

Maps Today



(Formerly GIS India since 1992) *On Line Journal sponsored by GeoMap Society (GEMS)*

Volume 2 Issue 3

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Editorial

GIS has become a popular technology for spatial data capture, processing and analysis. Internet is full of applications in a variety of fields. We will try to give brief information about GIS and readers can visit related website for details.

A news item of malpractices in Departmental exam in Survey of India held in 2002 is reported after 18 years. British legacies continue to adversely affect governance. Delay of 18 years for filing case by CBI and continuance of Army Officers in Survey of India are two examples of British legacies which need amendments for better governance, essential for development. Technologies are rapidly changing. Mapping and GIS too. GEMS facilitated use of digital maps and GIS in managing Agriculture planning in Telangana. Read about this in this issue. In many other States too, Maps/GIS are being used for a variety of applications. This is an encouraging trend. Members/Readers are requested to send information about applications helping society. GIS helps epidemiologists to map disease occurrence against multiple parameters including demographics, the environment, geographies and past occurrences to understand the origin of outbreaks. In this issue we have included an article " How enterprises are using GIS to track Covid-19 impact" More article are on the websites.

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Frequently asked questions

(Answers are given in simple and easy-to-understand style. Refer to standard books or websites for definitions/explanations)

1. Question: What is Remote Sensing (RS) in the current scenario ?

Answer: As the term implies, it is the technology of capturing information without coming into physical contact with the object.

RS is currently active from four platforms:

1. Ground (terrestrial)
2. Low air (like Drone)
3. Air
4. Space

RS is active with two sensors

1. Camera
2. Scanner (LiDAR example)

3. Question: Which combinations are in use for reliable spatial data acquisition?

Camera and Scanner are in use from all platforms

Space imagery acquired from satellites has the lowest accuracy in position and height. Resolution is in the order of 50 cm

Aerial imagery can yield accuracy of 20 cm in position and height. Resolution is still better

Drone and terrestrial imagery can provide 5 cm accuracy in position and height

4. Question: Applications ?

Satellite RS is the most up to date. But resolution being low as compared to others, this is used to update maps derived from other combinations

Drones or Unmanned Aerial Vehicles (UAV) can be used for small or medium sized areas. Camera and or scanner can be fitted. Imagery has high accuracy and resolution. Results can be processed quickly and at low costs.

Aerial photography (digital camera) and scanners are popular for large to medium scale mapping

Terrestrial photography (digital camera) and scanner are common and is useful for small areas like heritage sites, parts of a city or estate, huge buildings, etc.

Mobile imagery is also gradually coming into use.

5. Is the data 3D ?

Most data is 3D. With date and time recorded, it is actually 4D (if time is considered).

Stereo imagery generates 3D data.

6. What are the main components of data processing

Ground Control Points (GCPs) are needed to provide accuracy and consistency to the 3D spatial data captured. Accuracy of GCPs is directly related to the accuracy of spatial data base or mapping.

7. What is the approx cost of preparing GIS data base for a project which satisfies specifications of 1:1000 scale and one metre contour survey.

This is a tricky question. Yet the cost range can be estimated as Indian Rs 20,000 to Rs one lakh per sq km. Taking average cost of Rs 50,000 per sq km, cost per hectare is Rs 500 and cost per acre is Rs 200. Note that cost per acre of land even in out-skirts of a city is around Rs 15 lakhs. This shows that cost of GIS mapping is insignificant when compared to cost of land and the benefits of use of GIS.

GIS for Covid 19

How enterprises are using GIS to track Covid-19 impact

<https://cio.economictimes.indiatimes.com/news/strategy-and-management/how-enterprises-are-using-gis-to-track-covid-19-impact/74821102>

GIS technology has been utilized by varied set of industry verticals for decades. But can the same technology help enterprises assess the impact of Coronavirus? In a conversation with ETCIO, Esri President Agendra Kumar talks about how the company is helping enterprises in these tough times with decision support by offering them free access to their latest tool ArcGIS Hub



Edited excerpts:

How GIS technology can help in tracking the spread of COVID?

