

MAPS TODAY

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November-December 2019

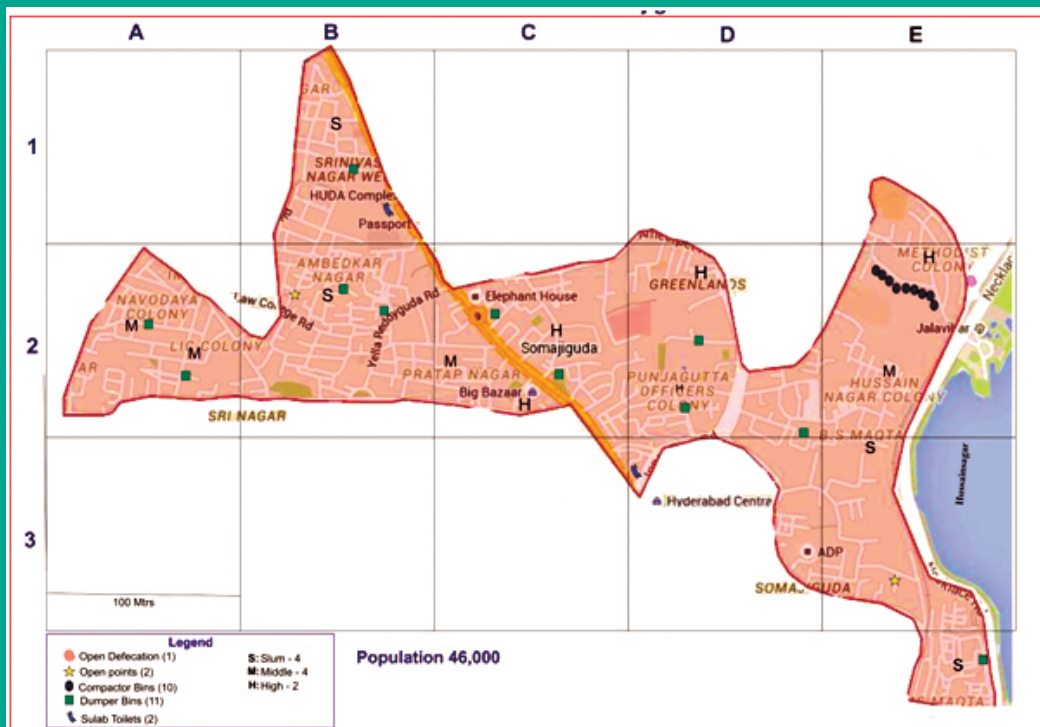
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Drone based mapping by Survey of India

India is using hundreds of drones to map the country in incredible detail



Using a fleet of drones, India plans to map 75% of the country by 2021. (Details on page...6)



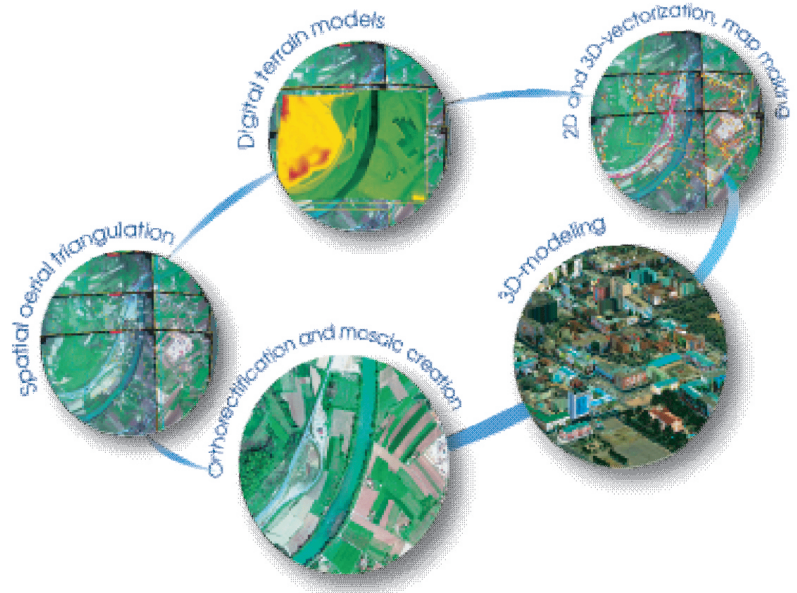
Ward level Solid Waste Management plan (Details on page ...19)

Overview



RACURS, Russia

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The PHOTOMOD software family comprises a wide range of products for the remote sensing data

photogrammetric processing. This state-of-the-art software allows the extraction of geometrically accurate spatial information from almost all commercially available types of imagery, whether obtained by film or digital cameras, [UAS](#), high resolution satellite scanners.

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General questions: info@racurs.ru

MAPS TODAY

November - December 2019



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Editorial

Some articles / information of special mention in this issue are:

- Use of GIS for Ward level planning for solid waste management
- Land Title Insurance. This is being attempted as per news item included in this issue. This is a decades old issue and needs to provide conclusive title on registration as in many countries.
- Form 2 for application for spatial digital data from Survey of India. Certificate of undertaking prohibits sharing and commercial use !!
- Extracts from an investigative report on a water body with pollution and encroachments

KOMPSAT-3A program of Korea Aerospace Research Institute (KARI) obtains IR (Infrared) and high resolution EO (Electro-Optical) images for GIS. KARI's imaging modes and extracts from an article on KOMPSAT 3 are covered in this issue. Findings on plan and height accuracy aspects are interesting. GeoMap Society (GEMS) organized two major events.- 1. National seminar on Surveying & Mapping 2. GeoMap Quiz for students. Brief Reports appear on both in this issue.

Two articles from archives are reproduced. One is related to photogrammetry and another to geodetic infrastructure. Both are relevant even today.

The project planned by Department of Science & Technology (DST) through Survey of India of surveying with drones has given new hope. Prof Ashutosh Sharma, Secretary, DST says ".... using your smartphones you can do your mapping with an accuracy of 10 cm," This will solve many problems including that of ownership/title of properties pending for decades.

Views of the authors of articles may not be shared by editors and members of Maps Today.

GIS Principles and Practices

By **GS Kumar**, former Director, Survey of India and Managing Editor, GIS India, Editor, Maps Today

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We invite you to actively take part in the refresher course. The themes which will be discussed are detailed in the brochure attached. We also request you to please give it a wider publicity by circulating it to faculty members of your University/Institution/Departments and in turn ask them to encourage their colleagues for the same.

Name of the course: GIS and its Applications

Duration: Two week

Scheduled dates: 02-14 March 2020

Important dates: Last date for receipt of application 20-02-2020

Intimation of selection to the candidates through e-mail: 21-02-2020

Confirmation by e-mail: 24-02-2020

Course commencement: 02-03-2020

The number of participants is limited to a maximum of 40, and the selection will be based on the priority of 'first-come-first-served' basis.

Email: mvssgiridhar@gmail.com

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Declaration:

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---- Editor **G.S. Kumar**

GIS DAY

Every year, GIS Day is celebrated on the Wednesday of Geography Awareness Week. GIS Day was first celebrated in 1999.

This year GIS Day was on Wednesday, November 13, 2019 and marks the 20th anniversary of this celebration.

GIS Day was initiated by Esri, a commercial GIS software company, who has a list of suggestions for celebrating this day.

GeoMap Society (GEMS) has been holding GIS Day events every year. This year GeoMap Quiz was held for school students. Report appears elsewhere in this issue.

Some briefs on reports available on the net are given below. For more details visit <https://www.gislounge.com/must-do-gis-day-events/>

Wild Life Institute

On the occasion of GIS DAY, Wildlife Institute of India (WII) organized the 'GET SET GIS Workshop' for the researchers on 11th November 2019. The celebration at the campus received a participation about 80 researchers. The full day program consisted of a technical session in forenoon with hands on training for beginners, covering the basics of GIS software, Google Earth and Maps. The idea was to impart basic cartography skills. Different maps, prepared by the researchers of WII from different projects and by the IT, RS & GIS Lab were showcased to the students to demonstrate the context and various applications of maps. The participants prepared study area maps of which the best three were awarded prizes.

1st Prize- Abhin N, 2nd Prize- Moulik Sarkar, 3rd Prize- Uddalak T. Bindhani

The afternoon hosted a fun packed session, full of games and prizes. The games were 'color the map' and 'treasure hunt' with in the campus, which was open for all. An ArcMap Story of WII Nature trail, was presented.

The Treasure Hunt prizes were awarded to 1st Prize- Abhin N, 2nd Prize- Basawaraj M

In addition the three best coloured maps were declared the winners.

Book Prize, printed photo frames and coffee mugs were presented to the winners by the Nodal & Associate Nodal Officer (IT,RS & GIS Cell), Registrar and Dean and Director. The program ended with certificate distribution to the participants followed by Director's concluding remarks.

Four key benefits to adopting a mobile GIS solution

<https://www.geocortex.com/four-key-benefits-to-adopting-a-mobile-gis-solution/>

As mobile data requirements increase, the need to be able to collect and submit that data in an offline environment accurately and efficiently is paramount for success. If your field team isn't equipped with a mobile GIS solution, your organization could be missing out on the opportunity to reduce errors, boost productivity, and make informed decisions more proactively.

Traditionally, field data collection and editing tends to be a very time consuming and manual process. Geographic data travels into the field in the form of paper maps, and field edits are performed using sketches. Once that data is brought back to the office, edits are made manually, resulting in data that is more prone to human error.

With that in mind, here are four key advantages to adopting a mobile GIS solution:

1. Save money. By adopting a mobile GIS framework, you'll be reducing or eliminating your reliance on paper processes, which can lead to a significant amount of savings on printing costs, not to mention the costs associated with papers being lost or damaged. Additionally, by simplifying manual processes that free up your field team's valuable time, you'll also be saving money on internal resources.

2. Boost data accuracy. Another significant benefit to mobile GIS is that the data you're obtaining is more accurate, reliable, and accessible. No more assumptions or human-caused errors that prevent you from getting complete clarity.

3. Real-time location intelligence. Mobile GIS can be used to monitor location data in real-time, which means that – whatever situation may occur – your GIS team can make intelligent, critical decisions confidently and quickly based on the data they're viewing.

4. Synchronize changes offline. Modern advances in mobile technology means that field workers can now access applications and make edits in the field whether they're online or offline. If data is entered while offline, that data can be synchronized once reconnected to the Internet. This reduces the problems associated with connectivity and paves the way for better field work.

Whether you're responsible for managing utility workers, surveyors, or police officers, a mobile GIS solution like **Geocortex Mobile** will help you streamline your day-to-day operations and increase efficiency. Geocortex Mobile is the world's most complete framework for configuring,

Drone based mapping by Survey of India

India is using hundreds of drones to map the country in incredible detail



Using a fleet of drones, India plans to map 75% of the country by 2021.

Image: REUTERS/Henry Nicholls

<https://www.weforum.org/agenda/2019/10/india-using-drones-ai-digitally-map-country/>

<https://timesofindia.indiatimes.com/india/using-drones-ai-and-big-data-india-to-draw-up-digital-map-with-10-cms-resolution/articleshow/71151780.cms>

HIGHLIGHTS

- India has initiated a project to digitally map the country with a resolution of 10 cms, using drones and Artificial Intelligence
- Once the project is completed, the data will be available to citizens and to Gram Panchayats and local bodies, empowering them to use it in decision making and planning process

India has initiated a project to digitally map the country with a resolution of 10 centimetres, using drones and technologies such as Artificial Intelligence and big data, a senior government official said on Monday.

