Vol. 11, Issue 1

Arc India News

COVER STORY:

THE SCIENCE OF WHERE

LOCATION IS ALL PERVASIVE

Your
Smart City journey
starts with ArcGIS® Platform

esri India

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esriindia.com/smartcity

Agendra Kumar
President, Esri India

Geographic information system (GIS) technology helps in unlocking the full potential of data to improve operational and business results. We call this "The Science of Where". With 'location' being the center of almost every technological development taking place today, the need for seeing GIS as 'The Science of Where' has become a necessity.

The role of 'The Science of Where' in the Indian context is already established. GIS technology is a key component of many government initiatives including the most talked about Smart City programme where the country will have 100 smart cities coming up in the next few years. GIS is helping in driving social schemes like 'Direct Benefit Transfer' and 'Slum Rehabilitation', and helping the governments in improving citizen services and engagement.

India is home to the third largest number of technology driven startups in the world; many of them have 'Location' as the basis of their business ideas. Esri India currently supports over 50 startups in integrating ArcGIS into their development. Setting an example of Public-Private-Partnership, Esri India and the Department of Science and Technology have recently launched GeoInnovation Challenge under the 'Make in India' movement. This platform provides startups with an industry recognition and an opportunity to show case their products to potential customers in India and across the globe.

Web GIS implementations are gaining popularity in India. Web GIS connects people, organisations and communities through web maps and apps, and enables working with all types of data – imagery, tabular, vector, LiDAR, real time, 3D, Big Data etc. Apart from being a strong WebGIS platform for data management, mapping and geo processing, ArcGIS Enterprise also offers real time data integration and processing, through GeoEvent Server, image management and raster analytics through Image Server, and Big Data analytics through GeoAnalytics Server. Its modular architecture enables independent scalability of each of these functions, which means most optimised investments.

With 'The Science of Where', we are excited to come up with a common visual language that has the potential to enable organisations make more informed decisions. We are glad to provide the next generation of GIS for our users.

Agendra Kumar

Esri and Autodesk collaborate to advance infrastructure planning and design

Esri and Autodesk have announced the start of a new relationship to build a bridge between GIS mapping and BIM technologies. "It is important to consider the needs of future generations during the design and building of projects today," said Jack Dangermond, President, Esri. "The benefits of partnering with Autodesk will include securing sustainable resources for the growing population, a responsible human footprint on our natural environment, better use of our planet's resources and more resilient cities."

For infrastructure owners around the world, both public and private, enabling BIM and GIS mapping software to more seamlessly work together will optimise their ability to plan, design, build and operate infrastructure assets saving precious time and money. Improving the integration of Esri and Autodesk software has the potential to dramatically decrease workflow times.

"Partnering with Esri is intended to combine the power of BIM and GIS mapping which will enable our shared customers to build anything, anywhere," said Andrew Anagnost, CEO, Autodesk. "Our goals are to provide industry and city planners the ability to design in the context of the real world. This will allow communities to build more connected, resilient cities, and infrastructure with a focused eye on sustainability."

ArcGIS Pro 2.1 is almost here

Esri is all set to release the next version of its flagship 64-bit desktop GIS application, ArcGIS Pro 2.1. It continues Esri's mission to provide new and user-requested functionality, the latest innovations for working with 2D and 3D spatial data, tools for performing advanced analytics and enhanced support across the ArcGIS platform.
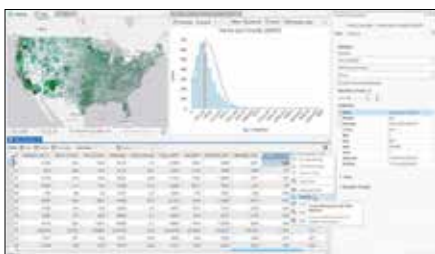
Enhance Your Work in 3D

ArcGIS Pro 2.1 brings you many new features to enhance how you work with and analyse 3D data.

- Using the new 3D editing grid, you can precisely edit, snap, and work with your data.

- There are now three modes of interactive 3D exploratory analysis for quick visibility analysis using Line of Sight, Viewshed, and View Dome tools.

- The new stereoscopic mode and isometric views give you new ways of looking at your 3D data.

Generate Table Statistics for Your Attributes

When exploring an attribute table, you can get Statistics describing the values in numeric attribute fields. Statistics include the sum, mean, median, minimum, maximum, and standard deviation of those values. A histogram is also created showing the distribution of the field's values.

Do More with New Extensions

With the ArcGIS Pro 2.1 release, comes some new extensions designed to enhance your workflows and analysis.

- **Business Analyst for ArcGIS Pro** helps you gather a variety of marketing analytics, including customer and competitor analysis, and site evaluation to give your business the geographic intelligence edge.

- **ArcGIS Image Analyst** lets you do more to visualise and analyse imagery in ArcGIS Pro, including stereo mapping, advanced image segmentation and classification, image space analysis, and building custom image processing algorithms.

Esri's CityEngine 2017 makes urban planning efficient

Esri announces the release of Esri CityEngine 2017. The software is the latest version of Esri's 3D modeling software that offers new features and let planners and architects compare different scenarios and visualise them with dashboards to view how each would affect the same geographic area—all in real time.

With the updates available in the new version of CityEngine, users can make changes to specific features—such as adjusting the size of windows or adding a balcony—in a model without affecting the entire structure. Before this, planners would have to create two entirely different projects to understand the consequences of a proposed building's design variations.

The new CityEngine also introduces procedurally generated 3D city content. This means that planners can automatically create unique design features on buildings without manually rendering them.

"With this release of CityEngine, we focused on the needs of urban planners, designers, and architects," said Pascal Mueller, Director of Esri R&D Center Zurich AG, where CityEngine is developed. Further, we implemented many long-awaited user requests such as measurement tools and computer generated architecture (CGA) neighborhood queries. Last but not the least, we completely revamped the graphical user interface, resulting in the fresh, modern look of CityEngine and a much improved ease of use."

Esri & UrtheCast bring imagery to life in ArcGIS

UrtheCast and its subsidiary, Deimos Imaging, announced to start a new UrtheCast imagery service which is powered by Esri Kanvas. The service will enable all Esri users to access timely, reliable and quality assured imagery, directly into their apps and desktops. Hosted in Amazon Web Services using ArcGIS, Esri users can utilise the multi-temporal imagery service and start building valuable apps for monitoring, change detection, precision insights and more.

"We are very excited about the broad partnership with UrtheCast and for our users to explore the potential of Kanvas using ArcGIS. Allowing users to create simple, quick, insightful apps, based on timely and qualified imagery, will inspire new solutions in GIS," said Lawrie Jordan, Director of Imagery, Esri.

"The goal of Kanvas is to bring imagery to life by leveraging machine learning algorithms in an integrated environment. By partnering with Esri, we are delighted to make available our imagery in ArcGIS, to significantly accelerate decision making in a wide range of fields,"said Jamie Ritchie, Business Development Director, UrtheCast and Deimos Imaging.
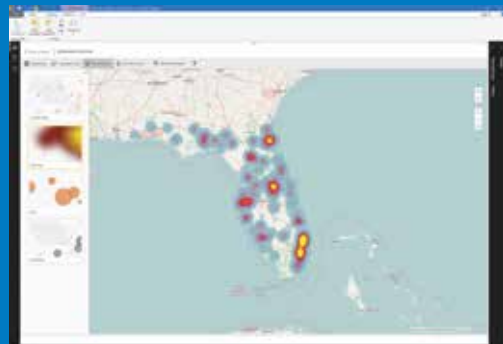
Esri introduces global demographics and other features to Microsoft Power BI

Esri has announced its new ArcGIS Maps for Power BI capabilities. Those who avail Plus subscription will have access to global demographics, expanded data mapping, and more content from Esri's Living Atlas of the World, which is a collection of ready-to-use geographic information.

Power BI is a set of business analytics tools that allow enterprise users to create dashboard reports and data visualisations through a cloud-based server. With the help of integrated data and location intelligence from Esri's ArcGIS platform, Power BI enables business and data analysts to identify patterns that are revealed by geography.

Dirk Gorter, Esri director of product management, says "80 percent of the data that businesses deal with on a day-to-day basis has a location component. The new Plus subscription to ArcGIS Maps for Microsoft Power BI looks to shine a light on that location data with new spatial analytics capabilities"

"The interactive data visualisation possible with Power BI, combined with Esri's collection of geographic data, provides our mutual customers the benefit of being able to make more informed, location-based decisions." says John Doyle, Senior Director of Product Marketing, Microsoft Corp.

Esri finds mention in report forecasting growth in location intelligence market

eading global geospatial platform provider Esri has been mentioned in Gartner's May 2017 Forecast Snapshot: Location Intelligence Software, Worldwide, 2017 report. Esri was cited among five location intelligence specialist platform vendors. The report projects global enterprise spending on location intelligence software to increase from $1.337 bn in 2016 to $2.563 bn by 2021, resulting in a compound annual growth rate of 13.9%.

According to the report, "The Internet of Things (IoT) and digital business will produce an unprecedented amount of location-referenced data, particularly as 20 billion devices become connected by 2020. Location is one of the most important pieces of information for understanding context in sync with transactional, social, mobile, user and sensor data."

"Everything in business happens somewhere, and when you tap into the integrative and analytical power of location, you can boost customer loyalty, improve real estate portfolios, slash operational costs, and build a better supply chain," offered Jack Dangermond, Founder and President, Esri. "We believe a location strategy will help any business find profitable growth."

The Gartner report also states, "Location Intelligence provides a way to reveal relationships between datasets that might not have otherwise been obvious or easy to ascertain and, through location analytics, arrive at the kind of insights that get reflected in the bottomline… In the combination of geographic and dynamic data, visualised on a map, location intelligence reveals characteristics that may have been otherwise obscured in a spreadsheet environment."

Esri is the worldwide standard for digital mapping and analytics. The company's ArcGIS platform helps organisations of all sizes reveal deeper insights embedded within their geospatial data.

Esri receives over 30 OGC Compliance Certificates for ArcGIS 10.5 platform

sri has received over 30 compliance certificates from the Open Geospatial Consortium (OGC), for its ArcGIS 10.5 platform. These certificates of compliance cover a wide variety of OGC implementation standards, which allow customers, especially within the geospatial intelligence (GEOINT) community, to work more collaboratively.

"The purpose of the OGC Compliance Program is to increase interoperability of system components while reducing technology risks. Buyers gain confidence that a compliant product will work with another compliant product based on the same OGC standard—regardless of the provider. Esri has been a longtime active member of the OGC and is committed to open standards compliance. This is evident in their current product release, which has received over 30 OGC compliance certifications." said Mark Reichardt, President of OGC.

HERE map data to be available for ArcGIS users

n a bid to improve its mapping and spatial analytics platform, Esri has turned to HERE with a new licensing agreement that will give Esri the access to a complete range of map data from HERE.

Providing in-depth analysis and visualisations, it's easy for ArcGIS users to access and, perhaps more importantly, to understand location-based data. And now the platform has even greater access to HERE maps and data, that process is even easier, including a broader, more comprehensive set of features.

The partnership will also give Esri access to real-time and predictive traffic data from HERE, which can then be used with the ArcGIS platform to give users the information needed to decide everything from whether building a new road is viable, to developing services where precise ETA times are critical.

With ArcGIS, Esri aims to give clients access to the highest quality commercial map data available, and the partnership with HERE will help Esri realise that target.

Imagery & GIS: Best practices for extracting Information from imagery
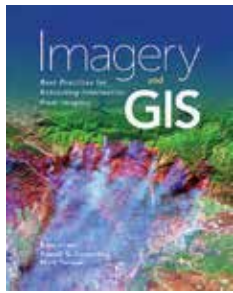
The latest in print from Esri shows how imagery can be integrated successfully into GIS maps and analysis. It helps in discovering how imagery brings value to GIS and how GIS can be used to derive value from imagery. One can learn from case studies and in-depth explanations about selecting the 'right' imagery, image analysis, how to efficiently manage and serve imagery datasets, and how to accurately extract information from imagery. The authors' experience working together on numerous research, teaching, and operational remote sensing and GIS applications bestow the book with both the newest inno-

vation, as well as proven advice. The book is authored by **Kass Green, Dr. Russell G. Congalton and Mark Tukman.**

Kass Green has more than 30-years of experience in remote sensing and GIS spanning over innovative research, multiscale and multisensor mapping projects, strategic planning, policy analysis, and development of decision support tools for NGOs, public agencies, and private companies throughout the world.

Dr. Russell G. Congalton is a professor of remote sensing and GIS at the University of New Hampshire. He has more than 35 years of experience in teaching and researching geospatial technologies working for private industry, federal and state

agencies, and academia. He has authored/coauthored more than 150 papers, 10 book chapters, and four books on geospatial analysis, including *Assessing the Accuracy of Remotely Sensed Data: Principles and Practices (CRC Press, 2008 and upcoming), Meeting Environmental Challenges with Remote Sensing (American Geosciences Institute, 2013), and Quantifying Spatial Uncertainty in Natural Resources(Amazon Digital Services, 2007).*

Mark Tukman is the owner of Tukman Geospatial based in Santa Rosa, California. He has more than 20 years of experience using imagery and other datasets to help public and private organisations map land cover, make decisions using spatial data, and support land conservation efforts.

GeoInnovation – A challenge for startupreneurs

Esri India rolled out GeoInnovation - A Challenge for Startupreneurs, in association with Department of Science and Technology (DST), Ministry of Science and Technology. GeoInnovation Challenge is an exciting programme for entrepreneurs who are building GIS technology-enabled start ups. The aim of the challenge was to provide the start ups with a platform to showcase their GIS based business ideas and build a strong network with industry experts whilst also providing startups with an industry recognition. Esri India currently supports more than 50 start ups in integrating ArcGIS in their solutions.

This is GIS industry's first of its kind Public Private Partnership (PPP) initiative in India with an objective to support start-ups building new businesses based on GIS technology. With the association between Department of Science and Technology (DST) and Esri India, the platform has been set-up for start ups to be a part of the 'Make in India' movement. This platform would also provide startups with an industry recognition and an opportunity to show case their products to potential customers in India and across the globe. GIS start ups is a segment, that has not been explored much in India but has a huge business potential. With many venture firms showing interest and joining this program, GIS led startups now have an opportunity to pitch and raise money for their businesses.

NIC gets SAG award at Esri UC, San Diego for innovative technology application

At the annual Esri User Conference, the National Informatics Centre (NIC) of the Ministry of Electronics & IT was presented with Special Achievement in GIS (SAG) Award by Esri.

The NIC received the award for its innovative application of technology, data collection, geospatial information visualisation, and thought leadership through GIS in the field of e-Government/e-Governance Applications using Information & Communication Technology.

The award was presented by Jack Dangermond, President and Founder, Esri to Vishnu Chandra, Deputy Director General and HOG, RS & GIS Division and Utility Mapping Division, on 12th July, 2017 at San Diego, California, USA.

"The SAG Awards provide a great opportunity to showcase all the outstanding achievements of our users," said Dangermond. "The Special Achievement in GIS Award recognises exemplary organisations implementing spatial analytics technology to change the world. Highlighting the good work of users–in industries ranging from commerce to government–benefits the entire GIS community, and that's very valuable."

