

TECHNICAL SESSION - VII

Restrictions on Supply of Spatial Information on Maps

- Restrictions on Supply of Spatial Information on Maps - *Snehmani, P. Mathur*

- Publication of Topographical Maps on WGS - 84 Datum for Open Use in View of National Security Perspective : Pros & Cons - *Madhav N. Kulkarni, M.G. Arur*

Restrictions On Supply Of Spatial Information On Maps

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ABSTRACT

In Asia, where the security threat perceptions from the neighbours are very high and the confidence to manage them is low, the laws governing the supply of spatial information and related activities have never been easy to handle. In spite of a vibrant democracy, the situation is not much different in India. The only front-runners in this respect are some of the South East Asian countries where the upsurge in the economic activity has silently and perhaps unknowingly decreased the hostility towards public access to geo-spatial information.

The use of geographic information for purposes other than defence is relatively recent. Unlike many developed countries, the use of maps has not been widespread in India and the culture of making use of maps is also relatively under-developed. Since the use was restricted to defence and other government departments, government geo-spatial policies had been framed primarily to provide accurate and reliable data to security forces.

It is for this purpose, map information was seen as being sensitive and sharing of information with wider public had therefore not been encouraged, especially on account of its potential of being misused. It is only now that geographic information is being seen as vital infrastructure along with the trend towards the right to information. There is an articulated need for a policy framework for making data assets already created available and accessible to the larger public.

The importance of having a policy framework has already been recognised and a lot of thinking has gone into it after extensive consultation. There is an overwhelming consensus on the kind of policy framework required and the strategy to make geographic information available and accessible. The proposed National Spatial Data Infrastructure (NSDI) is an attempt to establish a policy framework which will promote, direct, guide and regulate both the production and dissemination of information as relevant to society.

Security related concerns are the main inhibiting factors for this policy framework to be effectively operational. These issues have also been addressed and solutions are proposed which safeguard security interest. It is expected that the whole policy of restricting geographic information will shortly undergo a change. Some liberalization has already taken place. Although the pace of liberalization so far has been slow but now it is picking up.

The Government can allow the Private Sector to import high resolution satellite images and use them to create digital maps. It may issue a guideline on what may be shown and what may not be shown on digital maps. The private sector may be permitted to carry out ground surveys etc.

There could be a digital or other medium by which the Government can scrutinize and clear the maps within a short time of submission of the maps. The process should be based on guidelines, and not ad-hoc. Up dates to the cleared maps not involving a map feature (like change in a road name, traffic restrictions etc) could be made by the private sector company without prior permission from the Government.

INTRODUCTION

From time immemorial, maps have served great social, geographic, scientific, economic and historical purpose. Map is an important medium of communication of geographic information, represented on a plan and drawn to a scale. Maps and terrain data are essentially required by various users for geotechnical investigations, engineering project studies, geological mapping, earth science studies, geomorphological analysis, environmental assessment planning, development, administration, education, land management, military purpose, etc. From the geo-spatial information available in the oldest

available Babylonian map on clay tablet to present day sub-meter resolution space imaging, man has progressed by leaps and bounds in the field of cartography. The theodolites, compasses and levelling instruments appear primitive when compared with the present day computers, cameras, satellites and Global Positioning System, etc. (Srikantia, 2000).

In the succeeding paragraphs, the status of availability of spatial data in Indian context, the restrictions imposed on their accessibility and their dissemination mechanism are discussed, and some suggestions are also made for making the optimum use of this valuable national resource.

THE LEGACY OF INDIA'S MAP MAKER: SURVEY OF INDIA

Survey of India (SOI), under the Department of Science & Technology (DST), is the principal national survey and mapping organization of the country and also the oldest scientific department, having been established in 1767, which has evolved rich traditions over the years. This map maker organisation of India bears a special responsibility to ensure that the country's domain is explored and mapped suitably; provide base maps for expeditious and integrated development; and ensure that all resources contribute with their full measure to the progress, prosperity and security of our country now and for generations to come. On account of their high accuracies, precision and contents, its topographical maps are still preferred for preparation of thematic base maps, research and spatial planning as no other organization has the capabilities to produce accurate maps based on geodetic control. Thus, SOI's expertise and products, even in this space era, form the backbone of all thematic representations and research.

