Leveraging PLANET Imagery and AI/Analytics to Mitigate Food insecurity in Odisha – NRSC UIM 2024

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FOOD SUPPLIES & CONSUMER WELFARE DEPARTMENT
GOVERNMENT OF ODISHA

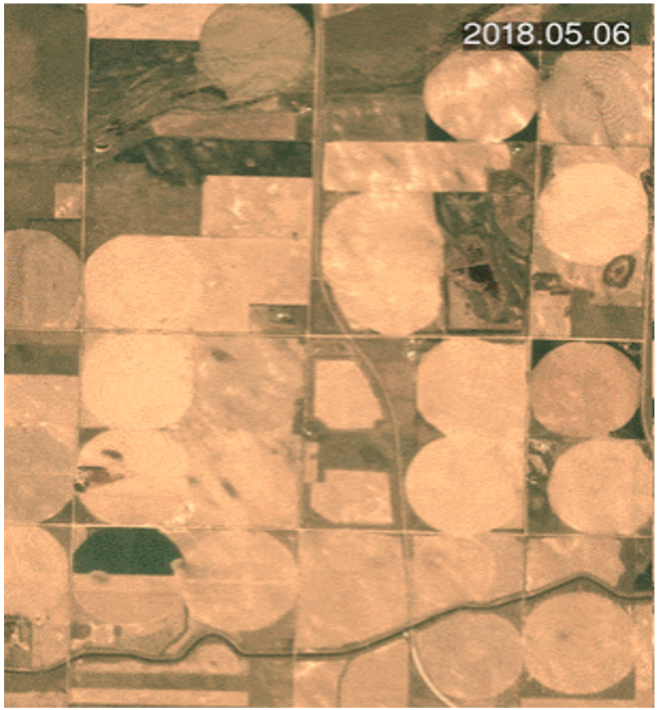
The Food Supplies and Consumer Welfare Department, Government of Odisha aims to **support the citizens by providing food grains and other essential items and ensures the food support to the families** below the poverty line.

The Department **targets to put an end to false/ inflated claims in registration/procurement process** and seeks to ensure MSP to genuine farmers.

The process of authentication of genuineness in farmer's reporting was strengthened using GIS and High Resolution Temporal Satellite Images from PLANET Labs

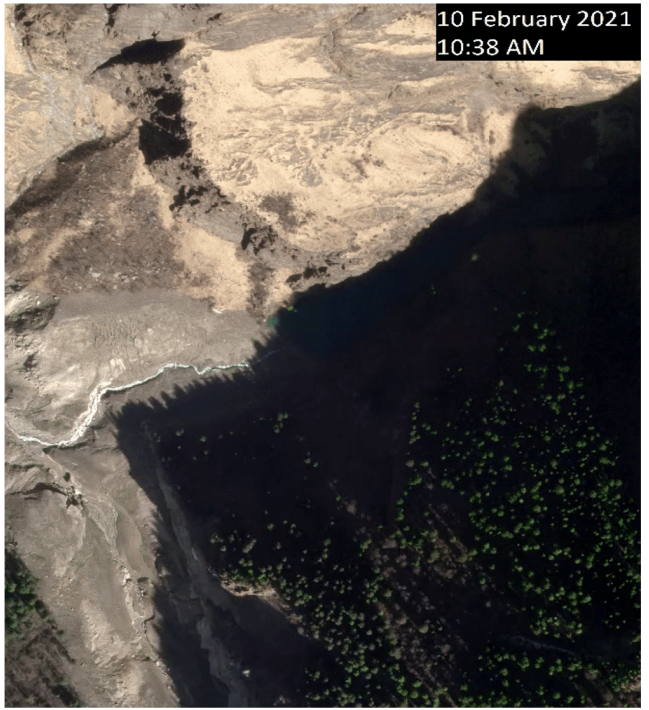
Planet offers Near Daily and Subdaily Imagery

Planetscope (3m)



Nebraska growing season 2018
Planetscope Near Daily

SkySat (50cm)



Rishiganga Landslide Lake 2021
SkySat Sub-daily

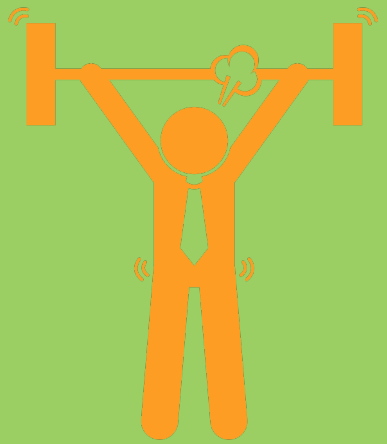
Objectives:

- Bring transparency in farmer registration and assess correct entitlement to sell paddy to Government under MSP program.
- Crop areas claimed by farmers during farmer registration process to be validated at cadastral level using high solution satellite imagery of the crop period.
- GIS-based visualisation and reporting for better decision support.
- Ensure benefit of Minimum Support Price (MSP) reach to the genuine farmer.

