Exploring Electricity, Latrine and Water Access Data in India

with sf, leaflet and shiny

Sean Angiolillo

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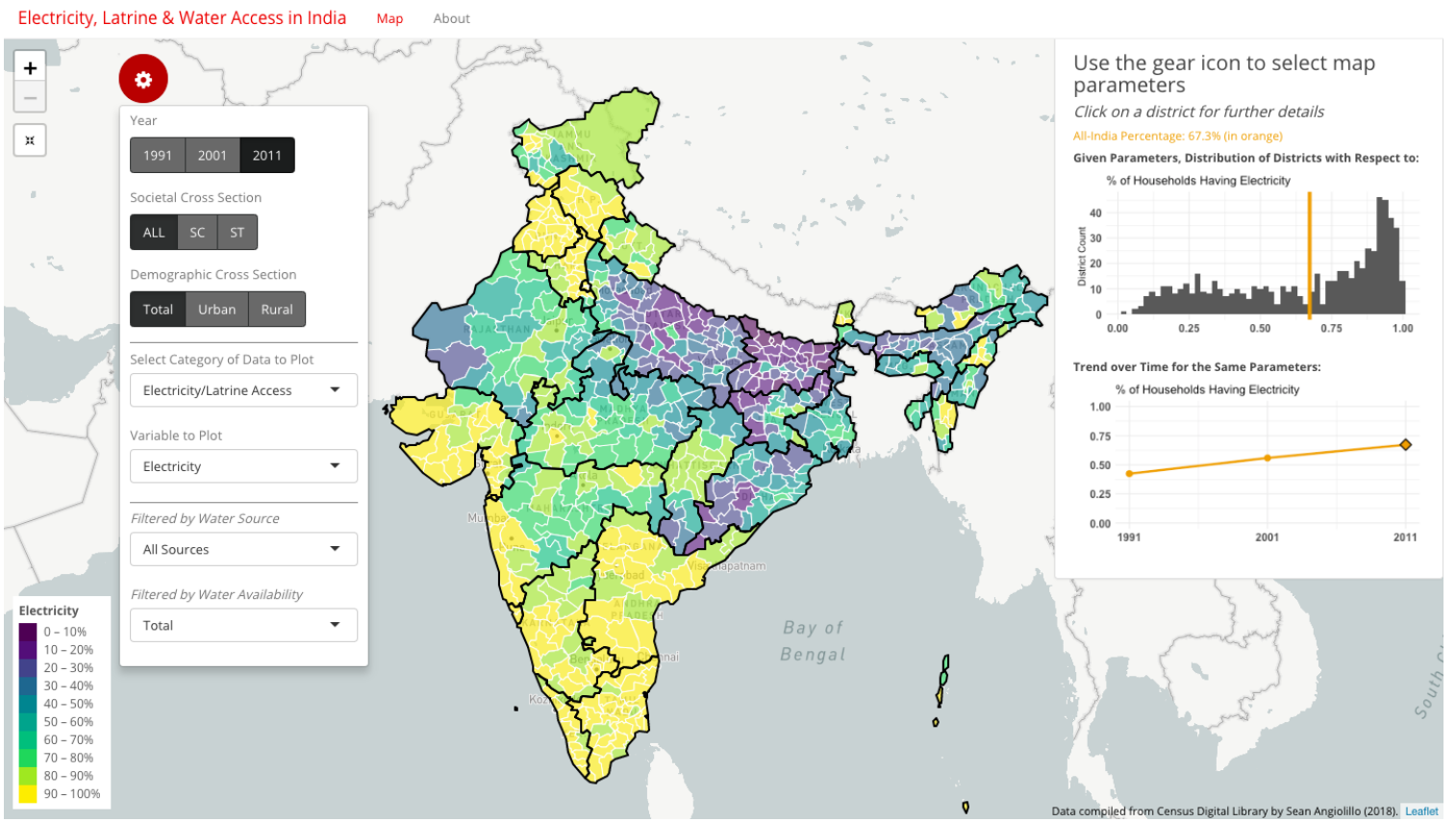


