NEW MILFORD PUBLIC SCHOOLS
New Milford, Connecticut

Ecology II

February 2012

Approved by the Board of Education
March 13, 2012

New Milford Board of Education

Wendy Faulenbach, Chairperson
Daniel Nichols, Vice Chairperson
Daniele Shook, Secretary
Lynette Celli Rigdon, Assistant Secretary
Tom Brant
David Lawson
Thomas McSherry
David R. Shaffer
William Wellman

Superintendent of Schools
JeanAnn C. Paddyfote, Ph.D.

Assistant Superintendent
Maureen E. McLaughlin, Ph.D.

New Milford High School Principal
Greg P. Shugrue

Authors of Course Guide
Eileen Reed
Ethan Saldana

New Milford’s Mission Statement

The mission of the New Milford Public Schools, a collaborative partnership of students, educators, family and community, is to prepare each and every student to compete and excel in an ever-changing world, embrace challenges with vigor, respect and appreciate the worth of every human being, and contribute to society by providing effective instruction and dynamic curriculum, offering a wide range of valuable experiences, and inspiring students to pursue their dreams and aspirations.

Course Overview

In Ecology II, emphasis is placed on the major environmental problems in the world today. Many of the concepts from Ecology I are applied; therefore, it is recommended that students take Ecology I prior to Ecology II. Students learn about their role in the environment and how it can be both positive and negative. Major environmental issues, such as water and air pollution, global warming, and the use of energy resources, are studied. Emphasis is placed on project work. Students may contract for honors level credit with teacher recommendation.

Pacing Guide

Unit #	Title	Weeks	Pages
1	Introduction to Environmental Issues	2	7-9
2	Water as a Resource and Water Pollution	4	10-13
3	The Atmosphere	3	14-16
4	Energy Resources and Climate Change	4	17-20
5	Land Management	2	21-23
6	The Impact of Human Population	2	24-26
7	Energy Policies and Regulations	2	27-29

Key for State Standards

RST = Common Core Reading Standards for Literacy in Science 6-12

WHST = Common Core Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6-12

CSF = Connecticut Science Framework for High School

INQ = CSF Inquiry standard for High School

New Milford Public Schools

Committee Members: Eileen Reed, Ethan Saldana Unit 1: Introduction to Environmental Issues	Course/Subject: Ecology II Grade Level: 11 / 12 # of Weeks: 2

Identify Desired Results

Common Core Standards

- **RST.3** Follow precisely a complex multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
- **RST.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context.
- **RST.5** Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
- **WHST.2** Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
- **WHST.6** Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback including new arguments or information.
- **CSF D INQ 6** Use appropriate tools and techniques to gather data.
- **CSF D INQ 7** Assess the reliability of the data generated in an investigation.
- **CSF D INQ 8** Use mathematical operations to interpret data and present relationships in appropriate forms.
- **CSF Enrichment**: Stability in an ecosystem is a balance between competing effects.

Enduring Understandings Generalizations of desired understanding via essential questions (Students will understand that …)	**Essential Questions** Inquiry used to explore generalizations
• The irresponsible use of natural resources by people can have far-reaching effects. • The law can be used to protect natural resources. • As stewards of the environment, people must balance their economic and societal needs with the protection of natural resources. • In a sustainable world, the needs of people are met without overusing natural resources.	• What are the major environmental challenges facing the world today? • Why is it important that society take responsibility for maintaining our limited resources? • What are some economic and societal factors that must be considered when approaching environmental problems?

Expected Performances
What students should know and be able to do

Students will know the following:

- The importance of managing the environment for the future
- The impact an individual has on the environment
- How ecological footprints are calculated

Students will be able to do the following:

- Explain the "Tragedy of the Commons" and how it relates to present time
- Explain "sustainability" and why it is the goal of environmental science
- Explain ecological footprints and compare footprints from different countries

Character Attributes

- Citizenship
- Cooperation
- Respect
- Responsibility

Technology Competencies

- Use the Internet to research ecological footprints, and to support a topic or viewpoint
- Using Excel to organize data

Develop Teaching and Learning Plan

Teaching Strategies:

- Teacher pre-assesses students' knowledge of ecological footprints and sustainability using true/false, knowledge rating, and other formative tools.
- Teacher gives guided notes using PowerPoint on ecological footprints and sustainability.
- Teacher addresses the psychomotor, affective, and cognitive domains when conducting the *Tragedy of the Commons* lab.
- Teacher identifies similarities and differences between ecological footprints of different countries.
- Teacher uses non-linguistic representations to represent the sustainability process.
- Teacher uses three-level guide for reading comprehension from Hardin's *Tragedy of the Commons* essay.

