Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

APCAS/24/A2.2

ASIA AND PACIFIC COMMISSION ON AGRICULTURAL STATISTICS

30TH SESSION

19–24 May 2024

Kathmandu (Nepal)

BETTER PRODUCTION | BETTER NUTRITION | BETTER ENVIRONMENT | BETTER LIFE

Improvement and utilization of Farm Map (Agricultural Digital Map)

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Republic of Korea

Ministry of Agriculture, Food and Rural Affairs

EPIS Korea Agency of Education, Promotion and Information Service in Food, Agriculture, Forestry and Fisheries

CONTENT
S

01 The background of Farm Map

Rapid Changes in Agricultural Rural Environments

Abnormal Climate

Rural Population Decline

Food Security

Changes in main production area items

Agricultural price fluctuations ↑

Spread of ICT-based Smart Farm

Changes in production due to natural disasters and pests↑

Growing need to support sustainable agriculture

Necessity of systematic management of agricultural support policy

Efficient identification and utilization management of farmland is necessary

Increasing need for systematic farmland management based on land data analysis

01 The background of Farm Map

The future direction of agriculture

Farm Map is basic data used for precise location information and predictive analysis

The key drivers of future agriculture

- Ultra-precise location information system
- Internet of Things
- Predictive Analytics
- Robotics
- Artificial Intelligence

Unmanned autonomous tractor

- Drive on a programmed route
- Tracking and route changes with tablet PC

The era of the 4th revolution in agriculture

Spraying pesticides using drones

01 The background of Farm Map

The purpose of building Farm Map

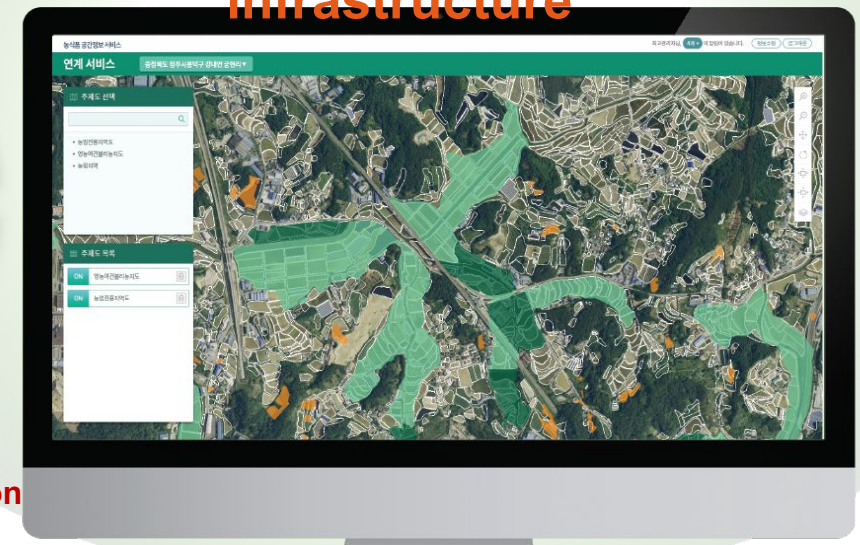
Consumer-oriented Agricultural policy

· Achieving carbon neutrality through **support for agricultural energy efficiency**
· Decision making **support to prevent the spread of pests**

Establishment of scientific agricultural policy infrastructure

Agricultural on-site inspection

· On-site inspection to **provide national subsidies to farmers**
· On-site **agricultural activity inspection**



Agricultural national statistics

· Collect agricultural production status data and **build statistics**

Building high precision agricultural maps + **Agricultural administrative data linkage**

