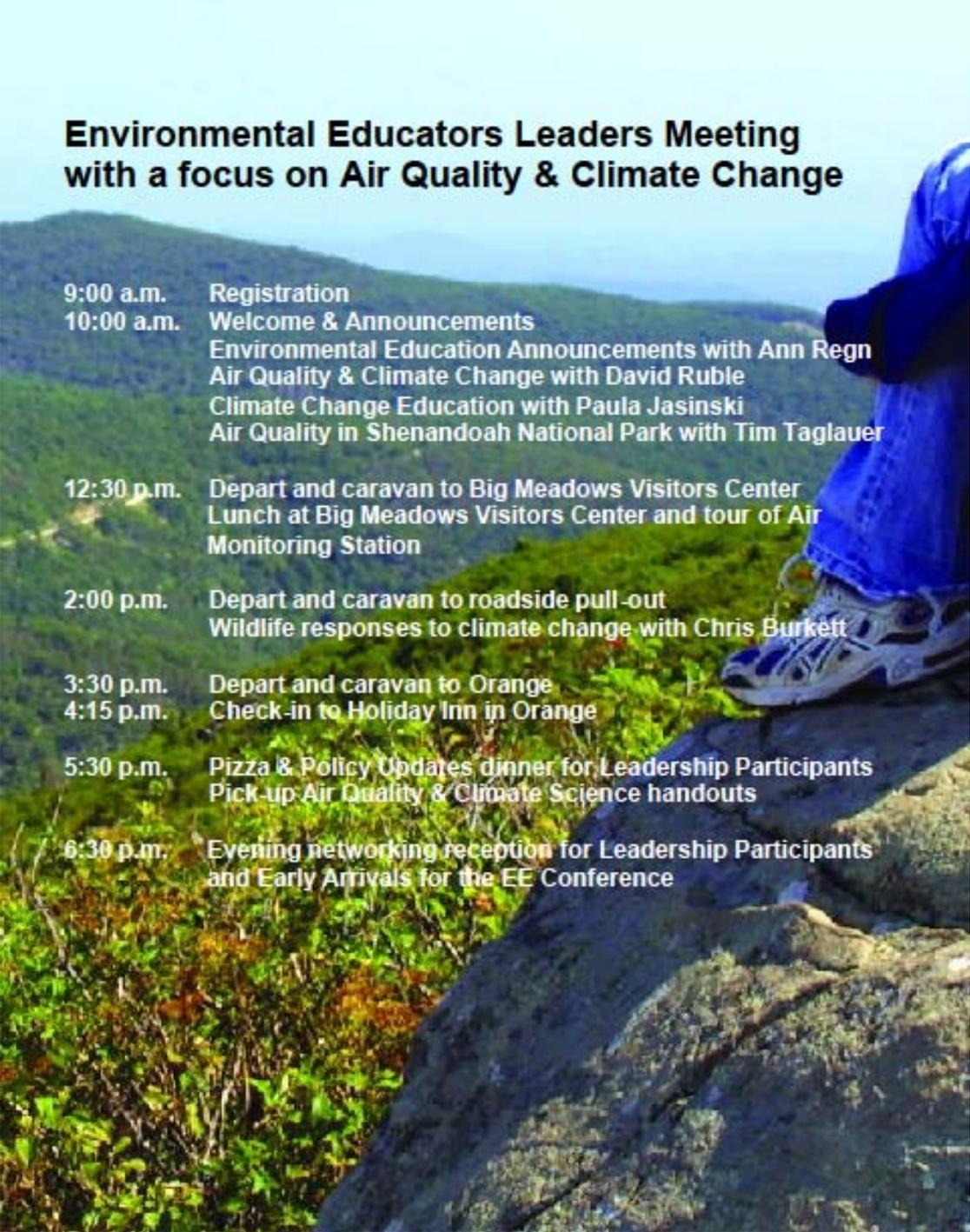
[Carbon Footprint from BP](#)

This tool helps you to estimate your household carbon footprint and shows how different lifestyle choices, household features and new technologies affect the size of your footprint.

Carbon Emissions and Air Quality are part of larger ecological systems. [Click here to access Ecological Footprint Calculators for calculating your lifestyle's impact on natural resources.](#)

Appendix D. Air Quality & Climate Education Leadership Summit

Environmental Educators Leaders Meeting with a focus on Air Quality & Climate Change

- 
- 9:00 a.m. Registration
10:00 a.m. Welcome & Announcements
Environmental Education Announcements with Ann Regn
Air Quality & Climate Change with David Ruble
Climate Change Education with Paula Jasinski
Air Quality in Shenandoah National Park with Tim Taglauer
- 12:30 p.m. Depart and caravan to Big Meadows Visitors Center
Lunch at Big Meadows Visitors Center and tour of Air
Monitoring Station
- 2:00 p.m. Depart and caravan to roadside pull-out
Wildlife responses to climate change with Chris Burkett
- 3:30 p.m. Depart and caravan to Orange
4:15 p.m. Check-in to Holiday Inn in Orange
- 5:30 p.m. Pizza & Policy Updates dinner for Leadership Participants
Pick-up Air Quality & Climate Science handouts
- 6:30 p.m. Evening networking reception for Leadership Participants
and Early Arrivals for the EE Conference

Appendix E. Water Stewardship Program Training Manual

LIVABLE NEIGHBORHOOD WATER STEWARDSHIP PROGRAM TEAM LEADER TRAINING

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LIVABLE NEIGHBORHOOD WATER STEWARDSHIP PROGRAM TEAM LEADER TRAINING

Pre-meeting Activity: Where Am I in the Watershed? – Invite participants to locate their homes on an aerial watershed map.

