

# Measuring the Rural Access Index (SDG 9.1.1) for the Philippines

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# Outline of Presentation

- I. Introduction
- II. Methodology
- III. Results
- IV. Future Steps



# I. Introduction

## ➤ September 2015

The 193-Member United Nations General Assembly formally adopted the 2030 Agenda for Sustainable Development or the Sustainable Development Goals (SDGs).



# I. Introduction

## ➤ 2015 - 2017

The Philippine Statistics Authority (PSA) conducted a series of technical workshops to assess the Tier classification and metadata of the SDG indicators for the Philippines.

➤ *PSA Board Resolution No. 9, Series of 2017- Approving and Adopting the Initial List of Sustainable Development Goals for Monitoring in the Philippines*

**17**  
GOALS

**97**  
TARGETS

**155**  
INDICATORS



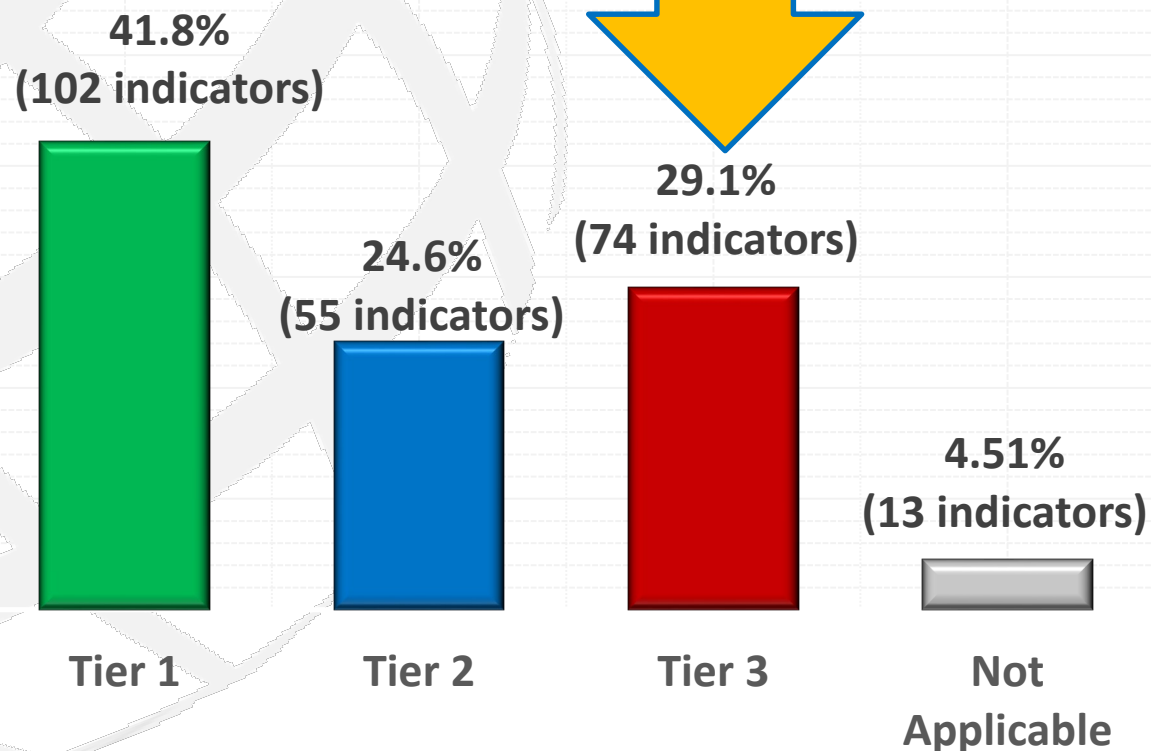
# I. Introduction

## Summary of

Tier Classi

Phi

**SDG 9.1.1** Proportion of the rural population who live within 2 km of an all-season road (Rural Access Index)



**Tier I – with established methodology , regularly collected**

**Tier II - with established methodology, data not regularly collected**

**Tier III - no established methodology, methodologies are being developed/tested**



# I. Introduction

**Goal 9:** Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

## Target

**Target 9.1:** Develop quality, reliable, sustainable and resilient infrastructure, including regional and trans-border infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all

**Indicator 9.1.1:** Proportion of the rural population who live within 2 km of an all-season road or **RURAL ACCESS INDEX (RAI)**

