# Rural Access Index (RAI)

## Key policy recommendations

▶ **RAI must be considered as part of a wider policy framework for rural development**. The RAI can be used as an indicator at global, regional, national and sub-national levels. It should take account of other modes of transport and services, maintenance capacity and the environment.

- **SuM4All:** The Global Roadmap of Action (GRA) includes RAI within a suite of indicators that form a global tracking framework for transport.

- **RAI at National level:** The RAI should be considered at national development level, linking with other key sectors such as agriculture, health, education and transport.

- **RAI at sub-National level:** RAI should also be considered for monitoring at sub-national level, especially for larger countries with semi-autonomous state systems.

▶ **RAI as Absolute Numbers:** RAI is reported as a percentage, but presenting it as the absolute number of people who do not have access provides a more powerful statement, for example:

*"420 million people in Africa without access to an all-season road"* is a much more powerful statement than *"Africa has an RAI of 53%".*

▶ **Support to statistical systems.** There is significant international support to build the capacity of statistical systems in Low Income Countries (LIC). It is important that any efforts to help the uptake and embedment of RAI are aligned with these undertakings to avoid duplication of effort and to leverage other work going on in these areas.

- **Stakeholder coordination:** There are many stakeholders involved in the Sustainable Development Goals (SDG). The custodian for RAI is World Bank, with the United Nations Economic Commission for Europe (UNECE), United Nations Environment Programme (UNEP) and the Asian Development Bank (ADB) as partners and AfDB actively considering

partnership. Each stakeholder has a role to play in monitoring the RAI, in a coordinated way.

- **Support to National Statistical Offices (NSOs):** The United Nations Development Programme (UNDP) has a guidance note on Data for Implementation and Monitoring of the 2030 Agenda, which supports strengthening national statistical capacity.

- **Support NSOs for SDG reporting:** With 232 SDG indicators to report on, this can be a challenge for many countries. There are many tools and resources available to support countries in this process, so countries should be made aware of these and guided to use them.

- **Strengthening SDG reporting platforms:** There are efforts to standardise and strengthen national reporting of SDGs, with several online resources available, and often supported by international assistance, such as the UK Office of National Statistics (ONS). The RAI should benefit from this type of support.



- **Support use of new data and technologies:** Data and how it is processed is changing with new technologies, supported by initiatives such as Accelerator Labs and Regional Data Cubes. The RAI can benefit from this, so alternative technologies to measure RAI should be explored.

- **Embed RAI in a National Statistical System (NSS):** The National Statistical Office (NSO) in a country should liaise with other agencies (roads agencies, development agencies, mapping agencies) to incorporate the RAI into its NSS. RAI should also be included in the UN e-Handbook on SDG Indicators.

RAI (SDG 9.1.1) — proportion of the rural population who live within 2 km of an all-season road
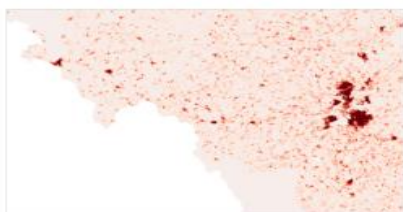


Where do people live?

Where do roads exist?

All-season access?

## Brief Problem Summary

The Rural Access Index (RAI) was developed by the World Bank in 2006 and is one of the most important global development indicators in the transport sector. The RAI is defined as the **"proportion of the rural population who live within 2 km of an all-season road"**. There is a common understanding that the 2 km threshold is a reasonable extent for people's normal economic and social purposes and equates to approximately 20-25 minutes walking time.

*All-season =* *"a road that is motorable all year round by the prevailing means of rural transport (often a pick-up or a truck which does not have four-wheel-drive), with some predictable interruptions of short duration during inclement weather (e.g. heavy rainfall) allowed."*

The 2006 RAI methodology was based on household surveys and had several issues with inconsistency across countries and a lack of sustainable regular updates (Roberts, 2006). In addition, the approach was felt not to be spatially representative and of limited operational usefulness, resulting in weak client ownership.

