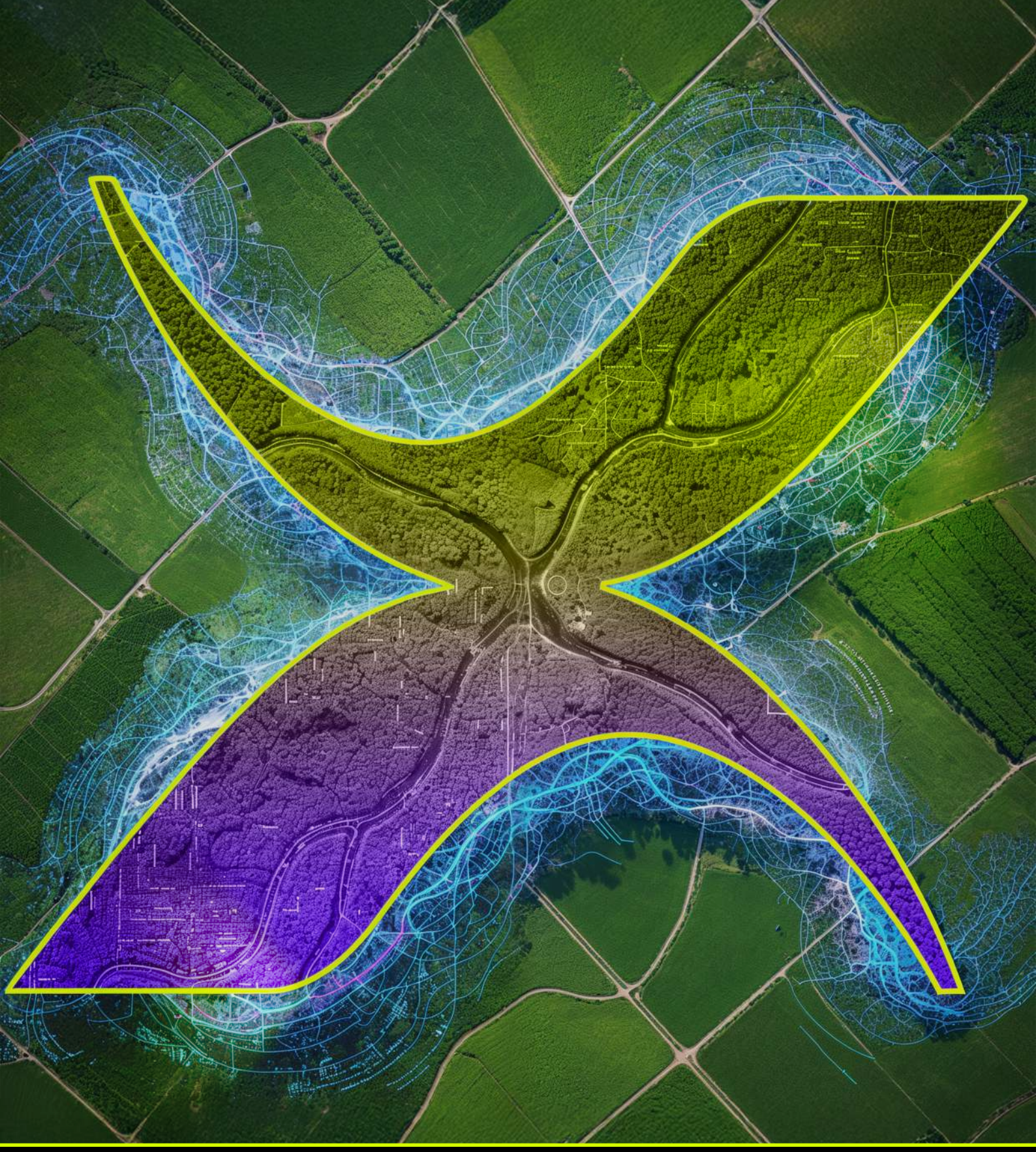


AGRITECH PULSE – VOLUME 3

This Agritech newsletter is from Dexian India and is a part of the Anubhav newsletter

- September 2025

DEXIAN AGRITECH PULSE

Something remarkable is growing in India's farmlands, and it's not just the crops.

In a world grappling with global food scarcity, where climate shocks, soil degradation, and supply chain disruptions threaten to push billions into hunger, India's agricultural landscape is quietly emerging as a beacon of resilience and innovation. Between April and July 2025, what unfolded across India wasn't just a string of isolated AgriTech initiatives. It was a coordinated evolution of policies, technologies, startups, and farmer-centric innovations, all converging to redefine how food security can be strengthened not just for India, but for the world.

This edition of Dexian AgriTech Pulse sharpens that picture further. With insights drawn from state-level experiments, national policy pivots, and the ingenuity of Indian startups and researchers, we unpack how the sector is shaping itself into a vital pillar of global food security.

POLICY PUSH: TECH-FIRST, FARMER-FOCUSED

Governments are shifting the conversation from subsidies to solutions, embedding technology at the root of agricultural growth:

Maharashtra's MahaAgri-AI Policy

₹500 CR

A full-stack AI rollout with drones, chatbots, and sensor-based farming. The local-language Agri-bot Vistaar is already live.

Krishi Samruddhi Yojana

₹5,000 CR ANNUALLY

Targets irrigation, climate-resilient seeds, and digitized equipment access, with a strong focus on women and SC/ST farmers.

Madhya Pradesh's AgriTech Innovation Hub

₹14.98 CR

Incubating startups in AI, genomics, and robotics with IIT Indore's support.

STARTUP SPOTLIGHT: FROM PITCHES TO PROFITS

Startups are scaling beyond prototypes and making a dent in both farmer income and food sustainability:

DeHaat

crossed ₹**3,000 Cr** in revenue and reported Q1 profitability.

greengrahi Harnessing Value Out of Food Waste

raised ₹**32 Cr** for insect-based sustainable Agri-inputs.

AgroStar

raised ₹**2,500 Cr** to expand smart farming tools & advisory platforms.

ON-GROUND INNOVATIONS: WHAT'S NEW IN THE FIELD?

Bhu-Parikshak (IIT Kanpur)	Instant soil testing device.
CowFit	AR wearables for cattle health.
Prithvi Rakshak	Composting robot processing 12 tons/month.
MACRO Gardens	Hydroponic kits for semi-urban households.
OUAT-Odisha Pilot (₹70L)	AI sensors, smart paddy, solar traps, & weather stations benefiting 7,000 farmers.

AI, DATA, AND ROBOTICS: SMARTER BY THE SEASON

Google Cloud	agripilot.ai	Microsoft
UP's Open Agri Network (Google Cloud)	**FarmPilot.ai**	**Microsoft-backed trials**
Connecting farmers to credit, markets, & advisories in local languages.	Fusing satellite data and soil sensors for real-time crop coaching.	Yield boosts of up to 40% with AI-driven insights.

THE BIG PICTURE: BEYOND INDIA, FOR THE WORLD

As the **UN warns of food demand outpacing supply by 2050,** India's AgriTech playbook is offering scalable models for sustainability:

AI is mainstream, driving efficiency from soil to supply chains.

Policy is aligned with innovation, creating fertile ground for adoption.