Once the project is completed, the data will be available to citizens and to Gram Panchayats and local bodies, empowering them to use it in decision making and planning process.

The herculean task was taken up by the Survey of India, part of the Department of Science and Technology, a few months ago and is planned to be completed in two years, the department's secretary, Prof Ashutosh Sharma said. "...now we are equipping them (Survey of India) with the latest technologies like drones, Artificial Intelligence, big data analytics, image processing and continuously operated reference system", he told reporters on the

sidelines of an event here.

Once the project is completed, the data will be available to citizens and to Gram Panchayats and local bodies, empowering them to use it in decision making and planning process.

The survey is currently in progress in Karnataka, Haryana, Maharashtra and the Ganga basin.

"The entire Ganga basin from the beginning to the end, 25 km from either sides of the banks is being mapped with an accuracy of 10 cm," said Prof Sharma.

He stressed the need to have such a digital map.

"Even today we don't have a digital map of India of sufficient accuracy, but this (the new digital map being prepared) is (going to be) the basis for everything you do, whether we have to lay down train tracks, lay a road, put up a hospital, cleaning up Ganga, cleaning up Cauvery or any kind of development and planning," he said.

The official clarified to a question that the Indian Space Research Organisation (Isro) was not part of the programme.

"This is a different technology. Satellite produces image, but this one is based on drones.

.....using your smartphones you can do your mapping with an accuracy of 10 cm

This is based on two technologies because you get higher resolution with that. It is not just getting an image by flying the drone.

A map is different from an image. We have to produce a map which takes into account the curvature," Prof Sharma said.

Speaking about the continuously operated reference system, he said the Survey of India has a reference point at every 20 km.

"Now with the digital technology, each of these points you put actually a beacon...a stick...a digital station... with the help of these digital stations, whose coordinates are well established, even using your smartphones you can do your mapping with an accuracy of 10 cm," according to him.

Digital map is different from GPS (Global Positioning System), he noted.

While the GPS may have an accuracy of a few metres, the planned digital map — with these reference points at every 20 km — increases the accuracy manifold.

"So you can do mapping as you go up and down, walk around with a resolution of 10 cm or better," the official said.

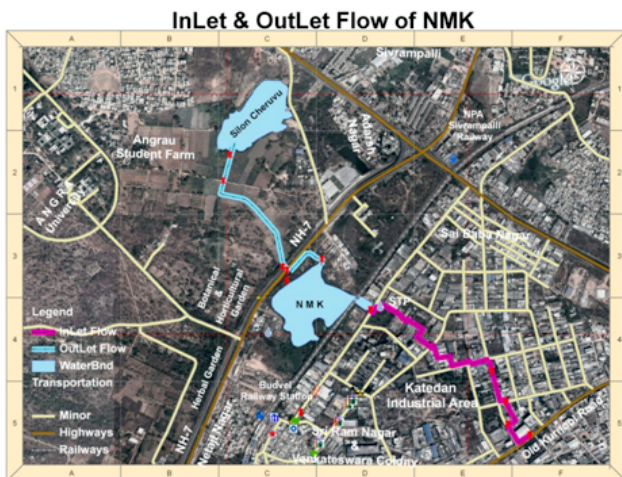
Extracts from the report on

Social Impact Assessment

for Remediation of Noor Mohammed Kunta (Lake NMK) and Kattedan Industrial Estate (KIE) in Hyderabad. 2012

by Sukuki Exnora & Society for Participatory Development

Noor Mohammed Kunta (NMK) (7.95 ha as per EPTRI Report, 1997) is located (78° 25' 38.965'' E and 17° 18' 56.522'' N) to the South-West of Hyderabad and receives active discharge from industries (plastic recycling and Biscuit manufacturing) in the Kattedan Industrial Estate (KIE). Having been used as a dumping site by industries of Kattedan and surrounding locations, Noor Mohammad Kunta was found to contain high levels of pollutants. Sriram Nagar and Venkateswara colony on South Eastern side of the Lake, Budvel railway colony and Netaji Nagar on Southern side, Saibaba Nagar on North Western side, and KIE on the Western side of the Lake are the habitation areas around NMK.



Change analysis has been carried out about **Land Use Type** using satellite imagery of 2000, 2003, 2007, 2009 and 2012

XXXXXXXXXXXXXXXXXXXXXXXXXXXX

In this context of serious violence to lake through pollution, encroachment and illegal encroachments – civil society platform for protection of urban water bodies (SOUL- Save Our Urban Lakes) in collaboration with Citizens Welfare Society have been active in precipitating action to

First, stop illegal constructions in lake bed

Second, facilitate constitution of a multi-stakeholder group

Third,.....to remove all illegal constructions in lake.....a ring sewer has been constructed by HMWSSB to divert sewerage flows out of the lake into main drainage trunk sewer.

Finally, a situation of conflict has been converted to complimentary and diverse set of stakeholders have come on a common platform to negotiate to work towards a common goal – rejuvenation of the Lake

Time dimension in ancient India

Extracts (English text)

(In GIS, we talk of 3-D, i.e.X,Y and Z coordinates. Time is the fourth dimension. In ancient India there are references to TIME in terms of millions of years – mind boggling figures. Pidaparty is a well known name for publishing regional calenders every year. Pidaparty Purna Satya Hariprasad has published a research paper on this subject. Some extracts from the book are reproduced here. Readers are welcome to respond - Editor)

In search of UNKNOWN “ How ancient are Vedas, Vedanga Jyotisha and Surya Siddhantha ? “

Pidaparty Purna Satya Hariprasad e-mail: hariprasaddps@gmail.com

Dated 27th December 2017

Abstract

Vedas, Vedanga Jyotisha, Surya Siddhanta are known as “apaurusheyas” meaning that their author and their period is unknown. No serious attempt seems to have been made to determine the age of these ‘apaurusheyas’.

In this short paper, an attempt has been made by the author to determine VEDIC AGE using Equinoxes and their precession. He relied heavily on available evidence in Rig-Veda, Vedanga Jyotisha, Brahma Siddhanta, Surya Siddhanta etc and quoted extensively from these sources to support his contentions.

The author is neither a scholar nor a scientist. At best he may be called an ANALYST with bare minimum knowledge of Sanskrit.

Contd..... on page 18

Photogrammetry as a powerful 3D spatial Data Capture Technology

NS Gayathri,

GIS scientist, Hyderabad

email: vsgayu@gmail.com



Geospatial Technologies have undergone evolutionary changes. Ground measurements are replaced by Total Stations, DGPS, Scanners, digital images, etc.

In the past, photography from air and scanning from space were popular for mapping mainly because of accuracy and ease of use. Today digital imaging has emerged as a popular means of spatial data capture.

DGPS and Total stations capture point based spatial data. But digital images capture a given area at various resolutions. If spatial imagery is stereo, it is possible to generate accurate 3D measurements.

Today spatial imagery is being captured from

1. Ground level (terrestrial)
2. Drone
3. Air
4. Space

All types of data is in use for different applications. This paper deals about a software used by the author, that can process 3D digital spatial data captured from different platforms.

Racurs company has 25 years long history of success with their flagship product PHOTOMOD having been founded in 1993. Photomod is an innovative digital mapping software for processing aerial, space and terrestrial imagery, for creation of wide range of output products from the available remote sensing data

One of the main activity of Racurs is R&D in the field of Remote Sensing Data processing software, methods, and algorithms. Dr. Victor Adrov, Managing Director is the key scientist behind this.

This state-of-the-art software allows the extraction of geometrically accurate spatial information from almost all commercially available types of imagery, whether obtained by film or digital cameras, UAS, high resolution satellite scanners.

PHOTOMOD advantages:

- Full line of data output
- Wide range of supported sensors
- Multiple data exchange formats for compatibility with

photogrammetric and GIS products • High level of automation for main photogrammetric operations • High productivity • Distributed network configurations for large projects implementation • Comprehensive quality control at all stages of data processing • Chinese, English, Greek, Russian, Spanish languages.

PHOTOMOD benefits: • Complete image data processing workflow without third party products • Flexible modular architecture: you only buy what you need • Wide choice of stereoviewing options: LCD glasses or screens of various vendors with page-flipping modes, as well as simple anaglyph glasses • Support for a variety of input devices: 3- and 5-button mice, specialized 3D controllers Good tech support and affordable price are two other plus points of Photomod.

PHOTOMOD is a modular system which allows users to obtain maximum benefit from its high level of flexibility. Configure for optimal system production. Buy only the modules you need for your particular workflow.

Photogrammetric operations include : Automation; Aerial triangulation; DTM, DSM, denseDSM; Point cloud; Contour lines; Orthorectification ; 3D modeling; 2D-3D vectorization

Stand-alone full photogrammetric UAS-oriented software PHOTOMOD UAS allows the user to process UAS data and acquire all types of value added photogrammetric products: DEM, 2D and 3D-vectors, orthomosaics.

The main techniques of UAS data processing in the PHOTOMOD system are rigorous photogrammetric processing of images with accuracy comparable with ground sample distance (GSD), and simplified method with absolute accuracies of about tens of meters. Functionality, high performance, simplified user-friendly interface and automation of photogrammetric operations are key benefits, allowing the user to consider PHOTOMOD as the optimal solution for UAS.

Traditional RS is not available during floods due to clouds. The PHOTOMOD Radar software is intended for full-scale processing of Earth remote sensing data acquired by spaceborne radars with synthesized antenna aperture (SAR) such as KOMPSAT-5, Sentinel, ERS-1/2, Radarsat, SIR-C/X, ENVISAT ASAR, TerraSAR-X, ALOS, COSMO-SkyMed and generation of so called "secondary information products" from SAR images, such as digital elevation models. The fact that SAR is the active sensor makes possible reception of required measurements independently of time, day and weather conditions.

Contd....on page 13

Geodetic Infrastructure in India; What is Wrong And What Needs To Be Done

By N. K. Agrawal, nande@rediffmail.com

(Reproduced from GIS India, January 2012)

Abstract

Geodetic Infrastructure in India is inadequate. There are many shortcomings. What is wrong and what needs to be done, has been discussed and possible solution suggested in this paper. It appears that, beginning has been made by the National Survey Agency, SURVEY OF INDIA, towards improving the geodetic infrastructure. It will be appropriate, if Survey of India puts on its website, the present status of Geodetic Infrastructure in India and also state as to what are their plans to put in place adequate geodetic infrastructure along with time frame.

Introduction

Geodetic Infrastructure in India is inadequate. It needs a fresh look and complete revision. Indian Geodetic Datum, The Reference Surface, Horizontal Control, The Vertical Datum, Height Control, Indian Geoid and Mean sea level, The Gravity datum, Projection System for Maps, and Indian Grid, are all inadequate or inappropriate.

Indian Geodetic Datum is based on Everest Spheroid as Reference Surface and Kalyanpur in Central India as initial point. Center of this reference surface is estimated to be about 1 km away from the center of gravity of the Earth. The datum is thus a local datum and in error. Scientific and Defense studies of vital National importance cannot be based on such a system. It is therefore extremely necessary that the Indian Geodetic Datum should be redefined at the earliest. The project on Redefinition of Indian Geodetic Datum should be taken up in right earnest and completed within one year.