The single largest users of the Survey of India's services have been the defence forces which accounted for the unique manpower structure of SOI. They did have some other clients, mainly large infrastructure related projects, but these were again largely within the government. So a proper client service provider relationship did not emerge. Moreover, there were no commercial incentives to encourage a service orientation. Unless the demand side starts exercising pressures for improved level of high quality service, the organizations' desire to change will not be effective. This demand is now building especially because alternative sources of information are available. The SOI is trying to reinvent itself, and with newer markets and other civilian clients emerging as the bigger clients, it has been forced to think of itself as a service provider who has to strive for customer satisfaction. Its greatest strength lies in its image, its brand equity and the quality and reliability of its data assets. There is also a fresh drive in SOI in terms of methodology changes and acquiring modern equipments and skills for data acquisition and updating.

MAP COVERAGE OF INDIA

India, with an area of 32, 87, 263 sq. Km, is covered by nearly 394 degree toposheets and by 5100 toposheets on 1:50,000 scale. More than 35% of the country is also covered on 1:25,000 scale. This is an impressive record for any country in the world. The topographical maps at the scales of 1:25,000 and 1:50,000 are ideally suited for the professional workers, whereas geographical maps on less than 1:250,000 scale or 1 inch to 4 miles are useful mainly for synoptic views. Besides topographical map series, many public series maps on scale of 1:10,000 and smaller, such as guide maps, tourist maps, trekking maps, etc. by SOI are available to increase the awareness of general public towards the environment.

STATUS OF RESTRICTIONS POLICIES ON SOI DATA

During pre-Independence era, great importance was attached to the security of maps and there was a strict rule that surveyors should treat their work as secret and not pass on copies even to local officers, civil or military, without proper authority. Thus, the dissemination of these maps, prior to the Independence of the country, was limited for official use only. The loss or even disclosure of these maps to unauthorized persons attracted penal action under Section 5 of the Official Secret Act, 1923.

The policy of restriction was first enunciated in 1950 which broadly laid down that all maps even on large scale except those in a narrow belt along the land border of India would be available to the public. All maps of up to and including 1:1 million scale which include any part of J & K would be restricted. In the wake of Chinese aggression in 1962, the maps on 1/2" scale and larger for the whole of India were restricted. Maps on even 1:1 million scale containing any portion along the northern portion of India were restricted (Mathur, 1999).

The prevalent policy of restriction of maps and toposheets was laid down in the late 1967 and further amended in the early 1968 by the Ministry of defence (MOD), Govt of India. According to this, the restricted toposheets are issued only to Govt officials, educational/scientific institutions and semi-government organisations after completing formalities as laid down by MOD. In 1971, clearance of MoD was accorded for issue of restricted maps to private individuals, organisations and commercial firms whose indent, applied through State Government, has been approved by the MOD. In case, part of any area falls across the external boundary of India, the indent has to be cleared by Ministry of External Affairs. The salient features of the restriction policy now in force are as following (Srivastava, 2000):

TOPOGRAPHICAL MAPS

At present nearly 227 out of 394 degree toposheets come under restricted category and cannot be accessed in normal course. All topographical and geographical maps of the area between thick line (on Survey of India Index map) and the external border/coastline, on the scale 1:1 M and larger are restricted. This restricted area is nearly 80 km wide from the land border and coastline and includes the whole of J&K, northern and eastern districts of HP, northern districts of Uttaranchal & UP, Sikkim, and the whole of NE. All topographical and geographical maps pertaining to outlying islands on scale 1:1 M and larger are restricted. All topographical maps, both for restricted as well as unrestricted areas depicting grid lines are restricted. All topographical maps as digital data are classified as restricted. Further, the digital data of restricted areas is not to be disseminated on net works like NICNET. Export of geoscientific thematic maps on a scale of 1:25,000 based on unrestricted toposheets is prohibited.

