

Lesson Plan: Teaching Human Health and Climate Change

As a **high school Biology / Biological Sciences and Environmental Sciences** teacher, you can use this set of computer-based tools to help you in teaching about **human health and diseases, vectors** and **vector-borne diseases** such as malaria.

This lesson plan allows students to study the geographical distribution and spread of diseases. Further, students can explore how climate change could impact the spread of vector-borne diseases (specifically, malaria) and could consequently affect human health outcomes. The activity will also help students to identify policies for adapting to and mitigating the spread of diseases.

Thus, the use of this lesson plan allows you to integrate the teaching of a climate science topic with a core topic in the Biological Sciences.

Use this lesson plan to help your students find answers to:

- *What are the major vector-borne diseases and their symptoms? What is the current geographical distribution of these diseases globally?*
- *Explain whether climate-related factors could influence the distribution and spread of vector-borne diseases.*
- *How could an increase in the average global temperature affect the geographical distribution of malaria?*
- *Recommend specific actions/policies that can help in mitigating the spread of vector-borne diseases caused by a rise in average global temperature, increase in sea-levels, and growth in population.*

About the Lesson Plan

Grade Level

High school

Discipline	Biological Sciences, Environmental Sciences
Topic(s) in Discipline	Protozoa, Malaria, Vectors, Vector-borne Diseases, Climate Change and the Spread of Malaria, Climate Change and Human Health
Climate Topic	Climate and Health
Location	Global, USA
Access	Online (some material can be downloaded for offline use)
Language(s)	English
Approximate Time Required	150 – 190 min

1 Contents

- 1. Reading (20 – 30 min)** A reading that provides an overview of vectors and vector-borne diseases.
<http://www.who.int/news-room/fact-sheets/detail/vector-borne-diseases>
- 2. Video (~8 min)** A video that explains the potential impact of climate change on disease vectors and the spread of diseases, and consequently, on human health outcomes.
<https://www.youtube.com/watch?v=jDueuwB3Tcs>

3. Classroom/Laboratory Activity (60 – 90 min)

A classroom/laboratory activity to examine maps on malaria distribution, study temperature data, establish potential links between disease distribution and temperature, and predict the effect of climate change on disease distribution.

https://www.strategies.org/wp-content/uploads/2011/12/Mosquitoes_May02.pdf

4. Game (computer-based) (~60 min)

A computer-based game to help students understand the impact of climate on health, identify diseases, and choose actions or policies for adapting to and mitigating the spread of diseases.

<http://playgen.com/play/climate-health-impact/>

5. Suggested questions/assignments for learning evaluation

- What are the major vector-borne diseases and their symptoms? What is the current geographical distribution of these diseases globally?
- Explain whether climate-related factors influence the distribution and spread of vector-borne diseases.
- How could an increase in the average global temperature affect the geographical distribution of malaria?
- Recommend specific actions/policies that can help in mitigating the spread of vector-borne diseases caused by a rise in average global temperature, increase in sea-levels, and growth in population.

2 Step-by-step User Guide

Here is a step-by-step guide to using this lesson plan in the classroom/laboratory. We have suggested these steps as a possible plan of action. You may customize the lesson plan according to your preferences and requirements.

1. Introduce the topic with the help of a reading

- With the help of the reading, “[Vector-borne diseases](#)”, introduce the topic of vector-borne diseases and the factors that influence their distribution and spread.

The reading, “Vector-borne diseases”, is a fact sheet from the World Health Organization (WHO), and is available at: <http://www.who.int/news-room/fact-sheets/detail/vector-borne-diseases>.

- Proceed to explain malaria (or another vector-borne disease) and its transmission.
- Discuss the environmental conditions that are conducive for the spread of malaria (or another vector-borne disease).

2. Play a video

Then, play this video titled “[Human Health, Vector-Borne Diseases, and Climate Change](#)”, which can be used as a micro-lecture. In this video, Mary Hayden and Andy Monaghan from the National Center for Atmospheric Research discuss the role of weather and climate as one of the factors that could impact the spread of diseases, thus potentially affecting human health outcomes.

