



**TRAINING CUM WORKSHOP
ON
NAKSHA PROGRAMME FOR DISTRICT
MAGISTRATES/MUNICIPAL COMMISSIONERS**

(8TH DECEMBER TO 9TH DECEMBER, 2025)



**COURSE
REPORT**

**B.N. Yugandhar Centre for Rural Studies
Lal Bahadur Shastri National Academy of Administration,
Mussoorie – 248179**

Training cum Workshop on NAKSHA
Programme for District
Magistrates/Municipal Commissioners
(8th December to 9th December, 2025)

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Day 1



Training cum Workshop on National Geo-Spatial Knowledge-Based Land Survey of Urban Habitations Programme for District Magistrates/ Municipal Commissioners (8th – 9th December, 2025)

Venue: Kalam Hall, Indira Bhawan, Lal Bahadur Shastri National Academy of Administration, Mussoorie



Organized by
B N Yugandhar Centre for Rural Studies
Lal Bahadur Shastri National Academy of Administration, Mussoorie

Sponsored by
Department of Land Resources
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Objective and deliverables

Objective

To provide orientation and hands-on exposure to District Collectors on the complete NAKSHA workflow and their strategic leadership role in facilitating inter-departmental coordination, survey supervision, and grievance redressal.

Deliverables

Comprehensive understanding of:

- o Map-1: Aerial survey and feature extraction
- o Map-2: Ground truthing and field validation
- o Map-3: Handling public objections and finalization of UrPro Cards
- o Exposure to GNSS/RTS-based surveying, Web-GIS portal, and coordination protocols.

Welcome Address by Dr. Bagadi Gautham, IAS, Professor (Public Administration) and Centre Director, BNYCRS

Dr. Bagadi Gautham, IAS, Centre-Director of BNYCRS and Professor of Public Administration in his inaugural address spoke about the objectives and ongoing initiatives of the Centre, underscoring its efforts to engage with pressing issues in rural and urban governance. He extended a warm welcome to the Shri Sriram Taranikanti, Director, LBSNAA along with other distinguished guests, faculty members and participants comprising Municipal Commissioners, Executive Officers and Senior Administrative Officers from across the country. He then continued outlining about NAKSHA and its objectives and long-term relevance. Dr. Bagadi Gautham also highlighted several state-level initiatives being undertaken within the NAKSHA framework underscoring the importance of collective effort and inter-departmental collaboration for its effective implementation.



Address by Shri Sriram Taranikanti, IAS, Director, LBSNAA

The Director of LBSNAA warmly greeted the Joint Secretary of the Department of Land Resources (DoLR), the Centre Director and all participants attending the two-day NAKSHA Programme. He underscored the critical role of the NAKSHA Programme in enhancing the capacity of Urban Local Bodies (ULBs) by equipping them with modern tools and knowledge necessary for effective urban planning and amenities development.

The Director elaborated on how the programme supports micro-level management of urban infrastructure, which is pivotal for delivering efficient public services. He highlighted key components under this micro-management framework, including the maintenance and development of roads, effective street lighting solutions, management of parking spaces and proper functioning of sewerage systems. He also drew attention to specialized facilities such as Material Recovery Facilities (MRF) for waste segregation and recycling and Sewage Treatment Plants (STPs) that ensure sustainable wastewater management in urban areas.



Expanding beyond infrastructure, the Director stressed the importance of integrating tourism management at the local level, noting that well-maintained tourist sites contribute to both economic development and cultural preservation.

Another significant aspect he emphasized was the need for comprehensive public space management. He urged participants to not only focus on urban public spaces such as parks, plazas and roadsides but also extend careful planning and management efforts to rural areas, recognizing the interdependence between urban and rural environments. This holistic approach helps improve quality of life, enhances community engagement and promotes sustainable development.

The Director's address conveyed the overarching vision that efficient micro-level management, supported by programmes like NAKSHA, is essential for strengthening ULBs to meet current and future urban challenges effectively.

NAKSHA Overview

***Shri Kunal Satyarthi, IFS, Joint Secretary, Department of Land Resources,
Ministry of Rural Development, Govt. of India***

Shri Kunal Satyarthi presented a comprehensive and strategic overview of the NAKSHA Programme, positioning it as one of the most significant national initiatives aimed at bringing scientific precision, transparency and interoperability into urban land governance. He opened the session by identifying the fundamental challenge confronting urban India—rapid and uneven urbanization, fragmented land ownership records, outdated cadastral data and lack of coordination among various land-related departments. He emphasized how these challenges have resulted in increasing land disputes, poor quality town planning, delays in infrastructure development and weakening of municipal finances.



He explained that the core purpose of the NAKSHA Programme is to create a modern, accurate and unified urban land record ecosystem using high-resolution geospatial technologies. He explained the collaborative implementation structure involving DoLR, Survey of India (SOI) as the technical

authority, MPSEDC as the Web-GIS developer, NIC for cloud and hosting and States/UTs as the key implementing stakeholders. He provided a detailed explanation of the pilot phase, which covers 27 States and 3 UTs, focusing on 1,000 Urban Local Bodies (ULBs). This phase is supported through an approved outlay of ₹194 crores under DILRMP, with a future scaling plan to cover all 4,912 ULBs across India. Shri Satyarthi emphasized that the programme is not only an urban mapping exercise but a transformational project intended to support property taxation reforms, urban planning, slum redevelopment, smart city initiatives, utility management and credit access mechanisms.

Shri Satyarthi described the programme's 3-stage workflow—Map-1 (Aerial Survey & Data Processing), Map-2 (Ground Truthing & Integration) and Map-3 (Claims, Objections & Final Publication).

1. **Map-1 – Aerial Survey and Data Processing**

In this stage, SOI generates high-resolution 5 cm ORI, DSM, DTM, 3D Mesh and vector layers. This creates India's most accurate scientific base map for urban areas.