- 1. Welcome (ALL, 15 minutes)**
 - a. Introduce leadership team (names, titles, role in program)
 - b. Express appreciation (“Thank you for your willingness...you have stepped forward to protect...you will make a difference in our communities.”)
 - c. Introductions – State name, community, watershed, why they said “yes,” (Be first – model the introduction.)
- 2. Break into coaches/team leaders if conducting joint training**
- 3. Overview of Livable Neighborhood Water Stewardship Program (10 minutes)**
 - a. **Basic format** (Neighborhood Walk, gathering, 4 team meetings)
 - b. **Social Diffusion Theory** – Provide handouts.
 - c. **Team successes** – Sharing from former team leader or anecdotes from past teams
- 4. Creating a Vision (20 minutes)**
 - a. **Introduction** – It’s far more motivating to focus on what we want to move toward (and to see it and feel it) than to get rid of something and have nothing to replace it.
 - i. Example: If you’re planting a garden, instead of focusing on removing rocks and weeds, envisioning flowers or vegetables in full bloom.
 - ii. Our job: To help teammates focus on what they want and how to get there.
 - b. **Your “dream” neighborhood** – Draw or describe in writing, or both (10 minutes)
 - i. Partner Share (5 minutes)
 - ii. Group Share – ask for any highlights (5 minutes)
- 5. Neighborhood Walk (20 minutes)**
 - a. **Description** – Explain purpose of the walk, who goes on it, how many homes to target, etc.
 - b. **Script/typical responses** – Review “Inviter’s Script”
 - c. **Tips for a successful walk** – Review “Best Practices for a Neighborhood Walk”
 - d. **Practice** – Find a partner and go through the script at least twice each using different responses. (10 minutes)
- 6. Neighborhood Gathering (40 minutes)**
 - a. Model the meeting and do items from the agenda where appropriate. Explain the purpose of the meeting, who is responsible for what, materials needed, etc.
 - b. Watch “Watershed Connections” film (10 minutes)
 - c. Overview of the problem
- 7. Water Quality Meeting (45 minutes)**
 - a. Model the meeting and do items from the agenda where appropriate.
 - b. Do the “Pervious Surface Demonstration” or exhibit the Enviroscape

- c. Workbook quiz – Explain that the workbook is the primary tool of the program and that team leaders should become very familiar with it.
- d. Lifestyle Assessment – Introduce the assessment and go over program statistics
- e. Walkabout – Introduce the “Yard Walkabout” (may include walk/outside break)

8. How to Build a Successful Team (15 minutes)

- a. Describe the rest of the meetings and time frame.
- b. Review and discuss “How to Build a Successful Team” checklist

9. Limiting Belief Exercise (15 minutes)

- a. **Define** – Explain what is meant by a “limiting belief” and a “turn-around”. Give an example.
- b. **Examples** – Write on chart pad:
 - i. LB – I’m afraid to reach out to my neighbors and risk rejection.
 - ii. LB – I don’t have enough interpersonal communication skills and experience running meetings to be a good team leader.
 - iii. LB – I won’t know how to successfully motivate my teammates to carry out the actions they have chosen if they hit an obstacle and want to give up.
 - iv. LB – Other ideas? (Ask them to share; add to chart pad.)
- c. **Turn-arounds** – Provide/ask for way of overcoming the above LBs

10. Evaluation Form (5 minutes)

- a. Hand out evaluation form and ask folks to fill it out. Don’t leave yet though!

11. Close (5 minutes) – Pass around bowl of water from local waterway and have people express their hopes for the project

12. Scheduling (20 minutes) – Have Team Leaders meet with coaches to set up walks and meeting dates.

Social Diffusion Theory

When new ideas or innovations enter the mainstream, some are readily embraced by the masses and some aren't. Understanding how ideas find their way through social systems is a branch of study within the communications field. Social diffusion theory examines how information, ideas and innovations spread within a society.

Description

Social diffusion theory--also known as the diffusion of innovation theory--describes how new ideas or innovations are spread through the social structures that make up a society. Diffusion is considered to be a form of communication where new information and messages are spread through the masses. The rate at which a new idea is spread depends on how it's received within the social system. As social systems are hierarchical in form, new ideas follow a certain course through these hierarchical structures.

"Word of Mouth" Research

The concept for social diffusion theory was the focus of a research project conducted by the University of Chicago in the 1950s. A project funded by the television industry was designed to examine how broadcast advertising could best reach its target audiences. Researchers came to realize that introducing a new product or service to consumers was akin to announcing innovations, or innovative ideas. Results from the study revealed that innovative ideas were best spread through levels. Advertising to early adopters (level one) provided the momentum needed to reach secondary adopters (level two). Secondary adopters were developed through the "word-of-mouth" advertising from the early adopters. An innovation would continue to be spread through a succession of these levels via "word-of-mouth." Broadcast advertising followed this trend by targeting ads in steps to each successive level of adopters.

Communication Channels

Social diffusion theory views social systems as made up of different types of communication channels. Communication is the means by which individuals reach a mutual understanding regarding a new idea or innovation. Interpersonal communications between individuals is one type of communication channel while mass media is another. When first introducing an innovation, mass media channels provide a way of creating knowledge, or awareness, about a new idea. Interpersonal channels provide a context in which individuals can form attitudes about an innovation through discussion and comparing experiences. The forming of an attitude moves individuals further along in the decision process.

