



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

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STATUE OF EQUALITY · India · February 12, 2022

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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)



© 2022 PLANET L
Nebraska growing season 2018
Planetscope Near Daily

SkySat (50cm)



Rishiganga Landslide Lake 2021
SkySat Sub-daily



Objectives:

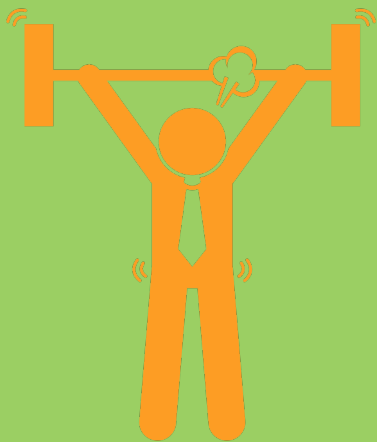
- Bring transparency in farmer registration and assess correct entitlement to sell paddy to Government under MSP program.
- Crop areas claimed by farmers during farmer registration process to be validated at cadastral level using high resolution satellite imagery of the crop period.
- GIS-based visualisation 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

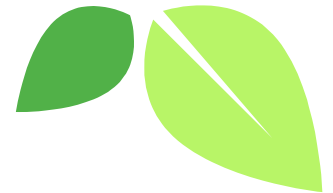
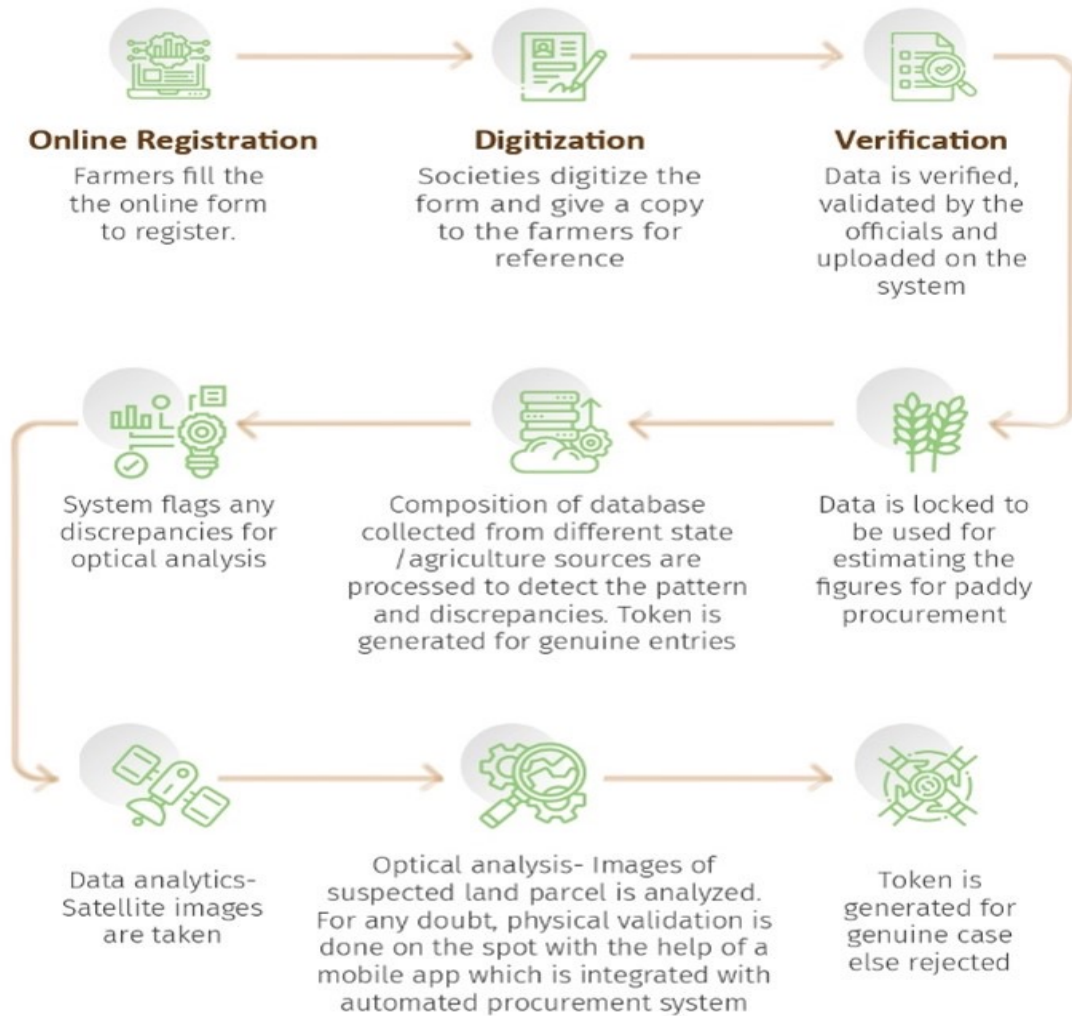
Due to incorrect assessment, procurement agencies tend to have a **conservative procurement target**, leading to distress sale of crop by farmers.

