Measurement Framework and Case Study Trials of the Proposed Methodology

Kevin McPherson

<table>
<thead>
<tr>
<th>Country</th>
<th>RAI history</th>
<th>Data</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2006</td>
<td>2016</td>
<td>2018</td>
</tr>
<tr>
<td>Ghana</td>
<td>✅</td>
<td></td>
<td>✅</td>
</tr>
<tr>
<td>Malawi</td>
<td>✅</td>
<td>✅</td>
<td></td>
</tr>
<tr>
<td>Nepal</td>
<td>✅</td>
<td>✅</td>
<td></td>
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<tr>
<td>Myanmar</td>
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</tbody>
</table>
World Pop data

- 100 x 100 meter grid cells representing population derived from census data and imagery
- Reconciled to the lowest level of country census data (e.g. ward)
- WorldPop are making annualised data available for last 20 years
“The distinction between urban and rural population is not amenable to a single definition applicable to all countries. For this reason, each country should decide which areas are to be classified as urban and which as rural, in accordance with their own circumstances”.

UN Statistics Division website
Urban / rural definition

Malawi Fourth Integrated Household Survey 2016/17:

“The urban strata include the four major urban areas: Lilongwe City, Blantyre City, Mzuzu City, and the Municipality of Zomba.

All other areas are considered as rural areas, and each of the 27 districts were considered as a separate sub-stratum as part of the main rural stratum”.

Urban / rural definition

Malawi Urbanization Review (GSURR, 2015)
Urban / rural definition

WB RAI Report, 2018 (draft)

“The figure may be different from the official statistics because a different definition of urban areas is used.”

“Urban areas are defined based on the 1995 University of Columbia (CIESIN) urban area imagery”.

Urban / rural boundary

<table>
<thead>
<tr>
<th></th>
<th>Source</th>
<th>Year</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blantyre City</td>
<td>WorldPop</td>
<td>2015</td>
<td>884,817</td>
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<tr>
<td></td>
<td>Malawi NSO (Malawi in Figures, 2016)</td>
<td>2015</td>
<td>884,000</td>
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<tr>
<td>Lilongwe City</td>
<td>WorldPop</td>
<td>2015</td>
<td>922,374</td>
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<tr>
<td></td>
<td>Malawi NSO (Malawi in Figures, 2016)</td>
<td>2015</td>
<td>1,037,000</td>
</tr>
</tbody>
</table>
Urban / rural boundary

Humanitarian Data Exchange Level 3 Boundaries
Road Network Lengths

<table>
<thead>
<tr>
<th>Source</th>
<th>Length of Network (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malawi Road Network Classification (2008)</td>
<td>15,457</td>
</tr>
<tr>
<td>Open Street Map (2018)</td>
<td>15,540</td>
</tr>
<tr>
<td>WB RAI Report (2016)</td>
<td>12,859</td>
</tr>
<tr>
<td>GRIP Database (2018)</td>
<td>tbc</td>
</tr>
</tbody>
</table>

These figures represent the **Classified Road Network** only.
OSM v GRIP
OSM v GRIP

Population distribution
Road network
Road condition

OSM Data Breakdown

- Only 13.6% of records have any surface information
- Only 966 km of the entire network is identified as “paved”, versus the 4,100 km on the MRA website
- Only 2,018 records (0.8%) have “smoothness” information
- Only 653 records (0.3%) have “seasonal” information
- Only 289 records have (0.1%) max speed information
Alternative Methodologies

• Mobile Phone Network Data

• “Machine Learning” – e.g.
  - to produce mapping of Road Networks from imagery
  - to determine if road is “all-season” or not (e.g. based on flooding that may be visible on historic satellite imagery)
Alternative Methodologies

- Mobile Phone Network Data
Alternative Methodologies

• Machine Learning Tools

Unlock hidden patterns

Analyzing geospatial imagery has historically only been possible for experienced analysts and engineers—Raster Foundry makes it possible for anyone to experiment with building custom algorithms or applying existing algorithms to imagery they want to analyze.

- Search through a library of common algorithms like NDVI, NDWI, SAVI, and more.
- Build your own custom algorithms using a visual interface
- For advanced users, use the Python client or REST API directly to bring analyses into your own workflows and dashboards

1. Survey of SDG-related Big Data projects

**Type of data source**

- Mobile phone data: 20
- Satellite imagery data and geodata: 18
- Other (please specify): 15
- Other social networks: 12
- Web data: 12
- Twitter data: 11
- Financial transaction data: 11
- Scanner data: 11
- Facebook data: 8
- Sensor data: 6
- Smart meter data: 5

- Mobile phones (20), satellite imagery (18) and social media (11+8) are the most prominent sources
- Otherwise, wide range of sources
Key Points for a New Methodology

• Clear assessment of data sources identified and chosen
• Clear documentation on data sources and methodology
• Validation / assurance on the data sources and methods
• Consistency over time in the method of calculation to allow for trend analysis
• Consistency of urban/rural definition among countries (UN is working on this*)
• NSOs must always play a major role in definition / coordination / assurance / publication process
Thank you for your attention

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