App: https://seanangio.shinyapps.io/in_household/

Data Source: GOI Census Digital Library

Approaches to Explore the Data

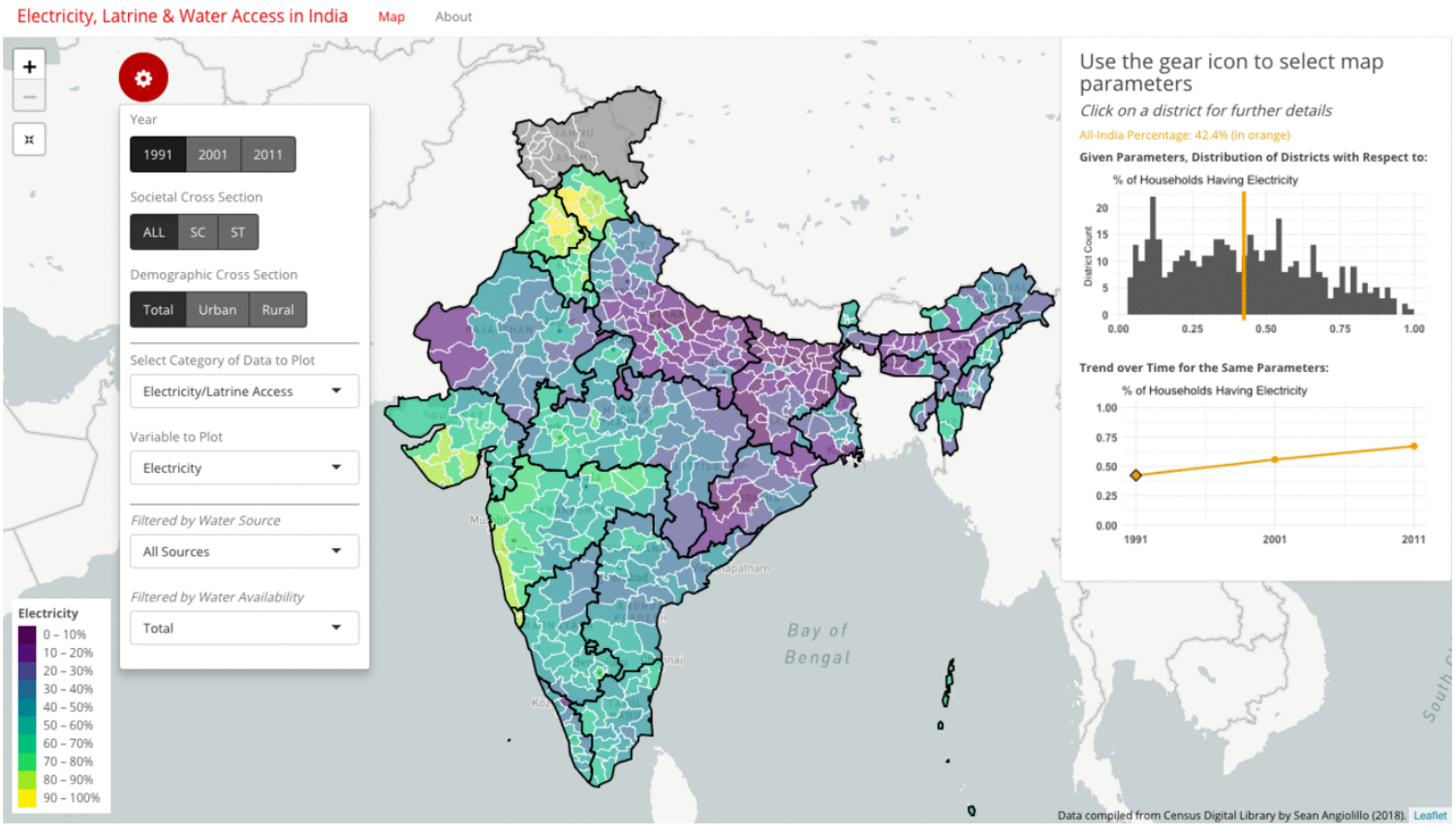