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



TARGET

9-1



DEVELOP SUSTAINABLE, RESILIENT AND INCLUSIVE INFRASTRUCTURES

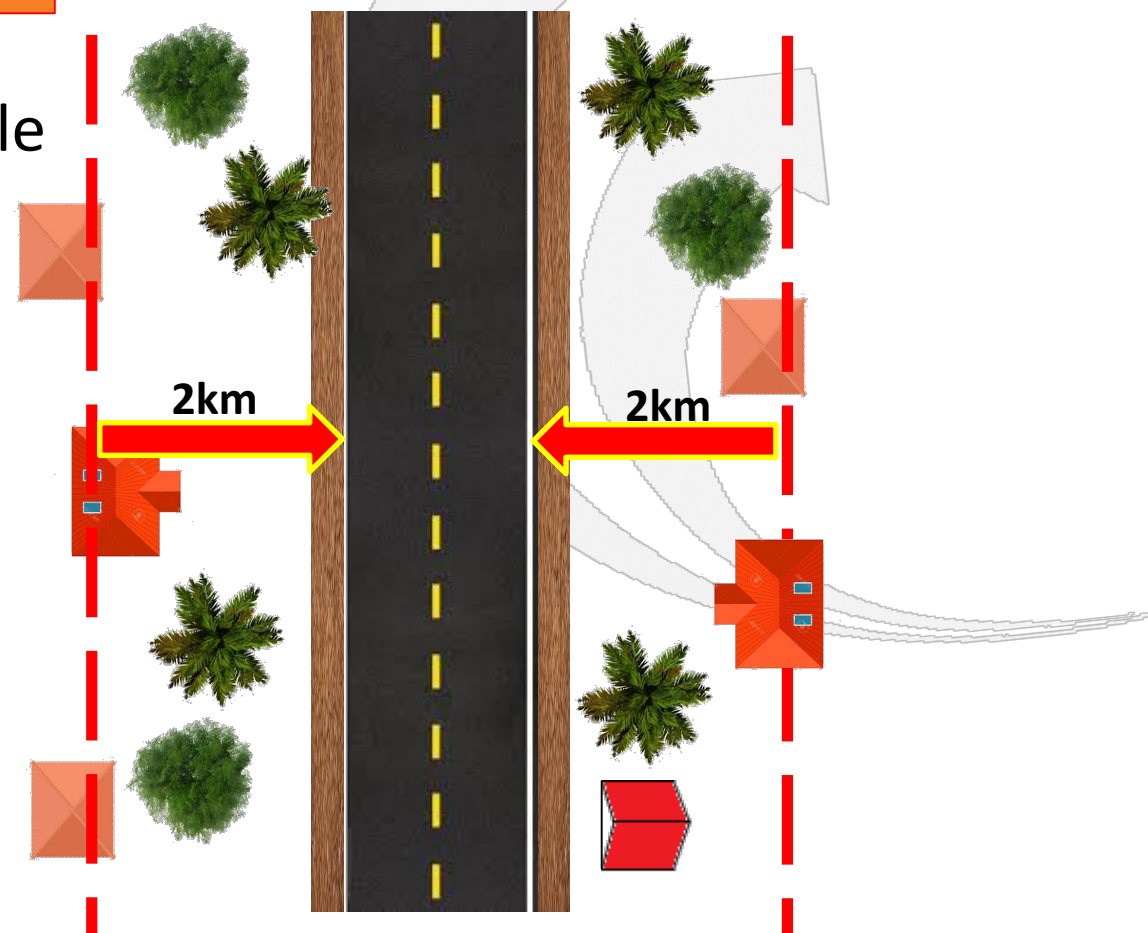


# I. Introduction

## THE RURAL ACCESS INDEX (RAI)

Measures the proportion of people who have access to an all-season road within an **approximate walking distance of 2 kilometers** (around 20-25 minutes walk)

- There is a common understanding that the **2 km threshold** is a reasonable extent for people's normal economic and social purposes





# I. Introduction

## THE RURAL ACCESS INDEX (RAI)

- Indicates the extent of access of people living in rural areas
- Sets a country's target for providing better road access to people in rural areas and improve access to services and markets
- Helps manage investments of national and local policymakers in the infrastructure and transport sector
- Shows the enhancement of social well-being of communities and people



