



# Seneca Park Zoo Society

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# Agenda

- Vision and Objectives
- What We've Done
- 3<sup>rd</sup> Party Data
  - 1. Demographics
  - 2. Geospatial
  - 3. Disasters
  - 4. Lemurs
- Proposed ERD for New Data
- Deliverables
- Summary
- Questions & Discussion



# Vision and Objectives

- Vision of connecting Seneca Park donors to their donations
- Objectives based on Sponsor requests:
  - Finding new sources of relevant datasets.
  - Defining the methodology for tracking and updating new sources.
  - Creating a storage format for data sets.
  - Visualizing that data using GIS and visualization software.



# What We've Done

- Cleaned and explored Seneca Park data
- Identified need for data enrichment
- Collected 3rd Party data
- Identified ways to connect new data to reforestation donations



# Demographic Data

## What

- Collected data on 32 demographic measures, such as:
  - Rural and Urban populations
  - Literacy Rates
  - Aid per capita in US Dollars
  - Access to electricity
- Transformed and merged into one time-series csv file

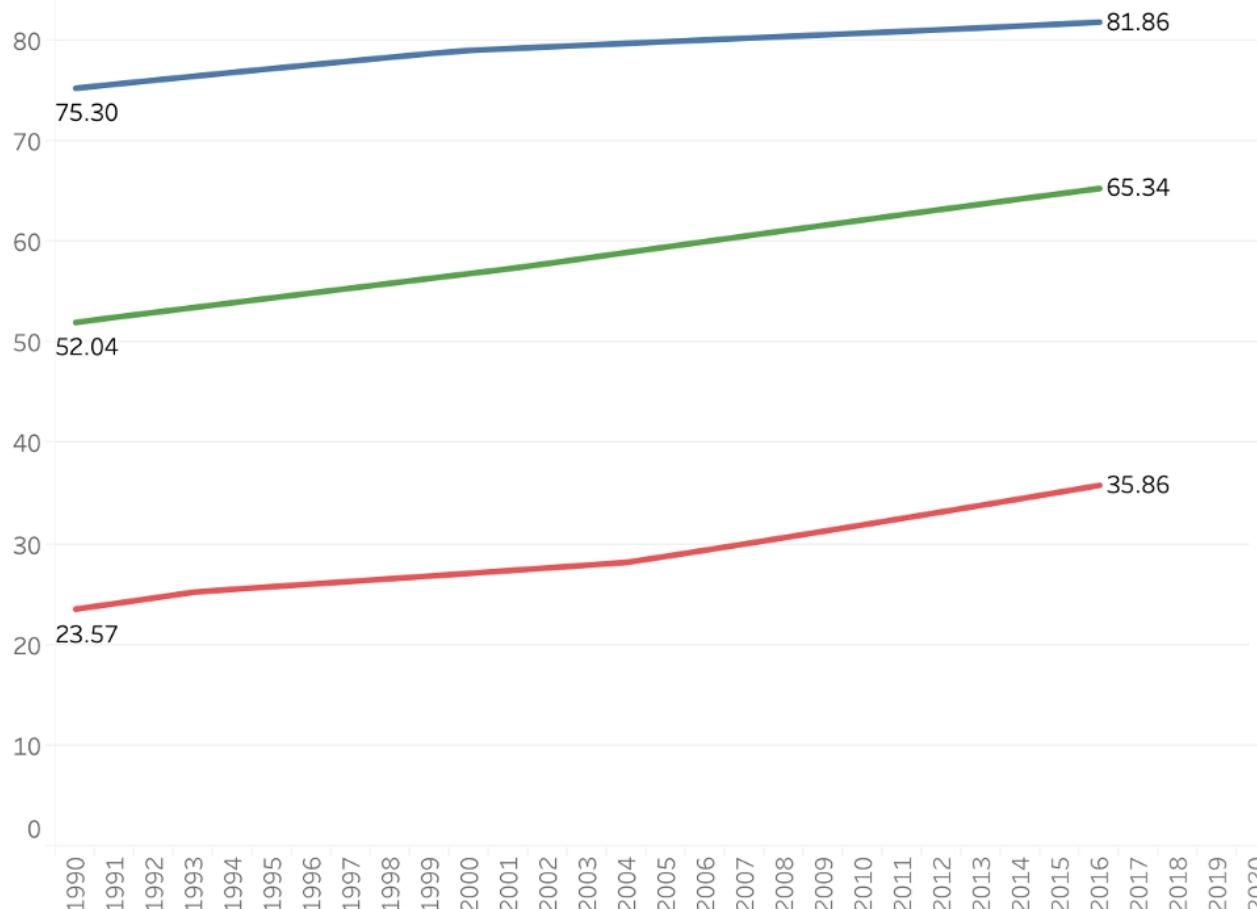
## Why

- Allows for donors to learn more about the country they are donating to help
- Highlights reasons for necessity of aid like reforestation