Track a Metric Over Time

Track a District Over Time

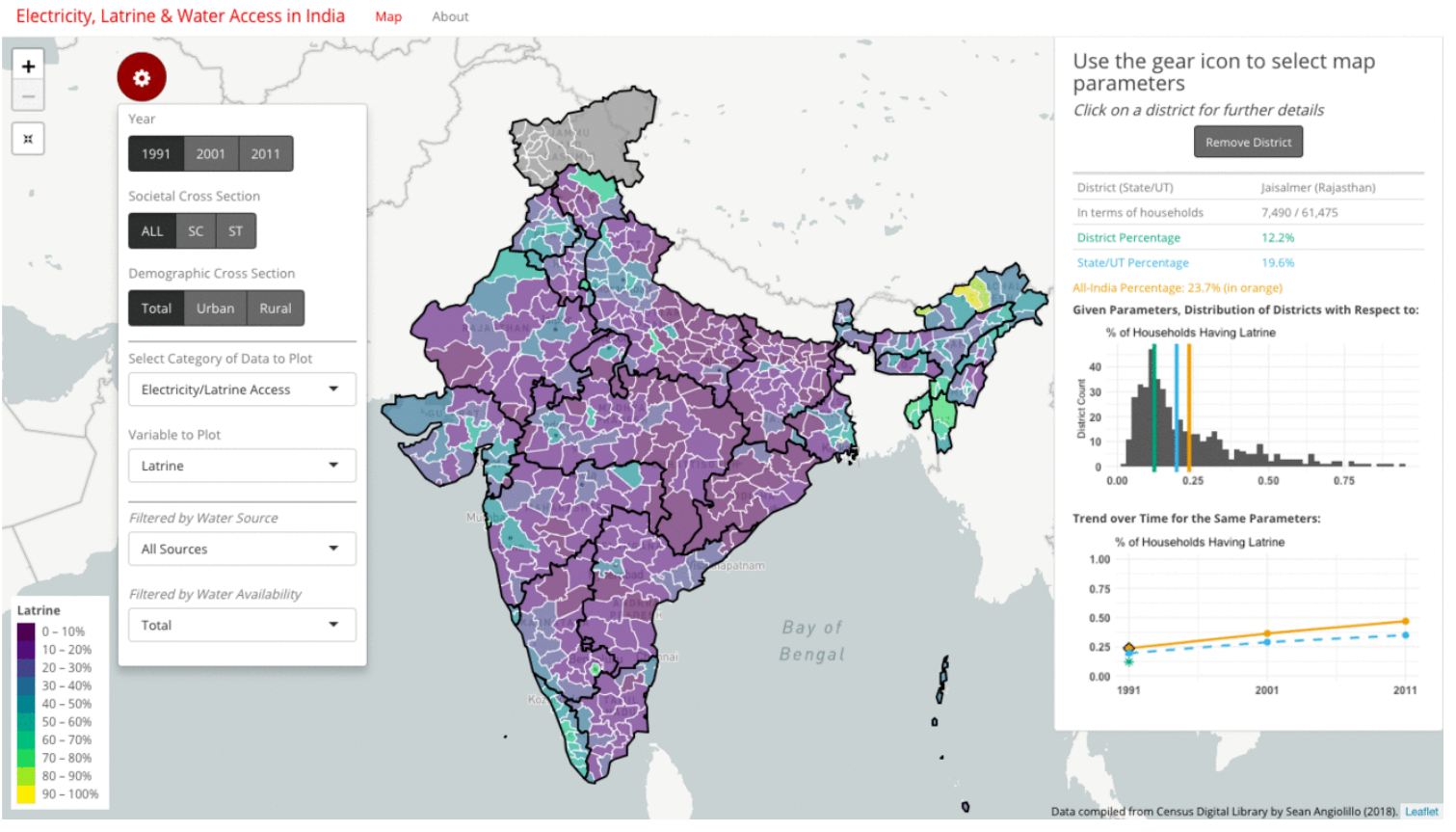
Compare Urban vs. Rural Households

Compare SC/ST vs. All Households