Major Challenge Addressed

False/inflated claims in the registration/ procurement process

Challenges



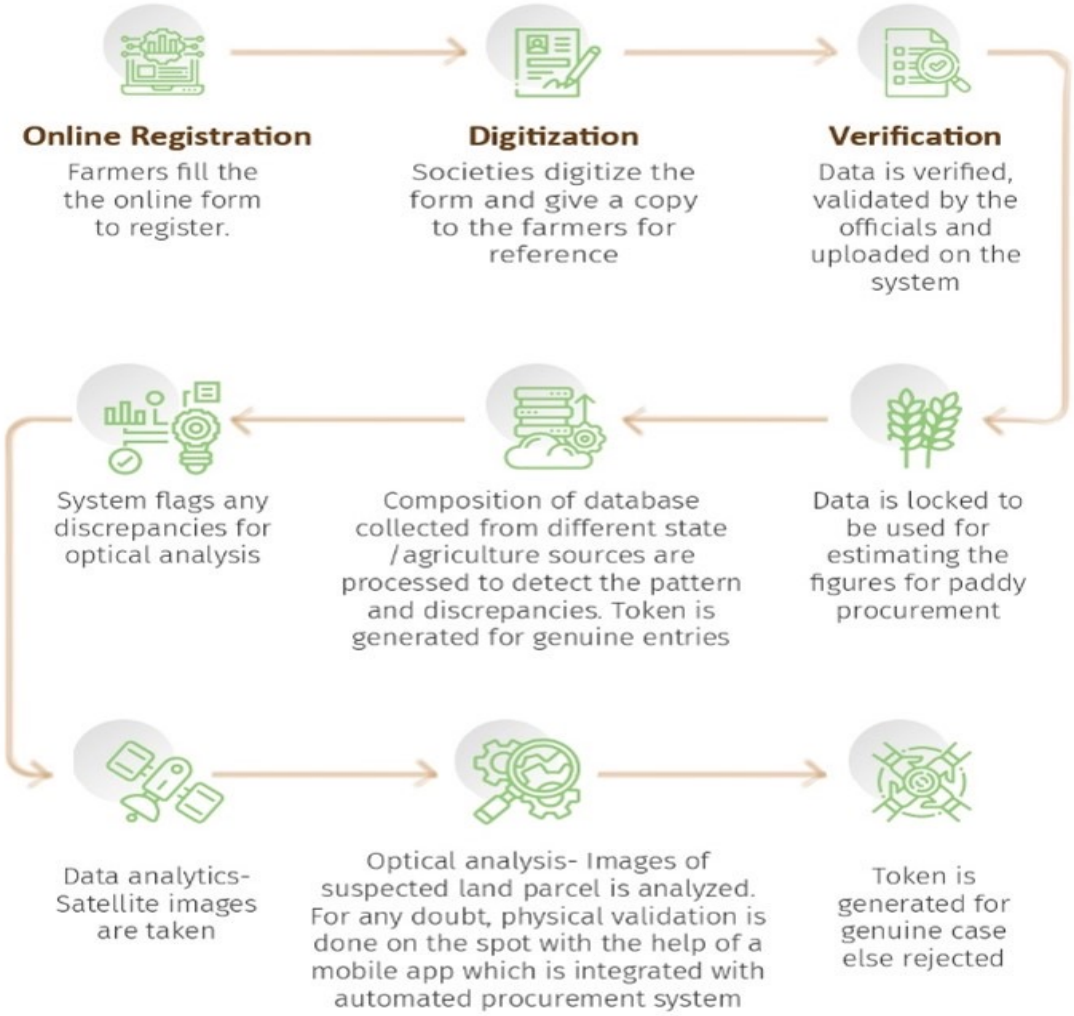
Land Parcel Anomalies	Not all registered land parcels are cultivated. This leads to an exaggerated estimate for procurement of foodgrains.
Underestimation of Produce	Due to incorrect assessment, procurement agencies tend to have a conservative procurement target, leading to distress sale of crop by farmers.
Fraudulent Procurement	Fraudulent elements get into the system by buying produce from small/ marginal farmers & posing as traders with registered land parcels.

Before Government Process Re-engineering:

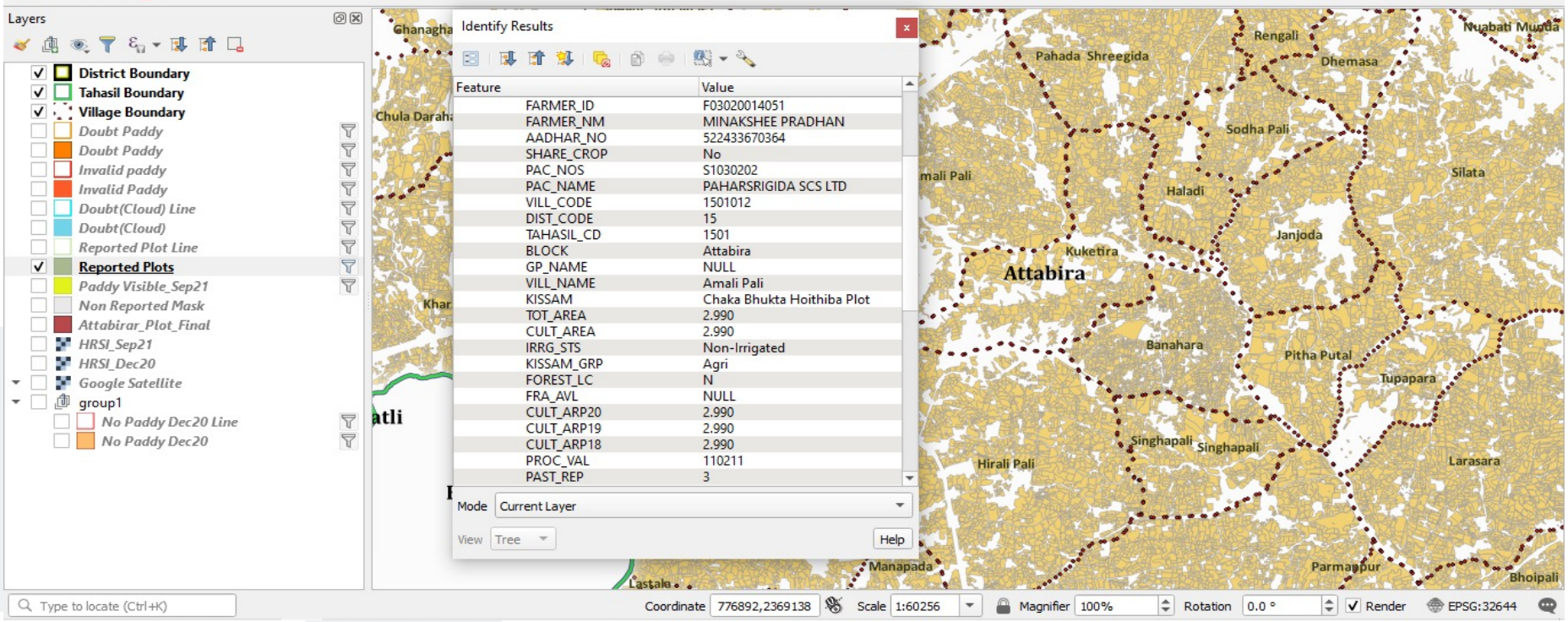
- In every Kharif Marketing Season (KMS) farmer registration exercise takes place during the Kharif paddy crop season and Rabi paddy crop season wherein farmers willing to sell paddy to the Government get themselves registered with their nearest procuring societies like PACS/ LAMPCS/ WSHGs/ Pani Panchayats.