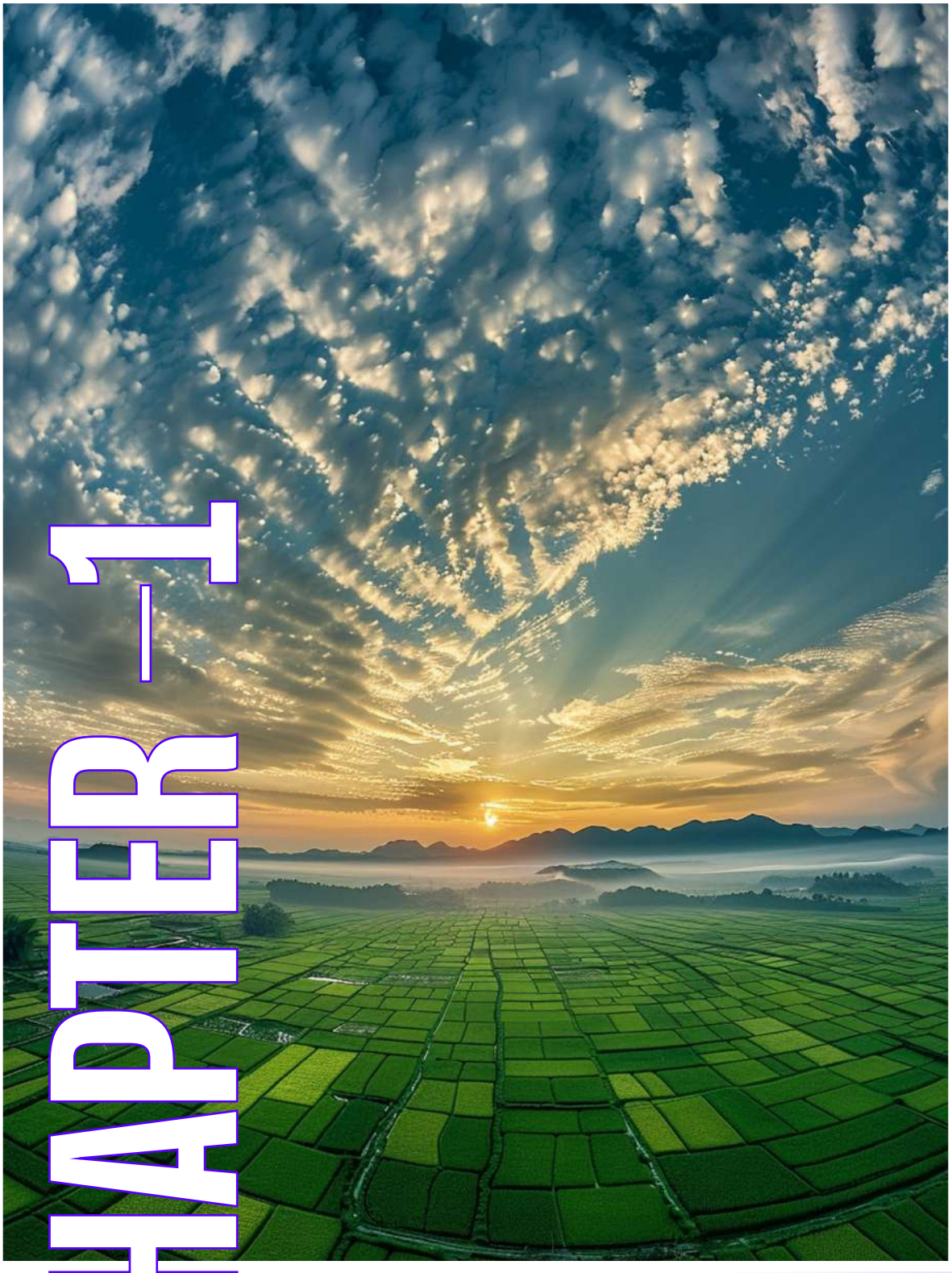
Startups are solving for both scale and sustainability, proving profitability and purpose can coexist.

Inclusion is measurable, women, SC/ST, and smallholder farmers are active beneficiaries.

But the **next frontier is already unfolding.** As farmers optimize their fields with sensors and AI, the **skies above are becoming their strongest allies.** High-resolution **satellite imagery** and **Geographic Information Systems (GIS)** are now enabling:

- **Precision mapping of soil health and crop stress.**
- **Climate risk modeling for droughts, floods, and pests.**
- **Optimized resource use,** water, fertilizer, and energy applied only where needed.
- **Predictive insights into food supply chains,** ensuring resilience in a world facing scarcity.

India's AgriTech story is no longer about catching up; it's about **leading the way in solving global food challenges.** The fields of rural India are now **data-rich ecosystems,** and with GIS and satellite intelligence, they're poised to feed not just the nation but also contribute meaningfully to global food security.



CHAPTER – 1

A Clearer View from the Sky

What if the most game-changing farming decisions weren't made in the field, but from space?

That's no longer a futuristic idea, it's today's reality. With the world standing at a crossroads of population growth and food scarcity, the pressure to produce more with less has never been greater. According to the ***UN's Food and Agriculture Organization*** (FAO), global food demand will surge by nearly **70% by 2050,** yet arable land and freshwater resources are shrinking. Climate change, erratic rainfall, and pest outbreaks are only amplifying the crisis.

Here's where satellite-powered **Geographic Information Systems (GIS)** are stepping in as a lifeline. For millions of smallholder farmers in India and beyond, space-based insights are helping bridge the gap between rising demand and constrained resources.

Take Manjunath, a farmer from Karnataka. Just a year ago, he relied on intuition for irrigation and pest control, often wasting water and input. Today, using a GIS-powered mobile app integrated with real-time satellite imagery, he knows exactly when to water his crops, which plots need attention, and where pest stress is likely to spread. The result? **A 20% increase in yield** and **18% reduction in water use,** all in one growing season. For farmers like Manjunath, this isn't just convenience, it's survival.

Why GIS from the Sky Matters in a Hungry World

Market momentum:
India's GIS in agriculture market is expanding at a CAGR of 10.3% (2024–2029) (IMARC Group), driven by the urgent need for precision farming, sustainability, and climate resilience.

Resolution revolution:
Satellites like ***PlanetScope*** and ICEYE SAR now deliver imagery at 3–5-meter resolution, updated as often as every 24 hours, enabling near real-time monitoring of crops.

Affordability & access:
Platforms such as ***ISRO's Bhuvan,*** Planet Labs, and NASA are democratizing satellite data, ensuring even small and marginal farmers can access critical insights.

Global urgency:
With 828 million people already facing hunger (FAO, 2024), GIS is no longer an option but a necessity to prevent future food crises.

From Seeing to Understanding the Farm

Modern GIS platforms do far more than capture images, they interpret them:

- **NDVI (Normalized Difference Vegetation Index):** Detects early crop stress before it's visible to the naked eye
- **Evapotranspiration models:** Fine-tune irrigation to avoid overuse of water
- **Soil moisture mapping:** Guides precise input application
- **Pest prediction algorithms:** Prevent outbreaks before they spread

These capabilities are being integrated into **farmer-first solutions.** For example, **Dexian India** is developing GIS-powered applications that merge satellite feeds with ground sensors and intuitive dashboards. Designed to function even in low-bandwidth rural regions, these solutions bring space-age technology to the palm of smallholder farmers.