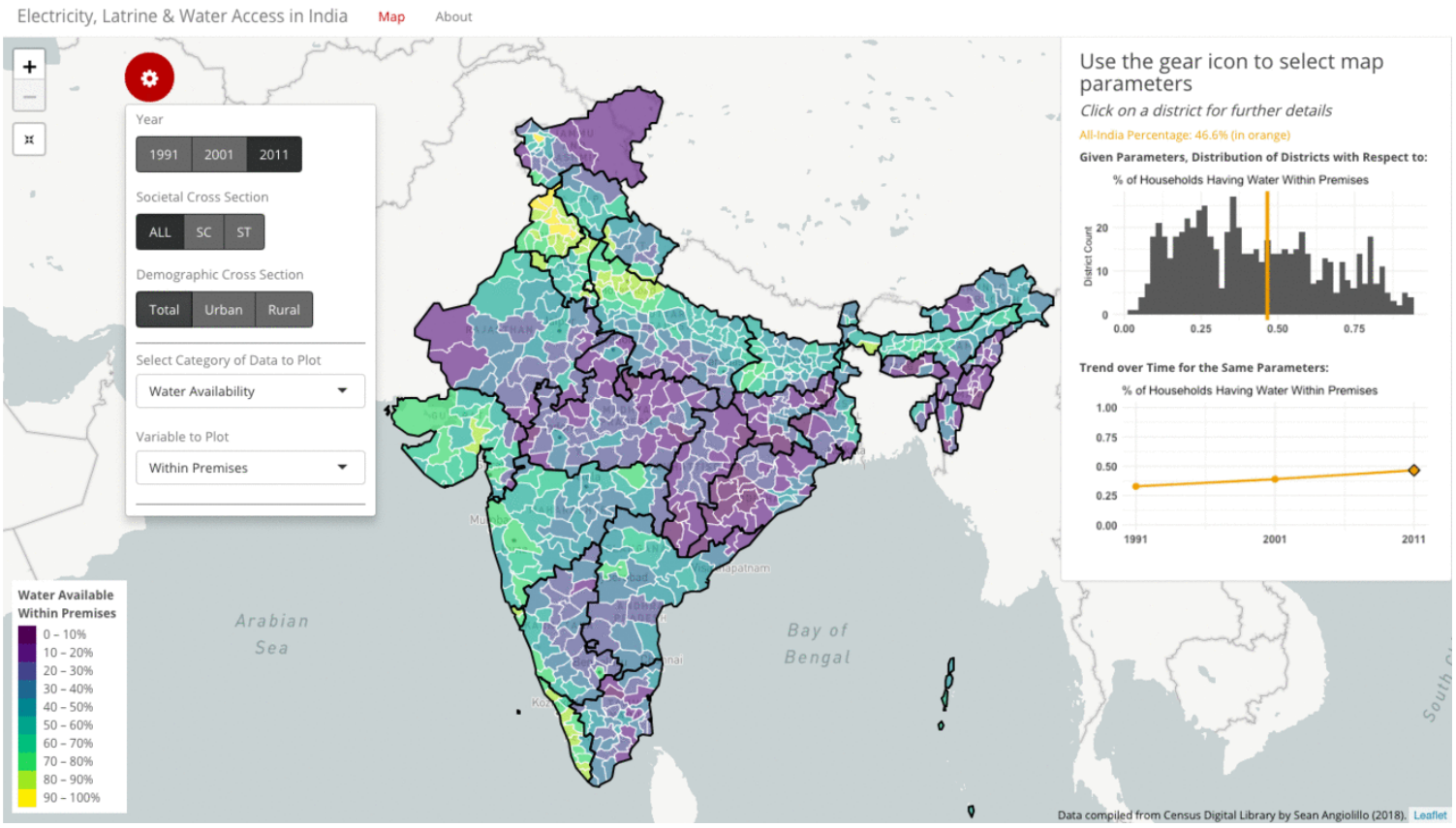
Check Household Density



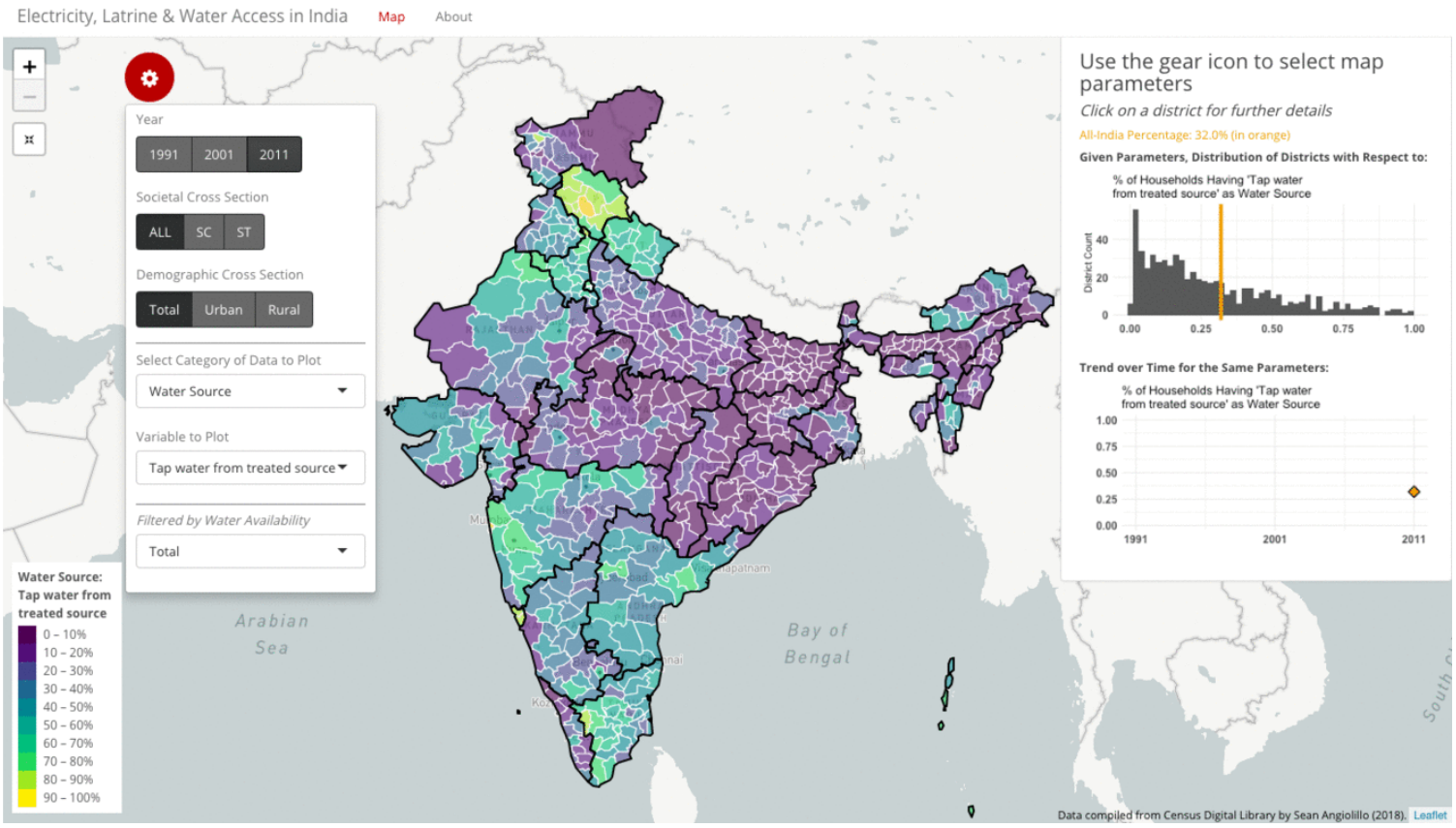
Track a Metric Over Time: Electricity Access