Horizontal Control in India resulted from The Great Trigonometrical Survey. The different triangulation series are inconsistent between each other. It has not been properly adjusted. Stations are burdened with varying degrees of error and many points are either destroyed or in need of repair. It is therefore urgently necessary that fresh observations be carried out to get a set of vectors by GPS and other means and least square adjustment be carried for the whole country at one go to get control

points of zero, 1st, and 2nd order in 2 to 3 years. **Vertical Datum for Heights** in India was chosen as the **Mean Sea Level** at a group of nine tidal observatories situated at Indian ports. Level network in India is of moderate to high precision at different places. No gravity observations were carried out at that time. Network has not been properly adjusted. It is required that a fresh datum for heights based on Mean Sea level at one tidal observatory say Mumbai. High Precision Leveling should be carried out afresh throughout India to get a network along with gravity observations and adjusted so as to have 1st order vertical control. It is necessary to have a **Gravity Datum** in India. Presently there is no absolute gravity station in India. Gravity values in India are based on relative gravity observations based on gravity datum/s in other countries. It is therefore necessary to establish some absolute gravity stations, adopt a gravity datum and carry out relative gravity observations in order to get a 1st order gravity network. No satisfactory **Indian Geoid** is available. To get heights above Mean sea level by GPS observations we need a geoid that can give geoidal undulation of accuracy of 25 cm or better. A project should be taken up immediately to obtain geoid by gravimetric as well as astro-geodetic methods. **Projection** for topographical maps in India is Polyconic. Each individual sheet is projected individually assuming no distortion along parallels and neglecting distortion along meridians. Meridians and parallels are assumed as straight lines. These assumptions make it a perfect projection, which is not possible. We can say that The Earth/Ellipsoid has been assumed to be flat for individual sheets. This creates problems in digitization, integration and compilation of maps. It is therefore necessary to abandon so called polyconic projection and adopt either Lambert Conformal Conic or Transverse Mercator Projection designing suitable zones. **Indian Grid** on Lambert Conformal Conic Projection for superimposition on topographical maps was designed during British days. It has 9 zones with scale factors at central parallel as 649/650 and 823/824. The design is unsatisfactory as scale error at central parallel should be 1 in 2000 or better. The grid has been restricted which is irrational as the grid parameters are available to everyone outside India including Pakistan.

It is therefore necessary to design grids on Transverse Mercator or Lambert Conformal conic Projection with suitable zones similar to State Plane Coordinate systems in USA. It is suggested that each Indian state should have a grid for that state and all mapping is carried out on such grid for civil use. Structure of **Monuments** (geodetic stations, bench marks etc.) is not of permanent nature in many cases and many have been destroyed. Monuments that are not fixed to bedrock are not suitable for geodetic monitoring of crustal movements. New and suitable permanent monuments need to be constructed before any new project regarding geodetic infrastructure is taken up.

Indian Geodetic Datum

Indian Geodetic Datum is based on Everest Spheroid as reference surface given by Sir George Everest, then Surveyor General of India in 1830. Kalyanpur in central India was chosen as initial point or origin. Coordinates of initial point and azimuth of a line were obtained by astronomical observations and leveling. The reference surface was however defined piece-meal at various times. Astronomical observations were carried out at least twice. More precise observations carried out later were accepted. Hence meridional and prime vertical deflection of vertical, were defined at Kalyanpur. Parameters of the datum are given below: -

Initial Point (Origin)	Kalyanpur
Latitude of origin	24° 07' 11".26
Longitude of origin	77 39 17.57
Meridional deflection of vertical	- 0".29
Prime vertical deflection of vertical	+ 2".89
Geoidal undulation	0 metres
Semi major axis	6,377,301.243 mtrs
Flattening f	1/300.8017
Azimuth to Surantal	190° 27' 06".39

Value of Semi major axis and semi minor axis were given in feet as 20,922,931.80 feet and 20,853,374.58 feet respectively. These values were converted into metres using different conversion factors resulting in many values of a and b of Everest spheroid. The official conversion factor for India is 0.3047996 and should be accepted.

It is estimated that the center of Everest spheroid is about 1 km away from the center of gravity of the earth; hence it is not a geocentric datum. We therefore conclude that it is inaccurate system and needs redefinition. The present datum is especially not suited for many geodetic, geodynamic, geophysical and defence applications. One

has either to use WGS84 for Geodetic monitoring of crustal movements, plate tectonic movements, development and deployment of missiles and many other scientific applications or redefine Indian Geodetic System/Datum. A project to redefine Indian Geodetic Datum was taken up in 1989 but nothing much appears to have been done so far. Redefinition project should be taken up and given highest priority. It should be time bound and completed in 2 to 3 years. In USA a similar project was taken up in 1974 by National Geodetic Survey and completed in 1983. It is known as NAD 83 and is used for all applications including Geodynamic and defense.

Horizontal Control

Horizontal datum in India is Indian Geodetic Datum based on Everest Spheroid as reference surface as mentioned in previous paragraph. Existing horizontal control in India is the result of Great Trigonometrical Survey of India consisting of 5 blocks with 2700 stations and 10 bases. Triangulation series were started from Kalyanpur. The Indian subcontinent was divided into five parts region-wise, four quadrilaterals (NW, NE, SW, SE) and the Southern Trigon. The quadrilaterals could not be adjusted together due to computational limitations at that time. Several corrections viz. for deflection of vertical, skew normal and geodesic also could not be applied. In 1937-38 an attempt was made to readjust the triangulation network but this also suffered from the same limitations. Though densification of control and filling of gaps has been done in addition to observation of more bases and Laplace stations, no fresh adjustment has been carried out. This has resulted in the various series being inconsistent with each other. The horizontal control is therefore burdened with varying degrees of errors; say from a few metres to as much as 100 metres at places. Many stations are however supposed to of 1st order that is 1 in 50,000. Most of the stations of this control are on hills covered by jungles. Many stations have been destroyed and many others in poor condition, hence not suitable for geodynamic studies and zero/1st order geodetic horizontal control. The need therefore is to provide complete horizontal control of zero and 1st order afresh and adjust it by least squares for the whole country at one go, using available scientific adjustment software. BIGADJUST, the software used by National Geodetic Survey of USA has been obtained by Survey of India to adjust the present control but the same has not been completed and it is not known as to what are there plans regarding this.

It is suggested, that in addition to redefinition of Indian Geodetic Datum a project should be planned to provide horizontal control of zero, 1st and 2nd order throughout India. The following steps are suggested: -

- 1) Identify places for monuments. Care should be taken to choose places suitable for geodynamic studies also. Rooftops of permanent public buildings can also be chosen in preference to hilltops in many cases, as the control will now be provided using GPS.
- 2) Design suitable monuments and carry out construction of monument pillars. It should be seen that pillars are fixed to bedrocks to be suitable for future geodynamic studies.
- 3) Design network and observe all vectors using dual frequency geodetic GPS receivers in relative positioning mode.
- 4) Process the data using scientific software such as Bernese.
- 5) Adjust the data by least squares using network adjustment software such as BIGADJUST.
- 6) Compile the data in a suitable format for use for various purposes and for dissemination to public.

Vertical Datum and Height Control

In India, the vertical datum for heights has been chosen as the **mean sea level** at a group of nine tidal observatories situated at various Indian ports. Hourly tidal observations were carried out at these ports for a number of years and averages obtained.

It was assumed that the mean sea level at these ports, belong to the same sea level surface. All these ports served as issue points for the first level net of India. Leveling net in India consists of first level net of moderate precision covering 18,000 miles started in 1858, and second level net of 16,000 miles based on first level net. Second level net was adjusted on to first level net wherever necessary. We can see clearly from the above that assumptions were incorrect. Precision was moderate and adjustment was not carried out properly. Choice of vertical datum was not unique and creates confusion. Gravity observations were not carried out which is necessary for National Level Nets of high precision and 1st order accuracy. The present heights are thus in varying degrees of error and are not of present day standards. These cannot be used as basis for geodynamic studies and many geodetic and geophysical studies where 1st order vertical control is required. It is therefore suggested that a fresh vertical datum be adopted and vertical control of 1st and 2nd order be provided by spirit leveling along with gravity

observations. The following steps are suggested: -

- 1) Select a tidal observatory where hourly tidal observations of 18.6 years cycle of successive nodes of the moon are available. Construct a few permanent benchmarks near the observatory in stable and protected area. Provide heights of these benchmarks by 1st order spirit leveling from the chart datum to the benchmarks. These benchmarks should be taken as issue points for the fresh leveling network of India. The mean sea level obtained here should be the National Mean Sea Level for India at this observatory. Tidal observatory at Mumbai port may be chosen for obtaining the mean sea level. Design the network and construct the benchmarks along the routes selected for leveling in phases. Leveling of 1st order should be carried out along-with gravity observations using relative gravimeters throughout India.
- 2) Carry out adjustment of the network by least squares at one go and document the heights along with description of benchmarks.
- 3) Construct a few permanent benchmarks near other tidal observatories also. Find mean sea level at these observatories also and provide heights of the benchmarks constructed near the observatories from the chart datums of such observatories by 1st order leveling. These will represent the local mean sea level in those areas. There will be some difference between the national mean sea level heights and local mean sea level heights. The difference can be applied to heights in that area wherever needed based on sound statistical analysis. Scientific analysis of various mean sea levels and heights may be carried out for geoidal, geodynamic and geophysical studies.
- 4) All the monuments constructed for zero and 1st order horizontal control, should also be connected by 1st order spirit leveling. Monuments constructed for geodynamic studies should also be similarly connected.

Gravity Datum

Presently we do not have a gravity datum in India. The National Base Station of Gravity is at Dehra Dun. The gravity values at the base station were first provided by Lenox Conyngham from Kew reference station using Potsdam pendulums. The value obtained was 979.063 cm/sec². The values of Dehra Dun base station were again provided in 1906, 1913, 1924, 1929, 1932, 1939 and 1948. The last value, provided by Woolard and Gulatee from Washington via Delhi using Worden and Frost gravimeters is also 973.063 cm/sec². Minimum value is 979.054 of 1924 and maximum 979.085 of 1932. It can be seen from this that the gravity observations were not

very reliable even for the National gravity base station. The spread of observations is 31 mgal and it is interesting to note that 1904 and 1948 values are the same. A precise gravity network of 42 stations was established in 1971 by Survey of India covering airports of the country with an uncertainty of + or – 0.05 mgal. These stations served as reference for future gravity surveys in India. This gravity network was adjusted within the framework of International Gravity Standardization Net 1971

(IGSN 71). La-Coste and Romberg model G gravimeters were used for observations.

Until recently we did not have any absolute gravimeter. Recently NGRI has acquired one absolute gravimeter, which is being used by them for scientific research. We have to plan establishment of absolute gravity datum in India and connect existing gravity stations to the absolute gravity station/stations as we can see from the above paragraph that gravity values in India are not so reliable. It is hoped that NGRI will take leading part in this project. All first order horizontal control monuments and 1st order leveling bench marks should be connected to gravity network so as to have 1st order gravity values. This will facilitate precise repeat gravity observations for geodynamic applications such as 1) Detection and interpretation of vertical ground motion in earthquake prediction. 2) Monitoring and interpretation of post earthquake motion. 3) Postglacial rebound studies. 4) Monitoring of movement of magma in volcanic areas along with leveling. 5) Reservoir depletion studies of all kinds. 6) Tectonic motions and crustal warping studies.