The short video about Climate and Health is available at <https://www.youtube.com/watch?v=jDueuwB3Tcs>.

3. Conduct a classroom/laboratory activity

Now, explore this topic in an engaging manner by conducting the activity, “[Beyond the Bite: Mosquitoes & Malaria](#)”, developed by Institute for Global Environmental Strategies.

- Download the activity “Beyond the Bite: Mosquitoes & Malaria” from https://www.strategies.org/wp-content/uploads/2011/12/Mosquitoes_May02.pdf.

- Print the maps and other data sheets for your students.
- Conduct the activity in the classroom or laboratory by following the procedure described in the downloaded file.

4. Facilitate a game-based activity

Students can play the computer-based game “[Climate Health Impact](#)”, from Big Picture/Playgen, for an interactive experience. This game will enable students to understand the possible effects of climate change on human health in different regions of the world, to identify diseases from their symptoms, and to explore measures (specifically, policies) for adaptation and mitigation:

- Download the resources for teachers (including an introduction and a homework sheet) from <https://bigpictureeducation.com/climate-health-impact-game>.
- Go to <http://playgen.com/play/climate-health-impact/>.
- Conduct the game-based activity by using the guidelines in the “Teacher Notes”.

Note: This game requires a Flash player; therefore, it may not play in some browsers. The game works in Firefox.

5. Questions/Assignments

Use the tools and the concepts learned so far to discuss and determine answers to the following questions:

- What are the major vector-borne diseases and their symptoms? What is the current geographical distribution of these diseases globally?
- Explain whether climate-related factors influence the distribution and spread of vector-borne diseases.
- How could an increase in the average global temperature affect the geographical distribution of malaria?

- Recommend specific actions/policies that can help in mitigating the spread of vector-borne diseases caused by a rise in average global temperature, increase in sea-levels, and growth in population.

3 Learning Outcomes

The tools in this lesson plan will enable students to:

- enumerate some vectors and the diseases that they cause
- discuss the causes for the spread of vector-borne diseases
- explain the possible link between climate change and the distribution/spread of infectious vector-borne diseases
- discuss climate change-related actions and policies that will help in adapting to and mitigating the spread of vector-borne diseases

4 Additional Resources



If you or your students would like to explore the topic further, these additional resources will be useful.

1. Reading

A reading, “Climate Change and Infectious Diseases”, from the World Health Organization (WHO):

<http://www.who.int/globalchange/environment/en/chapter6.pdf>

2. Video

A video, “What is the role of climate change in disease emergence?”, from the course, “Epidemics – the Dynamics of Infectious Diseases”, by the Pennsylvania State University:

<https://www.coursera.org/learn/epidemics/lecture/2EXqq/what-is-the-role-of-climate-change-in-disease-emergence>

5 Credits/Copyrights

All the teaching tools in our collated list are owned by the corresponding creators/authors/organizations as listed on their websites. Please view the individual copyright and ownership details for each tool by following the individual links provided.

We have selected and analyzed the tools that align with the overall objective of our project and have provided the corresponding links. We do not claim ownership of or responsibility/liability for any of the listed tools.

1. **Reading, “Vector-borne diseases”** [World Health Organization \(WHO\)](#)
2. **Video, “Human Health, Vector-Borne Diseases, and Climate Change”** [UCARConnect](#), Mary Hayden and Andy Monaghan from the National Center for Atmospheric Research
3. **Classroom/Laboratory activity, “Beyond the Bite: Mosquitoes and Malaria”** [Institute for Global Environmental Strategies](#)
4. **Game (computer-based), “Climate Health Impact”** [Big Picture/Playgen](#)
5. **Additional Resources** [World Health Organization](#);

[Coursera](#) (course by [The Pennsylvania State University](#))