Geographic understanding is essential in detecting, understanding and responding to any infectious disease outbreak specifically in pandemics such as **coronavirus** disease 2019 (COVID-19). GIS helps epidemiologists to map disease occurrence against multiple parameters including demographics, the environment, geographies and past occurrences to understand the origin of outbreaks, its spread pattern and its intensity to implement control, preventive, and surveillance measures. Public health agencies, policy makers and administrators need GIS to understand outbreak patterns in real-time to identify at-risk populations and plan targeted intervention such as evaluate available facilities or increase healthcare capacities. In addition, there is a need for effective communication among other supporting agencies and citizens to ensure a coordinated response.

With location as a common denominator, **Geographic Information System (GIS)** technology provides the capability to enable this common operating picture for multi-agency collaboration. Using GIS capabilities such as spatial analytics,

mapping, and location intelligence, health officials and government agencies can map confirmed and active cases, fatalities, and recoveries to identify where COVID-19 infections have occurred.

Time-enabled maps can reveal how infections spread over time and where you may want to target interventions. COVID-19 disproportionately impacts certain demographics such as the elderly and those with underlying health conditions. Mapping social vulnerability, age, and other factors help you monitor at-risk groups and regions you serve.

Map facilities, employees or citizens, medical resources, equipment, goods, and services to understand and respond to current and potential impacts of COVID-19.

Use interactive Web maps, dashboard apps, and StoryMaps to help rapidly communicate your situation.

What is the authenticity of the data which is provided on Esri platform?

In context of COVID-19, agencies are integrating data from multiple sources for operational intelligence. Real-time data APIs from expert organisations and government bodies such as World Health Organisation (WHO) and Centres for Disease Control & Prevention (CDC) are being integrated for a global perspective of the pandemic.

In India, National Centre for Disease Control (NCDC), an institute established to function as a national centre of excellence for control of communicable diseases by Ministry of Health and Family Welfare is providing the authoritative data via APIs. NCDC is internally collating the latest data from various state health departments into their central MIS system as per the defined data model for tracking and managing the pandemic.

Both these data are being combined by agencies with their relevant area of interest data such as hospitals, location of cases being reported, affected areas, capacities and demographic data to derive strategies as per their focus administrative boundaries.

How are you updating these datasets?

The reported cases and their location datasets are being collated by NCDC in their MIS system from various state health departments as per the defined data model for tracking and managing the pandemic. Agencies are combining this with their own authoritative data for decision making.

How has GIS worked in previous such outbreak of diseases

GIS based maps and analysis has been used effectively by epidemiologists and various supporting agencies like WHO, UNICEF, CDC and more in understanding the outbreak controlling the spread of Ebola and Zika through informed decision making. In India, institutes like National Institute of Malaria Research (NIMR) have been using GIS for tracking vector borne disease outbreaks such as Malaria and Dengue. In Polio eradication, GIS based apps were used to survey, map and analyse the reach of vaccination in the vulnerable population areas. This helped identify gaps - unvaccinated children, reasons for not vaccinating, hard-to-reach or unsecure areas including mapping primary healthcare centers, districts, and provinces responsible for children who did not receive the vaccination.

Which all verticals can leverage it? How and why?

GIS as a technology is already being used extensively across various industries across government, utilities, natural resource management, environment management, urban planning, public safety, emergency management, telecommunications, banking, insurance, retail, real estate and much more. GIS is the core technology for major mission mode programs in the country such as Smart Cities, Bharatmala, Sagarmala, Clean Ganga Mission and City Gas Distribution.