Learning Activities:

- Students will conduct an online survey to identify students' personal impact on the environment: *Ecological Footprint.*
- Students will perform a lab (Sustainability and Technology) to demonstrate the impact of technology on ecosystems: *Tragedy of the Commons*.
- Students will prepare a presentation showing how a particular time in the development of human society has impacted the environment.
- Students will add personal learning goals to unit goals.

• Teacher uses *Mind's Eye* to help visualize an ecological footprint. • Teacher assigns homework to define key terms and to outline assigned text reading.	

Assessments

Performance Task Authentic application to evaluate student achievement of desired results designed according to GRASPS (one per marking period)	**Other Evidence** Application that is functional in a classroom context to evaluate student achievement of desired results
Goal: Identify the different components of an ecological footprint. **Role**: Student Environmental Activist **Audience**: Students **Situation**: Develop a series of questions that helps inform high school students about their impact on the environment. **Product**: develop a survey tailored for high school students to help inform them of their ecological footprint. **Standards for Success**: Rubric with outlined skills and knowledge requirements	• Entrance/exit tickets with responses from students • Formative assessments through questioning • Standard assessment (test) • Lab analysis questions • Self-evaluation of knowledge gained (see true/false on teaching strategies)

Suggested Resources

- Arms, K., *Environmental Science*, Austin, TX: Holt, Rinehart and Winston, 2006.
- http://www.myfootprint.org/- online quiz

New Milford Public Schools

Committee Members: Eileen Reed, Ethan Saldana Unit 2: Water as a Resource and Water Pollution	Course/Subject: Ecology II Grade Level: 11 / 12 # of Weeks: 4

Identify Desired Results

Common Core Standards

- **RST.3** Follow precisely a complex multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
- **RST.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context.
- **RST.5** Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
- **WHST.2** Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
- **WHST.6** Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback including new arguments or information.
- **CSF D INQ 1** Identify questions that can be answered through scientific investigation.
- **CSF D INQ 4** Design and conduct appropriate types of scientific investigations.
- **CSF D INQ 6** Use appropriate tools and techniques to gather data.
- **CSF D INQ 7** Assess the reliability of the data generated in an investigation.
- **CSF D INQ 8** Use mathematical operations to interpret data and present relationships in appropriate forms.
- **CSF Enrichment** Stability in an ecosystem is a balance between competing effects.
- **CSF Enrichment** Each element on Earth moves among reservoirs which exist in the solid earth, in oceans, in the atmosphere, and within and among organisms as part of biogeochemical cycles.

Enduring Understandings Generalizations of desired understanding via essential questions (Students will understand that …)	**Essential Questions** Inquiry used to explore generalizations
• Although there is an abundance of water on the earth, only a small percentage is suitable for human use and consumption. • Water pollution threatens the human water supply.	• What are the sources and effects of water pollution? • What is a watershed and what factors affect it? • Why is water considered a limited resource?

Expected Performances
What students should know and be able to do

Students will know the following:

- How water is distributed on the earth
- The important role of watersheds
- How water usage by individuals, industry, and agriculture impacts water resources
- The main causes and effects of water pollution
- The important role of wetlands in flood prevention, pollution control, and as habitats

Students will be able to do the following:

- Compute their daily usage of water and explain how they can conserve water
- Compare the three main uses of water: residential, agricultural, and industrial
- Compare and contrast point source and non-point source water pollution
- Identify the major types of water pollutants and their sources
- Explain the effect of water pollution on ecosystems and human health
- Describe how a modern waste water treatment plant works
- Identify and describe how and where New Milford waste water is treated
- Simulate how a watershed changes over time
- Identify the major watersheds of Connecticut