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.



GIS Mapping of Farmer Reporting

The screenshot shows a GIS application interface with a map of a region. The map displays various village boundaries and reported plots. An 'Identify Results' window is open, showing a table of data for a specific feature.

Layers

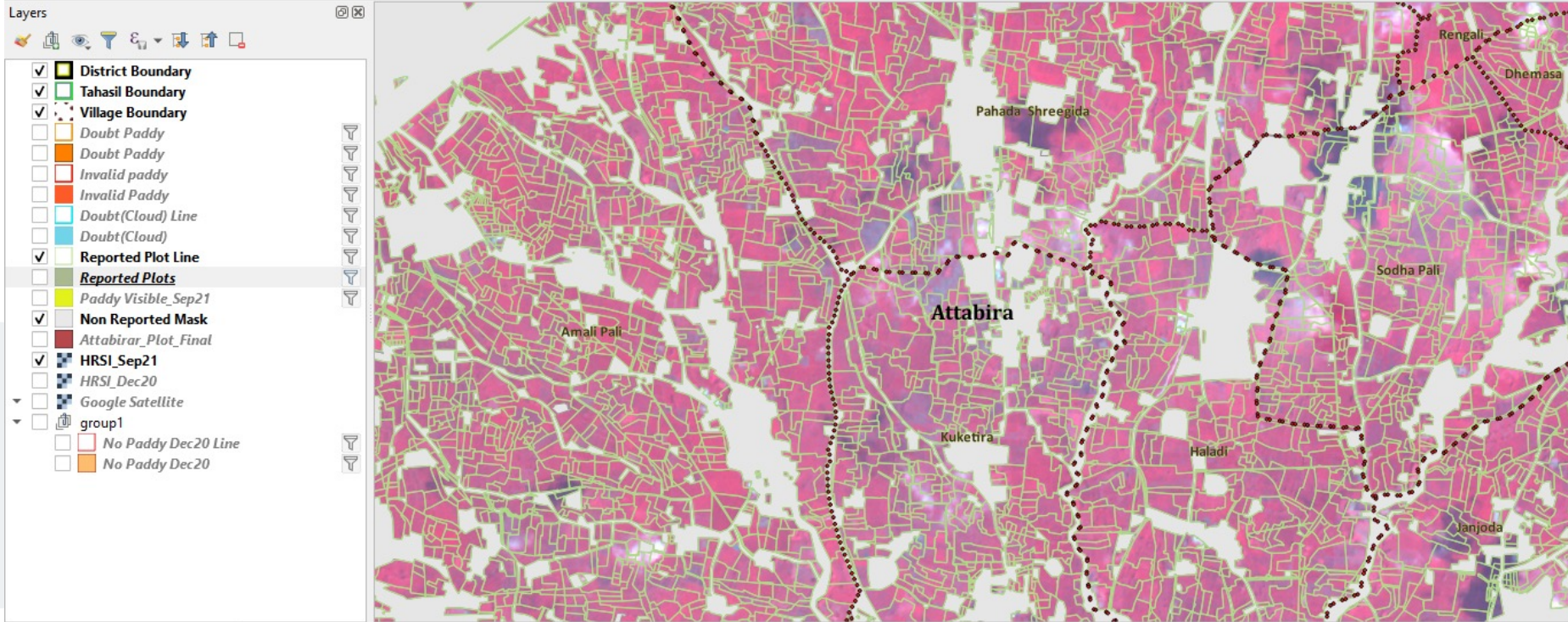
- District Boundary
- Tahasil Boundary
- Village Boundary
- Doubt Paddy
- Doubt Paddy
- Invalid paddy
- Invalid Paddy
- Doubt(Cloud) Line
- Doubt(Cloud)
- Reported Plot Line
- Reported Plots
- Paddy Visible_Sep21
- Non Reported Mask
- Attabirar_Plot_Final
- HRSI_Sep21
- HRSI_Dec20
- Google Satellite
- group1
 - No Paddy Dec20 Line
 - No Paddy Dec20