- Framers provide land details during registration process, specifically indicating the area of land on which actual cultivation has been taken up. There have been instances in the past of claims found to be false/ inflated.

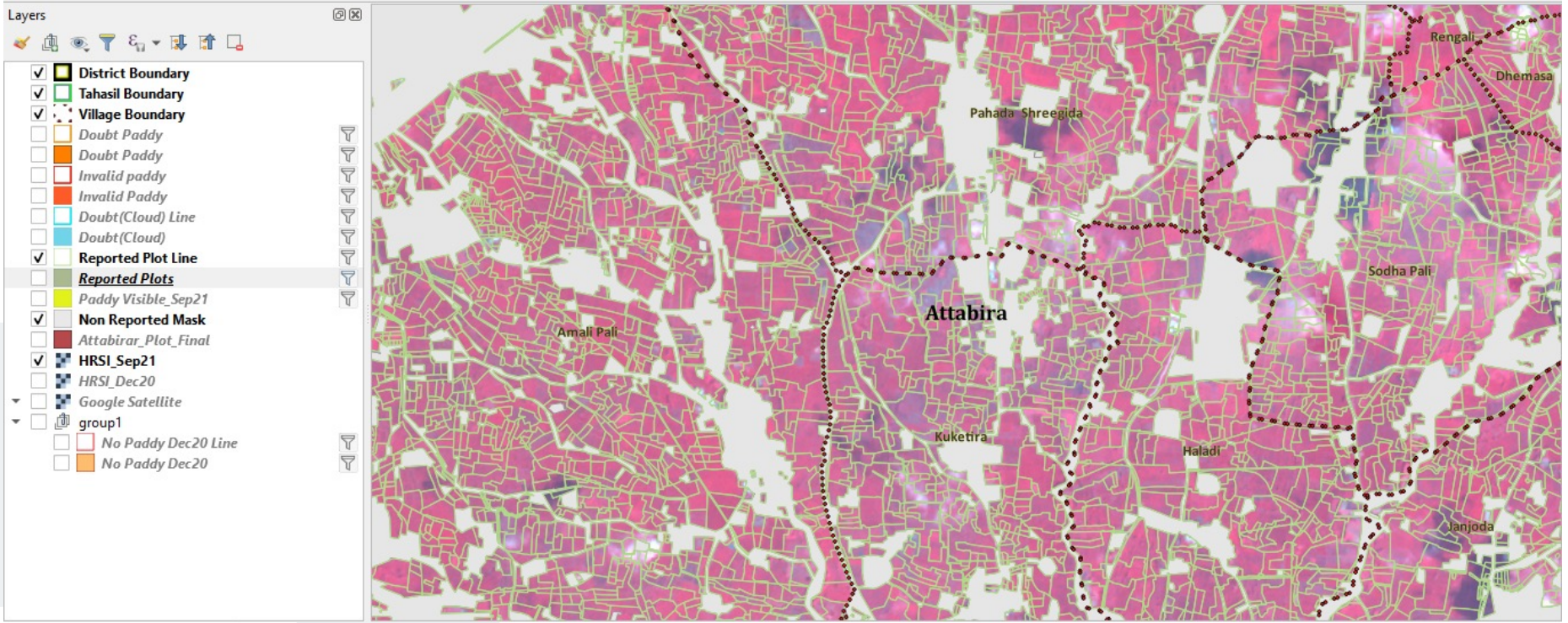
- In such cases MSP goes to the undeserving cases and this is loss of public money.