In the west, every one is a map user and city maps are sold in millions but in India because of restrictions, the city maps are sold only in thousands.

SOI is the only agency authorized to undertake digitization on the basis of Ground Survey Data. In addition to this, the nine designated Government departments are allowed to undertake digitization of SOI toposheets of unrestricted areas up to 1:50,000 scale after deleting Defence/Civil VAs/VPs and important strategic locations. However, digitized data of the 'restricted areas' continues to be handled by the Army HQrs. and SOI.

GEOLOGICAL MAPS

The sheets of Geological Quadrangle Map Series on the scale of 1:250,000 and 'Geological and Mineral Atlas of India' on one million scale published by the Geological Survey of India (GSI) based on the SOI restricted sheets are restricted. Geological maps, without contour details, pertaining to "restricted" areas, prepared by GSI need clearance from the MoD prior to their publication. For publication, information regarding even latitude, longitude, heights of peaks and names of rivers is to be removed.

AERIAL PHOTOGRAPHS

At present aerial photography is classified as secret/top secret for the whole of India and is not available for civil users in the country.

GEODETTIC DATA

In India, a huge amount of geodetic data exists, collected through dedicated efforts of centuries by various Government agencies, which is mostly of strategic importance. The precise horizontal and vertical co-ordinates of important sites can be used for missiles or conventional bombing targets. Due to these reasons, this data is assigned different levels of security classifications, by the MoD. The publication "Gravity Data in India" is a restricted publication.

The Gravity Recovery And Climate Experiment (GRACE) is another way of data acquisition, which facilitates geoid measurements up to centimeter accuracy. This necessitates looking afresh on the restriction of the Everest Ellipsoid parameters by the SOI.

However, currently there are no clear cut guidelines on what could be mapped and what could not be mapped by the private sector. Digital equipments are being extensively used by Engineering Survey firms for highways, irrigation and telecom industries for creation of detailed digital maps at 1:500 scale. These digital drawings with information on heights and other above ground features, etc. do not need clearance from any organisation. However, digital maps of towns, cities, etc. at scales of 1: 20,000 or better needs clearance from the Ministry of Defence. In absence of no clear guidelines on what

could be mapped, this process is on a case to case basis. The Ministry of Defence normally takes long time to clear a digital map, by which time the city might have grown and the map becomes less useful. Any further change/update in the map feature has to be cleared by the Ministry of Defence once again (Rajgopalan, 2003).

STATUS OF DATA AVAILABILITY

The restriction policy on geodetic, geophysical and map data has been changing from time to time keeping in view the user's requirement for such data and the assessment of internal and external threat perceptions arrived at by the Ministry of External Affairs, Ministry of Home Affairs and Ministry of Defence. However, realizing the importance of topographic database for development, planning and other scientific research, the map dissemination policies underwent reviews from time to time. This practice against all belief is not unique in this country. Internationally, there is a rising trend to withhold spatial information, which has evolved from recent terrorist events. It is based on the assumption that restriction of spatial information will deny probability and reduce the risk of future terrorist problems. Some of the salient features now in force with regard to availability of data in India are as following:

- (a) All geographical data and maps, including those in restricted zone, are available to Scientific and Educational Institutions and planners for bonafide use after obtaining clearance from the appropriate authorities.
- (b) Surveying activity in unrestricted zone is open to all Government and non-Governmental agencies. State Governments are allowed to undertake mapping on cadastral and engineering scales (large scales) in restricted zone as well. Such maps may be published after clearance from MoD. Unrestricted large scale maps and charts of coastal areas (restricted zone) published by NHO are available for sale.
- (c) A number of Scientific Institutions and Departments such as FSI, GSI, NGRI, NIO, IIG, ONGC, NIC, etc. are independently charged with the responsibility of collecting a variety of geographical/ geophysical data for scientific and developmental purposes and their value-added maps, after clearance, are available to public. However, very often, the agencies collect and utilize their own data as part of their institutional mandate, and therefore, are less concerned with the problem of data compatibility from other sources. This has led to repetitiveness and redundancy in the data because one organisation does not know what the other is doing. If this data is shared, the user can

concentrate on the conceptual and practical problems of data analysis, interpretation and reporting.