2. **Map-2 – Ground Truthing and Integration**

GNSS-based property validation, RoR integration, field corrections, attribute collection and verification of parcel boundaries.

3. **Map-3 – Claims, Objections & Final Publication**

Citizen participation, dispute resolution, appeals, final map publication and issuing of Urban Property Cards (UrPro).

He highlighted the role of advanced technologies such as Nadir/Oblique Cameras, LiDAR, UAV platforms, GNSS Rovers, CORS and AI-enabled data processing for producing 5 cm resolution outputs. He stated that the NAKSHA Web-GIS platform will enable end-to-end, transparent and citizen-accessible digital land records, supporting scientific property taxation, infrastructure planning, disaster management and overall ease of living.



He concluded that NAKSHA represents a transformative shift in urban spatial governance, ensuring accuracy, transparency and interoperability across all land-related departments. By bringing together precise geospatial science, a robust digital platform, clear legal backing and public participation, the programme is poised to become the backbone of India's 21st-century urban governance ecosystem.

Map-1 Workflow & Deliverables under NAKSHA Programme

Shri Sandeep Srivastava, Additional Surveyor General, Survey of India

Shri Sandeep Srivastava delivered a detailed technical presentation on the Map-1 workflow, highlighting its central role in constructing the Digital Spatial Reference Framework (DSRF) for the NAKSHA Programme. He explained that Map-1 provides the most accurate baseline for all future layers—ground truth, legal validation, attribute mapping and dispute resolution. The accuracy and reliability of Map-1 determine the scientific credibility of the entire programme.

He began by outlining the components of Map-1, which consist of high-resolution aerial photography, Nadir and Oblique imagery, LiDAR point clouds, Ground Control Surveys, ORI extraction, DSM/DTM creation, 3D Mesh modelling and vector layer generation. This foundational dataset is essential for the integration of municipal property registers, cadastral maps, registration data and legacy land records.



Shri Srivastava provided a comparative assessment of different imagery resolutions—from 2.38 m satellite imagery, 30 cm orthoimagery, 10 cm platform

imagery and finally 5 cm NAKSHA imagery. He demonstrated with real examples how lower-resolution imagery often leads to errors ranging from 3 to 21 meters, affecting parcel boundaries, buffers and critical utility infrastructure mapping. Using images from multiple states, he illustrated how misaligned datasets can lead to overlaps, missing roads, incorrect building footprints and distortions in property extent.

He detailed the steps of Map-1 Workflow:

1. **Aerial Data Acquisition**

Conducted using advanced manned flights, UAVs and hybrid camera systems. The nadir camera provides vertical imagery for ORI, while oblique cameras provide façade visibility and support 3D reconstruction.

2. **Ground Control Surveys (GCPs)**

CORS-enabled, DGNSS-supported surveys ensure positional accuracy up to sub-decimeter levels. Hundreds of GCPs and checkpoints are used per city.

3. **Pre-Processing and Block Triangulation**

Camera calibration, radiometric balancing, tie-point generation, aerial triangulation, bundle block adjustment (BBA) and accuracy check using checkpoints.

4. **DSM/DTM Creation and ORI Extraction**

Models created through dense matching workflows, followed by accuracy filtering and mosaicking for uniform, seamless imagery.

5. **3D Mesh and 2D/3D Vector Extraction**

Building heights, roof structures, utilities, roads and topographic features are captured in detail.

6. **Quality Assurance, Compliance & Portal Upload**

The outputs are validated as per NAKSHA standards and uploaded for state-level review in Map-2



He explained common Map-1 challenges: humidity, terrain shadowing, high-rise obstructions, airspace restrictions and the need for repeated flights. He emphasized the importance of tight SOP compliance, inter-agency coordination and timely approvals.

He concluded that Map-1 is the scientific backbone for India's urban land record modernization and provides a high-precision geospatial foundation for governance, planning and legal verification.

Map-1: Aerial Data Acquisition & Data Processing

Dr. Aurobindo Upadhyaya, President, NeoGeo Info Technologies Ltd.

Dr. Aurobindo Upadhyaya presented an advanced technical explanation of aerial data capture, sensor calibration, photogrammetry workflows and processing pipelines that form the core of Map-1 operations. He emphasized that the quality of Map-1 outputs fully depends on meticulous planning, strong technical supervision, experienced field teams and precise execution of flights and data workflows.

He began by describing the pre-flight activities, including AOI assessment, terrain and elevation study, flight path simulation, sun angle planning, camera and sensor selection and wind pattern analysis. Permissions from DGCA, district authorities, defence establishments and airport operators must be secured well in advance. He stressed the importance of risk analysis, emergency landing strategies and backup flight plans.



The session covered the hardware used, including Nadir and Oblique cameras, high-density LiDAR sensors and platforms such as fixed-wing UAVs, VTOL systems and large-format aerial survey aircraft. Dr. Upadhyaya explained how

camera geometry, focal length, shutter speed, exposure settings and overlap configuration impact the quality of derived products.

He then outlined the key steps in the data processing pipeline:

1. Data Ingestion & Quality Check – Reviewing metadata, flight logs, image sharpness, motion blur, GPS time stamps and initial tie point consistency.
2. Camera Calibration – Both pre-calibration and in-project self-calibration methods.
3. Aerial Triangulation – Bundle block adjustment with GCPs and ICPs for horizontal and vertical accuracy.
4. Dense Point Cloud Generation – Using state-of-the-art image-matching algorithms.
5. DSM and DTM Extraction – Ground filtering, noise removal, outlier correction and hydro-enforcement.
6. ORI Generation – Mosaicking, blending, seam line correction and radiometric equalization.
7. 3D Mesh Modelling – Reconstruction of building façades, roof structures and terrain features.
8. Vector Feature Extraction – Buildings, roads, utilities, water bodies, parcel boundaries and other topographic details.

