Photogrammetric Mapping

Technological innovations and introductions are no doubt praiseworthy and to be continued always till there is a passion to know the mystery and secret of nature. The lack of technology was not only the ailment of India's poor urban development but it was the lack of political will to have our cities planned, towns properly designed and the villages to get the right distribution of technology to march towards progress. Few cities may adopt technology for development, but there is hardly any care for thousands of villagers who are deprived of the basic necessities and these need the special attention. Such scenario is also due to too much emphasis on development of cities for better roads, sanitation, communication, education, etc. which has left villagers deprived of basic facilities and thus have forced these villagers to migrate to cities to get their livelihood thereby leading to choked cities. Thus, the issue is always how can we "co-relate" the lack of development in villages without compromising the development of urban amenities. Technology helps in shaping the life better and can make human suffering lesser if used properly. Photometry is an advanced technology for the same; it helps in minimizing the human sufferings which in turn helps scientists, city planners and survey analysts.

Photogrammetric Mapping (or Photometry) is an art and science of making measurements in three dimensions. Photometry has been used since the World War II and now it is an important aspect in urban infrastructure. For long, India has not been permitting aerial surveys for security reasons. This is depriving the urban planner of a most useful and potential tool for making a master plan. Photometry is, however, cheaper than traditional civil surveys, but such maps are not available to public as three dimension figure is considered as a security threat. However, a new mapping policy in this regard is likely to remove such restrictions.

The concept of photometry evolved during the World War II as there was a need to target and view 3-D pictures, but the pictures taken were not so accurate.

Urban planning and promoting the rural infrastructure often gets held up due to lack of accurate maps

During the 1950s, measurement was through mechanical means and aerial photography was preferred. The picture accuracy was 50 cm on the ground. This era was called as the first generation or Analogue era.

During 1950-80, there was hardly any technological advancement in photometry, but the last 25 years have seen the actual advancement in this particular field.

During the 1980s, the second generation era started, aerial photometry required further rectification and measurement was done by electrical means and the picture accuracy was 30 cm on the ground.

During the 1990s, just after the advent of GPS and high capacity PCs, GPS-fitted aircrafts were used and the concept of high resolution photography came into picture and this time the picture accuracy was 10 cm on the ground.

In the last 3-4 years, third generation era of photometry has been in existence, high resolution digital camera is being used and the accuracy is surprisingly 1 cm on the ground, which is a big achievement in the field of photometry.

The recent launch of CARTOSAT-1 will also take the digital maps of cities, rural areas, etc.; it is a step forward in the world of photometry.

Applications

Urban planning and promoting the rural infrastructure often gets held up due to lack of accurate maps. A lot of benefit can be derived by using shortcuts in technology. However, there are security issues and it becomes controversial while implementing such technologies. However, technology should be used to reach the unreachable areas, but not to exhaust the resources and disturb the systems and must be regulated time wise. The secret behind such photometry is that it gives a thorough analysis of the site. It reduces the wastages in laying telecom lines, establishment of sewerage equipment and other relevant urban support systems. It facilitates better analysis of city planning, real estate, population, city museums, system design, traffic departments, etc.

The power of Photogrammetry is in correlation analysis, visualization like images, points and lines.This graphic helps in accuracy and provides a needful statistical data and helps in navigating the exact location.

CARTOSAT-I

CARTOSAT-I was launched from the Satish Dhawan Space Center at Sriharikota on May 5 this year. It has stereoscopic imaging capability which will help in the digital mapping in 3-D and this satellite will transmit data in the X-Band mode. As far as the utility is concerned, CARTOSAT-I will be helpful in taking the maps of land, water, contour, watershed and will be helpful in urban utility mapping, rural road connectivity, etc.

CARTOSAT-I has sent one of the first images of the Khed Brahma area bordering Gujarat and Rajasthan and the Harnav Nadhi (river) in black and white image which has been beamed colored by National Remote Sensing Agency (NRSA), Hyderabad. The picture is yet to be analyzed by NRSA. Such 3-D pictures will help in navigating the total area, which is not possible in general aerial view. On May 7, 2005, CARTOSAT-1 also showed the 3-D image of islands of the Maldives. As per the news published in *The Hindu* dated May 19, 2005, other images sent by the CARTOSAT-1 cover Amritsar showing the Golden Temple, the Durgiana temple dedicated to goddess Durga and the Jalianwala Bagh; Tarn Taran area of Punjab, Asuncion, the capital city of Paraguay; Guizhou, in southern China, with its high, rugged plateaus and deeply incised valleys; the Grosseto city of central Italy on the banks of Ombrone river near the Tyrrhenian sea. Such images will save time and the cost in the long run and any changes in the map because of floods, earthquakes, etc. can be differentiated very easily. ISRO is also planning to launch CARTOSAT-II in September 2005.

New Map Policy 2005

In May 2005, the Union Cabinet approved a new mapping policy. This is a new dimension to photometry and a supportive frame for the private agencies.Till now, most of the maps were not in the public touch because of security reason but with this new mapping policy, certain types of mapping can be done by private agencies as well. Maps will be divided into two types: Defense series maps and open series maps.

- The defense series maps will be under the control of Defense Ministry while Survey of India will be solely responsible for open series maps, which will act under Science and Technology Ministry. The Defense Ministry has been asked for preparing a policy on using and mapping the defense series maps.
- The open series maps can be done by any agencies, which are accredited by the Survey of India. The Survey of India will be responsible for updating the open series maps which will have all essential parameters like contours, latitudes, altitudes, river flows, etc. Thus, such policy will really be helpful in urban planning, as they will be less dependent on government for every map.

Thus, CARTOSAT and other technological innovations can be regarded as the promising planning tools. Having an accurate speedometer in a car doesn't make a driver stick to speed limits but an efficient police force monitoring traffic violations with heavy fines and strict punishment certainly does. As most of Indian cities are not planned—certainly not for want of a CARTOSAT! Land grabbing, indiscriminate conversion of green space for commercial/residential buildings, a regulatory mechanism to clearly define laws and an efficient and honest law-enforcement agency with "real teeth" is required for every field—be it urban planning, education, environment protection, healthcare, etc. Technology is like a sharp knife, how it is to be used is a decision that should not be belittled for a wrong decision. A good decision can be better than a highly acclaimed innovative technology. CARTOSAT is good, for what, that depends on our decision.■

Deepak Kumar,
Associate Consultant,
The ICFAI University Press.

Satellites Launched by ISRO

Name: Cartosat-1

Launched: May 5, 2005
Site: Satish Dhawan Space Center, India
Launcher:PSLV
International Number: 2005-017A
Orbit: LEO, apogee: 618 km, perigee: 618 km, inclination: 98.87°
Owner: ISRO

There are six remote sensing satellites in service at present—

IRS-1C

IRS-P3

IRS-1D

Oceansat-1,

TES and

Resourcesat-1—making IRS system the largest civilian remote sensing satellite constellation in the world.

Cartosat-1 is the latest satellite under the IRS program.

A Radar Imaging Satellite (RISAT), carrying a C-band Synthetic Aperture Radar (SAR) with a spatial resolution of 3 to 50 m and a swath of 10 km to 240 km is under development. With all weather remote sensing capability, RISAT will enhance remote sensing applications in the areas of agriculture and disaster management. RISAT is slated for launch by 2006.

Source: ISRO (Indian Space Research Organization)