Online Registration
Farmers fill the the online form to register.
Digitization
Societies digitize the form and give a copy to the farmers for reference
Verification
Data is verified, validated by the officials and uploaded on the system
Data is locked to be used for estimating the figures for paddy procurement
Composition of database collected from different state / agriculture sources are processed to detect the pattern and discrepancies. Token is generated for genuine entries
System flags any discrepancies for optical analysis
Data analytics- Satellite images are taken
Optical analysis- Images of suspected land parcel is analyzed. For any doubt, physical validation is done on the spot with the help of a mobile app which is integrated with automated procurement system
Token is generated for genuine case else rejected

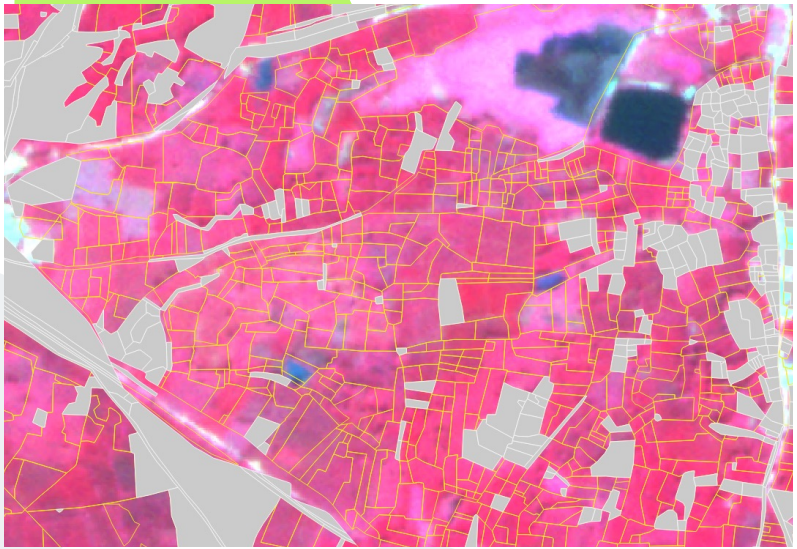
GIS Mapping of Farmer Reporting



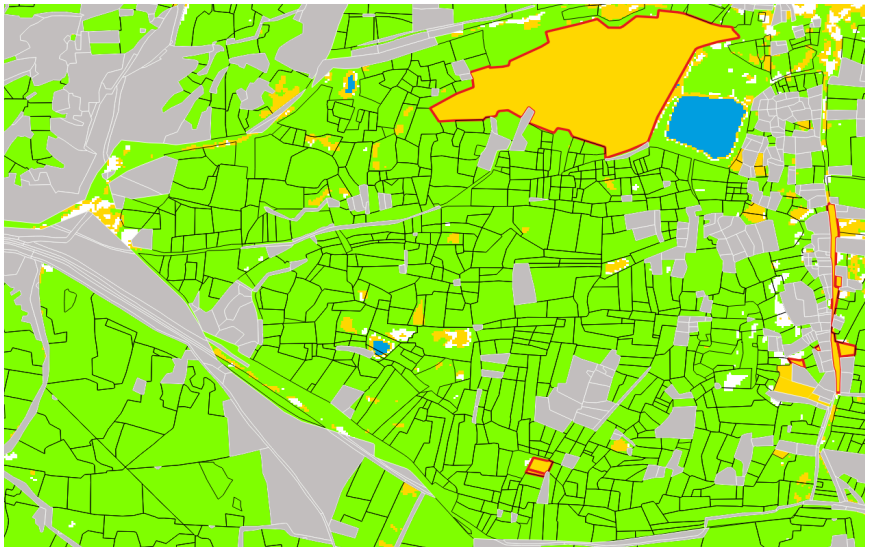
Kharif Paddy Reported Area On Satellite Image



