

FRAMEWORK DATA AND TOPOGRAPHIC MAPPING IN DEVELOPING COUNTRIES – A SURVEY

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ABSTRACT:

The paper gives a first account of an initiative to survey the state of providing fundamental geo-spatial data and in particular topographic data in developing countries. Focusing on developing countries the ITC aims at capacity building and institutional development of professional and academic organizations and individuals in the field of geo-information science and earth observation. In support of ITC's educational activities and project services we attempt at intervals to systematically "map the mapping status". The present survey includes analysing the responses of a questionnaire that was sent to national mapping agencies of countries of interest, ITC's international partner institutes, and to recent alumni.

1. Motivation

The Bathurst Declaration (Bathurst, 1999) formulates what at least every mapping professional is likely to believe, *ie*, "spatial data is the key to planning, sustainable management and development of natural resources". We can easily extend the relevance of spatial data and geo-information to the planning and managing of physical infrastructure, protection of the environment, securing land tenure, and decision making on safety issues. The existence of a spatial data infrastructure (SDI) is expected to ensure efficient accessibility of data/information that is referenced to a position on the earth's surface. The Bathurst Declaration defines SDI as a term that describes the fundamental spatial data sets, the standards that enable them to be integrated, the distribution network to provide access to them, the policies and administrative principles that ensure compatibility between jurisdictions and agencies, and the people including user, provider and value adder who are interested at a certain level of area that starts at a local level and proceeds through state, national and regional levels to global level. SDIs are increasingly recognized as an essential element for the development of a country. By now creating a (national) SDI has been put on the political agenda of many countries.

The 'geo-awareness' seems to spread through out the world and ambitious plans shape up. How does increasing awareness and new plans translate to the existence and availability of base data? What is actually done today around the globe in terms of producing fundamental geo-spatial data--framework data, if you wish--and in particular topographic data? There is very little literature published in the worldwide public domain about the availability of framework data and the state of topographic mapping and data/map revision in developing countries. Several attempts have been made in the past, at kind of regular intervals, to monitor the progress in providing base data (*eg*, Brandenberger, 1980; Bos, 1982; Perry & Perkins, 1991;

Brandenberger, 1993; Davis & Fairbairn, 1998). All researchers faced the problem of not much being reported by developing countries. Despite of the Internet this situation has not changed much. Five years ago Davis & Fairbairn reported, "there is an alarming dearth of literature concerning mapping and map revision in developing countries. This is a worrying trend since it implies that the mapping activities fundamental to a country's development may not be taking place." Is the latter true? Ezigbalike et al (2000) claim, "while there are several initiatives in Africa that can be regarded as rudiments of a holistic SDI, most advance has been made on spatial data, because we did not have to start from scratch. Spatial data always have been available in various forms in all countries, especially in map form". Yet we ask ourselves, is the rapid change of technology triggering changes at equal pace in operational practice of large volume data providers (national mapping agencies, etc) in developing countries? Is the technological promise met of improved quality, more detailed data, greater variety products, and faster availability?

Focusing on developing countries the International Institute for Geo-information Science and Earth Observation (ITC) has started out more than 50 years ago on a mission of developing and transferring knowledge of aerial surveys for base mapping as part of the Netherlands Programme for Technical Assistance. Meanwhile the institute has broadened its aim to capacity building and institutional development of organizations dealing with the provision of spatial data (ITC, 2000). ITC's mission includes the institute's continuing interest in topographic mapping but does not imply that we are fully aware of what is really done in terms of collecting, processing, storing, updating, and disseminating topographic data in many developing countries. Another incentive for our initiative to survey the mapping status globally is ITC's recently adopted policy of "decentralization". As part of this policy, educational programmes will be developed and implemented jointly with partner institutions in a "Geo-Information Network for

Education and Training (GI-NET)". The main aim of this network is to promote the use of spatial information and earth observation. The network will be active in research and development, as well as in education, training and advisory services (itcnews, 2003). What could be the role of ITC, what the role of its international partners in the GI-NET? One of the action points identified in the workshop "Joint Education Partnership Network" held at ITC in December 2003 was "to inventorize current facilities, resources, procedures, and demands".

