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Reviewing Aerial Survey in India

The Government of India on 19th May 2005 approved a radical New National Map Policy, ending decades of restrictive practise that had hampered geospatial development on the subcontinent (see Pinpoint August issue). This interview was conducted before announcement of partial lifting of restrictive practises.

What level of expertise does NRSA possess in aerial survey?

NRSA features a high-quality facility for carrying out aerial photography, Lidar and aeromagnetic surveys. Synthetic Aperture Radar (SAR) is being developed by the Department of Space and will be in operation in coming years. Well-established facilities for photo-processing, photogrammetric mapping, Lidar data processing and GPS ground surveys are managed by NRSA.

Company Background

The Indian National Remote Sensing Agency (NRSA) has been carrying out Aerial Surveys since 1975 and initial surveys were carried out with two Dakota DC-3 aircraft and Canberra (photo-reconnaissance aircraft). Early surveys consisted of aerial photography, aeromagnetic survey, Airborne Synthetic Aperture Survey and multi-spectral scanner surveys. A photo-processing facility for both black-and-white and colour film was established at NRSA and data-processing facilities for multi-spectral scanner and aeromagnetic data processing were later included. An HS-748 AVRO aircraft was subsequently added to the fleet. In the 1990s two Beechcraft Superking Air B-200 / 300 aircraft were acquired. Following the trend in technology development, improvements in navigation systems, camera systems, ground control surveys etc. were carried out and currently NRSA has a state-of-the-art facility in Airborne Remote Sensing working to standards comparable to any similar organisation in the world. The Agency has recently also procured an Airborne Laser Terrain Mapping System with digital camera.

Could you describe NRSA facilities for aerial survey?

NRSA has two Beechcraft Superking Air B-200 aircraft and three metric cameras (Carl Zeiss), ALTM system (Leica) with Enerquest (4K / 4K) Digital Camera. It also has an aeromagnetic system, sixty photogrammetric systems (in-house and associates) combined, and 45 geodetic GPS receivers. The NRSA work environment includes a hangar for the parking of aircraft at Hyderabad airport, photo-processing facility, Lidar data-processing facility and aeromagnetic data-processing facility. NRSA has three decades of experience in aerial surveys and has carried out aerial photography and mapping for various state and central government agencies in India. We have covered more than 70% of the country by aeromagnetic survey. On top of this, using NRSA-available facilities we have carried out aerial photography in Nepal, the Sultanate of Oman, Bhutan, Sri Lanka, the Maldives and in Dubai (UAE).

What quality standards do you follow?

NRSA has strict quality standards in place which conform essentially to ISPRS standards, as well as national standards framed by the renowned Survey of India. There is a separate Quality Control Cell with a number of engineers carrying out quality checks at every stage of the production chain. NRSA is about to obtain ISO-9001 certification.

Who have been your clients?

Several state and central government organisations such as the Town & Country Planning Organisation, Bangalore City Development Authority, Hyderabad City Metro Water Supply & Sewerage Board, Rajasthan State Urban Infrastructure Development Project, Water Resources Development Organisation (Government of Karnataka State), Kolkata Municipal Corporation etc. In addition to the above, foreign clients include BKS Surveys (UK), Global Scan Technologies (Dubai, UAE), Geo Informatics Pvt Ltd (Sri Lanka) and EPDC (Japan).

What is the size of the market for aerial survey in India and how will this change in the future?

India has more than 5,000 towns that need very large-scale maps for development planning and utility surveys. Such maps are available only for a few hundreds of towns and hence there is a big market potential for aerial surveys in India. The availability of high-resolution satellite data should allow maps for urban planning to be made. However, detailed development plans and utility mapping still need to be carried out by aerial survey.

Public domain access to aerial remote sensing has been very limited in India compared to other countries and, despite its considerable size and needs, there are no private operators collecting aerial data. To what do you attribute this?

One of the major reasons has been the restriction on the use of aerial photographs in the public domain for security reasons, since May 2005 partially lifted. The availability of funds is pretty low and hence the high cost of this type of survey in India compared to the international market. With the onset of several GIS projects for different applications there is an urgent need for large-scale maps of various parts of the country. The government is aware of this problem and it is expected that a liberal policy on this will be announced shortly, removing some public domain map restrictions.

A Delhi-based private company has recently shown interest in flying aerial sensors in India. What is your strategy for competing and/or collaborating with private players?

NRSA works to develop and introduce new technologies for various mapping and GIS applications, so it constantly strives to produce new products and create high-quality technology elsewhere available in the world. The focus is basically on catering for core government areas like disaster management, urban planning etc. NRSA should have a co-operative role with private entrepreneurs in the development of the country. Currently some foreign operators in geophysical survey are flying for purposes of oil and mineral exploration in various parts of the country. Depending on the outcome of the new government policy, the market will open up.

Are you happy with the education in aerial survey being provided by various institutions across India, and what if anything needs to be done to improve this?

I am not happy with the education in aerial survey being provided by various institutions across the country. Frankly, the current syllabus does not address some of the latest trends in digital mapping, Lidar, aeromagnetic, SAR and GPS survey, or in large-scale GIS etc. We need to spend a great deal of time in training people at our facilities.

What are your plans for NRSA's recently purchased Lidar system?

Lidar systems will be flown primarily for the Disaster Management Program by generating close-contour information for various flood-prone and coastal areas. We also plan to undertake power-line surveys, canal-alignment surveys (for distribution of river water), highway design and urban planning. There is as yet not much awareness of Lidar technology in India. Hence we intend to show some cases of projects which will be completed this year for various potential users outlined in the previous paragraphs. Lidar has a special place in India since it is cost and time-effective as compared to ground methods.

The NRSA Lidar system was procured from Leica Geosystems and has been tested at four test sites and found to meet specifications. It is being deployed operationally for some ongoing projects. We also have a 4K/4K Digital Camera and have created calibration facilities on NRSA premises for their calibration. The tariff we have planned is around Rs.15,000/- (approx. US\$ 300) per sq. km of data capture.

Are you going to standardise process and tariff plans by conducting pilot projects?

We are planning to generate close contours with a contour interval of half a metre for various flood-prone areas. To achieve this, and based on pilot projects, we have formulated a method for flight planning, deployment of GPS on the ground, processing procedures etc. to achieve an accuracy of 20-25cms in height. The procedure for the production chain has also been finalised and this will be decided after our first operational results are known.

Could you describe the set-up you have established for data processing?

We have organised ALTM and Digital Camera data-processing facilities for carrying out ALTM surveys of 10,000 sq. km area per year. However, facilities will be scaled up, based on operational experience gained. We do not foresee any problem in scaling up, since sufficient expertise is available for data processing as well as for quality control.

What will be the deliverables, and might users have access to raw Lidar data?

The deliverables will be DEM, orthophotos, line maps and contours. We are not planning to provide users with raw laser data. However, if some user wants this, we can consider the request. If someone has a proposal to use Lidar for applications other than what we have envisaged we may consider taking on a joint project and arrangement for Lidar data. We have an in-house 'R & D Cell' which is the backbone of our efforts in taking up projects in the application of large-scale data. We have taken up a number of pilot projects to design concepts for various applications using high-resolution data, derived from aerial and satellite platforms.