CBMS Poverty Mapping using Q-GIS

CBMS Network Training Workshop
Somerset Olympia, Makati City, Philippines
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What is GIS

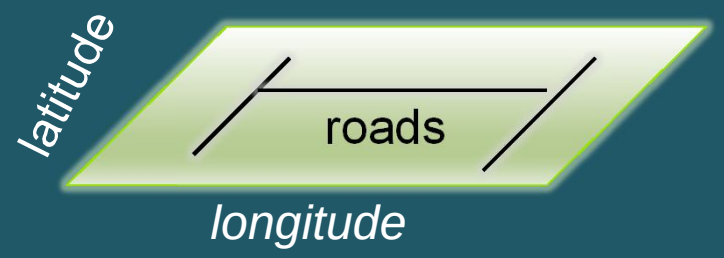
- Geographic/Geospatial Information
  - information on the earth's surface
  - knowledge about "what is <u>where</u> when"

- What S stands for?
  - Technology (Systems)
  - Concepts and theory (Science)
  - Relevance to society (Study)

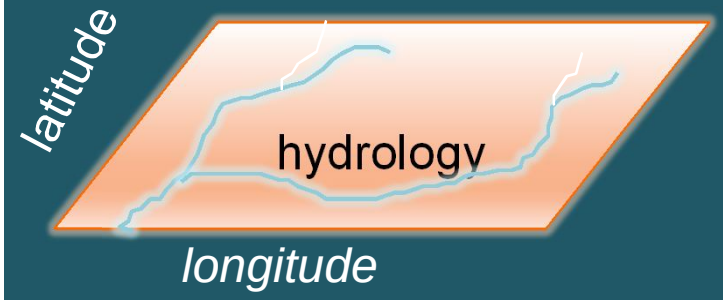
GI Technologies

- Global Positioning Systems (GPS)
  - a system of exploiting earth-orbiting satellites to provide location on the earth's surface (in long-lat / cartesian or equiv.)
  - With a given precision (can 100 meter to sub-cm.)
- Remote Sensing (RS)
  - use of satellites or aircraft to capture information about the earth's surface
- Geographic Information Systems (GISys)
  - Software systems with capability for input, storage, manipulation/ analysis and output/display of geographic (spatial) information
  - Commercial or free/open-source
- GPS and RS are usually serve of input data for a GISys.

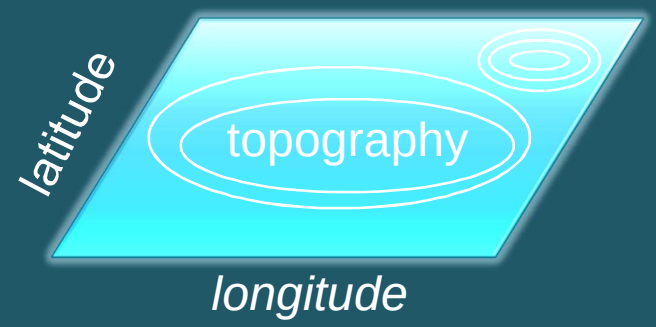
The GIS Model: example



Here we have three layers or themes:
--roads,
--hydrology (water),
--topography (land elevation)
They can be related because precise geographic coordinates are recorded for each theme.



Layers are comprised of two data types
•*Spatial data* which describes location (where)
•*Attribute data* specifing what, how much,when



Layers may be represented in two ways:
•in *vector* format as points and lines
•in *raster(or image)* format as pixels

All geographic data has 4 properties:
projection, scale, accuracy and resolution

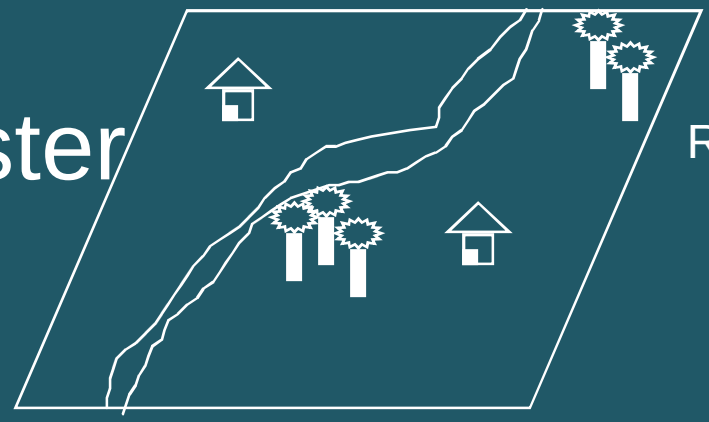
Spatial attribute and data

- Spatial data—where
  - specifies location
  - stored in a shape file, geodatabase or similar geographic file
- Attribute (descriptive) data (what, how much, when)
  - specifies characteristics at that location, natural or human-created
  - stored in a data base table
- GIS systems traditionally maintain spatial and attribute data separately, then “join” them for display or analysis
  - for example, in ArcView, the Attributes of … table is used to link a shapefile (spatial structure) with a data base table containing attribute information in order to display the attribute data spatially on a map

Spatial data representation

- Raster Model
  - area is covered by grid with (usually) equal-sized, square cells
  - attributes are recorded by assigning each cell a single value based on the majority feature (attribute) in the cell, such as land use type.
  - Image data is a special case of raster data in which the "attribute" is a reflectance value from the geomagnetic spectrum
  - cells in image data often called pixels (picture elements)
- Vector Model
  - The fundamental concept of vector GIS is that all geographic features in the real work can be represented either as:
  - points or dots (nodes): trees, poles, fire plugs, airports, cities
  - lines (arcs): streams, streets, sewers,
  - areas (polygons): land parcels, cities, counties, forest, rock type
- Because representation depends on shape, ArcView refers to files containing vector data as shapefiles

Concept of Vector and Raster

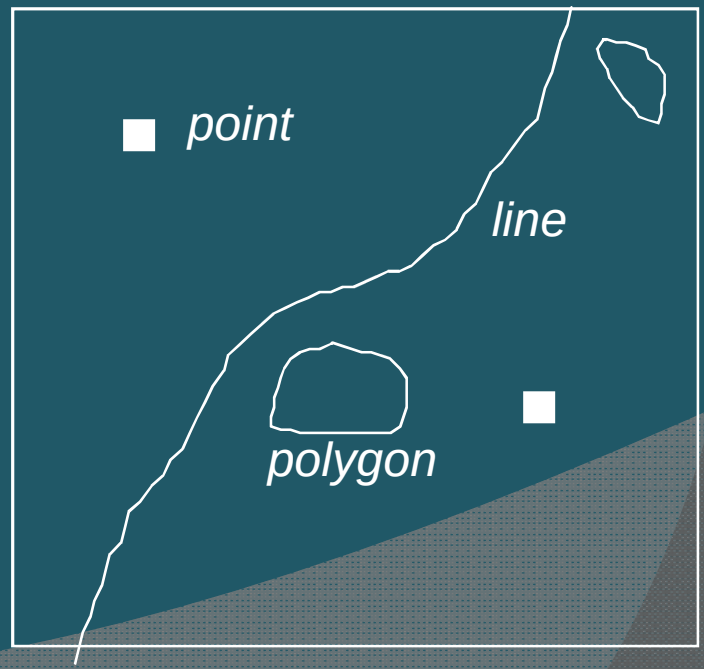


Real World

Raster Representation

	0	1	2	3	4	5	6	7	8	9
0								R	T	
1							R			T
2		H					R			
3							R			
4					R	R				
5				R						
6			R		T	T		H		
7			R		T	T				
8		R								
9		R								