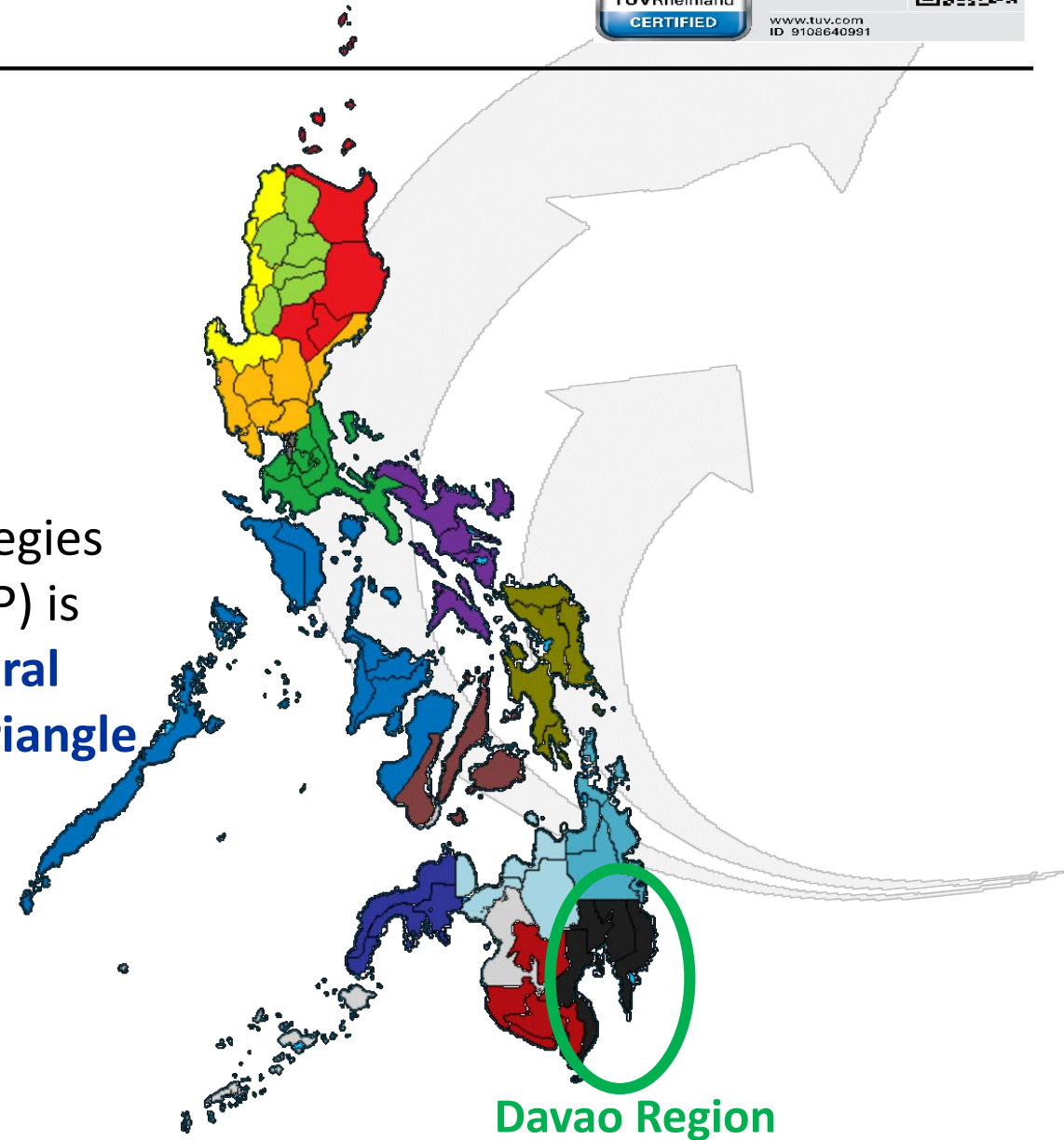


# I. Introduction

## Why Davao Region?

- Had the largest contribution among Mindanao regions to the total gross domestic product since 2011
- Among Davao Region's planning strategies in its Regional Development Plan (RDP) is the **Comprehensive Outcomes for Rural Empowerment or C.O.R.E. Growth Triangle**

- Aims to mobilize the Region's resources to enhance its Connectivity in order to achieve ease and mobility of access of people, goods and services through **integrated multi-modal transport linkages** and digital infrastructure



## II. Methodology

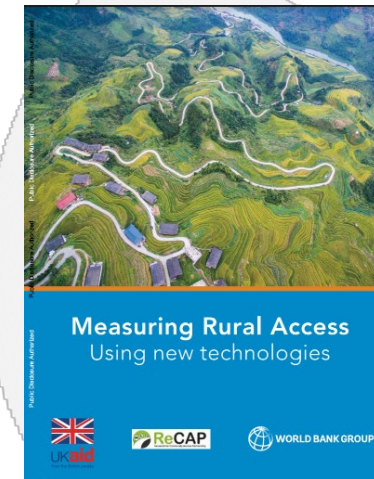
### Measuring RAI using geospatial data

1. “Measuring Rural Access Using New Technologies” (World Bank, 2016)