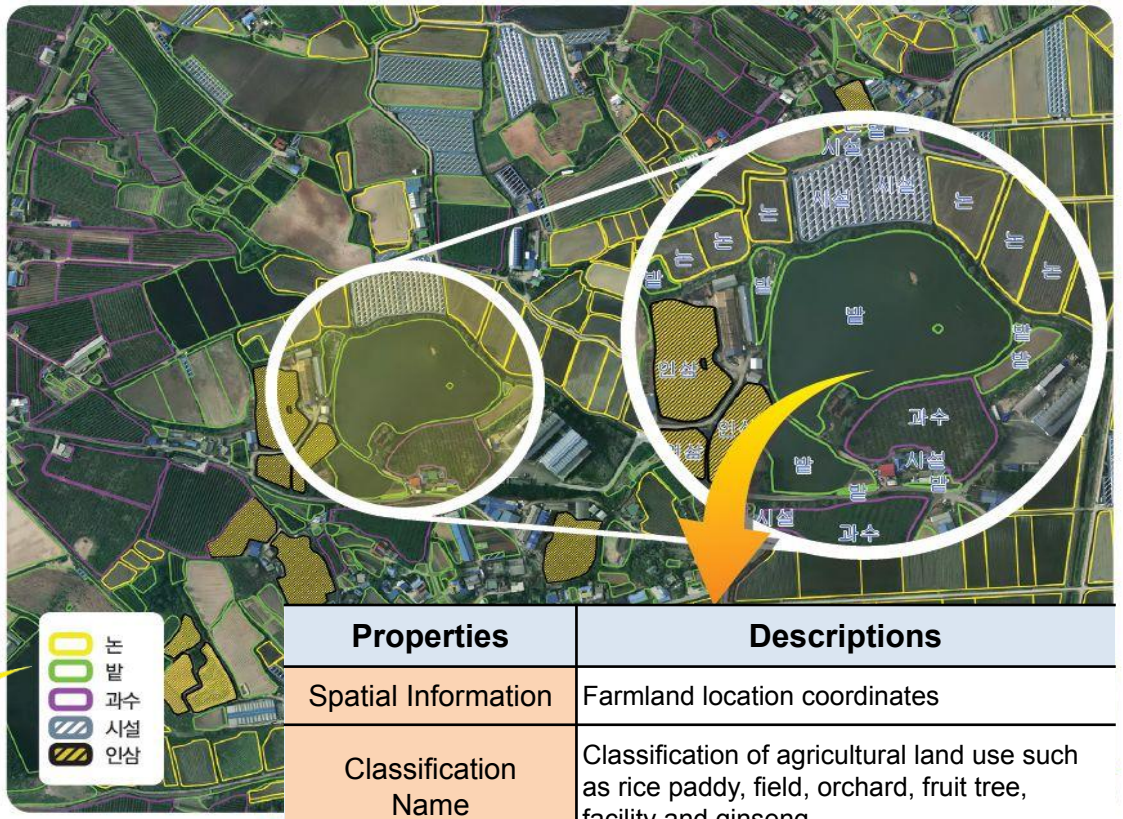
02 The overview of Farm Map

What is Farm Map ?

Agricultural Land Digital Map

Demarcate agricultural land boundaries using high-resolution aerial and satellite photography

Generates the location, boundary, area and farmland use status (rice paddies, fields, orchards, facilities, ginseng fields) of approximately 10.5 million agricultural lands in South Korea as digital spatial information.



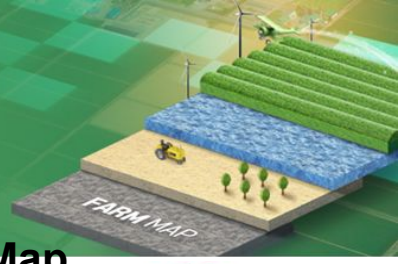
Arial Photography Interpretation

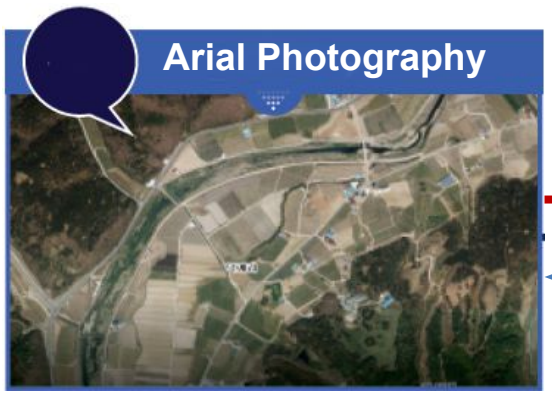
Rice paddies | fields | orchards | facilities | Ginseng fields