Vector Representation



Aspects of Spatial Representation

- **Projection**: the method by which the curved 3-D surface of the earth is represented by X,Y coordinates on a 2-D flat map/screen
  - distortion is inevitable
- **Scale**: the ratio of distance on a map to the equivalent distance on the ground
  - in theory GIS is scale independent but in practice there is an implicit range of scales for data output in any project
- **Accuracy**: how well does the database info match the real world
  - Positional: how close are features to their real world location?
  - Consistency: do feature characteristics in database match those in real world
    - is a road in the database a road in the real world?
  - Completeness: are all real world instances of features present in the database?
    - Are all roads included.
- **Resolution**: the size of the smallest feature able to be recognized
  - for raster data, it is the pixel size
- Higher specs—higher cost

Poverty mapping

- The ultimate objective of CBMS is to provide useful data for evidence-based policy making and plan formulation for decision makers

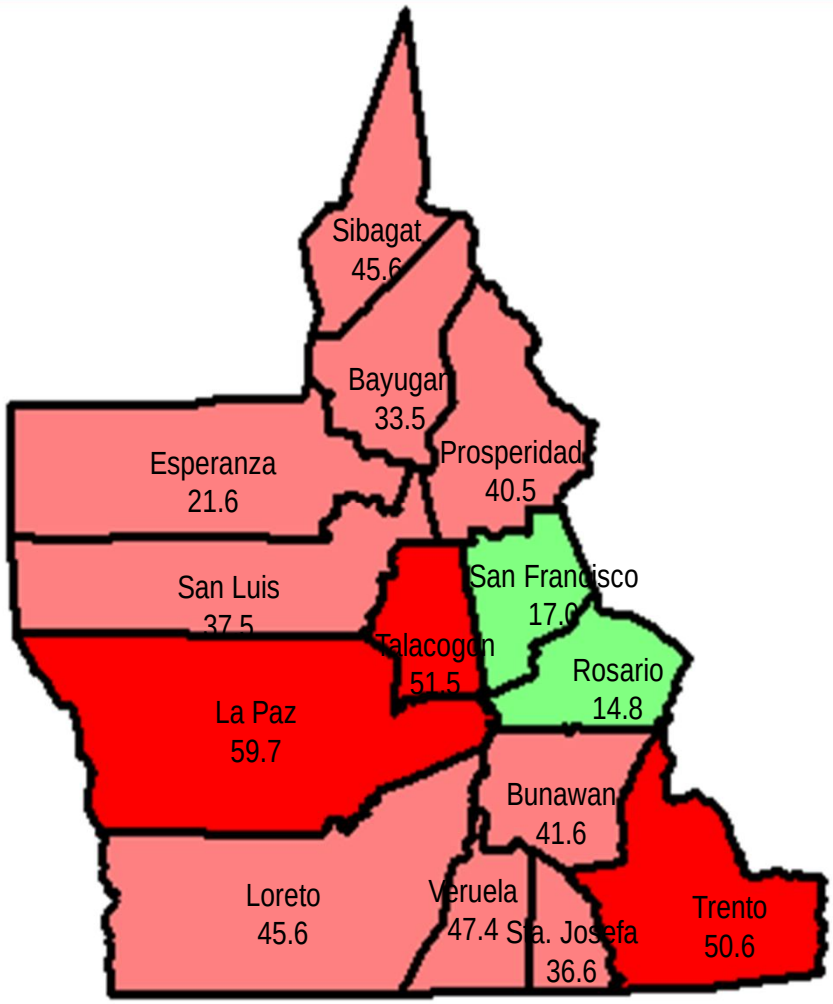
- Although processed information (e.g. indicators, proportions, etc.) in table format can be easily interpreted but data shown in maps offers a wide array of information for both for quick decisions and further analysis

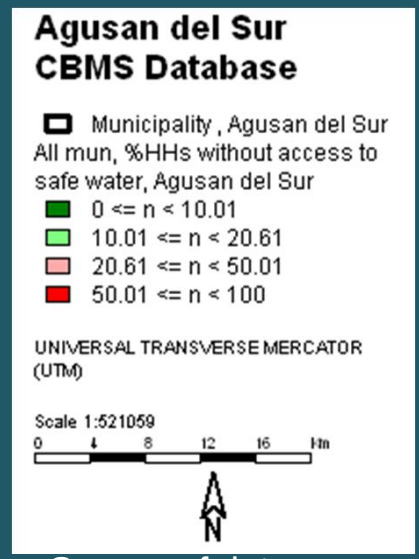
- Poverty mapping through the use of **geographic information systems (GIS)** has been a vital tool in the use and analysis of CBMS data

Uses of Poverty Mapping

- ***Easy comparison across geographic levels***

Proportion of households without access to safe water supply, by municipality, Province of Agusan del Sur, 2005





Source of data:
CBMS Survey, 2005

Green: significantly below provincial data
Light green: below provincial data
Pink: above provincial data
Red: significantly above provincial data