Dr. Upadhyaya highlighted field challenges: inconsistent lighting, obstructions from high-rise buildings, electromagnetic interference affecting GNSS signals, vibration-induced distortions and data overloads. He recommended mitigation strategies such as sensor stabilization systems, high-resolution IMS units, cloud-based processing and AI-assisted QC.



He concluded that aerial survey and scientific photogrammetry underpin the entire NAKSHA Programme. Without precise Map-1 data, Map-2 validation and Map-3 publication cannot deliver legally reliable land records.

Best Practices on IEC & Awareness plans for NAKSHA implementation and Andhra Pradesh Experience (Online)

Shri Siddharth Jain, Joint Secretary, Ministry of Cooperation, Govt. of India

Shri Siddharth Jain delivered a detailed session on Information, Education and Communication (IEC) strategies necessary for successful implementation of NAKSHA. He used the Andhra Pradesh urban resurvey initiative as a model to demonstrate how large-scale land reforms require sustained public engagement, inter-departmental coordination and clear communication.

He emphasized that urban resurvey often encounters resistance due to fear of changes in ownership, tax revisions or suspicion regarding government intervention. Therefore, a structured IEC plan is essential to gain public trust and secure cooperation. The AP experience showed that consistent communication at the ward and neighbourhood level dramatically reduced objections.

He detailed AP's key IEC strategies:

- Mandatory Ward Sabha meetings
- Form-1 public notices to every household
- Multi-language awareness materials
- Social media and FM radio updates
- Public display of maps (Form-6, Form-15)
- Helpline numbers and grievance counters
- Joint meetings with RWAs, councillors and local committees

Shri Jain then described the administrative achievements of the AP resurvey project: recruitment of 9,000+ survey assistants, procurement of advanced drones, rovers and CORS, development of SOPs and capacity building for both new and senior staff. AP successfully created a multi-tier PMU structure at State, District and ULB levels, enabling real-time monitoring and field supervision.

He explained the complete resurvey workflow, including GCP establishment, ORI generation, ground truthing, vectorization in QGIS, statutory notices under Sections 5, 6, 9(2), 10(2), draft PPM generation, appeals and final publication. He highlighted challenges such as absentee owners, multi-storey ownership disputes, mismatches between municipal and revenue records, encroachments of government lands and the need for correlation registers.

He concluded that AP's experience shows that IEC, institutional capacity, legal framework & technology is the formula for successful urban land modernization—directly applicable to NAKSHA across all states.

Demo of NAKSHA Web-GIS Portal & Modules

Shri Anoop Patel and Shri Parth Brahmkankar, MPSEDC

Shri Anoop Patel and Shri Parth Brahmkankar delivered a detailed demonstration of the NAKSHA Web-GIS platform, highlighting it as the backbone of the entire NAKSHA Programme. They explained that the portal supports every workflow from Map-1 to Map-3, enabling authorities, survey teams and citizens to participate in a seamless digital ecosystem.

The presenters outlined the three major components:

1. Web Application – For SOI, State PMUs, District officials, ULBs and public users
2. Mobile Application – For ground surveyors and supervisors
3. Desktop Utility – For validating and uploading TPK (ORI) and GDB (vector) datasets

The Web Application includes modules for AOI upload, map & image verification, RoR entry, GT point validation, publication workflows, dashboard analytics, role management and claim/objection interfaces.



The Mobile App supports offline data synchronization, ground truthing capture, point/line/polygon editing, plot correction (split/merge/modify), RoR tagging and plot verification. This allows surveyors to work in low-connectivity environments.

They also explained the post-survey modules, including first map publication, claim handling, resurvey triggers, final publication and automatic transfer of validated records to state land record portals.

Challenges noted included:

- Variable property card formats
- Differences in state-level rules
- Inconsistent attribute structures
- Delays in receiving API specifications
- User unfamiliarity with advanced GIS functions
- GNSS/CORS stability issues
- Data upload failures due to weak network connectivity



The presenters concluded that the NAKSHA portal is not only a survey management tool but a complete urban land governance platform, designed to ensure transparency, accuracy and citizen participation.

DAY 2

Administrative & Legal Framework for NAKSHA Implementation and Maharashtra Experience

Shri S. Chockalingam, Chief Electoral Officer, Government of Maharashtra

Shri S. Chockalingam delivered a deeply analytical and comprehensive presentation on the administrative and legal foundations necessary for successful implementation of the NAKSHA Programme. Drawing on Maharashtra's rich institutional experience in land governance, settlement operations and cadastral reforms, he highlighted the structural weaknesses that continue to affect India's land administration system and explained how NAKSHA, when supported by a robust legal framework, can address decades-old land challenges.

He began by describing the persistent and widespread nature of land disputes in India. Citing data, he noted that nearly one-fourth of all Supreme Court judgements involve land issues, while a significant proportion of serious crimes—including over 16% of homicides between 2019 and 2021—have a land or property-related trigger. These conflicts arise largely because the existing land records framework is fragmented, inaccurate and presumptive in nature. The absence of an authoritative and unified land title system has meant that ownership claims remain vulnerable to challenge and public authorities struggle to enforce boundary, tax and planning laws.

Shri Chockalingam traced the historical evolution of India's legal framework for land records, beginning with Regulation XXXVI of 1793 during the British period—a regulation originally designed to protect purchasers of real property from fraud. Over time, various laws were introduced but most of them continued to provide presumptive rather than conclusive titles. Within Maharashtra, the Maharashtra Land Revenue Code (MLRC) continues to operate on the principle that revenue records are presumed to be correct until proven otherwise. He explained how this creates administrative complexity,

particularly in urban areas where property values are high and disputes are frequent.

