# Environmental Studies Unit 5: Human Sustainability and Populations

Content Area: **Science**
Course(s): **Sample Course**
Time Period: **Sample Time Period**
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## Title Section

## Department of Curriculum and Instruction

**Belleville Public Schools**

Curriculum Guide

# Environmental Studies

# 11,12

**Belleville Board of Education**

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## Unit Overview

1. Birthrate that birthrate and death rate are both important in determining the population growth rate
2. The implications of overproduction
3. The biodiversity found in genes, species, ecosystems, and ecosystem processes is vital to sustaining life on earth.
4. The scientific theory of evolution explains how life on earth changes over time through changes in the genes of populations.
5. Populations evolve when genes mutate and give some individuals genetic traits that enhance their abilities to survive and to produce offspring with these traits (natural selection).
6. Tectonic plate movements, volcanic eruptions, earthquakes, and climate change have shifted wildlife habitats, wiped out large numbers of species, and created opportunities for the evolution of new species.
7. Human activities decrease the earth's biodiversity by causing the premature extinction of species and by destroying or degrading habitats needed for the development of new species.
8. Species diversity is a major component of biodiversity and tends to increase the sustainability of some ecosystems.
9. Each species plays a specific ecological role called its niche.
10. Five types of species interactions affect the resource use and population sizes of the species in an ecosystem.
11. No population can continue to grow indefinitely because of limitations on resources and because of competition among species for those resources.
12. The structure and species composition of communities and ecosystems change in response to changing environmental conditions through a process called ecological succession.
13. No population can continue to grow indefinitely because of limitations on resources and because of competition among species for those resources.

14. We do not know how long we can continue increasing the earth's carrying capacity for humans without seriously degrading the life-support system that keeps us and many other species alive.
15. Population size increases through births and immigration and decreases through deaths and emigration.

## NJSLS

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| SCI.HS-ETS1-1 | Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. |
| SCI.HS-LS2-7 | Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. |
| SCI.HS-ETS1-3 | Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts. |
| SCI.HS-ETS1-4 | Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem. |
| HS-ETS1-4 | Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem. |
| HS-PS1-2 | Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. |
| SCI.HS-LS2-6 | Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem. |
| SCI.HS-ETS1-2 | Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. |
| SCI.HS-LS2-4 | Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. |
| SCI.HS-LS2-5 | Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. |
| SCI.HS-LS2-8 | Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce. |
| SCI.HS-LS1-3 | Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. |
| SCI.HS-LS1-5 | Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. |

## Exit Skills

1. Analyze a problem, developing hypothesis, and design a scientific experiment to test those hypothesis
2. Use statistical analysis of data collected to make an argument based on purely scientific evidence
3. Develop a vernacular of scientific terms and current environmental problems

4. Data mine from scientific journals and articles evaluating their scientific methodology for validity

## Enduring Understanding

1. Populations evolve when genes mutate and give some individuals genetic traits that enhance their abilities to survive and to produce offspring with these traits.
2. Human activities are decreasing the earth's vital biodiversity by causing the premature extinction of species and by disrupting habitats needed for the development of new species.
3. Each species plays a specific ecological role in the ecosystem where it is found.
4. The human population is increasing rapidly and may soon bump up against environmental limits.
5. We can slow human population growth by reducing poverty, encouraging family planning, and elevating the status of women.
6. Most urban areas, home to half of the world's people, are unsustainable, but they can be made more sustainable and livable within your lifetime.

## Essential Questions

1. What Roles Do Species Play in an Ecosystem?
2. What Is Species Diversity and Why Is It Important?
3. How Do Geological Processes and Climate Changes Affect Evolution?
4. How Does the Earth's Life Change over Time?
5. What Is Biodiversity and Why Is It Important?
6. How Do Speciation, Extinction, and Human Activities Affect Biodiversity?
7. How Can Cities Become More Sustainable and Livable?
8. How Does Transportation Affect Urban Environmental Impacts?
9. What Are the Major Urban Resource Environmental Problems?
10. How Can We Slow Human Population Growth?
11. What Factors Influence the Size of the Human Population?
12. How Many People Can the Earth Support?
13. How Do Communities and Ecosystems Respond to Changing environmental Conditions?
14. What Limits the Growth of Populations?
15. How Do Species Interact?