Variables in Acceptance

According to social diffusion theory, the likelihood that an idea will be accepted, or received, by the masses is dependent on a number of variables. Ideas that aren't compatible with existing ideas or methods aren't as well received as those that can tie in with an existing idea or method. Ideas or methods that can be tried out for a period of time help to reduce the uncertainty factor experienced by many who happen upon a new concept. This works to increase the likelihood of the idea being received. The complexity of an innovation also affects how quickly it's received, as some will be able to grasp the concept and some won't. Complex ideas typically take longer to be received because of the time people take to understand them.

Time and Levels of Acceptance

In order for an innovation to be received by the masses, a certain amount of time is required for it to reach each level of the social system. This system is made up of different types of people. There are innovators, then there are early adopters, and then the beginnings of the mass majority begin to emerge. The time it takes for information regarding an idea to pass from level to level influences how quickly it will be received. Each level requires a certain amount of time to learn, sample and develop an attitude toward a new idea. As this process unfolds within each level, members from the next level enter into this same process until the idea has reached each level within the social system.

http://www.ehow.com/about_5423079_social-diffusion-theory.html

LIVABLE NEIGHBORHOOD WATER STEWARDSHIP PROGRAM

INVITER'S SCRIPT

Inviter's Script

The following talking points have been carefully crafted and tested to appeal to values that are important to people. Because people respond positively when invited in this way, it's recommended you stick to this approach. Follow the language as much as is relevant. Allow your enthusiasm to be present!

Invitation

Hi, I'm _____ (your name) your neighbor, I live (point in the direction of your house and describe where you live). (Introduce everyone else who is walking with you.)

I'm here to invite you to a gathering at my home to introduce everyone in our neighborhood to an exciting program sponsored by _____ (City of _____, the homeowner's association, etc).

The program is designed to help us:

- Improve the water quality in our local (streams, lakes, ponds) for the health of our children and families
- Improve the livability of our neighborhoods
- And get to know our neighbors better.

It's going to be (tell date, time & location). Can you or someone from your household attend?

Responses

Here are four possible responses they may have and what you might say for each.

1. **Yes, I'll Come.** "Great! I'll put you down as coming. In order to get a sense of how many people to expect, would you mind if we called you a day or two beforehand to confirm your attendance?" (Get their phone number for the Neighborhood List, hand them an invitation and tell them you look forward to getting together).
2. **I'm interested but can't make it at that time.** "That's fine. Can I call you to fill you in on what happened and see if you can join us in the future?" (Get their phone number for the Neighborhood List and follow-up with a summary after the first meeting.)
3. **I'm interested but it's not a good time for me to consider doing the program.** "That's fine. Can I call you to fill you in on what happened and see if you can join us in the future?" (Get their phone number for the Neighborhood List and follow-up with a summary after the first meeting.)
4. **I'm not interested.** "That's fine. Would you like an invitation so you know what's happening in the neighborhood?" (If they say yes, then hand them an invitation.) "Feel free to call me if you change your mind, my number is at the bottom (if they take it). Thanks for your time; it's been great talking with you! I look forward to seeing you around the neighborhood!"
5. **Not home.** Make note on Neighborhood List and revisit later.

RSVP Follow-Up Calls

If you speak with someone in person

Hi, (their name). This is your neighbor (your name). I'm calling to remind you about the neighborhood gathering at my home this _____ (date & time). I'm really looking forward to seeing you (again). It's going to be a wonderful chance for us all to get to know each other better as neighbors. I just want to confirm that you'll be able to make it and find out if you'll be bringing anyone with you."

If "yes"

"Great. I look forward to seeing you there."

If "no"

"Would you like me to call you after the gathering to tell you how it went, and explain more about what's happening so you can decide if you want to participate?"

If you get an answering machine

Hi, (their name). This is your neighbor (your name). I'm calling to remind you about the neighborhood gathering at my home this _____ (date & time). I'm really looking forward to seeing you (again). It's going to be a wonderful chance for us all to get to know each other better as neighbors. We're trying to get an accurate sense of how many people to expect. Would you be so kind as to call me at (your number) and confirm how many from your household will be able to make it. My number is (say your phone number again). Thanks a lot and I hope to hear back soon.

LIVABLE NEIGHBORHOOD WATER STEWARDSHIP PROGRAM

BEST PRACTICES FOR A NEIGHBORHOOD WALK

A Neighborhood Walk can be a rewarding experience. If you don't already know the people who live on your block this will be the ideal opportunity for you to meet them. You also will be generating community spirit among the people who live on your block by inviting them to the Neighborhood Gathering you are hosting. They will get to know each other while they learn about the Livable Neighborhood Water Stewardship Program.

The purpose of the Neighborhood Walk is to invite everyone on your block to attend your gathering to hear about the Livable Neighborhood Water Stewardship Program.

The neighbor to neighbor invitation is designed to take two or three minutes per home. You may stay longer to visit with neighbors if you wish.

NEIGHBORHOOD WALK GUIDELINES

Some practical guidelines for a Neighborhood Walk that will lead to a successful Neighborhood Gathering:

1. Walk with a friend. It is best to have a team of two women or a woman and a man. Some people are fearful if their homes are approached by two men.
2. Use the sidewalks; don't walk on people's lawns.
3. Knock firmly on the door or ring the bell and wait for a response. Be reasonably persistent.
4. After you knock or ring, step back from the door so the person inside can see you fully.
5. Hold your hands in front of you in sight of your neighbors when they answer the door.
6. Smile, smile, and smile!

LIVABLE NEIGHBORHOOD WATER STEWARDSHIP PROGRAM

NEIGHBORHOOD WALK LIST

Block Leader / Team Leader

Name: _____

Phone: _____

Email: _____

Use this list to keep track of your invitation calls and your neighbor's responses.