## Percentage of Urban Population

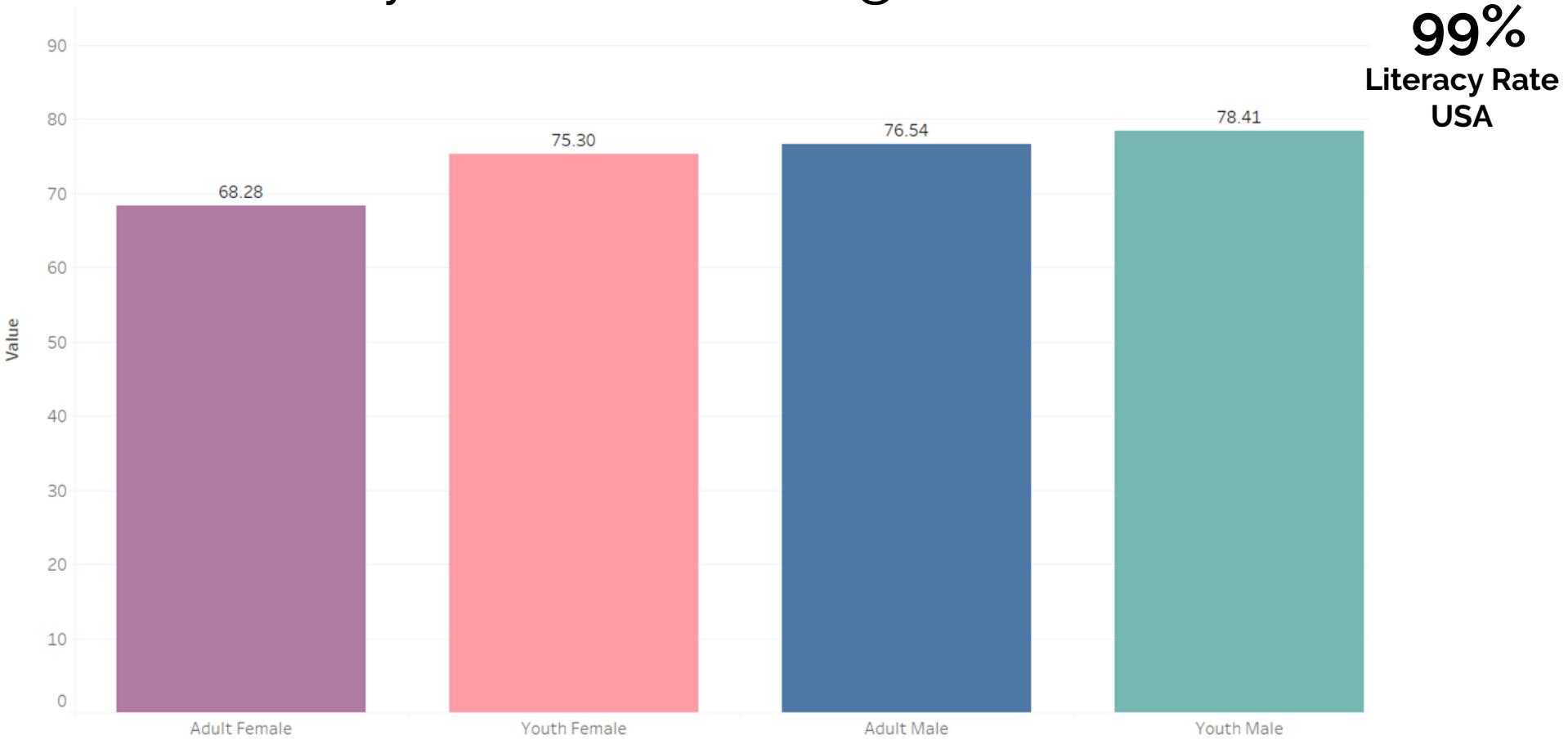
Year



- Madagascar
- South Africa
- United States

Madagascar  
is urbanizing

# Low Literacy Rates in Madagascar



Adult Female

Youth Female

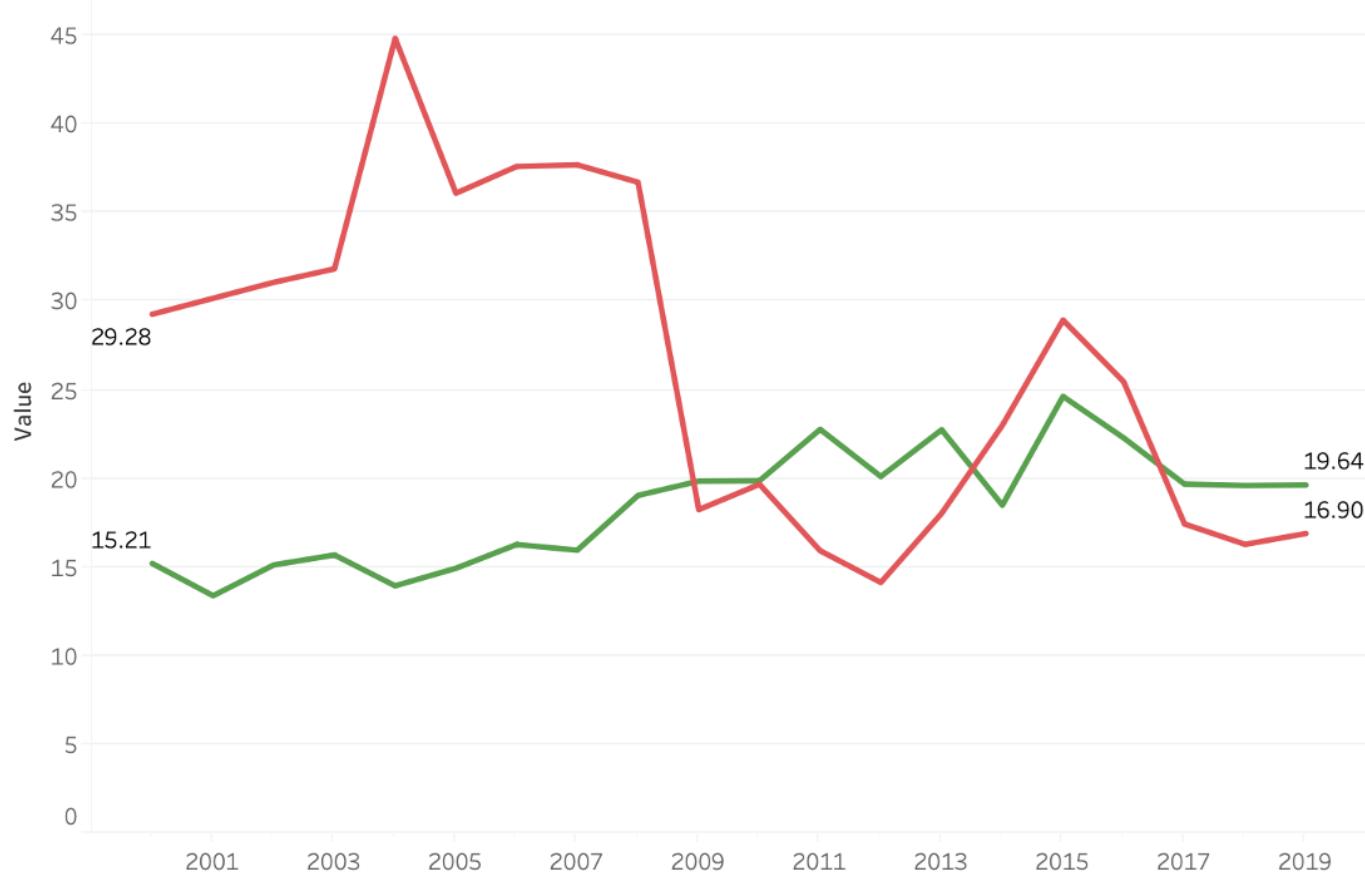
Adult Male

Youth Male

\* Adult >= 15 > Youth

