



# Transparent MSP Administration in Odisha using Geo-ICT

*GeoSmart India 2023*  
*October 17-19, Hyderabad*

**Food Supplies & Consumer Welfare Department**  
**Govt. of Odisha**

*In association with*  
**Odisha Space Application Centre (ORSAC)**



# Presentation Outline

- Introduction & background information
- The Project
- Project Impact

## India's Food Security Mission

# Introduction

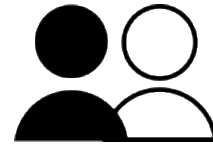
Food Security is **The Largest Welfare Scheme (INR 2.56 lakh Crore)** of Government of India (Ministry of Food and Public Distribution)



**1.24 Cr.**  
No. of Farmers  
benefitted by Govt.  
of India's Paddy  
Procurement in  
2019-20



**600.78 LMT**  
of Rice Procured  
by Govt. of India in  
2020-21



**80.6 Cr.**  
Beneficiaries covered  
under NFSA 2013, i.e.  
99% of eligible  
households under  
Census 2011.



**57.66%**  
growth in Rice  
Procurement by Govt.  
of India in KMS 2020-  
21, as compared to  
KMS 2016-17

# Paddy Procurement in Odisha



50k+ Villages



18.33 lakh  
Registered Farmer



15.15 lakh  
Farmers Sold Paddy



6.28 lakh MT Modern ,  
Scientific Storage Capacity



152  
RCMS Centers



2614

Primary Agriculture  
Co-operative Societies



51.86

Lakh Total Verified  
Land (in Acre)



1350+  
Mills



200+

Certified Transport  
Contractors



3.6 Crore  
Beneficiaries



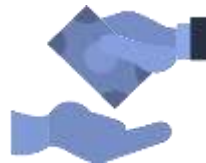
687

WSHG



84.15

Lakh MT  
Paddy Surplus



13,781+

Crore Paid to farmers  
24-48 hours



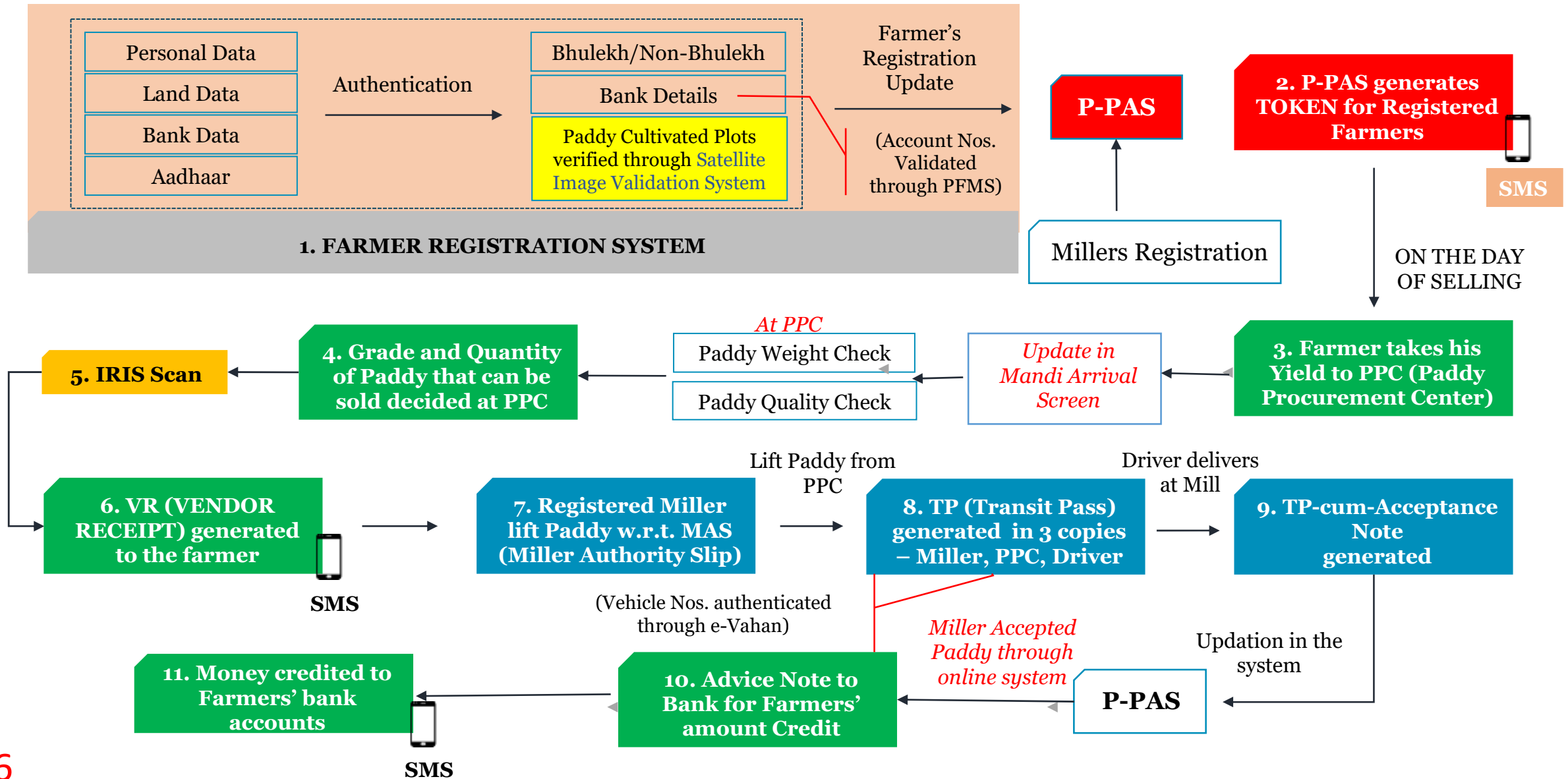
12100+

Fair Price Shops

# Highlights of Odisha Paddy Procurement System

- Odisha is the **4th largest contributors** of rice to Central pool.
- Paddy procurement covered about **15.15 lakhs farmers**
- Current Value of Annual MSP expenditure **INR 13781+ Cr.**
- Farmer's intending to sell paddy register through a Web-based **Farmer Registration System** by a cut-off date, *providing* personal details, Bank details and plot wise land details
- Data gets **digitized by the procuring societies with Land records validation & Aadhaar authentication**