Indian Geoid

Presently no satisfactory Indian geoid is available. To obtain heights above MSL with GPS we need a geoid, which can give geoidal undulation accuracy of about 25 to 50 cm or better. It is therefore necessary that a project should be taken up to determine Indian geoid by gravimetric as well as by astro-geodetic methods.

Projection for Maps

All topographical maps in India are on polyconic projection. Assumptions and approximations applied to it make it a mockery if we say that a projection has been adopted. The sheets on 1:25,000; 1:50,000; and 1:250,000 topographical sheets are individually projected assuming that distortion along meridians can be neglected. There is no distortion along parallels. Besides these the meridians and parallels are joined by straight lines. This means that it is not a projection. It amounts to assuming that the earth is flat in respect of individual sheets. It has created a lot of problems in integration of different maps,

compilation of maps, digitization and hence in GIS. We should change over to Lambert Conformal Conic or Transverse Mercator/UTM for our topographical maps after forming suitable zones. Individual states of India should adopt one of the two projections for all mapping in their states similar to State Plane Coordinate System in various states of USA. New map policy has since been adopted. Open series maps are to be on Universal Transverse Mercator (UTM) projection on WGS 84 datum.

Indian Grid

Indian grid was designed during British days dividing India into 9 zones in Lambert Conformal Projection. The grid is not satisfactory as scale error at central parallels is 1 in 850 and 1 in 650. Distortion is considered high. We should aim for 1 in 2500 but should not be more than 1 in 1000. Restriction of the grid is also irrational as parameters and all information about it is available to everyone anywhere in the world except in India. There is therefore an urgent need to design grids afresh. We should adopt either Lambert Conformal Conic or Transverse Mercator depending upon whether the area to be projected is greater in E-W extent or N-S extent. The present grid on maps of border areas with hostile neighbours is a security risk. We should immediately adopt a new grid immediately in such areas for our maps. Further it will be appropriate if a separate grid is adopted by each state of India. Some such grids have already been designed e.g. for Andhra Pradesh, Tamil Nadu, Karnataka, Maharashtra etc. by the author.

Conclusion

Geodetic Infrastructure in India is the same as provided prior to independence. All further work is based on this infrastructure, which is thoroughly inadequate for rapid development, growth, defence and scientific research viz. geodynamical studies, crustal movements, plate tectonics, earthquake prediction research. It is important that the issues of Redefinition of Indian geodetic datum, Vertical datum, geodetic datum, fresh horizontal and vertical control, gravity control, Indian Geoid, adoption of new projection system for maps, separate grids for defence and various states in Transverse Mercator or Lambert Conformal Conic projection and construction of monuments are addressed immediately on priority basis. WGS 84 has been adopted now for maps in India. In my opinion we should define our own Indian datum and adopt it for mapping. USA has adopted NAD 83 instead of WGS 84. Likewise many other countries have also adopted their own datum. We should also be capable of defining our

own datum. Further it is not proper to adopt UTM projection as all six degree zones have origins on equator and not in our own country. Northing values in these zones become very high which is not desirable. We should design suitable zones in Transverse Mercator or Lambert Conformal Conic or both as in USA and have origins of zones in India. It is also recommended that each state in India or combination of two or three small states be designed and adopted so that each state has only one coordinate system for all mapping in that state specially for cadastral maps. In case UTM is adopted for states as in Andhra Pradesh we may have as many as three UTM zones resulting in three coordinate systems in one state which will present difficulties and will be nightmare for all those dealing with these coordinates and maps. Present organization in India responsible for geodetic activities in India is incapable to meet these requirements in my opinion due to number of reasons like inadequate funds, manpower, will and bureaucratic/political support. **It is felt that a National Geodetic Institute be established at the earliest to address these issues and to supplement the geodetic activities of Survey of India.**

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Photogrammetry as a powerful 3D spatial Data Capture Technology

Contd.....from 8 page

PHOTOMOD Radar is built under module principle and comprises a number of separate modules suitable for individual user, along with several default modules, needed for proper operating. data processing. The system allows the user to improve processing performance due to distributed processing approach, and

cutlines building, tie points search and measurement, as well as DEM building and filtering are available in the system in fully automatic mode.

PHOTOMOD Lite is a free software package which has all features of PHOTOMOD digital photogrammetric system. The program is intended for photogrammetric processing of the remote sensing data. PHOTOMOD Lite allows exploring wide-ranging possibilities of the PHOTOMOD system and performance of test projects with the users data. However, PHOTOMOD Lite allows to execute small photogrammetric projects for orthomosaics, DTMs and vector maps creation. The program is not intended for commercial use.

Some of the features of SW to be considered in selection are (Consider Time and ease for the operations):

Price of software depends on several factors. For example- Price of SW for Network configuration is higher than Local (for one user and one computer)

camera calibration and the need for Ground Control Points

Aerial Triangulation (AT)

DTM

Stereo and mono feature extraction

orthoimage creation

SW upgradation and technical support system

User can choose and buy only those modules that are needed for their workflow

Computer configuration for the SW

In conclusion, it is reasonable to say that photogrammetric surveys are getting stabilized for 3D data capture of different accuracies and for different applications.

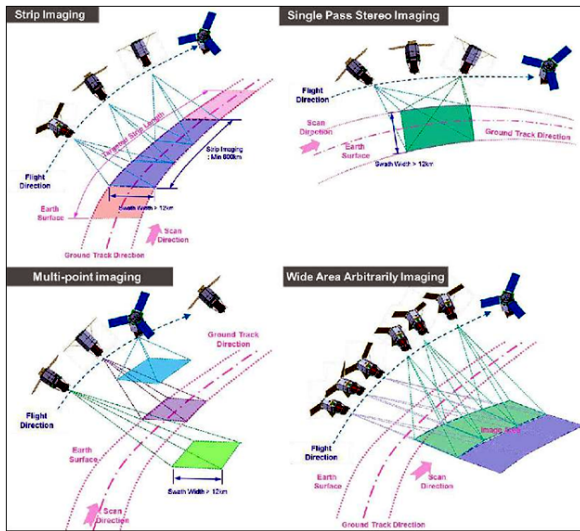
KOMPSAT

<https://directory.eoportal.org/web/eoportal/satellite-missions/content/-/article/kompsat-3a>

(herb.kramer@gmx.net).

KOMPSAT-3A is Korea's first Earth observation/Infrared satellite with two imaging systems on board. The main goal of the KOMPSAT-3A program of KARI (Korea Aerospace Research Institute) is to develop an Earth observation satellite to obtain IR (Infrared) and high resolution EO (Electro-Optical) images for GIS (Geographical Information Systems) applications in environmental, agricultural and oceanographic sciences as well as natural disasters

KOMPSAT-3A imaging modes



Extracts from the article Performance parameters

First high-resolution images (55 cm) of KOMPSAT-3A were released on April 1, 2015

GSD (Ground Sample Distance)	0.55 m for Pan band at nadir 2.2 m for MS bands at nadir 5.5 m for IR (Infrared imagery) data
Swath width	12 km (at nadir)

For the study, PhotoSat produced a 1m grid of elevations using their proprietary geophysical processing technology with stereo satellite images taken by KOMPSAT-3A. The resulting elevations were then compared to a 1 m LiDAR elevation grid in Southeast California, accurate to approximately 5 cm in elevation and available on the OpenTopography website. The size of the comparison area was 86 km². The resulting 21 cm RMSE (Root Mean Square Error) elevation accuracy was measured at 6,294 survey check points.

Extracts

Journal of Sensors; Volume 2017, Article ID 6393278, 14 pages

<https://doi.org/10.1155/2017/6393278>

Research Article

Orthorectification of KOMPSAT Optical Images Using Various Ground Reference Data and Accuracy Assessment

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In many applications, the location accuracy of satellite images is as important as the spatial resolution. However, few satellites possess the accuracy required by users, so additional processing is necessary. To improve the location accuracy of high resolution satellite images, a lot of time and money are often required for control points, DEM, and the like. Also, high quality ground reference data are not always available. In order to utilize KOMPSAT optical images for applications such as GIS, it is necessary to orthorectify the images. Therefore, for this study and with updated RPCs, we performed orthorectification of KOMPSAT images using various data and evaluated the results. The planimetric accuracy of KOMPSAT-2 orthoimages generated from GCPs with horizontal and vertical accuracies of 1 m (RMSE) and 2 m (RMSE), respectively, was the best. However, the orthoimages generated through matching with the existing corrected images such as GCP chips also had sufficient accuracy. We also found that the planimetric accuracy of the KOMPSAT-3 and KOMPSAT-3A orthoimages generated using GCPs and GCP chips was 1 m (RMSE) and 15 m (RMSE), respectively. Although good quality GCPs and DEM have a great influence on orthoimage generation, it is not always possible to obtain high quality datasets, and so orthorectification was performed using OSM and SRTM DEM (30 m) in this study. We analyzed the availability of open source data for image correction, even though the location accuracy was poor compared to GCPs and GCP chips. The orthoimages generated using OSM and 30 m DEM had accuracy on the order of 3 m (RMSE). However, in mountainous terrain it was found to have a maximum error of about 6 m (RMSE). In the future, we will present a more efficient correction method for KOMPSAT images using improved image matching techniques and a greater variety of data.

Land title insurance



Land title insurance set to be mandatory for MahaRERA registered builders

23 Sep, 2019 BusinessToday.In

Land title insurance is a form of indemnity cover, which insures builders and customers against financial loss from defects in title to real property, among others.

Every plot of land to get unique number with ownership details linked to Aadhaar

This unique identifier (UID) will not only host details of the state, district or zilla, tehsil/taluka and the relevant block, but also information about the plot, including size and ownership details



Going forward, the unique identification number for land parcel may be linked to the Aadhaar and revenue court system

With the digitisation of land records under the Digital India Land Records Modernisation Programme (DILRMP) close to completion in most states, the government is now planning to introduce a unique identification number for all landholdings in the country. Think of it as an Aadhaar number for land parcels that will allow the government to track everything from ownership to tax collection.

The rural development ministry has already started work on assigning a standardised unique number for each surveyed plot, a senior government official told The Economic Times. This unique identifier (UID) will not only host details of the state, district or zilla, tehsil/taluka and the relevant block, but also information about the plot, including size and ownership details.

The idea is to crack down on dubious land ownership and increase transparency - assigning unique numbers to plots of land would facilitate real estate transactions, help resolve property taxation issues and improve disaster planning and response efforts. Moreover, the process of land acquisition for public projects would become easier.

..... land ownership done via registered sale deed currently is presumptive in nature and is also subject to challenge.

Going forward, the unique land parcel number may be linked to the Aadhaar and revenue court system.

"Unique identity numbers have been long overdue and, when implemented, will help streamline and organise India's outdated land record system," Anuj Puri, chairman of Anarock Property Consultants, told the daily. He added that land ownership done via registered sale deed currently is presumptive in nature and is also subject to challenge. According to think tank Centre for Policy Research, 66 per cent of all civil cases in India are related to land/property disputes, and about a quarter of all cases decided by the Supreme Court involve land disputes, of which 30 per cent concern disputes relating to land acquisition. Disputes over land, rightful ownership and validity of titles also clog up the Indian courts since it takes 20 years, on average, to resolve them. This has a negative effect on sectors, projects and, by extension, economic growth. With UIDs for landholdings in place, such disputes are expected to reduce.

Puri believes that the new system will also help attract more foreign investors for whom lack of proper land titles is a major deterrent for investing in India.

