

Could Climate Change Impact the Mosquito-Human Disease Ecosystem?

Name: _____

Date: _____

Student worksheet

Part 1: Research mosquito biology.

1. What are some factors that affect the mosquito life cycle?
2. What are some human diseases that can be carried by mosquitoes, and what species carry these diseases?
3. Make a hypothesis about how temperature affects mosquito populations and how changes in temperature could affect the spread of human diseases carried by mosquitoes.

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Part 2: Analyze how mosquito populations compare across different climates.

Note: The work in this section will need to be done in a spreadsheet program and submitted in addition to this worksheet.

1. Go to this website: [Simplified NEON Data Download Tool](https://sbgo.org/neon-simplified-data) (<https://sbgo.org/neon-simplified-data>)
 2. You will see a map of NEON locations throughout the United States. Click a location on the map or use the drop-down menu below the map to choose a site, then click "Download." This will download an .xls file that you can open in a spreadsheet program.
 3. Choose two locations that you think have different climates. Download the spreadsheet for each location. Open one of the spreadsheets.
 4. The "Basic" tab of the spreadsheet contains columns with monthly totals for different mosquito species found at the site, along with temperature and rainfall data. The "Advanced" tab has the same information organized by different habitats at each site.
 5. Note that the data is not always collected every month. Some months might be missing data. This is OK.
 6. Sometimes rainfall and temperature sensors might report incorrect values. Use common sense when looking at the data. If it seems wrong, it probably is. For example, it is probably not 100°F in Maine in January.
 7. For each spreadsheet that you downloaded, make two graphs using the data on the "Basic" tab. If you need help making these graphs, see the videos linked below.
 - a. A scatter plot with the total monthly mosquito count on the y-axis vs. the average monthly temperature on the x-axis.
 - b. A dual-y-axis line graph showing total mosquito count and average monthly temperature on the y-axes vs. month on the x-axis.
- [Creating an XY Scatter Plot in Excel](https://youtu.be/gBbGBrHTMrM) (<https://youtu.be/gBbGBrHTMrM>)
 - [How to Create an Excel 2016 Chart with Two Y Axes](https://youtu.be/8vzhSjNGcSo) (<https://youtu.be/8vzhSjNGcSo>)
 - [Creating an XY Scatter Plot in Google Sheets](https://youtu.be/YC1Is9YJX0k) (<https://youtu.be/YC1Is9YJX0k>)
 - [Two Axis Chart – New Google Sheets Chart Editor](https://youtu.be/KoBsKZ_Yj28) (https://youtu.be/KoBsKZ_Yj28)

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8. Using a spreadsheet program, make a data table that compares the mosquito species found at each location and the diseases they carry. You cannot directly compare the absolute number of mosquitoes captured at different locations. Instead, you should calculate the percentage of the total population for each species at each location (for example, if Location A had 1,000 mosquitoes total for all species, and 100 of those mosquitoes were *Aedes albopictus*, then you would write 10% for that species, since $100/1,000 = 0.1 = 10\%$).

Mosquito Species	Human Diseases Carried	Warmer Location (% of total count)	Cooler Location (% of total count)

Part 3: Predict how climate change will affect mosquito-human interactions.

1. Climate change is leading to new climate patterns around the world. Online tools like the [Weather 2050 page](https://www.vox.com/a/weather-climate-change-us-cities-global-warming) (<https://www.vox.com/a/weather-climate-change-us-cities-global-warming>) allow us to predict what the climate may be like at different locations in the future. Look up the predicted temperatures for your two locations several decades from now.
2. How will the climate change at each location? Write a paragraph explaining what effects you predict this change will have on mosquito populations and human disease. Be as specific as possible, use your data as evidence, and explain your reasoning.