From Reactive to Predictive Agriculture

Traditionally, farmers acted only after damage occurred. GIS flips the model, enabling **predictive agriculture** where intervention happens before crisis strikes. ***As McKinsey's 2023 Digital Agriculture Report highlights:***

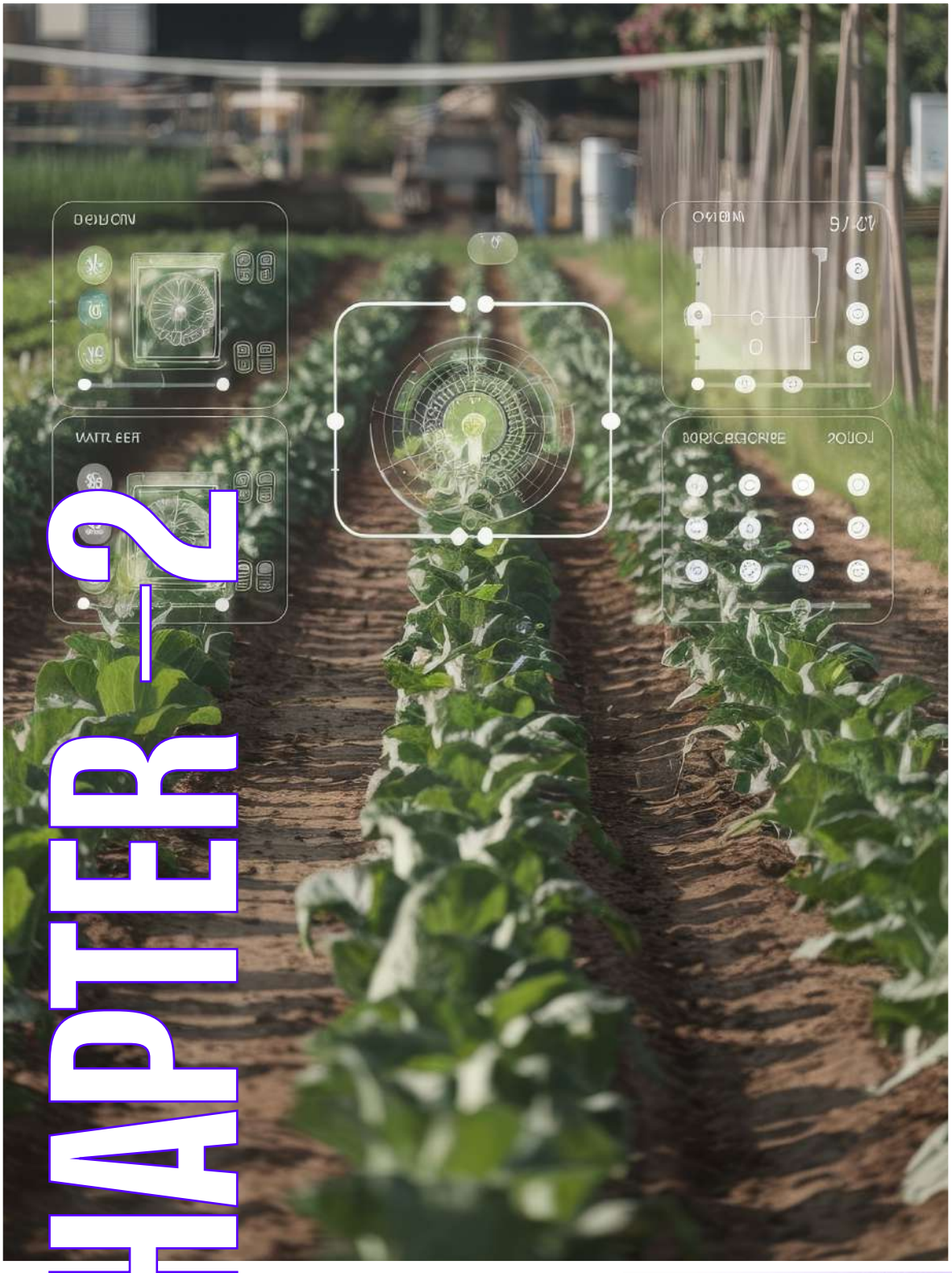
20–25%
yield improvements

15–20%
input cost reductions

Up to 30%
higher water-use efficiency

These figures aren't just statistics; they represent hope for a food-secure world. By helping farmers optimize limited resources, GIS directly addresses the challenge of feeding billions more people in the decades to come.

And this is just the beginning. In the next section, we'll explore how GIS is shaping the agricultural market landscape, spotlighting regions of adoption, funding flows, and the convergence of **AgriTech, IoT, AI, and cloud** that promises to redefine farming for a food-constrained world.



CHAPTER -2

Current Market Landscape

GIS in Indian Agriculture: Market Overview

The Indian Geographic Information System (GIS) market in agriculture is witnessing rapid growth and innovation. As of 2024, the overall

Indian GIS market is valued at

USD 621.2 MILLION,

with projections indicating it will exceed

USD 1.94 BILLION BY 2033,

growing at a

CAGR OF 12.84%

from 2025 to 2033. A significant portion of this growth is driven by the adoption of GIS solutions in agriculture, supported by strong government initiatives, private AgriTech investment, and a national push toward digital infrastructure in rural India

Leading Regions in GIS Adoption

GIS adoption in Indian agriculture is highly regionalized, with key states and zones leading the charge:

Maharashtra

Maha Agri Tech Project:
Maharashtra is pioneering the use of satellite imagery and AI for crop monitoring and advisory services through the **Maha Agri Tech initiative,** led by MRSAC and NRSC. This project enables real-time tracking of fields from sowing to harvest and supports accurate yield modeling, moisture assessment, and disaster response planning.

Karnataka

Geotagging Lakes for Water Management:
Karnataka has geotagged over **31,000** lakes (as of April 2025) using GIS tools. This initiative aids in tracking water flow, managing encroachments, and enhancing drought resilience, supporting sustainable agricultural practices.

Delhi NCR

As a policymaking and administrative center, Delhi leverages GIS for agricultural planning, analytics, and subsidy management.

Punjab and Haryana

Known for intensive farming, these states employ GIS tools for **soil health mapping, yield forecasting,** and efficient **resource allocation.**

Bihar

Through initiatives like **Dexian's BIHAN platform,** Bihar has advanced digital transformation in agriculture, improving data-driven governance and farmer engagement.

Pan-India

Farmonaut & Private Sector GIS Solutions -
Private AgriTech platforms like ***Farmonaut*** offer satellite-based crop health monitoring, weather forecasting, and soil analytics across India. These solutions provide real-time data to farmers, cooperatives, and agri-businesses, enabling timely interventions, better input management, and improved productivity nationwide.

CHAPTER – 3

Revolutionary Applications of GIS in Agriculture

Modern agriculture covers the entire planet with domestic farmland. Regular remote field observations and timely problem-solving are essential for agriculture firms to maintain a good crop.

That's why, nowadays, agriculture implements solutions like GIS.

GIS technology visualizes, analyzes, and interprets data about places on the Earth's surface by fusing spatial or geographical data with analytical tools. Let's look out for different applications of GIS technology in agriculture:

PRECISION FARMING

GIS is implemented in precision farming, a branch of agriculture, to collect and monitor weather patterns, crop health, and soil conditions. Using the data collected helps generate a detailed map of the farm, providing better crop management and decision-making.
In various situations, farmers can use GIS to examine parts of fields vulnerable to pests or illnesses and more effectively apply fertilizer or pesticides to those regions.

Another possibility is mapping the variations of soil type, nutrient levels, and moisture across the field. This reduces waste and increases yield. ***EOSDA,*** a global provider of satellite analytics solutions in agriculture and forestry, is one of the companies enabling GIS. Using data from prior years, EOSDA Crop Monitoring helps you to generate productivity maps of your fields. With their help, you may determine which regions are productive and which are not, then use potassium-phosphorus solutions to fertilize the latter.

CROP MONITORING

GIS solutions integrate satellite imaging, remote sensing, and on-ground IoT sensors to provide real-time monitoring of field conditions without requiring the farmer to be physically present. Multispectral and hyperspectral imagery detect the plant chlorophyll levels, canopy structure, and biomass.