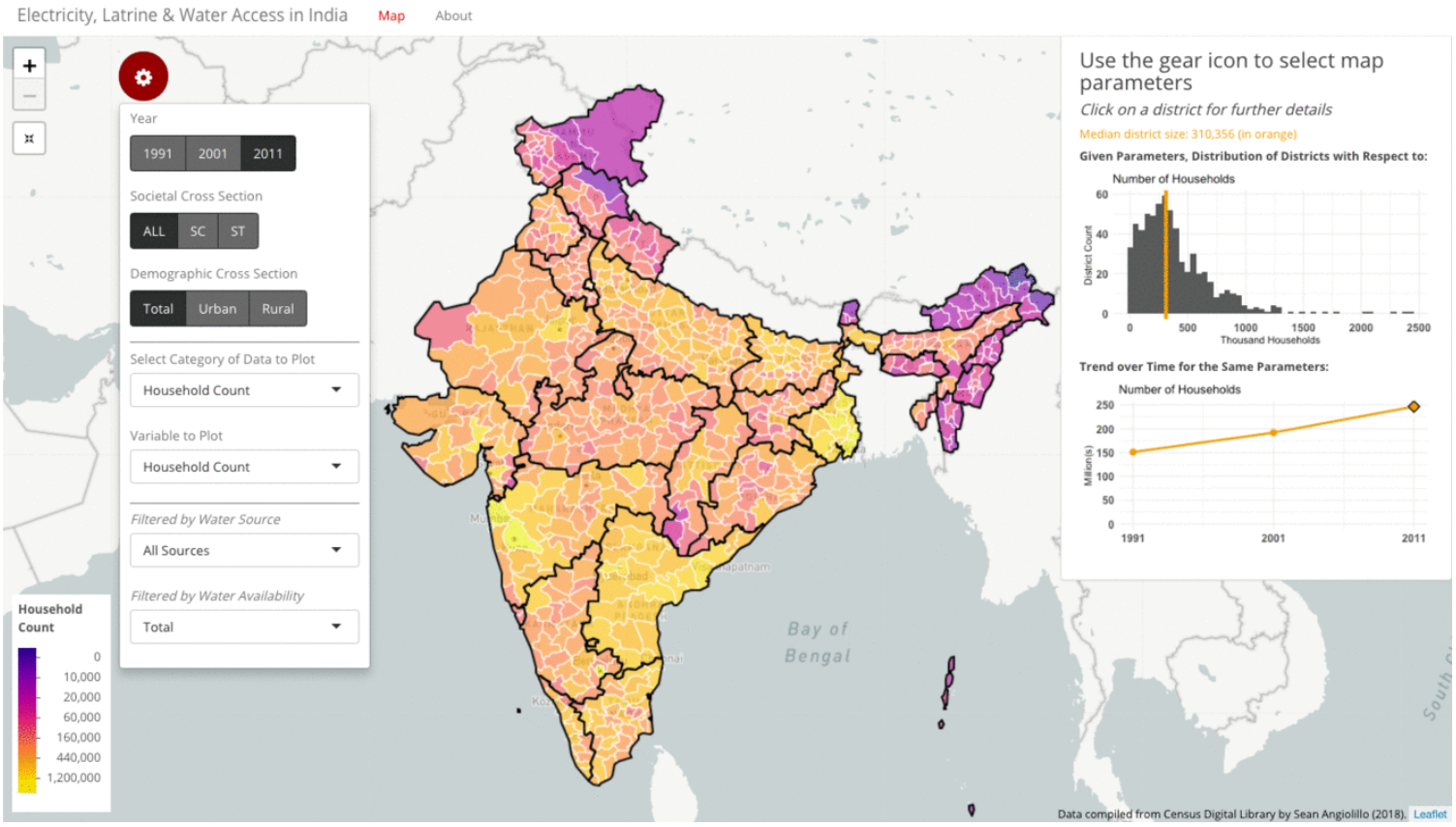
Track a District Over Time: Latrine Access in Jaisalmer, Rajasthan



