

Climate, Sunspots, and Forestry: Global Approaches to Understanding Malaria in British Mauritius

Yadhav Deerpaul (Presentation File – May 2023)

Purpose

The spread of malaria was documented in colonial reports which were lengthy and contained sometimes no visualizations at all.

These reports were also flawed at times while correct at other times.

How can the colonial reports be visualized and analyzed?

Data

There are two types of data.

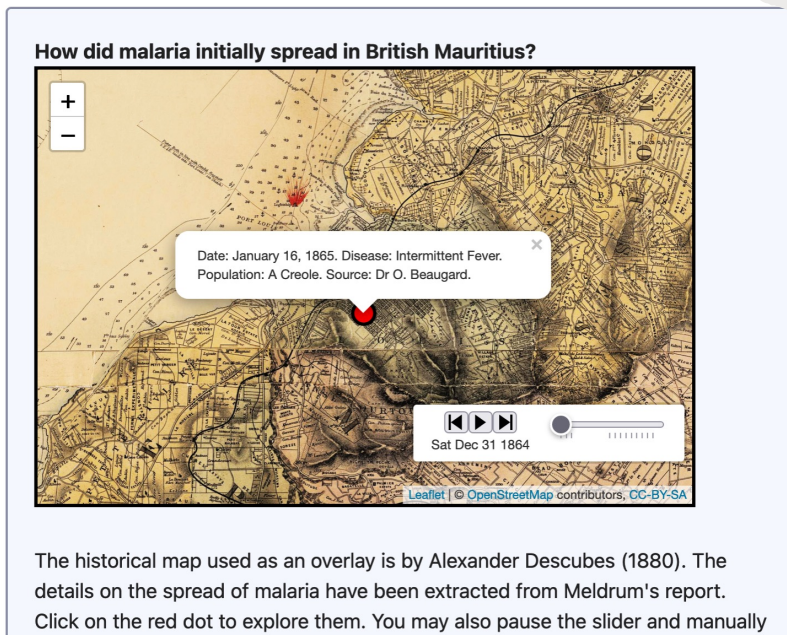
Those of a description nature such as a description of how the disease malaria spread.

Then, there are the statistical data which need to be georeferenced (used *ArcGIS Pro*).

All of them have to be transcribed and cleaned especially from wide to long format (used *OpenRefine*).

Leaflet Map

The Spread of Malaria in British Mauritius from January 1865 to May 1865

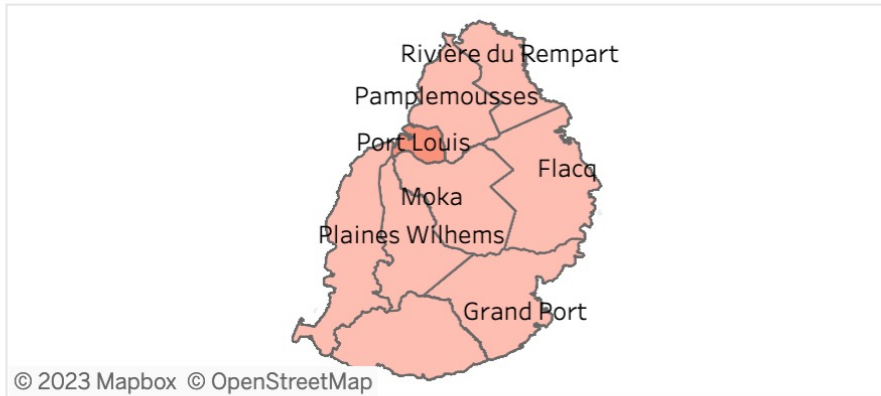


- One of the most challenging parts of the project.
- Leaflet does not natively allow timelines and there are no tutorials online on how to do all of them together with popups and rasters.
- The package *leafletime* which did allow timelines does not support popups.
- The popups which are visible when clicking on the red markers from the sliders is actually generated from Leaflet's *addCircleMarkers*.
- The reason why you cannot see the original circle markers is because they are hidden using *Timeslider* from *leaflet.extras2*.
- Adding a raster layer on top of them using *addRasterImage* is not possible as it breaks the timeline and popups mechanism.
- The solution was a georeferenced TIFF converted to PNG:
<https://stackoverflow.com/questions/47170828/overlay-image-on-r-leaflet-map>.

