



GOVERNMENT OF ASSAM



ASSAM STATE SPACE APPLICATION CENTRE (ASSAC)

Glimpses of Geo-spatial Activities for Planning, Development and Serving the Society



Key Areas



Forest



Agriculture



Water Resources



Urban Studies



Infrastructure



Law and Order



Education



Health



Revenue and Disaster Management
Border Area Mapping



Finance



Use of UAV

ABOUT ASSAC

The Assam Remote Sensing Application Centre (ARSAC) has been carved out of Assam Science Technology and Environment Council (ASTEC) by a decision of the Hon'ble Cabinet of Assam vide notification no. STE 25/2021/126 dated 17th August, 2021 and is registered as an autonomous body under Societies Registration Act XXI of 1860 on 3rd of November, 2021.

The basic mandate of ASSAC is to extend support to all user departments of government of Assam with space inputs for planning all developmental activities and identifying strategic areas that require priority intervention by Government. Besides, ASSAC is also notified as the Nodal Agency (No. No. STE 86/2016/93A dtd. 23rd March, 2018) by the Government of Assam to create and maintain Geo-spatial data repository on Natural Resources for the entire state of Assam. ASSAC is also involved in establishment of a training and capacity building centre for meeting the requirements of skilled manpower in Remote Sensing and Geoinformatics.

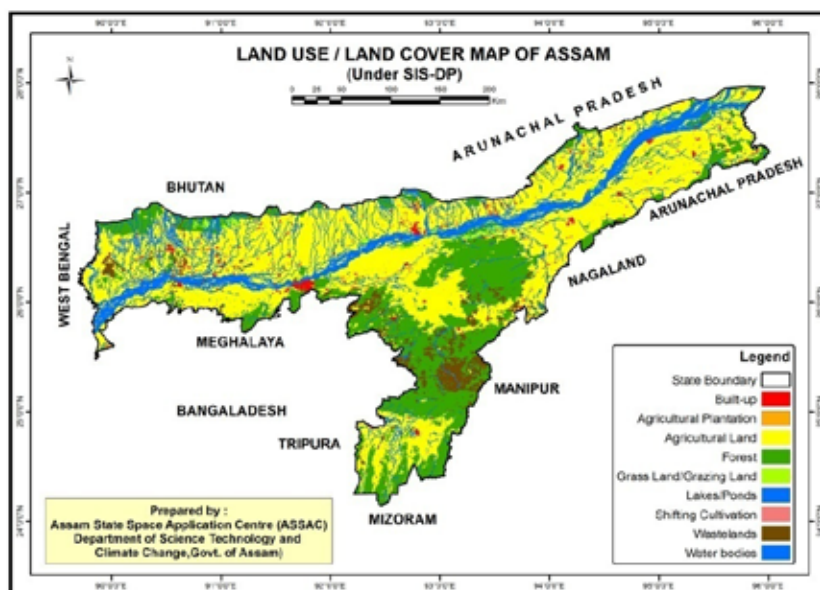
Since its inception as a Centre for Application of Remote Sensing technology, it has completed more than 100 projects including 36 projects (i.e. 24 nos are of Plan of Action (PoA) Projects identified under NESAC Society and 12 projects from GOI and Assam State) currently being under progress, mainly in the areas of Land Use and Land Cover, Asset Mapping, Mobile App development, Geo-visualization and Monitoring, Crime Mapping, Agriculture and Soils, Forests, Wetlands, Urban and Regional planning, Flood, Hydrology and Water Resources and all other natural and manmade activities related to the development of the state.

Project sponsored by Government of India (NRSC/ISRO, NESAC, SAC)

Project title

Space Based Information System for Decentralized Planning- update (SIS-DP update)

Summary: The project envisages to classify and map the Land Use and Land Cover types including Drainage, Slope, Infrastructure etc.) on 1:10,000 scale combined with administrative boundary maps such as cadastre, village, gaon panchayats, blocks and district to provide Space Based Support for Decentralized Planning at Panchayat Level using High Resolution



Ortho-rectified Satellite Image. The output will be used for dissemination through Geo-portal (BHUAN PANCHAYAT GEO-PORTAL). In addition the portal will be used for capacity building and activity planning.