On-ground sensors and drones capture micro-level changes in soil moisture, leaf color, or pest presence. This information is spatially mapped and evaluated to generate alerts, trend lines, and insights for farmers and agribusinesses.

ISRO and the Ministry of Agriculture use GIS and remote sensing to monitor crops like cotton, wheat, and paddy in ***India's FASAL system.*** The system assists insurance companies and state governments in tracking crop losses and forecasting yields. In 2022, FASAL covered more than 11 primary crops in more than 350 districts.

SMART IRRIGATION CONTROL

Dry spells and heavy precipitation in low-lying regions with inadequate drainage can ruin crop productivity. GIS allows farmers to determine the water stress level of each crop and identify visual patterns that determine either an excess or a shortage of water, which can be utilized to control irrigation.

The Power of GIS in Irrigation

GIS systems integrate:

- **Topographic and slope data to** identify natural water flow paths.
- **Soil moisture maps** (from ground sensors & satellite data) to locate dry zones or overwatered patches.
- **Weather data and rainfall forecasts** to time irrigation cycles precisely and avoid waste.
- **Crop type & growth stage** information to determine ideal water needs.

AGRICULTURE MAPPING

With the help of GIS, farmers can use planners and managers to choose the ideal location for agricultural projects. It can be used to map the locations of possible dangers like pollution and flooding, and resources like water, soil, and transportation. Comparing vegetation on different dates or using various indicators might help determine how several aspects affect yield. Multiple solutions are available that help monitor current and past data and evaluate the performance of two indicators on the same date.

INSECT AND PEST CONTROL

Crops can be destroyed by unpredictable pest outbreaks and plant diseases, often with little warning. GIS technology predicts these hazards by enriching environmental data with spatial data, aiding farmers in taking proactive actions before an infestation spreads.

A scout no longer needs to explore the field if the index map shows low vegetation in a small area, suggesting the chances of parasites and illness there. Using the vegetation index to define the infection zone, you can then use the tool to focus on a particular area. Using the GIS applications, the farmers can share the pictures of completed jobs and hazard kinds while also inspecting the chosen location.

CHAPTER–4

Emerging Technologies and Innovations: Shaping the Future of GIS in Agriculture

Advanced network planning, optimization, and asset management are becoming increasingly necessary as the global GIS market for telecom is predicted to reach $1099.9 million by 2033 at a compound annual growth rate (CAGR) of 3.1% from 2025 to 2033.

The combination of GIS and next-generation technologies is expanding the possibilities in agriculture. These advances, which range from blockchain-backed traceability systems to autonomous drones, are revolutionizing the way agricultural data is gathered, examined, and disseminated throughout the value chain and improving decision-making in the field.

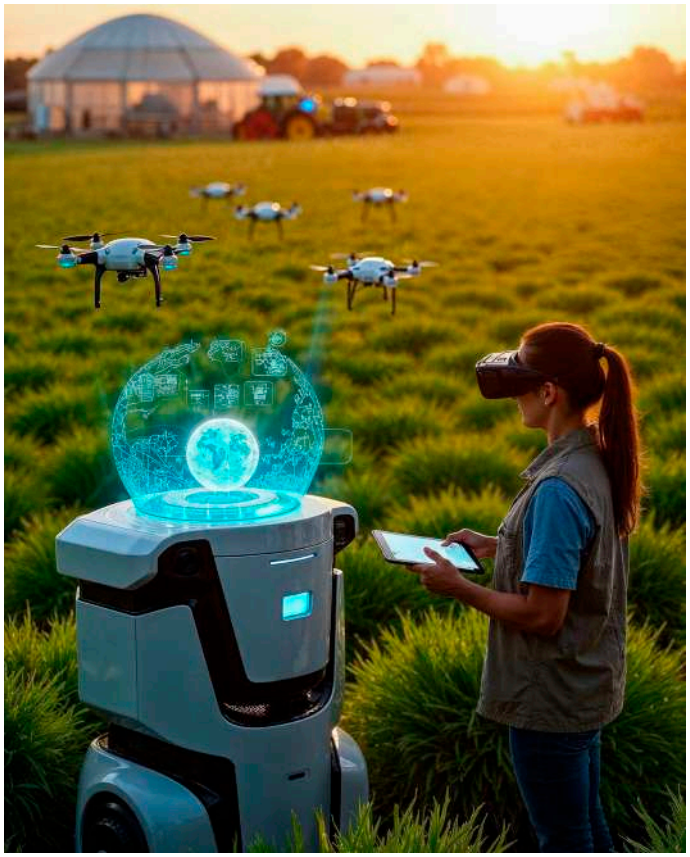
Drone Integration for Aerial Intelligence

The use of drones with thermal and multispectral cameras is transforming field surveillance. When paired with GIS platforms, they enable high-frequency, high-resolution data collection that traditional satellite imagery or manual scouting cannot match. Equipped with multispectral, thermal, and RGB cameras, modern drones change how farmers monitor their fields.

What Drones Enable on the Ground

GIS-integrated drone systems offer:

- Identify nutrient deficiencies, water stress, or disease symptoms before they're visible to the naked eye.
- Accurate plant counting and spacing analysis, beneficial for high-value crops like horticulture or orchards.
- Real-time identification of pest and disease hotspots, allowing targeted pesticide to be used and reducing blanket spraying.



These insights are mapped and analyzed spatially within GIS platforms to create precise, actionable recommendations for farm operators and agronomists.

For example, integrating drone imagery with NDVI and soil conductivity data makes creating zonal irrigation maps that optimize water use down to the meter easier. Users may combine historical climate layers, forecast models, topographic data, and drone-derived analytics to create rich, contextual insight in ***ArcGIS*** and related platforms.

Blockchain for Geo-tagged Traceability

Traceability is now a competitive requirement as consumers, authorities, and international buyers want more transparency in food chains. By enabling real-time, tamper-proof records that are based in both time and place, blockchain technology integration with GIS gives agricultural supply chains a level of transparency and trust never before possible.

What This Integration Enables

Combining GIS with blockchain unlocks powerful capabilities:

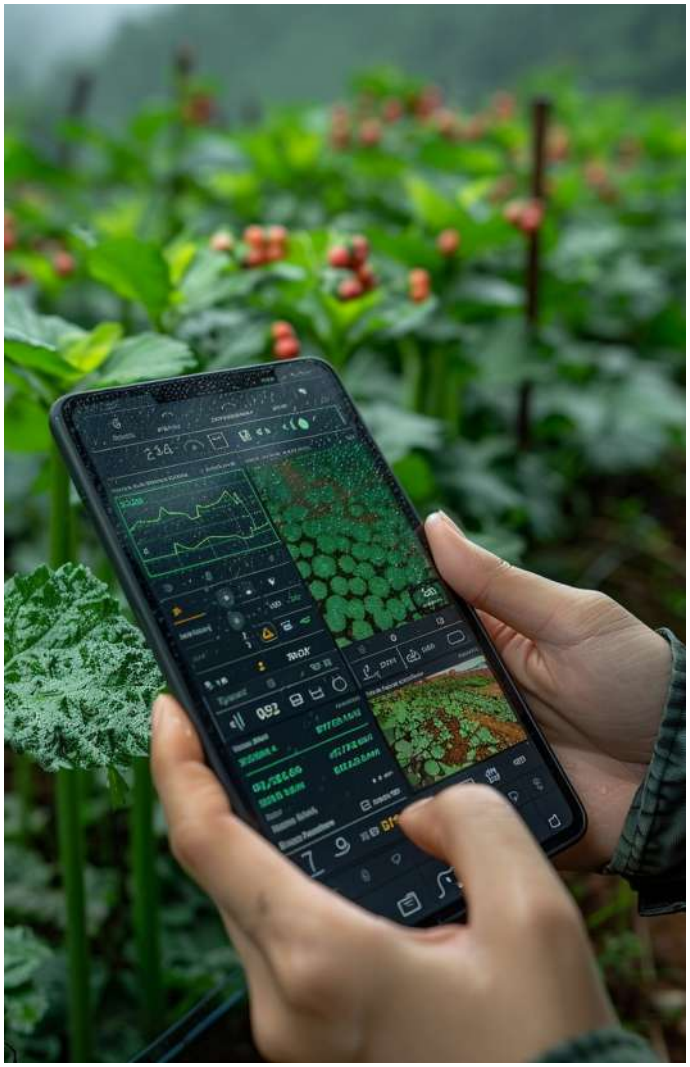
- **Geo-tagging of farming activities,** planting, fertilization, pesticide use, irrigation, and harvest events can all be recorded with precise location data.
- **Immutable digital records,** Blockchain ensures that a record cannot be altered or deleted once it is entered (e.g., crop treatment or transport). This builds authenticity and prevents fraudulent claims.
- **Seamless end-to-end transparency,** from the farm to the processing facility, distributor, and retailer, every step is traceable with verified geospatial and temporal data.

