Modernising Forest Mapping for the Madhya Pradesh State Forest Department

Mapex collaborated with the Madhya Pradesh State Forest Department (MP SFD) to modernise forest mapping across one of India's largest forest belts, covering over 75,000 sq. km. The goal was to build a unified, high-precision geo-database to support biodiversity conservation, fireline planning, watershed management, and property tax information systems.

Context

The department previously relied on fragmented records—scanned diagrams, cadastral maps, and paper files—which limited analytical and planning capabilities. Mapex addressed this with a robust, multi-source data strategy using satellite imagery, drone surveys, LiDAR scans, GPR inputs, and field data.

Objectives

To implement the solution, we fragmented our objectives into five key deliverables, allowing us to achieve them. They included:

- Comprehensive Geo-Database: Our first goal was to compile spatial data from satellite, drone, LiDAR, GPR, camera-trap surveys and scanned maps into a GIS repository.

- High-Resolution Topography & Canopy Mapping: Our second objective was to generate DEM/DTM, shaded relief, canopy-cover models and also achieve tree-species detection by using technologies like Ai and ML.

- Asset & Utility Surveying: Further, we also set out to identify and map utilities (pipelines, fire-lines, trails), point-of-interest (POI) features, and survey natural and regenerated forests.

- Operational Applications: Further, we also wanted to extract property-tax information management (PTIMS), fire-control planning, biodiversity surveys, and community engagement via a web-GIS portal.

- QA/QC & Training: Our last goal was to ensure quality control at every workflow step and build MP SFD's in-house capability through tailored training and support.

Challenges & Detailed Analysis

Varied Data Sources	Complex Terrain & Vegetation Structure	Biodiversity Monitoring Needs	Operational Scale
Inputs ranged from sub-metre MSI and stereo satellite imagery to drone-derived ortho-imagery, LiDAR point clouds and scanned	The state's topography spans plateau, hill and water ecosystems. Also, the dense canopy impeded aerial GCP visibility.	Tracking flora and fauna populations, root structures via GPR and illegal hunting hotspots required the integration of field-survey, camera-trap and community-reported	Covering 100+ urban local bodies for PTIMS and 75,000 sq. km. of forest required meticulous project management.

Our Approach: Four-Stage Methodology

STAGE I	STAGE II	STAGE III	STAGE IV
Data Acquisition & Ground Control	Image & Point-Cloud Processing	Feature Extraction & Ai/ML Integration	Geo-Database Creation & QA/QC

Impact & Results

60% faster forest map generation

Sub-0.5 m data accuracy

Real-time tracking of species & activities

Scalable platform for climate, conservation, and tourism planning

Mapex transformed MP SFD's forest mapping into a future-ready, data-rich system improving operational efficiency and enabling data-driven environmental governance.