Esri India and Asman Software Solutions join hands to enhance electoral experience

The general elections in India is a landmark event, however, the process involved is usually laced with the following challenges:

➜ Identifying the most sensitive areas from a polling perspective.
➜ Lower voter registration.
➜ Over-registration when compared to the population figures in the area.
➜ Mismatch in gender demographics when compared to the actual population ratio within the polling constituency.
➜ Identification of strategic locations for the polling stations.
➜ Inability to identify correct polling stations by registered voters and physically locating the polling premises.

The state election commission of Andhra Pradesh recognised these challenges early and realised a GIS solution can resolve the issues.

The solution

Asman Software Solutions, a leading Hyderabad-based web technologies and GIS solutions company collaborated with Esri India to develop a GIS-based Electoral Management solution. The solution, using Esri ArcGIS API for Java Script 4.x, WCF services, ArcGIS server 10.5, enables all voters and election officers to visualise relationships, patterns, and trends to deeply understand their constituency and manage electoral processes effectively.

"The main idea was to build a portal for the district collectors to use to analyse the historical data and also the polling registration." Swaroop Dunna, CEO, Asman Software Solutions Pvt Ltd.
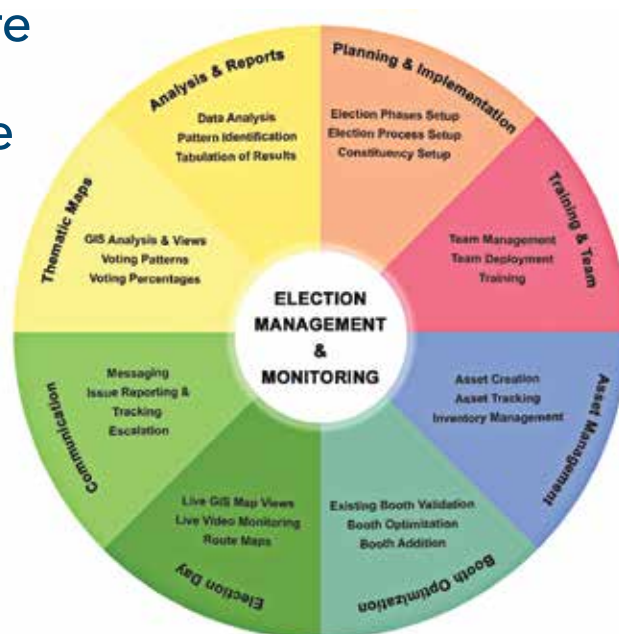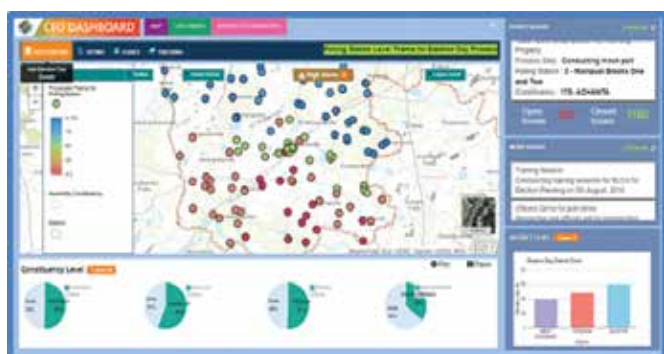
Election Management and Monitoring

Features

➜ A GIS-based dashboard for CEO, District Officers and Mobile App for Officers, Booth Level Officers, Staff and for Voters.
➜ Routes to the polling station can be created on maps and stored for future reference.
➜ Map-based view of key elements such as district boundaries, locations of polling booths etc. is available.
➜ Functionality of the ArcGIS application leads to easy management of election logistics.
➜ Webcasting feature with live video enables polling officers to monitor the voting process and identify discrepancies more efficiently.

Benefits

➜ A comprehensive GIS based analytics & reporting solution used at every stage of the election process.
➜ Instant access to polling logistics information to voters through mobile app.
➜ Registered voters can claim their voter records and correct discrepancies directly.
➜ Multiple language support allows ease of communication for voters from remote villages.
➜ Better coordination among booth level officers through the virtual space and data sharing.
➜ Reduced cost of managing the election logistics.
➜ Easy deployment of polling personnel to manage the election process efficiently.
➜ Easy creation of travel plans for observers as they can connect the polling booths they have to visit on the maps and create a route. ●

Insights for ArcGIS:
Discover the secrets of your data quickly and efficiently

Esri's latest innovation, 'Insights for ArcGIS' is a web-based, data analytics workbench that allows you to explore spatial and non-spatial data. Using it, you can get answers to questions that seemed impossible to ask and get powerful results delivered fast.

Explore, analyse, iterate

With Insights for ArcGIS, you can quickly discover the secrets your data holds. Insights enables you to visualise, analyse, and tell your story

in an amazingly unique way. As maps, charts and tables appear alongside each other as cards, the story gains life. Each card provides a live snapshot of the analysis, and interestingly, you can apply a different style to each card, and continue iterating. Who knew analysing data could be such an exciting experience! Thanks to Insights for ArcGIS.

Visualise and analyse simultaneously

The magic doesn't seem to stop. By allowing card interactivity, Insights

for ArcGIS enables you to gain new discoveries about your data. Linked cards allow you to click on a chart and see related data light up on another card. For instance, using Insights we can explore crime by type, volume and density, and also analyse if patterns have been changing over time. Needless to say, with Insights for ArcGIS, analysis crosses 'dashboard thinking'. Iterations happen faster and analysis becomes more powerful as the tool allows you to visualise and analyse data simultaneously and that too in such a visually enchanting way.

Visualise easy with drag-and-drop

Analysis of data gains speed with Insights for ArcGIS, as visual data discovery becomes a simple drag-and-drop process. With drag and drop facility, you can quickly analyse and refine results, ask questions, get answers, and get quick outcomes. There is more! Using spatial aggregation, Insights for ArcGIS allows you to quickly visu-

alise data by location. For instance, using Insights, the average cost of public colleges can be quickly symbolised by color across states.

Analyse better with demographic data

The richer the analysis is, the more useful the answers are. This is where Insights for ArcGIS stands out. By allowing you to add demographic data, it enables you to achieve stronger contextual analysis and thus better results. Rich analysis often extends beyond variables within our own data and organisation, and Insights for ArcGIS allows you to cross those limits. For instance, the analysis of cost of public colleges can be enriched using unemployment data. This leads to better assessment of RoI on college education in context of employment rates.

Get guided workflows and spatial questions answered

Insights for ArcGIS is equipped to provide guided spatial workflows for everyone. Using the action button, you can get answers for common spatial analysis questions. For instance, by calculating the ratio between the average cost of college

The richer the analysis is, the more useful the answers are. This is where Insights for ArcGIS stands out.

education and a college graduate's mean earnings, we can analyse the return on college education, visualised across states.

Share and communicate more effectively

With Insights for ArcGIS, anyone with a web browser can interact with the results of the analysis. It also allows you to control who has access. Sharing your findings with key stakeholders becomes much easier with Insights. The ArcGIS platform makes sharing results and communication among stakeholders very convenient and fast.

Connect to diverse data sources

You need not worry about the data sources while using Insights for ArcGIS. It allows you to connect to enterprise databases such as SQL and SAP HANA, geodatabases as well as Excel spreadsheets. It can also add demographic data from ArcGIS

to provide you better contextual analysis. So, no need to feel limited to a subset of available information while using Insights for ArcGIS; you can connect to all data sources.

Record and revisit workflows

With Insights for ArcGIS you can intelligently record your analysis workflow. This allows you and other relevant users to run the workflow as and when required to solve issues. The analysis view allows you to capture the model that can be revisited and reused.

Insights for ArcGIS is a long-term revolution in spatial analytics. It is intuitive and makes complex data simple to use. Whether your business focuses on retail, human services or any other domain, Insights for ArcGIS is the tool to enable you to make the most of spatial analytics. By integrating the results with business intelligence, you can achieve operational excellence like never before. ◆
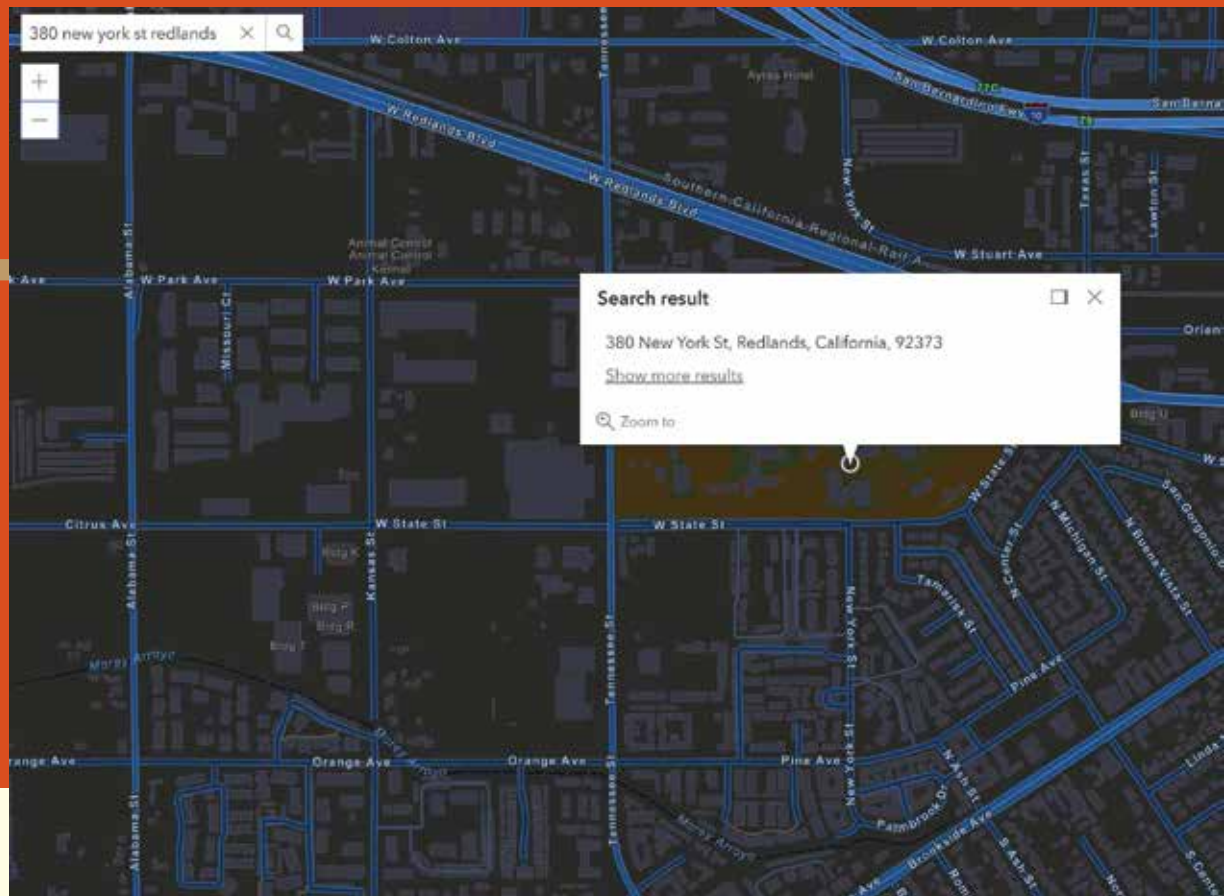
GEOCODING USING
ArcGIS

Geocoding – the process of transforming an address description into a location – requires the geographical coordinates, or a postal address of a place. These geo-coordinates represent locations that often vary in positional accuracy. To locate a point on Earth, we either rely on these coordinates or the description of a location, also known as postal address. By looking at these coordinates or postal addresses, we can locate a city, state, or country.

Just as any human search, geocoding also involves narrowing down your search to a specific region, finding a particular feature, and interpreting a point along that feature. The only difference it has is it uses a computer to assign a location to an address. The geocoding process starts with a computer using textual description of a location and translates that into the X,Y coordinates that can be plotted on a map.

For example, if you want to pinpoint **380 New York Street in Redlands, California** on a map, then your step should be checking if you have the right map. There is no way you will find your way to 380 New York Street in Redlands, California if you only have the map of Canada. Also, you won't be able to pinpoint the address very well if your map only

shows highways and major cities. Your map must have enough detail of the area to pinpoint the location for which you are searching.

How ArcGIS is making Geocoding more effective

The Esri ArcGIS platform offers its industry leading world geocoding capability that you can use to quickly, accurately, and securely map addresses around the world. The Esri World Geocoding capability includes:

Address-level geocoding coverage for more than 130 countries: Global local languages and formats gain exhaustive coverage by Esri World Geocoding as it delivers address-level geocoding coverage for more than 130 countries. The list includes key global economies. The platform also provides place-level coverage for other landmarks and cities. What's more interesting? Esri ArcGIS platform can handle addresses in local alphabets, languages, Romanized characters, transliterations, and local formats.

Accuracy like never before: Esri World Geocoding is committed to deliver highly accurate results. If it is unable to match at address level, its built-in cascading functionality automatically matches at the next best level and delivers an accurate result.

Multiple benefits at the same time: Using the platform, the user can not only locate individual addresses, places, and points of interest on a map, but also multiple addresses or places simultaneously. This is facilitated by batch geocoding. One can also use the feature of reverse geocode to obtain a place name or readable address from geographic coordinates.

Reference data at its best: Partnership with the best commercial data

The existing system for creating maps is time consuming, so we need to update our system to meet the current demand.

sources such as HERE, TomTom, government, and other reputable international mapping organisations, enables Esri to build a consistent and authoritative world geocoding.

Flexibility: The ArcGIS platform offers tremendous flexibility of its geocoding capabilities. As per the requirement, the users can deploy in the cloud, on-premises behind a firewall, or use a combination of both. They can use geocoding when they need it, with any ArcGIS application, on any device anywhere, anytime. Esri also enables custom locators for organisations collecting and managing their own asset and address data. Additionally, developers can integrate Esri World Geocoding capability into their own applications using the REST or SOAP APIs.

Choice in implementation

Esri Geocoding is available across the ArcGIS platform. An organisation can chose an implementation option that fits its requirements. The three options available are:

Global Geocoding using Cloud-based Services: Esri's World Geocoding Service is global, ready-to-use. It saves an organisation's money as it pays only for what it consumes. An organisation can use ArcGIS Online, ArcGIS for Desktop, Esri Web and Mobile Apps or ArcGIS for Developers.

Global Geocoding in an organisation's Infrastructure: For this the organisation uses World Geocoder for ArcGIS. It enables the organisation to map its global addresses behind its firewall at a fixed cost.

Local Geocoding in an organisation's Infrastructure: When an organisation avails this geocoding facility, it can choose from the options below:
➜ Use StreetMap Premium for ArcGIS to map local, country-specific addresses behind its firewall at a fixed cost
➜ Build geocoding using its own data with ArcGIS for Desktop and host it in its infrastructure using ArcGIS for Server

Need for Geocoding

Geocoding can benefit a wide range of applications, from simple data visualisation and analysis to distribution techniques and customer management. Insurance companies need accurate geocoding for policy valuation, risk assessment, and mitigation. Logistics companies use geocoding and other ArcGIS capabilities to optimise deliveries and reduce errors. In the retail industry, plays a crucial role in finding existing and new customers, plan new locations, market products by location, and create a competitive advantage. The financial industry also leverages geocoding extensively. Geocoding helps customers find the nearest ATM, allows banks to market products and services to new or existing and customers, and assists in analysing bank transactions to identify potential sites for fraud.