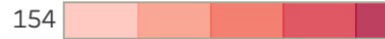
Is there a correlation between malaria and rainfall?

The two maps show the links between fever mortality and rainfall patterns during the period 1871–1879. If you select specific district(s), it will change across both maps. However, each map has their respective yearly filters.

Malaria



Mortality (Cases)



Mortality

☒ (All)

☒ Fever

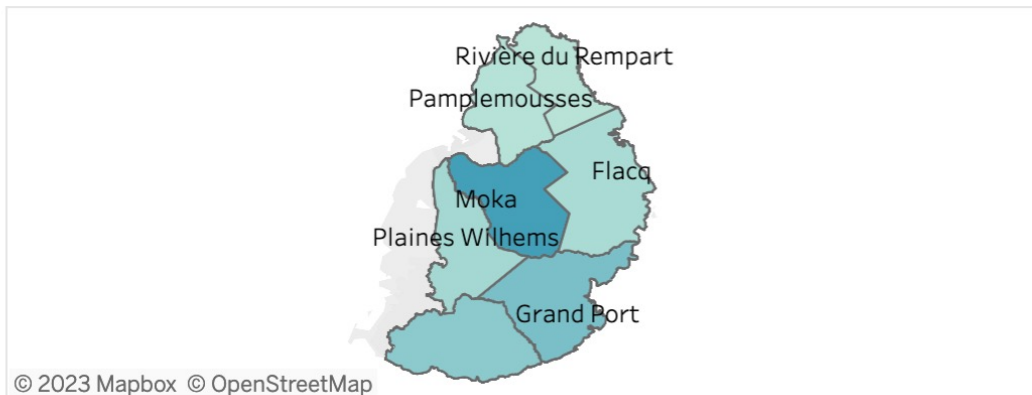
Year

1871

Districts

(All)

Rainfall



Rainfall (In...

44.2

Year

1871

Tableau Chart

- The *Tableau* charts use filters for the Districts.
- The one difference was I used my own shapefiles (because Tableau is a bit tricky with non-US districts).
- However, I kept the basemap. So, when the user deselects a district, a grey basemap is visible instead of an empty space.

History

Malaria was spreading at an alarming rate on the island of Mauritius during the late nineteenth century. The British Government instated a Sanitary Commission in 1882 to recommend laws which could potentially reverse the spiraling outbreak.

Charles Meldrum, a meteorologist and astronomer based in Mauritius, wrote a report in 1882 exploring the links between the spread of malaria, global climatic anomalies, and theories of deforestation. He contested the report that James Davidson had prepared for the Sanitary Commission of 1882. Davidson had attributed the spread of malaria in Mauritius to miasmatic influences, which he believed were exacerbated by deforestation. The now obsolete miasma theory attributed diseases to the miasma from rotting organic matter.

Meldrum relied on what would soon be proved as the scientifically correct theory, notably that microscopic organisms are the cause of diseases, to counter the miasma theory. The project is a visual analysis of the colonial datasets.

Tackling Malaria in British Mauritius



Website

- I used Simple.css (<https://simplecss.org/>) for the website design.
- It also adapts to the dark mode.
- I particularly also appreciated the `<p class="notice">` paragraphs which make the image and even map stand out.

Future Plans

- As the research project is an ongoing one, I have not used all my datasets at the current stage.
- Further adjustments are required especially for the historically coordinates.
- Two things I plan to try for future iterations is how to integrate 3D DEMs using perhaps *OL-Cesium* (<https://openlayers.org/ol-cesium/>) instead of *ArcGIS StoryMaps* and then doing correlational analyses using web maps using *Turf.js* (<https://turfjs.org/>).

Thank You