Identify Results

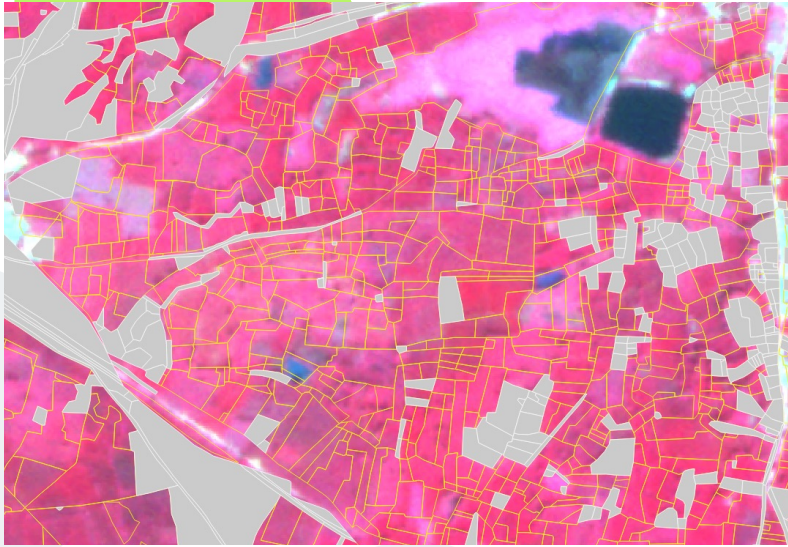
Feature	Value
FARMER_ID	F03020014051
FARMER_NM	MINAKSHEE PRADHAN
AADHAR_NO	522433670364
SHARE_CROP	No
PAC_NOS	S1030202
PAC_NAME	PAHARSRIGIDA SCS LTD
VILL_CODE	1501012
DIST_CODE	15
TAHASIL_CD	1501
BLOCK	Attabira
GP_NAME	NULL
VILL_NAME	Amali Pali
KISSAM	Chaka Bhukta Hoithiba Plot
TOT_AREA	2.990
CULT_AREA	2.990
IRRG_STS	Non-Irrigated
KISSAM_GRP	Agri
FOREST_LC	N
FRA_AVL	NULL
CULT_ARP20	2.990
CULT_ARP19	2.990
CULT_ARP18	2.990
PROC_VAL	110211
PAST_REP	3

Coordinate: 776892,2369138 Scale: 1:60256 Magnifier: 100% Rotation: 0.0° Render EPSG:32644

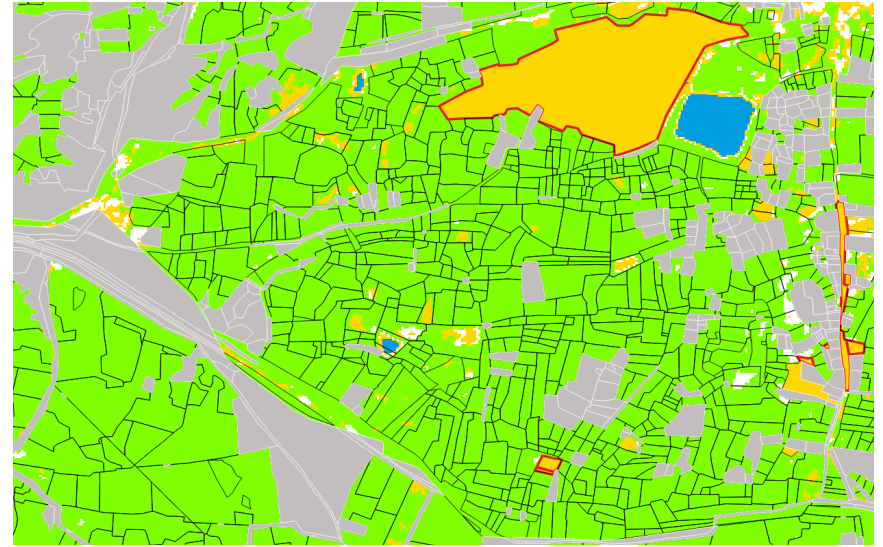
Kharif Paddy Reported Area On Satellite Image



