Geoinformation Issues for the Developing Countries

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SUMMARY

The BEV (Advisory Group for Surveys and Geoinformation for Technical Cooperation with the Developing Countries) in Germany consists of members in surveying, mapping and geoinformation disciplines from the academic, governmental and private sector with interst in geoinformation activities in the developing countries. The members accompany donor funded project activities in more than 30 countries.

Principal interests by donors are directed toward the establishment of cadastral systems with examples in Georgia, Cambodia and Mongolia, on which other BEV members will report. Another area of interest is the rapid and cost effective establishment of planning information systems with high technology tools such as high resolution satellite imagery and GPS technology use with the example of an urban GIS for the city of Tirana in Albania.

In this World Bank financed minor project, carried out by the Turkish contractor Inta Spaceturk, Quickbird imagery with 60 cm ground sampling distance was used. The satellite image had to be geocoded to +/- 2 m accuracy. This was possible by establishing and measuring 4 primary GPS stations, tying them directly to thr IGS network with long term observations, and with densification via RTK to about 60 control stations. To this new network the satellite image covering 273 km2 was geocoded. A raster DEM was automatically generated from stereo-Ikonos images, available to the contractor. It was manually improved and fitted using existing medium scale contour map data. The orthoready image product, geocoded with the control, and the DEM permitted to resample the digital orthophoto within the 2 m specification. An ESRI ArcGIS system was acquired. It contained an Oracle RDBS, ArcSDE, 2 ArcEditor and 10 ArcView licenses.

A geodatabase was designed for entry of the relevant existing and to be newly surveyed geodata, which incorporated a data structure linking community district – block . parcel, if available – building – attribute. The geocoded satellite ortho-image was used to on-screen digitize all existing buildings visible on the satellite image of the year 2004 in topologically structured shapefiles. The last systematic digital map digitized from the cadastral map 1:1000 of 1992 was made in 1996 in Autocad CAD format. It had not been systematically updated.

Since that time the population of Tirana has doubled from 300 000 to 600 000, and most new buildings, some 15 stories high, have been built across unresolved cadastral boundaries. Tirana Municipality had been unable to wait for the restitution of the 1992 cadastre.

During a 10 year period more than 10 M $ have been spent on this issue, but only 4 districts of the city out of 23 had been completed. For the Regulatory Plan project GIS the attributes for each building were collected by 2 field teams using a GPS controlled tablet computer in a 1 month period.

Each building entrance was visited, and a variety of attributes was entered relating to the use of the building, its condition and its inhabitants, as well as other relevant planning information. The data set will be an excellent opportunity to regulate house addressing (sofar the inhabitants only use P:O:Box numbers). The existing analog utility plans kept up-to-date by the utility enterprises were digitally scanned, geocoded or fitted and superimposed onto the geocoded satellite orthophoto.

In addition information on parking, no parking zones, bus routes, health facilities, industrial plants, waste disposal areas was collected and introduced into the geodatabase. The analysis capabilities of ArcGIS proved to be most useful for the design of the new regulatory plan, which is now in progress as phase II of the project. The total cost of the data collection from satellite image and ground surveys as well as the GIS installation for the urban area of Tirana of 60 km2 was only 200 000 $.

The GIS creation from satellite images and the terrestrial GPS data collection in phase I of the project lends itself to an annual updating process, which only requires a new satellite image (cost 5000 $) and an inexpensive locally contracted GPS controlled field computer update by the same procedures (cost 10 000 to 20 000 $). The procedure followed can be considered as a model to rapidly and inexpensively collect relevant planning information for urban areas of transformation and developing countries.

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