Kharif Paddy Classification from Satellite Image

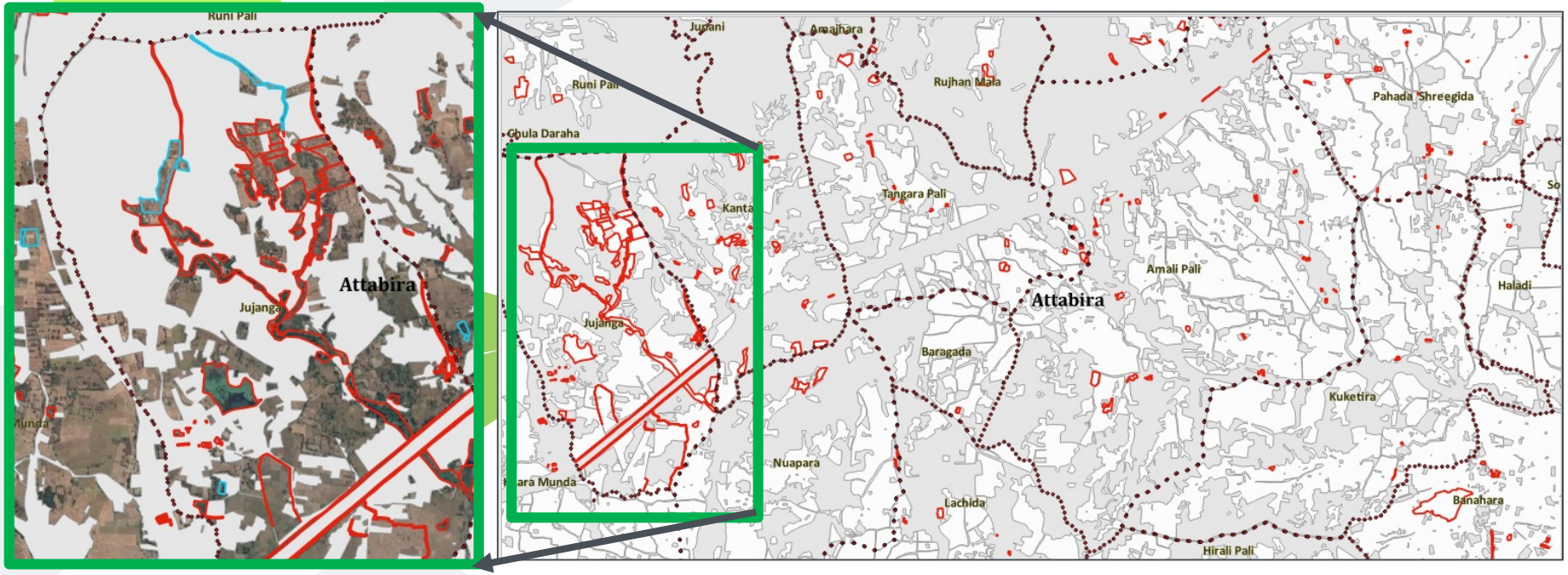


High Resolution Satellite Image of Paddy growing area

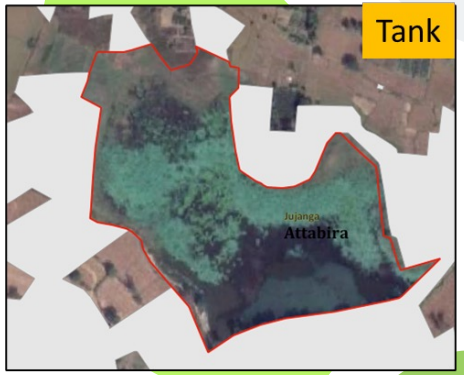


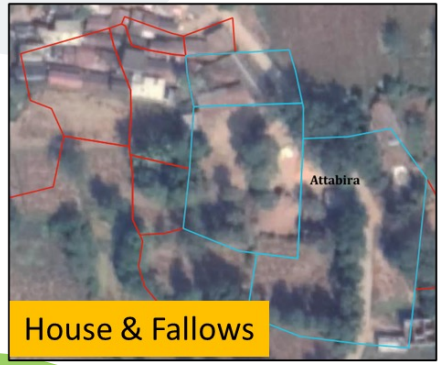
Paddy Classification (in Green)

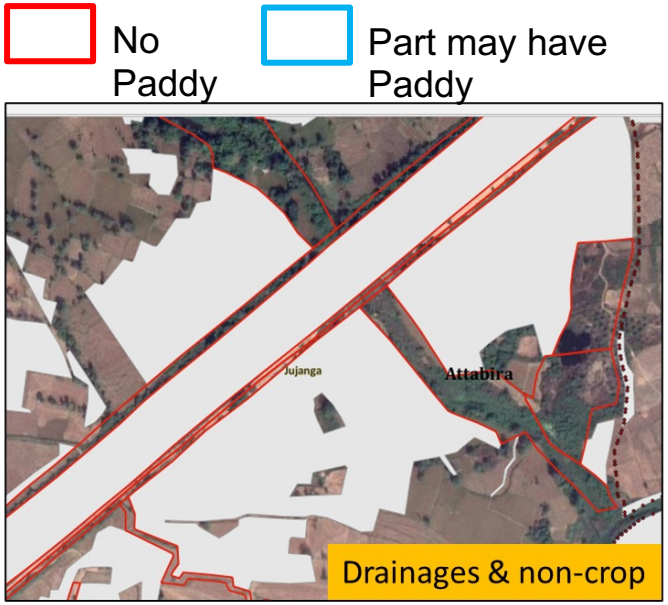
Doubtful Paddy Crop as per Satellite Image



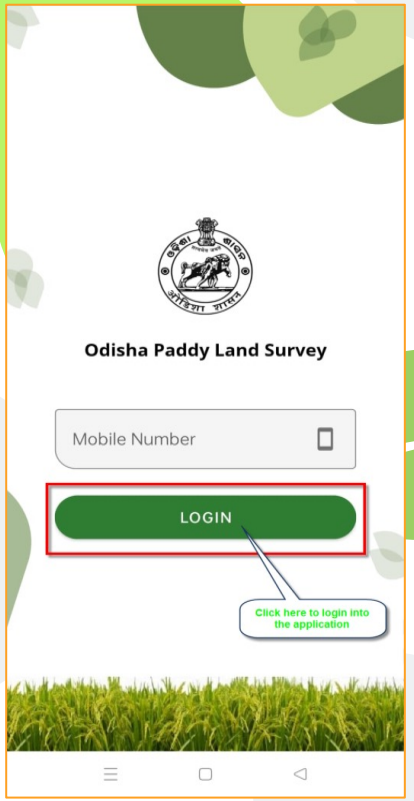
Misreporting / Doubt cases







Field Verification of suspect cases through Mobile App



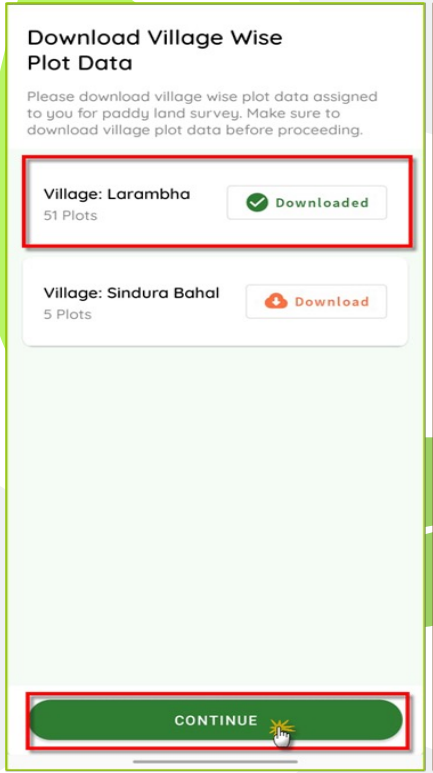
Highlighted Features

- Face detection while taking selfie of surveyor
- Compass Navigation in offline mode and google map navigation in online mode
- Camera Compass integration along with geo fencing to capture field photo of the targeted plot only