Kharif Paddy Classification from Satellite Image

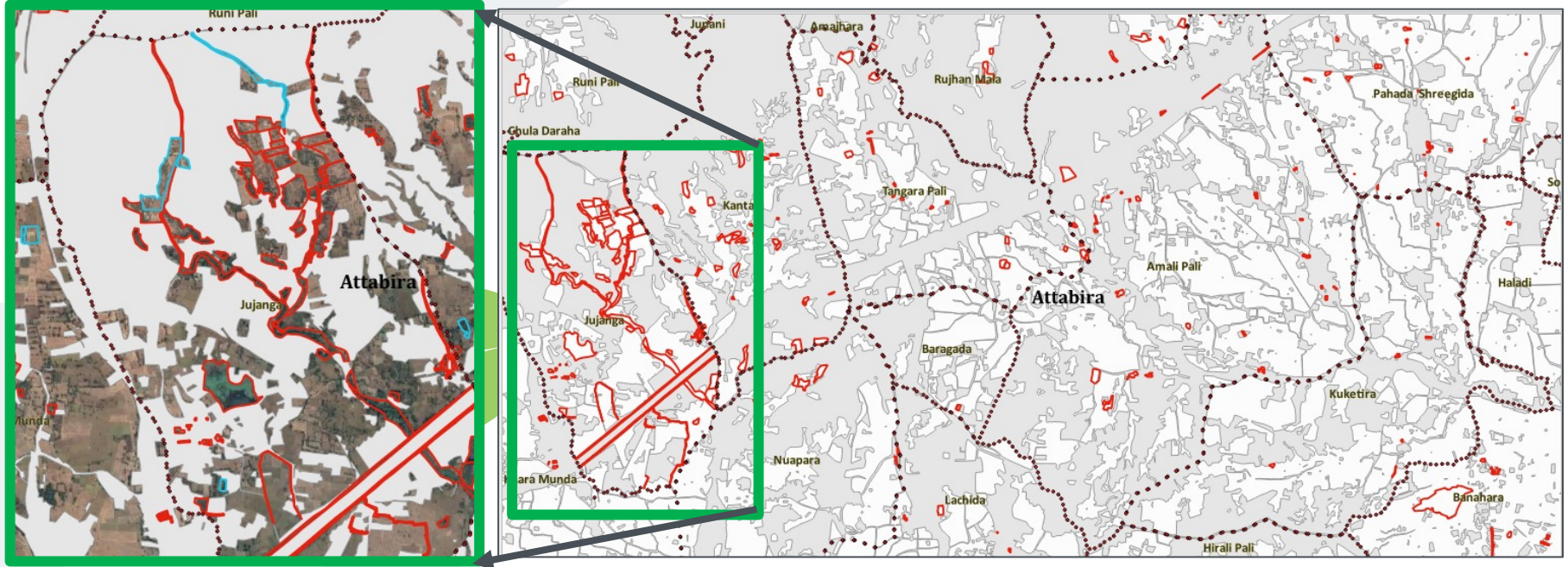


High Resolution Satellite Image of Paddy growing area

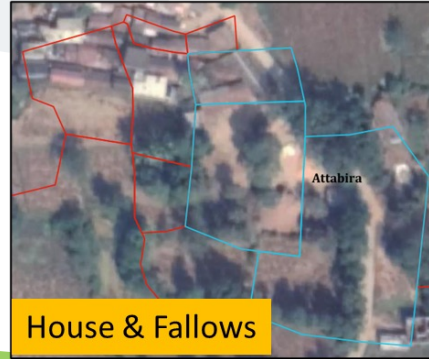
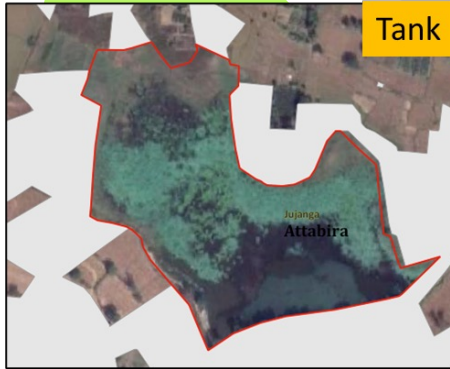