Full report is available at

<http://documents.worldbank.org/curated/en/367391472117815229/Measuring-rural-access-using-new-technologies>

2. “Exploring Earth Observations to Monitor SDG Indicators”  
– DANE Colombia (National Administrative Department of Statistics)





## II. Methodology

For the purpose of this study, the following were used:

I. DATA INFORMATION	SOURCE
1. Davao Region Administrative Map with Barangay boundaries and Urban/Rural tags	Philippine Statistics Authority (PSA)
2. Davao Region Administrative Map with Provincial boundaries	PSA
3. Davao Region Administrative Map	PSA
4. Davao Region Road Network 2015	PSA
5. Gridded Population Map 2015	WorldPop
II. SOFTWARE	SOURCE
1. QGIS (Software)	Open Source Geospatial Foundation (OSGeo)

## II. Methodology

### PART 1. Estimating the Rural Population

1. **Obtain an administrative map** with barangay boundaries.
2. From the map, **identify the urban barangays**. Barangay is the lowest level of administration in the Philippines, i.e., National, Regional, Provincial, City, Municipal and Barangay levels. Barangays are the only administrative levels which are classified either as urban or rural. Latest classification is as of 2015 based the Census of Population (POPCEN).

## II. Methodology

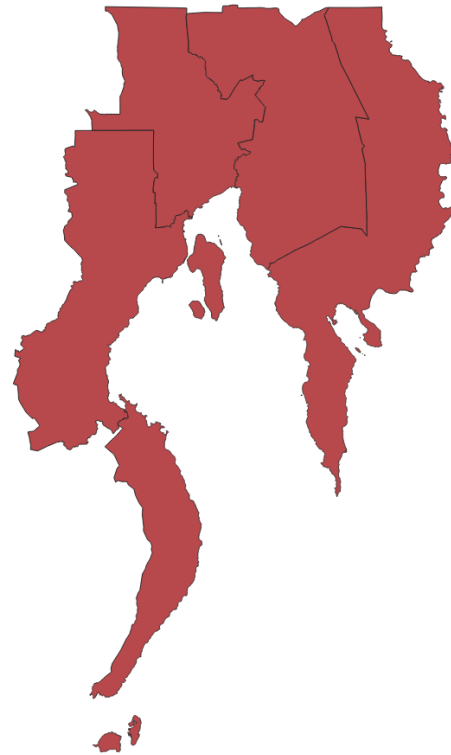
### PART 1. Estimating the Rural Population *(cont.)*

3. Using a map with provincial boundaries, **extract the rural barangays** by subtracting the identified urban barangays.
4. At this point, the result is a map of rural areas with provincial boundaries.
5. The map of rural areas was superimposed to a gridded population map (with reference year 2015) taken from WorldPop. A gridded population map of rural areas is generated at this point.
6. Using the QGIS Software, apply the “Sum” operation of the “Zonal statistics” function to estimate the **Total Rural Population (TRP)**.



## II. Methodology

To summarize Part 1...

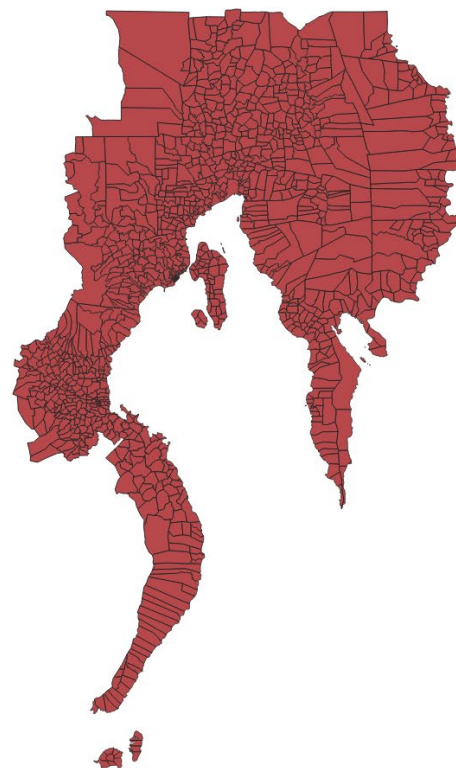


## Davao Region (Provincial Map)



## II. Methodology

### To summarize Part 1...



Step 1. **Obtain an administrative map** with barangay boundaries

## II. Methodology

To summarize Part 1...