Source: <https://ourworldindata.org/grapher/aid-received-per-capita?tab=chart&time=2000..2016&country=MDG>

## Aid received per capita (US Dollars per Year)

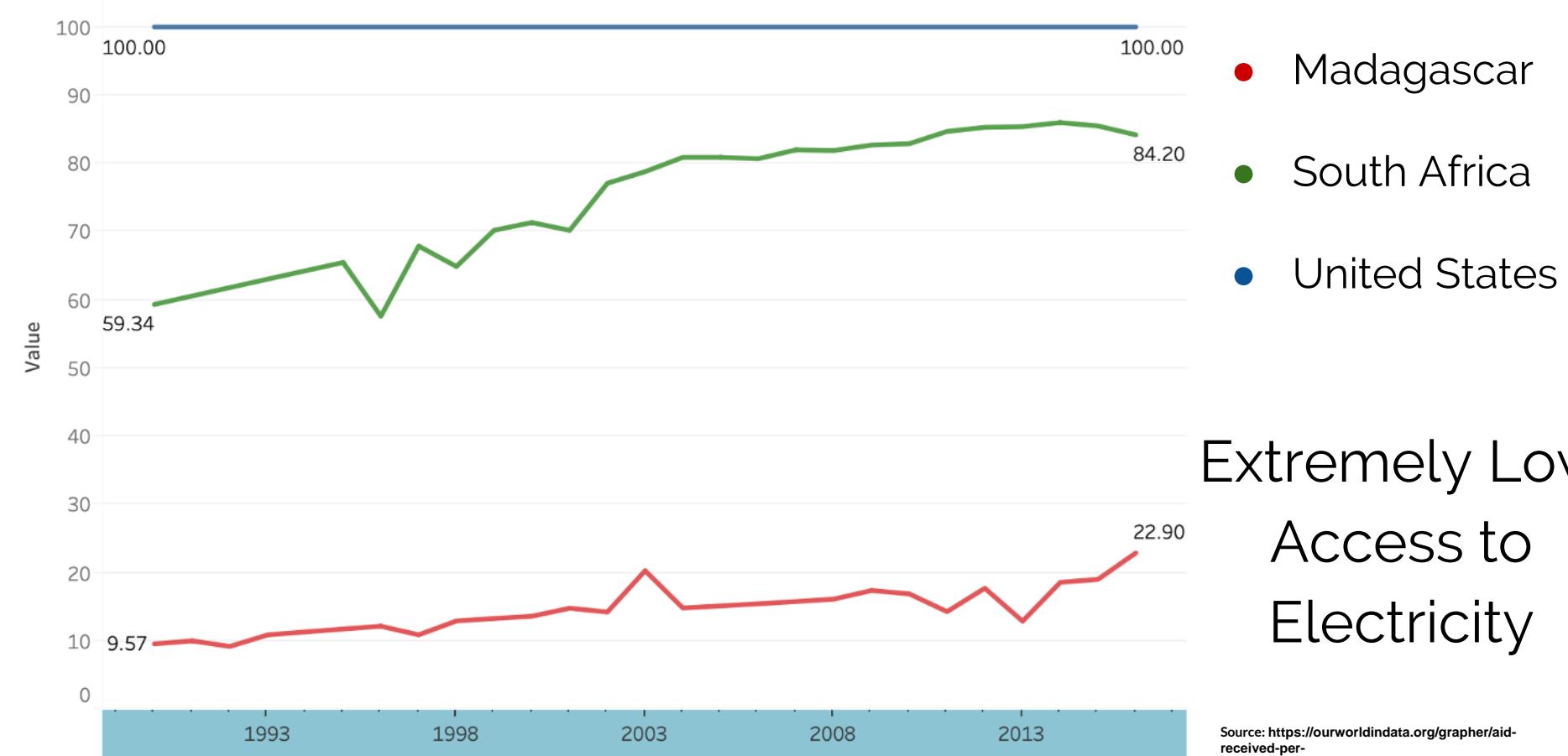


- Madagascar
- South Africa

# Reduced Aid to Madagascar

Source: <https://ourworldindata.org/grapher/aid-received-per-capita?tab=chart&time=2000..2016&country=MDG>

Electricity (%)