Paddy Classification (in Green)

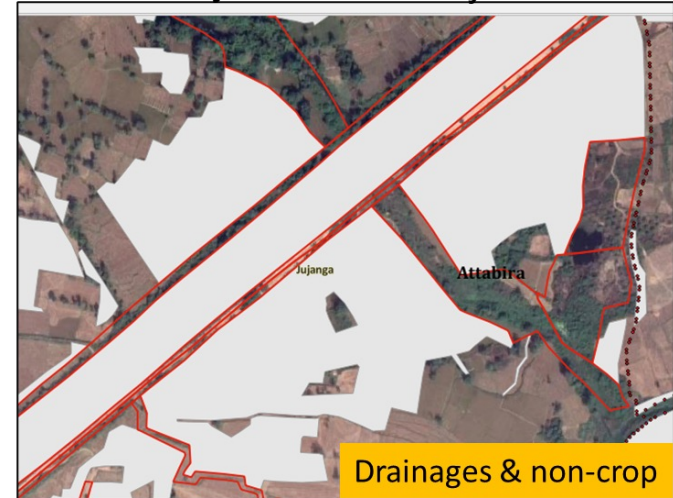
Doubtful Paddy Crop as per Satellite Image



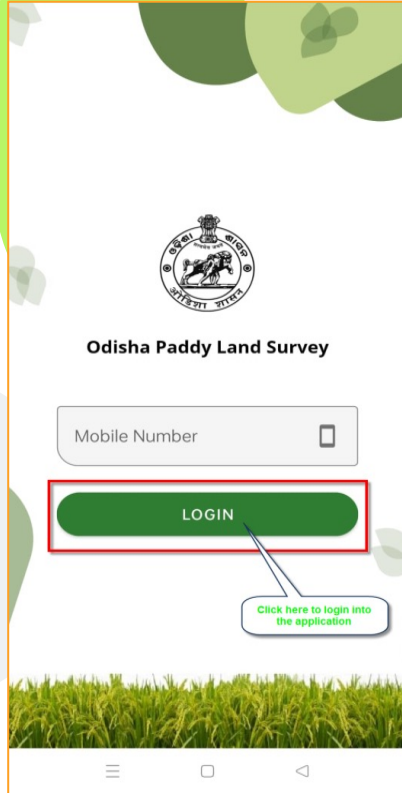
Misreporting / Doubt cases



 No Paddy  Part may have Paddy



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

Please download village wise plot data assigned to you for paddy land survey. Make sure to download village plot data before proceeding.

Village: Larambha 51 Plots	<input checked="" type="checkbox"/> Downloaded
Village: Sindura Bahal 5 Plots	<input type="checkbox"/> Download

CONTINUE

Download village wise plot data

Pending Actions

26 Oct 2021

Showing plots of the Village: Sanasingari

Plot No. 1029
Survey Reason: No Paddy Crop

Khatian No	139
Village	Sanasingari
Tahasil	Sambalpur
District	Sambalpur
Total Area	0.08

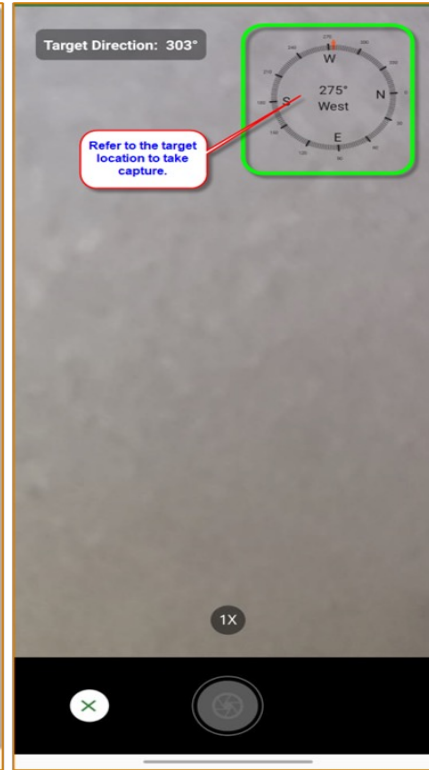
Plot No. 1031
Survey Reason: No Paddy Crop