Esri is leading the industry through its accurate and secure World Geocoding capability. With accurate geocoding becoming a strategic requirement in today's businesses, organisations around the globe are relying on geocoding and ArcGIS to spatially visualise data, perform thorough analysis, take informed decisions, and stand out. ◆

Bilingual Apps powered by Esri

Having a web app in multiple languages not only increases the audience, but also enhances the app's overall impact. In a world where businesses have a global outreach, it becomes all the more important that companies address the versatile bilingual audience.

The splash screen links to the version of the app that is in the other language

You may need to update your data to support domain choices in two languages
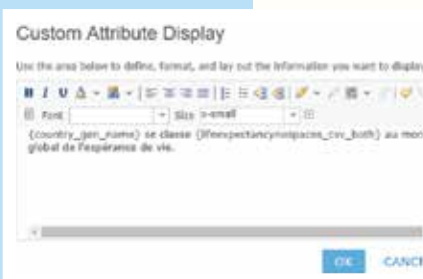
This custom attribute pop-up needed translation

Known for coming up with the best practices in using map based apps, Esri has developed templates using which translating content between global languages becomes a lot more easier.

Configuring two apps for translation: In this case, Basic Viewer Template is used to showcase a map. The steps involved are:

Identifying the data to be translated: This step involves identifying what has to be translated and what needs to be handled. All application elements, such as search, element labels, and tooltips based on browser locale or ArcGIS organisation locale get handled by the platform.

Translating the data and creating the second map: This step involves adding pop-ups, app-title, or layer tiles into the translated language. A second map is created and all required data is updated to achieve full translation of the map and app into the desired language.

Configuring the second app: While configuring the second app, the user is able to change the title, subtitles, and additional information to his language of choice. When finished, it can be published.

Sharing the app: Once published, the user can review and test the app in both languages. This is done to verify that everything is correctly translated.

Configuring one app to support two languages: The second case focuses on how to configure one app to support two languages, which is a three-step process. In this case data is collected in both the languages, but only one application is used for collecting all the information. This case uses GeoForm, a configurable app template for form-based data editing of a feature service, available from Esri.

The steps involved in this case are:

Configuring data to support two languages: In this step different fields of the GeoForm app are used to collect data. The domain values can appear in both the languages, however, this will require a bit of planning or updating your data. These domains are created and published from ArcGIS Pro.

Configuring the application: During the configuration process, the user can assign a title and short instructions in both the languages. In most cases, the user should adjust the layer names in the web map, but GeoForm allows him to change the field name labels in the builder. This is a simple way to add a second language to the field name.

Sharing the app: In this step, the app is tested in both the languages to ensure everything is as expected. If needed refinements should be made in this step and the app can then be shared. While providing links to this app from a website, one must ensure that the app UI is in the correct language for the target audience. To ensure this, using a locale parameter is a good idea. 🔷

Identification of sites for small hydel using remote sensing and GIS

Dr. P. K. Paul &
Dr. S. Das. Bhattacharya
IIEST, Shibpur

Introduction

In the recent times the non renewable and exhaustible sources of energy are getting depleted at a very fast rate, which has focused attention to the non exhaustible and renewable sources of energy. Hydropower is one of the most common renewable sources abundantly available in the hilly region. It enhances our energy security and is ideal for meeting the peak demand. Small hydropower projects (SHPs) are normally run-of-the-river schemes with no storage of water. The globally accepted classification for hydro is in terms of power output, but the norms vary from country to country. In India, a hydro power plant of capacity lower than 15 MW is termed 'small hydro'.

Small hydro projects can generally be categorised as either "run-of-river developments" or "water storage (reservoir) developments,". "Run-of-river" refers to a mode of operation in which the hydro plant uses only the water that is available in the natural flow of the river. "Run-of-river" implies that there is no water storage and that power fluctuates with the stream flow. The power output of run-of-river small hydro plants fluctuates with the hydrologic cycle, so they are often best suited to provide energy to a larger electricity system. Individually, they do not generally provide much firm capacity. Therefore, isolated areas that use small hydro resources often require supplemental power. A run-of-river plant can only supply all of the electrical needs of an isolated area or industry if the minimum flow in the river is sufficient to meet the load's peak power requirements.

In India the Himalayan region provides a suitable tract where small hydels can be located. Though identifying sites in this inaccessible mountainous area is a tremendous task. Remote sensing and GIS technology can play a vital role in scientific assessment of the suitable sites for such identification, which no other method can provide.

The objective of the project was to identify sites suitable for small hydel power plant in the Kalimpong subdivision of West Bengal using Remote Sensing and GIS. The project has also formulated a streamlined methodology for site suitability analysis, which can be used for the same analysis at any place.

Summary of the work carried out

The study area selected for the project is the Kalimpong sub-division of Darjeeling district of West Bengal. The Kalimpong sub-division is situated in the Siwalik Himalayan region of West Bengal. The latitudinal extent of the study area is from 26°53'47.16"N to 27° 14' 53.22"N. The longitudinal extent of the study area ranges from 88° 23' 29.45"E to 88° 55' 02.45"E. The elevation of the study area ranges from 150mts to 3700mts. The Kalimpong subdivision consists of three CD blocks namely: Gorubathan, Kalimpong I and Kalimpong II. Kalimpong city is the main city within the sub division. The total area of the sub-division is 1108.41 sq km having 128 villages and a total population of 1,94,923 persons. In this 104 villages are habitated and 24 villages are uninhabitated (census 2001). Within these villages 32 villages has electric power for domestic use (census2001).

Determining a site for small hydel in the inaccessible tracts of the Himalayan region has posed a lot of problem and also consumes a good amount of time and money. In this work an attempt has been made to use ArcGIS to identify sites, which suits the head requirement and flow in stream for setting small hydel power plant. ArcGIS has been used to arrive at the best location within the identified sites. The flow has been divided into two portions namely the base flow and runoff. Continuous measurement of flow has been done at the accessible points in the different watersheds of the study area for all the seasons, for two years. The minimum flow of water at the point of measurement throughout the year has been considered as the base flow. SCS CN method has been used to calculate the average monthly runoff of the various watersheds. Distributed curve number technique has been used in calculating the runoff. For determination of regional flow of the study area the following catchments catachrestic were considered:

→ Area of the watershed
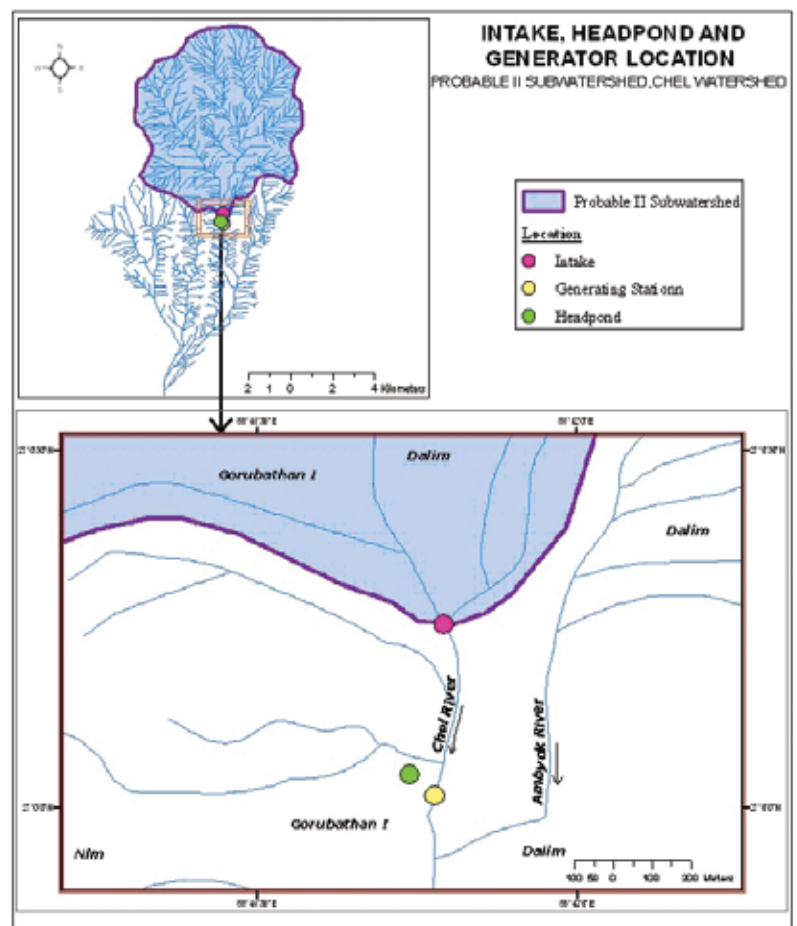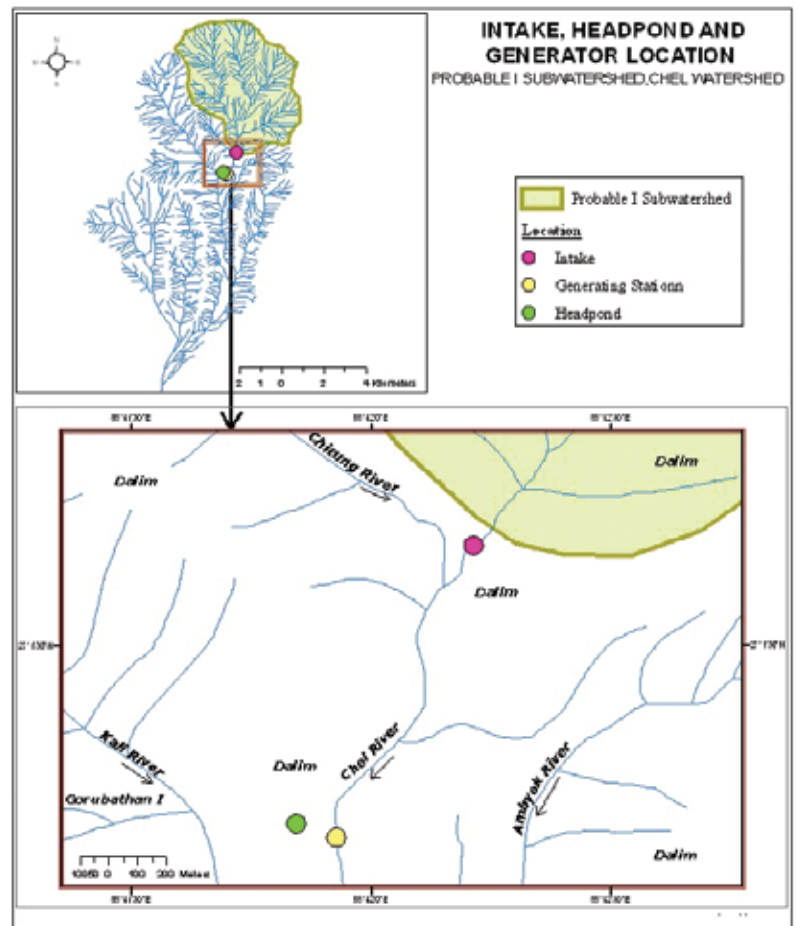→ Average Slope of the watershed
→ Drainage density

In addition to these catchment characteristics, rainfall which directly affects the flow in a watershed was also considered. The streams in the study area is all ungauged so the total flow was regressed using the rest of the factors that is rainfall,

area of the watershed, slope and drainage density and an empirical formulation for identification of regional flow equation was undertaken. This formula identified can be used for identifying flow of water at any point of the ungauged stream.

Using the DEM the flow direction map was generated. Flow accumulation map has been created by using the flow direction map. Cells with a high flow accumulation are areas of concentrated flow and was used to identify stream channels. The area that has the flow accumulation 1500 or more has been extracted from the flow accumulation map as this was consistent with the recommendation of Huggins and Burney (1982). The sub watersheds which has the probable chances of harnessing small hydel has been delineated using the flow accumulation map, stream map of the watershed and a buffer of 2kms of the contour map all along the points where flow is more than 1500 pixels. The buffer of contour was necessary to get an idea about the presence of suitable head in that area. The buffer of 2Km was selected as more than 2Km intake will be an impracticable solution for small hydel project. The details of the sub watersheds in the Chel watershed which has been identified are shown parallely ⬟

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INTAKE, HEADPOND AND GENERATOR LOCATION
PROBABLE I SUBWATERSHED, CHEL WATERSHED

INTAKE, HEADPOND AND GENERATOR LOCATION
PROBABLE II SUBWATERSHED, CHEL WATERSHED

Software used: Esri Platform

CHEL PROBABLE1

	Coordinates	Height (mt)
Location of intake Point	88° 42' 12.70"E 27° 01' 40.98"N	760
Location of generating station.	88° 41' 55.72"E 27° 01' 09.44"N	620

Location of intake and generating station
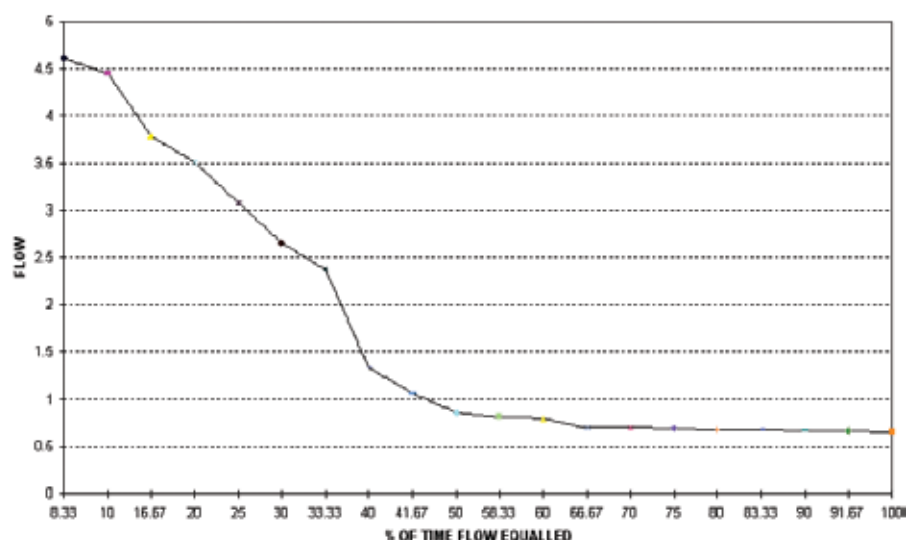
Flow Duration Curve

Distance from the intake to the head pond
1015.87 mts.

The head of the penstock
130 mts.

Power generating capacity with 90% dependability
697.87KW

Can supply power to:
– Dalim panchayat having a population of 5528 persons
– Gorubathan I panchayat having a population of 3430 persons

CHEL PROBABLE2

	Coordinates	Height (mt)
Location of intake Point	88° 41' 47.30"E 27° 00' 15.83"N	760
Location of generating station.	88° 41' 55.72"E 27° 01' 09.44"N	620

Location of intake and generating station

Flow Duration Curve

Distance from the intake to the head pond
370.22 mts.

The head of the penstock
76 mts.