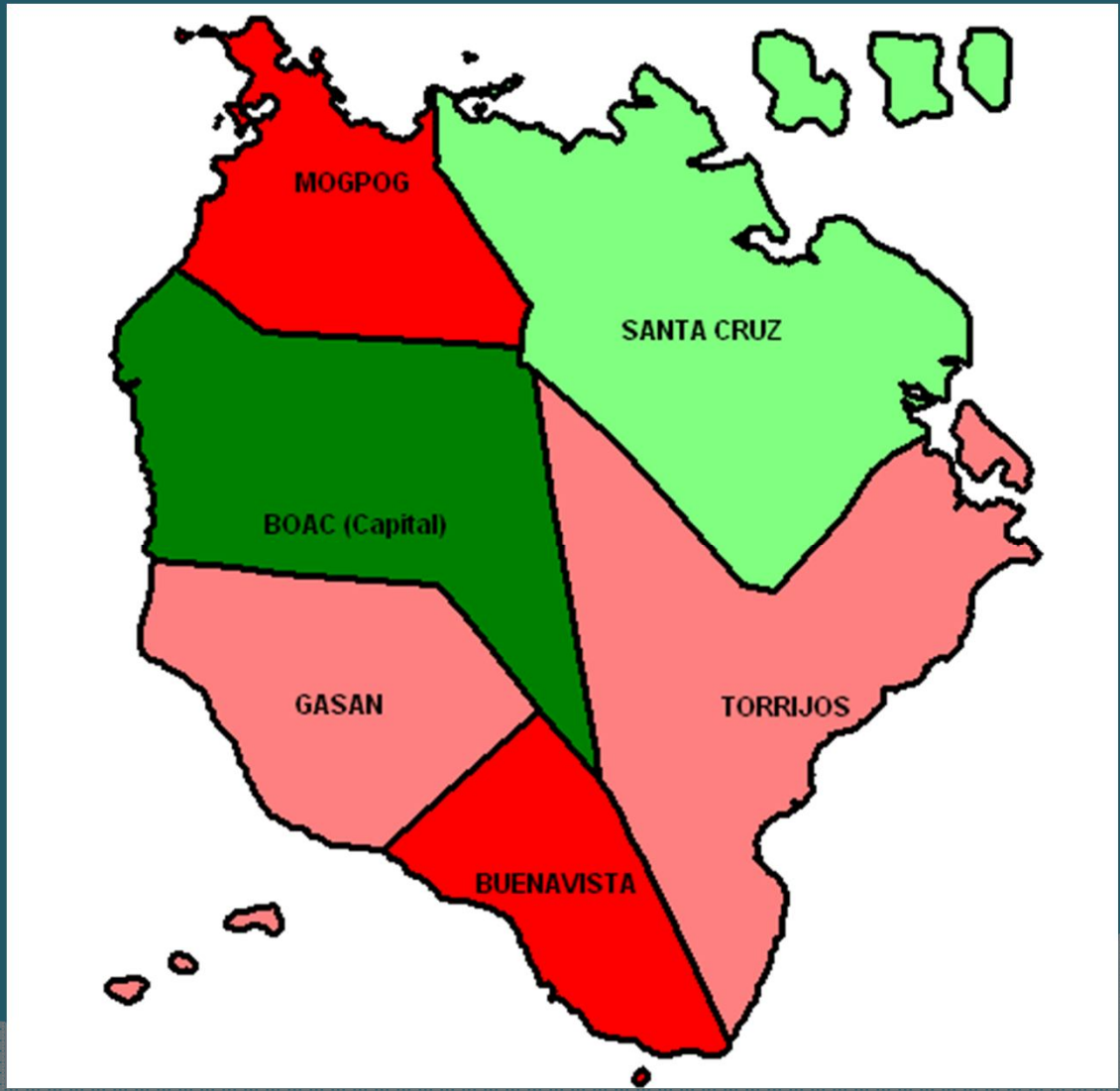
CBMS Database and Poverty Mapping

1. Know the midpoint data for the indicator. This can be the provincial/municipal/village data.
2. Sort the data from lowest to highest
3. To determine the cut-offs, use the formula below:

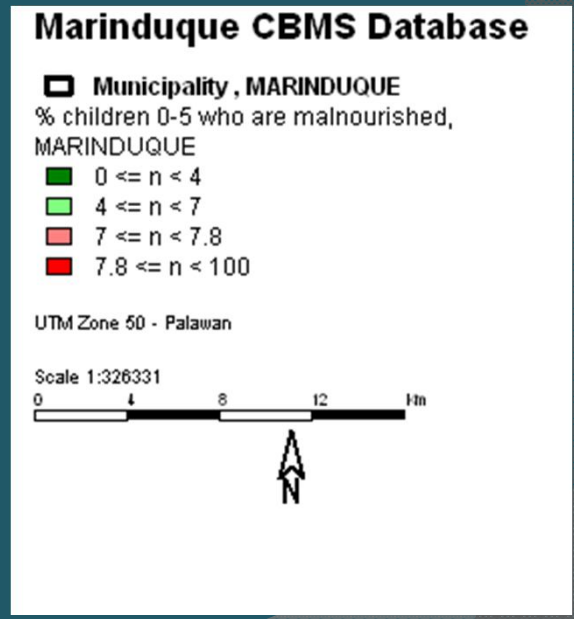
1st Range: A: 0	B: (Village data-min/2)+min
2nd Range: C: B	D: Village data
3rd Range: E: Village data	F: (max- Village data/2)+ Village data
4th Range: G: F	H: 100

Uses of Poverty Mapping

- ***Easily understood by laymen***



Proportion of children aged 0-5 years old who are malnourished, by Village
Province of Marinduque, 2005



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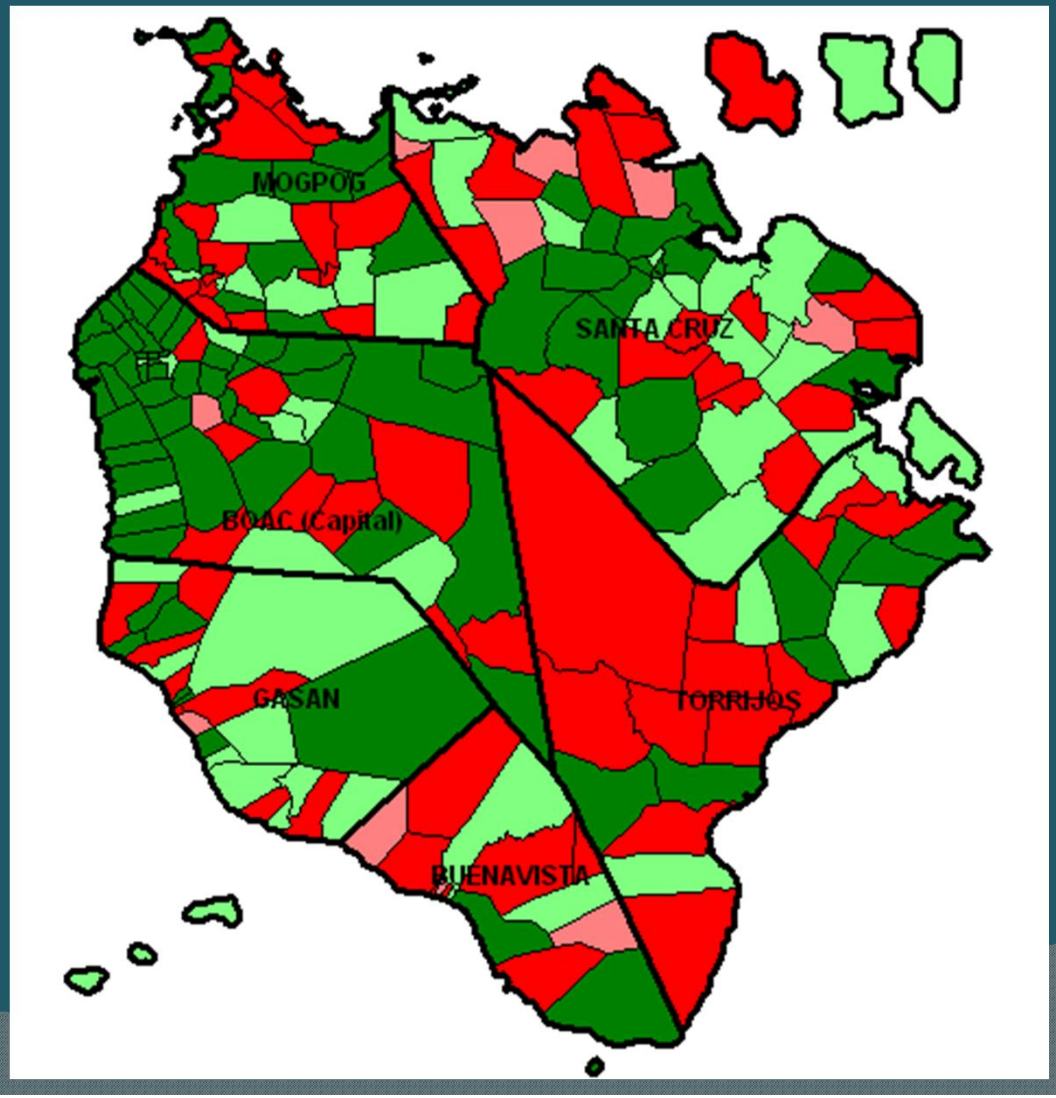