Step 2. From the map, **identify the urban barangays.**





## II. Methodology

To summarize Part 1...



Step 3. **Extract the rural barangays**



## II. Methodology

To summarize Part 1...



Step 4.  
**Superimpose the rural area map to a gridded population map**

## II. Methodology

To summarize Part 1...

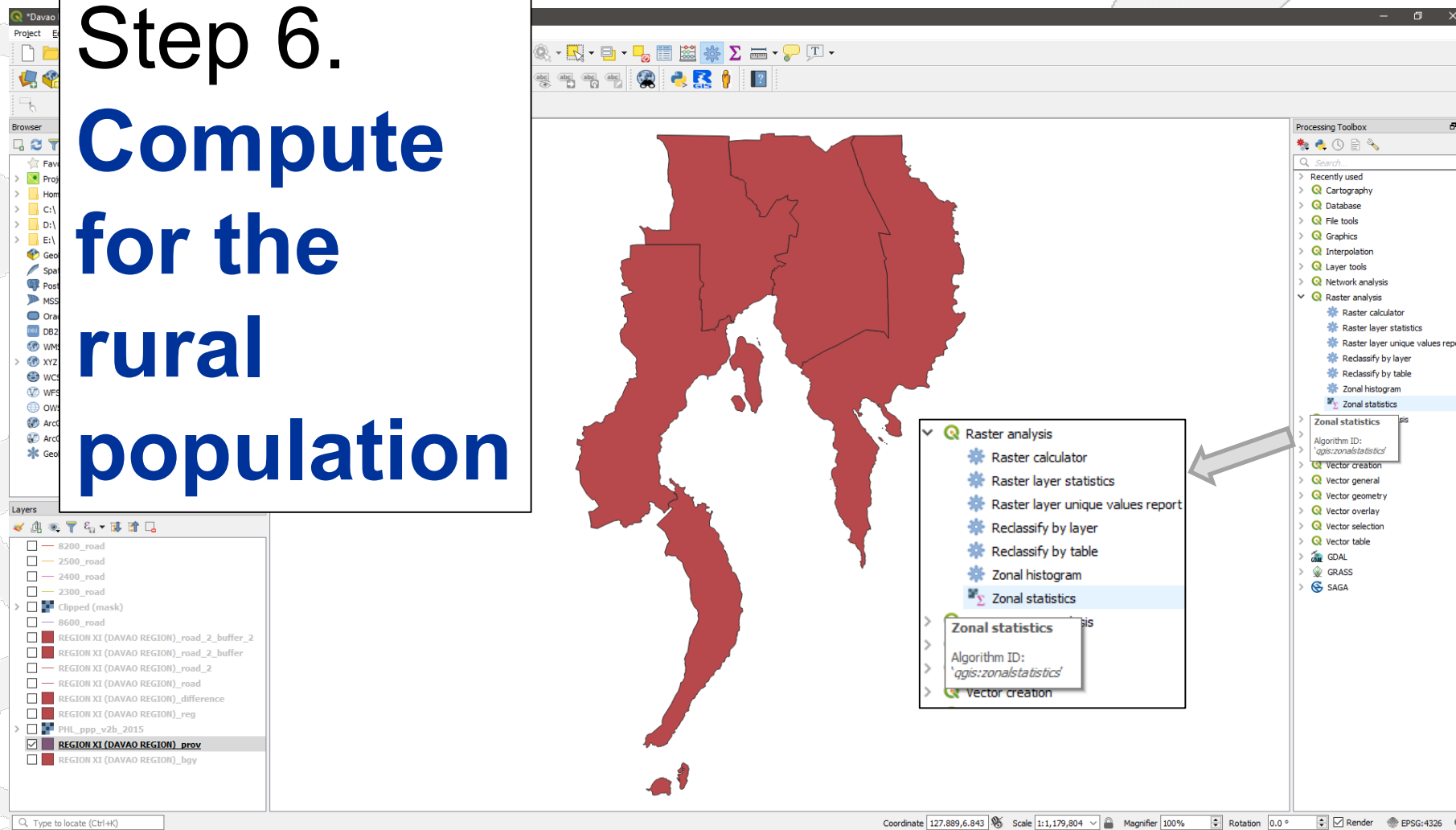


Step 5.  
**Superimpose the rural area map to a gridded population map**



## To summarize Part 1...

Step 6.  
Compute  
for the  
rural  
population



The screenshot shows the QGIS interface with the 'Zonal statistics' tool selected in the Processing Toolbox. The map displays a red-shaded area representing the rural population. The Processing Toolbox is open, and the 'Zonal statistics' tool is selected. A tooltip shows the algorithm ID: 'qgis:zonalstatistics'.

