



# afrimapr

Creating reusable R building blocks  
for mapping data in Africa in 2020

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“Open data in Africa needs a vibrant, dynamic, open and multi-tier data ecosystem if the datasets are to make a real impact. [...] democratization of information and communication platforms has opened up opportunities among a large and diverse set of intermediaries to explore and combine relevant data sources, sometimes with private or leaked data.”

*Africa Data Revolution Report 2018*  
*Van Belle et al. Commissioned by UNDP, UNECA, WF, OD4D*  
<https://webfoundation.org/docs/2019/03/Africa-data-revolution-report.pdf>

# Collaborators



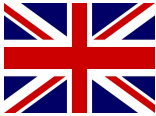
Dr Andy South

- *Liverpool School of Tropical Medicine, UK*



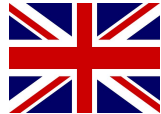
Dr Paula Moraga

- *Lancaster University, UK*



Dr Julie-Anne Tangena

- *Liverpool School of Tropical Medicine, UK*



Dr Robin Lovelace

- *University of Leeds, UK*



Dr Margareth Gfrerer

- *Education Strategy Center, Ethiopia*



Anelda van der Walt

- *Talarify*

# About the project

- 1 year funded project (Jan - Dec 2020)
- R building blocks will make it easier to perform spatial data management tasks
- Designed for ease of use to target newer users of R
- Workshops in Liverpool, Ethiopia, Malawi and South Africa

# Funding: Wellcome Open Research Fund

Supports researchers to develop and test innovative ways of making health research open, accessible and reusable

**Career stage:** Postdoctoral Research

**Level of funding:** Up to £50,000

**Duration of funding:** Up to one year

**Eligibility:** Open to individuals or teams of up to six members

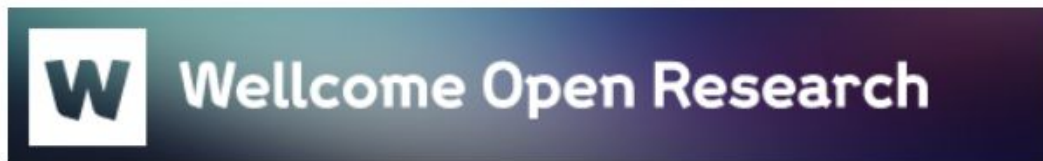
Applicants can be based anywhere in the world (not mainland China)

Academics, non-profits, private sector

<https://wellcome.ac.uk/funding/schemes/open-research-fund>

# What have been done to date?

Journal List > Wellcome Open Res > v.4; 2019 > PMC6915811



Version 2. [Wellcome Open Res.](#) 2019; 4: 151.

PMCID: PMC6915811

Published online 2019 Dec 2. doi: [10.12688/wellcomeopenres.15495.2](https://doi.org/10.12688/wellcomeopenres.15495.2)

[Other versions](#)

PMID: [31886410](#)

## Malaria Data by District: An open-source web application for increasing access to malaria information

[Sean Tomlinson](#), Conceptualization, Methodology, Project Administration, Software, Writing – Original Draft Preparation, Writing – Review & Editing,<sup>#a,1,2</sup> [Andy South](#), Conceptualization, Methodology, Project Administration, Software, Writing – Review & Editing,<sup>b,1</sup> and [Joshua Longbottom](#), Conceptualization, Methodology, Project Administration, Software, Writing – Original Draft Preparation, Writing – Review & Editing<sup>#1,2</sup>

# Malaria Data by District Web App

Malaria Atlas Project + FAO Admin Boundaries + Shiny + Leaflet

MaDD is a shiny app that allows easy interaction with summary statistics and plots for data provided by the Malaria Atlas Project: [MAP Homepage](#)

More information can be found in the help tab.

Country :  

Kenya

Data to show and compare :

- ☒ Malaria in children (Falciparum)
- ☐ Malaria incidence (Falciparum)
- ☐ Insecticide Treated Net distribution
- ☐ Travel time to nearest city