For example, GIS is being used for monitoring environmental change, a great challenge to our world today. Sea levels are rising, habitats are changing, and all these things are being mapped and analyzed using GIS. Organisations are using GIS to manage utilities such as telecommunication and power. It is being used to discover energy potential of various energy technologies, especially renewables such as geothermal, solar and wind. It is also being used for conservation and

land use planning, roads and re-development planning and managing land cadastre. It is also being used to design future cities, multi-modal transportation systems and manage them, which not only means just managing roads, railways and air traffic, but also understanding the interaction between these different modes of transportation. Insurance companies are using GIS for crop insurance, risk management and the understand their customer demographics better for new product launches. Manufacturing organizations are using GIS to manage their supply chains and understand the risk of various factors to their businesses.

LIFE DURING LOCK-DOWN IN INDIA

An attempt has been made by *GIS Labs*, Hyderabad, to understand what people had to say about the life during lock-down imposed by Indian Government due to COVID-19 pandemic.

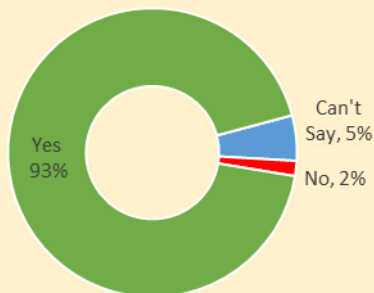
The online opinion poll was done using web-forms with facility to capture location information. The online questionnaire was shared via whatsapp and email.

A total of 253 samples were received in 24 hrs from various states of India. The data has been analyzed and presented in the following figures.

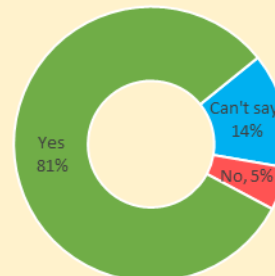
About 93% of the surveyed people felt that lock-down was essential to contain COVID-19 pandemic. Over 81% people felt that lock-down was implemented effectively.

People of India were willing to take on lock-down further to May 3rd. Private employees and students were the most affected due to mental stress. Lack of transport, closure of educational institutions, mental stress and loss of employment

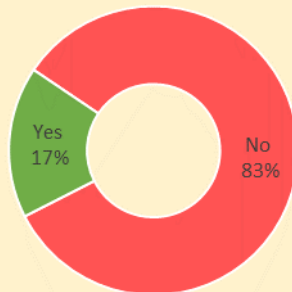
1. Was lock-down required?



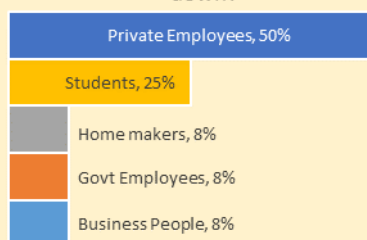
2. Was lock-down implemented effectively?



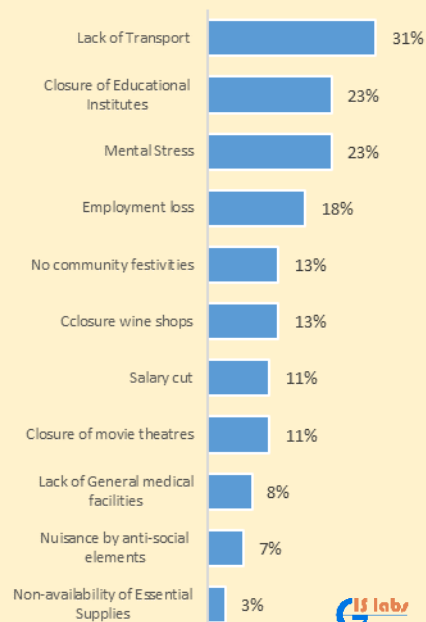
3. Do you welcome lock-down extension beyond 3rd May?



4. Most affected by stress during lock-down?



5. Difficulties faced during the lock-down



GIS to drive intelligent farming in Telangana

<https://telanganatoday.com/gis-to-drive-intelligent-farming-in-telangana>

It will be used to study crop patterns and help in effective implementation of regulated farming across the State

[TelanganaToday](#) 21st May 2020



The Telangana State government has been in the forefront in the use of advanced technologies in governance, but for the first time, perhaps in the entire country, the government has taken to extensive GIS mapping in the field of agriculture, more specifically, to study the crop pattern across the State that would ultimately lay the foundation on which it would build up its ambitious regulated farming programme.