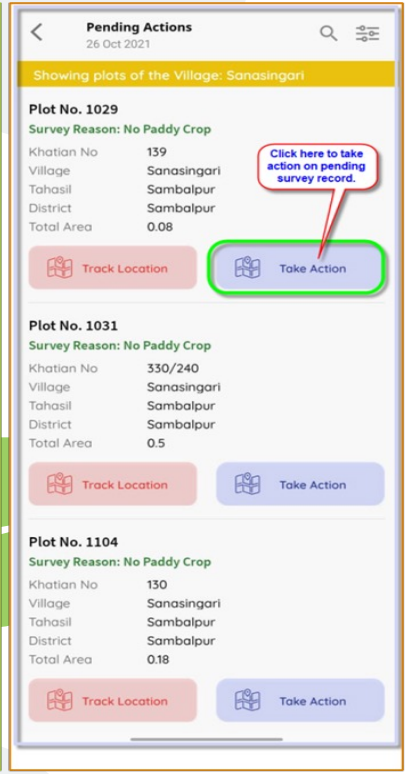
Targeted User

- Society members
- Society Secretary

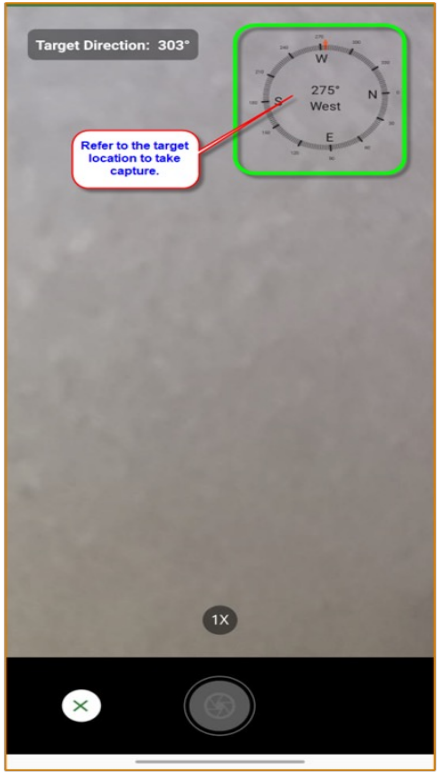
Field Survey Report by Mobile App



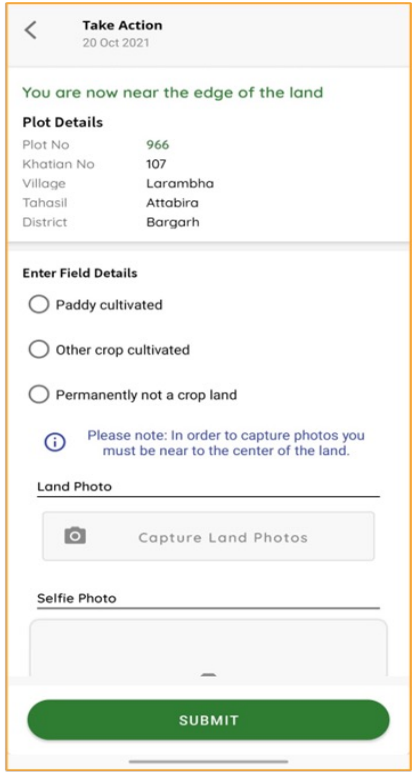
Download village wise plot data



View suspected plot data

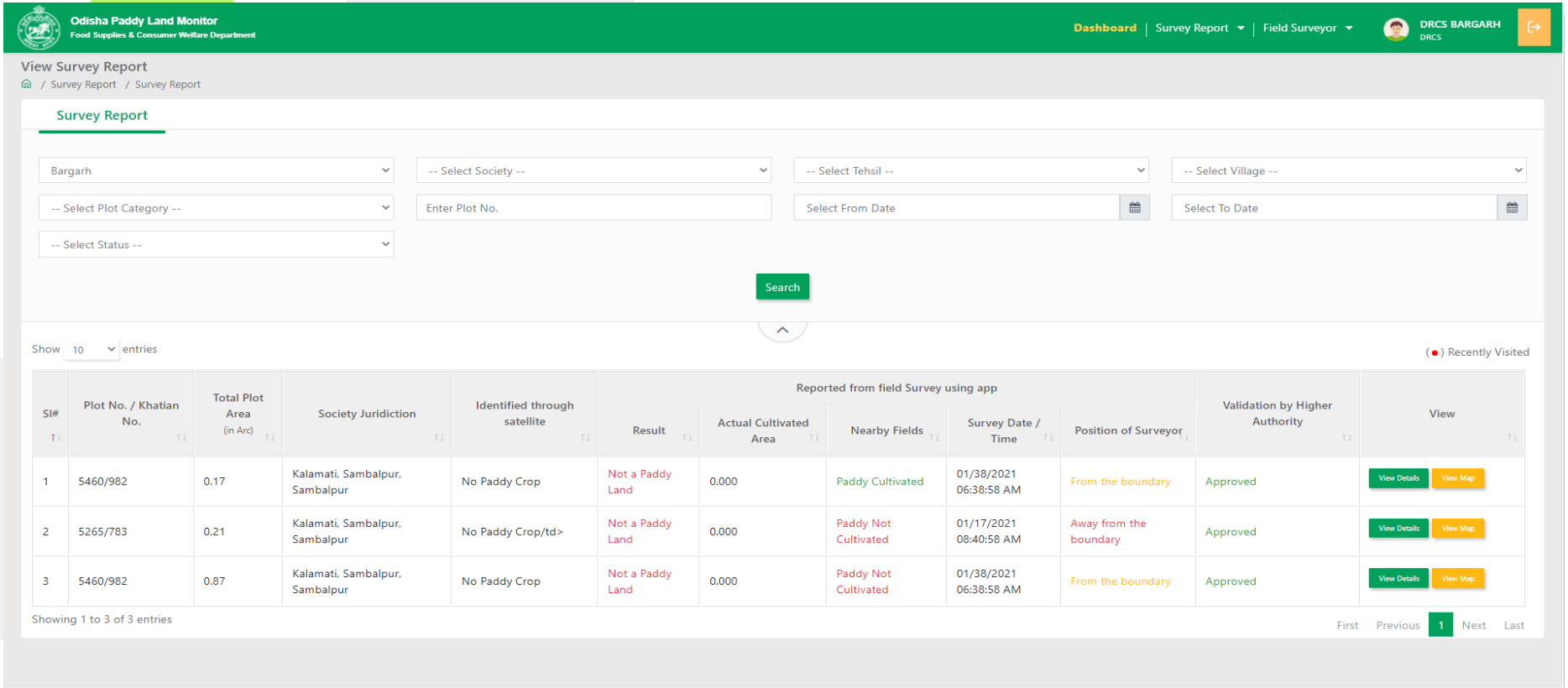


Camera Compass Integration



Survey Submission

Tracking of Field Validation



Field Validation

Plot Details

Plot No.	Khatian No.	Crop Status
954	208	Not a crop land
Society Jurisdiction	**Total Plot Area (in Acr)**	**Actual Area (in %)**