Compare Urban vs. Rural Households: Water Availability Within Premises (2011)



Compare SC/ST vs. All Households: Treated Tap Water as Water Source (2011)



Check Household Density: Zoom to see 9 Delhi Districts (2011)

App Anatomy

1. Wrangle the Data => dplyr, etc

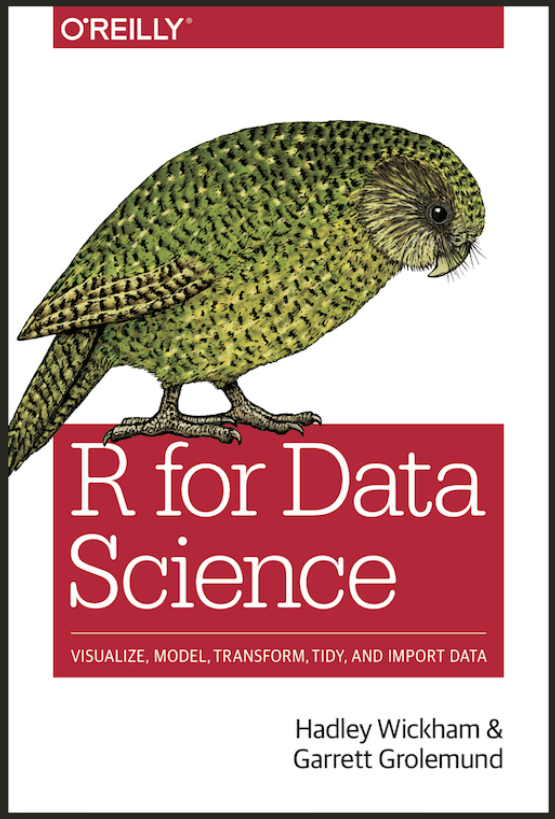
2. Join Spatial Polygons => sf

3. Draw the Map => leaflet

4. Make it Interactive => shiny

1. Learn the

https://r4ds.had.co.nz/



Data Wrangling Goal => A tidy dataframe

Data Wrangling Tips

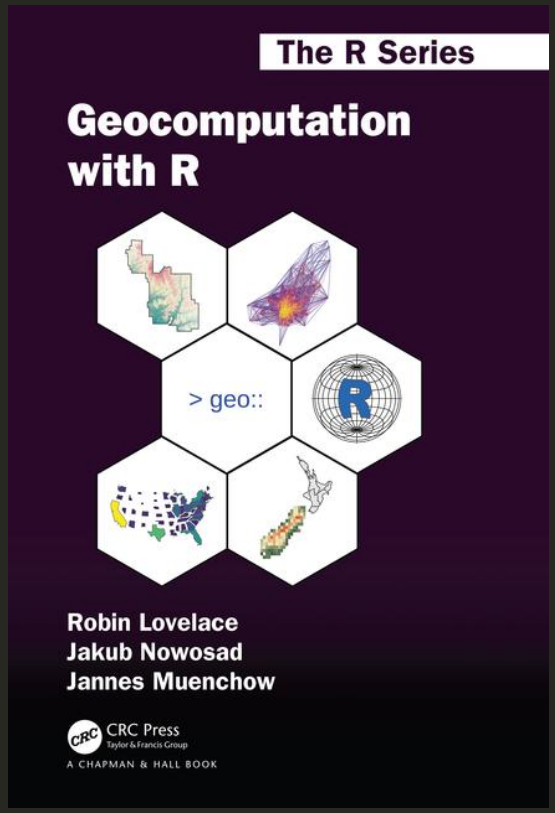
District names are not unique identifiers.