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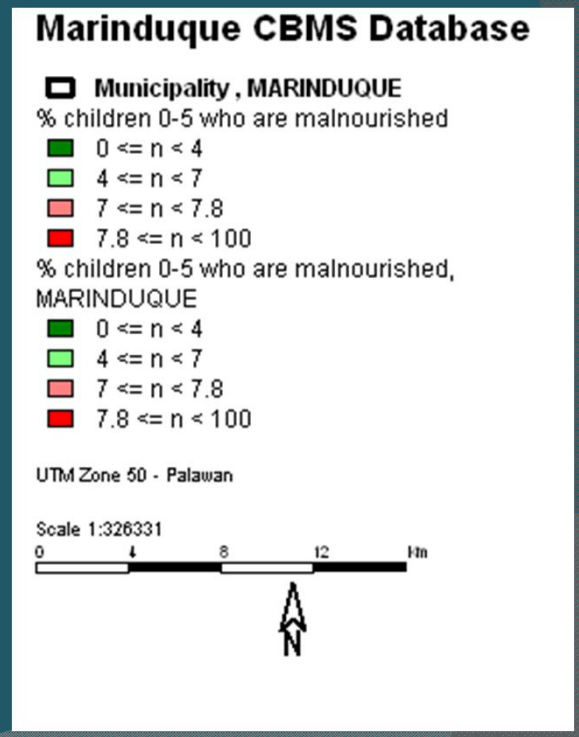

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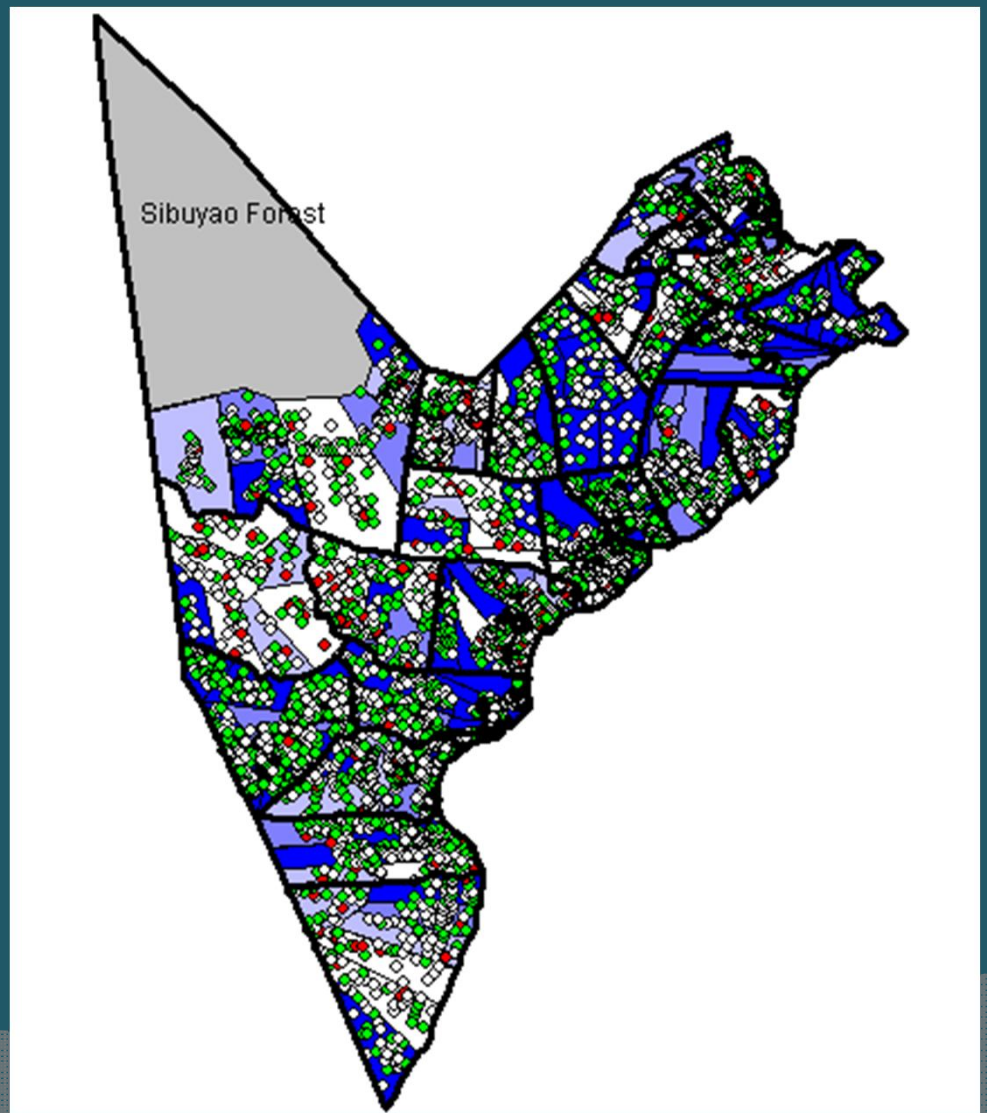
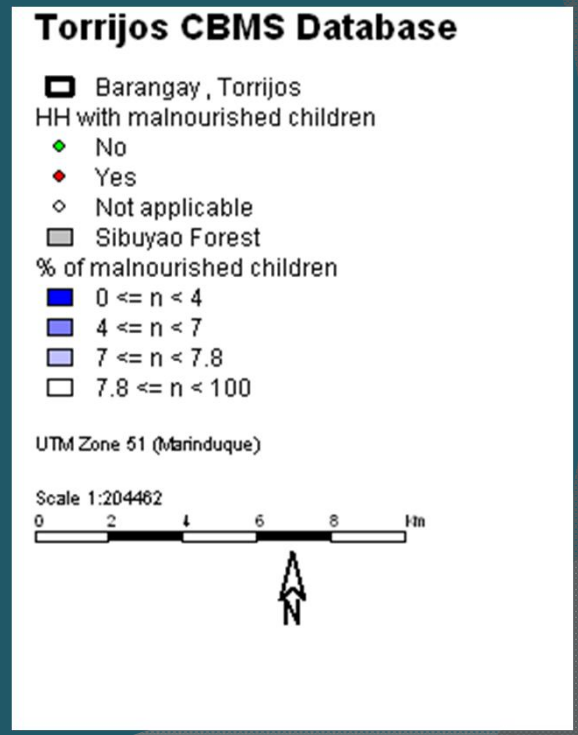
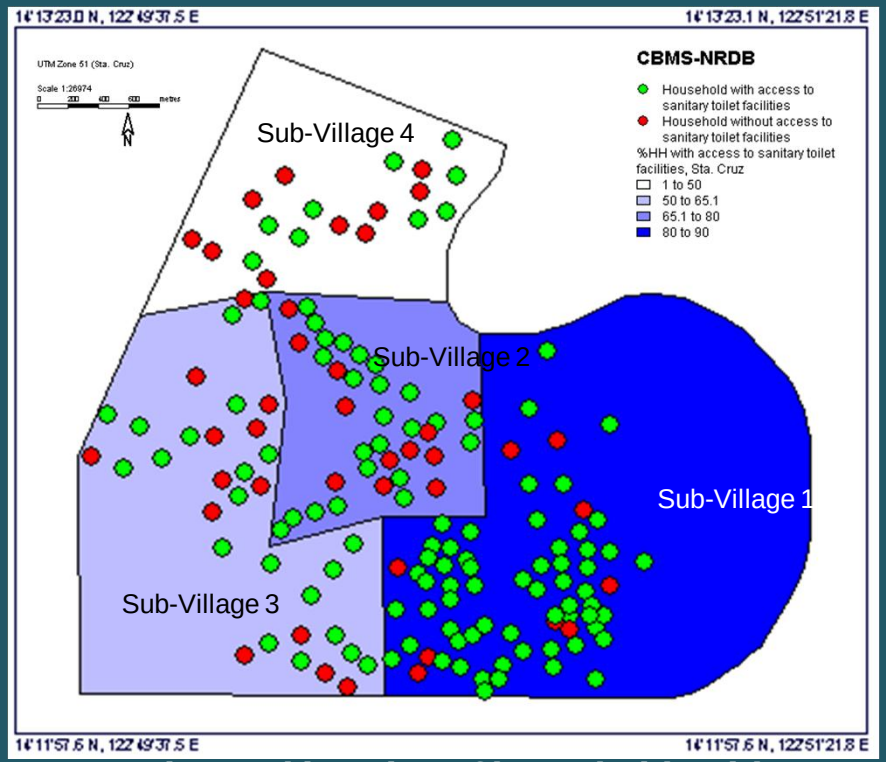