Project title

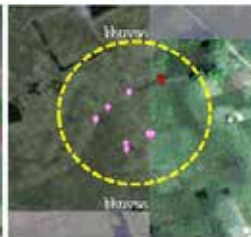
Integrated Watershed Management Programme (IWMP)

Summary: MORD, GOI implemented 293 IWMP projects in Assam through SLNA, Soil Conservation Department, GOA over a period of five years during 2009 – 14 for the schemes like farm pond, agricultural bund, field bund, ring well, weaving (Self Help Group) etc. NRSC, ISRO entrusted to monitor and visualise the implemented schemes in Bhuvan Portal (NRSC, ISRO) for the consecutive five year w.e.f. 2013. The objective of the project is to monitor by using multi date LISS 1V / Cartosat -1/ Sentinel-2 & Landsat-8 satellite image and uploading the intervention points (Dristi points through mobile app). LULC change analysis of respective watersheds for the all 293 watershed project sites. The details are made available with the Bhuvan Portal at <https://bhuvan.nrsc.gov.in>.

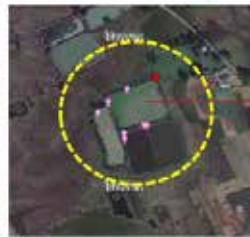
DEVELOPMENT OF FARM POND



T0: 2009-10



T1: 2013



T5: 2018



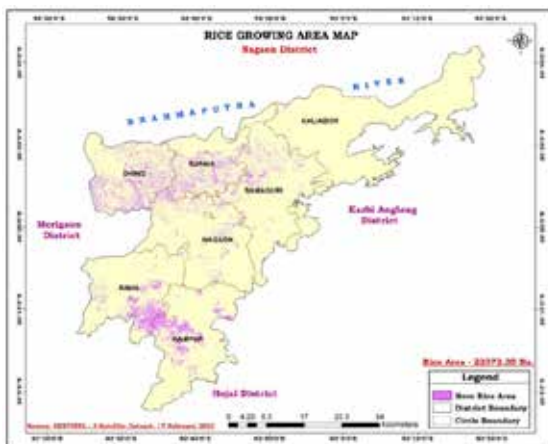
Dristi SL. No 567981
MWS: 3B2A8ii
Status of activity : Completed
Creation time : 24.04.2016

Remarks: Construction of farm pond is clearly visible in the image of 2018.

Location : Nagaon IWMP-1 (2009-2010) Batch-1

Project title

Forecasting Agricultural Output using Space, Meteorology and Land Based Observation(FASAL)



Summary: FASAL is the oldest ongoing project of ASSAC which has been involving for pre harvest acreage and production estimation of kharif rice for entire state and Jute for selected jute growing districts of Assam. Pre harvest crop acreage and production estimation is done by using multi-date AWIFS/ Sentinel-2/Landsat-8 & multi date Sentinel-1A SAR Data. Semi-physical Remote sensing based model, Remote sensing Index based yield model, Correlation weighted district level Agromet level, Crop stimulation model by IMD, and Data obtained from Crop Cutting Experiment are used for acreage and production estimation. As this project is Sponsored by MNCFC, New Delhi under Ministry of Agriculture and farmer's Welfare so the data generated used for planning and calculation of GDP of nation.

Data used: RADARSAT microwave satellite data, meteorological data, crop cutting data and space based index. Data classification is done by Model Rule.

Project title

National Wetland Inventory and Assessment (NWIA-Phase-1), Assam

Summary : The projects aims at updation of Wetland Inventory of Assam at 1:50,000 scale using Resourcesat LISS-III data of 2017-18 period, using the existing Wetland Inventory of 2006-07 period, as base layer and analysing the changes in the wetlands of the state with respect to number, shape and size. Preparation of Wetland Inventory and creation of a GIS database at 1:25,000 scale using Resourcesat LISS-IV data of timeframe 2017-18 are also done to facilitate data retrieval at the desired level using Information system module developed under VEDAS portal at SAC, ISRO.