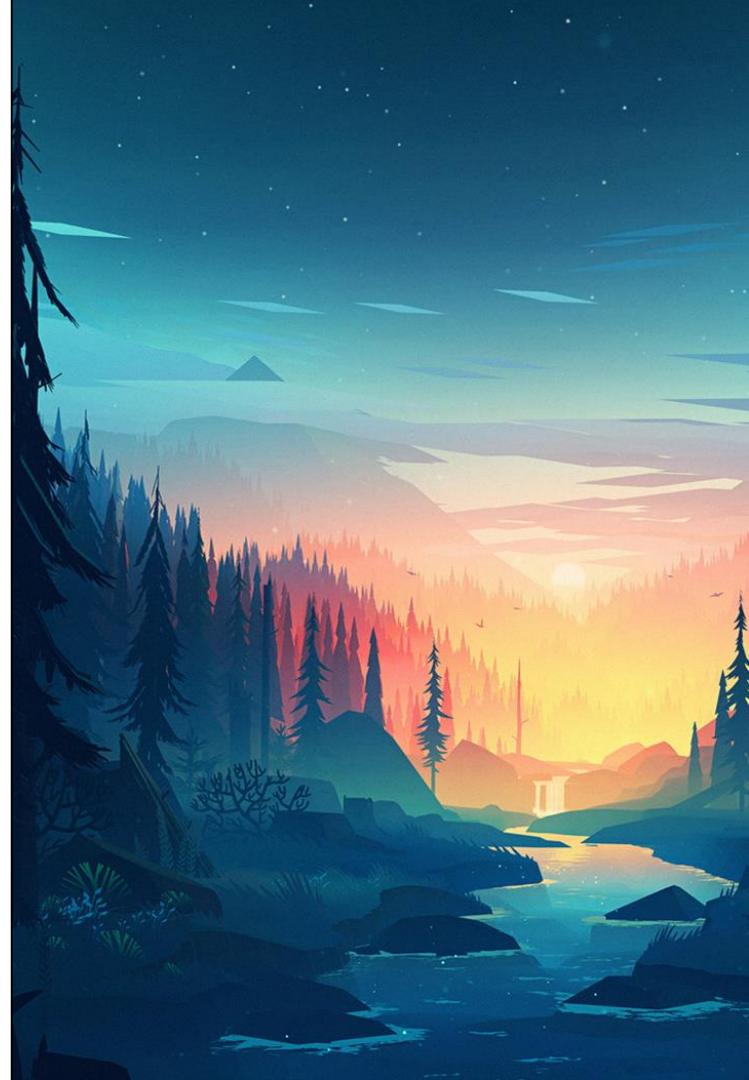
# Geolocation Data

## What

- Collected data on locations throughout Madagascar:
  - **Population**
  - **Elevation**
  - **Temperature**
  - **Rainfall**
- Aggregated ('91 to '16) to find seasonal averages

## Why

- Donors are interested in the climate in Madagascar
- Deforestation causes Global Warming



# Geolocational: Dashboard (Temp.)

March Through May in Madagascar

Explore Madagascar (Interactive)



Average Temperatures In Municipalities (March Through May)

Mahajanga	82	Ambanja	79	Toamasina	77	Toliara	77	Ambovombe	76	Beroroha	76	Farafangana	76	
Antsohihy	81		Antalaha	79										
Marovoay	81		Belo sur Tsiribihina	79	Mananjary	76	Andilamena	72	Tsiroanomandidy	72	Ihosy	71	Anjozorobe	69
					Beloha	75								
Antsiranana	80		Sambava	79			Ankazobe	69	Ranomafana	68	Antananarivo	67		
Maintirano	80		Manakara	77	Tolagnaro	75	Bealanana	69					Ambatolampy	65
Morondava	80				Ankazoabo	74	Fianarantsoa	68					Fandriana	65
		Nosy Varika	77											

# Geolocation: Dashboard (Temp.) Zoomed In

March Through May in Madagascar

Explore Madagascar (Interactive)



Average Temperatures In Municipalities (March Through May)



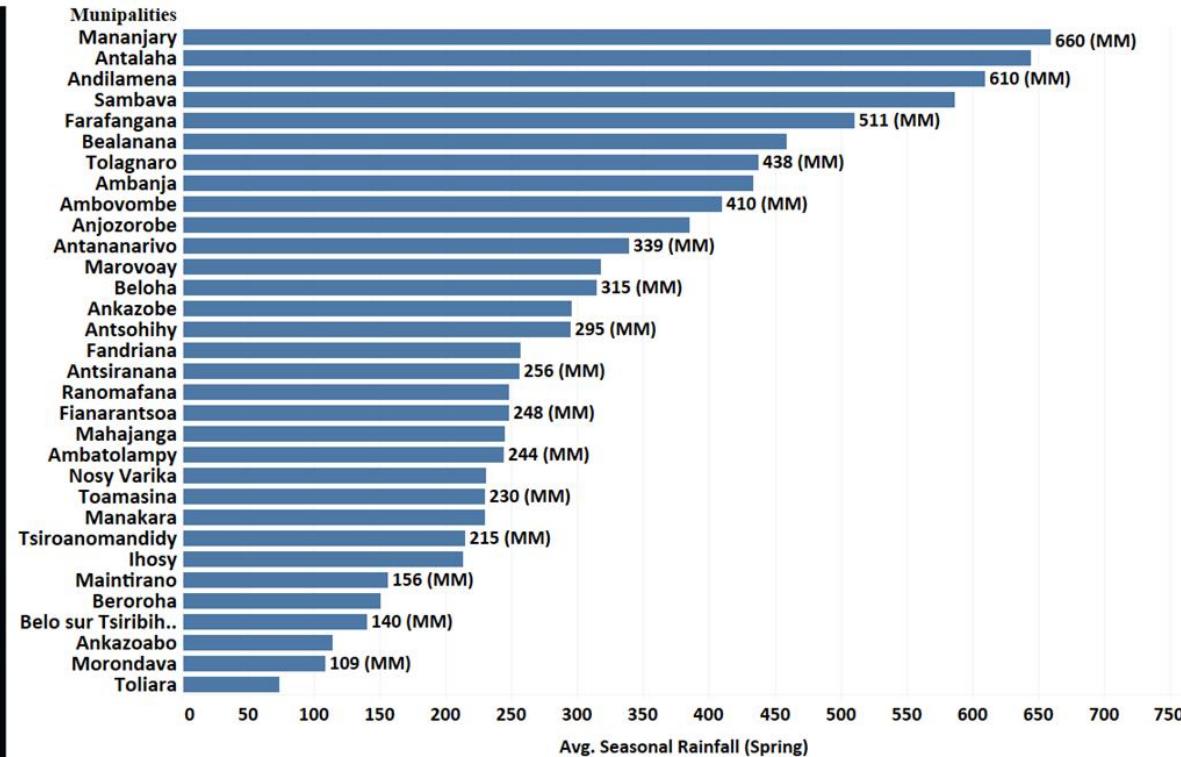
# Geolocational: Dashboard (Rain)