# PADDY PROCUREMENT PROCESS FLOW



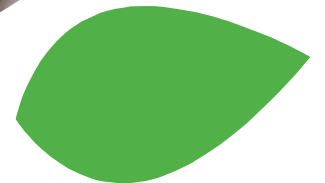
# Challenges in Paddy Procurement

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

INTELLIGENCE GAPS	
<b>Gap between Registered data &amp; ground realities</b>	A major reason behind anomalies in regd. land parcels is the <b>lack of authentication of field data.</b>
<b>Lack of Yield Analysis</b>	Lack of analysis of the past yields and registration trends the targeted estimates can go seriously wrong
<b>Validation Platform</b>	<b>Without technology, there is a Subjectiveness in validation of crops grown on farmlands</b>

# Project Background

- The demand to sell paddy under MSP scheme is growing by the day.
- It is therefore necessary to bring transparency in farmer registration and assess correct entitlement to sell paddy to Government under MSP.
- Crop areas claimed by farmers during farmer registration process needs to be validated at farmland level using high resolution satellite imagery of the crop period, to Ensure benefit of MSP reaching the genuine farmer.
- Data needs to be presented on WebGIS platform for better decision support.



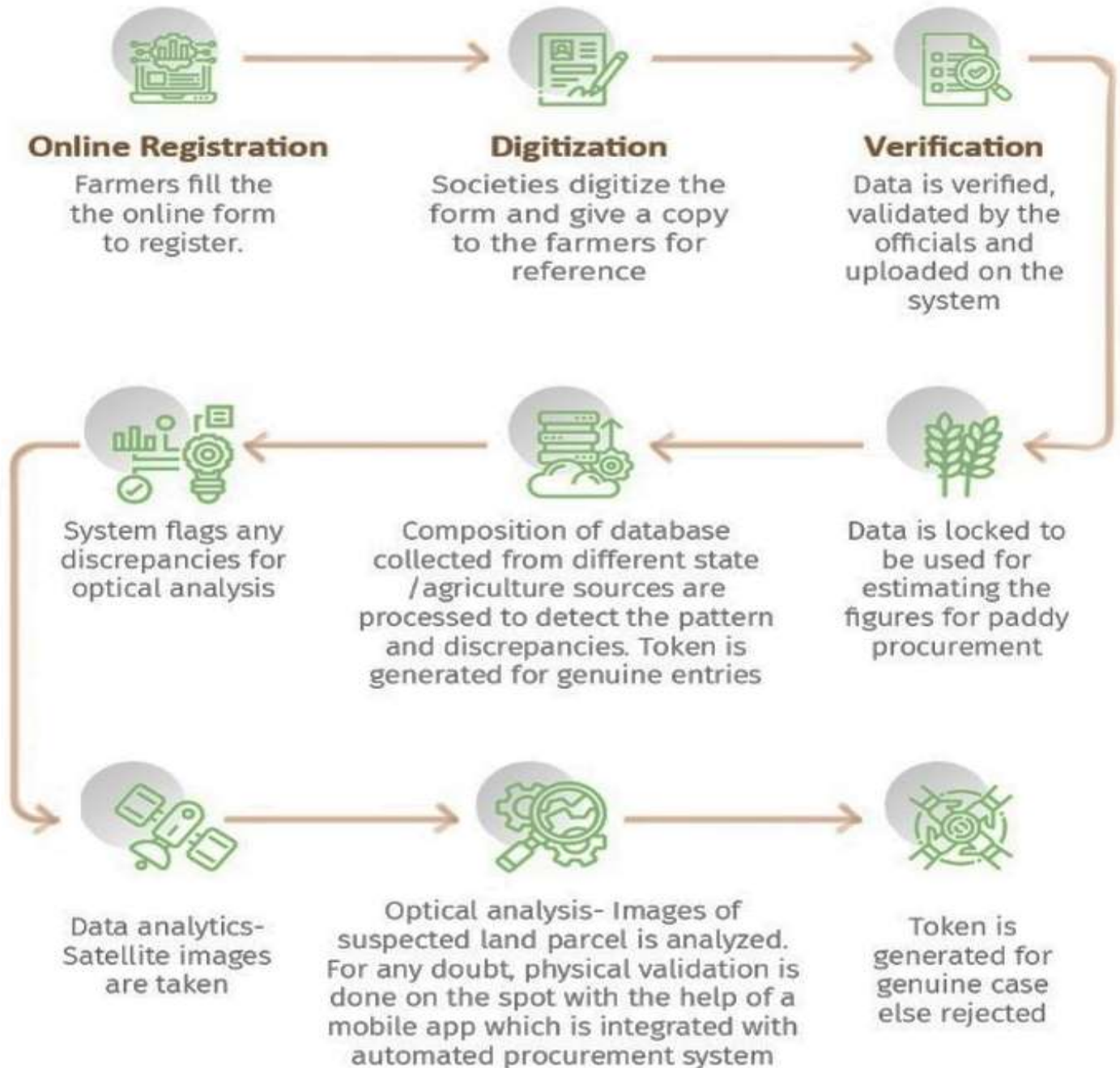


# The Project

- The Food Supplies and Consumer Welfare Department, Odisha ensures the food support to the families below the poverty line by providing food grains and other essential items.
- 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 implemented for Transparent MSP administration using GIS and High Resolution Temporal Satellite Images.



# The Process



# Methodology



- Analysis of Kharif paddy reporting for past 3 years
  - New plots, area changes, new farmers,
- Identification of Croplands using HRSI (~ 1m)
- 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 Planet 3m Mx image base maps (2 sets during crop period)
- Satellite image analysis for identification of paddy growth at farmland level.