- (d) Many scientific government and private organizations have adopted GPS for control and mapping activity, resulting in generation of geographical data in geodetic framework other than Everest Spheroid. Such maps, if limited in extent, sufficiently serve their purpose.

From the above, it is obvious that a variety of cartographic, geodetic, and geophysical data is already accessible to the central/state governments, their undertakings and other NGOs under stipulated guidelines formulated by the Ministry of Defence. Alternative technologies, such as satellite imageries and GPS, etc. and the nine government organizations now empowered to release digital spatial data from unrestricted SOI topographical maps, are also in use.

ECONOMIC IMPERATIVES FOR DATA ACCESSIBILITY

Spatial information is today being extensively used in decision-making processes because it enables visualization of the consequences of public decisions regarding natural resources, people and the involved interrelationships, and explains the rationale behind a particular decision. Most of the countries are set to exploit the potential of mapping technology. For safeguarding our national security and enhancing the effectiveness of our law enforcement agencies, the trend is to withhold spatial information, but the entire geo-spatial industry's direction is toward open access, interoperability and data sharing - capitalizing on e-government. Today's user community needs easy, affordable, fast, updated, accurate, authenticated and relevant data access.

Governments all over the world have realized that geographic information is an important infrastructure for a nation's development and are spending huge amount of money on collection of geographic information, data generation, acquisition, documentation and dissemination. For example, US spends more than 4 billion dollars per year on geographic data acquisition; UK approximately 400 million pounds annually on data collection and assembly; other countries are also spending (Gupta, 2002).

India has a good institutional infrastructure for geographic data collection. There is a network of institutions collecting information on every conceivable socially and scientifically relevant subject. The Survey of India and the Indian Remote Sensing Satellites are the most important generators of this data. Many other agencies and initiatives of the government like Natural Resource Data Management Systems (NRDMS) and National Atlas and Thematic Mapping Organisation (NATMO) under the Department of Science and Technology

(DST), National Informatics Centre (NIC), have played an important role in geographic data generation in the country. Hosts of other organisations under various central and state governments are also involved in geographical data acquisition in the country. Moderate estimate of the total budget of these organisations is more than Rs. 2,000 crores per year, which is comparable to spending on geographic information done by Australia or US, if we take that the operating costs in these countries are nearly seven times that of India.

India will benefit from a visionary policy on geographic information. India is fast emerging as a data outsourcing centre for GIS. This has created enormous employment opportunities in the sector, which is leading to proliferation of this technology. According to an estimate, the total export market size of Indian geographic information is around US\$ 40-50 million, and it is growing at a rate of over 40%. The GIS exports from India are expected to reach to US \$ 150 million by year 2005. This emerging market of geographic information opens up ample opportunities for the geographic information generating agencies such as SOI, NATMO, and IMD to exploit the market potential and earn revenue for their respective departments. They may become self reliant by selling value added data. According to an estimate, three to thirty lakh jobs can be created in the area of bibliographic database alone in our country. So, in the context of generating new employment and also giving a boost to the economy, it is high time spatial information made available through industry.

Similarly, the opening up of the South Asian countries (Nepal, Bangladesh, Sri Lanka, Bhutan, and Pakistan) to a market economy is giving rise to a high demand for geographic information. For example, in Nepal, there is no restriction on maps, despite its being a landlocked Himalayan country. These countries are spending millions of dollars in programmes financed by the big international funding agencies every year. These markets represent essential political and economic stakes.

