

GEOSPATIAL FOOTSTEP OF JAVA

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ABSTRACT:

In the 1st Indonesian Geospatial Technology Exhibition (IGTE) held in Jakarta Convention Center 2006, the Center for Mapping & Spatial Planning of Bakosurtanal made a special footstep for visitors. The 35 meter footstep was made to give a brief description about the “road” from image to geospatial information, and at the same time a continuous geospatial data over 1000 Km from west to east of Java Island Indonesia. Various data sources (satellite image, radar, aerial photographs, vector maps and cartographic maps) were integrated in the footstep.

1. INTRODUCTION

In the 1st Geospatial Technology Exhibition that was held in Jakarta Convention Center in 2006, the Center for Mapping & Spatial Planning had made its own mission to prepare a set of spatial data variation covering an area stretched lengthwise. The area should be printed in a footstep with a dimension about 1 meter x 30 meter. This footstep should give basic knowledge or education to the visitors about the current mapping process technology.

Spatial data available from the Center for Mapping and used for mapping process varied from scanned aerial photograph, airborne interferometric SAR as Ortho-radar-image (ORI) and Digital Surface Model (DSM), Landsat, SPOT, Aster, Ikonos, Quickbird, Radarsat, DEM from SRTM to digital topographic line map, printed topographic map at various scale etc.

To present all data seamlessly without interruption was challenging. Indonesia is an archipelagic country where the position of the islands are not exactly spanned from west to east or from north to south. So, there were not many choices.

If all data were stored in a seamless database, then it should not be so difficult to bring up the data which position is arbitrary from Aceh to Lampung or from Anyer to Banyuwangi and to directly transform the data so that the shape could be extended lengthwise as we wish.

However, when most data are stored sheetwisely, only data in one line can be further processed. For this reason, the most probable data is data topographic map of 1:25000 scale (RBI25) from Palabuhan Ratu in West Java straightly to East until Eastern Coast of Madura Island (Figure 1).

In this selected area, complete variations of topography will be represented such as coasts, forests, rurals, urbans, either in center of island such as Bandung or along coastal areas such as Semarang and Surabaya.

The available spatial data types in this area also varied. Most maps in this area were made using aerial photographs at 1:30,000 or 1:50,000 scales. Some of them have been updated already using airborne-interferometric synthetic aperture radar (Ifsar) image, SPOT, Aster or Quickbird. With some reasons, four data types were selected: composit image of Landsat 7

ETM band 543 resolution 15 meter, DEM from SRTM (Shuttle Radar Topographic Mission) with a resolution of 90 m, digital vector topographic line map of 1:25.000 scale and scanned cartographic topomap at the same scale.

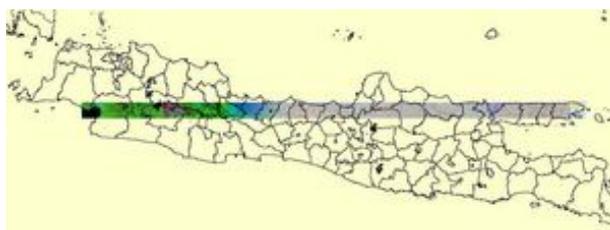


Figure 1. Selected are for geospatial footstep.

The size of footstep will be based on map layout of 1:25,000 topographic map, i.e. 56 x 56 centimeter each. The selected areas were covered by 2 x 63 sheets, so the footsteps will be about 35 m long and 1 m wide.

To make a good and meaningful story from the creative process from image to map, the data will be mosaicked from west to east with this sequence:

1. Landsat images
2. DEM from SRTM in two ways.
3. Vector of digital topogaphic line map, begins with contour line, and successively added with hydrographic lines (coastline and rivers pattern, transportation network, landcover, building and settlement, geographical names and lastly administrative boundary).
4. topographic print map

2. PRODUCTION PROCESS

2.1 Landsat data

Before landsat image were cropped, some calculation was made to determine the cropping boundaries. The boundaries were based on the RBI25 map index.

The cropping was done from the mosaicked images based on the cropping boundaries. For this process, software GlobalMapper™ is used. This software can process vector and raster simultaneously. After cropping, data will be stored as a georeferenced GeoTiff file. The image resulted was about 7 meter (covering 13 map sheets).

2.2 SRTM DEM Data

To crop this part, the end position of Landsat image should be considered. DEM data will be visualized in two ways: multicolor (rainbow) and hillshading.

The rainbow provides a 3D-impression when seen by special glass. The color of hillshading used further as the background of digital vector topographic line map. This process was done also using GlobalMapper™.

2.3 Vector Topographic Line Map (RBI25)

Initially, the vector data of RBI25 were in UTM coordinate system and for this selected area, they were in two UTM zones (48 and 49). To integrate (mosaic) with Landsat and SRTM, all data must be transformed firstly in Geographics coordinates. This process was done on software GlobalMapper™.

Vector data of RBI25 were divided in 7 main themes. Each of them was on 2 x 5 sheets (or about 1 x 2.5 m), so that the total length was 2 x 35 sheets (1 x 17.5 m). Each part consisted of:

1. just contour lines
2. Contour and hydrograph (coastline and river structure)
3. Contour, hydrograph and transportation network (road, rail, high voltage electricity transmission)
4. Contour, hydrograph, transportation and the boundaries of landcovers (vegetation, settlement)
5. Contour, hydrographic, transportation, the boundaries of landcovers and buildings.
6. Contour, hydrographic, transportation, the boundaries of landcovers, buildings and geographical names.
7. Contour, hydrographic transportation, the boundaries of landcovers, buildings, geographical names and administrative boundaries.

The selection of involved mapsheetnumbers will be done in ArcView™, overlaid with the RBI25-map index on the coastline of Java. All data on this area were then activated on the table which is then exported into MS-Excel™ for batch-scripting inder copy only files needed.

2.4 Scanned map RBI25

There were only 2 x 2 sheets of scanned map RBI25 needed, or only about 1 x 1 meter. The scanned maps did not have homogenous color, depending on the scanning quality and paper condition. The scanned map should be registered to have similar georeference to each other, then they were stored into a GeoTiff file.

Therefore, in total we had 10 different types of data.

3. INTEGRATION

All raster data were stored in GeoTiff format, while the vector data were generally in Autodesk-DXF-format. After geometric integration, the most important step was data “smelting” of vector into raster. In GlobalMapper™ this step was done using

GeoTiffExport menu. The sample spacing must be the same. The resolution that was closer to the mapscale of 1:25,000 was 2.5 m. The footstep should be readable to visitors while standing (4 – 5 x reading distance), and also to save the filesize, 10 m resampling was used. In this size, the text quality will be downgraded, both in the RBI vector or inthe raster scanned map. A special handling for text was then conducted.

To master this huge file in pre-printing software – i.e. AdobePhotoshop™ - with maximum file print of about 10 meter, the integrated data must be divided into several pieces that were ready for printing. In some cases, in AdobePhotoshop™ same problem was found, where the vector to be rasterized was too complex.

For the printing process, a Canon Large Format Printer PROGRAF W8400 was used. After dividing the files into pieces, there was another problem during the printing in which after each printing was started, the printer would automatically make an offset of 0.5 cm before starting new printjob. Without appropriate software for this printing process, a precise manual re-adjustment was needed for the printer, so that these gaps would be visible. Figure 2 shows the product installation.



Figure 2. Geospatial footprint of Java in IGTE arena

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