Proportion of children aged 0-5 years old who are malnourished, by Sub-Village and location of households
Municipality of Torrijos, Marinduque, 2005



CBMS Database and Poverty Mapping

- ***Use of color-coded maps in analysis of the CBMS data that makes it simpler for LCEs and program implementers to use***



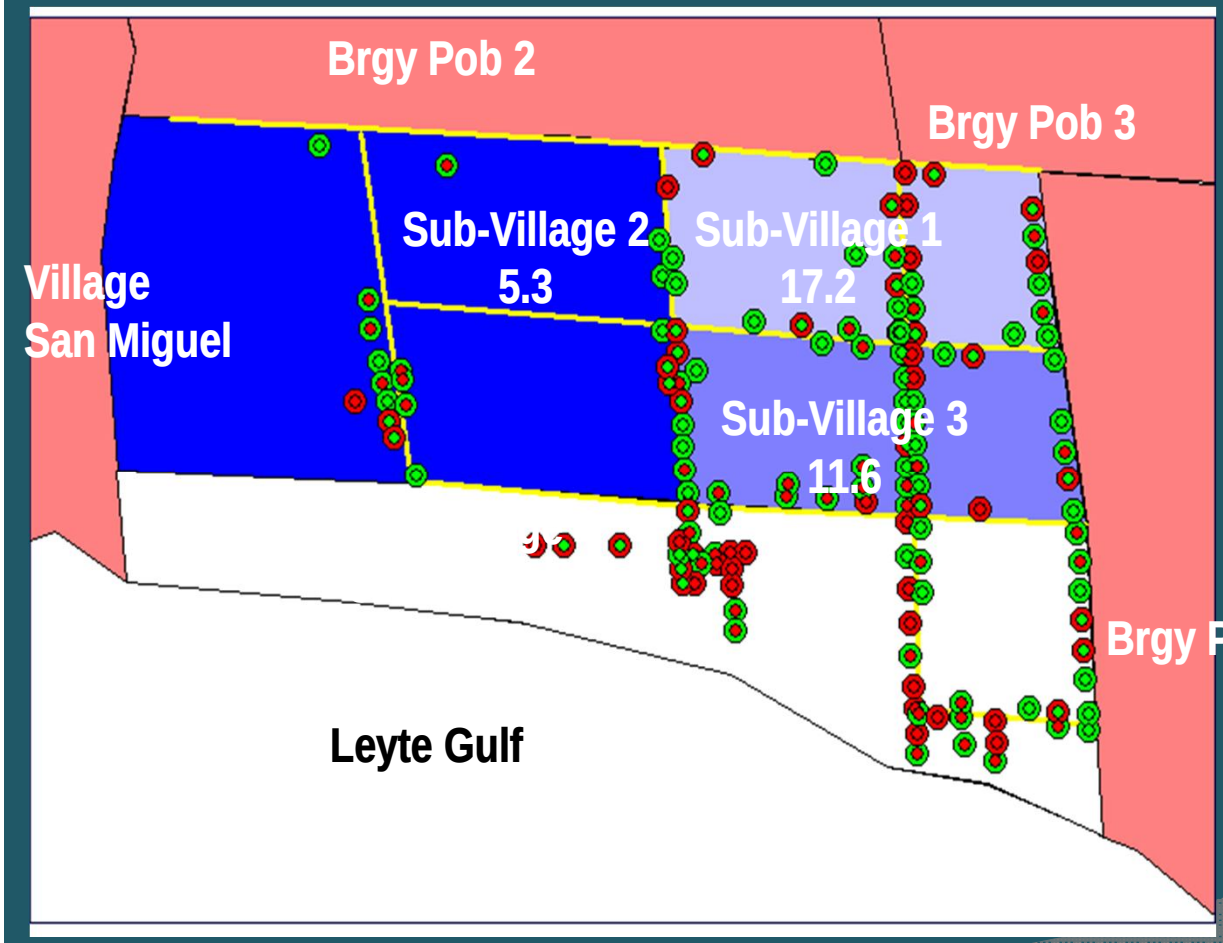
Proportion and location of households with access to sanitary toilet facilities
Brgy. Sta Cruz, Labo, Camarines Norte, 2003