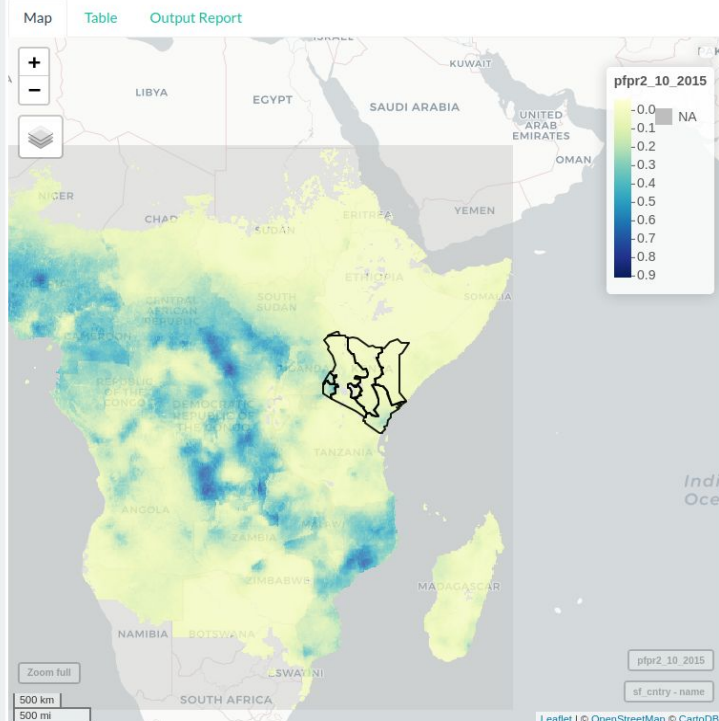
First layer is shown in map, other layers included in 'Output'

Select first-level administrative division (min 2):

- ☒ Administrative unit not available
- ☒ Central
- ☒ Rift Valley
- ☒ Nairobi
- ☒ Western
- ☒ Nyanza
- ☒ Eastern
- ☒ Coast
- ☒ North Eastern

Generate Report

Download File ...



<https://seantomlinson30.shinyapps.io/shiny-map-prize/>

**That was a prototype made in the UK...**

**The afrimapr project will make it easier  
to design similar applications  
in Africa**



# Building blocks

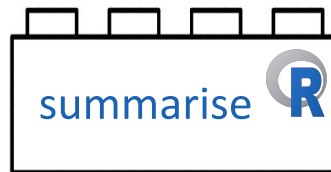
public data



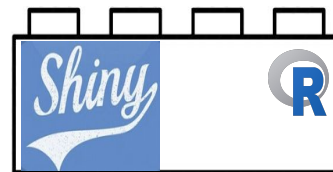
admin boundaries



data manipulation



web interface



# Mapping publicly available data...

## ... but where can we get open data

### The Humanitarian Data Exchange

Find, share and use humanitarian data all in one place

Data [17497]

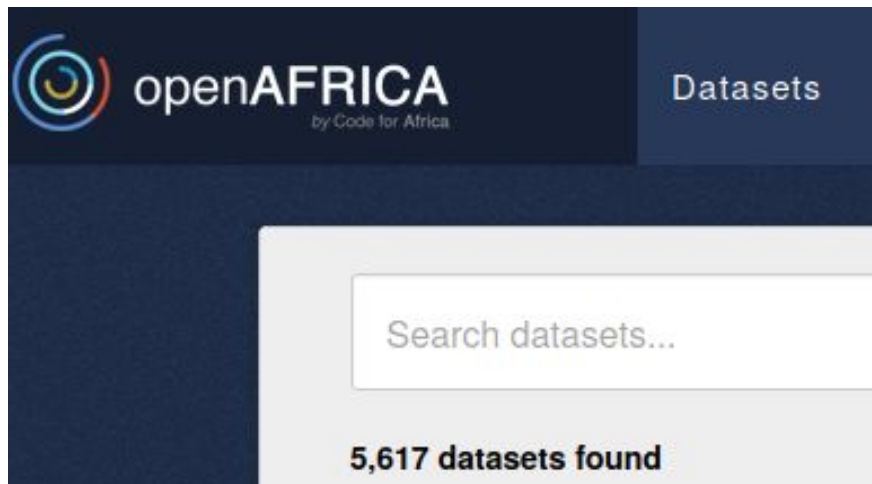
Search all datasets ...



AFRICAN DEVELOPMENT BANK GROUP



Data Portal



<https://open.africa/>

<https://data.humdata.org/>

<https://projectsportal.afdb.org/dataportal>

... and, and, and...