Power generating capacity with 90% dependability
485.43KW

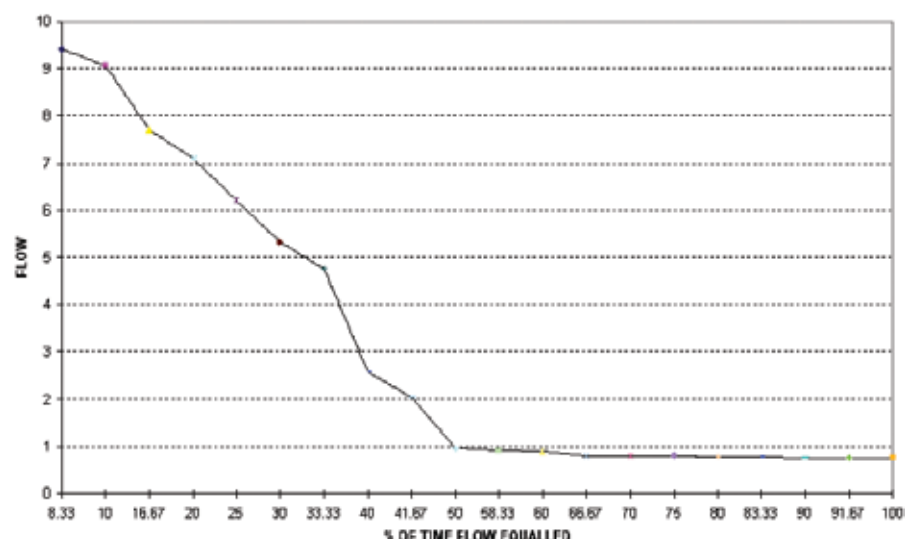**Can supply power to:**
– Dalim panchayat having a population of 5528 persons
– Gorubathan I panchayat having a population of 3430 persons

THE SCIENCE OF WHERE

Location is all pervasive

When Esri President, Jack Dangermond introduced the term 'The Science of Where' at Esri User Conference 2017 in San Diego, he rightly defined it as "a fundamental digital language for understanding and managing our world."

With the changing global scenario, GIS technology is evolving itself. It is moving towards a collective and interconnected system of systems, which is going to be a key part of this transformation. New kinds of capabilities such as multi-sensor data fusion, real-time data, on the fly analytics etc. aided by new forms of community engagement are evolving in GIS and making The Science of Where more relevant.

Informed decision making with The Science of Where

Location intelligence is enabling almost all major sectors to achieve better outcomes. Be it energy, transport and logistics, real estate and commercial developments, telecommunications, retail and whole-sale industry, healthcare providers, insurance, finance and banking or education, by incorporating The Science of Where in their operations, they are striving to achieve operational excellence. Like private enterprises, governments are also

> As the world is undergoing rapid transformation, the need for seeing GIS as The Science of Where is becoming more important.

actively incorporating spatial analysis into decision-making processes. This integration is helping them in achieving speed, accuracy, and cost effectiveness in information dissemination, urban planning, and service delivery.

The Science of Where is also enabling organisations to achieve their conservation goals more efficiently. By providing tools for gathering information, planning, and engaging others, it is enabling organisations to take action and create positive change. Whether an organisation is passionate about ending poverty, gender inequality, or food insecurity, The Science of Where is equipped to help it gain a comprehensive understanding of such issues as well as help overcome it using data and intelligent mapping tools. By harnessing the power of The Science of Where, organisations can gain a better understanding of the Earth's complex systems and get a better picture of key sustainability dilemmas. This understanding helps them create change more effectively.

The Science of Where for more accurate crop insurance

Providing the right amount of crop insurance coverage to customers is a balancing act.

If too many acres are reported, the customer pays too high a premium. If too few acres are reported, coverage is inadequate in the event of a covered loss. To have more accuracy in reporting acreage, Great American Insurance Group came up with a location-based solution. Putting The Science of Where to use, they created an innovative ArcGIS-based reporting tool. The tool which is available on the iPad, is revolutionising the business.

Great American Insurance Group's Crop Insurance Division has been providing crop insurance to farmers for more than 100 years. The company is engaged primarily in property and casualty insurance, focusing on specialty commercial products for businesses. The insurance underwriting process requires that agents visit each farmer and complete an acreage report. Ultimately, that report is reconciled with acreage records at the Farm Service Agency (FSA), a department of the United States Department of Agriculture (USDA).

During this reporting window, agents work with clients to determine accurate acreage for the crops that have been planted and, in certain circumstances, acreage that has not been planted. Insurance coverage is based on this report, so it must be complete and accurate. If the acreage FSA has on file for a farmer and the acreage reported by the agent don't match, coverage could be jeopardized.

Several years ago, USDA began moving the farming industry toward map-based reporting to improve accuracy. Following the suit, six years ago, Great American's Crop Insurance Division began using The Science of Where in the form of mapping software to communicate more effectively with its agents, policyholders, and the USDA. Great American implemented ArcGIS in its IT departments.

"We are able to agree on what is planted in the field and roll this data up into our own systems right away," said Dale Perry, divisional assistant vice president of marketing for the Crop Insurance Division at Great American.

The application, called GreatAg for iPad, was developed using the ArcGIS Runtime SDK for iOS. Powerful mapping and geoprocessing are embedded in maps in the application. All data, except for maps, is downloaded and stored locally on the agent's iPad so it can be accessed without an Internet connection. Agents have access to all the information about their clients' Multiple Peril Crop Insurance policies and claims.

If an agent has Internet access, the GreatAg application also provides access to acreage and crop mapping information. By keeping GreatAg for iPad simple and efficient, Great American has created a "win-win-win" solution for agents, policyholders, and the company.

The Indian need

Around 51% of India's geographical area is under cultivation. Major share of its GDP comes from agriculture, which supports 58% of the population. Consequently, the importance of having good crop production in the country is high, and to enhance the productivity of crops, the Government has undertaken several initiatives like crop insurance, per drop more crop, Rashtriya Krishi Vikas Yojna etc.

GIS-enabled systems enable the decision-makers to visualise all the farmlands with their allied information and current situation with just one click.

To make such programmes a success, it is vital to use technologies like remote sensing and GIS. GIS enabled systems enable the decision makers to visualise all the farmlands with their allied information and current situation with just one click. By using these technologies, yield estimates, soil amendment analysis, erosion identification and remediation, crop damage assessment etc. can be completed within minutes with high accuracy. Individual farmers can also receive useful information from remote sensing images, and learn about the health of their crops faster and adopt remedies quickly. Moreover, to identify the potential land for any particular crop, GIS is the

Smart City Bhopal using The Science of Where

Following the Indian Government's Smart Cities Mission, Bhopal is selected as one of the 20 lighthouse cities in the first round of the project. The city is expected to create a replicable model which shall act like a lighthouse to other cities. The core infrastructure elements in a smart city include adequate water supply, assured electricity supply, sanitation, including solid waste management, efficient urban mobility and public transport, robust IT connectivity and digitalisation, good governance, especially e-governance and citizen participation, sustainable environment and safety and security of citizens, particularly women, children and the elderly.

Bhopal Smart City Development Corporation Limited to achieve the goals of its Smart City initiative envisaged a technology solution that could cater to the smart citizens of this new age and modern Bhopal. It wanted to develop a platform which could provide best technique as it brings all the data on a single platform for the analysis.

There is no doubt that The Science of Where has an indisputably important role to play in the Indian agricultural context. It can help in achieving higher growth and thus lesser disparities within the society.

Smart living through The Science of Where

As urban areas are getting more crowded and falling increasingly short on future development potential, development of new self-sustaining cities, better known as smart cities, are emerging as an alternate solution to these problems. Technology is at the heart of these new self-sustaining cities.

The Smart city projects are complex as they are a conglomeration of residential and commercial spaces supported by infrastructure for roads, power, drainage and sewerage. The different participants of the smart city ecosystem achieve collaboration and integration with the help of a common technology system. This common

Figure 1: How GIS helps in planning smart cities

information to the citizens on what is happening and take citizens feedback. This was just the first step and was very important because they wanted citizens to be a part of the initiative.

Thus, Smart Map Bhopal was envisioned. Developed with the support of Esri India, Smart Map Bhopal is a city level GIS portal that is equipped to act as a one-stop destination for citizens, businesses and government departments to discover, consume and share information about Bhopal. Smart Map Bhopal, a web application that seamlessly functions across various devices has been developed using the ESRI ArcGIS software, a leading GIS software that provides unique set of capabilities for applying location-based analysis. Esri India created a platform where all departments could contribute their set of available data and information and bring it at one place which could then be used by various departments.

The Smart Map Bhopal provides the citizens visibility on the various initiatives of city administration and involves them in the city administration processes. It serves as a platform that provides authoritative data from Local Government to the citizens. It enables citizen engagement in building and updating city area and empowers citizen by public crowd sourcing. To promote the rich heritage of Bhopal, a unique and interactive Story map template has been used to allow citizens to explore geolocation information, images and descriptions of Bhopal's heritage sites, museums, gates and lakes.

The GIS system is playing a vital role in improving the key processes of the city administration, ensuring security and safety of citizens and assets using location based technological implementations, improving the operational efficiency, revenue generation capability and transparency by integrating GIS with the current ERP system (Municipal Administration System), facilitating data sharing & collaboration, efficient management of queries and grievances, self-mapping for planning, designing & implementations using available ready to use maps and apps etc. All these capabilities are leading to quicker actions and better results.

framework is provided by The Science of Where. As Figure 1 indicates, GIS provides an IT framework that integrates every stakeholder and takes care of every aspect of the Smart City.

The Government of India has conceptualised the 'Smart Cities Mission' according to which, India plans to develop 100 smart cities all over the country. When it comes to making cities smart, role of geospatial technologies cannot be ignored and Esri India has been actively involved in providing a technology platform that forms the backbone of a smart city. Along with working with several states and their municipalities, helping them solving their daily problems using location intelligence, it is playing a vital role in planning and execution of the Smart Cities Mission.

What role is The Science of Where playing towards community benefits?

Esri defines The Science of Where as 'the science of exploration and navigation, science of the grand and granular, the science of development, the science of sustainability, the science of power, the science of will, the science of wonder, the science of peace, the science of where.' Beyond solving real-life

"Planning is most important while setting up Smart Cities. Technology provides the framework for conceptualising and planning of Smart Cities. It will assist at every point from project conceptualising to site-analysis, design specifications, stakeholder participation and collaboration, design creation, simulation and evaluation."

Agendra Kumar, President, Esri India

problems, The Science of Where is committed to making a difference. Be it conservation, education or sustainable development, The Science of Where is geared up to, "enabling people worldwide to work collaboratively towards creating a better world."

Esri has launched a suite of public mapping tools and data to help communities protect the places and natural resources that help people, wildlife, and the economy thrive.

"It's possible for communities to preserve natural habitats, protect biodiversity, and improve quality of life while supporting sustainable growth," Dangermond said. "By using green infrastructure as a framework for growth, people can develop communities that are consistent and function in concert with the natural environment, instead of being at odds with it."

At the core of Esri's green infrastructure initiative is a first-of-its-kind national map depicting every intact natural area greater than 100 acres, regardless of ownership or preservation

Smart City Bhubaneshwar using The Science of Where

Another city which is gaining the stature of smart city under the 100 Smart Cities Mission of the Government of India is Bhubaneshwar.

Bhubaneswar Smart City Limited (BSCL) is the Special Purpose Vehicle created for implementation of Smart City Mission programme of Bhubaneswar Municipal Corporation. Understanding well that in an urban development context, for all sub-systems to work as an integral family, a spatial connect is essential and this is possible only through a GIS-enabled solution, BSCL envisioned BhubaneswarOne portal.

Developed with the support of Esri India, BhubaneswarOne portal is a Smart City initiative which integrates geo-spatial data from all the government and private organisations for providing easy and hassle free information for the residents and the tourists. It is an integrated GIS based map system for government agencies to deliver location-based services and information. It is a multi-agency collaboration with many government agencies currently participating and contributing information. This e-platform can be used to find locations, ward information, information on public services, updated notifications from various government organisations, location and significance of different tourist sites, event calendar of Bhubaneswar City and much more. The portal is equipped to update the data on a regular basis. More and more government departments are going to partner with the system for better service delivery. The GIS system will enable the people of Bhubaneswar to have a one stop solution for almost all location based issues.

The solution provides information such as Maps, Ward Info, Know Your plot, Measurement, Events, Query and Themes. Such information enables citizens of the city to be aware of the public amenities and infrastructure related components available in the city. The Base map gallery functionality in the solution provides citizens with different map data representations of Bhubaneshwar to view and scrutinise. It also enables the citizens to learn about the city's heritage by providing them geolocation information and images and descriptions of the heritage sites. The users can also give feedback on the city. On the basis on the complaints and suggestions received, the SPV is able to initiate actions faster. Overall, the GIS system is making governance citizen-friendly and cost effective. Citizens are increasingly relying on the online services provided. The system is also bringing about accountability and transparency. With such a robust GIS system in place, Bhubaneswar is all set to become a role model for other smart cities.

status. The map shows areas of ecological, cultural, and scenic importance, giving users a national and regional overview of the resources and places that are important to conserve before planning development.

By combining local data with Esri's map, municipal planners, investors, conservationists, and the public can visualise and prioritise which landscapes to protect and connect—such as natural systems that mitigate flooding, green spaces that boost property values, and trails that enable recreation.

Making the public feel safer

With increasing population, public safety is becoming a rising concern. To ensure public safety state and local governments are also using location intelligence. The Science of Where is making a difference in this domain as well.

Police departments are increasingly using location intelligence tools to make decisions about where to deploy resources to best impact public safety. Rather

The Science of Where in case of Pinal County, Arizona

From 2000 to 2010, the population of the place grew from 179,727 to 375,770. During this period of extreme growth, the county's resources were taxed trying to keep up with new development.

This was especially true for the county's floodplain management programme. In 2008, the Pinal County Flood Control District took over management of this programme and began employing Esri's ArcGIS software to ensure that every property located within a floodplain had a copy of the Federal Emergency Management Agency's (FEMA) mandatory elevation certificate.

Significant portions of Pinal County had been added to the floodplain after the 2007 map revision. There were hundreds of


existing homes that did not necessarily require an elevation certificate for the county's purposes even though they were now shown as being located in a floodplain. When the two sets of floodplain maps were combined and processed, the result was a comprehensive data layer that clearly showed where newly designated and existing floodplains were located.

Based on this GIS analysis, Pinal County was able to develop an accurate budget and reasonable time frame for obtaining elevation certificates for those 457 properties. This analysis has ensured better and safer living conditions for the people of the County.

" Climate change is a global issue that brings together government, utilities, non-governmental organisations, sophisticated cities, and developing countries. There is no single entity that can help developing countries plan for and adapt to climate change. But by uniting our resources, experience, and unique capabilities, this partnership can make a difference. "

Jack Dangermond, President, Esri

Optimising water use
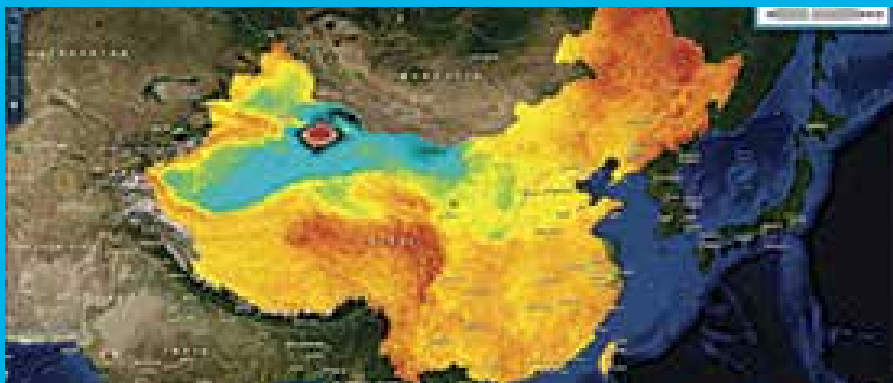
Understanding how much sustainable development depends on availability of water, and how crucial it is to work towards water conservation today, two companies in the Netherlands—WaterWatch and Basfood—formed eLEAF to support global solutions for agriculture and the environment based on the data they have collected on vegetation, water, and climate. WaterWatch developed PiMapping technology, a family of GIS-based tools that delivers more than 50 data components.