The restrictive regulations may inhibit the growth of the domestic market, which in turn prevents Indian companies from showcasing their skills in the international arena. The revenue which SOI or any other agency may have earned by value addition to their existing products, developed with hundreds of years of hard work, will then be earned by someone else.

Although the Indian citizens are denied access to any border area maps, many old maps of these areas are available freely outside India. High resolution spy satellites are monitoring each and every minute activity of the country and there is little left to hide. One can easily acquire very high-resolution data from agencies outside our country without any masking of data. For example, the high-resolution image of Russian KVR3000 for part of Mumbai city are available as a free sample on the

web and SPIN 2, the Russian satellite is selling its 2 m resolution data on the web. Thus, it is very difficult for countries to hide geographic information. India must endow herself with the means to surpass and be more dynamic than the global trends. Accelerating the process of quality digital data coverage of the territory and India's control of earth observation satellite technology are the primary means to guarantee autonomy in her choices. But the capability of a few agencies to obtain the data will not justify throwing open the data collected by our own agencies to all and sundry.

India, inspite of having one of the oldest survey organisations in the world, the best civilian remote sensing satellite and some of the best software engineers, has taken very limited part in international bodies. Whether it be the UN's specialized commissions, international standardization organisations like ISO, India's seat is empty or only symbolically occupied. However, an active presence within these bodies will prevent them from taking options which are prejudicial to the interests of nation. **It is not to be forgotten that how the patents of basmati, neem, turmeric, etc. by foreigners caught us unaware.** Organisations like the DST, ISRO or DRDO initially, must be in charge of making sure that India is present effectively in all these bodies.

TECHNOLOGICAL IMPERATIVES FOR SPATIAL DATA ACCESSIBILITY

Thousands of satellites encircling the Earth and gathering information about every inch of the land and sea have revolutionized map making process. The range and depth of satellite observation is enormous. Satellites are capable of gathering homogenous and continuous data over a wide area and are amenable to digitization, easier processing, computation, conversion to maps, which form the foundation of many GIS. Satellite imageries today provide ground data at sub-meter spatial resolution with which excellent maps can be prepared after elementary ground check. These maps can be obtained from open international market despite prevailing internal restriction on maps. For monitoring and management of our natural resources and environment, the first operational Indian Remote Sensing Satellite, IRS-1A was launched in 1988, followed by further satellites incorporating enhanced capabilities in terms of spatial resolution, spectral bands, stereoscopic imaging, wide field coverage and revisit capability. India's CartoSat satellite will have the capability of generating thematic maps at a scale of 1:5,000. The Indian Remote Sensing program has been a major factor for the growth of importance of geographic information in India.

Recent trends toward 'e-governance' imply access. In this age of virtual revolution in map-making and explosion of technological advancement in gathering and dissemination of information through Internet, the restrictions placed on toposheets and maps give a wrong signal about the maturity of approach of this great country. It is time that all the aspects

are looked into more carefully and every implication of the existing restrictions is analyzed in the light of technological revolution in cartography, the world is witnessing.

ACTION NEEDED

People who intent to misuse information may get it by whatever means, but the sufferers will be the genuine users. The lack of easy availability of maps places a major impediment to progress, and also causes resentment among scientific community and a host of other users. For India to march forward and be abreast with developed countries, it is high time that for solving this vexatious problem of restriction, a dynamic National Map Policy is evolved. The fundamental goal of the policy shall be to advance and protect national security and foreign policy interests by maintaining the nation's leadership in geospatial activities, and by sustaining and enhancing the digital spatial data industry.

In support of this goal, the Government shall: Develop a long-term, sustainable relationship between the Government and the industry; Provide a timely and responsive regulatory environment for licensing the operations; and Enable industry to compete successfully for foreign commercial users, while ensuring appropriate measures are implemented to protect national security and foreign policy. A robust industry can augment and potentially contribute to Govt military, intelligence, foreign policy, homeland security, and civil objectives, as well as Indian economic competitiveness.

THE RECENT INITIATIVES OF GOVERNMENT

The government has realized the importance of managing the geographic information and is taking necessary steps to develop a national geospatial data infrastructure for the masses.

