

EACLIPSE -

East Africa Climate, People, Livestock & Savanna Ecosystems



Introduction to Unit

The East Africa Climate, People, Livestock & Savanna Ecosystems (EACLIPSE) Project:

The goal of the EACLIPSE project is to understand the effects of climate change on the savanna ecosystem and the people who live there, and to understand how changing land use in the savanna in turn affects climate change. A team of researchers including scientists and social scientists from Kenya, Tanzania, and the U.S. are conducting field research in the savanna ecosystems of Kenya and Tanzania. They are collecting historical and current data on climate change, land use, and people's adaptations to environmental change. The results of this research will provide information needed to inform policy on land use and climate change in East Africa.

Also called the Dynamic Interactions among People, Livestock, and Savanna Ecosystems under Climate Change project, the overall objective of this project is to examine the dynamics between coupled human-biophysical systems in savannas under climate change. Climate change is affecting savanna ecosystems which directly impact livestock and crop production, and peoples' livelihoods. The study area encompasses the savanna areas of Kenya and Tanzania.

Researchers are using multiple methods and information sources in this project to identify the interactions in the coupled human-biophysical system. The interdisciplinary team has expertise in spatial and temporal analysis, long-term field research on the impact of climate and other environmental changes on society in East Africa, and the use of existing data sets and models including a regional climate model calibrated for the region. The team is composed of climatologists, experts in land use/cover change, remote sensing, meteorology, geographic information systems, and ecology.

Collaborating institutions include Michigan State University, the International Livestock Research Institute in Nairobi, Kenya, Ohio University, Virginia Tech University, the University of Dar es Salaam in Tanzania, and the National Science Foundation.

Funding for the project: *Dynamic Interactions among People, Livestock, and Savanna Ecosystems under Climate Change*, Award No. BCS/CNH 0709671, is from the National Science Foundation Biocomplexity of Coupled Human and Natural Systems Program.

The EACLIPSE project website can be accessed at www.eaclipse.msu.edu.



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This project is a follow up to the Climate Land Interaction Project (CLIP) *An Integrated Analysis of Regional Land-Climate Interactions*, BE/CNH Award No. 0308420, from the National Science Foundation Biocomplexity of Coupled Human and Natural Systems Program and the Michigan State University Foundation, which can be accessed at www.clip.msu.edu.

The Climate Land Interaction Project was designed based on data from LUCID (Land-Use Change, Impacts, and Dynamics). The "Land Use Change Analysis as an Approach for Investigating Biodiversity Loss and Land Degradation" project, funded by UNEP-GEF and other donors, is an umbrella for various research activities occurring in sites across East Africa, and at the East Africa regional level. The general goal is to contribute to the conservation of biodiversity and prevention of land degradation by providing useful instruments to identify and monitor changes in the landscape associated with biodiversity loss and land degradation, and identify the root causes of those changes. The LUCID website is www.lucideastafrica.org.

Unit Objectives

This unit on climate change in East Africa includes lessons for science and social studies at the middle and high school level (grades 6-12). It can be taught in its entirety as an integrated unit, as a science or social studies module, or individual lessons can be used to enhance an existing curriculum. An introductory lesson is provided to establish the context for the other lessons.

Climate change is interdisciplinary by nature. Most lessons include both social studies and science standards, but have been listed under the primary subject. Relevant national standards (grades 5-12) and Michigan content standards (grades 6-12) are listed in the standards chart. The first lesson provides important background information for all of the lessons in both modules.

The common thread throughout these lessons is human/environment interaction. Students will learn how human activity affects the environment. Within each lesson, students will be asked to consider what happens to the environment as a result of climate change and how those environmental changes affect people.

These lessons are designed to help students develop a deeper understanding of the complexity of climate change issues, using the East African savanna as an example. By learning about climate change in East Africa, students will understand that:

1. Climate change is the result of complex human/environment interactions.
2. Human activities can contribute to climate change.
3. Changes in climate can change local ecosystems by affecting temperature, rainfall patterns, availability of water, and vegetation.
4. Changes in the ecosystem can affect human activity, including what crops can be grown, economic opportunities, disease patterns, and the capacity to sustain life (human populations, livestock, and wildlife).
5. Each ecosystem is unique in that there are different social, cultural, economic, political, and environmental factors at play.
6. Studying one ecosystem in detail teaches students the factors that need to be studied in order to understand the complexities of climate change in a given ecosystem as well as the research methodology used to understand the interactions of the different parts of the system.

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7. Determining the factors that contribute to climate change and understanding their interactions allows scientists to make predictions about climate change.
8. Having data on the effects of human/environment interactions in an ecosystem makes it possible to anticipate effects of future climate change on local populations and ecosystems.

Background Material

These lessons are specific to the East African savanna ecosystem. The lessons assume that students have a basic understanding of climate change. The following resources can be used to provide students with the necessary background on climate change and Africa.