It is interesting to note that by optimising crop water use, water consumption can be optimised. During the mid-1990s, professor Wim Bastiaanssen, a water resources modeling and remote-sensing specialist and founder of Water-Watch, developed the Surface Energy Balance Algorithm for Land (SEBAL) model to calculate crop water consumption from remote-sensing data. The model measures the energy balance that specific plants in a defined area require to sustain the hydrologic cycle. The model uses satellite imagery (spatially distributed, visible, near-infrared, and thermal infrared data) that includes the albedo (solar reflection coefficient), leaf area index, vegetation index, and surface temperature. This complex algorithm calculates evapotranspiration on a pixel-by-pixel basis to determine the optimum amount of water needed to sustain healthy plant life in any part of the world. It can also calculate the biomass production (total plant life) in a specified area and soil moisture in the root zone.

Time-series data is plotted in ArcGIS to create evapotranspiration and biomass production maps. These maps help in estimating water requirements for different agro-ecosystems, drought monitoring, the identification of areas for possible water savings, and the potential volume of such savings.

Once these maps are combined with land-use and biomass coverages, we get a lot more information such as the amount of water use by land-use class; the boundaries of areas where water consumption can, and cannot, be controlled; the impact of changes in land use on downstream water availability; crop water productivity; and the amount of water that can be saved while the same production levels are maintained.

Analysis of this data can help in understanding how much water is available in a specified area, what yield one can expect from the water that is available for the crops, and how efficiently water is used. This can enable farmers to produce more food in a sustainable way.

than making decisions based on data from broad geographic regions like precincts or neighborhoods, departments are using location intelligence tools to analyse crime statistics down to the block, street, or intersection level. This detailed analysis enables the departments to place officers in the most effective locations.

The application areas of The Science of Where extend far beyond. Be it combating fraud, waste or abuse, government entities are using spatial analytics to help detect inappropriate spending. When it comes to enabling the community to live a better life or ensuring its safety, the role of The Science of Where is unmatched.
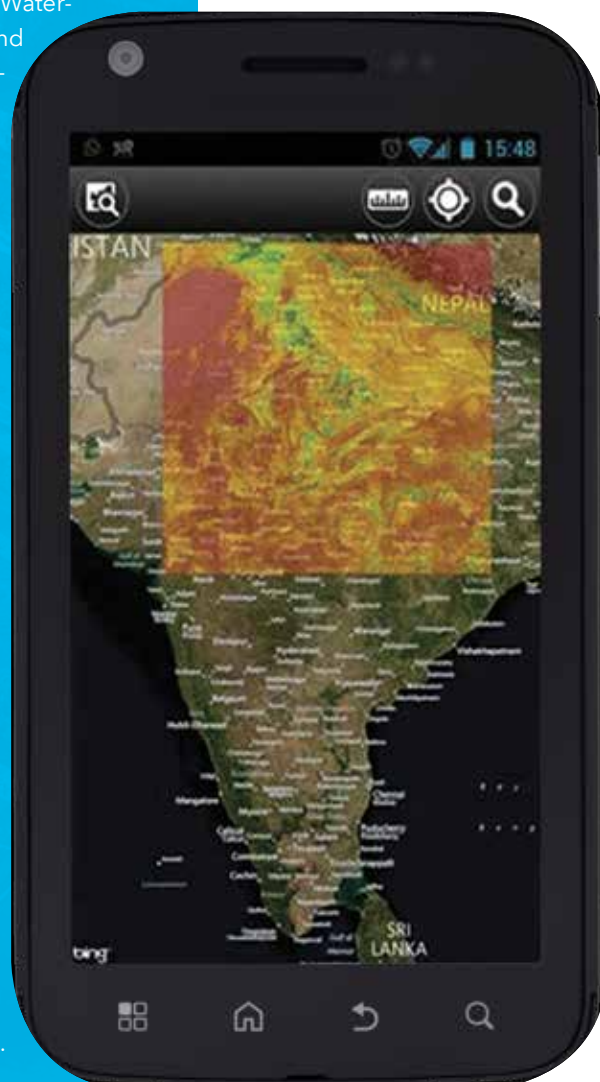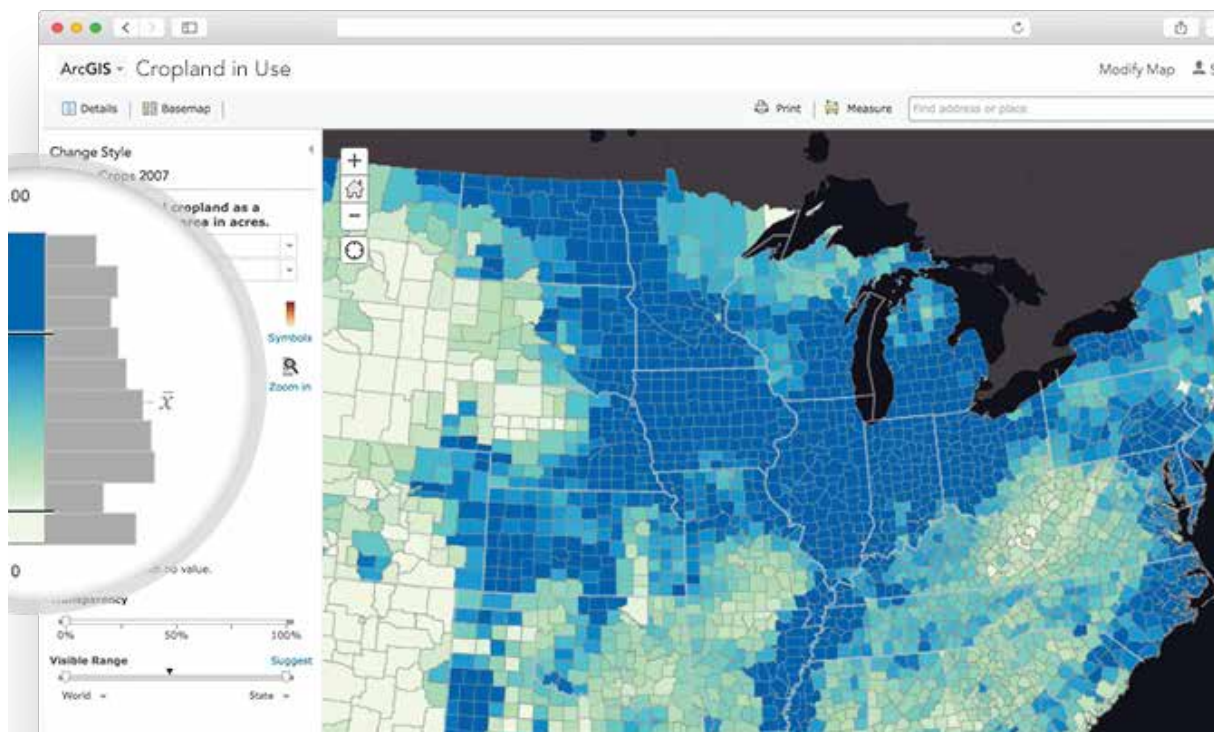
Public mapping tools by Esri, helping communities protect places and natural resources

During mid-1990s, Prof. Wim Bastiaanssen, a water resources modeling and remote-sensing specialist and founder of WaterWatch, developed the Surface Energy Balance Algorithm for Land (SEBAL) model to calculate crop water consumption from remote-sensing data.

Conclusion

All the examples discussed above corroborate the fact that The Science of Where is enabling the world to become a smarter, safer and healthier place to live in. Instances reveal geospatial technologies can do wonders when it comes to achieving operational excellence. With businesses now focusing on the 'where' of things – where products are shipped, where product inventories are aging on the shelves of which stores, where products are advertised, or where products are consumed etc., the integration of spatial analysis and BI is helping companies to make more informed decisions, thus leading to better outcomes.

Knowing where people and things are, their location, and their relationship to each other, is essential to informed decision making. Both private and government sectors are relying on geospatial information more and more for strategic decision making. Geospatial information technologies have become critical tools to support national development, economic growth, improved decision making and policy formulation. Be it disaster management and climate change; infrastructure management; land management; natural resource management; agriculture; education administration; business; and environmental management, The

Science of Where is the answer to all. Social, economic or environmental-by understanding The Science or Where, we can envisage growth in all sectors at a much higher rate.

The Science of Where is helping organisations to create a sustainable future. It is enabling the community to get answers to questions like: where and what are the services available? How well are they linked with the community demand? These answers are leading to faster and better decisions for improved living. Geospatial analysis is providing visual proof/ visualisation of extreme weather conditions, melting glaciers, dying corals etc. Mapping patterns of sea level rising is helping scientists determine the catastrophes that climate changes will bring. Be it disaster management or achievement of sustainable development, with situational awareness, the world is getting better at taking decisions and faster actions for better living conditions. ◆

DFS STRIVES FOR LARGER COVERAGE OF FINANCIAL SERVICES USING
Esri ArcGIS

U sing spatial analytics to understand human needs and providing public services accordingly is not a new practice. In developed countries, the government agencies have been using it from quite some time. With an intention to provide better customer service and garner new business, Indian businesses have also started integrating the GIS aspect in their services.

Spatial analytics is enabling businesses to resolve their problems faster and take concrete actions sooner. A sector which is increasingly adopting location analytics is the insurance and banking sector.

The Department of Financial Services (DFS), Ministry of Finance, Government of India

The mandate of the Department of Financial Services covers the functioning of Banks, Financial Institutions, Insurance Companies and the National Pension System.

Financial inclusion is an important priority of the government. The objective of financial inclusion is to extend financial services to the large hitherto un-served population of the country to unlock its growth potential. In addition, it strives towards a more inclusive growth by making

financing available to the poor in particular. The rollout of Direct Benefit transfer scheme also highlights the need for increasing the spread of Financial Institutions across India especially rural areas.

As an important step towards achieving the financial inclusion goals of the government, moving on from an excel-based system of recording data on financial institutions and assessing coverage, DFS considered implementing a GIS based solution that could enable it to identify potential areas more efficiently.

Challenges

DFS started working on collecting location data for various institutions giving financial services, but they were facing challenges in validating the data with respect to their location and accuracy as the platform they were using did not have a robust base map framework for the same. After weighing different options, they chose NIC's Multi-layer GIS framework which has robust base data up to village level.

DFS wanted to foster a well-regulated and orderly growth of the banking and insurance sector to serve all sections of society. It wanted to serve the citizens in a much more efficient way and thus wanted to identify the potential areas which lack financial inclusion facilities. This would help it drive a focused coverage.

Solution from Esri

With the aim of extending the banking network in unbanked areas, DFS decided to implement a GIS based solution on NIC's Multi-layer GIS framework Bharatmaps. The National Informatics Centre (NIC) was assigned the task of

The department wanted to foster a well-regulated and orderly growth of the banking and insurance sector to serve all sections of society.

developing the location-based application.

NIC provides a nationwide common ICT infrastructure to support e-Governance services to the citizen, products and solutions designed to address e-Governance initiatives, state/UT informatics support and district level services rendered. Some of the major projects recently undertaken and executed by NIC include:

➜ GIS for Financial Inclusion (DBT-GIS Portal)
➜ BBNL GIS Portal (Bharat Broadband Network Limited)
➜ School Location Mapping (School GIS)
➜ Slum Rehabilitation Authority (SRA GIS Portal)

To develop a robust application, NIC collaborated with Esri. Esri provided the technical resources. It provided the ArcGIS platform for the application. The application uses NIC's Bharatmaps framework which has various Esri Basemaps. Under the guidance of NIC, Esri has developed a framework for data collection, update and validation. The Esri ArcGIS Server provides web-based geo analytics which enables NIC to provide on the fly statistics regarding coverage of banking facilities and list the uncovered areas. This has enabled users to easily map uncovered areas and identify potential locations for setting up of a banking account or finding banking services in a nearby location.

The application has mobile as well web interface. Financial institutions collect data at state level and upload on the platform. They can update data easily and analysis becomes more effective with the updated data. The coverage efforts become more directed and useful.
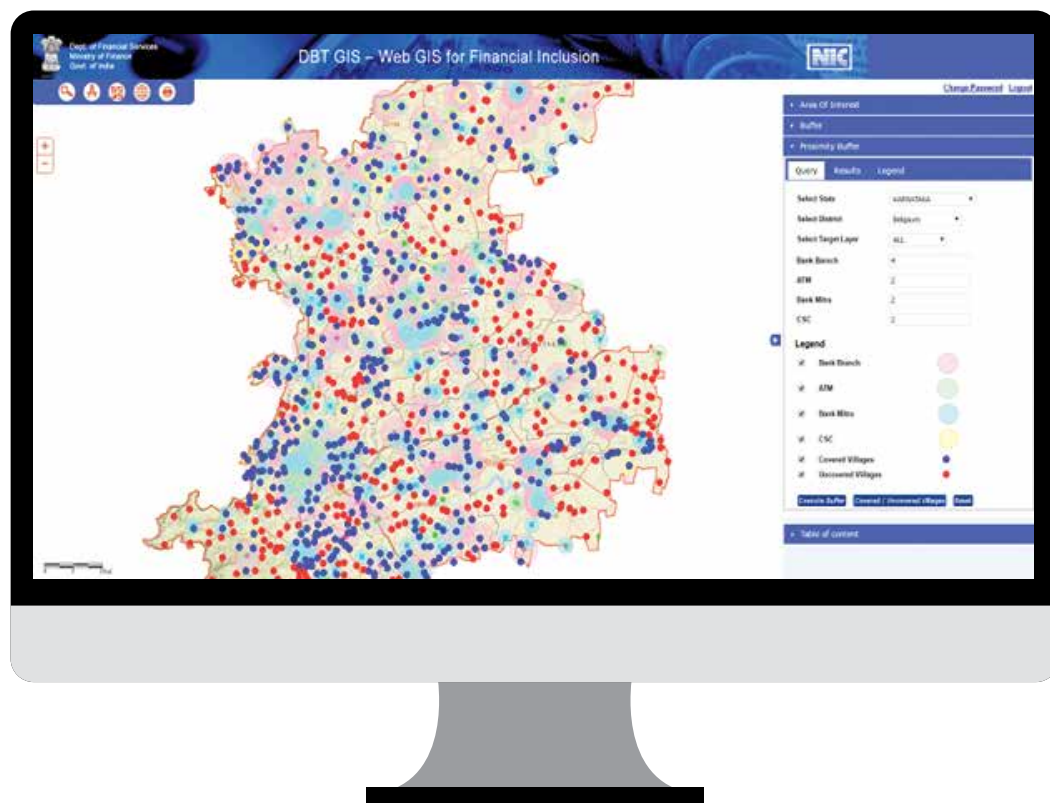
The GIS system has helped DFS to develop a deeper understanding of where things are and how information is connected, allowing them to take effective decisions.

Launched in April 2016, the solution has helped DFS to easily locate the financial services like ATM's, Bank Mitra, Bank branches and Post Offices, which are the key touch points for financial inclusion. With data of financial services, demographic and population spread, DFS has been able to identify the list of covered and uncovered areas for them to prioritise the coverage initiatives.