To show which **Sub-Villages** are performing better or worse than the others, we always use the following color scheme: shades of **blue**. That is, *the **darker** the shade of blue, the **better** the situation of the Sub-Village vis-à-vis the indicator*.

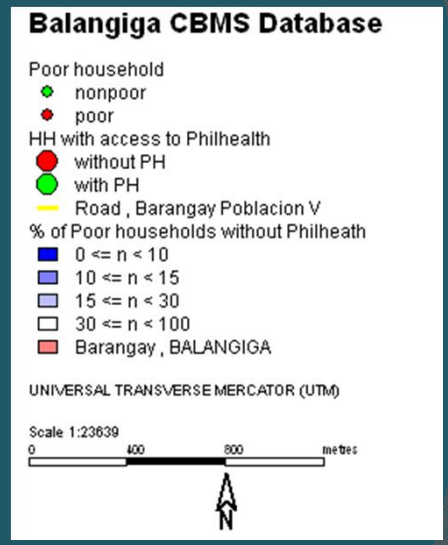
At the **household** level:
Green dots ● represent households performing **better** than other households for a particular indicator while
Red dots ● represent households **worse** than other households

CBMS Database and Poverty Mapping

- ***Displaying different dimensions of poverty simultaneously***



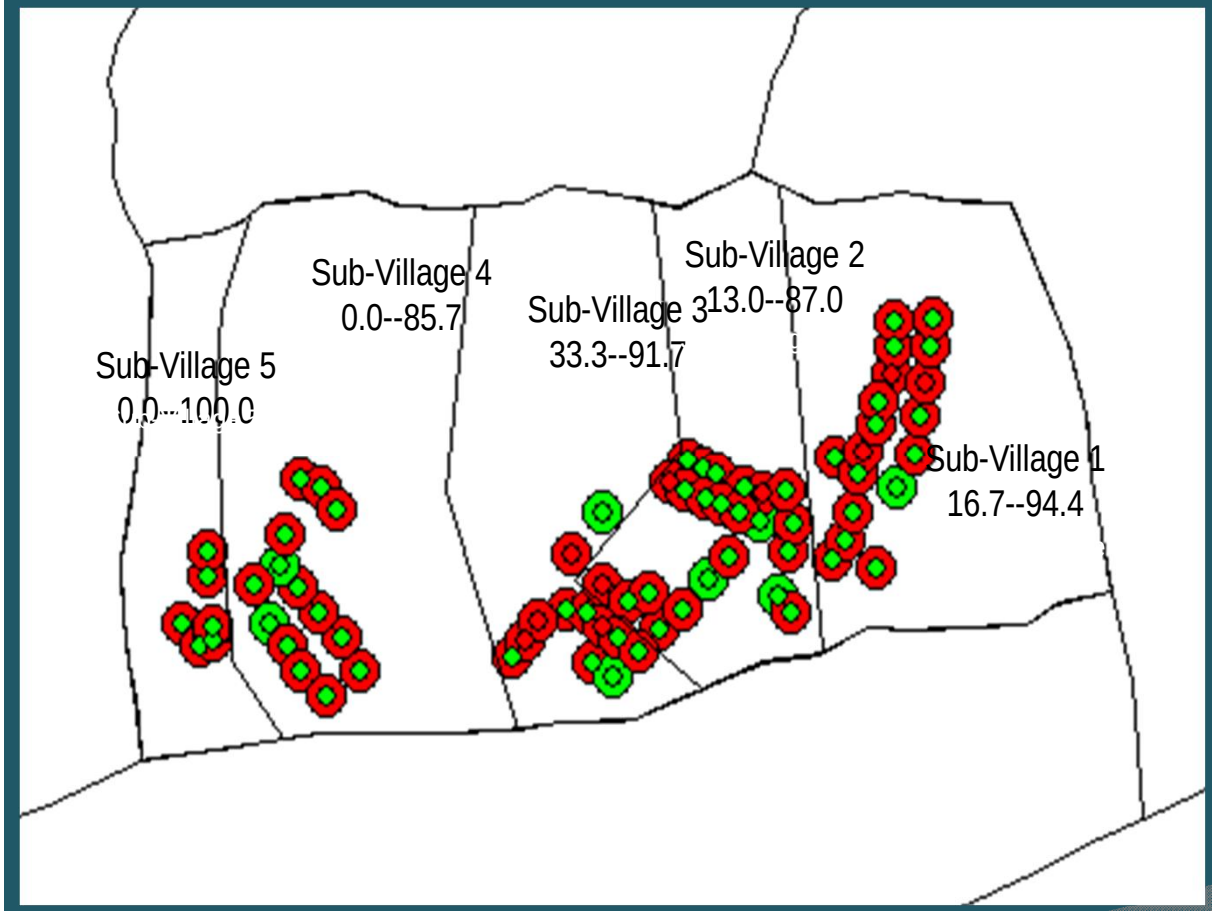
Location of households by poverty status and access to philhealth, Brgy. Poblacion 5, Balangiga, Eastern Samar, 2005