- Raster analysis
  - Raster calculator
  - Raster layer statistics
  - Raster layer unique values report
  - Reclassify by layer
  - Reclassify by table
  - Zonal histogram
  - Zonal statistics
- Zonal statistics
  - Algorithm ID: 'qgis:zonalstatistics'
  - vector creation

## II. Methodology

### PART 2. Identifying the 2-km radius from an all-season road

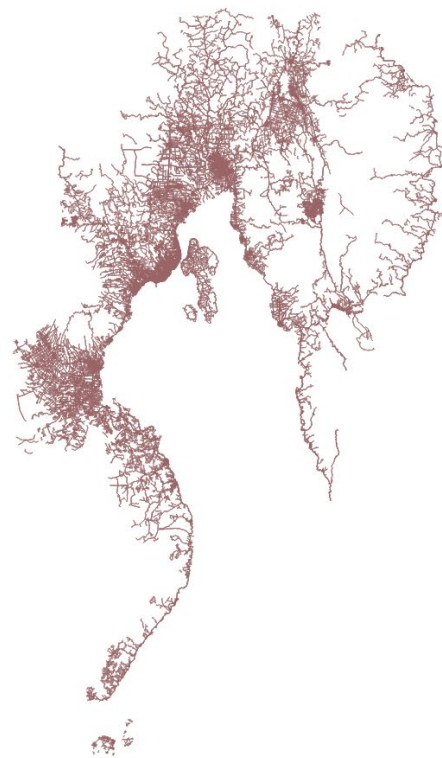
For the purpose of this study, *all-season roads* refer to national, provincial and municipal roads. The following steps are then employed:

1. From the road network map of the Philippines, **identify all-season roads**.
2. Using the QGIS Software, **map the 2-kilometer radius** surrounding all-season roads.



## II. Methodology

To summarize Part 2...



## Road Network in Davao Region

- national, provincial, municipal, barangay
- feeder, streets, alleys, drive, extensions

## II. Methodology

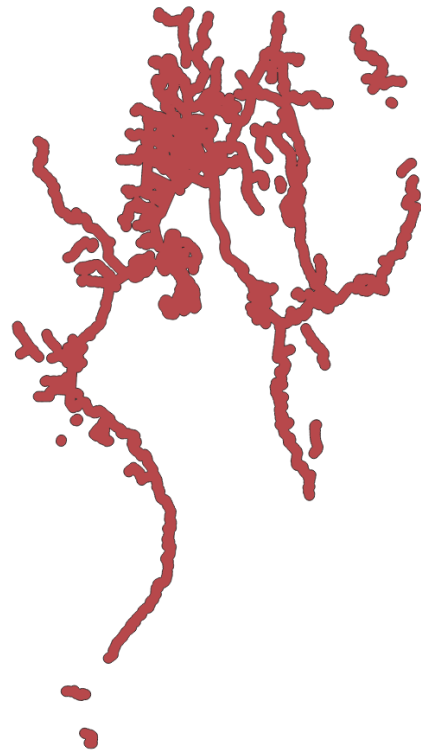
To summarize Part 2...

Step 1. **Identify the all-season roads**

- **national, provincial, municipal**
- **excluding barangay roads (generally not all-season roads)**

## II. Methodology

To summarize Part 2...



Step 2. **Map the 2-kilometer radius** surrounding all-season roads



## II. Methodology

### PART 3. Estimating the rural population within the 2-km radius from an all-season road

1. **Overlay the gridded population map** (from Part 1 Step 4) to the map showing the 2-kilometer radius from an all-season road (from Part 2 Step 2) to estimate the rural population living within the 2-kilometer radius from an all-season road.
2. Using the QGIS Software, apply the “Sum” operation of the “Zonal statistics” function to estimate the **Total Rural Population Living within the 2-kilometer radius from an all-season road (TRP2KM)**. At this point, a gridded total rural population map within 2-kilometer radius from an all-season road is also generated.