## Directory of Data Repositories in Africa (DODRIA)

The website provides access to Africa's research data sets

**re3data.org**  
REGISTRY OF RESEARCH DATA REPOSITORIES

 Search

OpenDOAR

Browse

Search

Statistics

Policy Tool

Our APIs

Browse by Country and Region

Countries by Region (5315)

**Africa** (218)

Eastern Africa (86)

Middle Africa (1)

Northern Africa (41)

Southern Africa (50)

Western Africa (40)

<http://v2.sherpa.ac.uk/opendoar/>

<https://www.re3data.org/>

<https://researchdatadirectoryonafrica.com/>

# Join & display data by admin region names...

## ... but where do we get administrative boundaries?

- Governments
- UN Agencies, NGOs and International NGOs
- Universities or research institutions
- Information Technology Outreach Services
- Technical NGOs (GIS Corps, MapAction, Open Street Maps)
- Information Management Working Groups at global levels

# Administrative boundary sources

Somewhat Authoritative	Advantages	Disadvantages
Global Admin Unit Layers (GAUL) by Food & Agriculture Organisation of UN	Endorsed by national govts	Not regularly updated (2014) Access not so easy
Global Admin Areas (GADM)	More accurate than GAUL Updated regularly (2018)	No historical/conflicting overlap Not endorsed by national govts Data not always clear
Secondary Administrative Level Boundaries	Provide admin level 1 & 2	Not updated since 2014
WHO polio health boundaries	Admin 1 & 2 Entire world's health-related boundaries Historical changes since 2000	Not sure how this can be shared outside of WHO

# Administrative boundary sources

Not Authoritative	Advantages	Disadvantages
Open Street Map	Data is open Data can easily be downloaded	Original sources not always known
Google Maps	Freely available	Should only be used as reference

# Challenges of administrative boundaries

Country	Administrative divisions <span>[hide]</span>			
	First-level	Second-level	Third-level	Fourth-level
 Afghanistan	34 <i>velaya'at</i> <sup>pro</sup>	398 <i>woleswali</i> <sup>dis</sup>		
 Albania	12 <i>qarqe</i> <sup>count</sup>	61 <i>bashki</i> <sup>m</sup>		
 Algeria	48 <i>wilayas</i> <sup>pro</sup>	553 <i>daïras</i> <sup>dis</sup>	1,541 <i>baladiyahs</i> <sup>com</sup>	
 Andorra	7 <i>parròquies</i> <sup>pa</sup>			
 Angola	18 <i>províncias</i> <sup>pro</sup>	163 <i>municípios</i> <sup>m</sup>	618 <i>comunas</i> <sup>com</sup>	
 South Africa	9 provinces	44 district municipalities	205 local municipalities	4392 wards
		8 metropolitan municipalities		
 South Korea	8 <i>do</i> <sup>pro</sup>	75 <i>si</i> <sup>ci</sup>	<i>gu (ku)</i> <sup>dis</sup> [52]	<i>dong</i> <sup>[8]</sup> <i>ri</i> <sup>[32]</sup>
		77 <i>gun (kun)</i> <sup>count</sup>	<i>dong</i> <sup>[8]</sup> <i>eup</i> <sup>[26]</sup> <i>myeon</i> <sup>[27]</sup>	

[https://en.wikipedia.org/wiki/List\\_of\\_administrative\\_divisions\\_by\\_country](https://en.wikipedia.org/wiki/List_of_administrative_divisions_by_country)

## Challenges of administrative boundaries

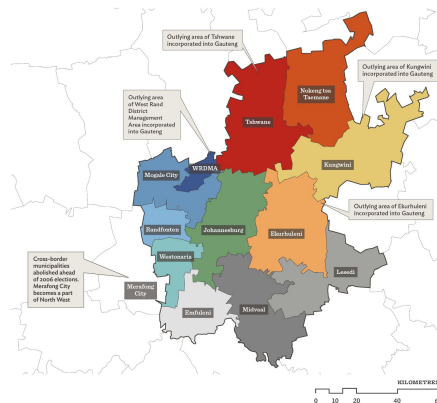
“Municipalities in Gauteng have undergone a significant spatial metamorphosis since 2000 as a result of re-demarcation.”

*Thembani Mkhize, Samkelisiwe Khanyile*

## 2000 - 2005



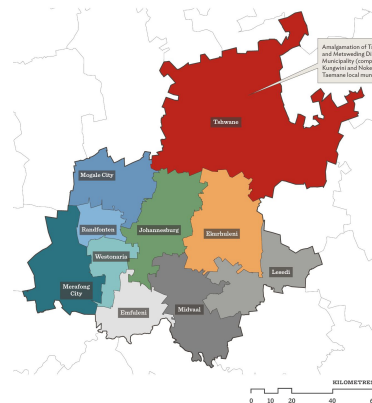
# 2006



# 2009



# 2011





# Challenges of administrative boundaries

“The subnational boundaries are dynamic and vary by size, shape and number within a country. It would be important for the policy makers to be able to load different sub-national units within the app or add functionality to the app to load boundaries from other sources (GADM, HDX, DIVA-GIS and others).”