The GIS system is well-equipped to enable DFS identify uncovered areas in their services and help them understand where they may have gaps or excess redundancy. The system seems promising in terms of fostering a well-regulated and orderly growth of not only the banking and insurance sector, but also related industries.

Impact and benefits

The GIS system developed with the support of Esri has enabled DFS to take more concrete steps towards financial inclusion. The solution provides the banks and other financial institutions at local/state level to record and update data on real-time. Analytics of the spatial and non-spatial data provided by the system allows DFS to identify areas to be covered for financial inclusion more easily.

The GIS system has helped DFS to develop a deeper understanding of where things are and how information is connected, allowing them to take effective decisions. With multiple stake-holders involved, GIS has provided a common platform for delivering value-added analytical services to facilitate planning and decision support tools. The various functions of Financial Inclusion application include Role based Access, Area of Interest Navigation & Statistical Reports, Search, Proximity Buffer Analysis, etc.

The authoritative GIS data is also providing a framework for DFS to deliver additional spatial data services to other departments. The solution is a part of the larger programme to drive financial inclusion across India. In the near future, NIC with support extended by Esri, plans to extend the GIS system to make it citizen centric as well. The data on financial institutions will be extended to the citizens as well via a citizen interface (web and mobile) via which they could find out financial services (Bank, ATM, BankMitra & Post Office) in their neighbourhood.

The benefits extended by the Esri supported GIS system is unmatched. With this robust system in place, DFS will surely be able to achieve many milestones towards the fulfillment of the Government's financial inclusion goals. ▲

Airtel delivers a truly transparent network using **Esri ArcGIS** server-based platform

A highly competitive and capital intensive industry, telecom in India is the world's second-largest tele-communications market with a subscriber base of 1.05 billion. In that, Airtel is the largest mobile market share holding company. Airtel has been known for many firsts and innovations to its credit, ranging from being the first Pan India Mobile Service Operator, first Private Basic Telephone Service Provider in India, Largest Mobile Market share in India and many more in its kitty.

For telecom companies in India, the cost of customer acquisition is much higher as compared to retention cost and quality of service is of para-mount importance for customer retention. Realising that customer retention is directly related to trans-parency, Airtel, India's largest tele-communications services provider, thought of implementing a new initiative – Open Network under Project Leap.

Under this initiative, for the first time in the industry, Airtel planned to open up its entire mobile network information to its customers through an interactive online interface. The new interface would display Airtel's mobile network coverage/signal strength across India in addition to network site deployment status. The project envisioned to empower customers with a capability to check Airtel's network presence across India and make suggestions on how its network coverage can be improved.
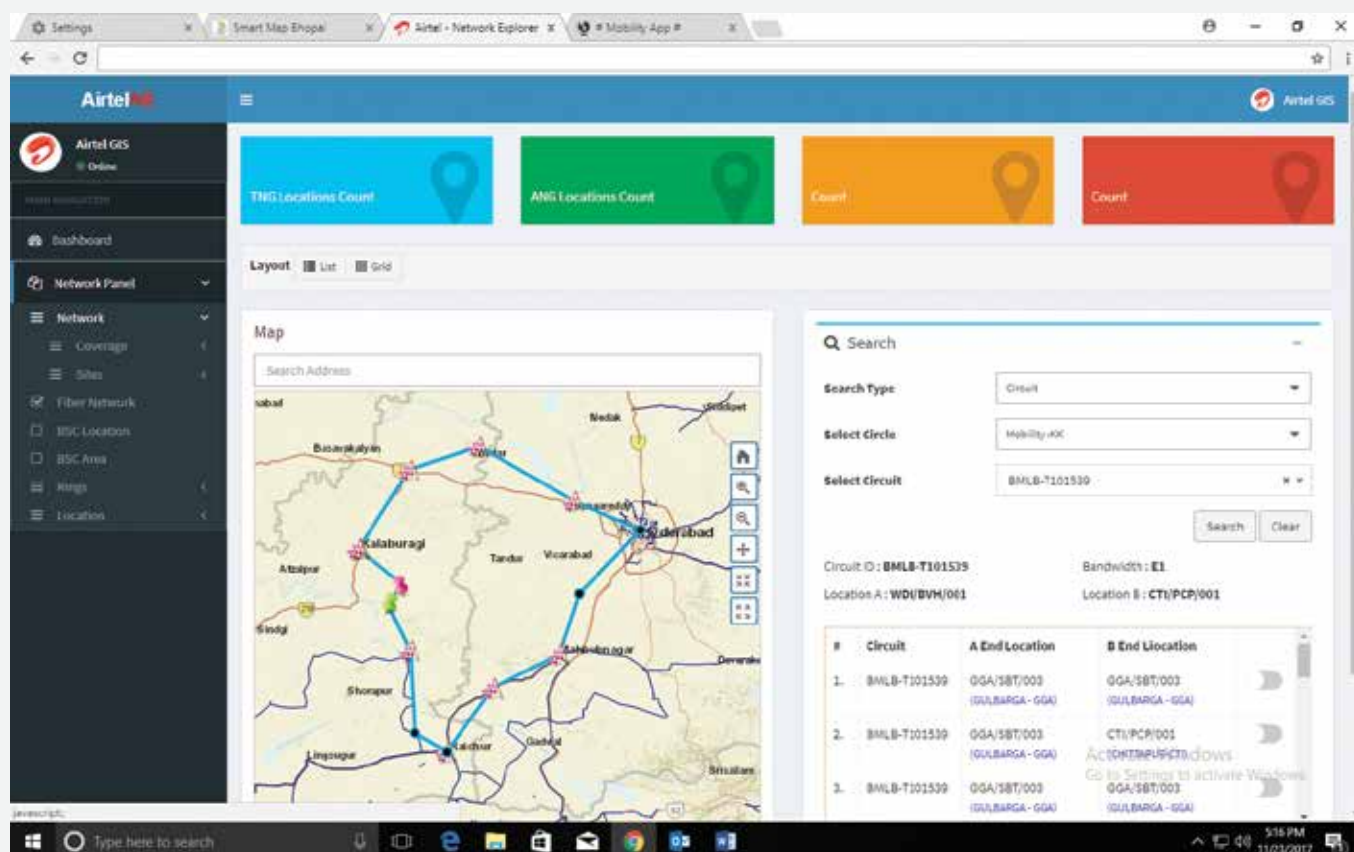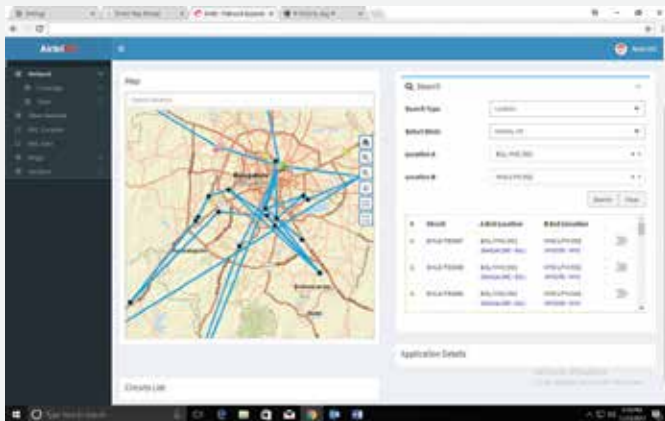
*Through the initiative, Airtel aimed to enable the end users:*

Learn about

→ Availability of voice and data coverage in customer pin code level with feature to drill down to street level.
→ Network up-gradation happening in their respective areas like upgrading from 2G to next generation 3G or 4G, capacity enhancement etc.
→ New network technology rollout in their locality.
→ Information about locked sites in their locality.

Check

→ Status of the Airtel mobile network in an area- excellent, good, moderate or non-existent.
→ Status of corresponding sites serving the area – existing, required, being upgraded or forcibly shut down.

Report

→ Network related issues in an easy fashion.
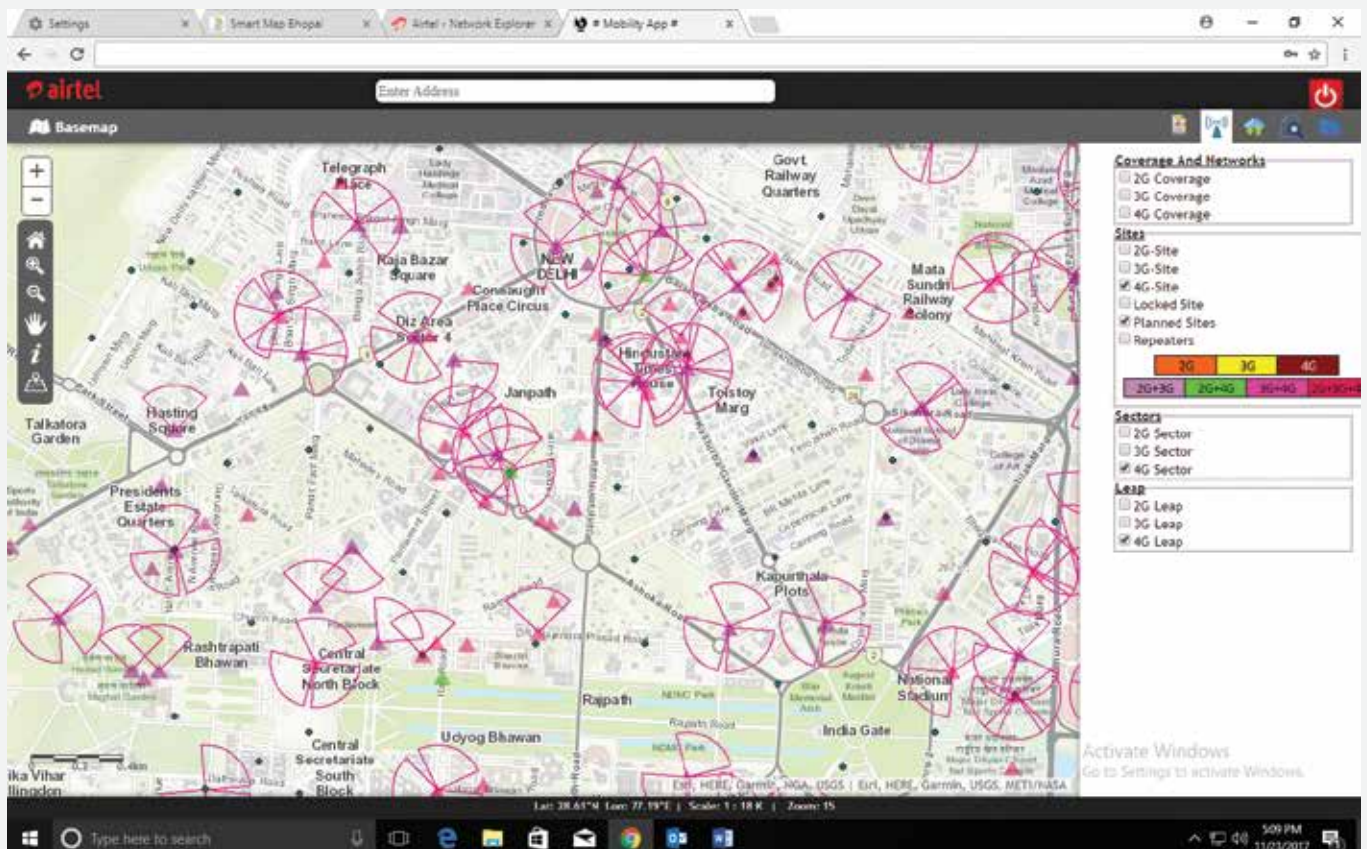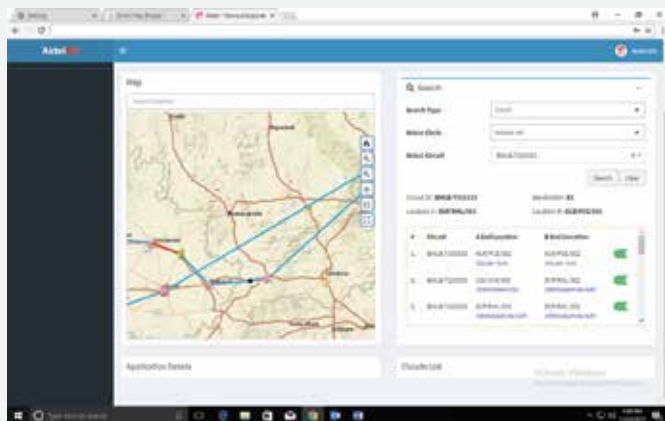
Challenges

Installing network towers is a highly capital intensive process that involves multitude of stakeholders like network planners, RF engineers, real-estate, construction, O&M, business, projects and finance personnel.

Project Leap involved working on system, processes & terabytes of wireless coverage data at different signal strength. For making this customer portal, a CFT team was formed to work on processes, web interfaces, APIs development, data processing and correlation of large RF coverage data and come up with "Know my Network" window for end customer who could see the network developments in terms of existing and new coverage and site presence for Voice and High Speed data connectivity.

Additionally, the solution had to be quickly deployable, capable of providing easy and flexible rollout options, and include an easy-to-use integration system.

Every telecom tower has a location associated with it. The coverage radius of the tower defines area that would be serviced by it and the customer base in that radius defines the capacity needed to serve that particular customer segment. To ensure that the consumers get sufficient coverage from telecom towers while at home or in motion and to identify the coverage blind spots, there was need for spatial decision making. The tower locations had to be mapped along with their coverage capacities.

Solution

When it came to developing a map based solution, Airtel needed expert help. As the developer of the world's most powerful mapping and analytics software – ArcGIS – Esri became a preferred choice. ArcGIS applies The Science of Where to connect everyone, everywhere through a common visual language. It combines mapping and analytics to reveal deeper insight into data. Esri provides advanced mapping and data analytics services to 137 countries including India.

Esri India provided the ArcGIS Server-based platform to Airtel. The entire application was designed, conceived and hosted within 10 days, which typically takes about 3 – 9 months. It became operational in February 2016.
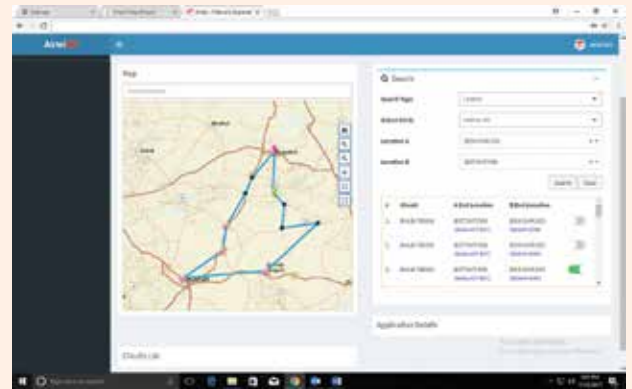
Impact

The solution helped Airtel to:

→ Carry out hotspot analysis and network route planning on web.
→ Access to various web services in a thin client with Esri content.
→ Provide GIS based content & user management system.
→ Flexibility to integrate with open source API with a heart of Esri geospatial framework.
→ To perform the raster analysis on telecom coverage files like .grd and .grc.

The most important benefits of this technology have been:

- Easy rollout.
- Quick deployment.
- Easy and flexible enterprise rollout options.
- User friendly rest API's for easy integration.