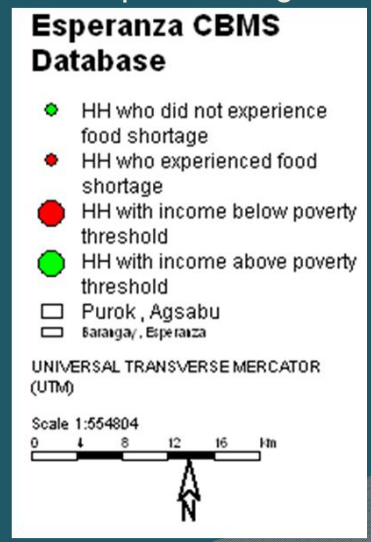
Source of data:
CBMS Survey, 2005

CBMS Database and Poverty Mapping

- ***Understanding poverty determinants***



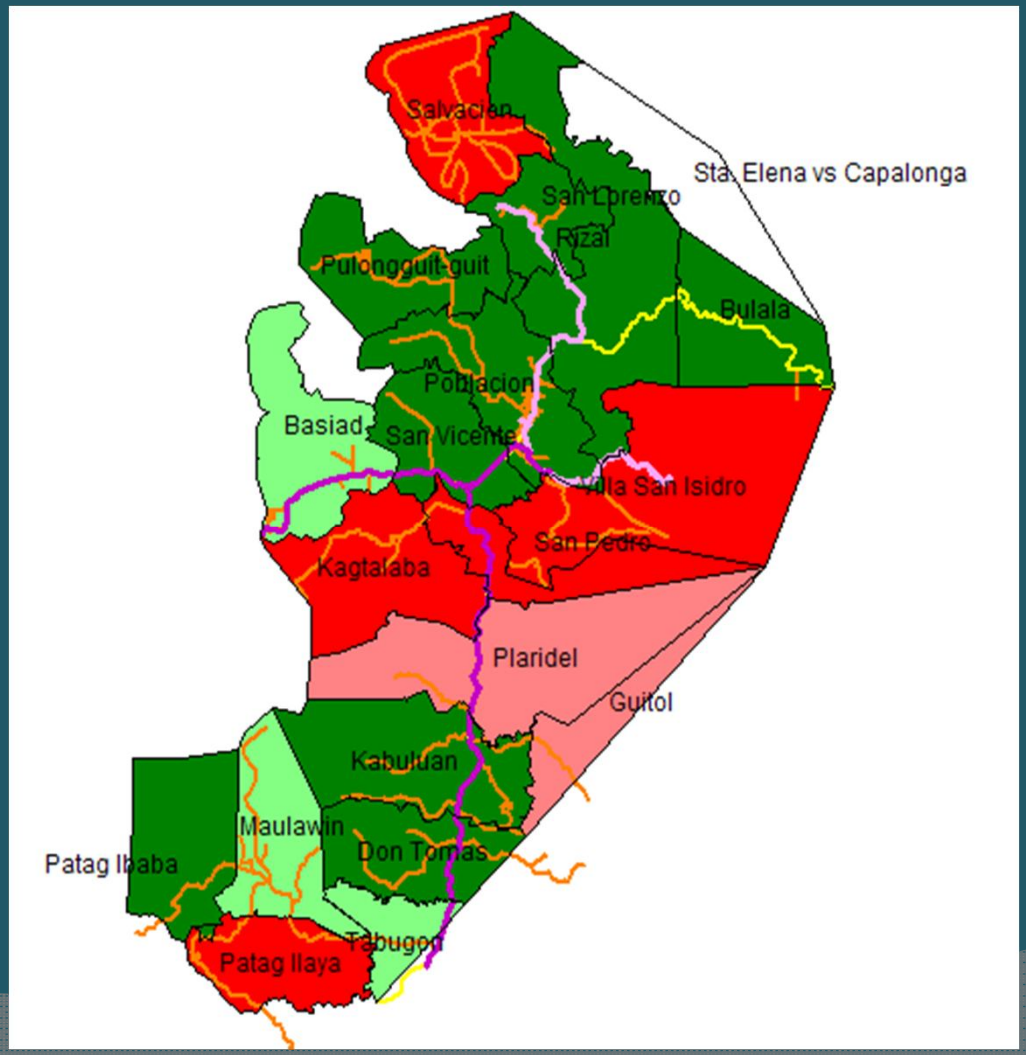
Households who have Experienced Food Shortage and have Income Below Poverty Threshold by Sub-Village and Household Location
Brgy. Agsabu, Esperanza, Agusan del Sur, 2005



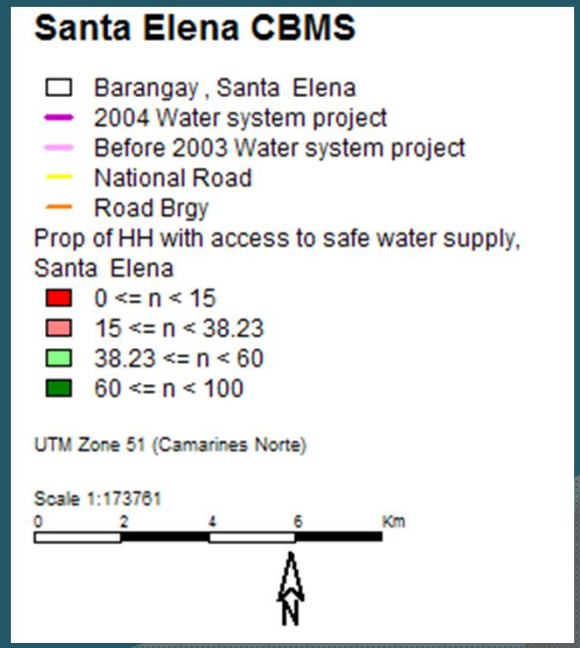
Source of data:
CBMS Survey, 2005

CBMS Database and Poverty Mapping

- ***Selecting and designing interventions***



Proportion of households with access to safe water supply, Municipality of Sta. Elena, Camarines Norte, 2003



Quantum GIS (QGIS)

- A user friendly Open Source Geographic Information System (GIS)

- Licensed under the GNU General Public License.
- Official project of the Open Source Geospatial Foundation (OSGeo)
- Runs on Linux, Unix, Mac OSX, Windows