# GIS Mapping (cadastral) of Farmer Reporting

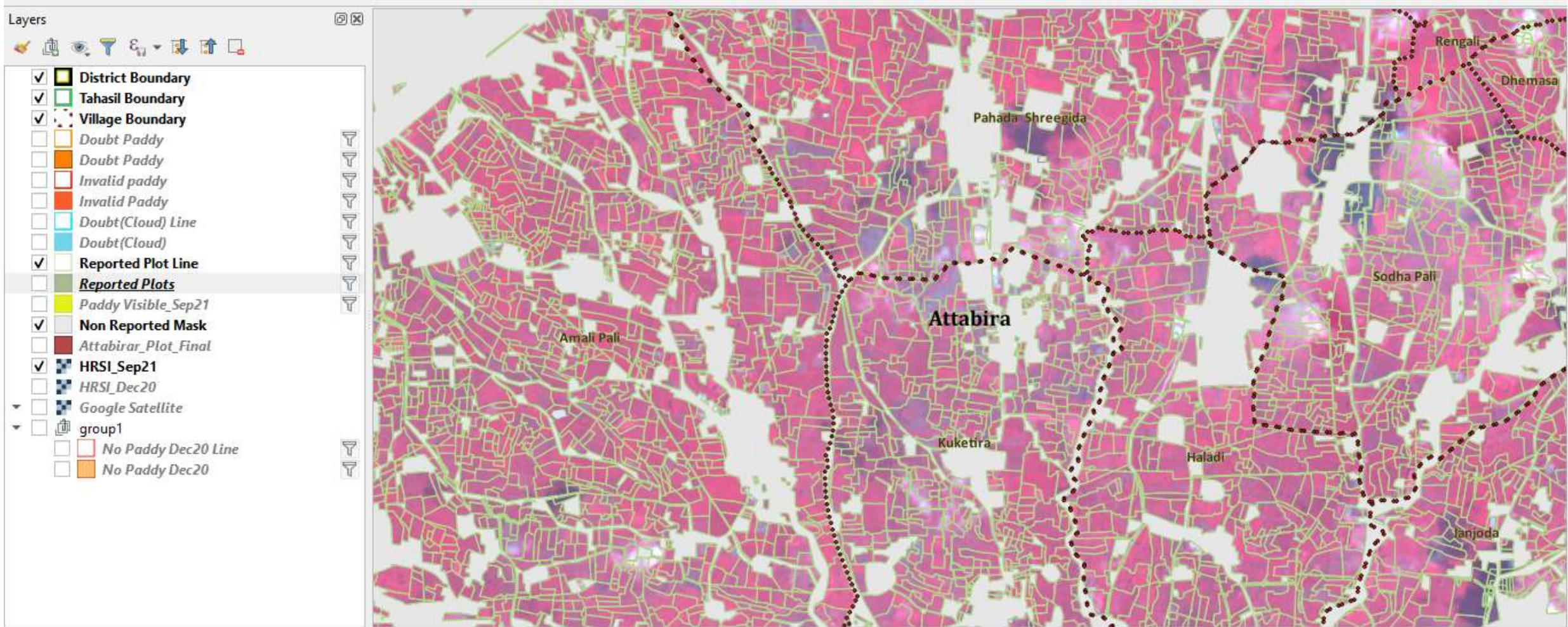
The screenshot shows a GIS interface with a map of a rural area. The map displays village boundaries and reported plots. An 'Identify Results' window is open, showing a table of attributes for a selected plot. The table lists various fields and their values, including farmer ID, name, Aadhaar number, and plot details.

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

The map shows several villages including Ghanagha, Chula Daraha, Khar, Lastala, Manapada, Hiralali Pali, Singhapali, Banahara, Pitha Putal, Tupapara, Larasara, Bhoipali, Pahada Shreegida, Rengali, Dhemasa, Nuabati Muatla, Sodha Pali, Haladi, Janjoda, Silata, and Amali Pali. The village of Amali Pali is highlighted in the center, with the name 'Attabira' also visible.