He emphasized the importance of cadastral survey as a statutory requirement for determining clear boundaries, ownership and land use. Urban areas, in particular, experience heavy construction, subdivision of parcels, encroachments and undocumented transfers, making periodic resurvey essential. He highlighted legal provisions related to adverse possession, explaining how long-term, uninterrupted possession may convert into ownership under the Limitation Act, 1963. These legal realities shape resurvey operations, especially in dense and complex urban environments. Section 20(2) of the MLRC, which empowers settlement officers to adjudicate disputes involving State land, becomes central during adjudication phases of resurvey.



Moving to the operational framework, he described Maharashtra's implementation model under NAKSHA, which aligns closely with the programme's Map-1, Map-2 and Map-3 workflow. Before any technical activity begins, the State undertakes several preparatory tasks. These include the establishment of CORS stations to provide consistent geodetic reference, the compilation of legacy data such as RoR extracts, registry information,

municipal property tax records and historical settlement maps and conducting extensive information, education and communication campaigns. Public awareness is considered essential because it informs residents about the purpose, benefits and process of the survey and reduces the likelihood of resistance during field activities.

One of Maharashtra's unique contributions is the introduction of pre-pointing, a proactive method of marking both public and private property boundaries before aerial survey. Pre-pointing ensures that public assets like roads, water bodies and amenity spaces are clearly identified and protected. By encouraging households to voluntarily demarcate their property boundaries, the State significantly reduces the number of disputes and objections that arise during later stages. The State also uses historical satellite imagery to detect encroachments, unauthorized construction and changes in land use over time—helping validate correct boundaries during the aerial and ground stages.



Following the pre-survey phase, aerial flights are conducted using drones and advanced camera systems. Shri Chockalingam described the technical processes performed by the Survey of India, including ortho-rectification, geo-

referencing, image stitching and creating high-resolution ORI. This is followed by field verification using Electronic Total Stations (ETS) and GNSS rovers, which help clarify boundaries that are obscured by vegetation or built-up structures. These ground truthing exercises ensure that the map produced is both scientifically precise and legally defensible.

Shri Chockalingam emphasized that the enquiry stage—often referred to as adjudication—is the most crucial phase in the entire workflow. During this stage, preliminary notices containing land details and spatial representations are issued to all concerned parties. Hearings are conducted to address objections, clarify claims, reconcile RoR entries with ground reality and resolve disputes. Many of these disputes stem from old, undocumented transactions, changes in possession, encroachments or boundary shifts that have occurred over decades. The enquiry officer's role is to apply legal principles consistently and ensure that decisions are fair, evidence-based and transparent.

After this adjudication process concludes, the updated Record of Rights (RoR) for each parcel is prepared digitally. The State finalizes the revised maps, calculates applicable fees and issues updated property cards (Sanads). These records are then made available online, ensuring easy access for citizens and strengthening transparency. The digital availability of maps and RoRs also assists municipal corporations in improving property taxation, planning infrastructure and safeguarding public lands.

Shri Chockalingam pointed out that Maharashtra's experience demonstrates how scientific mapping transforms land governance. Accurate maps allow citizens to visually understand parcel boundaries— “seeing is believing,” he remarked—reducing mistrust and disputes. The availability of detailed elevation models and 3D imagery supports better urban planning, storm water design and infrastructure development. Municipalities benefit from higher revenue accuracy, improved enforcement and efficient service delivery.

He concluded by affirming that a strong administrative structure, clear legal framework, technological accuracy and citizen-oriented processes are essential pillars for NAKSHA's nationwide adoption. Maharashtra's model showcases how a balanced combination of legal authority, scientific detail and public engagement can create a transformative and durable urban land governance system.

Implementation Approaches and Best Practices under NAKSHA Programme – Bihar Experience

Ms. Pallavi Mishra, Assistant Settlement Officer, Directorate of Land Records & Survey, Government of Bihar

Ms. Pallavi Mishra delivered an extensive and insightful presentation on Bihar's experience with the NAKSHA Programme, emphasizing how the State has adapted its historically rich land administration system to modern geospatial technology. Bihar has a unique advantage because its land records framework has evolved through multiple historical phases—from the Zamindari era under Permanent Settlement, to the Cadastral Survey of the early 20th century, the Revisional Survey beginning in 1952 and later the Land Reforms Act of 1955. This long institutional memory, combined with more recent legislative initiatives such as the Bihar Special Survey and Settlement Act, 2011 and the Rules of 2012 (further strengthened in 2019 and 2025), has created a strong foundation for implementing scientific surveys using drones, GNSS and CORS



She explained that Bihar's land administration system is built around the “mauja”, a unit that continues to hold legal and administrative significance even today. While municipal and ward boundaries evolve over time due to demographic and administrative changes, mauja boundaries remain stable. This makes the mauja the most logical unit for conducting urban resurvey. Bihar therefore implements NAKSHA by first validating village boundaries and then working downward to individual plots, ensuring consistency between legacy records and modern spatial layers.

Describing the State's administrative framework, Ms. Mishra highlighted the coordination between the Directorate of Land Records and Survey (DLRS), Settlement Officers, Charge Officers, Shivir Prabharis, Kanungos and the large number of field teams drawn from municipal and revenue departments. Bihar's approach integrates all available legacy data—RoR extracts, registry information, municipal property tax registers, previous settlement maps, field notebooks and even hand-written records preserved from early cadastral operations. These datasets are harmonized through API integrations wherever possible, ensuring alignment between revenue and municipal domains.

Bihar follows a four-stage approach to Special Survey under NAKSHA, beginning with extensive pre-survey activities. These include gazette notifications to initiate settlement operations, district-level proclamations, awareness meetings and the collection of self-declarations from raiyats. Family trees and ownership claims are compiled in advance to minimize future objections. During this stage, all available records—textual and spatial—are prepared for comparison with the upcoming drone survey outputs. This preparatory work builds clarity among residents and improves efficiency during later adjudication.