Character Attributes

- Cooperation
- Respect

Technology Competencies

- Use the Internet to find research to support a topic or view point.
- Vernier Probe Ware to analyze water quality
- Excel spreadsheet to organize data
- Photostory program to create a picture story

Develop Teaching and Learning Plan

Teaching Strategies:	Learning Activities:
• Teacher pre-assesses students' knowledge of water use, pollution, and global distribution using true/false, knowledge rating, and other formative tools. • Teacher gives guided notes using PowerPoint on water pollution and water usage in the US. • Teacher uses three-level guide for reading comprehension using current events and through research pertaining to water pollution and other issues.	• Students will do *A Drop in the Bucket* to determine how much of our planet's water is usable, fresh water. • Students will simulate the impact of bio-magnification on aquatic organisms. • Students will conduct an exploration lab on groundwater filters by creating a soil profile to test the ability of the soil to filter out contaminates from the solution.

• Teacher presents multiple intelligence activities using kinesthetic, interpersonal, and logical intelligences using a variety of data collecting lab experiments. • Teacher identifies similarities and differences between point source and non-point source water pollution. • Teacher addresses the psychomotor, affective, and cognitive domains when data collecting and researching water pollution. • Teacher uses non-linguistic representations for eutrophication, bio-magnification, and bio-accumulation. • Teacher uses three-level guide for reading comprehension using articles about water pollution. • Teacher uses gears to demonstrate cause and effect of water pollution on the environment. • Teacher assigns homework to define key terms and to outline assigned text reading.	• Students will conduct an experiment that monitors the effect of nitrates or phosphates on water by artificial eutrophication in a fish bowl. • Students will conduct a lab on dissolved oxygen versus temperature to analyze how temperature affects dissolved oxygen in a body of water. • Students will analyze how changing land uses impacts the watershed in *Color Me a Watershed*. • Students will add personal learning goals to unit goals.

Assessments

Performance Task Authentic application to evaluate student achievement of desired results designed according to GRASPS (one per marking period)	**Other Evidence** Application that is functional in a classroom context to evaluate student achievement of desired results
Goal: Understand how the waters in New Milford are being polluted **Role**: Concerned citizen **Audience**: Public TV audience **Situation**: Students are to take a series of pictures of water pollution happening in the town of New Milford and identify the type and potential sources. **Product**: Video collage with pictures taken from various New Milford locations. **Standards for Success**: Rubric outlining skills and knowledge requirements.	• Entrance/exit tickets with responses from students • Formative assessments through questioning • Standard assessment (test) • Self-evaluation of knowledge gained

Suggested Resources

- Arms, K., *Environmental Science*, Austin, TX: Holt, Rinehart and Winston, 2006.
- Project Wet Curriculum and Activity Guide, Project WET International Foundation and CEE, 1995.

New Milford Public Schools

Committee Members: Eileen Reed, Ethan Saldana Unit 3: The Atmosphere	Course/Subject: Ecology II Grade Level: 11 / 12 # of Weeks: 3

Identify Desired Results

Common Core Standards

- **RST.3** Follow precisely a complex multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
- **RST.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context.
- **RST.5** Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
- **WHST.2** Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
- **WHST.6** Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback including new arguments or information.
- **CSF D INQ 1** Identify questions that can be answered through scientific investigation.
- **CSF D INQ 4** Design and conduct appropriate types of scientific investigations.
- **CSF D INQ 6** Use appropriate tools and techniques to gather data.
- **CSF D INQ 7** Assess the reliability of the data generated in an investigation.
- **CSF D INQ 8** Use mathematical operations to interpret data and present relationships in appropriate forms.
- **CSF Enrichment** Stability in an ecosystem is a balance between competing effects.
- **CSF Enrichment** Energy enters the Earth system primarily as solar radiation and eventually escapes as heat.

Enduring Understandings Generalizations of desired understanding via essential questions (Students will understand that …)	**Essential Questions** Inquiry used to explore generalizations
• Air pollution has short-term and long-term health effects. • The ozone layer shields the earth from harmful ultraviolet rays.	• What are the major air pollutants? • What are the major sources of air pollution? • What are the consequences of air pollution? • How does weather impact air quality?