Edge Computing and Smart Sensors

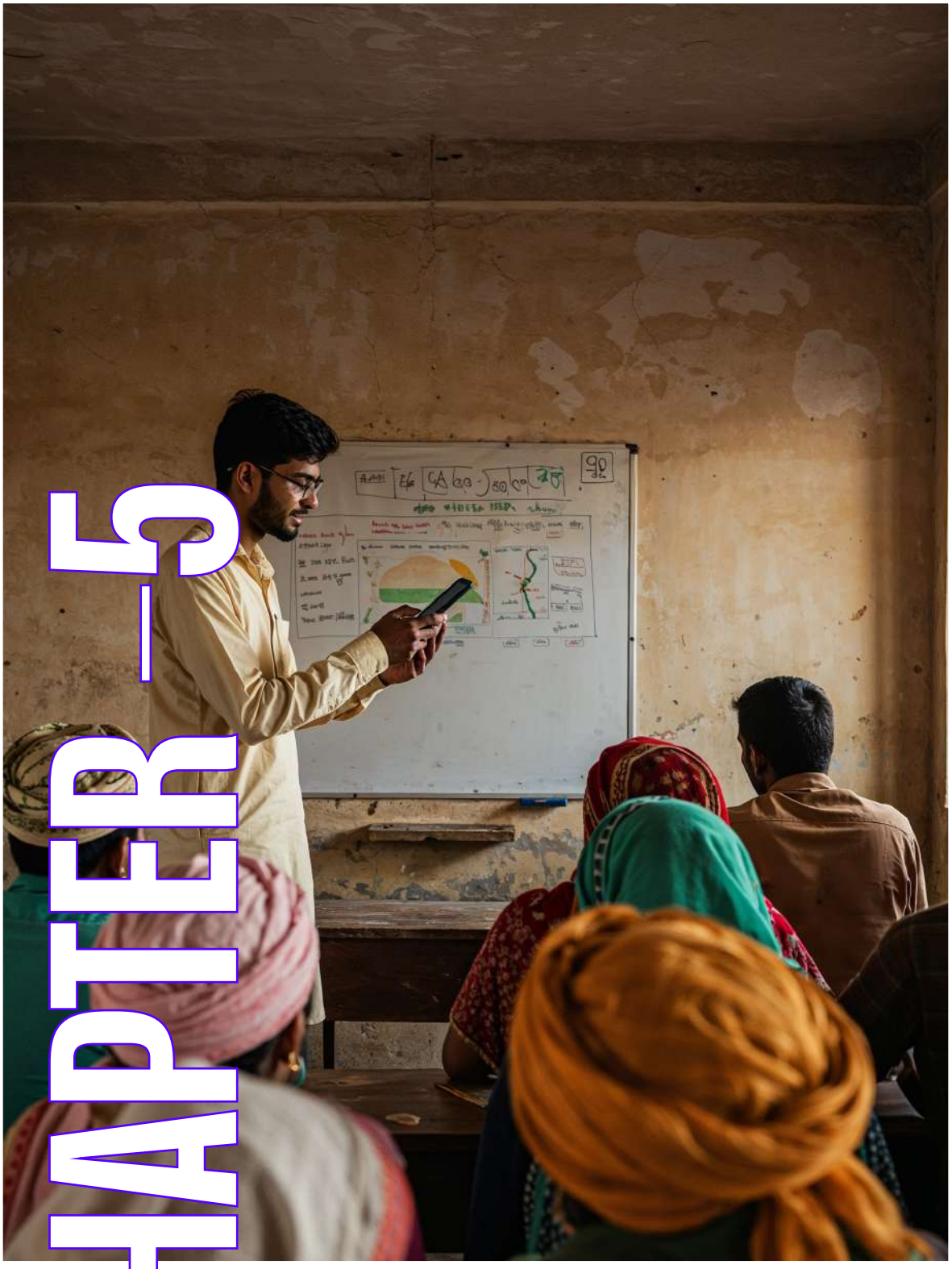
Farms are becoming intelligent ecosystems in the era of data-driven agriculture, outfitted with edge computing devices and Internet of Things sensors that enable decision-making at the soil level. Together with GIS platforms, these tools frequently transform unprocessed field data into timely, valuable insights without requiring continuous internet access.

Smart farms use edge computing to:

- Gather high-frequency data from field sensors to measure temperature, humidity, pH, soil moisture, and leaf wetness.
- Analyze, filter, and process data locally at the source (on a microcontroller or gateway).
- Trigger real-time actions such as:
    - Activating irrigation systems only where soil moisture is low
    - Sending alerts when the temperature exceeds crop tolerance thresholds
    - Closing greenhouse vents based on humidity and wind patterns



Cloud solutions such as Azure, Snowflake geographic Geospatial, ***Esri's ArcGIS Online,*** and AWS Location services enable companies to store, transfer, and analyze geographic information without needing substantial on-premises infrastructure. Teams may now easily collaborate in real time, allowing for faster decision-making and constant updates.



CHAPTER – 5

AgriTech Challenges & Market Barriers in India

Navigating the Barriers to Digital Farming

Despite India's growing adoption of GIS and AgriTech solutions, multiple challenges remain that slow down the pace of digital transformation, especially for small and marginal farmers. Addressing these issues is essential for ensuring equitable, scalable, and sustainable growth in the sector.

DATA PRIVACY AND OWNERSHIP: WHO CONTROLS FARM DATA?

The rapid digitization of agriculture has led to a surge in data collection, from soil health and weather patterns to yield and input usage. However, data privacy and ownership remain pressing concerns:

01

Farmers often have **limited visibility & control** over how their data is collected, stored, & shared.

02

The absence of **transparent consent mechanisms** can lead to concerns about potential misuse or unauthorized monetization of farm data.

03

With **private companies and public agencies** handling data, there is a growing need for assurance that farmers' rights are respected and safeguarded.

While India's data protection policies are evolving to address privacy concerns, there is an opportunity for agriculture-specific guidelines that ensure responsible data usage and farmer empowerment.

The Challenge

Ensuring that **data is transparently handled, securely stored, and used with the informed consent of farmers,** while enabling innovation and insights.

RURAL INFRASTRUCTURE AND CONNECTIVITY GAPS

AgriTech platforms rely heavily on **digital infrastructure,** which remains underdeveloped in many parts of rural India:

01

Approximately **37% of rural households** have access to high-speed internet, which limits the usability of GIS and real-time data tools.

