



4.21.01 An Example of Evaluating Map Accuracy

GIS technology has broadened our view of maps. Instead of being a static entity, a map is now a dynamic presentation of geographic data. The advantages are outstanding but there are also risks involved. In this case study, the importance of observing positional accuracy between the input data and the end product in form of a CLUP map is shown.

Sources of Data

In the preparation of the CLUP using GI Technology, secondary source data will be used when available. Sources and samples of these data are discussed in Chapter 4.17.01. The LGU planner makes use of data captured by a national agency (e.g. geologic map, soil map, erosion map, flooding map, etc.). More often than not, these data will be in a paper format though there could be some where digital files are available in JPEG (scanned or imported image of the map) or vector file. Some may have already been produced using modern methods (GPS, Aerial Photography, Satellite Imaging, Digital Processing, etc.), but majority of these have been produced manually. Scales vary and little is known about the accuracy when they were produced (little metadata is attached). Furthermore, the process of production, reproduction and use of these maps will also produce distortions or errors (e.g. crumpling, stretching, uneven surface or rotation during tracing or production). It is important that during request and acquisition, researchers should take the time to ask about the data. This will be critical in assessing the accuracy and limitations of the data being acquired. In Chapter... m/Metadata specifications are given on some of the data but a lot more needs to be done to assist the planner properly.

In order to be of use in a GIS, the source map must be transformed to a digital layer. In technical terms, the paper maps will need to be *digitized*. Scanning and georeferencing, which is discussed in Chapters 4.21.04 and 4.21.05, is the first step in digitizing where acceptance and accuracy should be observed with respect to those processes. The presence of errors within the source will be transferred into the digital form plus any errors that might have been incurred during reproduction of the source data, scanning and georeferencing process. The accuracy of the digital data will be limited to the accuracy of the secondary source and comparison will only be between secondary data sources. How to treat errors between primary and secondary sources will be taken up in a different chapter.

The accuracy of digitization is dependent on the accuracy of the source. The georeferencing operation and output digital file will never be more accurate than the source. We can only make these source data. The use of a more accurate source will be superseded when dealing with administrative boundaries that will be discussed later on. If the accuracy of a secondary source cannot be determined, it should be compared to other secondary sources that have comparable features.

Care must also be taken when comparing data. Most secondary sources were done manually, and could have a lot of errors. It is possible that there are secondary sources that have been produced digitally like orthophotos and GPS surveys. These sources would have greater accuracy than all other secondary sources and the

manner in which this data is treated, compared to manually made data, should be considered differently.

First step is to compare secondary datasets, which were manually prepared.



Use a 1:50,000 topographic map published by NAMRIA and digitize a portion of a road (yellow line) in the map retaining the thickness.



When the digitized road (yellow line) is overlaid on a Soil Map published by the Bureau of Soils and Wastewater Management (BSWM) with a scale of 1:100000, it will be apparent that there is a big discrepancy in size and direction of the same road on the other map (thick blue line).

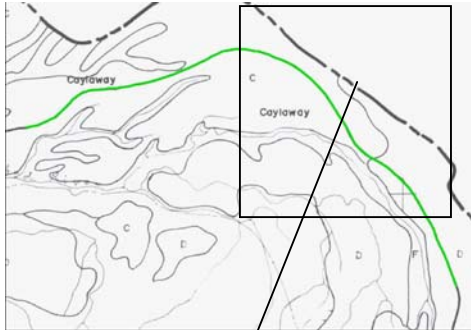
Compare the scales. A 1:50000 map would be twice more accurate than a 1:100000 map. Consider plotting in these two scales using 0.5 mm technical pen. A 0.5 mm thick line on a 1:50000 map would have an equivalent ground distance of 25 m and on a 1:100000 map, an equivalent ground distance of 50 m. A 10-meter main road will be more accurately plotted on a larger scale map. Data taken from a larger scale map should be treated more accurately. In the case shown above, the road on the NAMRIA map would be 30 meters wide while the Soil Map displayed the road as 100 meters wide. Of course the NAMRIA 1:50000 topomap will have to be used for the road data if no other up to date source is available.

Now take a look at another aspect to consider when assessing accuracy.

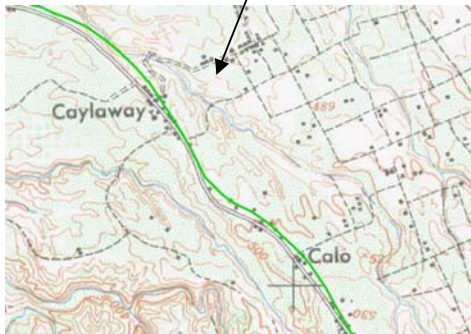
SOURCES OF INFORMATION : AMS topographic map series scale 1:50,000 compiled in 1955; Census of Batangas province 1970 edition and land resources data provided by Bureau of Soils and Ministry of Agriculture and Food, Region IV survey team.

Map preparation and reproduction by the Cartographic Division, Bureau of Soils, Manila from June to December 1985.

In some cases, there is metadata on the map. Look at the dates on the map, both source preparation and production. Unless otherwise known, newer data should have more weight in accuracy than old data. Newer data means that new methods were used, more accurate survey equipment, better plotters and printers and more accurate computations. In this example, it says “*map series 1:50,000 compiled in 1955*” so it should be treated as more accurate for map data created prior to that year and less accurate for map data after that year. Even if the map was produced recently, the source data will still be the old.



This map is a slope map from BSWM. The base map used is a NAMRIA 1:50000 topomap with the Metadata used above. A portion of a road was digitized on the map.



Overlaying the road with the NAMRIA 1:50000 Topomap and zooming in on the area shows that the road will still be out of place. In this example, it is off approximately 65 meters in ground units.

This example shows maps that have the same source but with different outcomes. One can never be more accurate than the source (NAMRIA 1:50000 topomap) so adjustment for the road data will have to be made in conformance with the NAMRIA Map.

(example of areal photo will be added if photo is already available)

Lessons Learned

In searching for data, there will always be discrepancies found. It is only now that these discrepancies become apparent through the use of GIS. It should not discourage the user because as has been shown, there is not one good single source for data.