1. As you visit your neighbors, fill in their information.
2. In the few days before the Neighborhood Gathering use this list for making your reminder calls
3. After the Neighborhood Gathering, fax, email, or give your lists to your team coach.

1. Name: _____

Address: _____

Phone: _____

Email: _____

Comments: _____

<u>Yes</u>	<u>Maybe/bad date</u>	<u>No</u>	<u>Confirmed</u>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Notes:

2. Name: _____

Address: _____

Phone: _____

Email: _____

Comments: _____

<u>Yes</u>	<u>Maybe/bad date</u>	<u>No</u>	<u>Confirmed</u>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Notes:

3. Name: _____

Address: _____

Phone: _____

Email: _____

Comments: _____

<u>Yes</u>	<u>Maybe/bad date</u>	<u>No</u>	<u>Confirmed</u>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Notes:

4. Name: _____

Address: _____

Phone: _____

Email: _____

Comments: _____

<u>Yes</u>	<u>Maybe/bad date</u>	<u>No</u>	<u>Confirmed</u>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Notes:

5. Name: _____
Address: _____
Phone: _____
Email: _____
Comments: _____

Yes Maybe/bad date No Confirmed

Notes:

6. Name: _____
Address: _____
Phone: _____
Email: _____
Comments: _____

Yes Maybe/bad date No Confirmed

Notes:

7. Name: _____
Address: _____
Phone: _____
Email: _____
Comments: _____

Yes Maybe/bad date No Confirmed

Notes:

8. Name: _____
Address: _____
Phone: _____
Email: _____
Comments: _____

Yes Maybe/bad date No Confirmed

Notes:

9. Name: _____
Address: _____
Phone: _____
Email: _____
Comments: _____

Yes Maybe/bad date No Confirmed

Notes:

10. Name: _____
Address: _____
Phone: _____
Email: _____
Comments: _____

Yes Maybe/bad date No Confirmed

Notes:

YOU'RE INVITED!
TO A
NEIGHBORHOOD GATHERING

Learn about an exciting program designed to help us:

- Improve the water quality in our local streams for the health of our children and families,
- Improve the livability of our neighborhoods,
- And get to know our neighbors better.

This program is made available to our neighborhood thanks to the Virginia Department of Environmental Quality.

**THE GATHERING WILL
TAKE PLACE:**

DATE:

PLACE:

TIME:



Come learn how to create a Water-friendly lifestyle, and get to know one another better.

If you have questions, please phone

YOU'RE INVITED!
TO A
NEIGHBORHOOD GATHERING

Learn about an exciting program designed to help us:

- Improve the water quality in our local streams for the health of our children and families,
- Improve the livability of our neighborhoods,
- And get to know our neighbors better.

This program is made available to our neighborhood thanks to the Virginia Department of Environmental Quality.

**THE GATHERING WILL
TAKE PLACE:**

DATE:

PLACE:

TIME:



Come learn how to create a Water-friendly lifestyle, and get to know one another better.

If you have questions, please phone

MEETING NOTES NEIGHBORHOOD GATHERING

To bring: Nametags, markers, sign-in sheet, watershed puzzle, maps, workbook, video

As people arrive: Ask them to sign in and to put on a nametag. Invite them to the refreshments table and/or to try putting the watershed puzzle together (or locating themselves on the map).

Meeting Outline:

1. Welcome – “thank you” to the hosts – and to all of you for coming!
 - a. Purpose of the gathering
 - i. To give you an opportunity to find out about an exciting state pilot program that the City/County is involved in, and
 - ii. To invite you to participate.

2. Introduction
 - a. Introduce yourself and acknowledge the team leader.
 - b. Context: We all live in a “watershed” – what is it? (Area of land that drains to a common body of water. Give examples.)
 - i. All of us live in the _____ watershed.
 - ii. If appropriate, also mention the sub-watershed the groups live within (South Holston, Lake Joyce, etc.)
 - iii. There are many small sub-watersheds in the City; more about this in a minute.
 - c. The state has invited our community to be part of a state pilot program called the Livable Neighborhoods Water Stewardship Campaign. Purpose of the program is to help people understand:
 - i. What happens in their watershed and the conditions creating poor water quality
 - ii. What we can do as individuals to improve local water quality.
 - d. We really appreciate your being here.
 - e. During the next hour or so, we’re going to do several things:
 - i. Introduce ourselves
 - ii. Get an overview of the problem
 - iii. Learn about the benefits of the Livable Neighborhood Water Stewardship Campaign
 - iv. Share what some of us are already doing to help protect and conserve water
 - v. Find out the details of what it means to be part of the neighborhood team
 - vi. Identify who’s interested in being on the neighborhood team

3. Group introductions – Your name, where you live, one sentence about why you decided to come today

4. Overview
 - a. For thousands of years, our local streams and rivers had clear, drinkable, fishable, swimmable water. (Hard to believe...)
 - b. But, beginning in the 1600’s, water became degraded from
 - i. Cutting down forests – eradication of beaver (extinct within 20 years)
 - ii. Poor agricultural practices
 - iii. Streams and rivers used as dumps; we began to look at water, not as a resource, but as waste – something to get rid of.