The results of the study indicate that there is an total number of 53982 wetland in the state of Assam covering an area of 1114822 hectare. Further there are 36700 small wetlands of size smaller than 0.1 Hectare. A comparison to the status of wetland in the year 2006 indicates an increase in wetland area of 336,093.11hectare. Deepor beel, Dhir beel, Sareswar beel, Sone beel,Urpad beel,Saran beel, Tamaranga beel and Sonai beel are some of the important wetlands of the state.

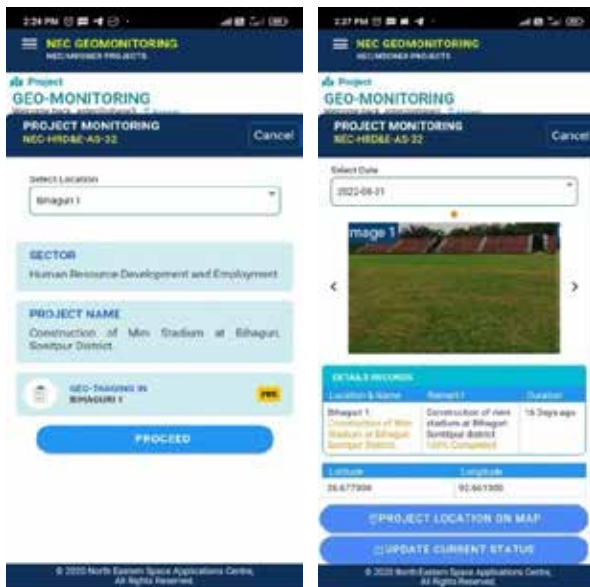
Project title

Geotagging and Monitoring of NEC funded Projects/schemes in NE region using Geospatial Technology and Tools

Summary: It is one of the unique applications developed by the North Eastern Space Applications Centre (NESAC) with the support of North Eastern Council (NEC) and Ministry of DoNER (MDoNER), started from November 2019.

Primary Goals of the project work are to geo-tag the existing project sites of NEC and monitor the status of the progresses of the implementation in periodic manner. In Phase I, Geo-tagging of project sites of NEC have been completed and in Phase II, monitoring of project sites are under process.

Currently, total 67 projects spreading in more than 111 locations throughout Assam & It is being monitored using Mobile application.



Mini Stadium at Bihaguri, Sonitpur District

Projects under SOPD during Fy 2021-2022 to support project identified under PoA for utilization of Space input

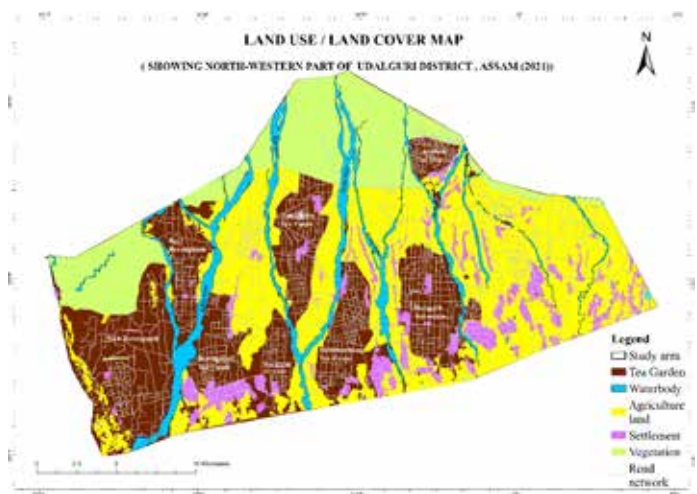
Project title

Application of Geospatial Technology in Small Tea Garden Development and Management (house hold Tea Gardens: small & marginal), Assam

Summary: The main objective of the project is to develop a Spatial Decision Support System (SDSS) for the small tea garden areas of the State based on space inputs and application of geospatial technology taking into account the Information related to infrastructure, drainage/

irrigation facilities, land use/land cover and all other relevant data.

The boundary of the small tea garden areas will be demarcated with the help of GPS based ground level information. Based on the DEM data the elevation, slope and aspect pattern map of the Tea garden area will be prepared. The Road and Landuse/Landcover map of the Tea garden area of north-western part of the study area is prepared with the help of Sentinel-2A Satellite data.