## Learning Objectives

1. Define the following characteristics of a population: nationality, mortality, sec ratio, age distribution, biotic potential, and spatial distribution
2. Explain the significance of biotic potential, and spatial distribution
3. Explain the significance of biotic potential to the rate of population growth

4. Describe the lag, exponential growth, declaration, and stable equilibrium phases of a population growth curve. Explain why each of these stages occurs.
5. Describe how limiting factors determine the carrying capacity for a population
6. List the four categories of limiting factors
7. Recognize that humans are subject to the same forces of environmental resistance as are other organisms
8. Explain how human population growth is influenced by social, theological, philosophical, and political thinking
9. Explain why the age distribution and the status and role of women affect population growth projections
10. Recognize that countries in the more-developed world are experiencing an increase in the average age of their population
11. Recognize that most countries of the world have a rapidly growing population
12. Describe the implications of the demographic transition concept
13. Recognize that rapid population growth and poverty are linked

## Interdisciplinary Connections

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| LA.11-12.RST.11-12.7 | Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. |
| LA.11-12.RST.11-12.8 | Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. |
| LA.11-12.RH.11-12.1 | Accurately cite strong and thorough textual evidence, (e.g., via discussion, written response, etc.), to support analysis of primary and secondary sources, connecting insights gained from specific details to develop an understanding of the text as a whole. |
| LA.11-12.RST.11-12.9 | Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. |
| LA.11-12.RH.11-12.2 | Determine the theme, central ideas, information and/or perspective(s) presented in a primary or secondary source; provide an accurate summary of how key events, ideas and/or author's perspective(s) develop over the course of the text. |
| LA.11-12.RH.11-12.3 | Evaluate various perspectives for actions or events; determine which explanation best accords with textual evidence, acknowledging where the text leaves matters uncertain. |
| | Decisions or predictions are often based on data—numbers in context. These decisions or predictions would be easy if the data always sent a clear message, but the message is often obscured by variability. Statistics provides tools for describing variability in data and for making informed decisions that take it into account. |
| LA.11-12.WHST.11-12.1 | Write arguments focused on discipline-specific content. |
| | Functions may be used to describe data; if the data suggest a linear relationship, the relationship can be modeled with a regression line, and its strength and direction can be expressed through a correlation coefficient. |
| LA.11-12.RH.11-12.7 | Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, qualitatively, as well as in words) in order to address a question or solve a problem. |

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| LA.11-12.RH.11-12.8 | Evaluate an author's claims, reasoning, and evidence by corroborating or challenging them with other sources. |
| LA.11-12.RH.11-12.9 | Integrate information from diverse sources, both primary and secondary, into a coherent understanding of an idea or event, noting discrepancies among sources. |

## Alignment to 21st Century Skills & Technology

**Key SUBJECTS AND 21st CENTURY THEMES**

- English, reading and language arts
- Mathematics
- Science
- Computer Science
- Economics and Government

## 21st Century/Interdisciplinary Themes

- Civic Literacy
- Environmental Literacy
- Financial, Economic, Business and Entrepreneurial Literacy
- Global Awareness
- Health Literacy

## 21st Century Skills

- Communication and Collaboration
- Creativity and Innovation
- Critical thinking and Problem Solving
- ICT (Information, Communications and Technology) Literacy
- Information Literacy
- Life and Career Skills
- Media Literacy

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| CRP.K-12.CRP2.1 | Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation. |
| CRP.K-12.CRP5.1 | Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organization, and the environment. They are aware of and utilize new technologies, understandings, procedures, materials, and regulations |

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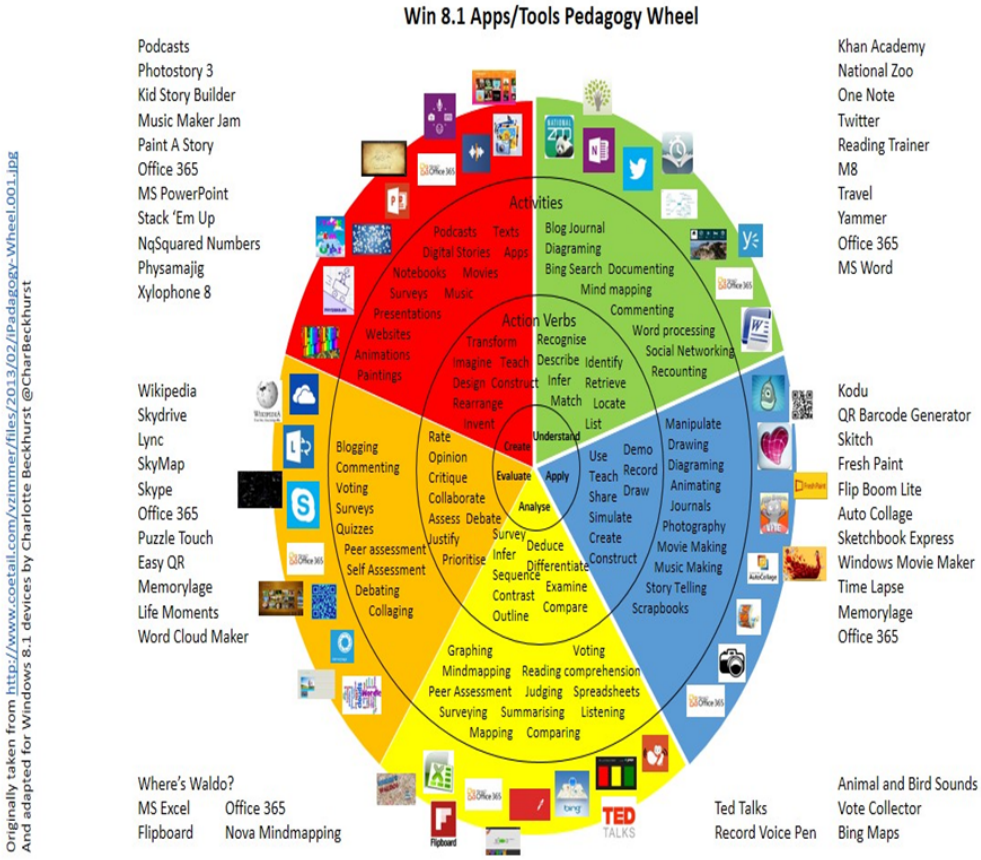
| | affecting the nature of their work as it relates to the impact on the social condition, the environment and the profitability of the organization. |
| CRP.K-12.CRP7.1 | Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation. |
| CRP.K-12.CRP8.1 | Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others. |
| CRP.K-12.CRP11.1 | Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks. |
| CRP.K-12.CRP4.1 | Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome. |
| CRP.K-12.CRP12.1 | Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings. |
| CRP.K-12.CRP6.1 | Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization. |