02

Power interruptions and network coverage challenges can disrupt the consistent use of connected devices and mobile applications.

03

Access to **affordable digital tools,** such as smartphones, sensors, and GPS-enabled devices, remains uneven.

04

India's linguistic diversity, with hundreds of regional languages, of ten creates communication barriers for digital training, user interface design, and adoption of technology tools.

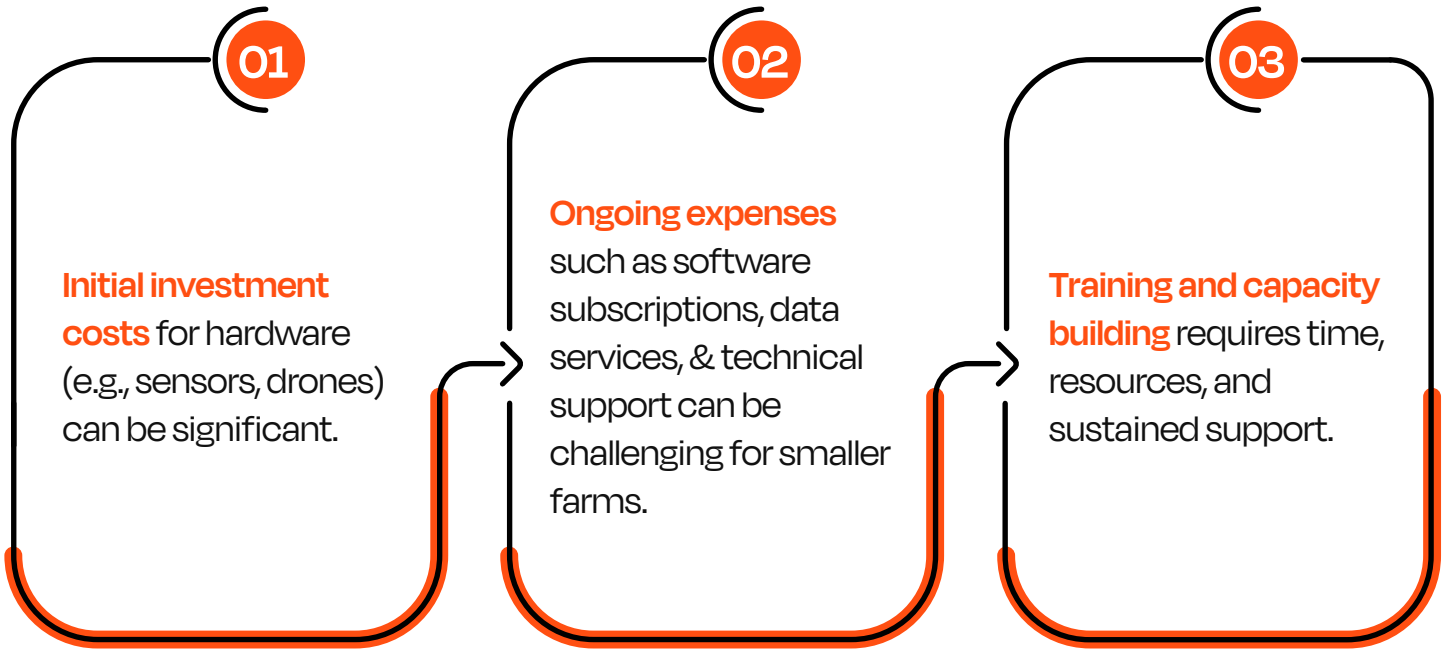
Though several public and private initiatives aim to enhance rural connectivity and digital access, implementation hurdles and varying levels of digital literacy continue to impact technology adoption.

The Challenge

Delivering GIS and AgriTech solutions that work **effectively in low-connectivity environments,** while supporting infrastructure upgrades at the grassroots level.

COST BARRIERS: AFFORDABILITY FOR SMALLHOLDER FARMERS

For India's **over 120 million small and marginal farmers,** affordability is a key consideration in adopting GIS technologies:



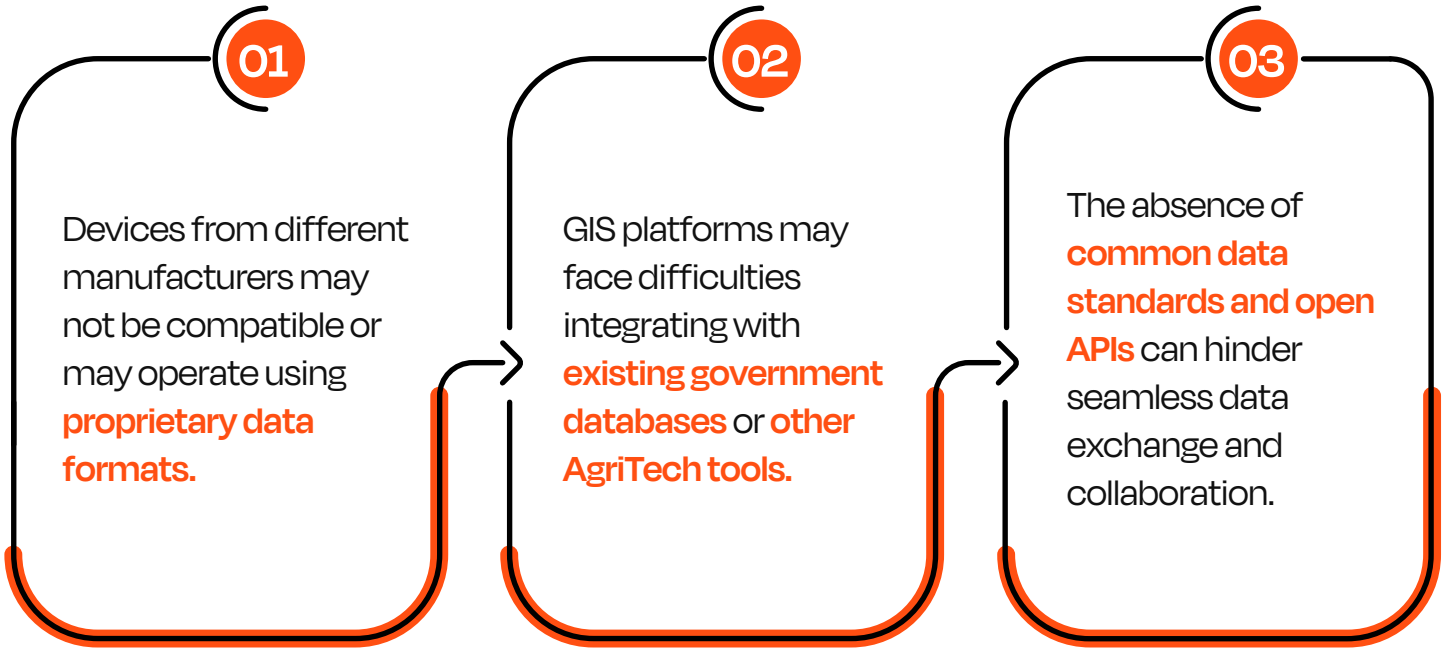
While various government initiatives and public-private programs offer support, the overall cost of adoption still presents a barrier for many.

The Challenge

Developing **cost-efficient, modular GIS solutions** that offer tangible value, supported by **innovative financing models** such as subscription-based access or shared community infrastructure.

INTEROPERABILITY ACROSS DEVICES AND PLATFORMS

India's AgriTech ecosystem includes a wide range of solutions, but often lacks standardization, creating integration challenges:



This fragmentation can result in **redundant data collection, limited insights, and reduced efficiency** for stakeholders across the agricultural value chain.