- iv. 1940s & 50s – we began putting streams into pipes; piping rainwater runoff increased flows to streams and this HUGE volume of water became a MAJOR problem
 - c. All over the country, waterways were degraded. The story of our watershed is the story of watersheds all over the country.
 - d. 1970's – landmark legislation (Clean Water Act); helped control "point source" pollution
 - e. Now, the problem is non-point source pollution. There are thousands of sources of pollutants and vast quantities of water flowing into streams (oil & litter from streets, herbicides/pesticides/fertilizers from lawns), and huge rushes of water during storms
 - f. If we're the source of the problem, then we can also be the source of the solution.
 - g. Distribute and review watershed maps. If appropriate, provide historical background on the name of the stream.
 - h. Introduce the "Watershed Connections" video
 - 5. The state has invited our community to be part of a state pilot program called the Livable Neighborhoods Water Stewardship Campaign. Purpose of the program is to:
 - a. Help us better understand the conditions that are creating poor water quality.
 - b. What we can do as individuals & neighborhoods to improve water quality.
 - c. Our challenge is how to move people from awareness to action.
 - d. You don't need to get everyone to change. Research shows that once 20% of a population is active in an action, then the behavior becomes unstoppable
 - e. Research has also shown that the neighborhood-based approach works.
 - 6. How Program Works
 - a. Neighborhood Walk & Gathering – what we're doing today and how most of you were invited
 - b. 4 Team Meetings where you get to choose actions to take and share what you've learned from the actions
 - c. Workbook is Key – 31 different actions (Read samples of actions from table of contents)
 - d. Supplemental Materials
 - 7. Progress to Date
 - a. Trained over ___ neighborhood team leaders so far.
 - b. Data analyzed to date – households complete an average of ___ actions each and the average team savings in water is _____ gallons a year.
 - 8. Program is Unique – Neighborhood focus, Workbook, Team Leader, Coach
 - 9. Most people find themselves in one of three places:
 - a. Haven't done much to – don't know where to start
 - b. Have the environmental understanding, but haven't gotten around to it yet
 - c. Already doing some things, but there's more that could be done
- There's something for everyone!**
- 10. Ask if there's anyone who wants to share an action they're already taking to protect and conserve. Ask what motivates them.
 - 11. Program is here to help you do more and address these obstacles.

- a. Reiterate how it works. (Become part of a team – 4 meetings – workbook – choose actions – share what you've learned – get support, if needed)
- b. First meeting tentatively scheduled for _____
- c. Questions? Some people miss out on this opportunity because of child care issues, schedule conflicts, etc. We'll see what we can do to help resolve these.

12. How many of you would like to join? (Ask for a show of hands)

- a. For those of who would like to join the team: Please put an asterisk next to your name on the sign-in sheet (pass-around)

13. Thank you all for coming! Feel free to stay to visit and eat.

LIVABLE NEIGHBORHOOD WATER STEWARDSHIP PROGRAM

HOW TO BUILD A SUCCESSFUL TEAM

1. Before Starting

- Before setting the date for your Neighborhood Gathering, check with the “key” people in your neighborhood who you’re pretty sure will be on your team. Find out the best times for them to meet.
- Establish a tentative schedule with your coach for ALL the meetings.

2. Neighborhood Walk

- If your coach is not available, ask your spouse, a neighbor, or friend to do the walk with you. This is especially helpful if you feel nervous or don’t know many people in your neighborhood.
- Get together with your coach (or walking partner) about 15 minutes before your first walk to practice what you’re going to say.
- Take along a clipboard and keep track of the responses. Make sure to get a phone number from everyone who says “yes” or “maybe”. Also keep track of the total number of people invited – your coach will collect this number from you after your walk.
- After the walk, create a spreadsheet that includes the information you’ve gathered.
- Go out again to contact those you missed the first time. Continue to update the spreadsheet.
- Keep going until you’ve got at least 10-12 affirmative responses. (Do not include those that say “maybe”.)

3. Neighborhood Gathering

- Make reminder phone calls 2-3 days ahead of time. If you have email addresses, use both email and phone calls.
- Have all materials (nametags, sign-in sheet, refreshments, seating, etc.) ready ahead of time.
- After the meeting, encourage everyone to stay and socialize.

4. Team Meetings

- Touch base with your coach before every meeting. Feel free to ask for help with calls and other items, as needed.
- Send email reminders 3-4 days ahead of the meeting date. Remind people of their assignments. Before the “Helping Out” meeting, make sure to remind people to bring their completed Lifestyle Assessments. Ask for confirmation.
- Make reminder phone calls a day or two before the meeting. If you talk in person, remind people what they need to bring to the meeting.
- Decide how to handle refreshments (i.e., host provides each time, ask team members to bring something, etc.)
- Have all materials (nametags, sign-in sheet, refreshments, seating, props, etc.) ready ahead of time.
- Hand out “assignment” sheets at the end of each meeting.
- After the meeting, encourage team members to stay and socialize.
- After the meetings you are leading, report back to your coach. Include any particular issues, as well as level of attendance.

5. Team Follow-up

- Schedule a “reunion” 3-6 months after the end of the program.

LIVABLE NEIGHBORHOOD WATER STEWARDSHIP PROGRAM

WORKBOOK QUIZ

1. What neighborhood water bodies are you interested in improving?
2. What is the first meeting of the program devoted to?
3. Name three resources available to your group.
4. What do the hourglass symbols in the action logs designate?
5. What page can you find information on reducing paved surfaces?
6. Name the materials needed for the “Cut It High and Let It Lie” action.
7. Which action in the water conservation chapter is estimated to take the most time?
8. What activities in the water quality chapter are estimated to be the least costly?
9. How many gallons of water does the average shower use?
10. Which phone number should you call for program support?

LIVABLE NEIGHBORHOOD WATER STEWARDSHIP PROGRAM

SIGN IN!