Since the UID will reportedly be GIS-tagged, accessing details of any landholding, including past ownership, will become much simpler. The new system may also facilitate easier access to credit, especially for farmers. Land is often used as collateral by farmers and unclear land deals inhibit their capacity to bag a loan.

Meanwhile, a steering committee looking into the development of fintech space in India has pitched for a dedicated National Digital Land Records Mission based on a common National Land Records Standards, within a three-year deadline. The panel headed by Atanu Chakraborty, Secretary, Department of Economic Affairs (DEA), submitted its final report to Finance Minister Nirmala Sitharaman earlier this month.

Report

All India Seminar on

Digital Technologies in Surveying, Mapping & Applications

Organised by

The Institution of Engineers (India), Telangana State Centre &

GeoMap Society, (GEMS) Hyderabad

October 15-16, 2019, Hyderabad

Prepared by Dr V Raghavaswamy, Chairman Technical Committee,

The seminar was held on the occasion of Centenary Celebrations of IEI, during 15-16, October, 2019 at the Visvesvaraya Bhavan, Khairatabad, Hyderabad. The two day seminar had a gathering of nearly 200 participants from all parts of the country and one from Racurs, Russia.



L-R: Mr. Gopal Krishna; Er T Anjaiah; Dr Rameswar Rao Mr Alexey (Racurs, Russia) receiving memento from Mr. Jayesh Ranjan, IAS, chief guest; Prof Dr Kavita Daryani Rao; Mr. GS Kumar

The participants included students, teachers, civil engineers, surveyors, geospatial scientists, administrators, planners, architects, and technologists

The two day program was structured into five technical sessions with 12 invited talks by experts on topics of surveying, mapping, applications, outreach and digital technologies. Each presentation was followed by discussion by the participants. One of the technical session was exclusively devoted for students from various colleges & universities, in which 14 papers were presented

for winning prizes for two best papers. The prizes were announced by Shri M V Krishna Rao (Retd) IPS, former Director General of Police (AP) & President, Pure Earth Foundation, Hyderabad. Maj. Shiva Kiran from GeoMap Society moderated questions from students. Shri K K Pappan (Retd, Sr. Scientist, NRSA, Hyderabad) mobilised participation of students to the seminar. A Map & Atlas sales exhibition set-up by Survey of India (SOI), Hyderabad, for the benefit of participants was a great attraction.

The chief guest at the Inaugural session (15th October, 2019) was Mr. Jayesh Ranjan, IAS, Principal Secretary to Government, Industries & Commerce, Information Technology, Electronics & Communication Department, Government of Telangana and Vice Chancellor in-charge, JNTU Hyderabad; the Guest-of-Honour was Prof Dr Kavita Daryani Rao, Professor & Vice Chancellor, Jawaharlal Nehru Architecture & Fine Arts University (JNAFAU), Hyderabad;



L-R: Dr G Rameshwar Rao; Er T Anjaiah; Mr. Jayesh Ranjan, IAS; Mr. Gopal Krishna; Prof Dr Kavita Daryani Rao; Mr. GS Kumar

Dr G Rameshwar Rao, FIE, Chairman, IEI, TSC welcomed the gathering and Er G S Kumar, President, GeoMap Society, Hyderabad gave a brief about the seminar; Er T Anjaiah, FIE, Hon. Secretary, IEI, TSC gave vote of Thanks. After release of the seminar Proceedings print copy & CD the Chief Guest & Guest-in-Honour

addressed the gathering. A brief press meet followed after concluding the inaugural program. The technical sessions commenced after the inaugural program.

On Day2, (16th October,2019) the technical sessions continued till lunch time. In the post-lunch session the exclusive student's session was held. The judges for selecting the two best papers were, Dr V Raghavaswamy from NRSC & Dr K Jayachandra, from CED,Hyderabad.



Dr Jayachandra addressing gathering and Dr V Raghava Swamy chaired the session

The chief guest to the Valedictory session was Mr. B P Acharya, IAS, Director General, MCRHRD & Special Secretary to Government of Telangana, Hyderabad. The Guest-of-Honour was Mr. M V Krishna Rao, IPS (Retd), Former Director General of Police (AP) & President, Pure Earth Foundation, Hyderabad. Er T Anjaiah, FIE, Hon. Secretary, IEI,TSC welcomed the gathering & Dr G Rameshwar Rao, FIE, Chairman, IEI,TSC ,delivered President's opening remarks; Dr V Raghavaswamy, Former Director, NRSC/ISRO, Hyderabad and Chairman Technical Committee gave a brief on recommendations of the seminar.

Later,the Chief Guest Mr. B P Acharya, IAS distributed the prizes to the winners of the two best papers presented in the students session. The first prize was given to Veda Apurva & G Likhita from JNAFAU and V Chowdhary from GIT, Hyderabad for their paper, 'Preservation of Archaeological and Architectural Sites using Survey and 3D Imaging Techniques'. The second prize was given to, V Sai Prasanna & A Divya from JNTUH, Hyderabad for their paper,' Geo-Database and Spatial Analysis of Schools Data for Developmental Planning and Decision Making by the School Education Administration of Telangana State'.



Winning Students receiving prizes from chief guest Mr. B P Acharya, IAS

Dr.V.Raghava Swamy is on the extreme left



Mr. B P Acharya, IAS addressing the seminar

After that, Mr. B P Acharya, IAS & Mr.M V Krishna Rao, (Retd.) IPS addressed the gathering. Finally, Vote of Thanks was given by Er V Jambul Reddy, FIE, Member, IEI, TSC, Hyderabad and the two day seminar concluded with National Anthem.

The following Recommendations emerged at the end of two day All India Seminar.

Recommendations

- i) There is a need to continuously use digital

Contd...20

Time dimension in ancient India

Contd from page....7

He has abundant curiosity to search for the truth beyond what is known

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

In Hindu mythology, Brahma is known to be responsible for creation of the Universe – including Earth, Planets, stars, oceans, living and non-living beings,

Brahma's life-span is also limited to 100 years in his time scale. Time Scales of Brahma and Humans are very different. Brahma Siddhanta or Paitamaha Siddhanta provides details of time scale in Brahma's life and their equivalents, solar years in time scale of human beings. In brief some significant details together with results of analysis are given below:

*Lengths of solar year and Lunar year are slightly different. They balance each other in a Mahayuga considering adhika masas (inter-calary months) in lunar years.

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

Page 3

Age of Vedanga Jyotisha - 2017 155,521,955,858,185 solar years

Age of Vedas > 155,521,955,858,185 solar years

Age of Surya Siddhanta 155,521,954,157,118 solar years

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Use of the word 'Divyabda' may kindly be noted. 'Abda' means a year. Divyabda means a year for those in heavenly abode (devas) and Raakshasaas (demons). The distinction between time scale for those in heavenly abode and on the earth is significant.

Equivalents are given below.

- 12000 Divyaabdhas = Life Span of Devas = 1 Mahâ-Yuga.
- 2 Ayanas (6-month periods, see above) = 1 human year = 1 day of the devas
- 4,000 + 400 + 400 = 4,800 divyabdhas (= 1,728,000 human years) = 1 Satya Yuga
- 3,000 + 300 + 300 = 3,600 divyabdhas (= 1,296,000 human years) = 1 Treta Yuga
- 2,000 + 200 + 200 = 2,400 divyabdhas (= 864,000 human years) = 1 Dvapara Yuga
- 1,000 + 100 + 100 = 1,200 divyabdhas (= 432,000 human years) = 1 Kali Yuga 12,000 divyabdhas = 4 Yugas (= 4,320,000 human years) = 1 Mahâ-Yuga)

Page 5

When present Brahma's life span is over, another or new

Brahma comes into being, process of creation begins all over again after a gap of approximately 1.7 million years (time scale for human beings). This is known as 'Srushtyadi' i.e. the beginning of Srushti or creation. Only then Universe is created

Page 6

Strustyadi – beginning of creation

Commentary on Surya Siddhanta, Triprasnadhikara, verse 9, By 'Jyotishacharya' Sri Kapileswara Sastry, Head of the Department, Govt Jnanodaya Mahavidyalaya, Patna – (ISBN 81-86937-59-5) Page 103

Meaning: 'The point of intersection' of Ecliptic and Equator at the time of 'Srushtyadi' was 'The First Point of Aries'. In Indian parlance it is known as Aswinyadi or Meshadi. That is: Equinox or Vishuvat was at 0p 0' 0". 'Ayana' means precession. 'Nirayana' means '0' precession. Therefore it is the starting point. (It may be construed that Sayana less Nirayana (cumulative values) = cumulative precession of equinoxes.)

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Vernal Equinox is known as 'Vasanta Vishuvat' and Autumnal Equinox is known as 'Sarat Vishuvat' in ancient Indian Astronomy.

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It is difficult to precisely identify end of stellar segment of Revati or beginning of Aswni. Revati has 32 stars. None of them is identified as 'yoga tara' or 'Principal Star'. 'Chitra' has only one star that is recognized as 'yoga tara'. That is exactly at the midpoint of stellar segment of Chitra. Even Western scholars recognized it as SPICA. It is 180p precisely on either side of 'First Point of Aries' as shown in the picture below. (not reproduced)

Page 7

Then VISHUVAT was at Longitude 270p and (-) 23p 20'. Therefore [360p 0' 0" - 23p 20' 0"] = + 336p 40' 0"

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

Page 8

There is a belief in the western world that ancient Indian Astronomers were unaware of 'Helio-Centric' system. Therefore their beliefs and computations relied on 'Geo-Centric' systems. Fact is that Geo Centric system was necessitated and considered relevant for the humanity that lives on the Earth. Conversion from Helio to Geo became a compulsive need.

Contd... Next Issue

Ward Sanitation Plans- a GIS Perspective



Maj. Dr. G Shiva Kiran

What is a Ward?

In our country ward is considered to be the unit for all planning. It is a geographic unit which was thought to be suitable for resource allocation and planning. To begin with in urban centres, an area with 20000 population constituted a ward. Over a period of time certain wards grew faster in terms of population as compared to other wards and this created management issues for Municipal bodies or Urban Local Bodies (ULBs). The population of an urban ward in 2011 census ranged from about 40000-60000 population. 84427 is the total number of wards in the country. In Telangana there are 2112 wards. GHMC alone has 150 wards.

The rationale behind ward as a unit was that allocation of resources and management could be better if a fixed population was to be serviced over a certain geographic area. It is probably the same reason why census is collected door to door, but presented on a ward basis for better understanding. Another interesting phenomenon of the ward structure is that they have no names, only numbers. This was done with foresight that as wards grew and were to be delimited, names would be dysfunctional and a ward if it were to be named after a prominent in the area could fall in a different ward in the next delimitation exercise.

GHMC- A case in example

In the erstwhile MCH- Municipal Corporation of Hyderabad, the geographical area was about 173 Sq kms having 24 wards with a population of 35 Lakhs. Average population per ward was 1,46,000. In 2007 when GHMC was constituted with the merging of 13 peripheral municipalities, the area increased to 650sqkms, with about 67 lakh population and 150 wards. Average population per ward reduced to 45000. With the present estimated population of around one crore, average ward population could be around 67000. Through a process of delimitation wards were carved out for better decentralised management. The administration and election wards now have same boundaries. Hitherto the ward boundaries and

election wards being different created confusion in jurisdiction and management.