# Paddy Reported Area On Satellite Image



# Paddy Crop Classification using HRSI



HRSI (FCC) of Paddy growing area

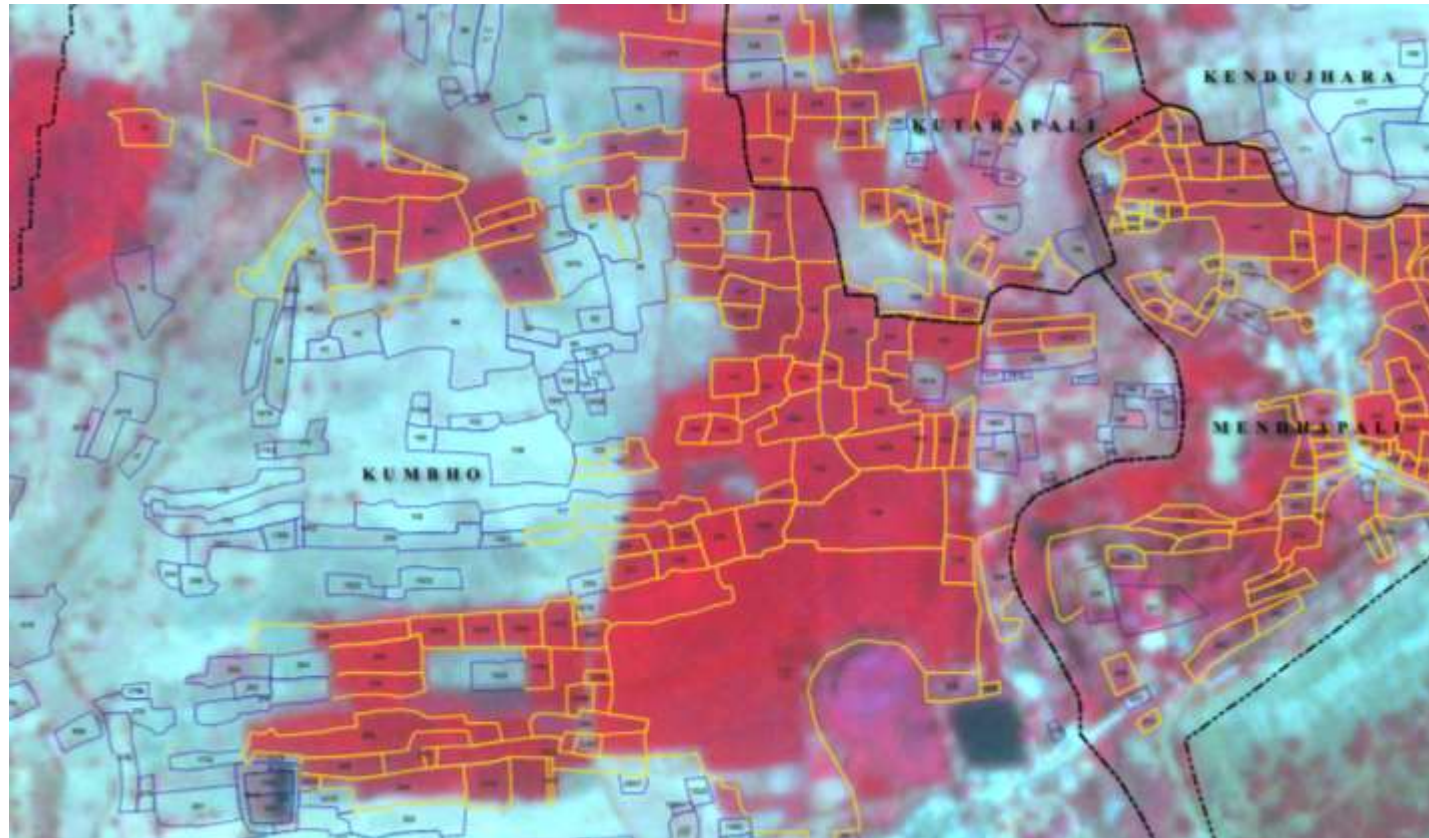


Paddy Crop Classification

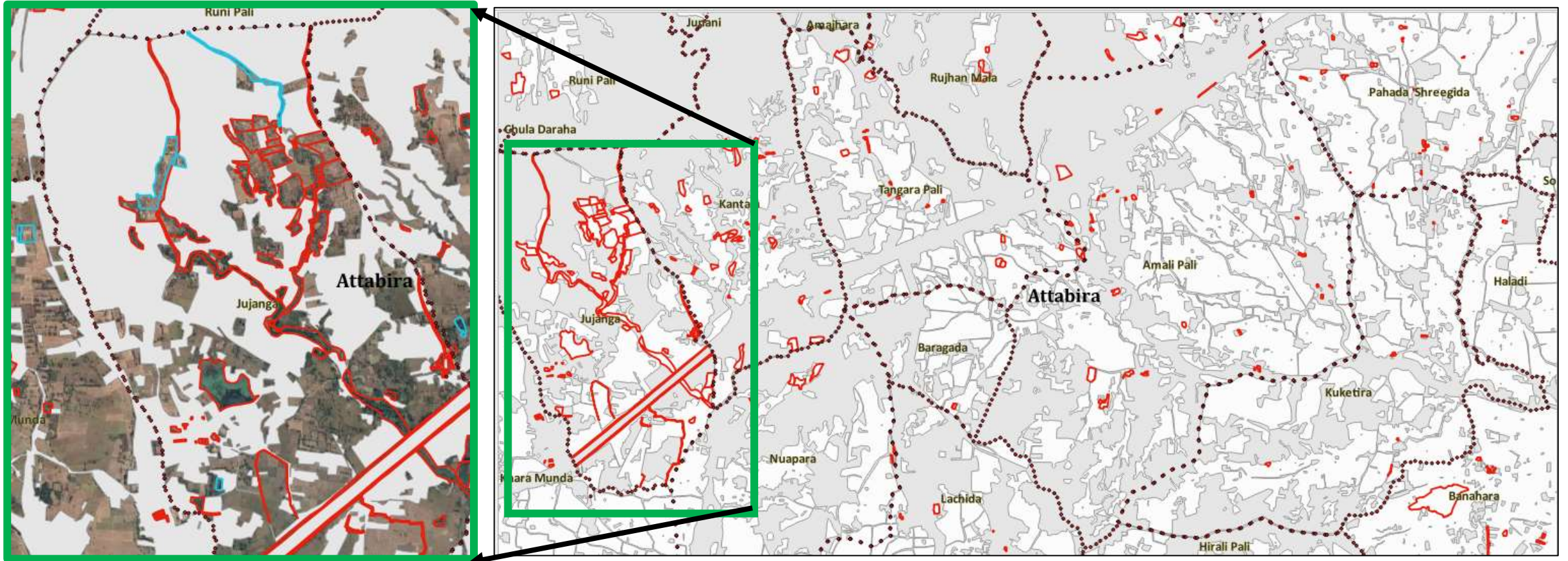


# Methodology, contd..

- Integration of image derived paddy crop information with Cadastral reported paddy crops and identification of Suspects (false/ mis-reporting cases)

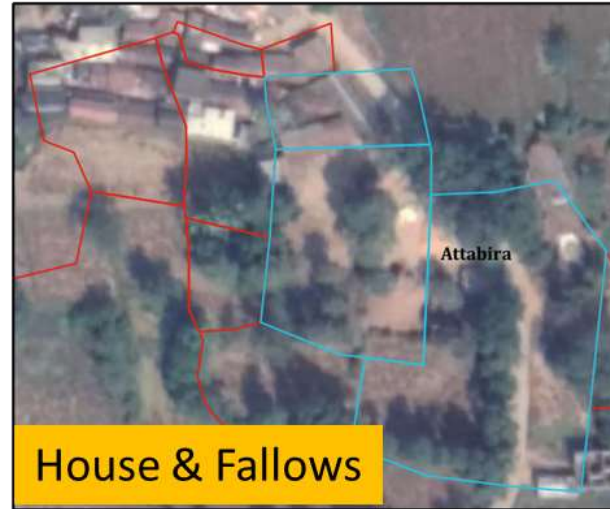
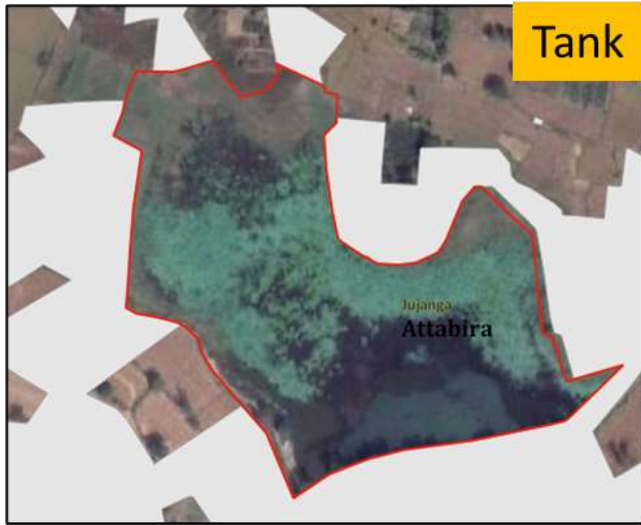