NATIONAL SPATIAL DATA INFRASTRUCTURE (NSDI) TASKFORCE

The National Spatial Data Infrastructure (NSDI) Taskforce constituted by the DST is expected to fulfill the major aspirations of the user community of the country. The stated objective of the NSDI is the creation of a national infrastructure for the generation, availability of and access to organised spatial data to be used at community, local, state, regional and national levels to meet the requirements of spatial data for sustainable development (R Matthan, 2000).

Accordingly, the NSDI will have adequate powers and authority to achieve the following: Function as a repository for spatial data currently available with, as well as all future data created and maintained by participating government agencies; Co-ordinate, control and manage the receipt of multiple sources of spatial data from participating government agencies and supervise the appropriate format conversion of this data to ensure uniformity of information and inter-operability of data; Co-ordinate and authorise the regular revision of existing spatial

data in order to reflect changes in spatial features; Develop the NSDI metadata of NSDI spatial information; Develop and co-ordinate appropriate quality control measures to ensure the integrity, standardization, accuracy and quality of NSDI data, including the establishment of appropriate certification and accreditation procedures; Offer consultancy services on specialised subjects including geodetic, geophysical, topographical surveys and digital data base to governmental and non-governmental organizations; Generate a digital database of unrestricted public series maps; Create mechanisms, procedures tools and applications (including appropriate search and access protocols and an NSDI user interface) to facilitate public access to NSDI spatial data; Increase the awareness and understanding of the vision, concept and benefits of the NSDI.

EASING OF RESTRICTION NORMS FOR DATA DISSEMINATION

In recognition of the need for geographical data in scientific and educational programs, all classified data is being permitted for bonafide use after going through certain laid down procedures. Recently, in view of the introduction of digital technology in the planning process, the requirement of digital data for use in GIS environment, and limitations in the digitization potential of the Survey of India, the Ministry of Defence has decided to allow nine government organizations to digitize the bulk of topographical data from unrestricted maps on 1:50,000 scale. This de-restriction is aimed at making digital geographical data available to scientists, planners, educationalists and other general users.

To overcome difficulties of users, SOI has introduced two series of maps: One series of maps on Everest spheroid datum with existing map projection and all existing details for use of Defence forces only; and the second series of maps on WGS-84 datum and UTM projection with less detail for use of public.

SOI is also working out strategic alliances with industry and has already introduced some new products in collaboration with industry in the market. It has also increased the pace of digitization of its data assets exponentially. It has got into a partnership with NIIT for quickly converting analogue data into digital form. Few organisations like Eicher, Mapsofindia.com and CE Info systems have also been able to get clearance from the government for digital publication of maps on the Internet.

CONCLUSION

There is a need for evaluating the country's need for spatial data and the mechanisms for its dissemination at a time when a lot of pressure is being built by the media against various map restriction policies. The importance of such security classification can not be questioned, as national security considerations over-ride all other activities. However, the restrictions need to be re-assessed in light of availability of spatial information using newer technology such as GPS, remote sensing, etc.; the 'open door policy' of the country;

and the importance of such data for developmental activities, so that a more rational and clear-cut policy can be formulated. The opening up of this activity to private sector will enhance the efficiency and competitiveness of Survey of India. Doing so will also foster economic growth, contribute to environmental stewardship, and enable scientific and technological excellence.

The business and scientific communities will play an important role in guiding the national policies but their perceptions must be arrived at after closer interactions with the policy makers and clear understanding of national priorities. This community would do a great service to the nation in directing their endeavour towards setting up consortiums for standardization and integration of spatial data in the form of a consistent and homogeneous spatial data base and its dissemination to serve a meaningful purpose in public domain. In such a scenario, it will suffice to postulate that many misgivings and presumptions being circulated in the media and which have become a cause of major concern to the committed surveying community, will stand clarified and public at large will also be more rational in their approach besides being sensitive to the nation's security environment.

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