March Through May in Madagascar

Explore Madagascar (Interactive)



Average Rainfall (March Through May)



# Geolocation: Dashboard (Rain) Zoomed In

March Through May in Madagascar

Explore Madagascar (Interactive)



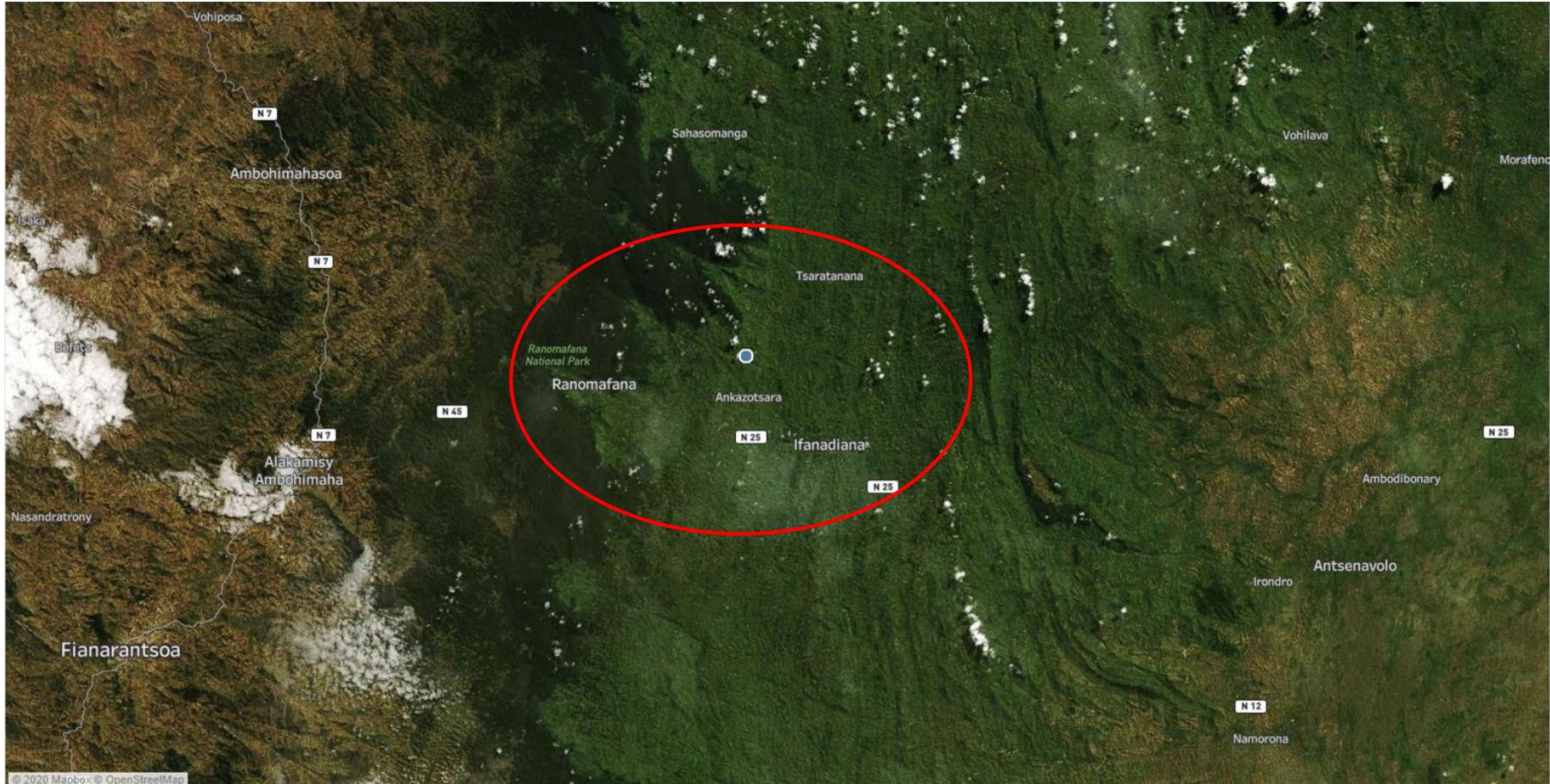
Average Rainfall (March Through May)

Municipalities

Ranomafana



# Where Are Trees Planted?



# Environmental Disasters Data

## What

- Collected data on 11 measures of environmental disaster damage, such as:
  - Deaths
  - Injured
  - Houses Destroyed, etc.
- Transformed Date field and removed outliers from key measure columns
- Applied One-Hot encoding to 'Event' column and estimated correlations between variables

## Why

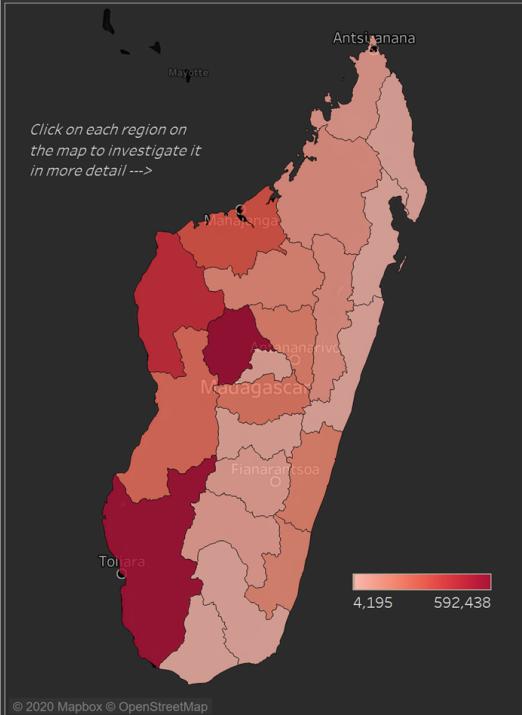
- Disasters destroy the environment throughout Madagascar
- Deforestation results in more environmental disasters