The outcome of the project is expected to help while evolving appropriate plan for sustainable management of small and marginal tea garden areas of the State.

Project title

Development of Hyper spectral Reflectance based spectral signature repository for important agricultural crops of Assam.

Summary: With the objective to develop a spectral repository of important agricultural crops of Assam, the project involves collection of spectral reflectance of crop from field using spectroradiometer and development of a Graphic User Interface (GUI) for the display and retrieval of different vegetation indices for the targeted crops. Altogether, eight crops are identified for the study i.e. Sali paddy, Black gram Jute, Summer paddy, Mustard, Sugarcane, Potato and Maize.

Project title

Development of DSS for controlling and monitoring of all major trans boundary animal diseases (TADs) including African swine fever (ASF).

Summary :

The major objectives of the proposed proposal are given below :

- a) Data collection, standardization and integration for analysis of TADs in a spatial domain
- b) Organization and linking of existing database on five major livestock – Cattle, Buffaloes, Sheep, Goat & Pigs with the proposed DSS
- c) Spatio-temporal data analysis and perform analytics for real time decision making
- d) Development of DSS Dashboard and Mobile Application for planning, monitoring and management of TADs

e) Imparting Capacity Building for effective utilization of DSS applications

Application will be developed on open-source tools following service oriented technology and will be comprised of two major functional modules: Spatial dashboard application for visualisation of information pertaining to TADs in the form of maps, statistics and reports for immediate decision making. Additionally, instant live feeds from the field captured via Mobile App will be visualized on dashboard with its detail. Mobile application with latest state-of-art mobile technologies will be developed for collection of geo-tagged live cases of TADs as per the specified format of Assam Government. The geo-fencing module will be developed to notify (automatically) the Officials or any other citizens while they are travelling across African Swine Fever/other TADs hot-spots or containment zones. A joint work of NESAC and ASSAC.

Project title

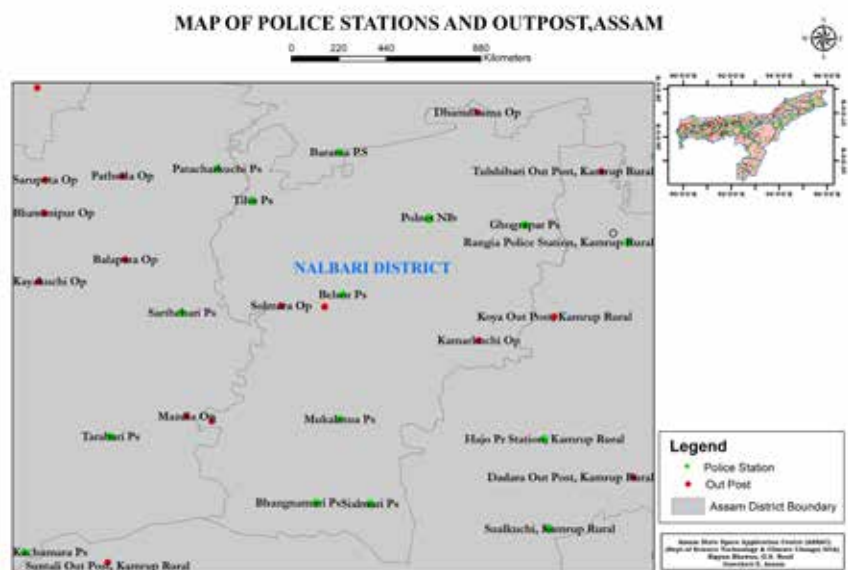
Mapping location of Fair Price Shops (FPS), GPSS, Godowns

Summary: Project will be carried out with the objective of Mapping of Fair Price Shops (FPS) maintained by selected individual, Gaon Panchayat level Samabai Samity (GPSS) maintained by Gaon panchayat and Godowns maintained by Government in Assam along with necessary attributes using high accuracy geo-tagging mobile apps and To determine the boundaries of FPS, GPSS and Godowns using high resolution satellite images with expected output of GIS map of numerous Fair Price Shops (FPS), Gaon Panchayat level Samabai Samity (GPSS) and Godowns which is spread in Assam and to store data in one database for future planning, administrative control and expansion.