*Reviewer, MaDD publication*

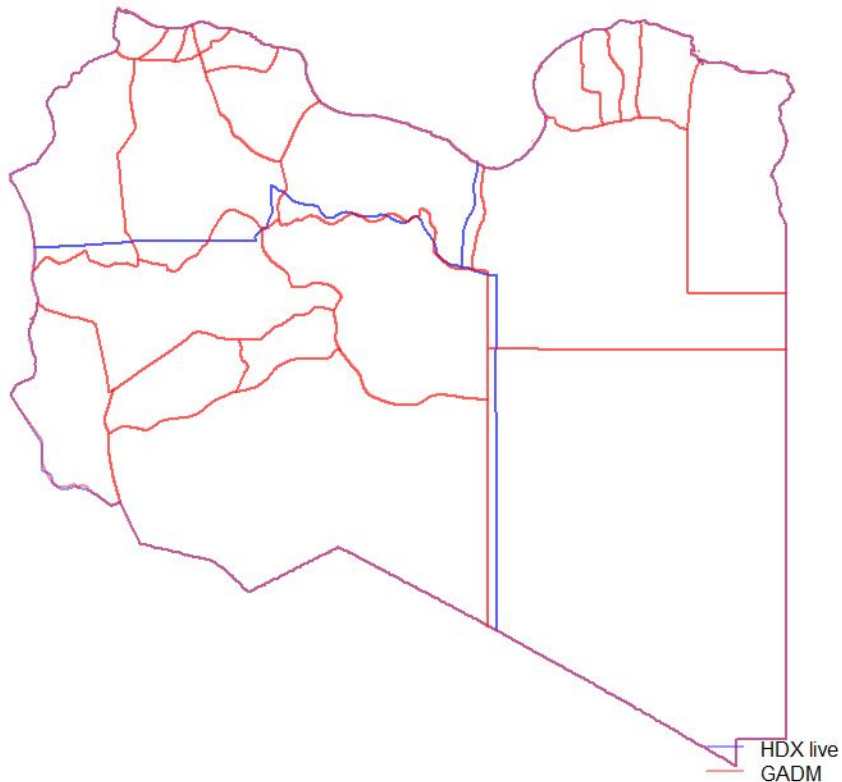
**First package: *afriadmin***

Experimenting with ways of making it easier  
to get at admin boundaries of Africa...

# *afriadmin*: comparing admin boundary sources

Libya: Level 1 admin boundaries

- Blue = HDX Live
- Red = GADM



<https://rpubs.com/southmapr/579418>

# *afriadmin*: comparing admin boundary sources

Dark red = agreement

Blue = HDX Live, recent, tricky from R

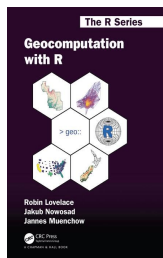
Light red = GADM, 2018, easy from R

Angola level1



# *Great open online learning resources*

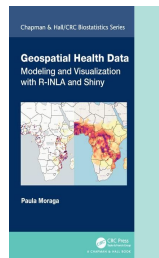
## Currently Available



### **Geocomputation with R**

Robin Lovelace, Jakub Nowosad &  
Jannes Muenchow

<https://geocompr.robinlovelace.net/>



### **Geospatial Health Data - Modeling and Visualization with R-INLA and Shiny**

Paula Moraga

<http://www.paulamoraga.com/book-geospatial/>

## To be developed...

Materials targeted at  
entry level users and  
specifically for use  
by Africans in Africa

# How can you contribute/get involved

- Suggest/request something:
  - [https://github.com/afrimapr/suggestions\\_and\\_requests](https://github.com/afrimapr/suggestions_and_requests)
  - [afrimapr@googlegroups.com](mailto:afrimapr@googlegroups.com)
- Let us know if you would like to
  - develop something specific
  - trial the software
  - trial the training materials
- We welcome any input on sources of up-to-date admin boundaries
- Early stages of the project and still experimenting on how to do this, please be patient

# Community & Sustainability

Part of the project includes coming up with a business plan to ensure the project continues after the end of this funding round. We are:



Looking for extra funders to come on board



Working on building an empowered community of users



Growing the community of contributing developers



Ensuring sufficient training material exist that are accessible



Inviting suggestions about how to achieve this

# Learn more & get involved



@afrimapr



<http://afrimapr.org>



[afrimapr@googlegroups.com](mailto:afrimapr@googlegroups.com)



# Thank you!



Van der Walt, Anelda; South, Andy (2020): afrimapr: Creating reusable R building blocks for mapping data in Africa in 2020. figshare. Presentation.

<https://doi.org/10.6084/m9.figshare.11949087>