ULB Services

Typically a Urban Local Body provides various services to the citizens, which include Urban Planning, Regulation of Land Use and Building Construction, Roads and bridges, Water Supply and Sewerage services, Public health, sanitation and conservancy, Fire services, Urban forestry, Preventive health care, Provision of urban amenities and facilities such as parks, gardens, playgrounds, Burials and burial grounds, cremations, cremation ghats/grounds and electric crematoria, Cattle pounds, prevention of cruelty to animals, Vital statistics including registration of births and deaths, street lighting, Parking lots, bus stops and public conveniences, Regulation of slaughter houses and tanneries, Slum Improvement and Upgradation, Urban poverty alleviation, Protection of the environment and promotion of ecological aspects, Planning for Economic and Social development, Safeguarding the interests of weaker sections of society, including the handicapped and the mentally retarded.

The Chief Minister of Telangana has number of times spoken about the basic services an ULB / Municipality has to provide. Sanitation, Plantation, water management are the basic tenets of the flag ship programmes of the Telangana Government such as Mission Kakatiya, Haritha Haram, and Mission Bhageeratha.

Need for Spatial Planning and Use of GIS

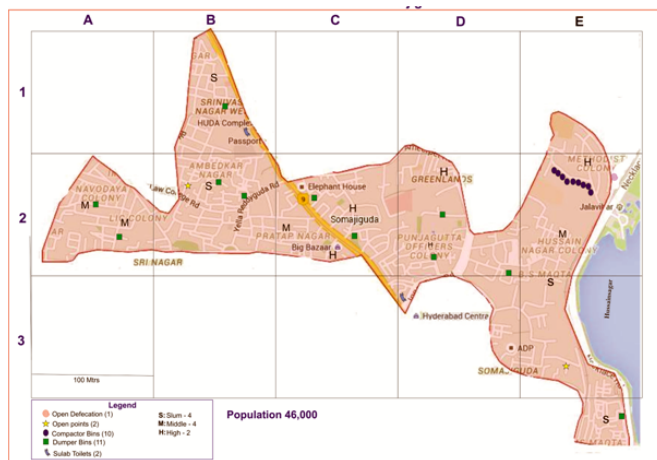
A careful look at the services to be provided to the citizens shows that all of them are location based. Where the building should be allowed? Where is the road infrastructure needed? Where are the urban amenities required? Where are the pipelines and sewerage systems to be laid? Where are streetlights required? Where should the lung spaces be created? The operative word is "Where". That is why precisely a GIS-Geographic Information System / Spatial perspective is needed for all planning. A ward level GIS – Map based

planning methodology will enable a stakeholder inclusive approach, better allocation of resources and micro level planning which will contribute to better urban governance in the long run.

An Illustration of GIS based Ward level Planning for Sanitation

The author has organised this ward level planning exercise for sanitation planning, environment management and water resources for Functionaries of ULBs across the country to ingrain a spatial perspective. The georeferencing of data and geo tagging of ULB assets enable a transparent management methodology and ensure zero duplication.

Ward Solid Waste Management Plan



A Map of one of the wards of GHMC is provided with the following details.

Population with Demographic Profile – Slums, Middle Class & Higher Income group.

Sanitation Information – OD areas, Open Dumping points, Dumper bin locations, Compactor bins & Sulab Toilets.

Design a **Ward SWM Plan** covering aspects of Door to Door collection, Segregation, location of Bins, Method of collection (Manpower and Vehicles), Treatment & Disposal, Revenue Model, and Sustainability

Technology Advantage

India is among the foremost countries generating spatial data of high resolution as good as one metre and an update frequency of 28 days. Bhuvan Geo Spatial portal developed by the National Remote Sensing Centre (NRSC) has several easy to use spatial tools which enable creation of maps at a ward, with features of different layers, vehicle tracking, measuring and visualisation tools, DEM (Digital Elevation Models), buffer creation, combining of existing Spatial data layers, hosting on the web using Open source tools. All this for free !!!

The right Tool for Hyderabad- Global city in the making

Ward level GIS planning has many advantages as Hyderabad aspires to reach the ranks of cities that are recognised for global living standards. The Minister for Municipal Administration has time and again emphasised for ward level planning, resource allocation and management. It is a tool which can enable Hyderabad leap frog into a **Vishwanagaram**(Global City).

Digital Technologies in Surveying, Mapping & Applications

Contd....17

- technologies in surveying and mapping and apply them in carrying application studies
- ii) The proven methodologies, success stories and best practices have to be disseminated widely amongst departments engaged in land surveying, land records /property, revenue, mining, civil engineering & construction, environmental engineering, urban /rural land use surveys, public health, water, disasters etc
- iii) Capacity building, training, skill development in digital technologies have to be timely extended to people working at different levels in government departments, ministries and institutions
- iv) Students studying various courses of engineering at undergraduate & postgraduate level in colleges / universities have to taught in syllabi about digital technologies in Hands-on Lab tools / work, Satellite imagery, Drones, GPS/GIS, Terrestrial scanners, Spatial analytics, Web GeoPortals (eg.Bhuvan), GeoMapping, LiDAR, New technologies like AI, IOT's etc
- v) Various 'Outreach Incubation Centers' available in Hyderabad eg. NRSC, T-Hub, besides other academic institutions like ,JNTUH, JNAFAU,WAPCOS, SOI, INCOIS, IE, Geospatial-ICT companies have to be utilized for building knowledge, career opportunities & entrepreneurship thinking among students.
- vi) Policy Efforts to liberalize availability of digital spatial maps & data, as sharable & accessible on a real time basis for academic, applications & research purpose, project evaluation & monitoring should be made by the government
- vii) Efforts to bring standard data / methodology guidelines, documents in print & e-version in vernacular languages are needed for larger outreach & digital awareness
- viii) Seminars, workshops , training for Trainees & TOT's (Training for Trainers) have to be conducted at regular intervals to keep abreast with new technologies & their applications

My Four Decades As A Cartographer: A Tribute To The Profession

By **Brig (Retd.) Niranjan Dhal**; Ex Director, Survey Of India; Ex Chair Professor, Col. Mackenzie Chair, Inst. of Remote Sensing, Anna University
(Reproduced from GI India, January 2012)

(Contributions of Brig. N.Dhal for Geomap Society, GIS India, Geomap Quiz and Events have been very significant. In this article, he refers to himself as a cartographer in the title. But he is in fact a Geospatial professional with expertise in various aspects. His knowledge of Photogrammetry is outstanding as brought out in this article – Editor)

Motivation:

My passion for the discipline of surveying grew during my student days in the engineering college. Thereafter on joining the Indian Army in 1968 and during my training days I was fascinated with the quality and operational usage of the topographic maps produced by SOI. These two factors deeply motivated me for joining Survey of India in 1970. Frankly speaking, I had no knowledge then about the glorious past of SOI, nor had I, any significant understanding about the profession of map making. On joining the Survey Training Institute at Hyderabad (one of its kind, at that time) and during the next 2 years of training there my understanding about the profession took root. On completion of the course I was awarded the trophy donated by Prof. Clawey, who was then working as the UNDP expert in Cartography and the profession became close to my heart and remained so throughout the four decades of journey as a professional cartographer.

Formative years as a professional:

The high standard of professional training with good mix of theory and practice on various aspects of surveying and mapping in STI opened up plethora of opportunities for me to experiment as a cartographer. From late 1950s SOI had adopted photogrammetry as the means to substitute much of ground efforts in surveying and mapping. So my focus in the next couple of decades remained mostly photogrammetry-centric.

During the first productive field season, from Oct.1972 to Jun.1973, I started productive work in form of

photogrammetric control provision covering 5 nos. of 1:50,000 scale toposheets in and around Vizag city. My innovative approach to post-pointing and sketching benefitted the photogrammetric operators to effortlessly transfer the control points during the stage of independent model triangulation. Also with the set of new control points they could properly adjust this important, but problematic block which was needed in connection with setting up of a steel plant at Vizag. This piece of information gave me enough encouragement in subsequent experimentations that I had tried in my field work, which were different from the standard practices being followed then.

This was followed by another assignment to manage a large survey camp at Panvel, in Thane district of Maharashtra, where I was to work for large scale mapping support to SIDCO under strong local hostility opposing us, for their New-Bombay project. During this period I could extend my experimentation of post-pointing, field sketching and innovative control extension methods on wide ranging scales of photographs from 1:40,000 to 4,000, besides handling various types of large scale mapping tasks needed on urgent basis for the town planners. It also provided me the opportunity to interact extensively with surveyors, plane-tableers, levellers and air-survey draftsmen, who were sent to my camp from various other survey parties, enabling me to understand the core strengths of SOI. The camp was chosen as a model to demonstrate our survey activities to a foreign expert delegation from Canada and USA visiting SOI then. Today when I visit the New Bombay city, I am pleased that I had some contribution in its realisation.

Hyderabad Test Area:

For calibration, standardization and research in photogrammetry, SOI needed to establish a Test area. Experts from UNDP tried such a Test area project spreading over some 75,000 sq km area around Hyderabad city. During the hot summer months of 1972 the work started with demarcation and targeting of the proposed pre-targeted control points prior to flying for photography. We had first-hand experience in this pre-targeting work just before completion of our training in

STI. But after completion of aerial photography on various scales ranging from 1:90,000 to 1:20,000, it was noticed that most of the targets did not appear in the photographs. I realized that the efforts had failed to achieve the desired results primarily due to the fact that pre-pointing concept was not suitable to Indian field conditions.

After specialization in Advanced Photogrammetry when I joined R&D at a young age of 29, the then Director, Col. G.C. Agarwal, handed over the sets of failed Hyderabad Test area photographs asking me to explore the possibility of their usage, if any. With the experience of innovative approach to post-pointing and control extension gained during my previous field work, I proposed to create an improvised Hyderabad Test Area through post-pointing and a two-tier sketching of control points. I advocated that such an approach should enable us to extend controls from 1:1,00,000 scale high flown photo to 1:25,000 scale mapping. The idea was appreciated by my director and the field work was completed successfully in 1975 just before I was due to be posted to the College of Military Engineering, Pune as a faculty member. During these days photogrammetric blocks were not proving with better than 100 micro metre of RMS with the available method of strip adjustment. SOI had just imported a new expensive package, PAT-M Enblock adjustment programme, which was needing a well proven block for its acceptance testing. Shri A. K. Bhatia, my senior colleague working in R&D used my just established Hyderabad Test area data, with some initial hesitation, for the acceptance testing of PAT-M programme. He was pleasantly surprised to find out that the Test area block could prove with RMS value of better than 30 microns and establishing in grid pattern some 100 well documented GCPs. This set the trend for quantum improvement to all subsequent block adjustment work in SOI. However, no documentation nor technical publication were made by R&D directorate in my absence.

Only in 1983, while posted at Dehradun, and on request from LtGen. G.C. Agarwal, then S.G, I published an R&D Technical Publication No. 2483 covering various aspects of the Hyderabad Test area created by us using 1:90,000 scale photography and about its post-pointing work. This document was extensively used by my colleagues in SOI and was often found being quoted abroad in various forums.