Esri ArcGIS Server based platform provides customers "Know my Network" view at State/ District/Pin code/ Locality level. It resolves other pain areas as well.

→ Helps the customers to know the upgradation happening at their location (Site up-gradation / New site planned). This knowledge enables them to switch the technology.
→ The customers do not need to depend on call center for network update happening in their areas.
→ Customers can offer their location for new site hosting.
→ Helps in identification of the network Service area.
→ Enables creation of sales territories for sales and operation teams.
→ Helps in creation of Smart FOS (feet on street) teams who have complete knowledge of Airtel's network. ♠

In Conversation with…
Lajpat Rai, AGM (Cartography), Airport Authority of India

The Airports Authority of India or AAI is responsible for creating, upgrading, maintaining and managing civil aviation infrastructure in India. It provides air traffic management services over Indian airspace and adjoining oceanic areas.

AAI covers all major air-routes over Indian landmass and has ground installations at all airports and 25 other locations to ensure safety of aircraft operations.

To safeguard the Airspace in and around the civil airports, Airports Authority of India (AAI) decided to use Colour Coded Zoning Maps (CCZM) based on the latitude & longitude of the area in respect of civil aerodromes. These maps indicate the permissible heights in the areas around the airport through different colour coded grids.

Accuracy is of utmost concern in the task and to ensure accuracy in Latitude & Longitude with $1/100^{th}$ of second, AAI collaborated with Esri, a leader in mapping software. How this collaboration has led to impressive outcomes, shares *Lajpat Rai, AGM, AAI in an exclusive interview*.

What challenges were you facing with the existing system?

The existing system for creating maps is time consuming, so we need to update our system to meet the current demand. Our main purpose is to provide systematic and accurate work in map form which fulfils the needs of Civil Aviation, which is as per ICAO requirement. Another concern was accuracy. The traditional system was not providing us as much precision as we desired. With safety being a major concern in case of airspace management, we needed a technology that could provide us accuracy to nano-second level.

Why did you choose ArcGIS?

The ArcGIS software provided by Esri India was apt to meet our requirements. Using the software, many of our aeronautical charts/maps could be prepared easily with more accuracy. Accuracy of latitude and longitude in GIS is very reliable. GIS fulfils the need of aviation, airlines, route maps, Colour Coded Zoning Maps, manmade feature, etc. for manipulating and preparation of maps/charts.

What are the main features of the technology?

The ArcGIS provided by Esri India is a robust solution. Using the application, many our maps like Colour Coded Zoning Map (CCZM), Air Route Chart (ATS) Instrument Approach Chart, Aerodrome Chart, Aircraft Parking Docking Chart, Airport Map, Type - A & B, etc. can be prepared easily. The software meets the requirement of accuracy in latitude and longitude with $1/100^{th}$ of second at the same time.

The existing system for creating maps is time consuming, so we need to update our system to meet the current demand.

Please illustrate the benefits of using Esri ArcGIS.

ArcGIS provided by Esri India is of great help. As expected, the system meets our requirements. The technology is benefitting AAI immensely. We are not only saving time and money but also our quality of work is improving. We believe a similar solution from some other organisation would have not only cost us more, but also we may not have got such enhanced quality work.
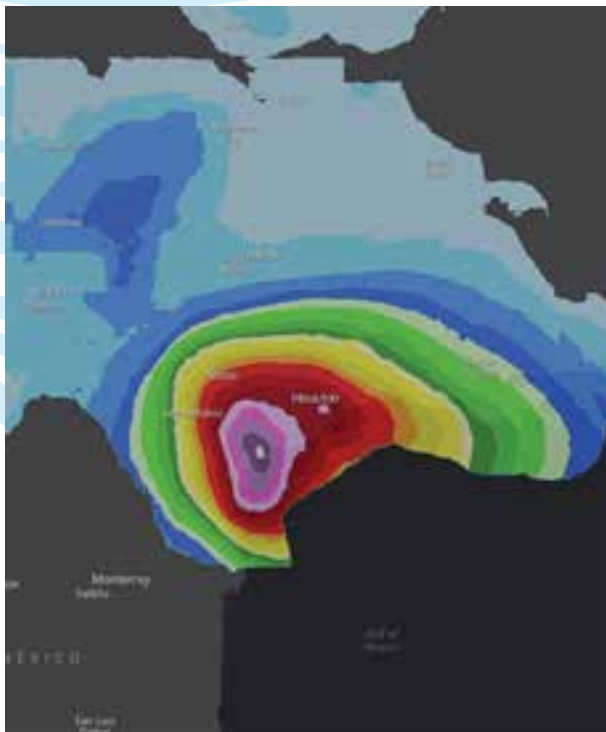
Is the technology completely meeting your requirements or you feel few updates/additions are required?

Though we are satisfied with the current results, to perform better, we feel some more tools need to be added as per our field of work and requirements. Also, I feel with better knowledge of the system and more hands-on experience, we will gain better results in the future.◆
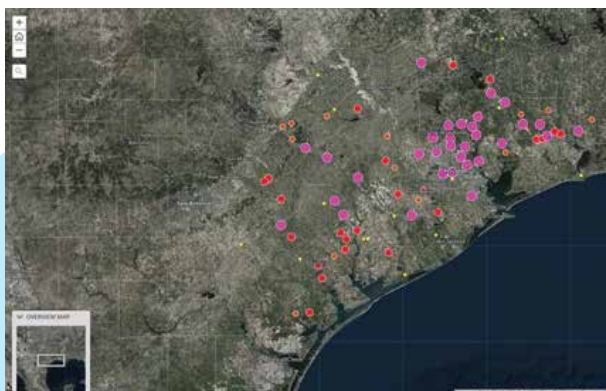
Esri Equips Rescue Agencies with GIS Tools against Hurricane Harvey

In the wake of the ongoing tropical storm Harvey, Esri made stupendous efforts to provide assistance to the affected. The company opened its Disaster Response Program and offered 24-hour support to those who needed help.

People can locate a shelter nearest to them

Hurricane Harvey in August 2017 was the costliest tropical cyclone on record, inflicting nearly $200 billion in damage primarily from widespread flooding in the Houston metropolitan area. It was the first major hurricane to make landfall in the United States since Wilma in 2005. Its intensity in the country was immense. In a four-day period, many areas received more than 40 inches (100 cm) of rain as the system slowly meandered over eastern Texas and adjacent waters, causing catastrophic flooding. With peak accumulations of 64.58 in (164.0 cm), Harvey was the wettest tropical cyclone on record in the United States. The resulting floods inundated hundreds of thousands of homes, displaced more than 30,000 people, and prompted more than 17,000 rescues.

In the wake of the ongoing disaster, Esri made humongous efforts to help and provide assistance to people in this moment of crisis. It opened its Disaster Response Program and offered 24-hour support to those who needed help.

Esri also worked with various organisations and provided them with software, data, imagery, and technical support, to enable them to respond to the emergency calls. The company also shared the Hurricanes and Tropical Cyclones Overview that mapped and described the current location of Harvey, as well as forecast positions

Esri Maps allow people to stay up to date with traffic alerts & closures
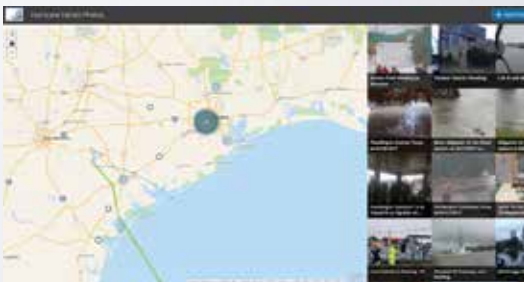
Esri Maps can analyse 72-hour precipitation forecast

Track and forecast the path of Harvey

and probable track of the storm. The shaded area around the forecast track is known as the "cone of uncertainty", that showed the probable track of the tropical cyclone.

The emergency management agencies also used social media and crowd sourcing platforms for gaining insights on the situation. This is where Esri's Crowdsource Story Map came into the picture. It works simply by submitting your photos on the platform and the images start appearing on the map by automatically picking up the location from your mobile device.

The platform is connected to social media and therefore, it allows people to know about your well-being. At the same time it helps first responders and emergency managers in identifying the requirement of the people.

Another Esri application that played a significant role in saving people from Harvey is its Current Conditions Application, which besides tracking Harvey, provides information on traffic alerts, road closures, shelter locations, flood gauges and more.

Also, its map features live feed layers for severe weather across the United States and Canada. You may click on reports and warnings to receive information about the specific location and read a short description about the issue.

In the catastrophic aftermath of Hurricane Harvey, maps and data were critical to the response, and Esri's contribution in this realm was phenomenal. ⬟

Captain Ronnie Hampton has been helping to spearhead the use of GIS technology at the OHP.

Esri Apps Go on the Road with the Oklahoma Highway Patrol

Workforce for ArcGIS and ArcGIS Online help the agency keep motorists safe and fight crime.
By Carla Wheeler, ArcWatch Editor

When the Oklahoma Highway Patrol (OHP) joined the search for a man suspected of killing a sheriff's deputy earlier this year, the law enforcement agency used Esri's ArcGIS Online and Workforce for ArcGIS to properly position more than 100 troopers as the dragnet tightened.

"We were able to keep track of all of [the troopers] with Workforce for ArcGIS," said Captain Ronnie Hampton, commander of the OHP's Futures, Capabilities, and Plans Division. Hampton spoke about his agency's use of Esri technology during the Esri National Security and Public Safety Summit, held last July in San Diego, California.

All 800 OHP troopers have downloaded the Workforce for ArcGIS mobile app onto their smartphones and enabled location tracking, giving dispatchers the ability to see each on-duty officer's GPS location on a customised Dispatch Map in ArcGIS Online. Workforce for ArcGIS is included at no extra cost in an ArcGIS Online subscription. The troopers, plus about 90 dispatchers, have ArcGIS Online accounts.

Hampton said that during the manhunt for the shooting suspect on April 18, 2017, incident commanders could see where each officer was stationed in real time on the map. That locational information helped the commanders decide where to place troopers that were needed for the operation while a

search perimeter was set up. "We were able to send in over 100 troopers, sealing off a two-mile area," Hampton said. "We could see the boots on the ground." The Oklahoma County Sheriff's SWAT team captured the suspect several hours later that day.

Other types of organisations typically use Workforce for ArcGIS to create projects and assign them to staff in the field. Often, the projects involve service, maintenance, and inspection requests and follow-ups to sales leads.

But OHP leadership realised the app could provide a critical, real-time view of where all on-duty troopers are located as they patrol more than 111,000 miles of roads and highways, waterways, and the state capitol grounds. Knowing each trooper's position—which appears on the Dispatch Map as a green icon next to the officer's call number—gives communication center dispatchers the ability to instantly see where all the officers are stationed and, if possible, send the closest officer to the scene of an accident or other incident.

Until Workforce for ArcGIS was launched throughout the organisation in the summer of 2016, dispatchers working in OHP's 13 communications centers were only responsible for dispatching troopers assigned to their specific district. For example, if a traffic collision occurred in the district covered by Troop A, only an officer from Troop A would be sent to the scene—even if an officer in Troop B was 20 miles closer.

"Prior to the [launch] of Workforce, [the dispatchers] would never have known that

The green icons on the map shows the positions of OHP troopers. Application designed by Christopher L Rogers, Oklahoma Department of Public Safety

unit [in another district] was even working because they were focused on their own troop areas," Hampton said.

Now, dispatchers can summon anyone on staff—from a marine enforcement officer to OHP chief Ricky G. Adams—to respond to an incident based on their present location. "Our chief requires everybody, including himself, to use Workforce as they commute to work," Hampton said. "So, everyone in the entire agency is an assignable asset. [Adams] is very much a champion of technology and keeping people safer."

Last year, OHP conducted a 90-day test to find out how many hours and miles in travel time would be saved by using Workforce for ArcGIS to make dispatch decisions. In responding to 28 collisions and 23 cases where motorists needed assistance, the test showed a savings of 889 miles and 14 hours in travel time, Hampton said. "Mileage is a savings of fuel. Hours [saved mean] a quicker response for the public," he said.
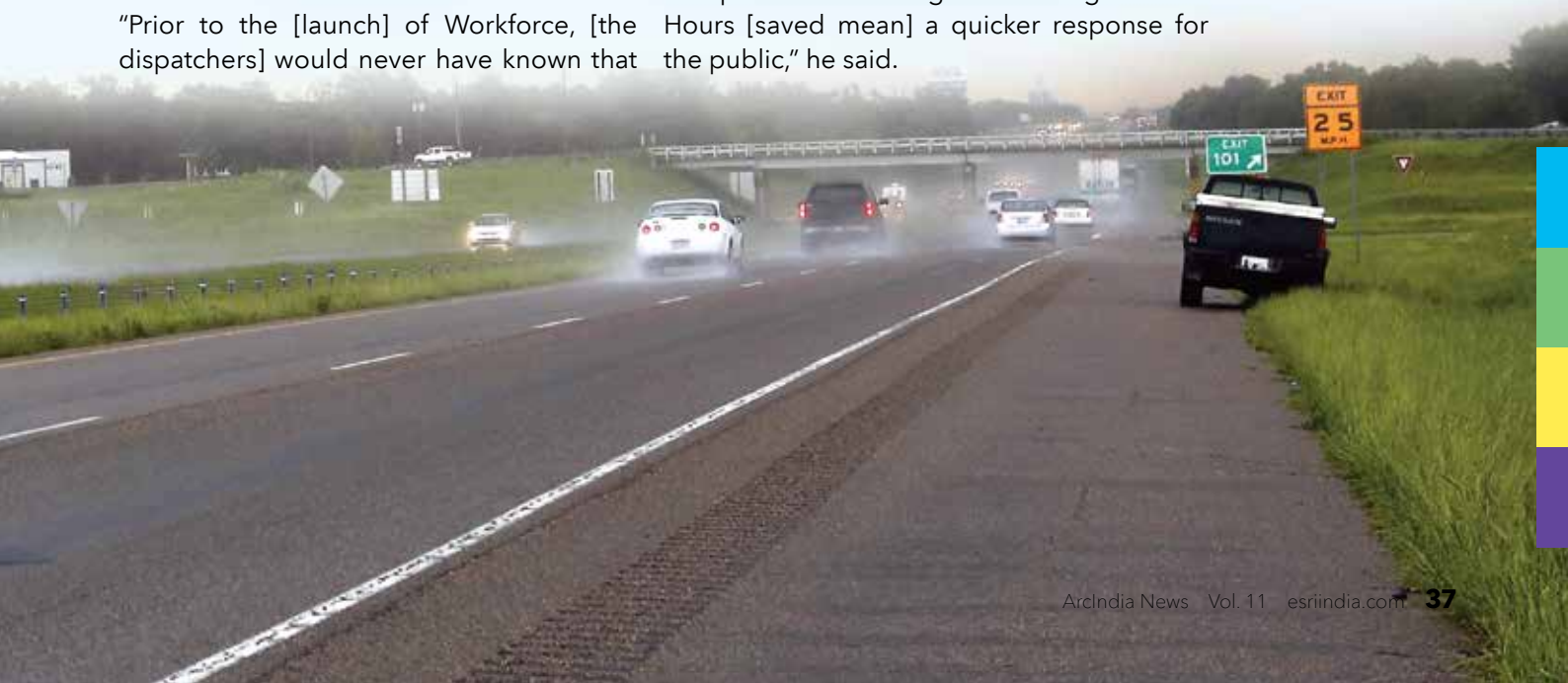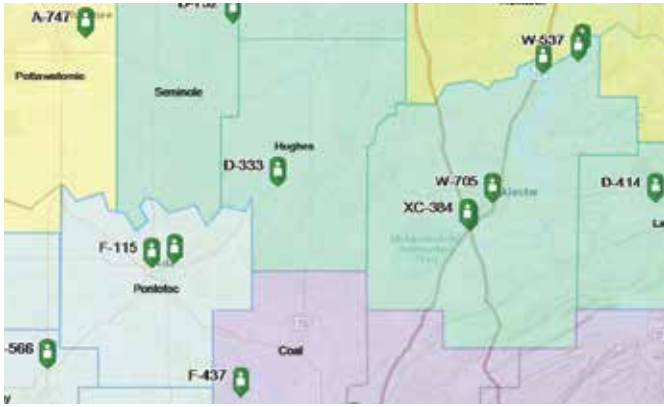
Officers also can see the locations of their colleagues using a Trooper Map in their patrol cars. Application designed by Christopher L Rogers, Oklahoma Department of Public Safety
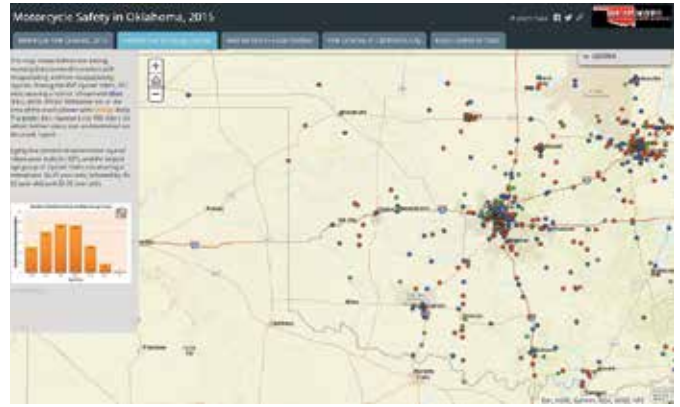
OHP also uses Esri Story Maps apps to tell stories about important issues such as motorcycle safety. Story map created by Amy Graham, Oklahoma Highway Safety Office