Project title

Mapping location of Police Stations/outposts, jurisdiction and their connectivity

Summary: Objective of the project is to map location of Police Stations/Outposts using high accuracy geo-tagging mobile apps along with their connectivity for the state of Assam Mapping of Jurisdiction using high resolution satellite images to demarcate the boundaries and the road network.



Project title

Mapping of vulnerable crime areas

Summary: Main objective of the project is mapping of vulnerable crime area in real time by Development & Implementation of Web based Crime GIS application. Draft version of mobile app and dashboard are developed. The final outcome is an application with a Decision Support System to capture, visualize and monitor the vulnerable crime locations of the past and real



time incident data in spatial domain with capability of querying to specific incident based on multi-criteria filtering i.e. gender, age, date, time etc.

Project title

Mapping and Geo-tagging of SATRAS and Archaeological Sites of Assam using mobile apps

Summary: The main Objective of the project is Geo-tagging of SATRA and Archaeological locations across the state in terms of latitude and longitude information (along with photographs and attributes as per department) to demarcate the



Shri Shri Ishwar Hati Satra



Ishwar Shri Shri Bardhigi Satra

boundaries of respective SATRA and Archaeological locations using high resolution satellite images. Mapping and demarcation of project boundaries can be accomplished with the help of QGIS. Further extending the scope, a web map project with the same geo-database can be deployed for dissemination of vital information to general public. Respective user department can have a holistic view of satras and archaeological sites with the help of attribute information.

Project title

Ground Control Point (GCP) library using DGPS

Summary: The main objective of this project is to establish GCP in selected specific location within the state using DGPS survey. It will facilitate / enhance further geometric rectification of satellite image and improve per pixel geodetic accuracy and also help in proper orientation digital cadastral map.

Project title

Conversion of manual conventional maps of Minerals and Mines /Quarry into GIS maps

Summary: This project is started from June 2022 and will be finish in January 2023. All the existing maps of directorate of Geology and Mining Govt. Of Assam are in paper print format with/without latitude longitude. The main objective of this projects is to convert that physical map of different mining site into GIS format. It will help the directorate to further use in planning and development.

Projects from user Agencies (Assam Govt., ONGC,OIL India, IGGL, RUSA, Sarvasiksha Abhijan)

Project title

Web GIS mapping of higher education institute of Assam (Web portal)

Summary: Core objective of RUSA Geographic Information System mapping was to geo-visualization of Higher Education Institutes located within the state of Assam. In addition to create a digital repository of schools (540 at present) as well as geospatial analysis of the same with respect to various parameters such as type of institute, administrative boundary, etc.

Project title

GIS mapping of schools (LP & UP): Web portal hosted in ARC GIS Enterprise



Key performance indicators

Summary: Core objective of SSA Web GIS Mapping was geo-visualization of LP and UP schools of Assam as well as geospatial analysis based on various parameters which would help

determined enrolment and dropout trend of schools. Core objective of this project was geo-visualization of lower primary schools amounting to 45,746. In addition, to create a digital repository of schools for further planning, as well as geospatial analysis of various parameters which would help to determine enrollment and dropout trend of schools.

Project title

Landuse Landcover mapping around 1km buffer of proposed well location in Golaghat, Sibsagar and Hailakandi Districts

Landuse Landcover mapping around 1km buffer of proposed well location in Dibrugarh, KarbiAnglong and Dimahasao districts of Assam

Summary: Customized Thematic Mapping services (i.e. Landuse landcover mapping using high resolution satellite data) for proposed well locations within districts of Golaghat, Sibsagar, Hailakandi, Dibrugarh, Karbi Anglong and Dima Hasao districts of ONGC and OIL India towards environmental clearance studies.