My days in CME as a young faculty:

In 1975, College of Military Engineering, Pune was planning to set up a modern photogrammetry laboratory in their Survey School and I was posted there to execute it. It provided me the unique opportunity to plan with a free hand to setup and handle wide varieties of photogrammetric instruments, like the Stereotopes, DP1 Zeiss optical plotter, and the most advanced analog plotter of the time- a WILD A-10 plotter, the first one to have been imported by India. I could use this modern photogrammetry laboratory, not only for teaching Photogrammetry to Engineer officers of the Corps, but also executing a number of large scale mapping projects including a 1:2,000 scale map of CME campus and a 1:5,000 scale map of Eblur in Bangalore urgently needed by CE, South zone to set up of an army cantonment. Although these were not part of my assignments, I took up these projects to demonstrate to my commandant about the potential capabilities of WILD A 10 plotter, who was until then worried about the huge investment made by the Civil engineering wing in establishing the photo lab. During this period, I also completed ME in structural engineering from Pune University and was bubbling with the idea of adopting close-range photogrammetry as a means to in-situ non-destructive study of structural deformation of engineering structures. Close range photogrammetry had great potential to civil engineers and archeologists besides others, but little progress was made then in this field in India. However, my department had other priorities and was anxious to enter into the emergent technology of total automation of cartography and map making. So I returned back to R&D directorate by end of 1978 to work in this emergent field.

Induction into Computer aided Cartography:

On return to R&D, in January 1979 I was sent to Roorkee University for Post Graduate Diploma programme in Automatic Computation and subsequently for a short training programme at Ottawa, Canada in Computer assisted Cartography. The first computer assisted mapping system, the AUTOMAP was imported from Canada, which we set up and system tested successfully in our newly raised Auto-Carto cell at Dehradun in 1981. It provided me opportunities to study and experiment with various aspects of computer assisted cartography, a field so advanced in computer graphics and totally new to most cartographers in our country at that point of time. Our efforts in Auto-Carto cell helped the departmental officers to be exposed to various aspects of cartographic

automation. I assisted a departmental Task Force set up by the Surveyor General to draft a proposal for consideration of the Govt. of India for total computerization of the department. Our efforts resulted in creation of three nos. of Digital Mapping Centers, two to be located at Dehradun and one at Hyderabad.

During this period I realized the essential requirement for integrating our hundred odd existing analogue photogrammetric plotters (most of them being operated on double shifts) to the Computer aided cartographic system as a means to realize the complete automation of cartographic processes in SOI. Co-authoring this idea with then Maj.A.S. Nathani, my colleague in R&D, we published the concept of such interfacing in the ASPRS journal of USA in 1987. But my deputation to the Ministry of Home Affairs from 1986-88 delayed its practical implementation until 1993, which finally took practical shape in the fabrication of PC EK-22 system in house in R&D. I had expected that SOI would take steps for indigenous development of such a product in 1980s to convert then available large number of analogue plotters into 3D stereo digitization platforms for topographic data processing and production of up-to-date digital maps in our digital mapping centers. On return from MHA I was really disappointed to find out that DMCs were in isolation being engaged in digitization of existing 1:250,000, and there after 1:50,000 scale map sheets without any intention of integrating digital processes of photogrammetry and field verification work. Our dream for total automation of topographic map making in the department was sadly nowhere in sight.

Railway alignment design using stereo-photogrammetry:

As Superintending Surveyor in charge of No. 22 photo party of North Eastern circle from 1982 to 85, the Surveyor General requested me to assist RITES of Indian Railways in survey of an alignment from Lanka to Silchar, which the RITES was unable to progress in spite of urgency shown by then Prime Minister. My efforts for this project gave rise to survey and design of rail alignment passing through difficult terrains within very short time frame and at low cost by integrating horizontal and vertical alignment design directly studying the 3-D stereo models.. RITES engineers were associated with me to complete a number of such alignment designs in Orissa, Himachal Pradesh and Andhra Pradesh. Our efforts attracted the Railway board to propose a workshop in our SOI campus at Dehradun in 1986 to expose their

senior engineers and general managers with this new approach to rail alignment design which could reduce time and cost of alignment survey many folds. Based on input from us Indian Railways also revised their Engineering Code of practices in 1989 to include for the first time the use of Photogrammetry and Remote Sensing as a means to design railway alignments. RITES constructed and gifted a building within our Dehradun campus to set up a Center for transfer of technology, besides providing my party an imported computer based system, WILD BC-1 for advancing further development of this methodology in digital process. The building did come up in the subsequent years while I was on deputation to MHA, Govt. of India, but SOI never set up such a centre with retirement of Lt Col. G.C. Agarwal.

On return from deputation, while I was posted in South Eastern Circle at Bhubaneswar, then Chief Engineer, Surveys of SE Railways, who was impressed with our design of alignment from Khordha Road to Bolangir, wanted me to design a third express goods movement corridor between Chakradharpur and Manoharpur. During 1990-95 we, not only designed this alignment, but also for the first time jointly transferred it on ground for actual construction work to start. Our report on this project titled Manoharpur-Sonua 3rd BG railway alignment project of 1995, I was told, was cited as a model to be followed in the Railway board.

Digital Cadasters & LIS:

During 1986-88, while working on deputation to MHA, Govt. of India along Indo-Bangladesh border for survey and design of road and fence alignments we came across difficulties in land acquisition along the border, primarily due to the poor quality and, at times non-existence of cadastral survey records at stretches due to undulating terrain conditions. On return to SOI from deputation, I decided to work in this important area of revenue survey and village map preparation which were withholding/distorting many engineering/industrial project implementations.

Our continued efforts till completion of the project in 1998 successfully demonstrated the use of stereo-photogrammetry and digital technology in modernization of cadastral surveying leading to creation of LIS.

The technology followed by most of the State Revenue departments were the old, and now obsolete method of survey evolved by SOI way back in the mid 19th century.

Fortunately then Director, Land Records & Surveys of Orissa, Late G. Dharmalingam, IAS, proposed for an experimental project to adopt photogrammetry and digital technology for revision of village maps and land records in about 400 villages of Angul district. With his dedication and unwavering support for the next 3 years starting from 1991-92 we took up a centrally funded ANGUL-NALCO project. Our continued efforts till completion of the project in 1998 successfully demonstrated the use of stereo-photogrammetry and digital technology in modernization of cadastral surveying leading to creation of LIS. Sadly neither SOI nor Govt of Orissa took any follow up actions to integrate the developed methodology in their system.

However, the project provided me with unique opportunity to work as a team with scientists of CEERI, Philani to go for production of PC-EK 22 and develop an R&D model of DGMAP software, enable to convert analog photogrammetric machines into stereo digitization platforms and to do all fair mapping for topographic map production in digital environment. But sadly SOI did not adopt DGMAP and continued to use commercially available Microstation software for digitization of line maps. It was really a heart breaking experience for me, who as a task force member had dreamt in the early 1980s, for a totally indigenously designed process for adoption in SOI. As an interim solution for decade ahead, until soft copy photogrammetric systems were made available.

With help of PCEK-22 attached plotters we prepared digital maps of 396 villages for use by Orissa revenue department for settlement operations. We also demonstrated the concept of village level LIS using Angul-NALCO technology that inspired many other organizations to work in the field of modernization of Cadastral Survey and Land Records till date. Besides Andhra Pradesh, many other states have now come forward to use photogrammetry for modernization of cadastral survey and land records in their respective states.

Bid Adieu to SoI:

I took premature retirement from SOI and this magnificent profession due to my domestic constraints in the year 2000. What I learnt and practiced in SOI as a professional cartographer, as stated earlier, was due mainly to the contributions of Survey Training Institute, and the outstanding Senior officers of SOI, the likes of LtGen. G.C. Agarwal, Lt Gen. S. M. Chadha, Brig(Dr)M.G. Arur, Late Brig. P. Rout, Shri. Mastan Singh, Shri. GB Das, to

mention some of them, whose able guidance and encouragement had shaped my professional knowledge as a cartographer. I also drew inspiration from the glorious history of SOI contributed richly by the genius British officers like Col. William Lambton, Col. Colin Mackenzie and Sir George Everest, who had set high standards of dedications and traditions to be followed by us. My contribution to this great profession were also due to many of my dear SOI staff, who worked dedicatedly and with self motivation with me as a team in every project that I worked in as I had no other means award/reward them except thanking them today in public.

A decade of Post Retirement work:

In the decade, post retirement, one of the most rewarding assignments was to be offered the professorship of the Chair set up jointly by DST and SOI in the Institute of Remote Sensing, Anna University in 2005 and from 2008 to 2009. The Chair was set up in memory of Col. Colin Mackenzie, the first Surveyor General of India, who, in 1790s was also the Principal of Survey School of Madras, where Anna University is now located. Here I found an excellent opportunity to share my knowledge and experience with young budding cartographers who are now called Geo Information technologists.

My thanks are due to Shri GS Kumar, Chief Editor of GIS India for bringing up this journal and keeping it alive for the past 20 years against all odds. Often I have used this as a platform for publication of many of my concepts on PC EK 22, DIGIMAP, GIS and LIS, interacting with wide group of researchers and practicing professionals. In these four decades I am amazed how cartography has grown in leaps and bound encompassing all disciplines of spatial digital technology into it, which GIS India has kept tracking meticulously year after year.

Essentials of GPS 2 nd Edition

By NK Agrawal, former Director, Survey of
India

Advisor – Geodesy & GPS

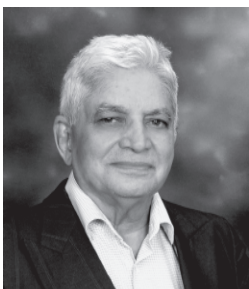
Price: Rs. 260/-

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Report

Map Awareness Programmes (MAP)



GS Kumar,
President, GEMS

GeoMap Society (GEMS) continues to organize MAPs.

Seminar

In October 2019, GEMS in association with Instn. of Engineers, Telangana State Centre, Hyderabad organised National Seminar on Surveying & Mapping. Survey of India provided major support. Report prepared on this by Dr V.Raghva Swamy is published in this issue elsewhere.

GeoMap Quiz Finals

November is GIS Day month. GEMS organized 29th annual **GeoMap Quiz** and held Finals at Durgam Cheruvu Lake Front (Courtesy GHMC). 10% of



Mr. GS Kumar guiding participants in Finals

students from different schools were selected for Finals based on Prelims.



Interaction with students for selection for special prizes

A sample question from Prelims 2019 for seniors is given here with explanations to high light, how Map Awareness/understanding is generated. amongst student participants.

Question based on given map

Nearest Police Station from village Baltola B5 is at

- (a) Jainagar (b) Korara (c) Dharmapur (d) Kholpur

To answer this question, the participants (two) have to identify Baltola village in square B5 on the given map. Then, from the symbol table they should note the symbol of police station. Then find villages with Police Station. Measure or judge the nearest village with PS from Baltola.

About 300 students participated in the finals which included **Satellite Image MapFun** (Recognizing features on the Satellite image Map) which was based on the Durgam Cheruvu, **Map Planning** (based on the DISHA incident),. The students were motivated to think of a GIS / mapping solution when facing an adverse situation - how map based decision-making enabled more informed and scientific choices. These modules were designed by Map experts to improve the map reading/understanding abilities of the participating students.

The winners were as below

Prize	Seniors	Juniors	Sub Juniors
1	Arnav & Aniketh-BVB, Rama Rao Atmakuri HS	Sri Lakshmi & Vasihnavi BVB, Rama Rao Atmakuri HS	Naga Pranav & Sai Shreyansh- Creek- The Planet School
2	Aravind and Anirudh-Sangamitra High School	Sai Vishwanath & Shaik Rayyans-Bhavans Sri Ramakrishna Vidyalaya, Sanikpuri	Sahiti & Mokssh-Hyderabad Public School, Ramanthapur
3	Roopa and Sanjitha-BVB, Jubilee Hills	Tanvi & Swara-Hyderabad Public School- Begumpet	Aditya & Sushant- BVB Rama Rao Atmakuri HS



Sitting Left: V.Raghava Swamy ; Right: Chief Guest Mr. Raghava Reddy of G.Pulla Reddy Sweets

Dr V.Raghava Swamay interacted with students in a very interesting manner, to bring out importance of maps. Prizes were given away by the chief guest, Mr. Raghava Reddy of Pulla Reddy Sweets, Hyderabad. He interacted with students on maps and sweets. He happily promised more sweets in the next Finals. All participants were given participation/appreciation certificates.