# False/ Mis-reporting as per Image Analysis

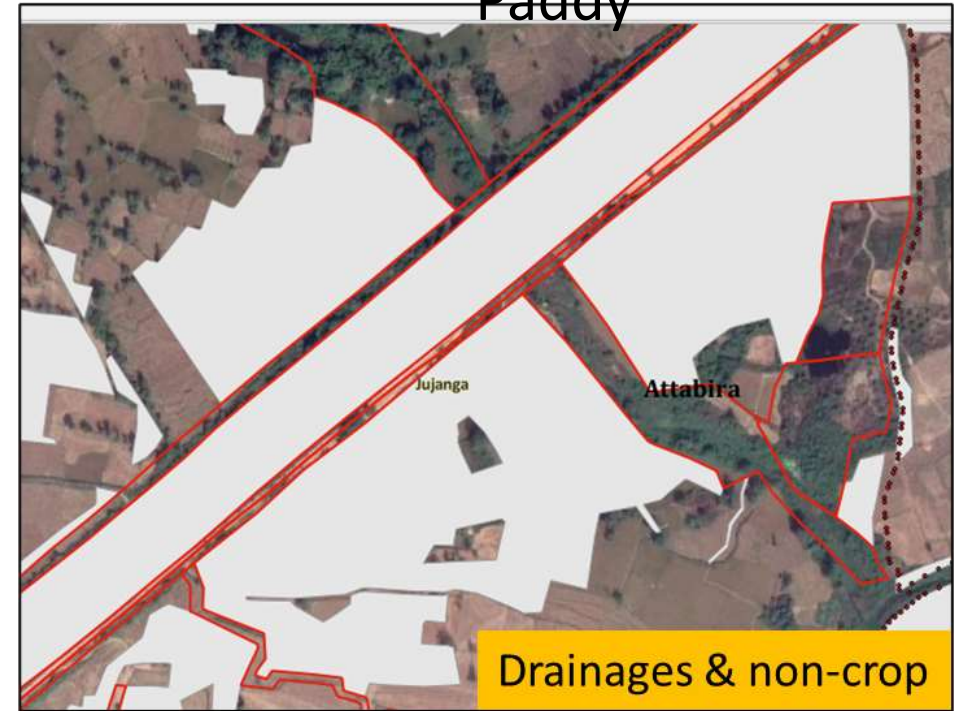




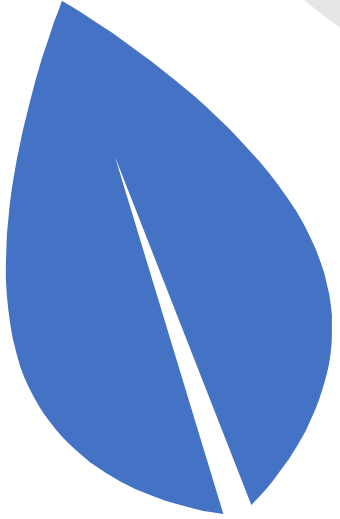
# False/ mis-reporting of Paddy Crop



 No Paddy  Part may have Paddy



# Methodology, contd..




- Publication of suspect plot polygons in Geo ICT platform (Location based Web/Mobile GIS application)
- Navigation to suspect plots using Mobile app by PAC/SHG surveyors and validation of crop status with geo-tagged photos
- Integration with P-PAS system
  - Valid reporting is passed with correct quantity for issue of Tokens
  - Tokens are stopped for fraudulent reporting

# TECHNOLOGY PLATFORM FOR CROP ANALYSIS

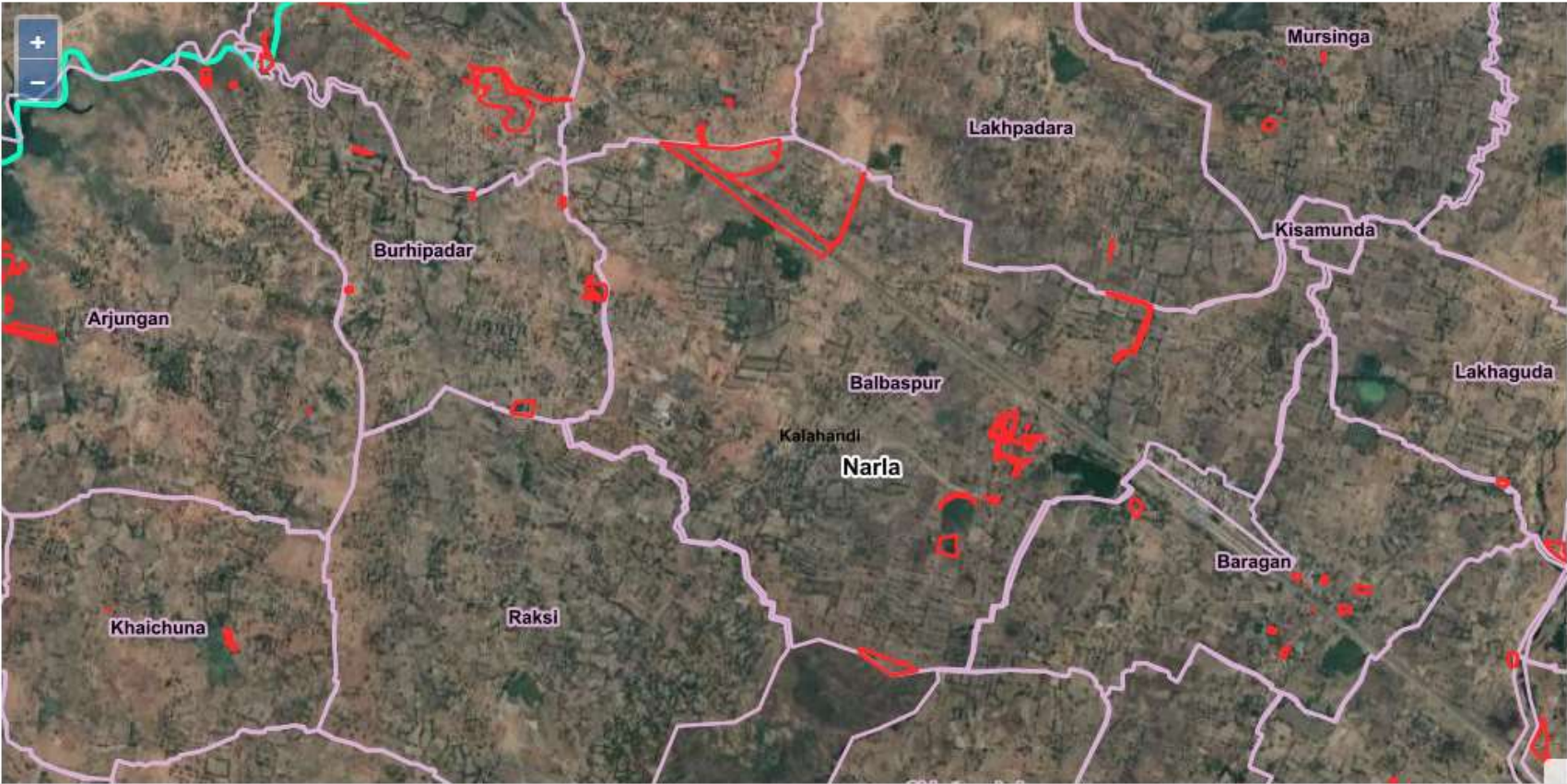
- ❖ **Crop Monitor:** Land GIS is a visual window in the stack, offering unique visual control with filters using Hi-Resolution Satellite imagery, Valid/Invalid/Doubt Crop and geographical boundaries.
- ❖ **Land Monitor:** Land Monitor is a state-of-the-art MIS that tabulates and aggregates data from automated procurement system and field surveys conducted via the official through mobile-app.
- ❖ **Land Survey:** The Land Survey is a mobile attachment and front for Land Monitor and is used for land parcel surveys. The app works by accessing geo-location of both the land & the surveyor. Inbuilt compass feature ensures the survey can be completed only inside or adjacent to the geo-fence of the land parcel.
- ❖ **Analytics Dashboard:** Insightful analytics in the form of powerful reports provides direction for better decision making, pertaining to trend analysis, tracking anomalies & traceability of crops and so on. The analytics are in easy-to-consume which are easily generated in the app.