Check for multiple sheets when reading Excel files.

Implicitly missing data (e.g. STs in Punjab) =>

2. Learn how to work with geospatial data

https://geocompr.robinlovelace.net/



Join Tidy Data, Spatial Polygons =>

Spatial Joining Tips

Match differently-spelled census and spatial district names =>

Simplify polygons before joining =>

3a. Learn

https://rstudio.github.io/leaflet/

Abhinav Agrawal YouTube Series on "Leaflet Package in R"

Draw the Map =>

Leaflet Tips

Solve layer issues (e.g. between district shapes and state border lines) =>

Custom Mapbox tiles =>

Capture events like clicks, mouseovers =>

Avoid redrawing the entire map each instance =>

3b. Learn Geospatial Data Visualisation

Kieran Healy, Data Visualization: A Practical Introduction

http://socviz.co/maps.html#maps

Claus O. Wilke, Fundamentals of Data Visualization

https://serialmentor.com/dataviz/geospatial-data.html

A Few Visualization Choices

Districts vary widely in area and population ==> plot Household Counts

Percentage data maps colors to decile; Logarithmic scale for Household Count data

Colorblind-friendly color scales ==> viridis, Okabe-Ito

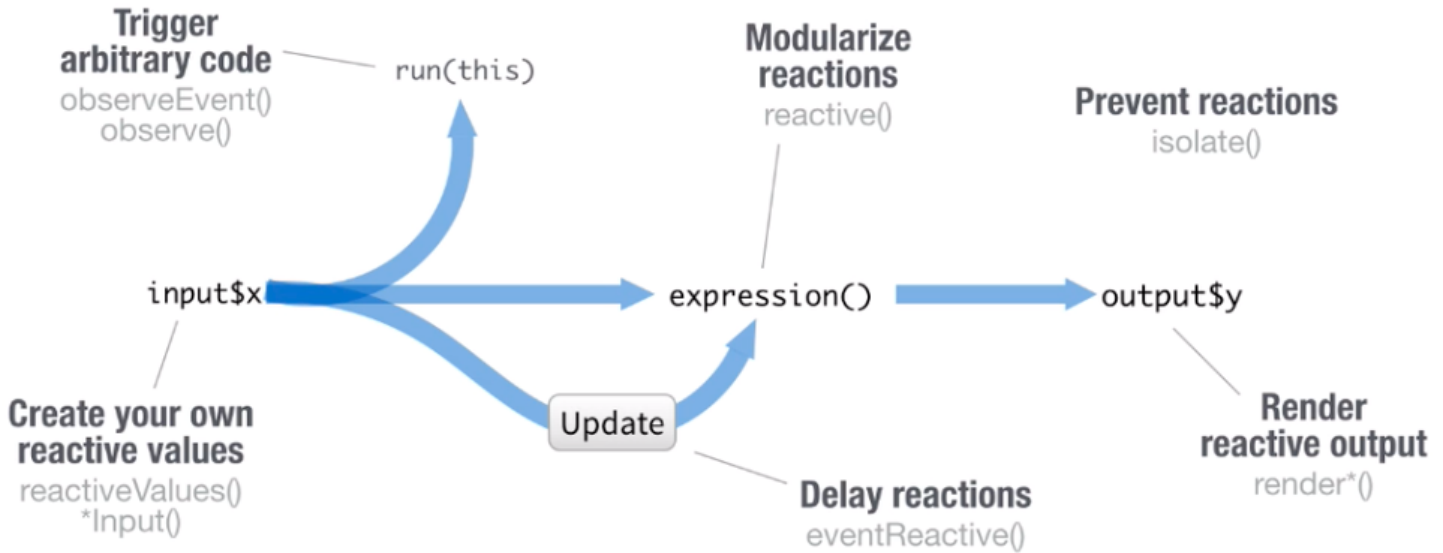
Frequent district boundaries changes makes trend plotting difficult ==> plot more consistent state trend instead