## Technology Infusion

What technology can be used in this unit to enhance learning?




## Differentiation

As a Reminder:

The basis of good differentiation in a lesson lies in differentiating by content, process, and/or product.

Resources:

- NJDOE: Instructional Supports and Scaffolds for Success in Implementing the Common Core State Standards http://www.state.nj.us/education/modelcurriculum/success/math/k2/

## Special Education

- printed copy of board work/notes provided
- additional time for skill mastery
- assistive technology

- behavior management plan
- Center-Based Instruction
- check work frequently for understanding
- computer or electronic device utilizes
- extended time on tests/ quizzes
- have student repeat directions to check for understanding
- highlighted text visual presentation
- modified assignment format
- modified test content
- modified test format
- modified test length
- multiple test sessions
- multi-sensory presentation
- preferential seating
- preview of content, concepts, and vocabulary
- reduced/shortened reading assignments
- Reduced/shortened written assignments
- secure attention before giving instruction/directions
- shortened assignments
- student working with an assigned partner
- teacher initiated weekly assignment sheet
- Use open book, study guides, test prototypes

## ELL

- teaching key aspects of a topic.  Eliminate nonessential information
- using videos, illustrations, pictures, and drawings to explain or clarif
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning;
- allowing students to correct errors (looking for understanding)
- allowing the use of note cards or open-book during testing
- decreasing the amount of workpresented or required
- having peers take notes or providing a copy of the teacher's notes
- modifying tests to reflect selected objectives
- providing study guides
- reducing or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using computer word processing spell check and grammar check features
- using true/false, matching, or fill in the blank tests in lieu of essay tests

## Intervention Strategies

- allowing students to correct errors (looking for understanding)
- teaching key aspects of a topic.  Eliminate nonessential information
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning
- allowing students to select from given choices
- allowing the use of note cards or open-book during testing
- collaborating (general education teacher and specialist) to modify vocabulary, omit or modify items to reflect objectives for the student, eliminate sections of the test, and determine how the grade will be determined prior to giving the test.
- decreasing the amount of workpresented or required
- having peers take notes or providing a copy of the teacher's notes
- marking students' correct and acceptable work, not the mistakes
- modifying tests to reflect selected objectives
- providing study guides
- reducing or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using authentic assessments with real-life problem-solving
- using true/false, matching, or fill in the blank tests in lieu of essay tests
- using videos, illustrations, pictures, and drawings to explain or clarify

## Evidence of Student Learning-CFU's

Please list ways educators may effectively check for understanding in this secion.

- Admit Tickets
- Anticipation Guide
- Common benchmarks
- Compare & Contrast
- Create a Multimedia Poster
- Define
- Describe
- Evaluate
- Evaluation rubrics
- Exit Tickets
- Explaining
- Fist- to-Five or Thumb-Ometer
- Illustration

- Journals
- KWL Chart
- Newspaper Headline
- Outline
- Question Stems
- Quickwrite
- Quizzes
- Red Light, Green Light
- Self- assessments
- Socratic Seminar
- Study Guide
- Teacher Observation Checklist
- Think, Pair, Share
- Think, Write, Pair, Share
- Top 10 List
- Unit tests

## Primary Resources

Please list all resources available to you that are located either within the district or that can be obtained by district resources.

## Ancillary Resources

1. Teacher and Publisher supplied powerpoints, notes, laboratory guides, and worksheets
2. Textbooks
3. Resource Manuals
4. Internet Resources
5. Computer and smartboard Activities

## Sample Lesson