The Challenge

Promoting **open, interoperable systems** that ensure smooth data flow and integration across platforms, enabling holistic decision-making and enhanced usability.

Dexian's Response: Turning Barriers into Opportunities

Dexian is actively working to address these challenges by:

01

Embedding **transparent data privacy frameworks** in its platforms, ensuring farmers' rights and consent are prioritized.

02

Designing **offline-enabled applications** that synchronize automatically when connectivity becomes available.

03

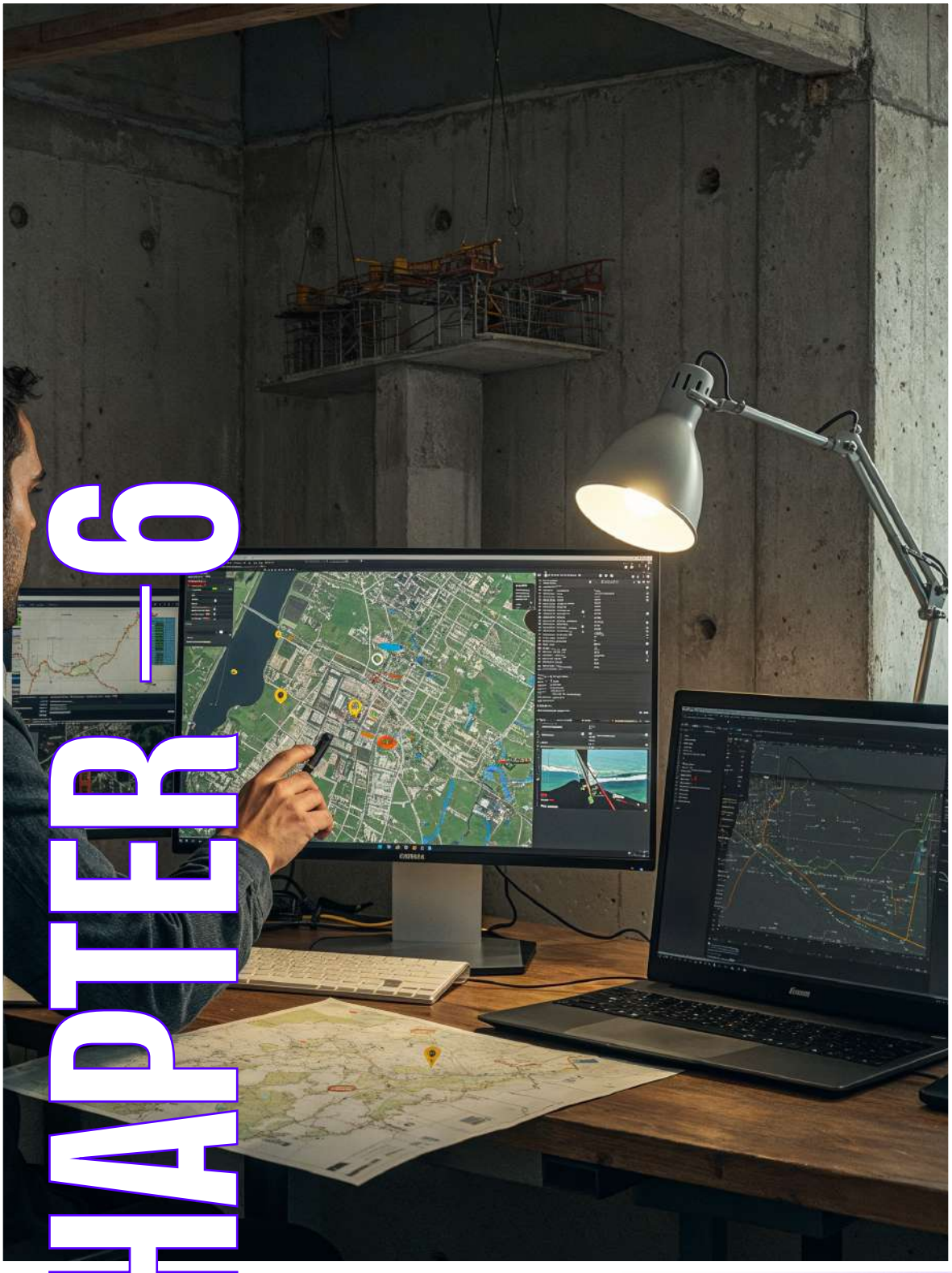
Offering **affordable, modular solutions** tailored for diverse farming needs, in partnership with state agencies and AgriTech innovators.

04

Encouraging **open API architectures** to enable seamless integration with third-party systems and government platforms.

05

Dexian's AIEP offers multilingual translation, voice-assisted commands, and simplified dashboards, enabling farmers to receive GIS insights in their native language, thus overcoming communication barriers and improving adoption rates.



CHAPTER-6

Key Takeaways: GIS and Satellite Data, Driving Concrete Impact

The use of geospatial intelligence in agriculture is no longer aspirational; it's operational. Between April and July 2025, GIS and satellite-based interventions shifted decisively from pilots to practice, delivering measurable improvements in farmer decision-making, input optimization, and yield outcomes.

Precision That Protects

Spatial data now offers predictive alerts on pest infestations, moisture stress, and potential crop failure, often up to 7 days in advance. These advisories help farmers apply preventive measures on time, leading to a 20–30% reduction in avoidable yield losses, especially in rainfed areas.

Real Impact on the Ground

In parts of Andhra Pradesh and Maharashtra, multiple field studies showed that farmers who adopted satellite-aided advisories for sowing, fertilization, and irrigation recorded average yield increases of 25–30%, and income jumps of over 35% per acre.

For example,

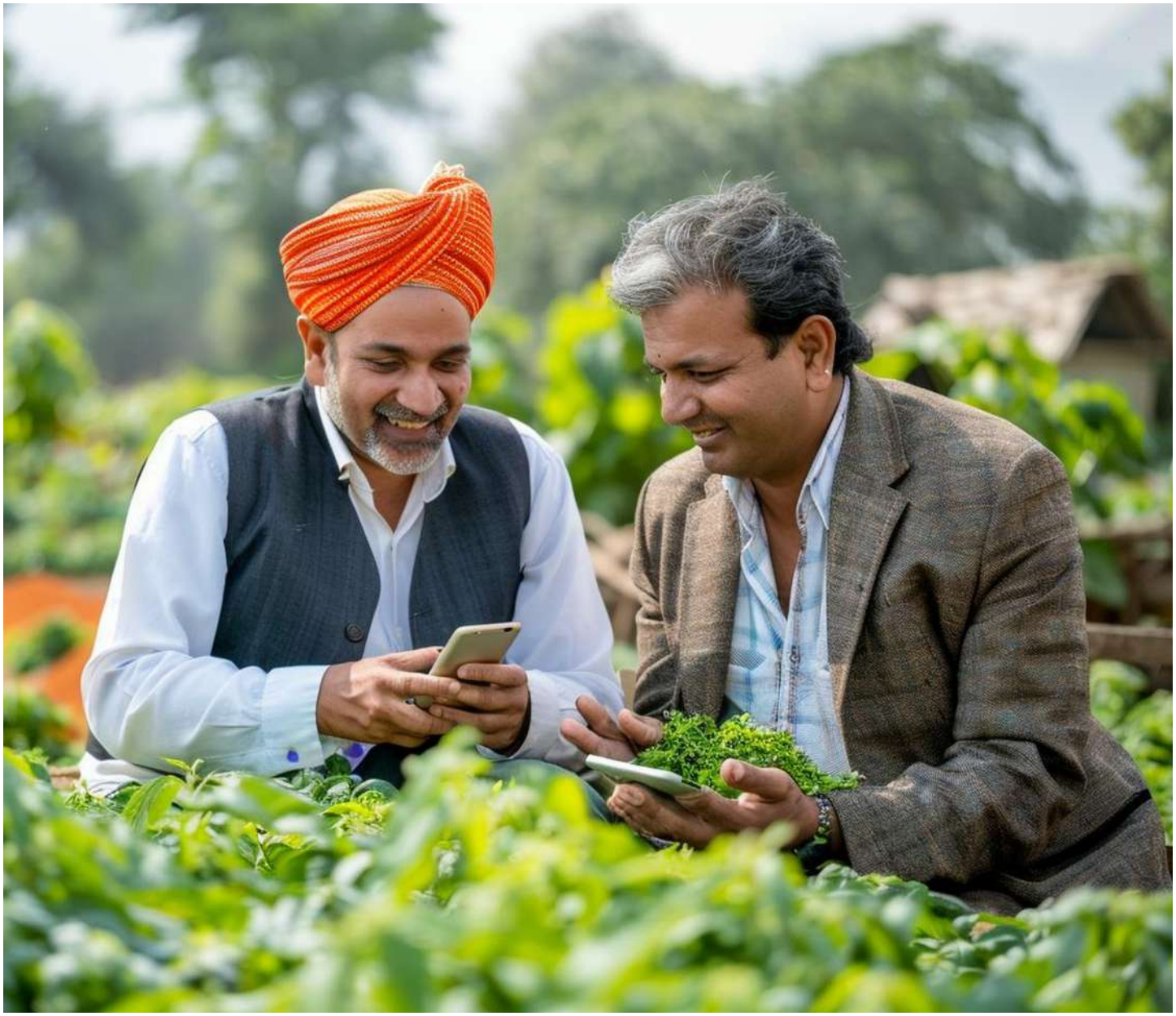
a farmer from Kadapa district reported that his net income per acre improved from ₹6,500 to over ₹19,000 in just two cropping cycles, attributed to satellite-validated irrigation and pest alerts.