The second stage involves actual survey operations. Bihar combines drone-derived orthoimagery with legacy cadastral and revisional maps, overlaying them through triangulation, boundary validation and ground verification using DGPS and GNSS rovers. Ms. Mishra explained that this hybrid method ensures continuity between old legal boundaries and new scientific measurements. It also helps address one of Bihar's unique challenges: riverine areas where land frequently undergoes alluvion and diluvion. Field teams therefore conduct triangulation monumentation at village edges, validate tri-junctions and carefully assess local topography so that every parcel is placed correctly on the updated map.

The third stage focuses on adjudication. Here, claims and objections are heard in multiple rounds, ensuring transparency and fairness. Forms 7, 12 and 20 record objections related to ownership, possession, encroachments and inheritance. Officers verify claims through field inspections, cross-checking with historical registers and hearing statements from raiyats. Ms. Mishra emphasized that adjudication is the heart of Bihar's model because it determines public acceptance of the final map. The State's approach blends strict legal process with local-level consultation, ensuring that any corrections are fully validated and defensible.

In the fourth stage, final records are prepared and published. This includes updating the RoR in Form 25, finalizing digital maps and integrating unique parcel identifiers such as ULPIN and Bihar's own 14-digit Parcel Unique ID. Ms. Mishra explained that ULPIN ensures geo-spatial precision, while the Parcel ID incorporates local administrative attributes, making the record useful for both revenue and municipal purposes. These identifiers are then linked to Bhunaksha, enabling digital visualization of every parcel across the State.

One of Bihar's most notable innovations is the creation of MARBLE, a field handbook that compiles recurring on-ground issues—boundary overlaps, missing khatiyani details, old verbal partitions, multi-party ownership, ambiguities in riverine lands and mismatches between RS and CS data. MARBLE provides standard solutions consistent with law and technical guidelines, allowing uniform decision-making across districts. Another significant effort is the modernization and preservation of historical land records. The State is digitizing century-old maps, storing them in climate-controlled record rooms and converting scripts such as Kaithi to modern formats so that legacy data remains usable in digital workflows.

Ms. Mishra also emphasized citizen engagement as a critical component of Bihar's success. The State organizes gram sabhas, awareness campaigns, street plays, helpdesks and social media outreach to ensure that raiyats understand the process and participate actively. Self-declaration forms and field camps help people submit necessary documents. The introduction of the Survey Tracker Mobile App enables the public to follow the progress of survey teams and receive updates on their cases.

She concluded by noting that Bihar's experience demonstrates a balanced combination of technology, law, public participation and historical record management. By integrating drone imagery with century-old maps, strengthening legal adjudication and building trust through extensive outreach, the State has developed a survey model that is both modern and deeply rooted in its institutional heritage. This approach provides a powerful

template for NAKSHA implementation across India and reinforces the importance of continuity between past records and contemporary geospatial science.

State Experience in Ground Truthing – NAKSHA in Uttarakhand

***Ms. Ranjana Rajguru, Commissioner-cum-Secretary, Board of Revenue,
Uttarakhand***

Ms. Ranjana Rajguru presented a comprehensive and practice-oriented account of Uttarakhand's experience in implementing the ground truthing component under the NAKSHA Programme. Her presentation provided deep insights into how a hilly, environmentally sensitive state is adapting modern geospatial tools, institutional coordination and field processes to create accurate, standardized and citizen-centric urban land records.

She began by contextualizing NAKSHA within the broader vision of Digital India Land Records Modernization Programme (DILRMP). For Uttarakhand, a state characterized by difficult terrain, varied altitudes and scattered settlements, the challenge of building precise and legally reliable land records is especially significant. NAKSHA, she explained, offers a transformational opportunity to re-establish spatial accuracy, integrate revenue and municipal datasets and build a transparent system of land governance that can serve both citizens and government agencies.

Ms. Rajguru described how the programme aims to create accurate GIS-based urban land records, a robust Web-GIS platform linked to revenue and municipal data and a unified mechanism for parcel visualization, verification and citizen services. This is expected to significantly reduce land disputes, improve municipal taxation, support urban planning and strengthen ease of living for residents across towns and Nagar Panchayats in Uttarakhand.

She explained the roles of the major institutional stakeholders responsible for NAKSHA execution. The Department of Land Resources provides policy leadership, financial support, national-level standards and monitoring. The Survey of India leads the aerial survey, producing vital datasets such as ORI,

DSM and GDB layers that form the base map. MPSEDC develops and maintains the NAKSHA Web-GIS portal and mobile applications, enabling real-time parcel verification, data upload and field monitoring. At the State level, the Revenue Department and Board of Revenue anchor implementation, integrating revenue records, supervising local surveys, building capacity for municipal and revenue staff and ensuring quality control. Urban Local Bodies provide on-ground support, citizen interaction and access to existing tax and property records.

Ms. Rajguru then explained in detail the process adopted for ground truthing in Uttarakhand. The State first undertakes project planning and preparation, including the selection of urban local bodies, examination of base ward maps and coordination of drone flight plans through the Survey of India. After SOI conducts aerial surveys and creates highly accurate ortho-rectified images, the next stage involves feature extraction, digitization of parcel boundaries and generation of GIS layers representing buildings, roads, water bodies and open areas.



Ground truthing constitutes the most crucial part of the process, as it validates the aerial data on the ground and ensures that digital maps match real-world

boundaries. Using high-precision GNSS/DGPS receivers and electronic total stations, field teams visit each parcel, verify boundaries in the presence of ULB and revenue staff and collect essential attributes. Property ownership details, land use information, building characteristics, tax references and photographs are collected through the NAKSHA mobile application, ensuring consistency and standardized data collection statewide. These data inputs are then matched with revenue records to identify mismatches, missing information or discrepancies requiring further examination.