Gambharapanka,Jujumura,Sa	0.05	0.000

Survey Details

Surveyor Name	Surveyor Designation	Mobile No.
MANARANJAN PODHA	Field Surveyor	9861595957
Surveyor Position	**Survey Distance (in m)**	**Reason For Survey**
From the boundary	31.99	Doubt

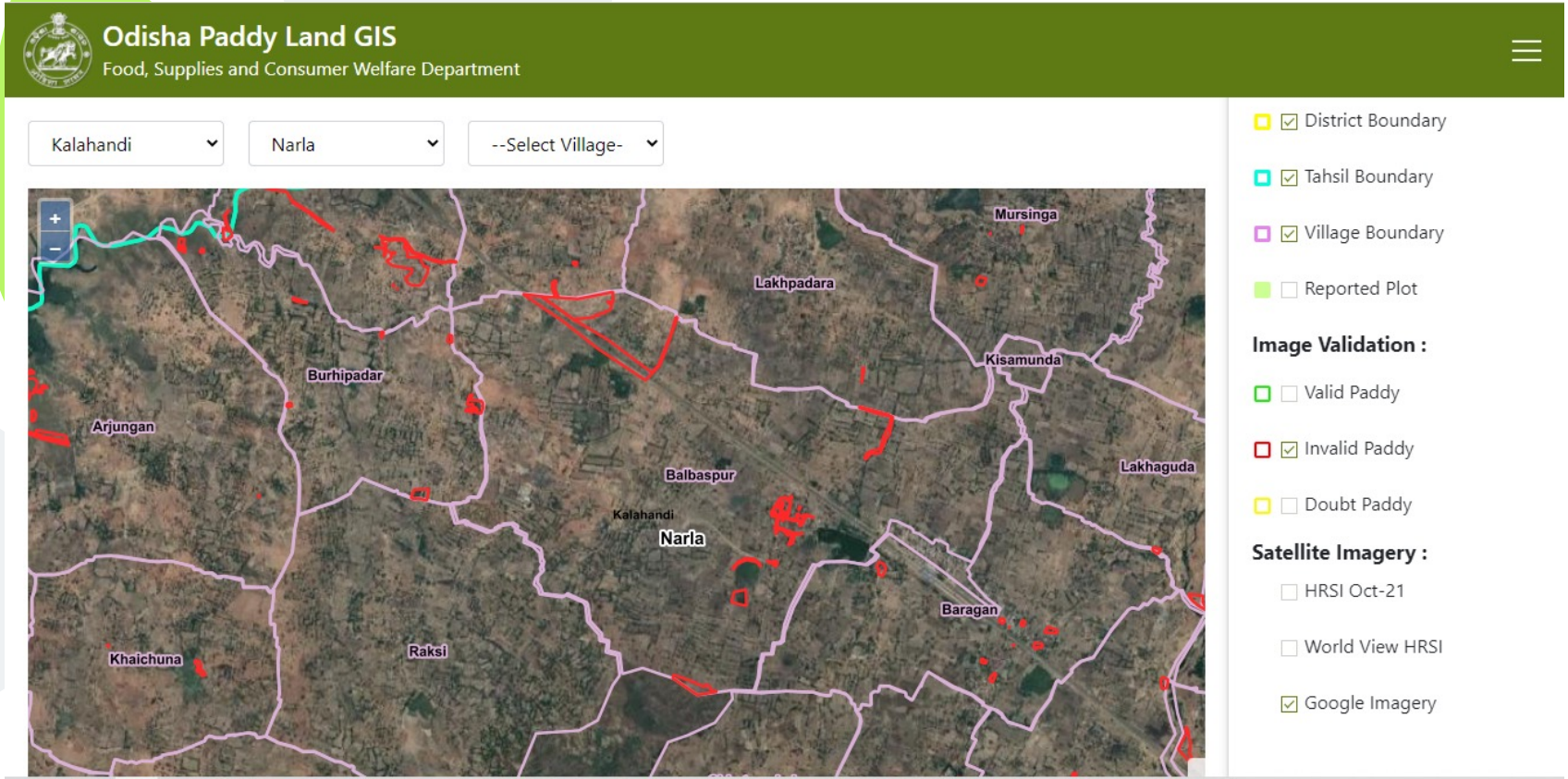
Supervisor Photo

Data Captured Information

Mobile Device Id	Mobile No.	Latitude
4dc63ca8dfb79209	9861595957	21.509974
Longitude	**Date / Time of Survey**	**Synced to Server On**
84.083856	11/2/2021 12:50:28 PM	11/2/2021 12:59:57 PM