# Disasters Data: Dashboard (Interactive)

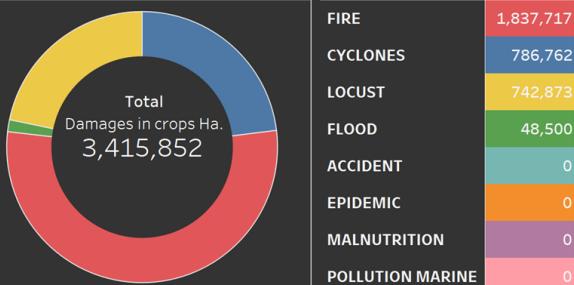
## Disaster Damage Analysis in Madagascar

Metric used: Damages in crops Ha.

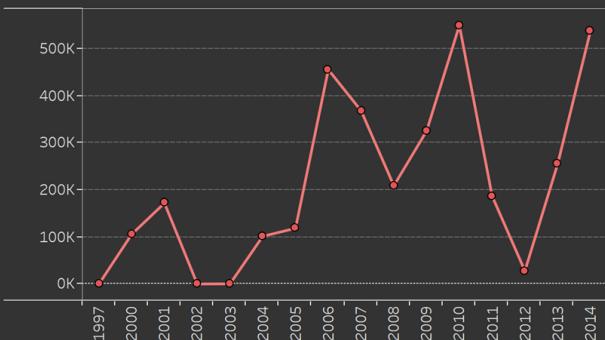


Choose Damage Metric  
Damages in crops Ha.

Damages in crops Ha. by Disaster Categories



Damages in crops Ha. over time



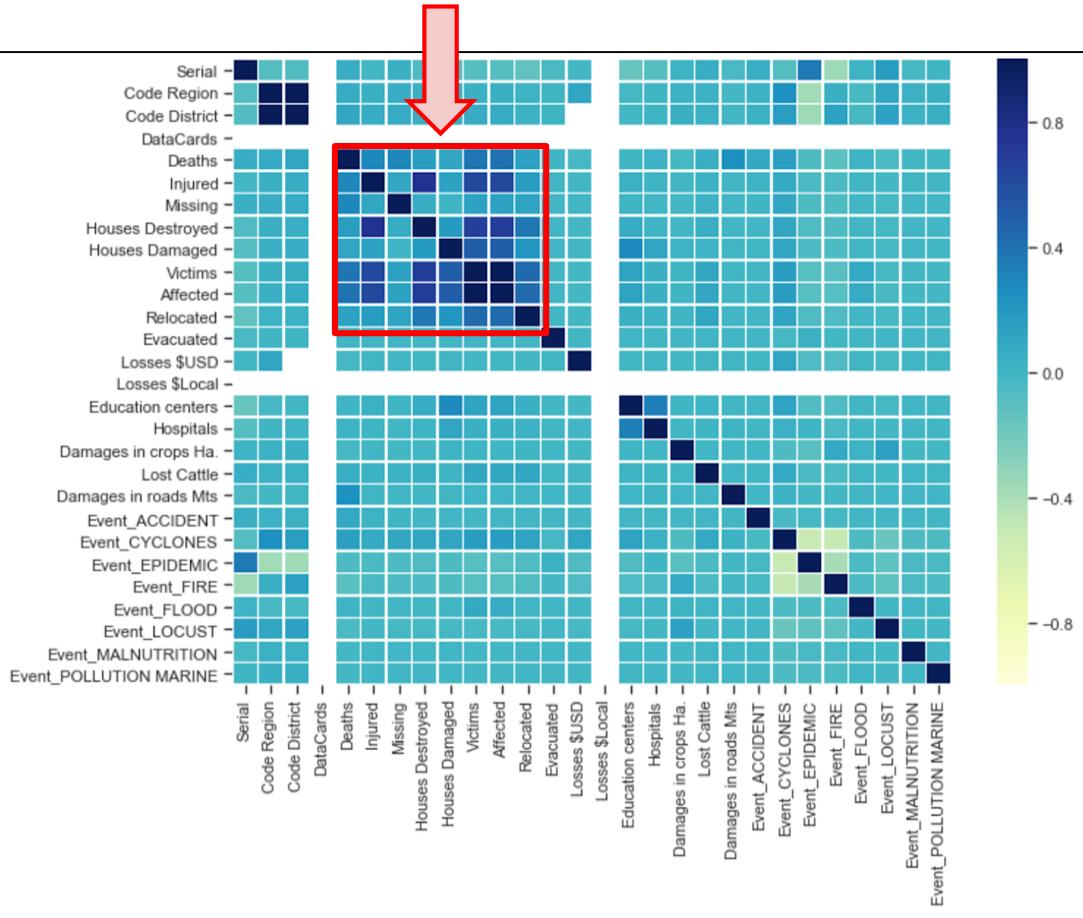
The Dashboard summarizes information on:

- Overall damage from different disasters by 8 metrics
- Areas of Madagascar that suffered the most
- Damage over time

Key insights:

- More than **2 million people** were injured by disasters over 20 years
- Over **400 thousand houses** were destroyed
- The total damage exceeded **1 billion US dollars**