Project title

**Administrative boundary maps of Kamrup district
Circle Boundary Map of Assam**

Summary: User defined services to NECTAR as well as ARIAS for their planning activities

Project title

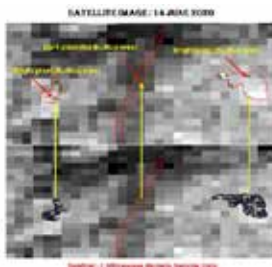
Master Plan Area Mapping in GIS of Kharupetia town

Summary: The preparation of plans/Maps under Mater Planning process presently involves collection of cadastral maps of villages and town area proposed to be incorporated within the Master Plan, geo-referencing/stitching of the cadastral maps and bringing down the same to a suitable scale for digitizing and preparation of the final Plans/maps, carrying out requisite physical surveys for verifying the areas and collection of relevant information. It also involves procurement of High resolution Satellite Imageries for digitization of the maps and verification by overlaying the maps on Google Earth Platform.

Project title

Analysis of multi date satellite data for village GOG in Kamrup district, Assam, finding building and other infrastructure in the proposed gas pipeline

Summary: Indradhanush Gas Gird Limited, a joint venture company of Govt. of India requested ASSAC to find out existence of a household bearing location extent of 260 21/27//N and 91045/34//E in the village Gog (Kamrup District) before and after 16th June



2020. Accordingly ASSAC scientist team had taken up the problem and resolved the issue using online freely available satellite data. From the analysis, as illustrated through the above satellite images it is found that there is no building structure on or before June 14, 2020. However, the building structure has appeared in the September 2020 satellite data.



Other line Departments of Govt. of Assam

Project title

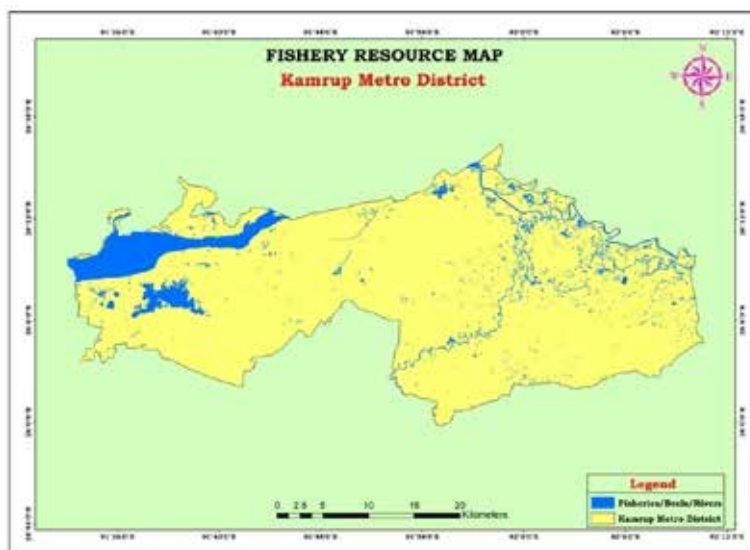
Geo-tagging of all existing Sports Complexes and playground of Assam

Summary: The main objectives of the project is mapping of Sports Complexes and playground in Assam along with necessary attributes using high accuracy geo-tagging mobile apps and to demarcate the Sports Complexes and playground using high resolution satellite images. This project will Support operation plans and clarify ideal deployment locations with better visualization of all Sports Complexes and playground in relation to distribution network connectivity in a map frame.

Project title

Application of Geospatial Technology for Mapping and Identification of Fishery Resources & to Prepare a Digital Database Repository for Fisheries Development Phase-I, Kamrup District (Undivided).