Expected Performances
What students should know and be able to do

Students will know the following:

- The major sources of man-made, as well as natural, air pollutants
- The causes and effects of ozone depletion
- The factors that influence air quality and the potential health hazards associated with them

Students will be able to do the following:

- Describe factors that affect air quality
- Identify and name the sources of the major air pollutants
- Differentiate between primary and secondary air pollutants
- Explain the effect of air pollution on human health
- Explain the cause and effect of acid precipitation
- Explain how the ozone layer shields the earth from ultraviolet radiation
- Explain how the chlorofluorocarbons disrupt the formation and breakdown of ozone molecules
- Describe the location and effect of ozone thinning

Character Attributes

- Cooperation
- Respect
- Responsibility

Technology Competencies

- Use an online simulation lab about smog and air quality
- Use the Internet to find research to support a topic or view point.
- Create a news broadcast using Movie Maker

Develop Teaching and Learning Plan

Teaching Strategies:

- Teacher pre-assesses students' knowledge of air pollution, air quality, and ozone using true/false, knowledge rating, and other formative tools.
- Teacher gives guided notes using PowerPoint on air pollution and air quality.
- Teacher uses three-level guide for reading comprehension using the Donora, Pennsylvania, Killer Smog example and through research pertaining to air pollution.
- Teacher presents multiple intelligence activities using kinesthetic, interpersonal, and logical intelligences when

Learning Activities:

- Students will use *Smog City*, an online simulation about the factors that affect smog development.
- Students will conduct a survey, Parking Lot Survey, to collect data on auto makes in a New Milford parking lot to infer how much CO_2 and pollution may be generated.
- Students will read Donora, Pennsylvania, Killer Smog.
- Students will leave collecting plates outside at various locations and then analyze the type of air pollutants that the area received.
- Students will conduct an investigation on the effectiveness of sunscreen/sunglasses on UV radiation.

conducting the investigation on sunscreen and sunglasses effectiveness. • Teacher identifies similarities and differences between primary air pollution and secondary air pollution. • Teacher addresses the psychomotor, affective, and cognitive domains when conducting the Smog City simulation. • Teacher uses gears to demonstrate cause and effect of air pollution on human health and the environment. • Teacher uses *Mind's Eye* to visualize primary air pollution and secondary air pollution. • Teacher assigns homework to define key terms and to outline assigned text reading.	• Students will add personal learning goals to unit goals.

Assessments

Performance Task Authentic application to evaluate student achievement of desired results designed according to GRASPS (one per marking period)	**Other Evidence** Application that is functional in a classroom context to evaluate student achievement of desired results
Goal: Describe the factors that determine air quality and the impact air quality has on human health. **Role**: Meteorologist for a news program **Audience**: People watching a weather report **Situation**: Students will create a short news report about the day's weather forecast and how it will relate to air quality and potential health issues for the day. **Product**: Video news report **Standards for Success**: Rubric outlining skills and knowledge requirements	• Entrance/exit tickets with responses from students • Formative assessments through questioning • Standard assessment (test) • Self-evaluation of knowledge gained (see true/false on teaching strategies)

Suggested Resources

- Arms, K., *Environmental Science*, Austin, TX: Holt, Rinehart and Winston, 2006.

New Milford Public Schools

Committee Members: Eileen Reed, Ethan Saldana Unit 4: Energy Resources and Climate Change	Course/Subject: Ecology II Grade Level: 11 / 12 # of Weeks: 4

Identify Desired Results

Common Core Standards

- **RST.5** Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
- **WHST.2** Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments or technical processes.
- **WHST.6** Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback including new arguments or information.
- **CSF D INQ 1** Identify questions that can be answered through scientific investigation.
- **CSF D INQ 7** Assess the reliability of the data generated in an investigation.
- **CSF D INQ 8** Use mathematical operations to interpret data and present relationships in appropriate forms.
- **CSF Enrichment** Stability in an ecosystem is a balance between competing effects.