The thematic maps covering the entire gamut of crops including paddy, maize, fruits, vegetables and spices would give a spatial perspective to the government based on which it can decide the crop pattern including proposed areas of cultivation and extent of cultivation for each crop that would best suit the farming community in the State, and make agriculture a profitable venture, Major Shiva Kiran, a consultant associated with the GIS mapping, told Telangana Today.

“Typically, the cultivation area when mapped, throws up a pattern, of what is grown where and to what extent. This exercise presents a comprehensive decision support system to engage domain experts to generate a sustainable agriculture plan for Telangana State,” he said.

Integrated Report (Top Three Districts)

Vanakalam

Paddy	Maize	Cotton	Soya Bean	Red Gram	Other Crops
Nizamabad	Siddipet	Nalgonda	Nirmal	Narayanpet	Sangareddy
Nalgonda	Rangareddy	Adilabad	Adilabad	Vikarabad	Mahbubnagar
Suryapet	Nagarkurnool	Nagarkurnool	Kamareddy	Adilabad	Vikarabad



Fruits

Mango	Orange	Bhattai	Guava	Pomegranate
Khammam	Nalgonda	Nalgonda	Rangareddy	Nalgonda
Jagtial	Jogulamba	Suryapet	Sangareddy	Mahbubnagar
Rangareddy	Narayanpet	Yadadri	Khammam	Rangareddy



Vegetables

Tomato	Brinjal	Bhendi	Green Chilli	Gourds
Rangareddy	Rangareddy	Rangareddy	Siddipet	Rangareddy
Siddipet	Vikarabad	Siddipet	Rangareddy	Siddipet
Vikarabad	Siddipet	Suryapet	Vikarabad	Nalgonda



Spices

Turmeric	Red Chilli	Ginger	Oil Palm
Nizamabad	Khammam	Sangareddy	Bhadradi
Jagtial	Mahbubabad	Vikarabad	Khammam
Nirmal	Jaishankar Bhupalpally	Jangoan	Nalgonda



The regulated farming proposed to be introduced from the coming Vaanakalam season by Chief Minister K Chandrashekar Rao will take into account various parameters including the critical market demand for crops, availability of water, manpower and other resources, proximity to markets in neighbouring States and the potential for export.

The GIS provides crucial inputs for decision-making on concentration of certain crops in some districts, while others are completely devoid of them. Due to excess cultivation of certain crops in a district, it was found that the available resources such as water were being consumed excessively. "Farmers too were not getting remunerative prices due to excess cultivation of specific crop in a district, even though there was demand for these crops in other districts," a senior official told Telangana Today.

For instance, paddy cultivation that was largely concentrated in the districts of Nalgonda, Suryapet and Nizamabad, accounted for about for 24.5 per cent of total sown area of about 41 lakh acres. Districts such as Vikarabad, Sangareddy, Rangareddy, Mahabubnagar and Medchal-Malkajgiri that are in close proximity to the State capital and Adilabad, were hardly growing paddy. Similarly, Kamareddy, Jayashankar Bhupalpally and Adilabad were largely focusing on coarse paddy varieties, while fine paddy varieties were popular in the districts of Jogulamba Gadwal (about 98 per cent), Nagarkurnool and Suryapet.

Similarly, cotton cultivation was taken up mostly in the districts of Nalgonda, Adilabad and Nagarkurnool, accounting for 27.07 per cent of the total sown area of about 54.45 lakh acres. Siddipet, Rangareddy and Nagarkurnool districts are hotbeds for maize cultivation in the State.

On the other hand, urban and semi-urban areas largely focused on horticulture crops with neighbouring districts of Hyderabad dominating the market. Nalgonda tops in cultivation of Orange, Mosambi (Batthai), and Pomegrante in fruit cultivation even as Khammam and Rangareddy are placed in top position in cultivation of Mangoes and Guava respectively in the State. Rangareddy and Siddipet districts are the largest producers of vegetables especially Tomato, Brinjal, Ladies Finger, Green Chilli and Gourds.