# Disasters Data: Correlation Heat Map

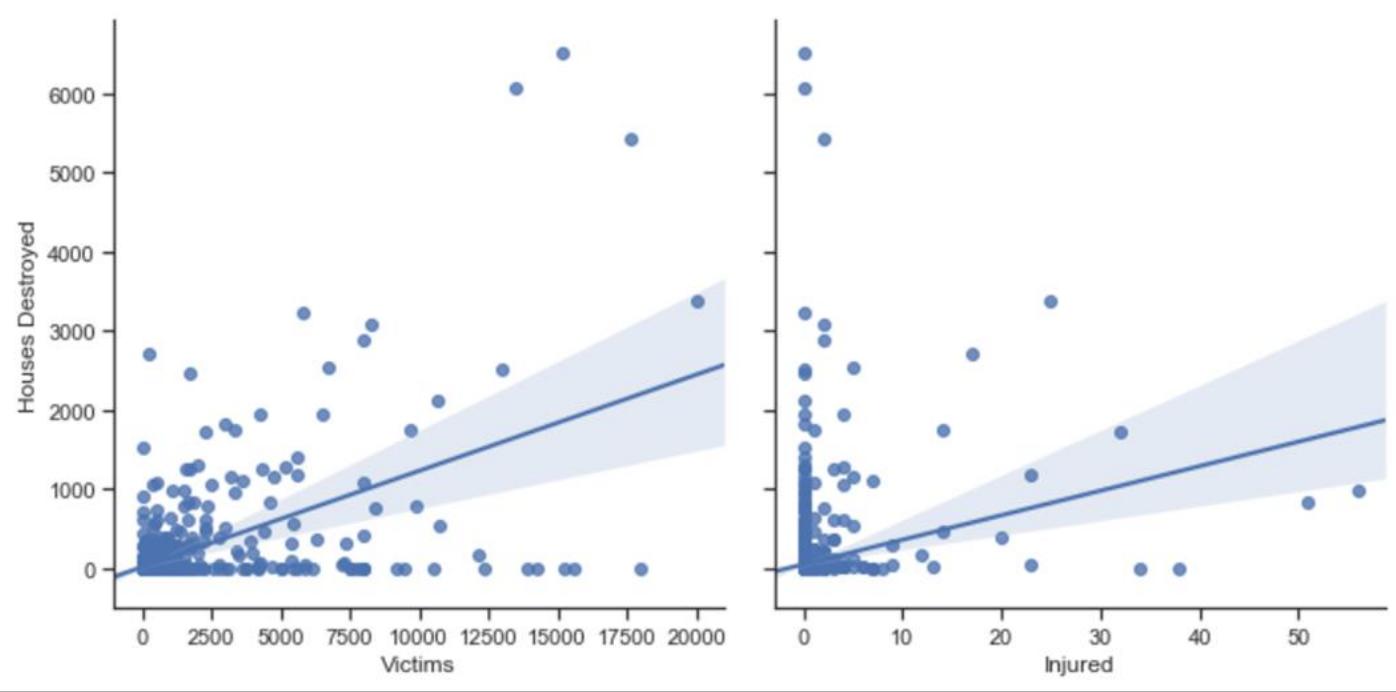


Variables with the highest correlation are 4 disaster damage metrics:

1. Affected
2. Victims
3. Injured
4. Houses Destroyed

Var1	Var2	Correlation
Affected	Victims	0.998
Houses Destroyed	Injured	0.770
Houses Destroyed	Affected	0.690
Houses Destroyed	Victims	0.687
Injured	Affected	0.623
Victims	Injured	0.620
Houses Damaged	Affected	0.506
Houses Damaged	Victims	0.506

# Disasters Data: Scatter Plots



- The measures of damage to people and property are positively correlated, which means most events affected both population and infrastructure.
- On average, each disaster caused damage to 5000 people and 200 houses.

# Lemurs

When I mention that my final project is about data from trees in Madagascar, and how to keep donors engaged, people right away say: "Lemurs?!"

"Madagascar, the movie?!"



Best way to keep our donors happy and engaged → give them a **face** attached to their donation



# MADAGASCAR

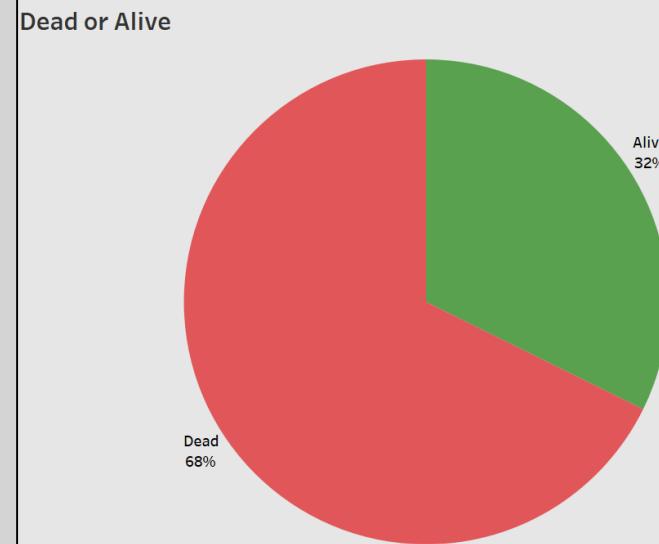
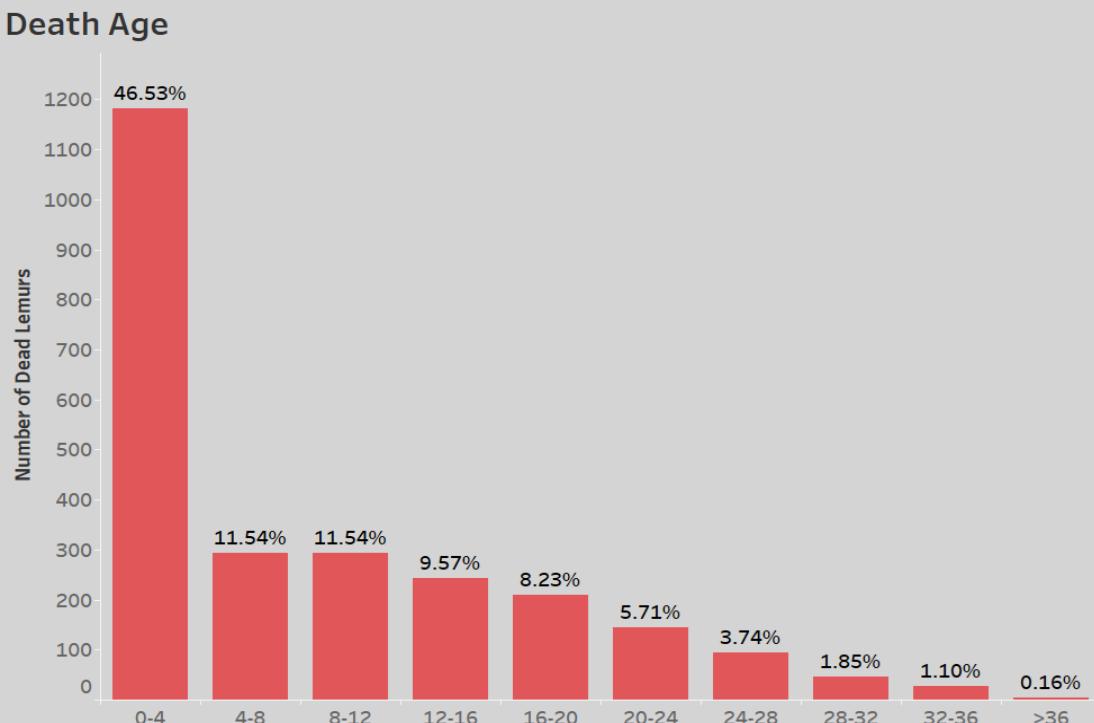