Enduring Understandings Generalizations of desired understanding via essential questions (Students will understand that …)	**Essential Questions** Inquiry used to explore generalizations
• Electrical energy can be generated from a variety of energy resources and can be transformed into almost any other form of energy. • Each different way of obtaining, transforming, and distributing energy, has environmental impacts. • Burning fossil fuels releases large amounts of carbon dioxide and other greenhouse gases into the atmosphere, contributing to global warming. • Fossil fuels will not last forever.	• What are the different energy sources and what environmental impact does using each have? • What is a carbon footprint? • What are carbon credits and how do they work? • What is green energy?

Expected Performances
What students should know and be able to do

Students will know the following:

- The difference between renewable and non-renewable energy resources
- The different types of renewable and non-renewable energy sources and their benefits and consequences
- How to conserve energy at home
- Energy trends in Connecticut, the United States, and the world

- The impact of climate change

Students will be able to do the following:

- Compare and contrast renewable and non-renewable energy resources
- Compare the four main sectors of energy consumption: residential, commercial, industrial, and transportation
- Describe the ecological impact from using different energy resources, such as: natural gas, petroleum, coal, wind, solar and water
- Identify pros and cons of using different energy resources
- Describe and explain the importance of the greenhouse affect
- Identify the major greenhouse gases and their sources
- Explain how CO_2 levels have changed over the past century
- Describe the consequences of climate change
- Describe and explain a carbon footprint

Character Attributes

- Citizenship
- Respect
- Responsibility

Technology Competencies

- Use the Internet to find research to support a topic or a view point
- Use the online game/simulation for Climate Change

Develop Teaching and Learning Plan

Teaching Strategies:	Learning Activities:
• Teacher pre-assesses students' knowledge of energy consumption trends, forms of energy resources, and environmental issues pertaining to energy consumption using true/false, knowledge rating, and other formative tools. • Teacher gives guided notes using PowerPoint on the variety of energy resources, energy usage, and environmental issues related to energy consumption. • Teacher uses three-level guide for reading comprehension through research pertaining to impact on the environment from using energy and other issues. • Teacher presents multiple Intelligence activities using kinesthetic, interpersonal, and logical intelligences through online	• Students will read and analyze an energy bill and locate the area/appliances at home that consume the most energy to investigate how much energy is used in their homes. • Students will identify areas or appliances that create phantom energy loss at home. • Students will play several online games that emphasize energy conservation and renewable energy resources. • Students will play a role of a leader of a country who has to balance the economy, environment, and people's happiness: BBC- Climate Change game. • Students will add personal learning goals to unit goals.

• Teacher identifies similarities and differences between green energy, renewable energy, and non-renewable energy. • Teacher addresses the psychomotor, affective, and cognitive domains when playing online games and researching environmental impact from climate change. • Teacher uses non-linguistic representations for the environmental impact of energy resources- from collecting, distributing, and using the variety of available energy resources. • Teacher uses *Mind's Eye* to visualize renewable energy and non-renewable energy. • Teacher assigns homework to define key terms and to outline assigned text reading.	

Assessments

Performance Task Authentic application to evaluate student achievement of desired results designed according to GRASPS (one per marking period)	**Other Evidence** Application that is functional in a classroom context to evaluate student achievement of desired results
Goal: Understand the potential impact of the modern hydraulic fracturing ("fracking") process on the environment and water supplies. **Role**: Citizen activist **Audience**: Town meeting: public, officials, and corporate employees **Situation**: Students will oppose or support a proposal for fracking in nearby lands. **Performance**: Presentation that opposes the proposal **Standards for Success**: Rubric outlining skills and knowledge required	• Entrance/exit tickets with responses from students • Formative assessments through questioning • Standard assessment (test) • Self-evaluation of knowledge gained (see true/false on teaching strategies)

Suggested Resources

- Arms, K., *Environmental Science*, Austin, TX: Holt, Rinehart and Winston, 2006.
- http://ecogamer.org/environmental-games/- BBC Climate Change, Windfall, Energyville, Blackout, Build a House