She highlighted that the NAKSHA portal developed by MPSEDC has played a crucial enabling role. The portal's interactive interface, multi-layer overlay capability, digital parcel verification workflow and automated reports support field teams and administrators throughout the process. Real-time data synchronization ensures that supervisors can monitor progress, identify bottlenecks and provide timely support. This is especially beneficial in a geographically challenging state like Uttarakhand, where terrain, connectivity and climatic conditions often affect field operations.

Ms. Rajguru noted that ground truthing activities in Uttarakhand were initiated in October 2025, starting with Bhagwanpur in Haridwar district and subsequently expanding to Kichha, Almora and Narendra Nagar. She presented the progress made so far—Bhagwanpur has achieved 95% completion; Kichha and Almora have begun ground truthing based on ORI availability; and Narendra Nagar has initiated survey activities in its first ward. Connectivity improvements through the installation of CORS stations in Bhagwanpur, Kichha, Almora and Narendra Nagar are further enhancing accuracy in field measurements.

The experience of Uttarakhand, however, has not been without challenges. Ms. Rajguru highlighted technical issues such as portal or application errors, synchronization problems and user adaptation difficulties. Operational challenges included incomplete documents, absence of property owners during verification, apprehension of increased taxation, fear of sharing

personal documents and communication barriers in certain localities. Boundary disputes and mismatches between old revenue records and actual possession patterns were also common. She noted that public hesitation toward new technology and occasional suspicion toward survey teams required patient stakeholder engagement and strong IEC efforts.



Despite these challenges, she emphasized that inter-departmental collaboration has been a critical factor in Uttarakhand's progress. Coordination among SDM offices, Tehsils, ULBs, Patwaris and private survey teams has ensured smoother field operations, quicker validation and more effective grievance handling. Regular training sessions have strengthened the capacity of surveyors and municipal staff, improving accuracy and consistency in data collection.

In concluding her presentation, Ms. Rajguru outlined the roadmap ahead. Uttarakhand aims to complete 100% parcel survey in selected ULBs, integrate ULPIN across all municipal systems, link the NAKSHA database with property tax and building permission systems and institutionalize a long-term mechanism for continuous updating of records. The State envisions scaling up NAKSHA to all

its urban areas, thereby creating a transparent and authoritative geospatial foundation for modern urban governance.

Her presentation demonstrated that even in states with complex geography and diverse settlement patterns, the NAKSHA framework—supported by scientific methods, strong institutional coordination and citizen engagement—can drive significant improvements in land records accuracy and governance efficiency.

Practical demo of ground-truthing technologies under NAKSHA

Shri Bhaskar Sharma, Faculty of Geodesy & Shri Shashi Kiran, Surveyor, at Survey of India, Hyderabad, Shri Pravesh Kumar, Officer Surveyor, UKGD & Shri Amit Mahajan, Officer Surveyor, G&RB from Survey of India, Dehradun.

The session opened with a presentation by Shri Bhaskar Sharma from the National Institute of Geo-Informatics Science and Technology (NIGST), Survey of India, Hyderabad. He introduced participants to advanced surveying instruments and explained the core principles of satellite-based positioning in brief. During his briefing, he highlighted the critical role of Global Navigation Satellite System (GNSS) technology in generating accurate spatial data, which forms the backbone of modern land and cadastral survey operations.

Following the technical introduction, the participants were divided into two groups for field demonstrations. Shri Bhaskar Sharma and his team also split into two units to guide each group at separate locations, providing practical exposure to ground-truthing technologies. The teams undertook designated tasks involving the use of GNSS NRTK rovers and Electronic Total Station (ETS) instruments, data capture and subsequent processing. The field exercise offered hands-on familiarity with the equipment, improved participants' understanding of real-time data collection methods and demonstrated the precision and operational efficiency that contemporary surveying tools contribute to land administration and mapping efforts.



The two-day Training-cum-Workshop on the NAKSHA Programme concluded with a formal vote of thanks delivered by representatives of BNYCRS. This was followed by the distribution of certificates to all participants, along with tokens of appreciation, acknowledging their active participation and significant contribution to the successful conduct of the programme.

Annexures

Annexure I	Sample Nomination letter sent to states to nominate District Magistrates/Municipal Commissioners for the workshop.
Annexure II	Schedule of "Training cum Workshop on NAKSHA Programme for District Magistrates/Municipal Commissioners"
Annexure III	List of Participants attending the Training cum Workshop on NAKSHA Programme for District Magistrates/ Municipal Commissioners

Annexure I



Dr. Bagadi Gautham, IAS
Professor (Public Administration) &
Centre Director, B N Yugandhar Centre for Rural Studies
Email: ers.lbsnaa@nic.in

No. T-31012/6/2025-CRS
Dated: 7th November, 2025

Subject: Nomination for the "Training cum Workshop on NAKSHA for Executive Officers/ Municipal Commissioners" at LBSNAA, Mussoorie (8-9 December, 2025) - Reg.

Respected Sir,

The B N Yugandhar Centre for Rural Studies (BNYCRS) of the Lal Bahadur Shastri National Academy of Administration is a leading resource establishment for training, research and policy recommendations in respect of various issues of land administration and management.

BNYCRS is conducting Training-cum-Workshop on NAKSHA Programme for Executive Officers/ Municipal Commissioners of the pilot districts sponsored by the Department of Land Resources (DoLR), Ministry of Rural Development (MoRD), Government of India at LBSNAA, Mussoorie from 8th to 9th December, 2025.

In this regard, it is hereby kindly requested to nominate the Executive Officers/ Municipal Commissioners involved in the implementation of NAKSHA in your state (Annexure). The nominated officials are to register at www.lbsnaa.gov.in by **26th November, 2025**. TA/DA during the travel has to be borne by the State Government.