CLIMATE CHANGE

Websites:

National Wildlife Federation's Climate Classroom

www.nwf.org/climateclassroom

Lesson plans for teaching about climate change and a down-loadable PowerPoint presentation (and presenter's guide) "What's Up With Global Warming?" designed for grades 5-12. http://online.nwf.org/site/PageNavigator/ClimateClassroom/cc_teachers_slideshow.

World Wildlife Federation Climate Curriculum for Teachers www.worldwildlife.org/climate/curriculum/item5944.html

Comprehensive high school curriculum on climate change (15 lessons for grades 9-12).

United States Environmental Protection Agency (EPA) www.epa.gov/climatechange/kids/greenhouse.html

Website on climate change designed for kids, includes links and games.

Creative Change Educational Solutions

www.creativechange.net

Lessons on carbon footprint, sustainability, and land use
(requires subscription; tax deductible for teachers)

Climate Change Education

climatechangeeducation.org

Portal to climate change websites, includes links to curriculum
climatechangeeducation.org/k-12/index.html

Video:

An Inconvenient Truth: A Global Warning

Al Gore's presentation on climate change and how we can prevent global warming
DVD and free companion educational guide available at www.climatecrisis.net



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Book:

How We Know What We Know About Our Changing Climate: Scientists and Kids Explore Global Warming by Lynn Cherry and Gary Braasch.

Introduction to the science of climate change, evidence gathered by scientists and students, actions to reduce climate change, and extensive resource lists (66 pages, written for ages 10-14).

www.howwewknowclimatechange.com

A Teacher's Guide to How We Know What We Know About Our Changing Climate by Carol Malnor. Standards-based lessons and classroom activities for grades 5-8.

Both the book and the teacher's guide are available at www.dawnpub.com.

Photographs:

World View of Global Warming: The Photographic Documentation of World Change

Photographs of climate change by photographer Gary Braasch

www.worldviewofglobalwarming.org

Addition climate change resources for teachers:

National Oceanic and Atmospheric Administration (NOAA)

www.noaa.gov/climate.html

United States Environmental Protection Agency (EPA)

Climate Change Information

www.epa.gov/climatechange

Includes a climate change glossary:

www.epa.gov/climatechange/glossary.html

UN Intergovernmental Panel on Climate Change

Assessment Reports on Climate Change

www.ipcc.ch

Union of Concerned Scientists

Global Warming 101: Science, Impacts, and Solutions

www.ucsusa.org/global_warming/global_warming_101

Pew Center on Global Climate Change

Climate Change 101: Understanding and Responding to Global Climate Change

www.pewclimate.org

RESOURCES ON AFRICA

For background information on Kenya, a free down-loadable book is available at www.clip.msu.edu.

For background information on Africa, curriculum is available at the website below.

Exploring Africa! <http://exploringafrica.matrix.msu.edu>

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The *Exploring Africa!* curriculum is divided into Units, Modules, and Learning Activities. Each unit covers a major topic or theme in the study of Africa. Each unit is divided into thematic, disciplinary, regional, or country modules developed in accordance with standard lesson and module plans for middle and high school social studies.

PROJECT WEBSITES

Teachers and students can directly access the project websites:

EACLIPSE (East Africa Climate, People, Livestock & Savanna Ecosystems) www.eclipse.msu.edu

CLIP (Climate Land Interaction Project) www.clip.msu.edu

LUCID (Land-Use Change, Impacts, and Dynamics) www.lucideastafrica.org

A NOTE ON TEACHING YOUNG PEOPLE ABOUT CLIMATE CHANGE:

The way a teacher frames and presents curriculum about climate change affects how students will respond to that information. An approach that emphasizes only the possible catastrophic outcomes of global climate change can leave students feeling fearful and powerless. It is important to frame the study of climate change around human/environment interactions, showing students how people affect the environment in both positive and negative ways.

This curriculum focuses on climate changes in the East African savanna, and should be presented as an example of what a dedicated team of international researchers is doing to understand climate change and its effects on an ecosystem and its local population with the aim of offering recommendations for mitigating the effects of climate change.

In order to empower students around the issue of climate change, environmental educators have found that it is important for students to:

1. Have positive experiences in nature that allow them to develop a connection to their environment and a personal interest in protecting the environment.
2. Learn about successful efforts to improve environmental quality and prevent climate change by governments, scientists, citizens, non-profit organizations, and students.
3. Get involved in projects at home, school, or in their community to protect the environment.

For more information, read the article “Beyond Ecophobia” by David Sobel.

www.yesmagazine.org/issues/education-for-life/803

After completing the unit (or teaching selected lessons), please consult the section at the end of this curriculum, Take Action: Resources for Students and Teachers (LINK), or involve students in action projects available through the school or community organizations.