Khatian No	330/240
Village	Sanasingari
Tahasil	Sambalpur
District	Sambalpur
Total Area	0.5

Plot No. 1104
Survey Reason: No Paddy Crop

Khatian No	130
Village	Sanasingari
Tahasil	Sambalpur
District	Sambalpur
Total Area	0.18

View suspected plot data



Camera Compass Integration

Take Action

20 Oct 2021

You are now near the edge of the land

Plot Details

Plot No	966
Khatian No	107
Village	Larambha
Tahasil	Attabira
District	Bargarh

Enter Field Details

Paddy cultivated

Other crop cultivated

Permanently not a crop land

Please note: In order to capture photos you must be near to the center of the land.

Land Photo

Selfie Photo

Survey Submission

Tracking of Field Validation



View Survey Report

Home / Survey Report / Survey Report

Survey Report

Bargarh -- Select Society -- -- Select Tehsil -- -- Select Village --

-- Select Plot Category -- Enter Plot No. Select From Date Select To Date

-- Select Status --

Search

Show 10 entries

Recently Visited

Sl#	Plot No. / Khatian No.	Total Plot Area (in Arc)	Society Jurisdiction	Identified through satellite	Reported from field Survey using app					Validation by Higher Authority	View
					Result	Actual Cultivated Area	Nearby Fields	Survey Date / Time	Position of Surveyor		
1	5460/982	0.17	Kalamati, Sambalpur, Sambalpur	No Paddy Crop	Not a Paddy Land	0.000	Paddy Cultivated	01/38/2021 06:38:58 AM	From the boundary	Approved	View Details View Map
2	5265/783	0.21	Kalamati, Sambalpur, Sambalpur	No Paddy Crop/td>	Not a Paddy Land	0.000	Paddy Not Cultivated	01/17/2021 08:40:58 AM	Away from the boundary	Approved	View Details View Map
3	5460/982	0.87	Kalamati, Sambalpur, Sambalpur	No Paddy Crop	Not a Paddy Land	0.000	Paddy Not Cultivated	01/38/2021 06:38:58 AM	From the boundary	Approved	View Details View Map

Showing 1 to 3 of 3 entries

First Previous 1 Next Last

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

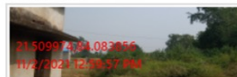
Supervisor Photo



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



Odisha Paddy Land GIS

Food, Supplies and Consumer Welfare Department



Kalahandi ▾ Narla ▾ --Select Village-- ▾



District Boundary

Tahsil Boundary

Village Boundary

Reported Plot

Image Validation :

Valid Paddy

Invalid Paddy

Doubt Paddy

Satellite Imagery :

HRSI Oct-21

World View HRSI

Google Imagery

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

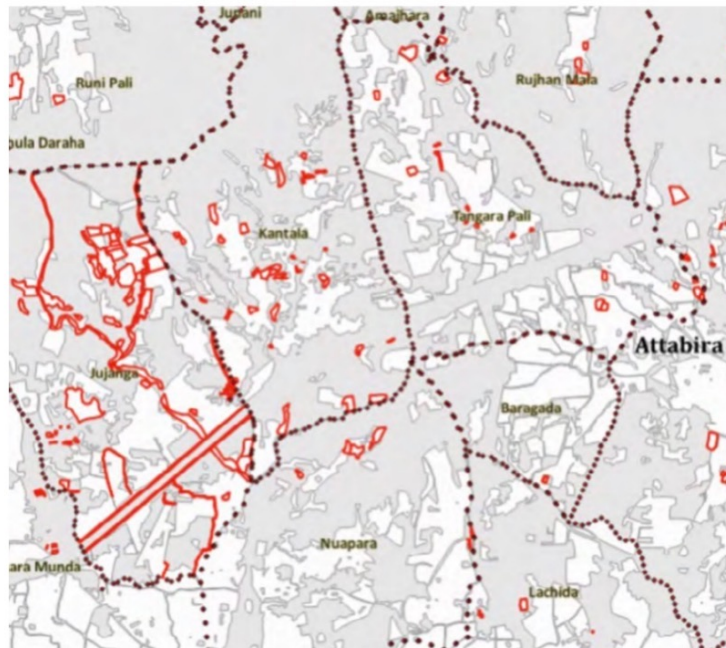
INR 1,700 crores

(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.