2. Action

We try to use any information source that may disclose quantitative data on topographic mapping; topographic mapping being understood in a broader sense than merely producing and publishing paper maps but rather as building and maintaining digital topographic databases in an SDI setting. To this end we decided to also send out a questionnaire, despite of the known disadvantages of doing so. We addressed the questionnaire to ITC's partners in the GI-NET, to national mapping agencies in many developing countries, and to ITC alumni who had completed our Geoinformatics or Geo-information Management courses since 2000.

3. Questionnaire

The Questionnaire interrogates the following aspects in 5 sections:

- (1) General information about the organization:
- (2) National context of topographic mapping:
 - State of a national policy on geo-information (GI) management
 - Who is in charge of the national GI management mandate?
 - National Metadata and Clearinghouses
 - Geodetic control
 - Human resources development
 - Current human resources recruitment from
 - Expected needs of human resources
- (3) Provided map products:
 - Paper maps and/or digital maps (vector data symbolized and at a fixed scale) and/or object-oriented (OO) topographic data (seamless, of specified resolution)
 - Diversity of products
 - How are data and/or paper maps made accessible to users
 - Percentage of land area covered to date by various map scales
 - Percentage of land area planned to be covered by 2010
 - Type of planned coverage by 2010 and currency:
 - Map contents of the most prominent topographic product world wide, ie, a 1:25,000 or 1:50,000 map
- (4) Techniques of Mapping:
 - Own production or purchase of value added products from international image and service providers

- Digital maps and paper maps produced from topographic databases
- Primary mapping or revision
- If primary mapping is done (actual production and not purchasing from global vendors), what is the data source for mapping/collecting vector data
- Data source for map revision
- Revision method
- Revision techniques
- Equipment used for mapping
- Acquisition of elevation data
- Major bottleneck in meeting production targets

(5) Miscellaneous:

- Current funding of topographic mapping

4. Status

At the deadline for submitting papers for the ISPRS congress in Istanbul we did not receive enough responses yet. Obviously we started too late with out mailing, underestimating how busy the agendas were of our addressees. The aim of the total survey is to compile statistics, identify common problems beyond the shortage of funding, and pin point local strengths. It is not our intention to produce a catalogue, listing all activities and techniques used country by country. As soon as we have a sufficient sample size we shall report our findings.

References

- Bathurst Declaration , 1999. United Nations declaration on land administration systems for sustainable development. UN-FIG Workshop on Land Tenure and Cadastral Infrastructure for Sustainable Development; Bathurst, Australia.
- Bos, E.S., 1982. Mapping in Africa: aspects of manpower and education. *ITC Journal* 1982-2, pp 191-199.
- Brandenberger, A.J., 1980. Study on the world's surveying and mapping manpower and training facilities. In: *World Cartography*, Vol XVI; UN, New York.
- Brandenberger, A.J., 1993. Study on the world's surveying and mapping human power and training facilities. In: *World Cartography*, Vol XXII; UN, New York.
- Davis, D.J.A., Fairbairn, D., 1998. Defining a topographic mapping and map revision system with reference to the state of world mapping. *ITC Journal* 1998/2, pp 106-112.
- Ezigbalike, C., Selebalo, Q.C., Faiz, S., Zhou, S.Z., 2000. Spatial data infrastructures: is Africa ready? Forth SDI Conference, Cape Town, South Africa.
- ITC, 2000. http://www.itc.nl/about_itc/mission_statement.asp (assessed 27 April, 2004).
- itcnews, 2003. Building a geo-information community for sustainable development: from bilateral to multilateral partnerships. *ITC News*, 2003-4, pp 6-8.
- Perry, R.B., Perkins, C.R., 1991. Measuring the state of world mapping. ICA 15th conference on mapping of nations, Bournemouth, UK.