With regards

Yours sincerely,

Encl.: As above

Dr. Bagadi Gautham
(Dr. Bagadi Gautham)

Shri P. Guru Prasad, IAS
Principal Secretary
Urban Development Department
Govt. of Uttar Pradesh
801, Bapu Bhawan
Lucknow
Uttar Pradesh

Copy to: District Collectors (As mentioned in the Annexure)

Uttar Pradesh

District	ULB / Town / City
Ambedkar Nagar	Tanda
Barabanki	Nawabganj
Bulandshar	Anupshahr
Chitrakoot	Chitrakoot Dham
Gorakhpur	Gorakhpur
Hardoi	Hardoi
Jhansi	Jhansi
Mirzapur	Chunar
Pilibhit	Puranpur
Shahjanpur	Tilhar

Annexure II



B N Yugandhar Centre for Rural Studies
Lal Bahadur Shastri National Academy of Administration,
Mussoorie
Training cum Workshop on NAKSHA Programme for District
Magistrates/ Municipal Commissioners
(8th – 9th December, 2025)

Time (in Hrs.)	Session(s)	Guest Speaker(s)
Day 1 (08-12-2025)		
09:30 – 09:35	Welcome Address by Dr. Bagadi Gautham, Centre Director, BNYCRS, LBSNAA	
09:35 - 09:45	Address by Shri Sriram Taranikanti, Director, LBSNAA	
09:45 - 09:50	National Anthem	
09:50 – 10:30	GROUP PHOTO and HIGH TEA	
TECHNICAL SESSIONS		
10:30 – 11:30	Overview of NAKSHA programme	Shri Kunal Satyarthi, Joint Secretary, DoLR, MoRD, GoI
11:30 – 12:30	Map-1: Workflow & deliverables under NAKSHA programme	Shri Sandeep Shrivastava, Addl. Surveyor General of India, Survey of India
12:30 – 13:30	LUNCH	
13:30 – 14:30	Map-1: Aerial data acquisition & data processing	Dr. Aurobind Upadhyaya, President, NeoGeo Info Technologies Ltd.

14:30 – 15:30	Best practices on IEC and awareness plans for NAKSHA implementation and Andhra Pradesh Experience (Online)	Shri Siddharth Jain, Joint Secretary, Ministry of Cooperation, Gol
15:30 – 15:45	TEA BREAK	
15:45 – 16:45	Demo of NAKSHA Web-GIS portal and its modules	Shri Anoop Patel and Shri Parth Brahmanekar, MPSEDC
DAY 2 (09-12-2025)		
09:30 – 10:30	Administrative & legal framework for NAKSHA implementation and Maharashtra Experience	Shri S. Chockalingam, Chief Electoral Officer, Govt. of Maharashtra
10:30 – 11:30	State experiences: Implementation approaches and best practices under NAKSHA programme State presentation (45 mins) followed by open discussion (15 mins)	Ms. Pallavi Mishra, ASO, Directorate of Land Records & Survey, Govt. of Bihar
11:30 – 11:45	TEA BREAK	
11:45 – 12:30	State experience in ground truthing – NAKSHA in Uttarakhand	Ms. Ranjana Rajguru, Commissioner-cumSecretary, BoR, Dehradun
12:30 – 13:30	Practical demo of ground-truthing technologies under NAKSHA (Groups will be shared separately)	Shri Bhaskar Sharma, Office Surveyor, Shri N. Shashi Kiran, Surveyor, Shri Pravesh Kumar, Officer Surveyor and Shri Amit Mahajan, Office Surveyor, Survey of India
13:30 – 14:30	LUNCH	
14:30 – 14:40	Vote of Thanks	Shri Snehasis Mishra, BNYCRS
14:40 – 15:00	Distribution of Memento and Certificate	

Guest Speakers and Session Moderators

Shri Kunal Satyarthi, Joint Secretary, Department of Land Resources, Ministry of Rural Development, Government of India

Session Moderator: Shri R.K. Singh

Dr. Aurobind Upadhyaya, President, NeoGeo Info Technologies Ltd.

Session Moderator: Shri Akhilesh Yadav, CoE, BNYCRS, LBSNAA, Mussoorie

Shri Sandeep Shrivastava, Addl. Surveyor General of India, Survey Of India

Session Moderator: Shri Aman Dhanda

Shri S. Chockalingam, Chief Electoral Officer, Govt. of Maharashtra

Session Moderator: Ms. Komal Mittal

Shri Anoop Patel, Manager-PG/ Drone Division & Naksha, M.P. State Electronics Development Corporation Ltd., Bhopal, Madhya Pradesh

Shri Parth Brahmankar, Business Analyst, M.P. State Electronics Development Corporation Ltd., Bhopal, Madhya Pradesh

Session Moderator: Shri Janardan Sharma

Shri Siddharth Jain, Joint Secretary, Ministry of Cooperation, Gol, New Delhi

Session Moderator: Shri Rajat Abrol

Ms. Pallavi Mishra, ASO, Directorate of Land Records & Survey, Govt. of Bihar, Patna

Session Moderator: Ms. Sita Verma

Ms. Ranjana Rajguru, Commissioner-cum-Secretary, BoR, Dehradun

Session Moderator: Ms. Sonia Devi

Shri Bhaskar Sharma, Office Surveyor, NIGST, Survey of India

Shri N. Shashi Kiran, Surveyor, Survey of India

Shri Pravesh Kumar, Officer Surveyor, Survey of India

Shri Amit Mahajan, Officer Surveyor, Survey of India

Session Moderator: Shri Suhail Ahmad Malik

Sd/-

(Dr. Bagadi Gautham)