In 2016, the World Bank partnered with the Department for International Development (DFID) of the United Kingdom and the Research for Community Access Partnership (ReCAP) to develop a new methodology (World Bank, 2016). The 2016 methodology took advantage of geospatial techniques and data collected using innovative technologies, and was trialled in eight ReCAP countries. However, the results from this new methodology were inconsistent with the 2006 results.

The gaps identified included no clear definition of rural areas; inaccurate or incomplete sources of data; lack of capacity to collect condition data; lack of motivation to measure RAI; lack of coordination between government agencies and a lack of awareness of RAI. Because of this ReCAP initiated a new project to develop a harmonised approach to data collection and measurement of the RAI that is relevant, consistent and sustainable.

## Project Background

The current project continues the improvement and uptake of the RAI methodology. The project was divided into three phases:

- TG1: A scoping study that included a comprehensive review of the status of the RAI to date (Vincent, 2018). This study was used to formulate TG2.

- TG2: Was an opportunity to consolidate existing and proposed approaches to data collection and refine the RAI approach in collaboration with the World Bank and other stakeholders. The goal was to recognise and understand any implications of inconsistencies in data collection, to meet international standards of data analysis and provide a clear framework for data validation. RAI was promoted to Tier 2 during TG2, which indicates it was conceptually clear with an internationally established methodology and standards are available, but data is not regularly produced by countries.

- TG3: the scope for TG3 was set from the learnings and recommendations from TG2. Given the experience in TG2, the tasks in TG3 were focused on providing policy guidance for countries measuring RAI, developing a Roadmap to achieve Tier 1 status by 2025, writing a scientific paper for publication in a relevant journal and extending the measurement of RAI that was initiated in TG2.

A RAI Measurement Tool was developed in parallel with TG2 that used open source data to measure RAI for the whole world. This data has been used to compare how countries in different geographical groupings compare in terms of RAI, as can be seen in Figure 1.

*Figure 1: RAI by Continental Group*
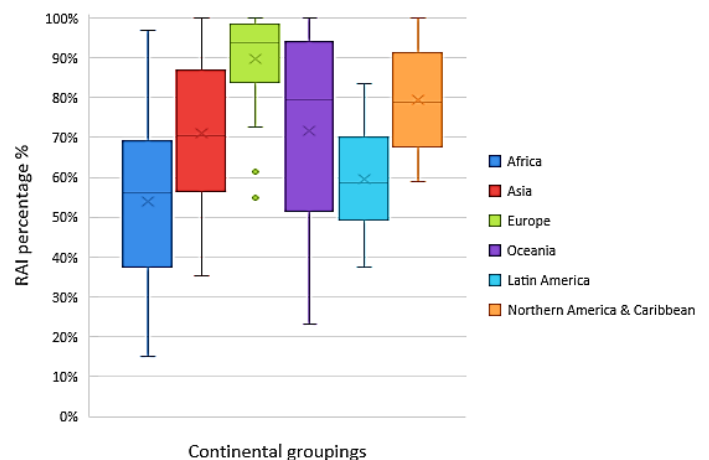


It is clear from this diagram that RAI is more relevant for LICs, but the diagram does not indicate targets or aspirations for LICs, which should always be realistic.
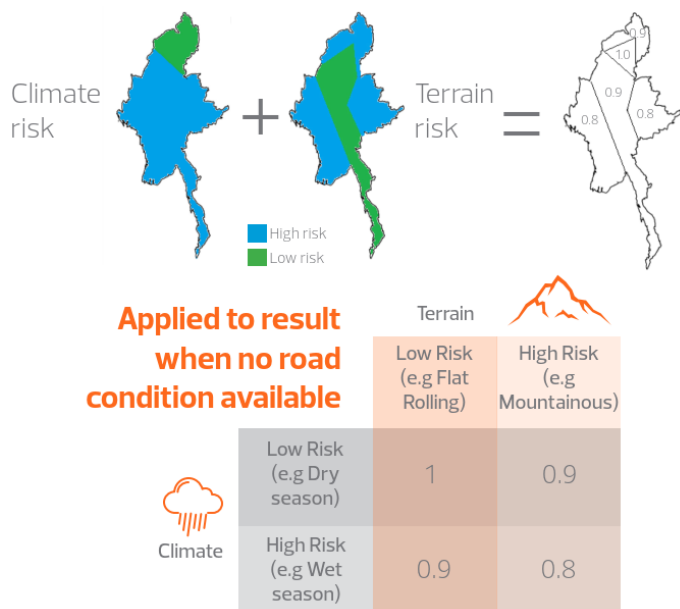
## Key findings and observations