The districts of Nizamabad, Khammam, Sangareddy and Bhadradi Kothagudem are the largest producers of turmeric, red chilli, ginger and oil palm among others.

Farming set for a big leap in Telangana

<https://telanganatoday.com/farming-set-for-a-big-leap-in-telangana>

KCR to unveil policy on regulated farming with focus on remunerative prices to ryots and also cater to the needs of the nation

By Author [TelanganaToday](#) | Published: 20th May 2020



Regulated farming will focus on changes in crop cultivation so that the paddy harvesting for Yasangi concludes by March-end and ensures that paddy does not get damaged due to unseasonal rains.

Rather than cultivating crops to cater to the needs of people in the State, the Telangana government will focus on encouraging crops that will cater to the needs of the nation and

also earn remunerative prices for farmers as part of its efforts to regulate cropping patterns in the State.

The high-level meeting to be chaired by Chief Minister K Chandrashekhar Rao at Pragathi Bhavan on Thursday will come up with a clear-cut policy on regulated cropping patterns.

During the two-day extensive meeting held by Agriculture Minister S Nirajan Reddy on Tuesday and Wednesday, deliberations were held to prepare a cropping map of districts which will be submitted to the Chief Minister during the meeting on Thursday to decide the way forward.

- GIS to drive intelligent farming in Telangana

The meeting chaired by Niranjana Reddy also discussed the recommendations to be made to the Chief Minister for effective implementation of regulated farming and make agriculture profitable.

Speaking to mediapersons after the meeting, the Minister said the State government was giving highest priority to agriculture as about 42 per cent of the GSDP was dependent on agriculture and its allied industries. He said farmers in the State made it self-reliant in terms of demand and supply of various crops including agricultural and horticultural crops catering to the local demand.

“We should cater to the greater demand in the market by cultivating diversified crops in the State. The Rythu Bandhu Samithis along with the field officers of Agriculture Department, will play a vital role in deciding the crops and extent of area to be cultivated in a role,” the Minister said. He pointed out that about 60 per cent of the population in the country was dependant on agriculture for livelihood, but economists give least priority to investments in agriculture sector. While an economic study indicated that about 52 per cent farmers were in debts, he said the Chief Minister was making all efforts to bring revolutionary reforms and ensure that farmers get rid of debts to become self-reliant.

The regulated farming will also focus on changes in crop cultivation such that the paddy harvesting for Yasangi season concludes by March end and ensure that paddy does not get damaged due to unseasonal rains during summer. Niranjana Reddy said the State government took up irrigation projects extensively to ensure water for agriculture throughout the year which will enable farmers to implement new crop cultivation pattern without depending on rains alone.

The Minister also informed that Chief Minister Chandrashekhar Rao will soon announce a policy on food processing units to attract huge investments into the sector and establish

Food Processing Special Economic Zones (SEZs). He opined that the State will be the torchbearer in bringing a new revolution in the country through regulated farming in the State.

Rythu Bandhu Samithi State chairperson Palla Rajeshwar Reddy, Principal Secretary for Agriculture G Janaardhan Reddy, Prof Jayashankar Telangana State Agriculture University vice-chancellor Praveen Rao, Telangana State Seed Development Corporation chairman Kondabala Koteswara Rao, the chairpersons of district Rythu Bandhu Samithis, district agriculture officers and agriculture scientists, participated in the two-day preparatory meeting held in Hyderabad.

Scope for Indian pvt. Industry in Space sector

Source: India's decision to allow private participation in space sector gets a thumbs up

<https://www.geospatialworld.net/blogs/indias-decision-to-allow-private-participation-in-space-sector-gets-a-thumbs-up/>

Extracts

"The intention behind the announcement is good. However, what we will have to wait and see is the implementation. If implemented properly, it will boost employment generation and enhance overall efficiency and decision-making," said **Professor Arup Dasgupta, former Deputy Director of Satellite Communication and IT Application at ISRO.**

Professor Dasgupta added that while ISRO must continue to lead the R&D, private players should be handed over the operational roles. "At this point in time, this will be the best model." With the space sector playing a significant role in strengthening the mankind's response to COVID-19 global pandemic, the Indian government's decision will also contribute in the overall capacity building and resilience.