## II. Methodology

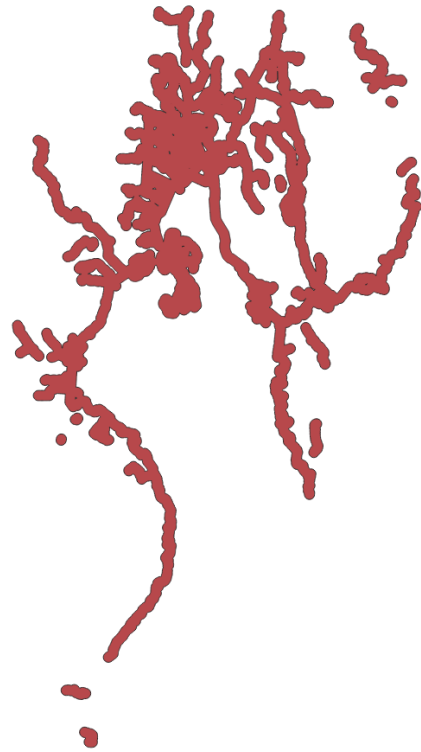
To summarize Part 3...



# Rural Population Map (results of Part 1)

## II. Methodology

To summarize Part 3...

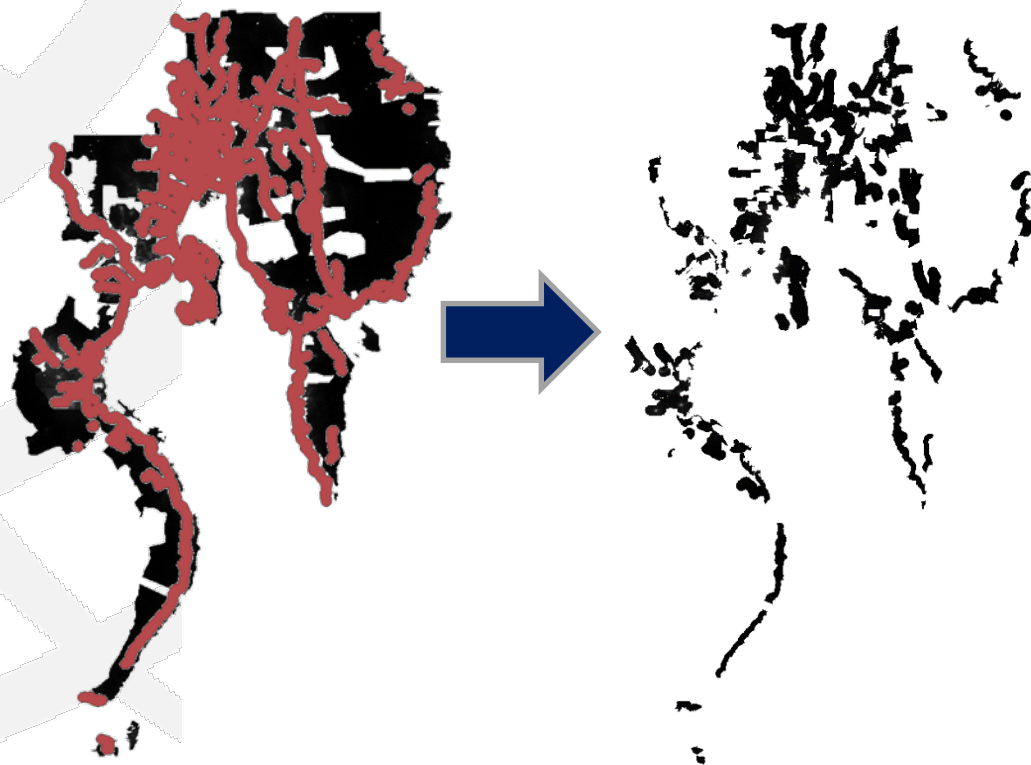


**2-km radius from  
an all-season road  
(results of Part 2)**



## II. Methodology

To summarize Part 3...



**Rural  
Population  
living within  
2-km radius  
from an  
all-season  
road**



## II. Methodology

### PART 4. Computing for the Rural Access Index (RAI)

To compute for the RAI, the following formula is used:

$$RAI = \frac{TRP2KM}{TRP} \times 100$$

where TRP2KM

= total rural population living within the 2-kilometer radius from an all-season road

TRP

= total rural population

## III. Results

### RURAL ACCESS INDEX (RAI) of Davao Region

Province	RAI
1. Davao del Sur	44.075
2. Davao Oriental	48.252
3. Davao Occidental	42.247
4. Compostella Valley	59.189
5. Davao Del Norte	90.057

- Three (3) out of the five (5) provinces in Davao Region had RAIs less than 50%. This means that less than half of the rural population in Davao del Sur, Davao Oriental, and Davao Occidental were living within 2km of an all-season road in 2015.
- Davao del Norte had the highest RAI among the provinces in Davao Region.