Properties	Descriptions
Spatial Information	Farmland location coordinates
Classification Name	Classification of agricultural land use such as rice paddy, field, orchard, fruit tree, facility and ginseng
Address	Agricultural land legal location name
Area	Agricultural land cultivation area
Cultivation Item	Name of crop grown in agricultural land

02 The overview of Farm Map

The features of Farm Map





Arial Photography

· **Realistic agricultural land digital map**
(boundary, land use, classification, etc)

Acquired Lidar(Laser Detection Ranging) surveying

Farm Map

REAL WORLD
Agricultural land digital map
(boundary, land use, classification, etc)

· Permitted boundaries and land category on ownership right established through cadastral surveying

02 The overview of Farm Map

The comparison of Farm Map and Cadastral Map

Cadastral Map

There is a difference from actual farmland.
It is difficult to determine the exact boundaries of agricultural land because it indicates the ownership boundaries of the land

Delay in information update and utilization
The timing of construction is determined by the public's willingness to build information,

VS

Farm Map

Providing actual farmland information using aerial photography
It is possible to determine the utilization status of agricultural land.

Providing accurate agricultural land use information
Easily determine the area of agricultural land and whether or not the actual agricultural land has been reorganized.

02 The overview of Farm Map

Comparison between Spatial Information

Arial Photograph (Real World)	Farm Map	Cadastral Map
		

	Space Unit	Agricultural land classification	Property information
Farm Map	**Real boundaries of cultivated land based on aerial imagery**	**Rice paddy/Field/Orchard/Facility/Ginseng Field** ***Plot classification and subdivision by type of agricultural land use**	Classification of agricultural land use , area, farmland arrangement, fallow field
Cadastral Map	**Land ownership boundaries** ***In most cases, cultivation boundaries and ownership boundaries do no coincide**	**Rice paddy/Field/Orchard** ***Legal land use type**	Land Category, Area, Legal address, Land ownership information

02 The overview of Farm Map

The comparison visualization of Cadastral Map and Farm Map

안내 | 지적조회 | 배경지도 | 주제도

국토정보기본도 정보

주제도 선택: 국토정보기본도

목록	항목	값
1	필지고유번호	4415038037200260001
	법정동명	충청남도 공주시 우성면
	리_코드	4415038037
	대장구분	임야대장
	대장_본번	0026
	대장_부번	0001
	지번	산26-1임
	대장_지목	임야
	대장_면적	11,361.0

* 목록선택 시 선택한 필지가 빨간색으로 표출 됩니다.

연계 팜맵 정보 | 연계 팜맵2.0 정보

(연계) 팜맵 정보

목록	항목	값
1	ID	441503803700129
2	UID	09924429
3	농경지분류	밭
4	농경지분류코드	02
5	법정동코드	4415038037
6	법정동주소	충청남도 공주시 우성면 안양리
7	대표PNU	4415038037200260001
8	대표지목	임
	부PNU	4415038037200260001

* 선택된 필지와 중첩되는 팜맵 필지가, 중첩되는 면적 비율 순으로 목록에 표출됩니다.

주제도 선택

- 팜맵
  - [2022] 팜맵
    - 전체
    - 논
    - 밭
    - 시설
    - 과수
    - 인삼
    - 비경지
  - [2021] 팜맵
  - [2020] 팜맵
  - [2019] 팜맵
- 팜맵2.0
- GAP인증
- 친환경인증
- 재해보험
- 토양개량제지원
- 유기질비료지원
- 농업활동지원
- 농식품통계