**Supplemental Guidelines:** The project found that methodology developed in 2016 could be refined to be more accurate and sustainable, and supplemental guidelines have been developed. These guidelines provide a comprehensive overview of the measurement process and include all of the necessary steps and processes to measure and publish RAI.

**Catalogue of RAI data:** A review of countries measuring, or intending to measure, RAI has been carried out by inviting countries to complete an online survey, and also by carrying out a comprehensive internet search of roads authorities and NSOs.
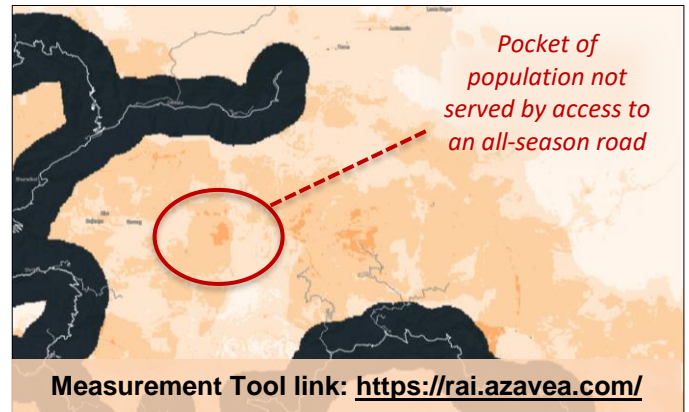
**Accessibility Factors:** The project observed that where road condition is not available, or is not reliable, an alternative was needed to determine the all-season status of the road network. Because it was necessary to not create a data collection burden for countries, the concept of Accessibility Factors was developed, as shown in Figure 2. This allows the accessibility risk of a network or group of roads to be assessed based on surface type, climate and terrain, without having to physically visit the roads.

*Figure 2: Accessibility Factors*



**Metadata:** Metadata from previous measurements of RAI was found to be inconsistent. It is vitally important to record metadata, so that the method used and results arrived at can be checked and the methodology is clear.

**New technologies:** Phase TG2 of the project considered potential technologies that could be used to measure RAI in the future. These included satellite imagery, mobile phone data and social media.

**RAI measurement tool:** A RAI Measurement Tool was developed by ReCAP to explore the possibility of online measurement of RAI using open source data. This was found to be feasible, including population distributions from WorldPop, road networks from OpenStreetMap and rural boundaries from the GRUMP database. Although it is recognised that the data used is open source and not officially endorsed by country governments, it nevertheless provided an example of how RAI could be measured and stimulate some countries to explore RAI

measurement further. The RAI Measurement Tool also allows planners to see clearly where communities do not have all-season access, as shown in Figure 3.

*Figure 3: Disconnected populations visible on the RAI Measurement Tool (areas of higher population shown in darker orange)*



*Pocket of population not served by access to an all-season road*

**Measurement Tool link: https://rai.azavea.com/**

**Results for trial countries:** RAI measurement was initiated in four trial countries; Ghana, Malawi, Myanmar and Nepal. Issues with the trials were observed in all four countries, commonly around the completeness and accuracy of road network data, including the all-season status of roads, and only three countries were able to complete the measurement. The results where RAI could be measured are shown in Table 1 and are compared to the RAI Measurement Tool open source data.

The figures match well for Malawi and Nepal, and the discrepancy for Myanmar is thought to be down to the less complete OpenStreetMap data in that country.