### III. Results

#### RURAL ACCESS INDEX (RAI) of Davao Region

Region	RAI
Davao Region	55.767

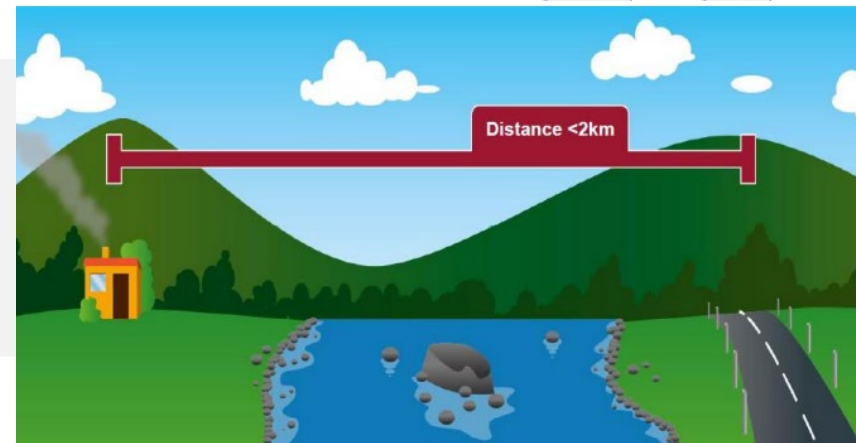
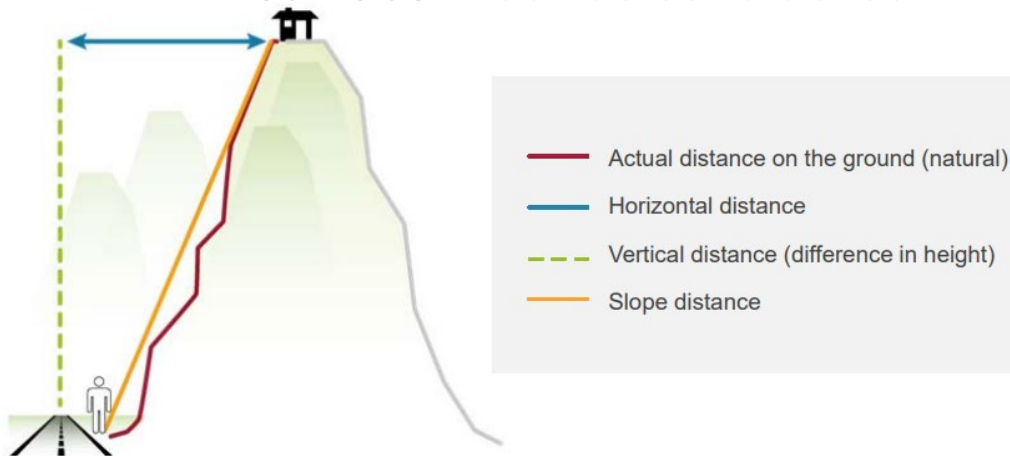
Around **55.8%** of the **rural population** of Davao Region **live within 2km** of an **all-season road** in 2015.

In the context of the SDGs, increased transport connectivity for rural areas is essential to attain inclusive and sustained growth. Thus, an increasing RAI through time is expected to be observed. However, full accessibility (i.e. 100% RAI) is not an ideal target, particularly in very remote areas, since this would lead to inefficient allocation of resources.

### III. Results

#### Limitations of the methodology and some considerations:

- There is no official definition of “all-season” road.
  - “**All-season**” road is also usually confused with “**all-weather**” roads.
- There are different definitions of urban and rural areas per country.
- The method only takes into account the **horizontal distance** from the all-season road. Hence, **elevation** and **presence of water surface** must be considered.





## IV. Future Steps

- **Computation** of RAI for all provinces and the whole Philippines.
- **Updating of the road network data** using data collected from geo-tagging activities of the PSA.
- Use of the **2020 Census of Population and Housing (CPH)** results as gridded population map.
- For Philippine Statistical System (PSS) to establish **official definition** of rural and urban areas.
- **Adoption and approval** of the **methodology** for the estimation of RAI in the Philippines.
- Release of statistics on RAI in the **SDG Watch**.

# Thank You!



<http://www.psa.gov.ph>



/PhilippineStatisticsAuthority



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