1. Name: _____
Address: _____
Phone / Email: _____

2. Name: _____
Address: _____
Phone / Email: _____

3. Name: _____
Address: _____
Phone / Email: _____

4. Name: _____
Address: _____
Phone / Email: _____

5. Name: _____
Address: _____
Phone / Email: _____

6. Name: _____
Address: _____
Phone / Email: _____

7. Name: _____
Address: _____
Phone / Email: _____

8. Name: _____
Address: _____
Phone / Email: _____

9. Name: _____
Address: _____
Phone / Email: _____

10. Name: _____
Address: _____
Phone / Email: _____

11. Name: _____
Address: _____
Phone / Email: _____

12. Name: _____
Address: _____
Phone / Email: _____

13. Name: _____
Address: _____
Phone / Email: _____

14. Name: _____
Address: _____
Phone / Email: _____

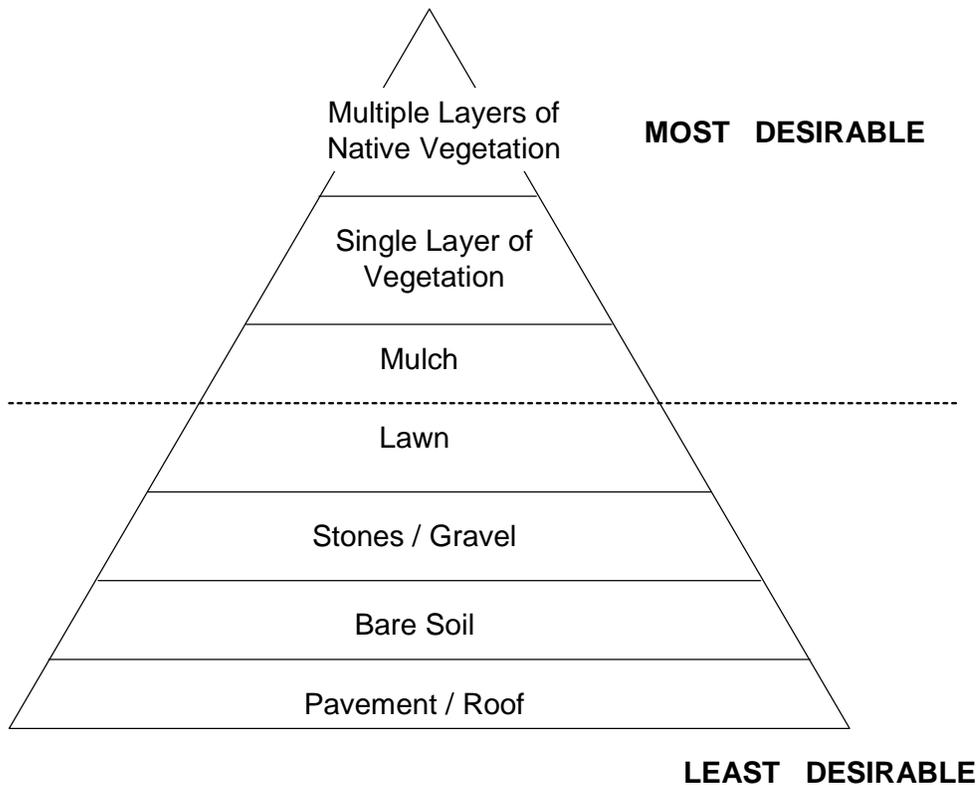
15. Name: _____
Address: _____
Phone / Email: _____

16. Name: _____
Address: _____
Phone / Email: _____

17. Name: _____
Address: _____
Phone / Email: _____

HIERARCHY OF SURFACE IMPACT ON WATERSHEDS

A watershed-friendly property is one that is designed to collect and absorb as much rainwater as possible. The least desirable surfaces are those that allow rainwater to run off into the street and subsequently into storm drains, carrying with it sediment and various chemicals from our yards and streets.



LIVABLE NEIGHBORHOOD WATER STEWARDSHIP PROGRAM

PERVIOUS SURFACE DEMONSTRATION

This demonstration helps team participants understand the importance of creating pervious surfaces (mulch, vegetation, etc). A good time to use this demonstration is at Team Meeting #2.

Materials: cookie tray, 8-10 kitchen sponges, paper cup, small bottle of water

Demonstration:

1. Explain that the cookie tray represents a property that includes primarily impervious surfaces (pavement, rooftops) or compacted soil covered by gravel or lawn.
2. “When it rains on our properties, we can catch the rain where it falls in two primary ways: one is through rainwater collection and the other is by creating absorbent – or pervious – surfaces.”
3. Take the bottle of water and pour it into a cup. “This cup represents a cistern, which can hold several hundreds of gallons of water. If you have a rain barrel, it can also hold water – just not nearly as much.”
4. Pour the water from the cup onto the cookie sheet. “The rainwater that is collected in a cistern or rain barrel can then be drained into the yard during drier periods, avoiding large volumes of water from running off your property during rain storms.”
5. “If you have a lot of impervious surface in your yard, the water will either sit there or run off into the street and into the storm drain. But if you have created mulched areas, rain gardens, or multiple layers of vegetation, then the water can be absorbed.” Begin to lay sponges in the tray. Add the sponges slowly, so that participants can actually see the water being absorbed.
6. Continue to add sponges to the tray until you have used them all. “The more pervious surface you have created, the more water can be absorbed.”

Discussion:

1. Visualize your home. Where would you be most likely to place a cistern or rain barrel?
2. Visualize your yard. Do you have areas of lawn or bare soil that would benefit from a layer of mulch? Where might you create mulched paths?
3. Can you think of a spot where you'd like to try a rain garden? Have you seen any particular varieties of “water-loving” shrubs that you might want to plant?