New Milford Public Schools

Committee Members: Eileen Reed, Ethan Saldana Unit 5: Land Management	Course/Subject: Ecology II Grade Level: 11 / 12 # of Weeks: 2

Identify Desired Results

Common Core Standards

- **RST.3** Follow precisely a complex multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
- **RST.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context.
- **RST.5** Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
- **WHST.2** Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments or technical processes.
- **WHST.6** Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback including new arguments or information.
- **CSF D INQ 1** Identify questions that can be answered through scientific investigation.
- **CSF D INQ 4** Design and conduct appropriate types of scientific investigations.
- **CSF D INQ 6** Use appropriate tools and techniques to gather data.
- **CSF D INQ 7** Assess the reliability of the data generated in an investigation.
- **CSF D INQ 8** Use mathematical operations to interpret data and present relationships in appropriate forms.
- **CSF Enrichment** Stability in an ecosystem is a balance between competing effects.

Enduring Understandings Generalizations of desired understanding via essential questions (Students will understand that …)	**Essential Questions** Inquiry used to explore generalizations
• Humans use land for many different purposes. • Land use must be managed to assure protection of natural resources while meeting the needs of society.	• What are the major ways in which humans use land? • What are the environmental impacts of human land use? • What are some ways that humans are preserving land for future generations?

Expected Performances
What students should know and be able to do

Students will know the following:

- The environmental impact of poorly managed land use land
- The importance of preserving the various landscapes, such as farmlands and forests

Students will be able to do the following:

- Identify the different ways land is utilized by humans
- Describe urban crisis and urban sprawl
- Explain the benefits to preserving farmland
- Describe best practices for managing land use in such areas as forests and rangeland
- Describe the environmental effects of deforestation
- Describe and identify the different layers of a soil profile
- Describe the need for soil conservation

Character Attributes

- Cooperation
- Respect

Technology Competencies

- Use the Arc/GIS- Geographic Information System and Esri systems
- Use online simulations/games

Develop Teaching and Learning Plan

Teaching Strategies:

- Teacher pre-assesses students' knowledge of land use and management practices using true/false, knowledge rating, and other formative tools.
- Teacher gives guided notes using PowerPoint on different soil types, land usage, management practices, and the environmental impact on the land.
- Teacher uses three-level guide for reading comprehension using *Making a Difference: Restoring the Range* and through research pertaining to land use and other issues.
- Teacher uses non-linguistic representations for land use and land management.

Learning Activities:

- Students will analyze local soil maps.
- Students will do soil profiling to identify the different soil horizons in a local ecosystem.
- Students will analyze GIS maps of Connecticut.
- Students will calculate how many trees were cut to make the paper New Milford High School students use in a school year.
- Students will learn about the effects of restoring land through *Making a Difference: Restoring the Range*.
- Students will add personal learning goals to unit goals.

• Teacher uses *Mind's Eye* to visualize how people use the land and or impact on the environment. • Teacher assigns homework to define key terms and to outline assigned text reading.	

Assessments

Performance Task Authentic application to evaluate student achievement of desired results designed according to GRASPS (one per marking period)	**Other Evidence** Application that is functional in a classroom context to evaluate student achievement of desired results
Goal: Understand the importance of land preservation **Role**: Citizen **Audience**: Town Zoning Commission **Situation**: Write a persuasive essay for preserving farmland rather than developing it for commercial use. **Product**: Essay **Standards for Success**: Rubric outlining skills and knowledge requirements	• Entrance/exit tickets with responses from students • Lab analysis questions • Standard assessment (test) • Self evaluation of knowledge gained (see true/false on teaching strategies)

Suggested Resources

- Arms, K., *Environmental Science*, Austin, TX: Holt, Rinehart and Winston, 2006
- http://ecogamer.org/environmental-games/- Virtual Forest

New Milford Public Schools

Committee Members: Eileen Reed, Ethan Saldana Unit 6: Human Population	Course/Subject: Ecology II Grade Level: 11 / 12 # of Weeks: 2

Identify Desired Results

Common Core Standards

- **RST.5** Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
- **WHST.2** Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
- **WHST.6** Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback including new arguments or information.
- **CSF D INQ 1** Identify questions that can be answered through scientific investigation.
- **CSF D INQ 4** Design and conduct appropriate types of scientific investigations.
- **CSF D INQ 6** Use appropriate tools and techniques to gather data.
- **CSF D INQ 7** Assess the reliability of the data generated in an investigation.
- **CSF D INQ 8** Use mathematical operations to interpret data and present relationships in appropriate forms.
- **CSF Enrichment** Stability in an ecosystem is a balance between competing effects.