In each category, top 10 teams were given prizes. All participants received certificates of Appreciation. Four special prizes were given under “GS Oberoi Inspired Map Awareness Programmes (MAPs)” to 4 participating students selected based on open questioning on maps. Maj Dr. G.Shiva Kiran, Convenor coordinated the entire programme.

Our members continue to get invitations from professional organization to give lectures/presentations on maps and map-related subjects.

Mr. GS Kumar

Geological Survey of India; ESCI; Walamtari

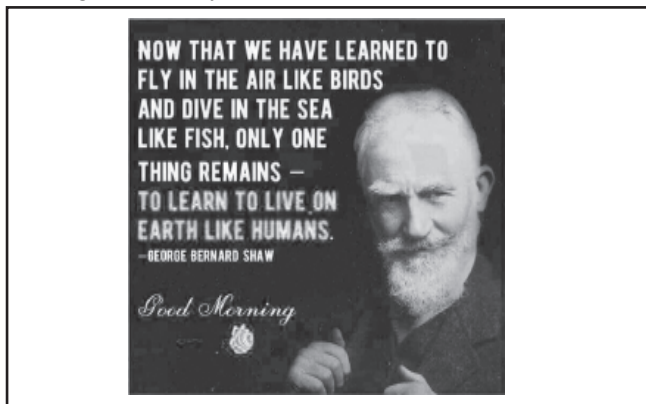
DrV.Raghava Swamy

Maj Dr. Shiva Kiran

ESCI

Mr. NK Agrawal

Geological Survey of india



Integrated Coastal Zone Management Project (ICZM)

A World Bank aided project being implemented in the Gulf of Kachchh

<https://gec.gujarat.gov.in/showpage.aspx?contentid=154&lang=English>

GEC was actively involved in the development and design of the Integrated Coastal Zone Management Project (ICZMP) with Forest & Environment Department, MoEF and World Bank. The ICZMP is a World Bank-funded project with a budget of Rs. 300 Crores.

It has been appointed as the State Project Management Unit (SPMU) of the ICZMP. Under the ICZMP, GEC is working with several Project Executing Agencies (PEAs) into achieve the specific of the project. These objectives form specific components of the ICZMP.

GEC is working with the following PEAs are given the responsibility of implementing activities to attain the project's objectives :

- For the development of mangrove ecosystem, the transplantation of coral reef and development of eco-tourism, it is working with Marine National Park (MNP) & Sanctuary, Jamnagar.
- It is also working with Kutch Forest Circle for mangrove regeneration and conservation. Sea turtle conservation is another important activity undertaken in the project. Other activities include the development of a Marine Interpretation Centre, Canopy Walk etc., in Jamnagar and Kachch, to promote eco-tourism.
- Bhaskaracharya Institute of Space Application & Geo Informatics (BISAG) is working with GEC under the project to use GIS and RS for continual monitoring for coastal parameters and resources.
- Gujarat Pollution Control Board (GPCB) and GEER Foundation are also working with GEC under the project to develop capacity of the State for quality monitoring of sea water and management of marine and coastal resources.
- Jamnagar Municipal Corporation (JMC) is another Project Executing Agency and implementing sewerage network and Sewage Treatment Plant under the project.
- It is also working with Tourism Corporation of Gujarat Limited to develop a fifth generation oceanarium and with Gujarat Maritime Board for developing a DPR of Oil Spill Response Centre and Environmental Management Plans for the ports. For more than 160 villages along the coast of Gulf of Kutch, GEC is implementing socio-economic development component of the ICZMP.

For further details visit <http://www.geciczmp.com>

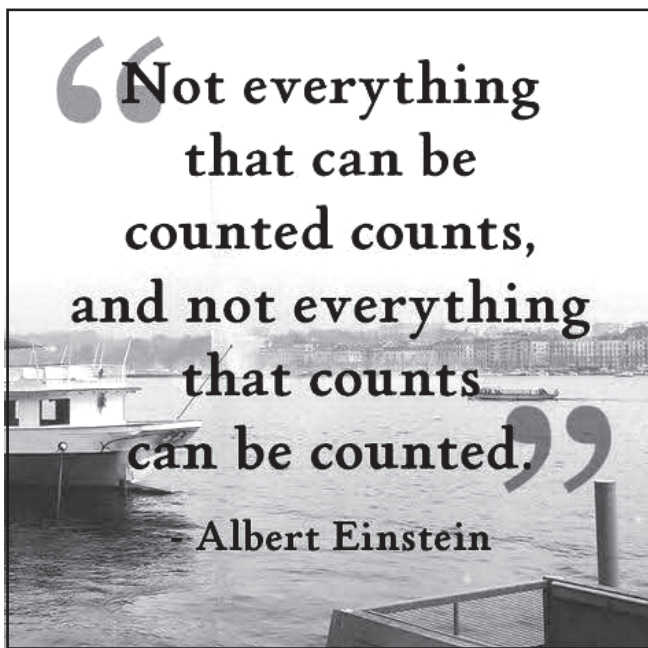
Memorandum of Agreement (MoA) between the Survey of India, Department of Science & Technology, Government of India and.....Government of.....for supplying Topographic Data base (TDB) data to Central/State Government Ministries/Organizations/Agencies without cost as per Pricing policy under National Map Policy-2005

1. This MoA is made between the Survey of India, Department of Science & Technology, Government of India, hence forth called Sol and the....., Department of....., Government of....., henceforth called Indenting Agency (IA) for supply of Topographic Data base (TDB) data to Central/State Government Ministries/Organizations/Agencies with only data handling charges as applicable from time to time as per Pricing policy under National Map Policy (NMP)-2005.
 2. The IA agrees to receive TDB data as per the terms of this MOA. The IA declares its commitment to the objectives of the MOA.
 3. The tenure of the MOA is for the period IA is bound by the license terms for the data supplied by Sol.
 4. NMP mandates Sol to prepare, maintain and update NTDB for the country. Further National Data Sharing and Accessibility Policy (NDSAP), 2012 mandates all Government agencies to facilitate the data access of types described in the NDSAP policy of data generated out of public funds. Such Non-sensitive sharable data sets are to be made available with the access to all users. Licensing guidelines issued under NMP-2005, Map Restriction & Data dissemination policies of MoD/MEA of Government of India. Pricing policy guidelines under NMP-2005 issued by Sol/DST governs the data accessibility, pricing, licensing and data management with entries in Map Transaction Registry (MTR) for each and every data transaction.
 5. The IAs need to follow the NMP guidelines and license agreement terms for use of the data supplied as part of this MOA. The IAs will be responsible for strict compliance of all guidelines for handling, safety and security of data supplied under this MOA.
 6. Any value addition or Updation of any kind on supplied data by the IA will be shared with Sol alongwith relevant records/documents (as applicable) on regular basis in a time bound manner for incorporation in NTDB subject to qualifying the requisite quality and validation checks by Sol.
- However the obligation for taking security clearance from the Ministry of Defence for updated/value added data, if applicable, rests with concerned IA. Concerned IA will only be responsible for any violation of any kind in this regard; Sol will not bear any responsibility of any kind.
7. Sol will take security clearance from the Ministry of Defence for TDB data of all kinds. However responsibilities or obligations, if any, associated with such security classification assigned by Ministry of Defence for the data will be completed by IA while handling such data.
 8. The supplied data will be issued under appropriate license by the SOI and this data will be not be shared with any other agency for any purpose.
 9. The Digital data will be used in any Web application (s) by the IA with following obligations:
 - a. No web service based on Sol TDB data will be provided by the IA, for internal or external uses, Web services provided from Sol Geoportal only have to be used for applications requiring TDB data as service.
 - b. Web application (s) should share the services based on value added data by IA only.
 - c. Web application (s) should be hosted in safe and secure manner strictly as per Govt, of India guidelines for hosting such web applications.
 - d. No direct/indirect digital data dissemination functionality should be provided to share the Sol data with other agencies in such web application.
 - e. Permission to use this digital data will be applicable for the intended purpose only i.e. for web application (s) of the particular project for which data supply has been approved by the authorities.
 10. In case TDB data supplied to an IA under this MoA with handling charges is found to be shared with any private/commercial/other organization, full cost of the digital data is required to be paid by the IA.
 11. No changes in the above mentioned conditions of the MoA will be made to relax any agreed terms and conditions.

EVENTS

GeoBuiz Summit 2020	13–14 Jan 2020	California, U S	geobuiz.com/summit-2020/
InfraTech 2020	14-16 Jan 2020	Germany	https://www.infratech.de
International Conference on Computer Science and IT	25~ 26, January 2020	Zurich, Switzerland	https://cosit2020.org/
Utility GIS Applications	18-19 February 2020	Atlanta, USA	www.utility-gis.com/
RS and Geoinformation on Environment	16 - 18, March 2020	Mesa Cyprus	www.cyprusremotesensing.com/rscy2020/
Mountain Cartography Workshop	April 14 - 18, 2020	CO USA	www.shadedrelief.com
FIG Working Week 2020 - “Smart surveyors for land and water management	10-14 May 2020	Amsterdam	http://www.fig.net/fig2020/
FME International User Conference	16-19 June 2020	Vancouver, Canada	https://fmeuc.com/
FOSS4G	24-29, August 2020	Calgary Canada	http://2020.foss4g.org/

Information about events has been compiled from different sources. Readers are advised to check correctness from the organisers



Late 1700s, in a German elementary school, as a punishment for misbehaving with the teacher, he was asked to sum 1 to 100. The teacher was astonished when a kid solved this within seconds as:

$$S = 1 + 2 + \dots + 100$$

$$S = 100 + 99 + \dots + 1$$

$$2S = 101 + 101 + \dots + 101 \text{ (100 times)}$$

$$= 101 \times 100$$

$$\Rightarrow S = 101 \times 100 / 2 = 5050$$

The student was the famous mathematician and physical scientist Carl Friedrich Gauss.

Beauty of
Brain



Chief guest releasing seminar publication
(Details on page...17)

Mr Alexey(Racurs, Russia) receiving memento from Mr. Jayesh Ranjan, IAS, chief guest
(Details on page ...16)



Chief guest giving away prizes of Quiz
(Details on page..17)



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HONOURS & AWARDS

Geospatial World Excellence Award 2018

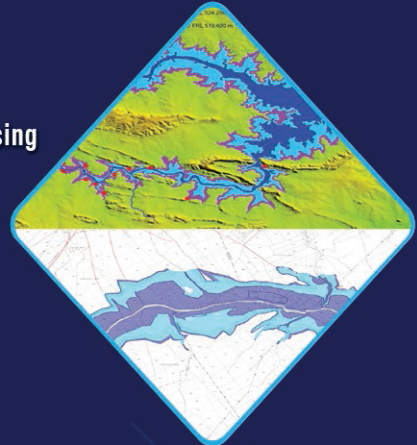
Best Professionally Managed Company 2014

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