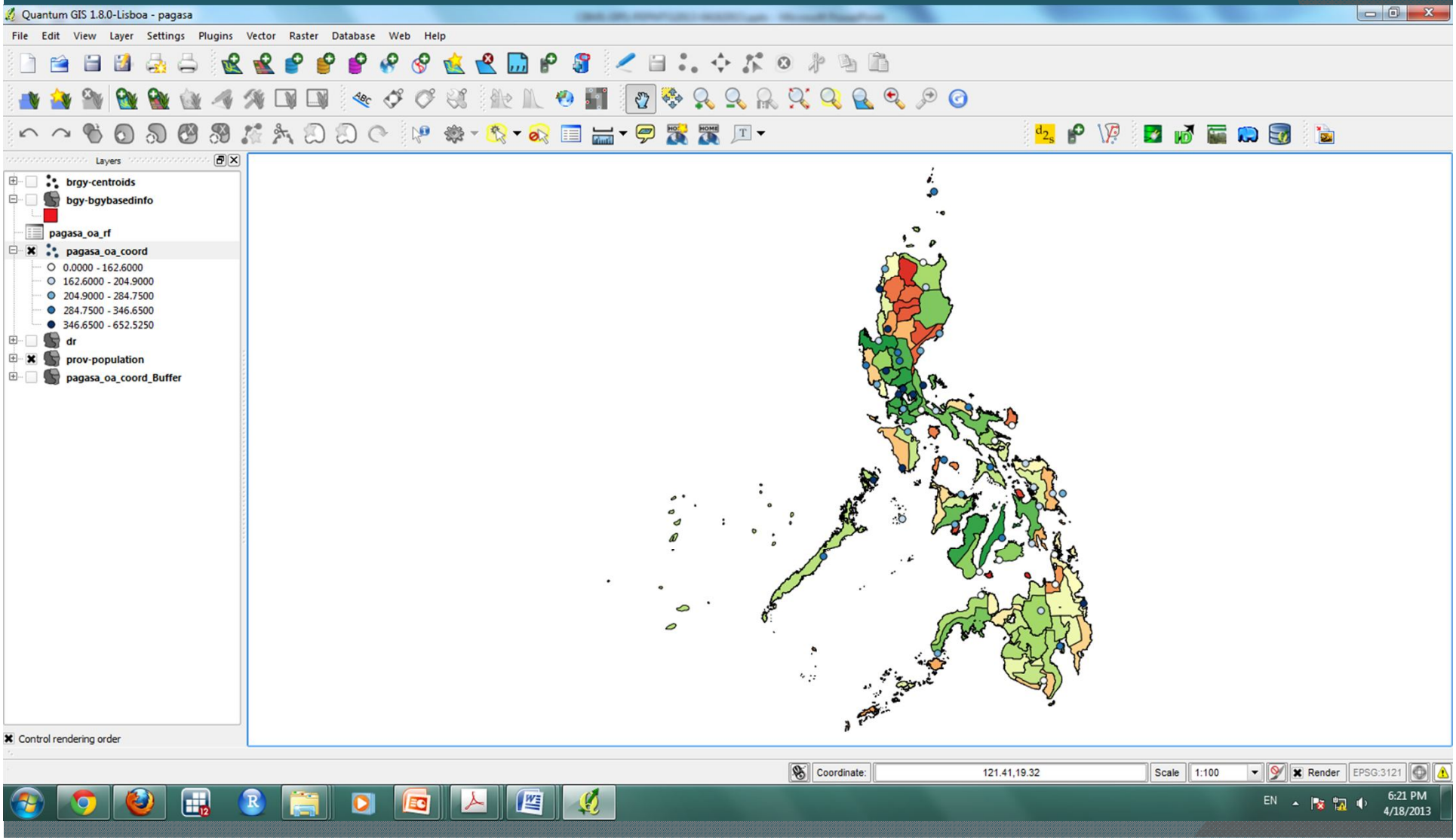
Source: www.qgis.org

Features

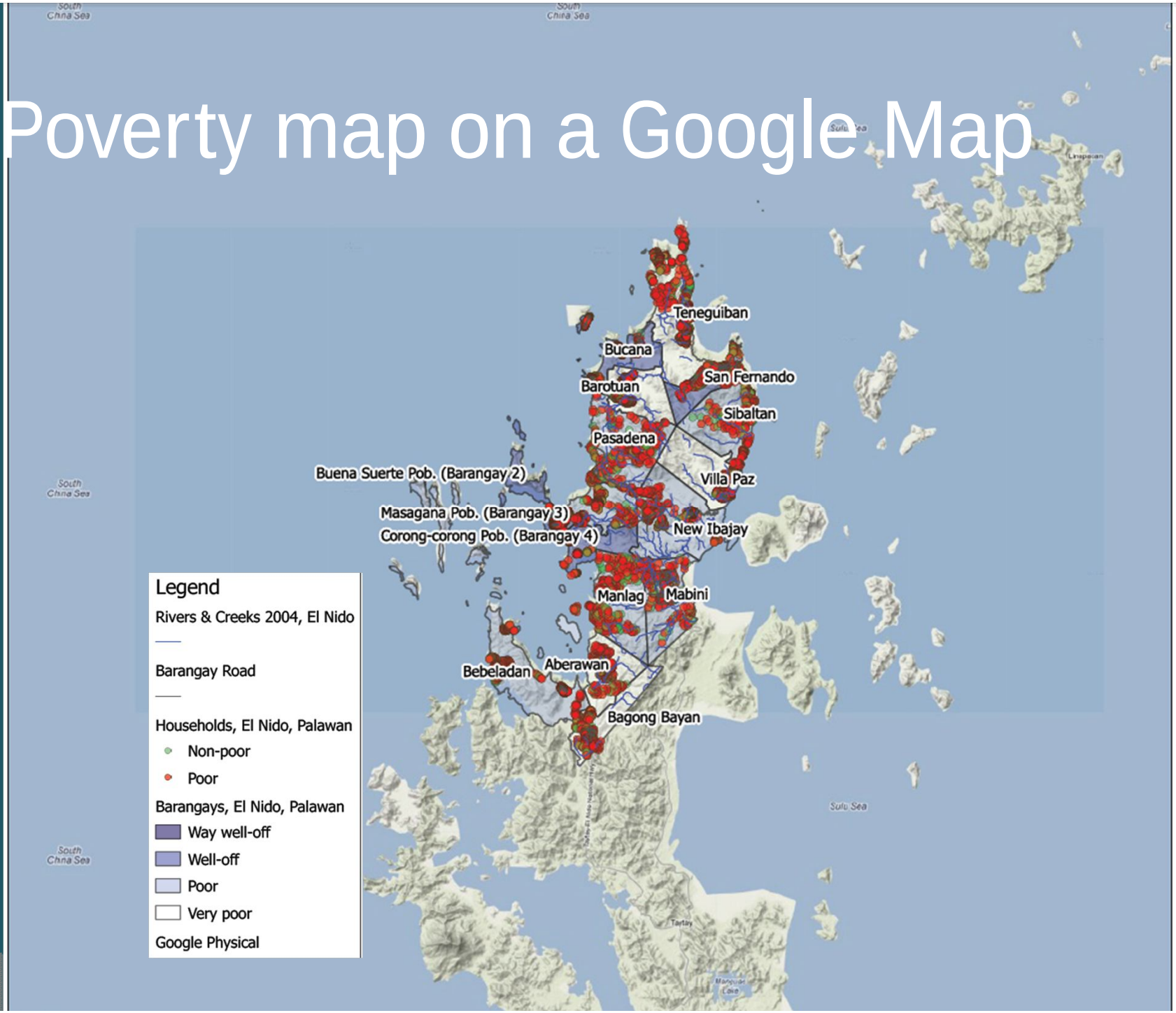
- Provides a facility for storing a wide array of information generated from the conduct of a CBMS Census
- One of its key features is that it can be used to generate desired information for presentation or reporting purposes in the form of digitized maps
- It is an open source software, which can be used and distributed at NO cost

Source: www.qgis.org

Quantum GIS (QGIS)



Poverty map on a Google Map



CBMS

Thank you!

Software/application Demo

Thank You!

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