"The announcements made by the Finance Minister on 16th May 2020 are very positive for the Indian geospatial community. The government plans to allow private firms to use ISRO facilities for testing and launch of satellites. It is a big encouragement for our budding space technology startups. The initiative will reduce the cost of projects and launch time for the Indian private players. Overall, the space technology sector will become more competitive at the global level," said **Agendra Kumar, President, Esri India.**

Obituary - LM Khanna

Dear friends,

I am very sorry to see the News about the sad demise of Shri L. M. Khanna.

I had known him since 1957 when I was posted at Mt. Abu as O.C. No. 3 Party. We had worked together at various places for years. A very good and competent officer who was loved by all who knew him.

May his soul rest in Peace!!!

My heart-felt condolences to all members of the bereaved family.

GS Oberoi, Noida(UP).



It is a very sad news.

A very much loving officer whom I had the chance of meeting him when I was in Dehradun during 1987 to 1993.

I pray the almighty to rest the departed soul in peace.

G Namasivayam

2002 case booked by CBI in 2020

<https://www.telegraphindia.com/india/2-former-major-generals-booked-for-corruption-in-survey-of-india-departmental-exams-in-2002/cid/1774264>

2 former Major Generals booked for corruption in Survey of India departmental exams in 2002

Those who had passed were made to fail and vice versa, resulting in wrong selection of 44 candidates



(Representational image) Malpractices were alleged in compilation of marks in the answer sheets of the Limited Departmental Competitive Examination for Group D to C Topo Trades held during October 2002 in the Survey of India.

The CBI has booked two former Major Generals for alleged corruption in conducting Group C and D examinations in the Survey of India in 2002, resulting in wrong selection of 44 candidates as those who had succeeded were made to fail, officials said.

The FIR has been registered against the then Brigadier M V Bhat, Director, Survey Training Institute (STI), and the then Brigadier K R M K Babaji Rao, Deputy Surveyor General, STI. Both of them retired as Major Generals, they said.

Other names include J K Rath and R Rama Singh, the then officials of STI.

The agency has registered the FIR after a two-year-long preliminary inquiry based on a complaint from a vigilance officer in the Ministry of Science and Technology who alleged malpractices in compilation of marks in the answer sheets of the Limited Departmental Competitive Examination for Group D to C Topo Trades held during October 2002 in the Survey of India.

It was alleged that candidates who had passed were made to fail and vice versa, resulting in wrong selection of 44 candidates.

The agency had alleged that answer sheets were deliberately manipulated by accused officers to favour selected candidates, they said.

Comments

(GS Kumar, Editor, Maps Today)

1. It has taken 18 years for the CBI to book a case of malpractices in departmental examination held in 2002
2. The case will go to courts/supreme court – filing petitions and appeals. By the time final judgment is delivered many will retire or expire. What is the fate of those wrongly selected for group C posts 18 years back
3. The news item is captioned “ **2 former Major Generals booked for corruption in Survey of India departmental exams in 2002**”. The point here is “ What are Major Generals doing in STI, Survey of India ?” Such senior and highly paid Army officers are conducting departmental examination for Group D to C !
4. How long they served Army that they earned such senior ranks as Major General. Army officers in SoI is a British legacy created to serve the interests of British Rulers. There is no need to continue this and other similar provisions of British origin.
5. Another damaging British legacy is with regard to judiciary. Violation of rules is common in India, mainly because it takes years/decades to get justice. Rules need to be changed that a petition should be finally settled within a year. Judges whose judgments are reversed in higher courts to be penalized. If cases are quickly settled, violations will reduce

Universal Transverse Mercator UTM

This brief article is an attempt to demystify the topic. Please visit websites for more detail.