Enduring Understandings Generalizations of desired understanding via essential questions (Students will understand that …)	**Essential Questions** Inquiry used to explore generalizations
• The rapid population growth of the 20th century has led to environmental problems around the world. • Predicting and managing human population growth is essential at local, national, and global levels because resources are limited.	• What are the trends in human population growth? • How do the population growth rates of different countries compare? • What do factors like human population density, movement, and composition mean for the sustainability of the planet? • What is meant by the Earth's carrying capacity?

Expected Performances
What students should know and be able to do

Students will know the following:

- How and why the size and growth rate of the human population has changed in the last 200 years
- How to interpret age structure graphs and use them to predict future population changes
- Why different countries may be at different stages of demographic transition

- The consequences of rapid human population growth
- The role of government in managing development and human population

Students will be able to do the following:

- Describe how the human population has changed over the past 2000 years and explain the factors by which it has been influenced
- Describe the value of and interpret several age structure diagrams
- Research the fertility rates and other demographic indicators of various developed and developing countries
- Analyze New Milford's and then Connecticut's population size and growth trends. Determine what growth-related problems exist and what solutions are being considered.

Character Attributes

- Cooperation
- Respect

Technology Competencies

- Research information from the Internet in the form of articles, books, and websites to support a topic or view point.
- Use Arc/GIS- Geographic Information System and Esri systems.

Develop Teaching and Learning Plan

Teaching Strategies:

- Teacher pre-assesses students' knowledge of human population growth and age structures using true/false, knowledge rating, and other formative tools.
- Teacher gives guided notes using PowerPoint on age structures and the impact of a large human population on the environment.
- Teacher uses three-level guide for reading comprehension via excerpts from essays and through research pertaining to human population growth and other issues.
- Teacher presents multiple intelligence activities using kinesthetic, interpersonal, and logical intelligences by analyzing population trends and how the data may impact civic decisions.
- Teacher identifies similarities and differences between a developed country and a developing country.

Learning Activities:

- Students will do the lab, "How Will Our Population Grow?", to predict which variables have a greater impact on future population growth.
- Students will study the fertility rate and its relation to female literacy in Africa.
- Students will read excerpts from essays by Thomas Malthus, Jonathan Swift, and Paul Ehrlich about population growth.
- Students will analyze the International Conference on Population and Development (ICPD) goals for 2015.
- Students will analyze age structure diagrams from different countries and predict potential societal issues for each country.
- Students will add personal learning goals to unit goals.

• Teacher uses non-linguistic representations for age structures. • Teacher addresses the affective and cognitive domains when analyzing essays on population growth. • Teacher uses *Mind's Eye* to visualize human population. • Teacher assigns homework to define key terms and to outline assigned text reading.	

Assessments

Performance Task Authentic application to evaluate student achievement of desired results designed according to GRASPS (one per marking period)	**Other Evidence** Application that is functional in a classroom context to evaluate student achievement of desired results
Goal: Make predictions about population trends for New Milford and/or Connecticut and make suggestions to deal with the changing population. **Role**: Statistician **Audience**: Government official **Situation**: The government has put you in charge to identify public pressures that may be caused by demographic trends. **Product**: A report with age-structure diagram and suggestions for solving the population trend (either increasing or decreasing) **Standards for Success**: Rubric outlining skills and knowledge requirements	• Entrance/exit tickets with responses from students • Acitivity/lab analysis questions • Standard assessment (test) • Self evaluation of knowledge gained (see true/false on teaching strategies)

Suggested Resources

- Arms, K., *Environmental Science*, Austin, TX: Holt, Rinehart and Winston, 2006.
- Malthus, Thomas, *An Essay on the Principle of Population* (1798 1st edition) with *A Summary View* (1830) and Introduction by Professor Antony Flew. Penguin Classics. ISBN 0-14-043206-X.
- Ehrlich, Paul R. (1968). *The Population Bomb.*. Ballantine Books.
- Paul R. Ehrlich; Anne H. Ehrlich (2009). "The Population Bomb Revisited".
- *Electronic Journal of Sustainable Development* **1(3)**: 63–71. http://www.ejsd.org/public/journalarticle/10.