Plot Photo

Web-GIS based Decision Support System



Approach

- Analysis of Kharif paddy crop reporting for past 3 years (2018-19, 2019-20, 2020-21)
- Mapping of village level crop/ non-crop land using HRSI (~ 1m) of recent past
- Updating existing digitized Cadastral maps as per crop reporting based on latest RoR data
- Mapping of village wise/ plot wise paddy crop reporting in cadastral maps using GIS
- Procurement of very high resolution Multispectral Satellite image (3m Mx) for paddy crop identification at cadastral scale
- Image analysis for paddy crop identification.

Approach (Continued)

- Integration of image derived paddy crop information with Cadastral reported paddy crops and validation/ confirmation of paddy crop
- 2-way integration of the proposed GIS based crop classification & with P-PAS to share the following information.
- Identification of discrepancy between farmer reported area and GIS verified area
- Mobile app for field verification to manage dispute farming area
- Business intelligence tool

Technology Used

- **Data Extraction**: Pentaho, Tableau & Python are used for developing connectors to acquire data from the source system
- **Data warehousing**: MS SQL DB is used as Enterprise DB Warehouse solution
- **Data Preparation and Analysis**: Pentaho & Python are used for data preparation & modeling
- **Remote sensing image Analysis**: ERDAS IMAGINE is used for remote sensing image analysis
- **Spatial Data Creation & Analysis**: QGIS used for spatial data creation and analysis
- **Spatial data storage**: PostgreSQL DB server used for spatial data storage
- **Spatial Data Processing on web**: Geo server is used as GIS server and Open layers used for analyzing the spatial data in frontend
- **Web Backend**: Java, Spring Boot and Hibernate are used for web application development
- **Web Frontend**: Frontends are developed in HTML5, Jquery and AngularJS frameworks
- **Mobile App**: Mobile Apps are developed for Android & IOS Platform by their Native technology.
- **Cloud Platforms:** The used AWS service are EC2, RDS, S3, Route53 and Elastic Load Balancer

Project Coverage – Geographical and Demographics

- Total number of Districts – 30
- No of District(s) covered out of total Districts
  - Khariff Paddy KMS 2021-22: 7 districts
  - Rabi paddy KMS 2021-22: 17 districts
- Percentage of Districts covered out of total- 57%
- Total Population- More than 7 lakh farmers
- Population projected to benefit (in absolute value and %age) - 16 lakh
- Population Actually benefitted (in absolute value and %age) - 7.1 lakh

RESULTS - GET RID OF MISREPORTING, SUPPORTED FARMERS

2022-23 Results

865,000

METRIC TONNES OF PADDY
identified and confirmed fraudulent reports

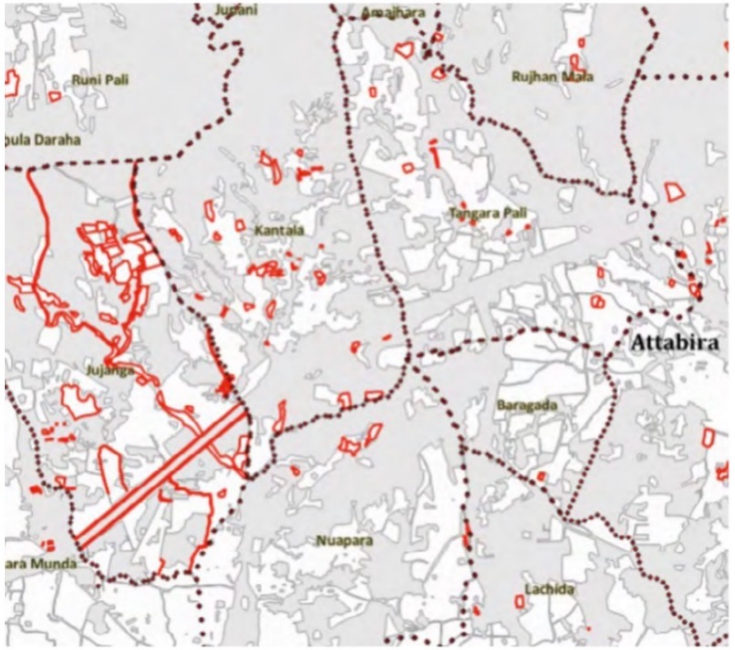
INR 1,700 crores

(206 MILLION USD)
government net savings

INCREASE FROM

77% to 87%

contribution of small and medium farmers
to the paddy procurement



State of Odisha (India) Adopts Transparency-Tech for Paddy Crop Validation • ORSAC-SPARC • 2023

Impact

RESULTS

- ✓ Introducing paddy crop validation also encouraged more small and medium farmers to contribute to (and benefit from) the MSP system.
- ✓ Their participation improved from 77% in 2020–21 to 87% in 2022–23 in the monsoon crop procurement and from 66% in 2019–20 to 81% in 2021–22 in the winter crop procurement.
- ✓ Similarly, the quantity of paddy sourced from small and marginal farmers also increased by about 22% in the monsoon crop procurement and about 23% in the winter crop procurement.
- ✓ The marked increase in data and intelligence improved the food support program so many rely on.
- ✓ The easy-to-use field verification solution will make a lasting impact on the government of Odisha and its citizens.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Thank
You!!!