Earth is an irregular surface approximating a sphere/ellipsoid. First, the points of the earth's surface are projected / transformed on to a spherical or ellipsoidal surface (globe), called a datum. A map projection is a systematic transformation of the latitudes and longitudes of locations from the surface of a sphere or an ellipsoid (datum) into locations on a plane surface. .

Let us place the spherical surface (part Globe) in a cylinder or a cone or against a plane. Project points to generate spherical or conical or planar projections.

A datum change can result in changes in coordinates and differences of distances in hundreds of metres.

According to National Map Policy of India, Open Series Maps (OSMs) in the country. are with UTM Projection on WGS-84 datum. .

The Universal Transverse Mercator (UTM) is not a single map projection. It divides the Earth into sixty zones, each being a six-degree band of longitude, zone numbering increases eastward to zone 60, which covers longitude 174°E to 180°E.

Each tile-zone of 4° Latitude X 6° Longitude represents alphabet (row) and number for column. Each row is numbered alphabetically with row alphabets increasing towards North.

For example;

The row covered by Latitudes 20° and 24° North is "F"

The row covered by Latitudes 24° and 28° North is "G"

The row covered by Latitudes 28° and 32° North is "H"

Column covering Longitudes 66° and 72° represents 42 ; 72° and 78° is 43 , 78° and 84° is 44

Thus Lat-Long limits of **Sheet No. G 43** are

Latitudes 24° and 28° North (4 degrees) Longitudes 72° and 78° East (6 degrees)

G 43 is divided into 4 X 6 = 24 one degree sheets (tiles) with alphabets A to X.

Lat-Long limits of **Sheet No. G 43 S** (degree sheet) are

Latitudes 24° and 25° North Longitudes 72° and 73° East

Scale : 1: 250,000 (one cm = 2.5 km)

This matches with Sol sheets.

The degree sheet is divided into $4 \times 4 = 16$ sheets numbered from 1 to 16.

Lat-Long limits of **Sheet No. G 43 S 04** ($15' \times 15'$) are:

Latitudes $24^{\circ} 00'$ and $24^{\circ} 15'$ North; Longitudes $72^{\circ} 00'$ and $72^{\circ} 15'$ East

Scale : 1: 50,000 (one cm = 500 metres). This too matches with Sol sheets

Unmanned Aerial Vehicles (UAVs)- Some legal concerns

September , 2020

During the fifth annual [Commercial UAV News Expo Americas](#) last October, high-level players operating within the commercial UAV space met in a series of closed-door [roundtable discussions](#). During every session, the topic that kept coming up was whether or not Congress would pass additional legislation banning the use of drones and hardware from non-cooperative countries like China, and how this could impact their business.

Since then, a [draft executive order](#) and new legislation has been proposed to limit American access even further. Whether or not these measures will actually be put into law is something the entire industry is watching very closely. What Congress decides will impact almost every part of the ecosystem from drone manufacturing to data collection.

In an effort to keep you informed, Commercial UAV News has been covering, and will continue to cover, news related to this issue and what this means for the industry. Here are a few articles we've posted within the last year to help recap what has happened so far and some ways the industry is trying to address it.

- [Are government entities using drones to steal data and spy on you?](#)
- [UAS industry roundtable reports: key issues and takeaways from closed-door roundtable discussions at Commercial UAV Expo Americas 2019](#)
- [DJI drones grounded by the U.S. Department of the Interior](#)
- [DOI "takes a pause" with their drone fleet](#)
- [Red Cat offers blockchain solutions to protect drone data regardless of the manufacturer's origin](#)
- [TerraView's new drone is designed, engineered, manufactured, and supported in the USA](#)
- [Video: Lorenz Meier, CEO and Co-Founder, discusses the launch of Auterion's Skynode and its capabilities](#)

Stay tuned to [Commercial UAV News](#) for more updates on regulations and legislation and how the industry is dealing with it. September 15-17, 2020