# Web GIS based Crop Land Monitor with intelligent dashboard to analyse/ visualize season wise reported/ validated paddy crop data

 **Odisha Paddy Land GIS**  
Food, Supplies and Consumer Welfare Department

Kalahandi ▾ Narla ▾ --Select Village- ▾



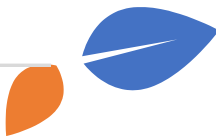
District Boundary  
 Tahsil Boundary  
 Village Boundary  
 Reported Plot

**Image Validation :**

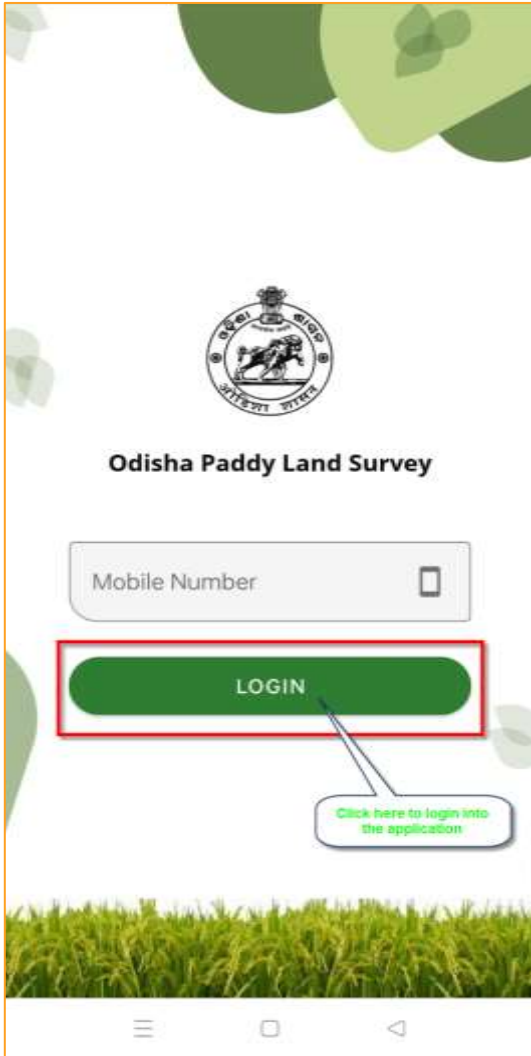
Valid Paddy  
 Invalid Paddy  
 Doubt Paddy

**Satellite Imagery :**

HRSI Oct-21  
 World View HRSI  
 Google Imagery



# Field Verification of Suspect Cases using 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



# Crop Land Survey Mobile Application



**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

Track Location  Take Action

**Plot No. 1031**  
Survey Reason: No Paddy Crop

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

Track Location  Take Action

**Plot No. 1104**  
Survey Reason: No Paddy Crop

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

Track Location  Take Action

View suspected plot data

Target Direction: 303°

Refer to the target location to take capture.

275° West

1X

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**

Capture Land Photos

**Selfie Photo**

**SUBMIT**

Survey Submission



# Tracking of field validation

**Odisha Paddy Land Monitor**  
Food, Supplies & Consumer Welfare Department

Dashboard | Survey Report | Field Surveyor | DRCS BARGARH

### View 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. / Khatlan No.	Total Plot Area (m.Ard)	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	01/30/2021 06:38:58 AM	From the boundary	Approved	<a href="#">View Details</a> <a href="#">View Map</a>
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	<a href="#">View Details</a> <a href="#">View Map</a>
3	5460/982	0.87	Kalamati, Sambalpur, Sambalpur	No Paddy Crop	Not a Paddy Land	0.000	Paddy Not Cultivated	01/30/2021 06:38:58 AM	From the boundary	Approved	<a href="#">View Details</a> <a href="#">View Map</a>