Course Coordinator

Date : 06.12.2025

Annexure III

**B N Yugandhar Centre for Rural Studies, Lal Bahadur Shastri
National Academy of Administration, Mussoorie
Training cum Workshop on NAKSHA Programme for
District Magistrates/ Municipal Commissioners (8th – 9th December,
2025)**

Venue: Kalam Hall, Indira Bhawan

LIST OF PARTICIPANTS

Sl. No.	Name and Address	Gender	Contact Details
1.	Shri Hitender Kumar HCS Joint Commissioner Municipal Corporation Manesar, Gurugram Haryana	Male	9468260200, 9991099929 hitenderkumar.hcs@gov.in
2.	Shri R. K. Singh, IAS Commissioner Municipal Corporation Sector 14 Panchkula, Haryana	Male	9350631897 rksb6363@yahoo.com
3.	Shri Aman Dhanda Additional Municipal Commissioner Sector 4 Panchkula, Haryana	Male	9466913444 dhanda.23@gmail.com
4.	Shri Ankit Lohan Executive Engineer Sector 4 Directorate of Urban Local Bodies Panchkula, Haryana	Male	8930747000 ankitlohan@gmail.com
5.	Shri Sumit Malik Executive Engineer Municipal Corporation Sector 14 Panchkula, Haryana	Male	9671876878, 9354970000 xen2mcpkl@gmail.com

6.	Ms. Monika Executive Engineer Municipal Council Narnaul. Haryana	Female	9255126426 monikabhargav126@gmail.com
7.	Shri Vikas Sharma Additional Commissioner Municipal Corporation Palampur, Shimla Himachal Pradesh	Male	8091253331 vikas557@rediffmail.com
8.	Shri Narender Kumar, HPAS Assistant Settlement Officer Assistant Settlement Officer Office Solan, Himachal Pradesh	Male	9459878383, 7018496551 cnarenderkumar@gmail.com
9.	Shri Chetan Chauhan Joint Commissioner Municipal Corporation Office of the Municipal Corporation Solan, Himachal Pradesh	Male	9882103663, 8219995909 chetanchauhan82@gmail.com
10.	Shri Naresh Assistant Engineer Municipal Corporation Mandi, Himachal Pradesh	Male	9736046820 nareshae75@gmail.com
11.	Shri Raman Kumar Executive Officer Municipal Council Nadaun, Himachal Pradesh	Male	9418503512 ramankumar02700@gmail.com
12.	Shri Tariq Hassan Lone Executive Officer New Office Building, Near Town Hall Awantipura , Jammu & Kashmir	Male	7006795599 lonetariq878@gmail.com
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14.	Shri Noveed Ajaz Khan Chief Executive Officer Municipal Council Ganderbal, Jammu & Kashmir	Male	7006685983 navidajaz@gmail.com
15.	Shri Rajat Abrol Chief Executive Officer Municipal Corporation Katra Office of the Municipal	Male	9906366707 ceomckatra@gmail.com

	Corporation Katra, District Reasi, Jammu & Kashmir		
16.	Shri Suhail Ahmad Malik Chief Executive Officer Municipal Council Shopian, Jammu & Kashmir	Male	9469469458 suhail.1989@jk.gov.in
17.	Ms. Neelam Assistant Town Planner Local Government Malerkotla, Punjab	Female	9988513993 khalsaneelam45@gmail.com
18.	Shri Avtar Chand Executive Officer Municipal Council Rajpura Patiala, Punjab	Male	9646107505 eomcraj@yahoo.co.in
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20.	Shri Jivtesh Singh Sidhu Assistant Town Planner Municipal Council Nabha Near Patiala Gate Patiala, Punjab	Male	9888194449 sidhu.jivtesh@gmail.com
21.	Shri Sumit Bilam Assistant Town Planner Municipal Council Kharar SAS Nagar, Punjab	Male	7009270754 sumitbilam88@gmail.com
22.	Shri Noor Mohammad Khan Commissioner Municipal Council Behror, Rajasthan	Male	9829230911 nmk.786.nmk@gmail.com
23.	Shri Mukesh Kumar Commissioner Municipal Council Bhiwadi, Rajasthan	Male	9414658321 eomukeshkumar@gmail.com
24.	Shri Lajpal Singh Commissioner Municipal Council Jaisalmer, Rajasthan	Male	9680500542,9460732297 lajpal1983@gmail.com
25.	Smt. Sita Verma Commissioner Municipal Council Kishangarh Ajmer, Rajasthan	Female	7737662303 mbksgn@gmail.com sitaverma3@gmail.com

26.	Shri Sorabh Kumar Jindal Commissioner Municipal Board Nathdwara, Rajasthan	Male	9460626681 np_ntd@yahoo.co.in
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30.	Shri Dinesh Kumar Executive officer Nagarpalika Nawalgarh Jhunjhunu, Rajasthan	Male	8079064947 dineshnunia04@gmail.com
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33.	Shri Satyendra Prakash Executive Officer Nagar Palika Parishad Tilhar Shahjahanpur, Uttar Pradesh	Male	8189078069, 9696784517 eosatyendra@gmail.com
34.	Shri Lal Jee Executive Officer Nagar Palika Parishad Chitrakootdham Chitrakoot, Uttar Pradesh	Male	8528828238, 8189077967 eonppchitrakoot@gmail.com
35.	Ms. Tanya, PCS Deputy Collector/ Asstt. Municipal Commissioner District Jhansi, Uttar Pradesh	Female	8373975192 tanya.jnv.1993@gmail.com

36.	Shri Vijay Kumar Yadav Executive Officer Nagar Palika Parishad Chunar District Mirzapur, Uttar Pradesh	Male	8189078511, 9453003354 nppchunar@gmail.com
37.	Shri Aejaz Ahmad Executive Officer Nagar Palika Parishad Puranpur District Pilibhit, Uttar Pradesh	Male	7080747007 aejazahmad15@gmail.com
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