LIVABLE NEIGHBORHOOD WATER STEWARDSHIP PROGRAM

YARD WALKABOUT

This activity allows team participants to investigate a yard to learn where rain barrels, rain gardens, and other landscape projects can be done.

Directing Rooftop Runoff

- Where are the downspouts that carry water off the roof of the house?
- Where does the water from the downspouts flow?
 - Onto a paved surface?
 - Onto the lawn?
 - Onto a vegetated area?
 - Into a pipe? If so, where does the pipe go?
- How close to the house does the water flow? Does the basement or crawl space tend to flood or get wet?
- Does rooftop runoff flow either into the neighbor's yard or directly into the street or a storm drain?
- How/where can you contain the water from the roof?

Creating Pervious Surfaces

- Are there areas of the yard that absorb water?
- Where are the opportunities to reduce paved surfaces, bare dirt, or compacted soil?
- Where are three opportunities to plant rain gardens?

Increasing Vegetation

- What portions of lawn are used or needed?
- Where are there opportunities to create multiple layers of native vegetation (canopy trees, understory trees, groundcover)?

LIVABLE NEIGHBORHOOD WATER STEWARDSHIP PROGRAM

LOW-FLOW FAUCET DEMONSTRATION

This demonstration provides a visual example of the amount of water that can be conserved through using faucet aerators. A good time to do this demonstration is during the Team Meeting #3.

Materials: Faucet aerator, channel locks or vice grips, two equal size large bowls, stopwatch

Demonstration:

1. Explain that showers and faucets account for approximately 30% of indoor water use between kitchen and bathroom uses.
2. "We can change how much water is used by installing low-flow shower heads and faucet aerators where appropriate."
3. Have team mates follow you into the kitchen.
4. "Let's look at how much water this kitchen sink uses." Put the bowl under the tap and turn the hot or cold water on full blast and have someone time for 5 seconds. Turn the water off.
5. "This is how much water is used in 5 seconds with a standard faucet." Set the bowl aside.
6. "Let's see how much water would be used if we install a faucet aerator."
7. Install the faucet aerator – it's helpful to have already practiced this **before** the meeting.
8. "Not too hard was it? Now, let's see how much water we use in 5 seconds."
9. Put the other bowl under the tap and turn the hot or cold water on full blast and have someone time for 5 seconds. Turn the water off.
10. Compare the quantities of water in both bowls.

Discussion:

1. How many faucets do you have in your house?
2. Where would it be helpful to install faucet aerators?
3. Where would you probably want to keep the same faucet?

LIVABLE NEIGHBORHOOD WATER STEWARDSHIP PROGRAM

WORKBOOK QUIZ

1. What neighborhood water bodies are you interested in improving?
2. What is the first meeting of the program devoted to?
Team Building & Introduction to Water Quality
3. Name three resources available to your group.
4. What do the hourglass symbols in the action logs designate?
Average time needed to complete an action
5. What page can you find information on reducing paved surfaces?
Pg. 25 – Action #13 Let the Ground Show Through
6. Name the materials needed for the “Cut It High and Let It Lie” action.
Pg. 11 – Lawnmower and a yard!
7. Which action in the water conservation chapter is estimated to take the most time?
Action #25 – A Master Waterer
8. What activities in the water quality chapter are estimated to be the least costly?
#1 – Toxic Sleuth, #4 – Cut It High and Let It Lie, #6 – Poop Scoop, #8 – No Phos-For-Us, #14 – The Road Less Travelled
9. How many gallons of water does the average shower use?
#22 – Am I Clean Yet? 5 gallons per minute
10. Which phone number should you call for program support?
List team leader or team coach information here

Appendix F. VRUEC 2011 Annual Action Plan

VRUEC 2011 Annual Action Plan

Addendum to [“A Business Plan for Environmental Education in Virginia”](#)

1. Continue to implement Chesapeake 2000 Agreement (C2K) Commitment for implementing “*Meaningful Watershed Educational Experiences*” (MWEE) for every student.
 - a. Update Virginia’s Bay Education Plan
 - b. Participate in biennial Bay Program Education Summit and Education Workgroup meetings
 - c. Administer mini-grants to schools and partners
 - d. Recommend teachers for MWEE Network
2. Support Teacher Professional Development
 - a. Sponsor 4 Chesapeake Bay Academies
 - b. Publish member-sponsored opportunities on web
 - c. Participate in the VA Association of Science Teachers (VAST) Board, e-blast and PDI
 - d. Co-sponsor annual conference with Mid-Atlantic Marine Education Association
3. Support delivery of locally-based, high-quality Environmental Education (EE)
 - a. Continue to work with regional EE teams
 - b. Promote EE Leadership Program to non-formal educators
 - c. Develop “Coastal Educator” Profile
 - d. Publish annual Love-A-Tree teacher’s kit
4. Recognize Exemplary EE Schools through Virginia Naturally
 - a. promote the program through member newsletters
 - b. distribute educational materials and teacher in-service offerings to schools
5. Continue Virginia Naturally as state clearinghouse for EE
 - a. Publish bi-monthly newsletter
 - b. Publish map-based member directory
6. Encourage more youth and families to go “outside”
 - a. Promote Children and Nature network resources
 - b. Research Children’s Bill of Rights
 - c. Support development of community and school-based outdoor classrooms
7. Strengthen EE programs across the state
 - a. Review and update 2004 VA EE Business Plan
 - b. Participate in EPA’s Region 3 Environmental Literacy Plan workshop
 - c. Seek funding for programs outside the Bay Watershed
 - d. Update funders with success stories and needs
 - e. Continue self-evaluation of programs

Appendix G. Virginia Office of Environmental Education Annual Report



VA Office of Environmental Education Annual Report 2010

DEQ programs help educators across the Commonwealth work together to provide high quality environmental education to support school and community-based environmental literacy. Major priorities are implementing Virginia's plan for Environmental Education, including the education commitments of the Chesapeake Bay 2000 Agreement and Virginia's academic standards. The office works to build capacity within communities to deliver standards-based environmental education. Across the state, regional teams are bringing together local conservation organizations and education agencies to implement stewardship projects, provide field experiences for students and to educate citizens about local issues.