4. Learn

https://shiny.rstudio.com/tutorial/

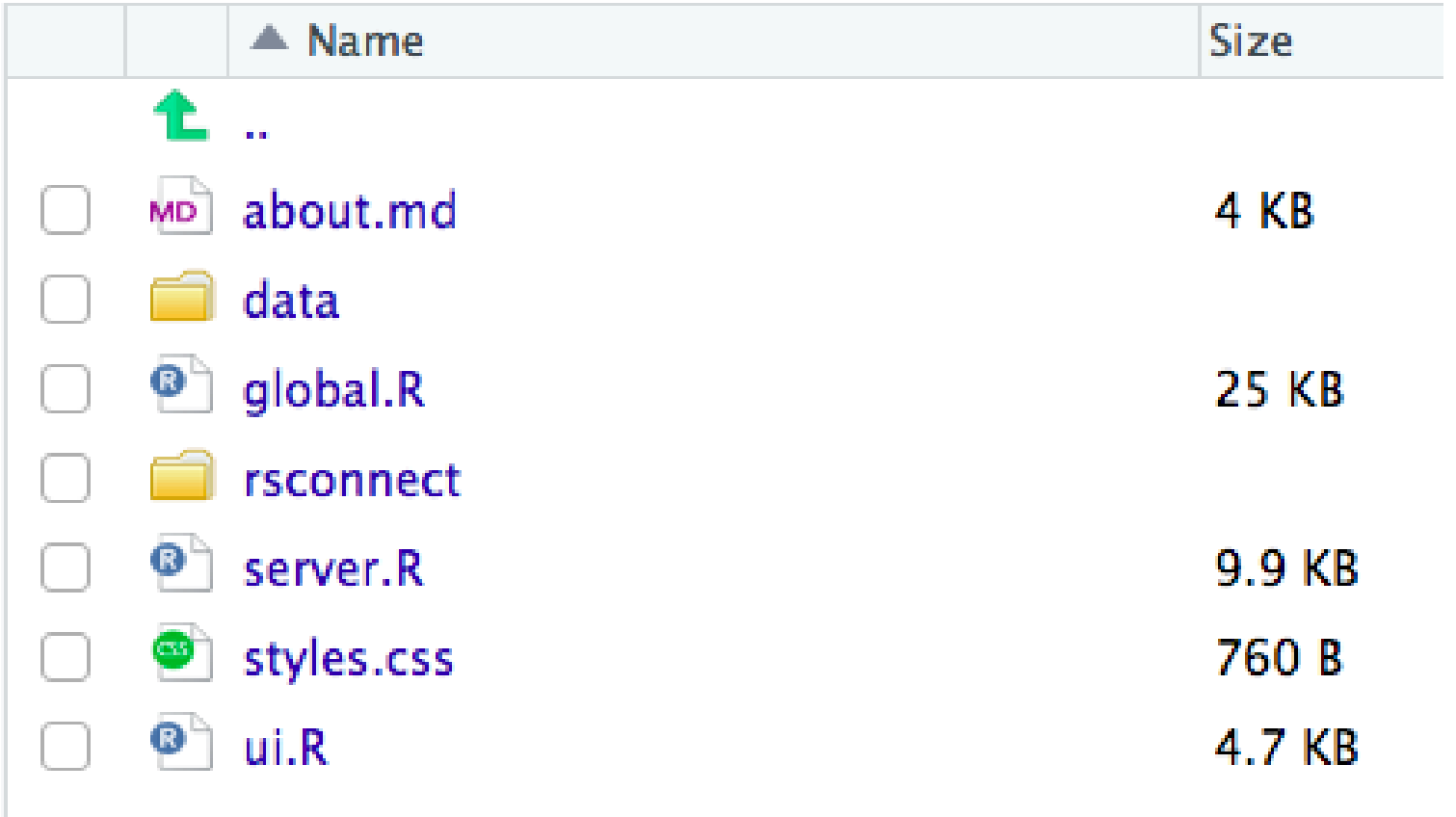
A Very Simple Shiny App

Shiny turns inputs into outputs



Source: How to Start with Shiny Tutorial, Garrett Grolemund

A Shiny Project Directory



Structuring Shiny UI

Choose an application layout => ,

Build dynamic UI => ,

Styling Shiny UI

Select a theme =>

Style CSS =>

Explore extra widgets =>

Add waiting effects =>

Shiny Server: Update UI

Note: Likely not most efficient solution!

Shiny Server: Reactive Expressions

Shiny Server: Map Drawing

Shiny Server: District Click Event (1)

Shiny Server: District Click Event (2)

Thanks!

App: https://seanangio.shinyapps.io/in_household/

Code: https://github.com/seanangio/in_household

Other projects: https://sean.rbind.io/