New Milford Public Schools

Committee Members: Eileen Reed, Ethan Saldana Unit 7: Environmental Policies and Regulations	Course/Subject: Ecology II Grade Level: 11 / 12 # of Weeks: 2

Identify Desired Results

Common Core Standards

- **RST.5** Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
- **WHST.2** Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
- **WHST.6** Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback including new arguments or information.
- **CSF D INQ 6** Use appropriate tools and techniques to gather data.
- **CSF D INQ 7** Assess the reliability of the data generated in an investigation.

Enduring Understandings Generalizations of desired understanding via essential questions (Students will understand that …)	**Essential Questions** Inquiry used to explore generalizations
• Governments can affect environmental issues through environmental policy. • Decision making on environmental policy occurs at the community, state, national, and international levels.	• How do political, legal, social, and economic decisions affect global and local ecosystems? • How are environmental laws written and enforced?

Expected Performances
What students should know and be able to do

Students will know the following:

- The several major international meetings and agreements relating to the environment
- How economics and environmental science are related
- What federal agencies in the United States have environmental responsibilities
- The purpose of environmental impact statements
- The importance of the Clean Water Act, the Clean Air Act, and other major environmental legislation

Students will be able to do the following:

- Describe several global, national, and local efforts to address environmental issues
- Describe what an individual can do to influence policy

Character Attributes

- Citizenship
- Cooperation
- Respect
- Responsibility

Technology Competencies

- Research information from the Internet to support a topic or view point.
- Create a PowerPoint presentation.

Develop Teaching and Learning Plan

Teaching Strategies:

- Teacher pre-assesses students' knowledge of environmental policies and regulations using true/false, knowledge rating, and other formative tools.
- Teacher gives guided notes using PowerPoint on government policies and laws.
- Teacher uses three-level guide for reading comprehension using EPA policies such as Clean Water Act and through research pertaining to global initiatives related to environmental protection.
- Teacher addresses the affective and cognitive domains when conducting research on policies.
- Teacher uses *Mind's Eye* to visualize environmental activism.
- Teacher assigns homework to define key terms and to outline assigned text reading.

Learning Activities:

- Students will identify an environmental issue and write a letter to the appropriate official to address it.
- Students will study and write a report on a local environmental issue.
- Students will use the Internet to research a federal agency including what the most important current issue for the agency is.
- Students will choose one environmental law or policy and discuss how it has been impacted by political shifts.
- Students will participate in different cooperative learning situations.
- Students will add personal learning goals to unit goals.

Assessments

Performance Task Authentic application to evaluate student achievement of desired results designed according to GRASPS (one per marking period)	**Other Evidence** Application that is functional in a classroom context to evaluate student achievement of desired results
Goal: Read, understand, and explain environmental laws or policies. **Role**: EPA public educator **Audience**: public **Situation**: The public needs to be educated about a specific environmental act. **Performance**: Presentation to educate the public that can be televised on a public television station **Standards for Success**: Rubric outlining skills and knowledge requirements	• Entrance/exit tickets with responses from students • Lab/activity analysis questions • Standard assessment (test) • Self evaluation of knowledge gained (see true/false on teaching strategies)

Suggested Resources

- Arms, K., *Environmental Science*, Austin, TX: Holt, Rinehart and Winston, 2006.
- Clean Air Act
- Clean Water Act (original title: Federal Water Pollution Control Amendments of 1972)
- Endangered Species Act
- Noise Control Act
- Marine Protection, Research, and Sanctuaries Act
- Pollution Prevention Act
- Safe Drinking Water Act
- All Acts and Executive Orders located at: http://www.epa.gov/lawsregs/laws/