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

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Talarify

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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
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?
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
- map
- HDX
- world pop

admin boundaries
- GADM

data manipulation
- join
- summarise

web interface
- Shiny
- Leaflet
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 ...

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

OpenDOAR
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

https://humanitarian.atlassian.net/wiki/spaces/imtoolbox/pages/61964310/Administrative+Boundary+COD+COD-AB
## Administrative boundary sources

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

<table>
<thead>
<tr>
<th>Not Authoritative</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Street Map</td>
<td>Data is open&lt;br&gt;Data can easily be downloaded</td>
<td>Original sources not always known</td>
</tr>
<tr>
<td>Google Maps</td>
<td>Freely available</td>
<td>Should only be used as reference</td>
</tr>
</tbody>
</table>
### Challenges of administrative boundaries

<table>
<thead>
<tr>
<th>Country</th>
<th>First-level</th>
<th>Second-level</th>
<th>Third-level</th>
<th>Fourth-level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>34 velayat</td>
<td>398 woleswall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Albania</td>
<td>12 qarqe</td>
<td>61 bashk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Algeria</td>
<td>48 wilaya</td>
<td>553 daïra</td>
<td>1,541 baladiyah</td>
<td></td>
</tr>
<tr>
<td>Andorra</td>
<td>7 parròques</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angola</td>
<td>18 províncias</td>
<td>163 município</td>
<td>618 comunas</td>
<td></td>
</tr>
<tr>
<td>South Africa</td>
<td>9 provinces</td>
<td>44 district municipalities</td>
<td>205 local municipalities</td>
<td>4392 wards</td>
</tr>
<tr>
<td>South Korea</td>
<td>8 do</td>
<td>75 si</td>
<td>77 gun (kun)</td>
<td>gu (ku)</td>
</tr>
</tbody>
</table>

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

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: \textit{afriadmin}

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

[Map of Angola level 1 boundaries]

https://rpubs.com/southmapr/579418
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

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
  ○ 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
Thank you!