Governmental Thrust Fuels Expansion

Public investment in GIS-backed agriculture has surged:

- Over ₹2,000 crore has been committed toward spatial technologies for soil health mapping, water resource planning, and Agri-extension digitization.

- The National Geospatial Program has crossed a milestone of 100,000 digital maps, accessible through open APIs to institutions and startups working on rural development.



Smarter Farming with Less Waste

GIS tools are enabling crop-specific fertilizer and pesticide usage recommendations. Field trials across 10 Agro-climatic zones showed that farmers using GIS-driven input plans saved 15–22% on fertilizer and improved their crop quality grades by 18% on average, enabling better pricing at procurement centers.

Wider Reach Through Local Interfaces

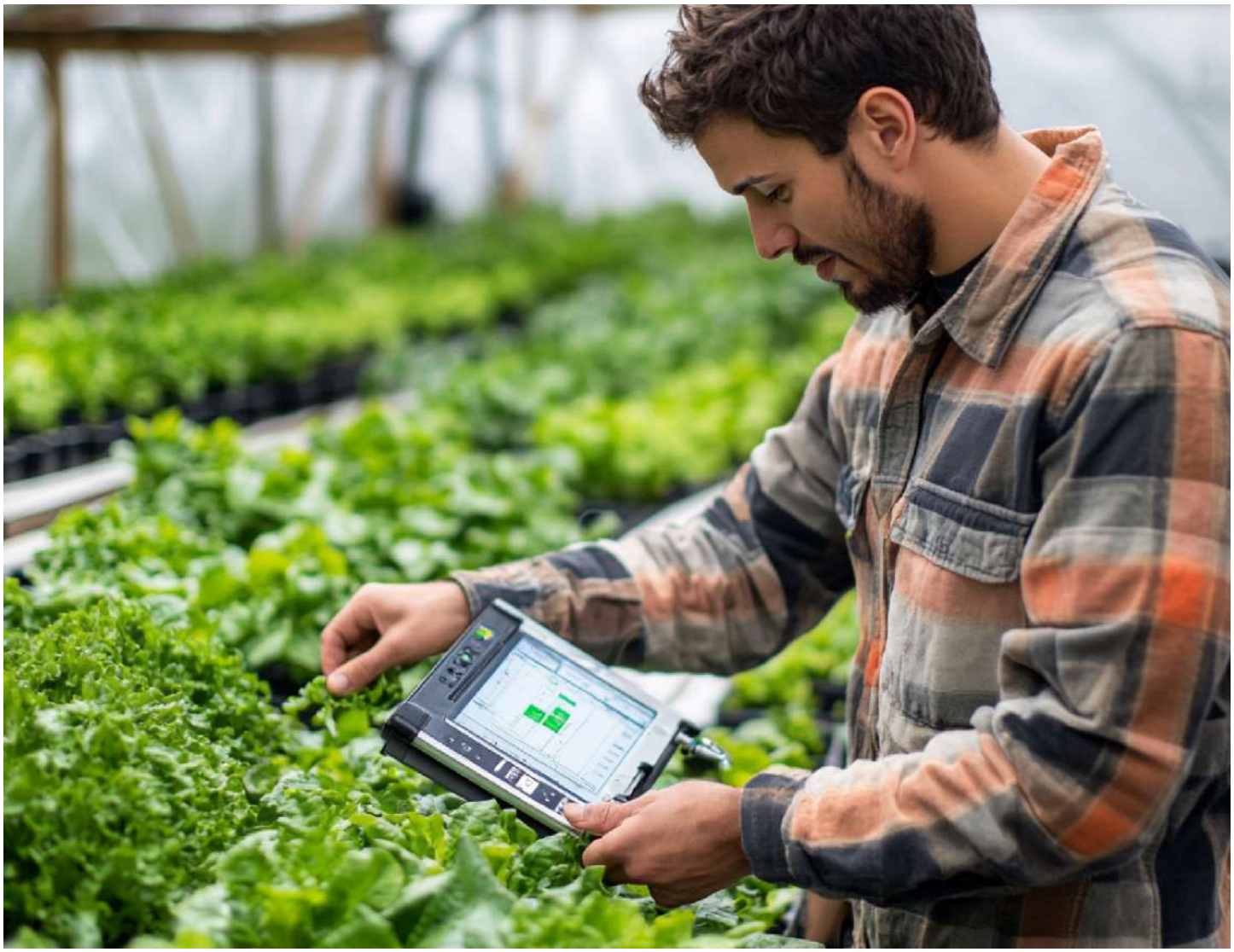
In the last quarter alone, more than 600,000 farmers accessed GIS-enabled tools through voice-guided mobile platforms in local languages. These tools allow them to digitally mark plot boundaries, track NDVI and VHI indices, and receive timely weather updates, even in low-connectivity zones.

Hyperspectral Innovation on the Rise

The deployment of hyperspectral satellite constellations is deepening agricultural visibility. These satellites offer over 100 spectral bands, enabling early detection of crop stress, disease, or nutrient deficiency. This technology is now reaching farms across 14 Indian states, especially in sugarcane, cotton, and paddy belts.

Trusted by the Field, Validated by Data

According to a rural impact assessment conducted across 244 villages, 92% of farmers reported productivity improvement, and 89% saw improved income stability due to the consistent use of location-based advisory. Most importantly, over 70% of the users indicated they now make planting and input decisions based on these tools, not just intuition or tradition.



In Brief,

Satellite and GIS-based tools are no longer an add-on; they are fast becoming the backbone of informed farming. They support not just productivity, but sustainability, precision, and predictability, key ingredients for ensuring resilient rural incomes in a climate-volatile world.

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