*Table 1: Trial country RAI results*

| Country | RAI 2019 trial measurement | RAI Open Data Measurement Tool |
|---------|---------------------------|-------------------------------|
| **Malawi** | 63% | 64% |
| **Myanmar** | 62% | 46% |
| **Nepal** | 66% | 69% |

**Dissemination:** It was found that many countries were unaware of the geospatial methodology for RAI. So the project focused on promotion of RAI and encouraging countries to undertake its measurement by dissemination of project results and promotion of the benefits from measuring RAI, for all indicators. Dissemination of the project outputs was achieved in many ways, including attendance and presentation at international conferences and awareness raising by the custodian and partners.

**Policy Guide and Draft Roadmap document:** Inclusion in country policy for SDG and other monitoring was found to increase the chances of a country measuring and reporting RAI. A guide was developed to identify the key policy areas and organisations that policy change should be aimed at. It was found that probably the most impact would come from including the incorporation of the RAI into a country's National Statistical System (NSS).

For more information, please visit the **Research for Community Access Partnership (ReCAP)**
website: **www.research4cap.org/SitePages/RAI.aspx**
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A draft Roadmap was also developed with the aim of promoting the RAI to Tier 1 of the IAEG-SDGs scale by 2025. Currently there are 34 countries that have measured RAI since 2016 using the geospatial methodology or a variation of it. To achieve Tier 1 it will be necessary to demonstrate that 50% of UN countries are regularly measuring RAI. The project has had interest from more than 30 countries during TG3, but there is clearly more promotion and support required to reach the target for Tier 1. The key points for the Roadmap were:

- Include RAI in IDA replenishments in the future, with the next due in 2023
- Publish the Supplemental Guidelines on World Bank, UN and partner websites
- Publicise and coordinate RAI within the context of the Global Roadmap of Action (GRA)
- Document and record Metadata
- Enhance road mapping at country level, encourage reconciliation with OpenStreetMap
- Liaise with WorldPop for accurate and reconciled geospatial population data
- Monitor changing universal boundary definitions, consider the impact of the Deg-Urba definitions
- Keep up to date with new technologies for measuring RAI
- Further develop the RAI Measurement Tool on the UN Global Platform
- Continue to research RAI to enhance accuracy and spread of measurement
- Monitor progress of RAI measurement via the World Bank Data Catalog

## Most Relevant Evidence

Evidence was primarily collected from the trial countries for the geospatial layers, including:
- Population distribution: WorldPop allocates population to a 100m x 100m grid. This data was compared to official national census projections and reconciled.

Figure 4: Rural road network in Zambia



- Road networks were obtained from road authorities in country, and checked against various sources, including OpenStreetMap. The most complete and verifiable data was used. As can be seen in Figure 4 the rural road network can be difficult to define.
- Road condition was obtained where possible, but most countries did not have current and reliable road condition data, so accessibility factors were used.
- Where available, official rural / urban boundaries were obtained from the trial countries. Where this was not possible in the correct format, the GRUMP database was used.

In addition to the country evidence, there is a wealth of information available on the SDGs and how they are measured and monitored. The supporting structure for RAI is indicated in Figure 5.

Figure 5: Supporting structure of RAI within the UN
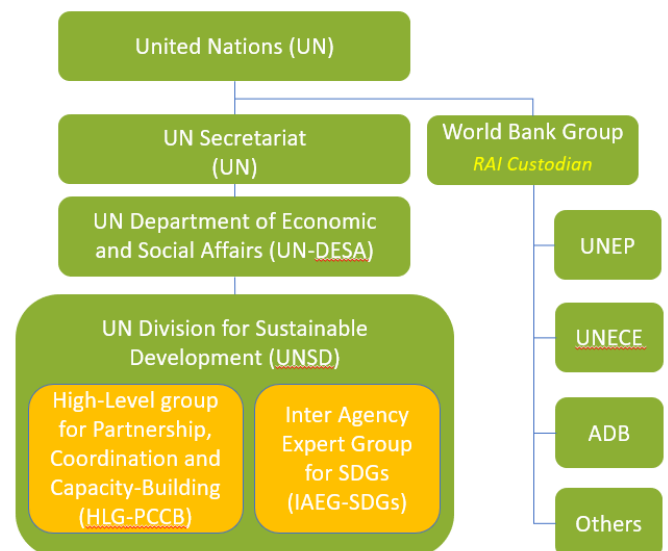


## References or further information sources

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