Showing 1 to 3 of 3 entries

First Previous 1 Next Last



# Field Validation Report



## 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





# IEC ACTIVITIES IN PADDY PROCUREMENT



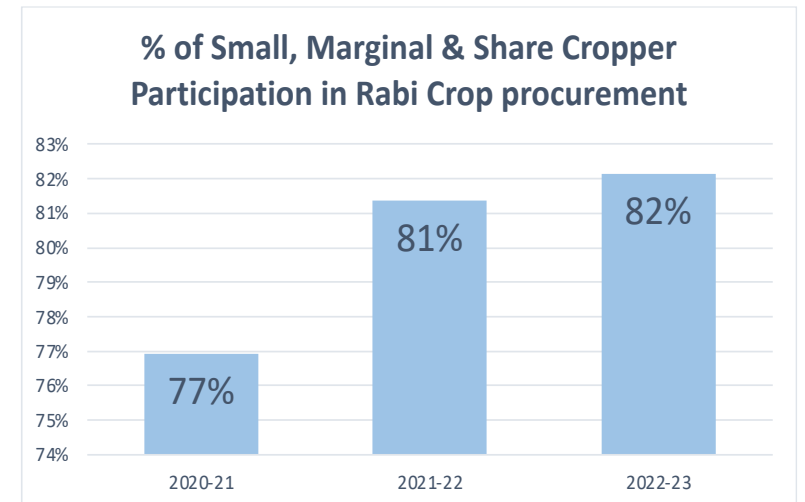
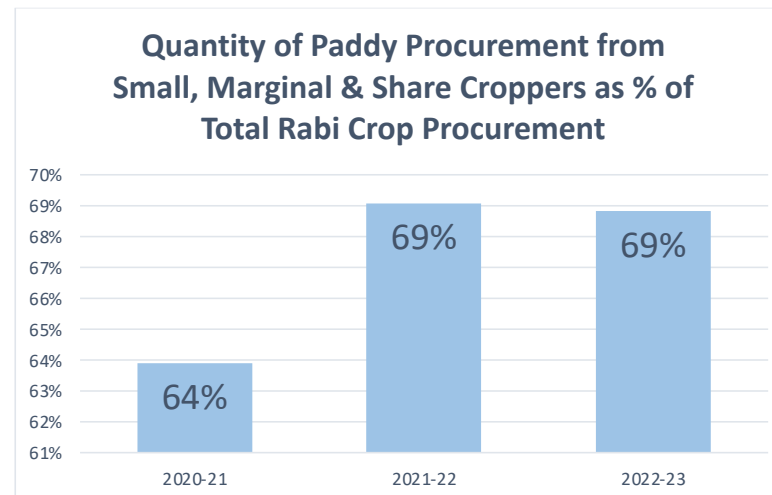
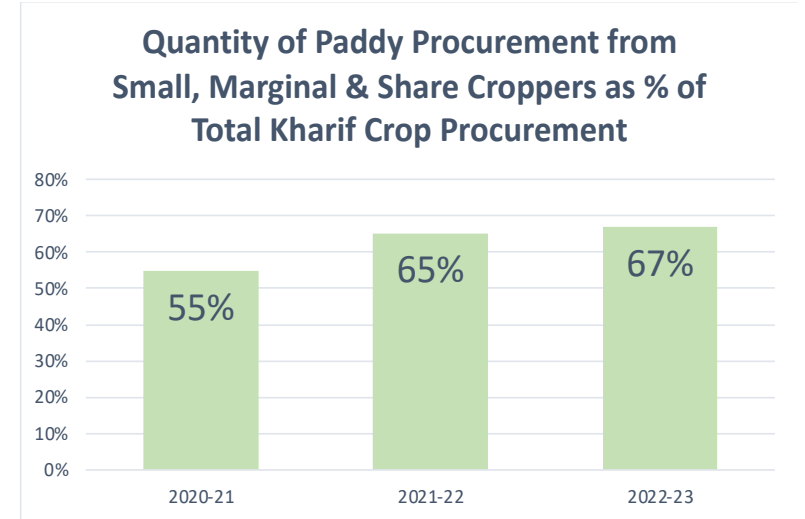
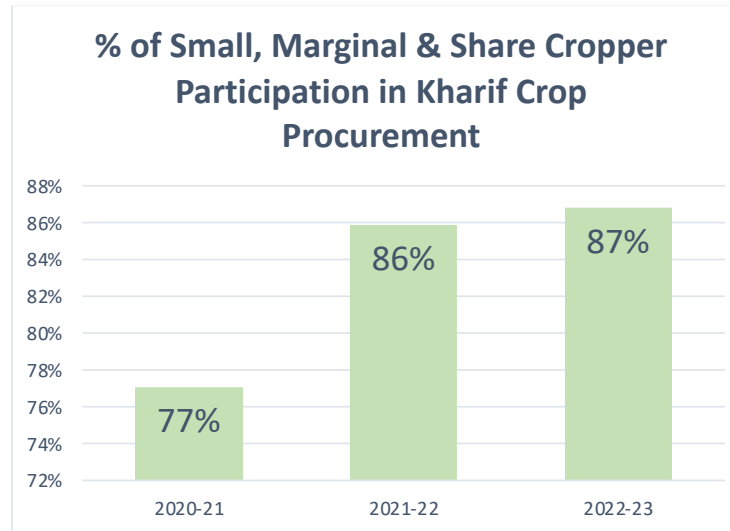
- ❖ **Call center** : to interact and register grievances of farmers.
- ❖ **Interactive Voice Response System (IVRS)**: farmers are able to know details relating to their verified land, exact quantum of paddy they can sell and payment of MSP by dialing from their registered mobile number.
- ❖ **SMS** issued to the registered farmers for selling their paddy at the designated mandi within the stipulated period. Reminder SMS *in 7 days*.
- ❖ **Pull SMS system** has been introduced through which the registered farmers from their registered mobile can fetch information on the quantity of paddy sold by them.
- ❖ Through **5T mantra** of Governance the entire paddy procurement operations have been transferred and it is being ensured that the small & marginal farmers also get benefited.

# Project Impact

With traders kept at bay, participation of Small, Marginal and Sharecroppers have increased after implementation of Image Based Validation.