Virginia Naturally

In 2010, 55 new partners signed up to participate in the statewide network. Electronic newsletters are sent to over 2,000 educators, litter and recycling program managers, and other interested parties across Virginia. 185 people attended the Annual Environmental Education Conference, held at James Madison's Montpelier in Orange, Virginia to receive state updates and professional development. Twelve [regional teams/alliances](#) are collaborating in various areas of the state to bring together educators and resources to deliver high quality education to citizens and schools in Virginia. Forty-eight (48) community leaders participated in Air & Climate Science Leadership Training at Skyland in the Shenandoah National Park. Training was provided to 932 community educators at 20 professional development workshops. In addition, the office provided coordination, public information, and educational resources to 5,320 people at 22 outreach events. Stewardship Virginia reported that 5,000 received certificates for 220 projects that were conducted during the spring and fall campaigns. Of the 220 projects that were registered, 150 were waterway cleanups.



Non-Competitive Litter Prevention and Recycling Grants

In FY 2010 306 (out of a possible 324) local governments were given non-competitive litter grants for [litter and recycling programs](#). In FY 2010 \$1,524,694 was awarded to the local governments which in turn matched these awards with \$11,061,966 in cash and in-kind services resulting in a match of 730%. The money for the non-competitive litter prevention and recycling grants is generated through a litter tax that is paid by Virginia manufacturers and retailers. Each local government decides how to best support anti-littering efforts within their region and uses the non-competitive grant funds to support these efforts.

Environmental Educators Leadership Program

The Environmental Educators Leadership Program (EELP) has involved over 100 different educators across the Commonwealth in the past two years. Forty-eight (48) community leaders participated in Air & Climate Science Leadership Training at Skyland in the Shenandoah National Park this past year focusing on Climate Science in Virginia, Climate Adaptation Strategies, Air Pollution & Climate Connections, and Wildlife Responses to Climate Change. Additional information about this program can be found online at <http://www.deq.virginia.gov/education/eelp.html>.

Regional Environmental Education Teams

The VOEE continues to build capacity within the existing 10 [Regional Environmental Education Teams](#) to provide high quality environmental education and encourage direct citizen involvement in natural resource stewardship projects. Continued funding from competitive EPA Office of Environmental Education grants allows the VOEE to supply pass-through funds for regional team administration, professional development, and regionally focused collaborative stewardship projects.

Virginia Classroom and Partner Grants

Last year, with funding from NOAA, students are conducting meaningful environmental watershed investigations through [Virginia Naturally Classroom & Partner](#) Grants. One round of applications has been awarded, distributing \$30,131 to 34 schools.

K-12 Education Efforts: More school divisions are providing meaningful watershed experiences on Virginia's Chesapeake Bay, tributaries and local streams and incorporating current issues such as air quality, pharmaceuticals, and recycling into their units of study. The Virginia Naturally website receives more than 11,700 visits and 1,200 downloads of educational materials monthly.



Window into a Green Virginia

This new curriculum was launched on November 18th at the VA Association of Science Teachers (VAST) annual Professional Development conference in Hampton, VA. The program was developed by VAST, the Virginia Department of Education (VA DOE), and the Department of Environmental Quality (DEQ) and funded by the Virginia Manufacturers Association. The program delivers lesson plans and standards-based information about Virginia's environment. Nearly 300 people attended the opening presentation which included DEQ and Smithfield Foods. The curriculum can be found at

www.vanaturally.com/vanaturally/window/homepage.html .

Watershed Education

Efforts continue that support the Chesapeake 2000 Agreement's goal for Meaningful Watershed Educational Experiences for all Virginia students. For middle schools students, six learning stations have been established at Meadow Event Park in Caroline County. At each station, students will be engaged in hands-on learning and investigation. This [curriculum](#), developed by DEQ and supported by the Hanover-Caroline Soil & Water Conservation District, is adaptable to other locations.

In August the office received a 3-year capacity building grant (\$225,000) from NOAA BWET to train nonformal educators in Virginia to deliver high quality programs and services to K-12 teachers and their students. Partner organizations on the project are the Department of Conservation and Recreation (State Parks), the Virginia Tech's Master Naturalists, and the Virginia Association of Soil and Water Conservation Districts.

Project WET

In 2010, a total of 200 Virginia teachers, non-formal educators and college students participated in 13 workshops for [Virginia Project WET](#) (Water Education for Teachers) and its associated curriculum.



Advanced Water Training: Healthy Waters Initiative & Places We Live

A *Healthy Waters* Initiative workshop was conducted jointly by DEQ, DCR, and VCU for 24 educators. These materials have been well-received and requests for duplicating the course has been made by a few Virginia Master Naturalists Chapters. One *Places We Live* workshop was conducted for 6 educators at the Virginia Council for the Social Studies and was regarded as a great resource for meeting new curriculum standards for A.P. Geography.