Exploring the Correlation between Rainfall and the Onset of Mosquito-Borne Diseases

Adult mosquitoes need to find standing water in which to lay their eggs. Therefore, the rainy season is also the perfect time for mosquito-borne diseases to flourish.

You can do an investigation to find the correlation between the amount of rain that falls over a given period of time and the onset of mosquito-borne diseases.

Before you begin this activity, think about what you know about the mosquito life cycle. How long after the adult female mosquito lays her eggs will the eggs hatch and become larvae? What conditions (temperature, precipitation, etc.) do the mosquito eggs require to hatch into larvae?

Did you know that scientists are able to measure precipitation that is falling using satellites? The Global Precipitation Measurement mission (GPM) is able to measure how much it is raining and snowing all around the globe, and it can update these measurements every three hours.

Let's look at the amount of precipitation that fell worldwide over the past week. Click here to view a data animation. As you watch, notice the direction the winds are moving and the type and amount of precipitation that is falling over your region.

We can go in closer to see how much precipitation has fallen in your region over a certain period of time using the Global Precipitation Viewer. You can move the globe to find the area you are interested in, and then use the "+" button to enlarge that region. You will also see some other tools you can use to assist you. You can select the last 30 minutes, the past 24 hours, or the past week and view the amount or rain and/or snow that fell during those time periods.

What did you find about how much precipitation fell in your region over the past 30 minutes? How about over the past 24 hours? How much and what type of precipitation fell over the past week in your region?

Return to the data animation showing the precipitation that fell in the past week, and use that data to predict whether you will get precipitation in the next few days. What is your prediction?

You could contact your local health authorities and find out when there were outbreaks of mosquito-borne diseases over the past five years. Then you could look at the satellite data to see if you can find a correlation between the onset and amount of precipitation and the incidences of mosquito-borne diseases.

To gather your precipitation data, go to the Giovanni data access system and select the date range you are interested in. Select "*Hydrology*" under disciplines, and then "P*recipitation*" under measurements. Find the "*Merged satellite-gauge precipitation estimate-Final Run (recommended for general use) (GPM_3IMERGEMv03)*" variable. To select the region you are interested in obtaining data for, go up to the "S*elect Region*" box and click on the folded paper icon. This will take you to a world map were you can draw a box around the area of interest. Then click on the green "*Plot Data*" box, and wait for your data to load.

Here is an example of the rainfall over Brazil for the two-month period between April 1, 2014 and June 1, 2014. You can develop a rainfall map for any time period and can go in closer for a more specific location.

Time Averaged Map of Merged satellite-gauge precipitation estimate - Final Run (recommended for general use) monthly 0.1 deg. [GPM GPM_3IMERGM v03] mm/hr over 2014-Apr - 2014-Jun, Region 66.7969W, 37.9687S, 33.75W, 2.8125S
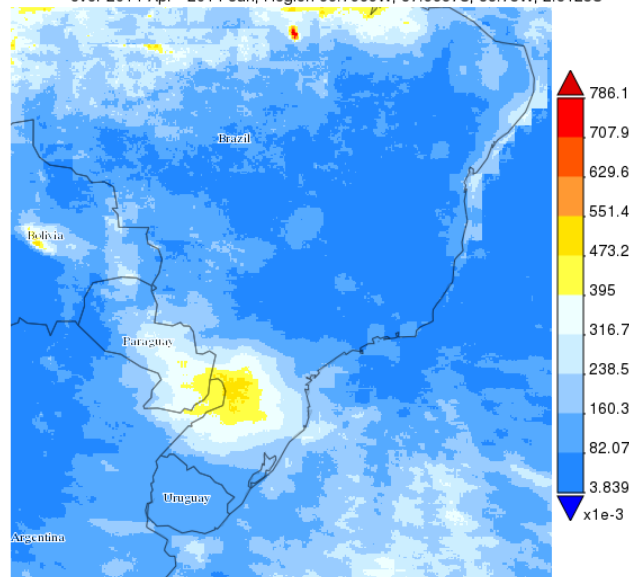
- Selected date range was 2014-Jan - 2014-Jun. Title reflects the date range of the granules that went into making this result.

See if you can find how much lag time there is between the periods of heavy precipitation in your region, and the onset of reported cases of mosquito-borne diseases.

Links:
- GPM Mission: pmm.nasa.gov
- Near Real-Time Precipitation Data Animation: svs.gsfc.nasa.gov/4285
- Global Precipitation Viewer: pmm.nasa.gov/data-access/global-viewer
- Giovanni Data Access System: giovanni.sci.gsfc.nasa.gov/giovanni/