Sl.	Parameters	Rabi (17 Districts)			Kharif (30 districts)		
		2020-21	2021-22	2022-23	2020-21	2021-22	2022-23
A	<b>Total Token Issued</b>	2,71,670	2,57,314	3,00,145	11,96,180	15,38,627	16,57,008
1	Token Issued to Small/ Marginal/ Share Cropper	2,08,944	2,09,352	2,46,495	9,22,333	13,21,486	14,39,003
2	% of Token issued to Small/ Marginal/ Sharecroppers	77%	81%	82%	77%	86%	87%
3	Token Issued to Medium/ Large Farmers	62,726	47,962	53,650	2,73,742	2,16,883	2,16,422
4	% of Token Issued to Medium/Large Farmers	23	19	18	23	14	13
B	<b>Total Quantity of Paddy Procured (in Qtls.)</b>	1,44,31,602	1,38,13,474	1,38,53,939	6,28,95,545	5,72,23,035	6,40,66,694
1	Quantity of Paddy Procured from Small/ Marginal/ Share Cropper	92,20,619	95,40,245	95,38,075	3,45,42,489	3,73,33,410	4,29,98,376
2	% of Paddy Procured (Qtl) from Small/Marginal/Sharecroppers	64%	69%	69%	55%	65%	67%
3	Quantity of Paddy Procured from Medium/ Large Farmers(in Qtls.)	52,10,983	42,73,229	43,15,864	2,83,48,528	1,98,89,625	2,10,03,004
4	% of Paddy Procured from Medium/Large Farmers	36	31	31	45	35	33

Increase in Small, Marginal & Sharecropper Participation after Image-based Transparency initiative from 2021-22



# Mis-reporting happens every year. Needs to be detected efficiently.

All areas in Acres				Misreporting detected in R2122			Mis-reporting R2223	
Sl.	District	Total Fraud Area Confirmed in RKMS 21-22	Stopped reporting in RKMS 2223	Reported in RKMS 22-23	No paddy in R2223 as per HRSI & Field verification	Have grown paddy in RKMS 2223	Total Fraudulent reporting RKMS 2223	New Fraudulent reporting RKMS2223
	a	b	e	f (~b-e)	g	h (~f-g)	i	j (i-g)
1	Balasore	18,263	13,810	4,330	2,202	2,128	10,942	8,740
2	Bargarh	19,632	12,915	6,280	3,846	2,434	20,558	16,712
3	Bolangir	6,036	4,556	1,416	851	564	3,173	2,321
4	Boudh	2,514	1,732	768	294	474	2,131	1,837
5	Cuttack	3,386	2,917	441	207	233	1,604	1,396
6	Jajpur	7,011	5,494	1,648	1,203	445	5,552	4,349
7	Jharsuguda	820	670	146	87	59	690	603
8	Kalahandi	8,266	4,279	3,926	1,936	1,990	19,766	17,830
9	Khordha	2,423	1,765	660	378	282	1,333	956
10	Koraput	32,752	21,705	11,002	6,575	4,427	16,113	9,538
11	Mayurbhanj	1,805	1,586	218	37	181	541	505
12	Nawarangpur	894	649	230	110	121	1,018	908
13	Nuapada	6,379	5,216	1,148	535	613	3,250	2,715
14	Puri	8,258	6,851	1,417	212	1,206	8,580	8,369
15	Rayagada	2,657	2,550	115	31	83	469	438
16	Sambalpur	2,040	1,445	586	285	301	2,714	2,429
17	Subarnapur	9,759	6,757	2,995	1,883	1,112	12,322	10,439
	<b>Total</b>	<b>1,32,894</b>	<b>94,897</b>	<b>37,325</b>	<b>20,669</b>	<b>16,655</b>	<b>1,10,755</b>	<b>90,086</b>

## Analysis Case: Rabi 2022-23

Misreporting detected in R2122 and stopped in R2223: **94,987 acres**

Misreporting detected in R2122 and again in R2223: **20,669 acres**

New mis-reporting detected in R2223, not reported earlier: **90,086 acres**

# Growth in Participation of Small-Marginal & Share-croppers Post Implementation of Plot level validation of Paddy Crop using RS & GIS

Sl.	Parameters	Kharif (7 districts)			Rabi (17 Districts)		
		2019-20	2020-21	2021-22	2019-20	2020-21	2021-22
A	<b>Total Token Issued</b>	<b>5,64,104</b>	<b>5,81,301</b>	<b>5,98,621</b>	<b>3,35,730</b>	<b>2,71,670</b>	<b>2,57,314</b>
1	Token Issued to Small/ Marginal/ Share Cropper	3,32,206	3,24,256	3,87,269	2,22,941	2,08,944	2,09,352
2	% of Token issued to Small/ Marginal/ Sharecroppers	<b>59%</b>	<b>56%</b>	<b>65%</b>	<b>66%</b>	<b>77%</b>	<b>81%</b>
3	Token Issued to Medium/ Large Farmers	2,23,309	2,57,040	2,11,065	1,12,052	62,726	47,962
4	% of Token Issued to Medium/Large Farmers	<b>40</b>	<b>44</b>	<b>35</b>	<b>33</b>	<b>23</b>	<b>19</b>
B	<b>Total Quantity of Paddy Procured (in Qtls.)</b>	<b>2,34,84,894</b>	<b>2,73,12,769</b>	<b>2,40,65,181</b>	<b>1,72,53,210</b>	<b>1,44,31,602</b>	<b>1,38,13,474</b>
1	Quantity of Paddy Procured from Small/ Marginal/ Share Cropper	1,01,37,827	1,19,67,359	1,30,80,344	96,12,839	92,20,619	95,40,245
2	% of Paddy Procured (Qtl) from Small/Marginal/Sharecroppers	<b>43%</b>	<b>44%</b>	<b>54%</b>	<b>56%</b>	<b>64%</b>	<b>69%</b>
3	Quantity of Paddy Procured from Medium/ Large Farmers(in Qtls.)	1,29,62,713	1,53,45,410	1,09,84,837	76,40,271	52,10,983	42,73,229
4	% of Paddy Procured from Medium/Large Farmers	<b>55</b>	<b>56</b>	<b>46</b>	<b>44</b>	<b>36</b>	<b>31</b>

# Concluding Remarks

- ❖ Satellite Image based paddy crop validation has encouraged genuine farmers by eliminating fraudulent reporting.
- ❖ It has enhanced farmer participation, simultaneously saving about Rs.1000 Cr during KMS 2021-22
- ❖ It has resulted in better participation by Small, Marginal farmers as well as Women Self Help Groups (WSHGs)
  - ❖ KMS 2020-21: 421 WSHGs (earned 21.86 Cr.)
  - ❖ KMS 2021-22: 687 WSHGs (earned 28.50 Cr.)
- ❖ This unique Geo-ICT initiative has brought Transparency in MSP administration in Odisha





Thank You!!!