# Lemur Data

- Duke Lemur Center: world leader in the study, care, and protection of lemurs.
- Analyzed data for ~3,700 lemurs.
- From 2014 to 2019, the lemur population **increased by 3.5%.**



# Lemurs: Mortality Rate



Baby lemurs are at the highest risk of death.

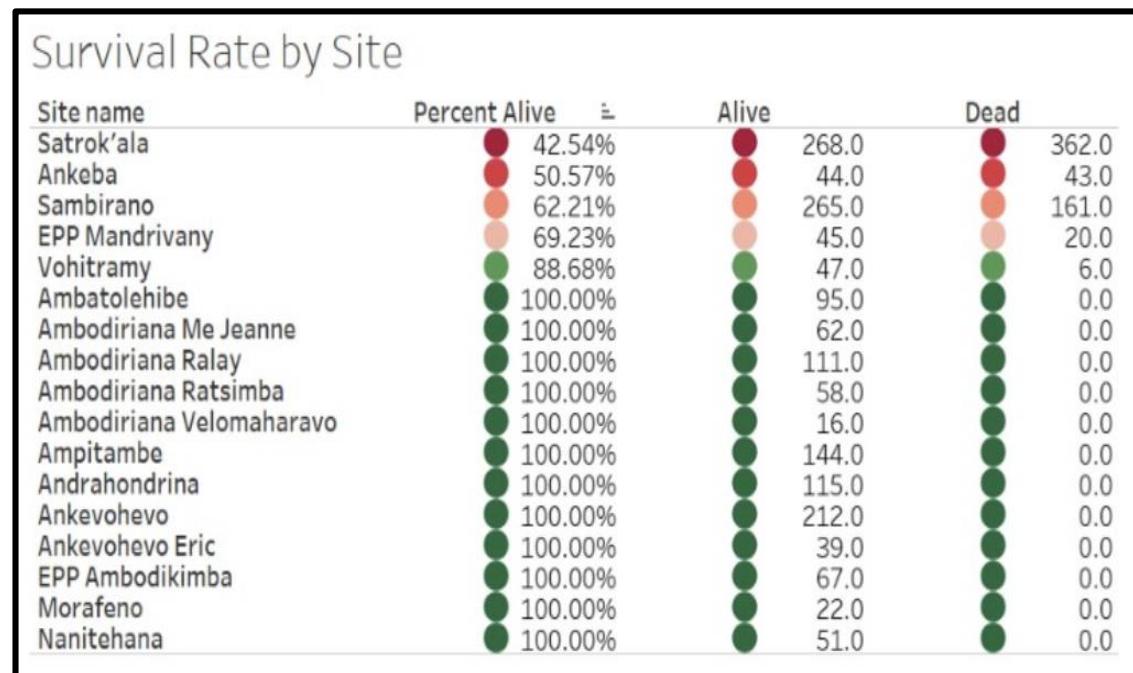
# How Planting Trees Can Save Lemurs

- Madagascar has lost nearly half (**44%**) of its forests **within the last 60 years**
- Deforestation alone could eliminate lemurs' entire eastern rainforest habitat
- Lemurs **depend on habitat cover to survive**
- Reforestation provides lemurs a habitat to hide from predators



# Seneca Park Zoo's Efforts Are Successful!

- The majority of tree-planting sites have a survival rate of 100%
- There are some sites we've identified as in danger:
  - **Satrok'ala**
  - **Ankeba**
  - **Sambirano**
- The survival of trees is vital for the protection of lemurs



# Data Warehouse ER Diagram

## Relationships:

- Years to disasters (one-to-many)
- Years to Cities (one-to-many)
- Years to Demographics (one-to-one)
- Years to Lemurs (one-to-Many)





# Going Further

- We have visualizations that will increase donor awareness of Madagascar
- We have formalized the data gathering steps in a written document
- You will have access to a MySQL data warehouse
- Other analysts can use this data to advance your tree-planting efforts in the future

# Deliverables

- Formatted data
- Methodology for updating data
- ER Diagram for data
- MySQL Script to create ERD
- Tableau Workbooks





# Summary

- Use enriched data to connect donors:
  - a. **Demographics** → Connect to the people of Madagascar
  - b. **Geolocation** → Show donors what living in Madagascar is like
  - c. **Disasters** → Deforestation causes Climate Change
  - d. **Lemurs** → Planting a tree can save lives of animals

# Questions & Answers