The greatest benefit for Oklahomans is the faster response times, especially in rural areas, Hampton said. "The people that benefit from this are the public, by being able to have someone at the scene in 3 or 4 minutes versus … 45 or 50 minutes," he said. "That's where your hours of savings come in."

Following the test's success, OHP made Workforce for ArcGIS and ArcGIS Online available to all troopers last August. All officers downloaded the app onto their OHP-issued Samsung Galaxy S5 smartphones, via the Google Play store. (The app is also available from the Apple App Store and Amazon.)

Today, staff in all 13 communications centers use one comprehensive statewide Dispatch Map in ArcGIS Online to keep track of the officers' locations. The dispatchers can use the built-in Near Me widget to find the officer closest to the scene of an incident. They also can turn on layers in the map to obtain weather information; traffic conditions; and the locations and phone numbers of police, fire, and ambulance stations.

To create the Dispatch Map, the feature data service layer from Workforce for ArcGIS that contains the officers' locations and the green icons was added to ArcGIS Online. Widgets such as Near Me, Basemap Gallery, Filter, Legend, and Measurement were added using Web App Builder for ArcGIS. Weather data from the National Oceanographic and Atmospheric Administration (NOAA) also was brought in, along with traffic information from Esri's World Traffic Service. The GPS coordinates for police, fire, and ambulance

agencies in Oklahoma and contact information, such as the phone numbers for each agency, were also added to the map.

Most of the information and capabilities in the Dispatch Map are available to on-duty officers using the Trooper Field Map in ArcGIS Online, accessible via computers mounted in their patrol cars. The troopers also have access to useful links on the toolbar, so they can retrieve information on court dates, for instance, for each of Oklahoma's 77 counties.

Troopers also can use tools in ArcGIS Online to set up buffer zones after an accident. For example, a trucker suffered a heart attack and crashed his vehicle into the beam of a highway underpass, causing a sulfuric acid spill, Hampton said. An OHP lieutenant on the scene used the Create Buffers tool to establish a zone with a half-mile radius around the incident. He then shared the map with colleagues so they could block off the area to traffic and onlookers.

Workforce for ArcGIS and ArcGIS Online also are providing situational awareness for OHP officers. During the pursuit of a suspect on a rural road, a trooper on duty 80 miles away, in another county, could see where the pursuing officer was located on the Trooper Field Map. When the trooper turned on satellite view, he noticed that the officer was coming up to a T-intersection and radioed him a warning to slow down. After the suspect veered off into a cow pasture, the trooper

from the other county told the pursuing officers where there were openings in the pasture's fencing that they needed to blockade. "[The trooper] knew where the likely escape points were," said Hampton, adding, "We caught that guy."

Hampton said ArcGIS Online and Work-force for ArcGIS are being embraced in his department, especially by the younger officers who grew up with technology. "I've had other police agencies ask, 'How do your troopers feel about people being able to see [their location on a map]?' Some of our older troopers were resistant at first, but our younger troopers are super excited," Hampton said. "It used to be, we had to rely on that person who needed help to give out his physical location. Now, all he has to do is say, 'I need help,' and everybody can see where he's at."

OHP also is putting other Esri technology to good use for public safety, including Esri Story Maps apps. One story map created by the law enforcement agency showed where in Oklahoma motorcyclists had been killed or injured in 2015, and it presented statistics on how many of the riders killed or severely injured had been wearing helmets. Fifty-six percent of the people killed in 2015 in motorcycle accidents were not wearing helmets, according to the story map.

Story maps also may be used in the future to document homicide cases that stem from traffic collisions caused by people driving while intoxicated, Hampton said. "Fast-forward a year, and the [district attorney (DA)] may be in trial and has to explain to the jury what has happened," he said. "If we start collecting information from the time the 911 call comes in, and we document everything in story maps, then it's easier for our investigator to present a case to the DA with little to no effort because [all the information] is there. Then the DA can take…that [story] and present it to the jury."

In the coming months, OHP also plans to process imagery from some traffic collision scenes using Esri's Drone2Map for ArcGIS. Hampton said that OHP plans to initially acquire 13 drones to capture imagery of

accidents that block busy roads. "We can't control cleanup, but we can control how much time we keep the road closed [while] doing the accident reconstruction," Hampton said. Rather than walking the scene and taking photos and measurements, the drone

OHP plans to dispatch drones to capture imagery of traffic accident scenes, which would reduce the amount of time roads are closed due to investigations

would take images of the accident aftermath. "With a drone, we can thoroughly document and collect video and photographs of a crash scene in about six minutes," he said.

OHP would use Drone2Map for ArcGIS to process the imagery and create products for use in investigations and, if necessary, court cases. "We can take a frame of a video and produce a two-dimensional picture. We can take still photography we shot with the drone and produce the two-dimensional picture," Hampton said. "If that case needs to go to court or if we want to revisit the scene the way we found it later, now we can watch the video of what we flew two years ago. If that case ends up being prosecutable, one of the things Drone2Map allows us to do is to create a 3D model. [You may] have seen these CSI [crime scene investigation] shows where they are walking a jury through an animation. Why animate something when you can actually take them back and let them fly through the scene?"

How to get started

True 3D integration with local and global scenes

Remember when you had to open up ArcScene or ArcGlobe to look at 3D data? This idea is on the brink of extinction because of ArcGIS Pro as it allows synchronisation between 2D and 3D.

Earlier it was difficult to move from ArcScene to ArcMap. You couldn't even drag and drop layers from ArcScene to ArcMap. But with ArcGIS Pro 3D data becomes seemingly integrated with local and global scenes.

World Elevation Basemap Rendered in an ArcGIS Pro scene view

Hit the bullseye with improved editing

Now that 3D is truly integrated in ArcGIS Pro, 3D editing has become so much easier. In fact, the whole editing experience is augmented. For example, the default options are very different from what you are used to seeing in ArcMap. Instead of the default point-and-click, you can choose to create polygon, autocomplete polygon, right-angle polygons, freehand, auto-complete freehand and trace. With a wide area of editing options, it sure keeps the user experience in mind. Because graticules are so easy to add in maps, it helps the user edit. Furthermore, ArcGIS Pro improves on the existing versioning tools, linear reference and data reviewer.

Create Polygon, Autocomplete Polygon, Right-angle Polygons, Freehand, Auto-complete Freehand, Trace

Chart your data dynamically with infographics

ArcGIS Pro introduced a new, innovative technique to add beautiful charts in your outputs. And this technique is all headlined under an infographic button. While infographics do consume credits, they look professional and snappy, just what your audience needs. Charts are better-designed in ArcGIS Pro. These charts even interactively and dynamically update when you change your data in your project.


Cartographic Symbology

The Python 3 and Conda facelift

The majority of GIS professionals are accustomed to working with Python 2.7 for their automation needs. The one big facelift ArcGIS Pro takes is how it shifts to Python 3. It also differs how Python is handled for you with Conda.

It really makes sense to use Python because of its seemingly endless number of pre-existing packages. Another notable change is how the arcpy. mapping module has been renamed to simply arcpy.mp. Other than this, the Python modules basically remain the same.
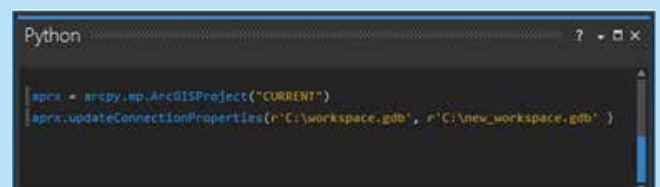

Python in ArcGIS Pro leverages Conda.

with ArcGIS Pro

Smart contextual ribbon interface

Many GIS professionals hesitate to switch to ArcGIS Pro as most of the tools have been moved. But this is not the complete truth!

It is actually the contextual tab interface that really adds to the user experience because it puts your favourite tools where you can access them easily (even new ones). That means when you click a tab, the contextual interface only shows relevant tools that you can use. For example, when you
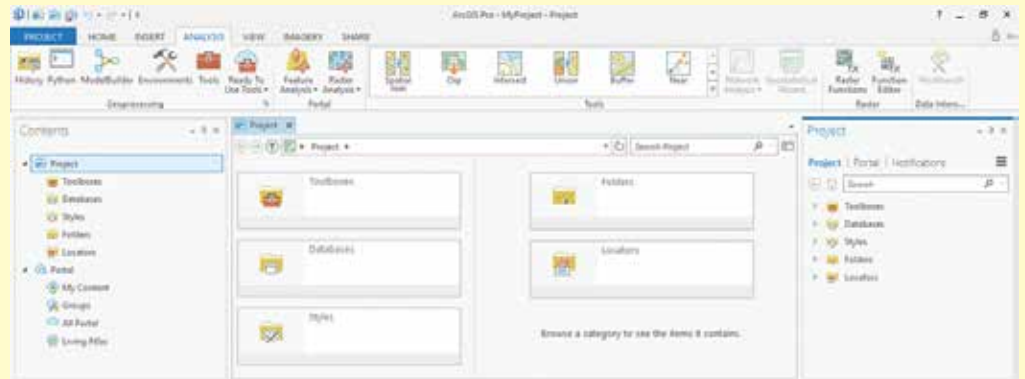
The ArcGIS Pro user interface with ribbons and projects

click a raster image in your table of contents, the view tab appears with tools like swiping and transparency settings. Instead of trying to find your effects toolbar, you can find common tools in its contextual ribbon.

Overall, when you play around with it more, you will realise that you don't have to search around as much to find the tools you need most.

TRIMBLE AND ESRI:
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A Centre of Geospatial Excellence

A collaboration between Esri India and Indian Institute of Engineering Science and Technology, Shibpur.

According to a report by the National Task Force on Geospatial Education (under the Ministry of Human Resource Development of the Government of India), India has less than 31,000 GIS professionals as against a requirement of 70,000. There are very few institutions in the country providing geospatial education, resulting in a serious shortfall in the availability of trained GIS professionals.

Tapping this deficit, Esri India Technologies and Indian Institute of Engineering Science and Tech-nology (IIEST), Shibpur, on October 5, 2017 in collaboration announced the launch of Centre of Geospatial Excellence (CoGE) in the eastern region. The centre aims to impart GIS skills to graduates and working professionals through a set of short and long-term programmes that are co-designed with senior faculty members from IIEST and domain experts from Esri India. These programmes will focus on foundational geoinformatics and its applications in various government programmes, like Smart Cities, Digital India and Clean Ganga.

Agendra Kumar, President, Esri India said, "Esri India acknowledges the urgent need for geospatial skills in India which are critical for country's transformation and, together with the educational institutions, aims to impart geospatial education to help industry overcome the talent deficit in GIS."

"We have achieved an important milestone with this collaboration. In today's technology driven environ-ment we cannot afford to leave the added advantage of understanding 'Location Intelligence' that will make our students career ready for GIS opportunities," said Prof. Ajoy Kumar Ray, Director, IIEST, Shibpur. He adds, "GIS goes beyond what users know of maps. It brings out the importance and value of the location in every business scenario. Students would be able to under-stand the multi-disciplinary nature of GIS and also its applications in various domains."

About IIEST

In March 2014, Bengal Engineering and Science University, Shibpur was taken over by the Government of India and converted into an 'Insti-tute of National Importance' and renamed as Indian Institute of Engi-neering Science and Technology, Shibpur. IIEST, Shibpur offers various technical and non-tech-nical graduate, post-graduate and PhD courses.

Infrastructure

Having a rich history, IIEST, Shibpur has a lush green campus with state-of-the-art amenities. The Centre is equipped with best of software and hardware related to GIS and remote sensing and gives an all-round perspective on the GIS technology.

Faculty

IIEST takes pride in having the best faculty in the domain on board and CoGE is not an exception. The faculty members associated with the Centre are the best in the industry with years of experience in the domain.

The centre aims to impart GIS skills to graduates and working professionals through a set of short and long-term programmes.

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Ahmedabad

505, Shree Balaji Heights, Beside IDBI Bank, Near
Tanishq showroom, C.G. Road
Ahmedabad - 380009, Gujarat

Bengaluru

Ramakrishna Towers, 4th Floor, 31/2,
Rupena Agrahara, Begur Hobli,
Hosur Road (Near Silk Board Flyover)
Bangalore - 560 068, Karnataka

Chennai

629, Regus Millenia, RMZ Millenia Business Park
Level 6, Phase II, Campus 4B, Unit 602A, No:143,
Dr.M.G.R Road,
Perungudi Chennai - 600096, Tamil Nadu

Hyderabad

Q City, Block B, 6th Floor, Sy. Nos. 109, 110, 111/2
Nanakramguda Village Serilingampally Mandal
R.R. District, Hyderabad – 500 032, Telangana

Kolkata

3B-501, 5th Floor, Eco Space Business Park
Rajarhat, New Town,
Kolkata - 700 156, West Bengal

Mumbai

4th Floor, Marwah Center, Kishanlal Marwah Marg,
Off Saki Vihar Road, Andheri (E)
Mumbai - 400072, Maharastra

Noida

H-7, Sector 63
Noida- 201301, Uttar Pradesh

Nagpur

55, 2nd Floor Satyam Apartment Near Nawad well,
Canal Road, Gokulpeth
Nagpur - 440010, Maharashtra

Other Branch Offices

Bhopal
Chandigarh
Dehradun
Lucknow
Thiruvananthapuram