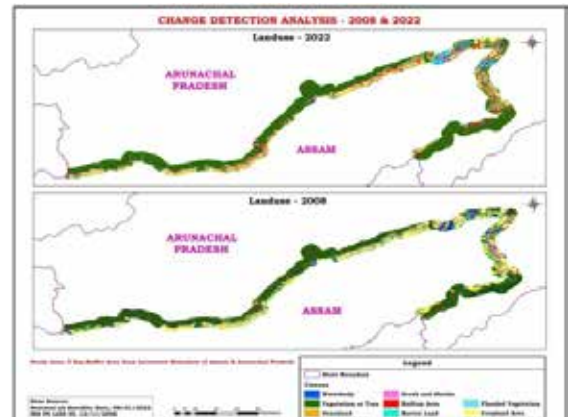
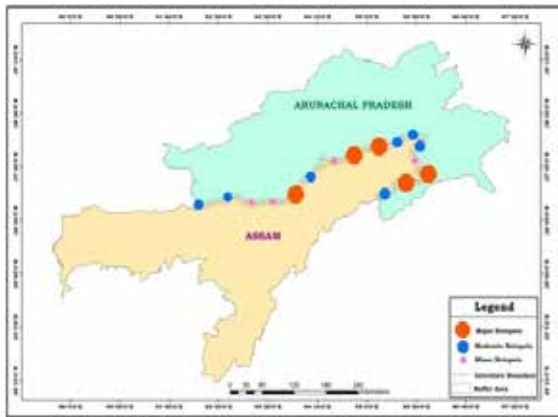
Summary: This project funded by the dept. of Fisheries, Govt. of Assam for identifying and mapping of fisheries/Bill up to micro size ponds (i.e. 0.05 ha.) with a pin point accuracy level which are registered with Revenue department and AFDC and unlisted fisheries sites within the districts will also be covered. The outcome will be in form of report and digital data repository which will be used for planning, management and advisory services.



Project title

Remote Sensing & GIS Based Technical Inputs For Interstate Border Dispute Management Along Assam-Arunachal Pradesh Interstate Boundary

Summary: On demand from the dept. of Border Area Development and Management, Govt. of Assam a study was conducted and output was submitted to the department. The basic aims of the study to delineate and mapping of built-up areas around 68 Nos. disputed sites inside Assam territory and to delineate the built-up areas around 13 Nos. of disputed sites spreading both sides of Assam and Arunachal Pradesh. Land use change analysis for 2008 and 2022 was carried and submitted to the concerned Department.



In addition to the above, following projects are to be executed under POA with the collaboration of NESAC and funding support from NEC/NESAC:

- Space technology support for expansion of Muga sericulture in Assam.
- Identification and mapping of encroached and degraded forest area.
- Wetland mapping using very high resolution satellite data both pre and post monsoon to delineate wetland extend Upto 0.1 acre as well as water quality analysis.
- Space-based landuse Intelligence system for Guwahati (SLIS-G).
- Watershed delineation for Dhemaji district of Assam using high resolution DEM.
- Bankline migration studied of Brahmaputra, Barak and selected tributaries.
- Mapping and Monitoring of Embankments and its vulnerable reaches.
- Space Based Support for Integrated Development of Horticulture In NER (SSIDH) Project
- Preparation of a Flood Risk Map of Assam.
- Fallow area mapping during winter due to non-availability of irrigation (Application of space technology for agricultural assessment in NER (ASSAN)
- Space technology support for utilization of Brahmaputra river island (chars) area for productive cultivation in Assam.

Role of ASSAC as a Nodal Agency and way forward

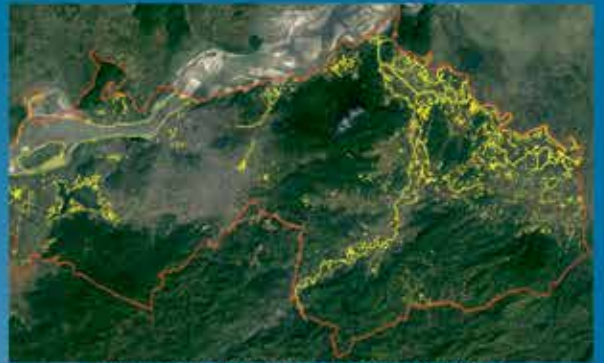
Possible areas that ASSAC can render necessary services for the Line Departments in planning and execution of various projects as detailed below:

SI No.	Potential of Geospatial technologies and applications in different areas where ASSAC can support
1	Agriculture: (a) Application of geospatial technology for the identification & mapping of wetlands/beel in Assam.(b)Application of geospatial technology for the identification & mapping of fisheries and beels in Kamrup mertro and Kamrup rural district.(c)Land resource evaluation for agricultural Land use planning & management & creation of an Agriculture Resource Information System (AGIS) for west Karbi Anglong district of Assam: a geospatial approach.(d)A Roadmap for Organic Farming in Brahmaputra Valley by using Remote Sensing and GIS Techniques for Augmentation of a Eco-friendly Agricultural system.
2	Forest: (a)Forest Resources Information System (FRIS) for all the Reserved Forest, Wild life Sanctuaries and National Parks of the state inclusive of information related to administrative control, management, involvement of stakeholders, micro-flora, micro-fauna, large plants and animals, reptiles, avifauna etc.(b) Ecosystem processes, economic value, status of degradation and possible avenues for rejuvenation and eco-restoration.(c)Drone based monitoring system for selected forests and wetlands which are under the threat uncontrolled anthropogenic activities.
3	Water Resource: Inventory assessment, reconnaissance and detailed planning for basin / watershed areas, watershed management (i.e. treatment for reducing erosion), river erosion / sedimentation, pollution studies, flood mitigation studies, planning and management
4	Urban Studies: (a) Base GIS database creation of building foot-prints using very high resolution satellite / UAV data (b)Master Plan/Development Plan for urban land management, urban sprawl, landuse intelligent system in encroachments / illegal activities, taxation and smart city planning, monitoring and control.
5	Infrastructure: GIS provides the central data system for the process of developing and constructing infrastructure gives the engineers a common means to communicate geospatial data, maintain current data, and allow iterative design/ data collection procedures without exchanging data files of differing format, version, and content.
6	Law & Order: Predictive analytics for crime locations/area that will empower Police Department to mobilize resources towards areas inclined or prone to higher crime rates.

7	Education: With the help of Machine Learning and geospatial modelling, trend analysis of enrolment rate and prediction of drop out can be ascertained that will enable Education Department to better cater to gap areas primarily responsible for the decline/drop in enrolment rate.
8	Health: (a)Providing public health practitioners and Researchers with several new types of data and to build models.(b) Providing decision makers to plan and visualize public health problem.(c)Providing immediate emergency service, disease and risk factor mapping and service delivery.
9	Revenue & Disaster Management: (a) The vision of remote sensing and GIS technology is to visualize the critical vulnerabilities & damages and reduce the impact of the disaster. The GIS Technology results could be responded quickly during the disaster. (b) GIS helps to create different levels of vulnerability maps which indicate the areas that are frequently affected by floods and base maps (Gram Panchayat, District) to show the location and setup of boats and the rescue team's plans. (c) The spatial analysis such as developing different theme maps like Elevation, Slope, Aspect, and Hill shade using terrain analyst which is very useful in landslide & Avalanches disaster prediction.
10	Border Area Mapping: (a)The application of Geospatial technology in solving the inter state border dispute between Assam and other north eastern states of India. (b)Continuous monitoring of border areas using UAV/drone.
11	Finance: Enhances understanding of risk, customer interactions and economic condition using spatial model based on geography and geo-demographics.
12	Use of UAV/Drones: (a)Crop growth monitoring and early detection of pest infestations. (b)The UAVs and remote sensing techniques appropriate measures at the right time to protect the crops from diseases. (c) Manual intervention to monitor and diagnose insect and pest infestations is difficult in Wider agricultural field but UAV remote sensing is useful.(d)Mapping of Forests and Biodiversity.(e)Measuring Forest Canopy Height and Attributes.(f)Precession forestry and sustainable forest planning management.(g)Mapping canopy gaps, Forest fire monitoring.

'Humankind must rise above the Earth- to the top of the atmosphere and beyond- for only thus he fully understands the world in which he lives'

- Socrates 500 B.C.



*Delineation & Mapping of Fisheries / Beel
in Kamrup (M) district*



Aerial view of Science City, Sonapur



Some moments of GIS Day and Training Programme

For more details, please contact:
Shri P. L. N. Raju, Director
Assam State Space Application Centre (ASSAC)
(Department of Science, Technology and Climate, Govt. of Assam)
Bigyan Bhawan, 3rd Floor, Near ABC Point
G.S. Road, Guwahati-781005, Assam, India
Mobile No.: 9411768991, E-mail: dirassac@gmail.com,
raju.pln@assam.gov.in, <https://www.arsac.in>