안양리 산26임 산26-2임 안양리 산26-1임

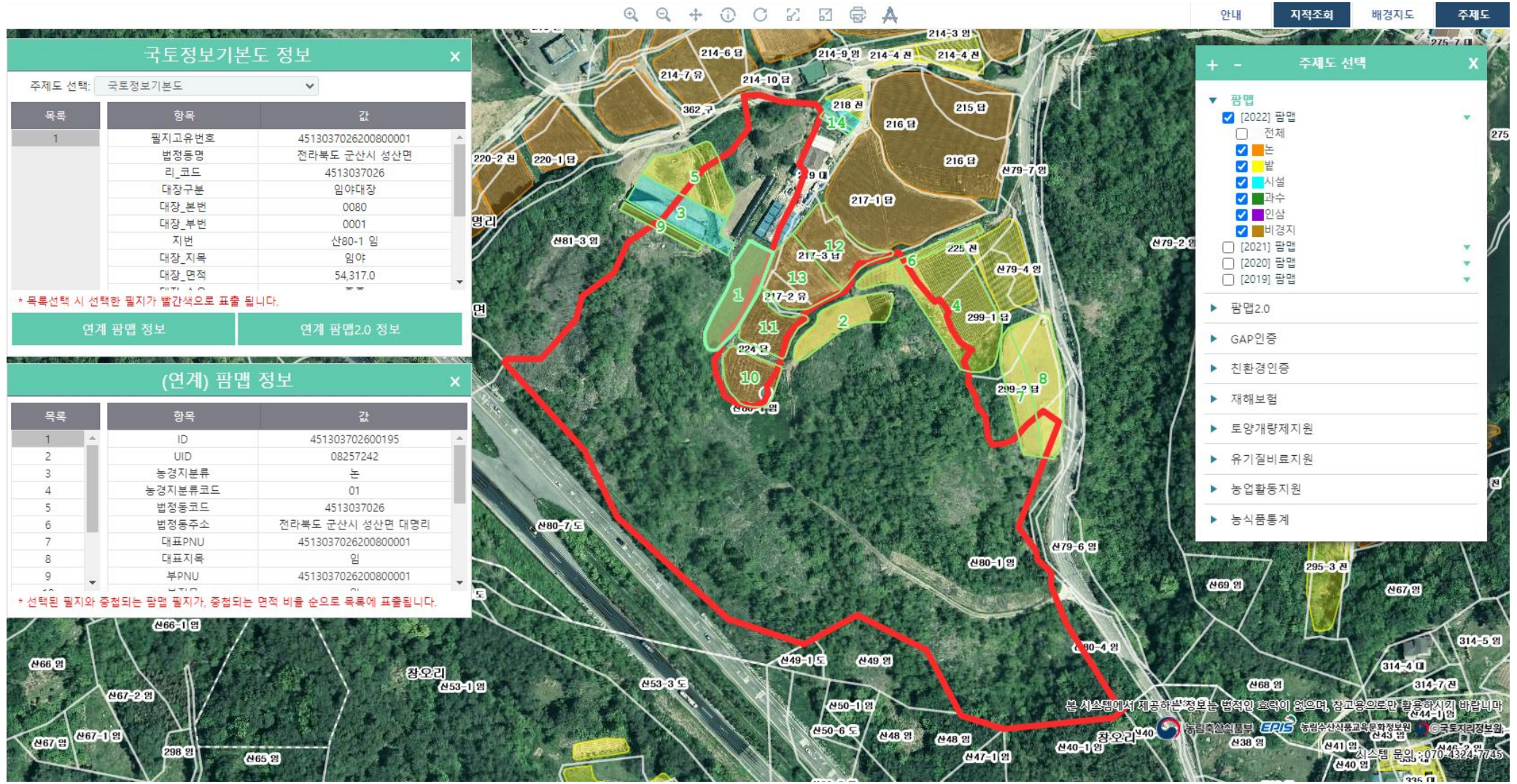
본 시스템에서 제공하는 정보는 법적인 효력이 없으며, 참고용으로만 활용하시기 바랍니다

농림축산식품부 EPIS 농림수산식품교육문화정보원 국토지리정보원

시스템 문의 : 070-4324-7745

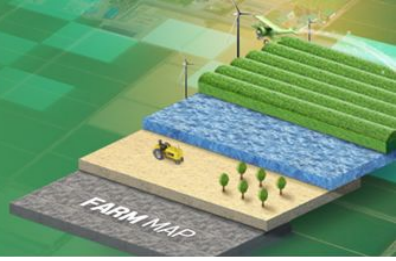
02 The overview of Farm Map

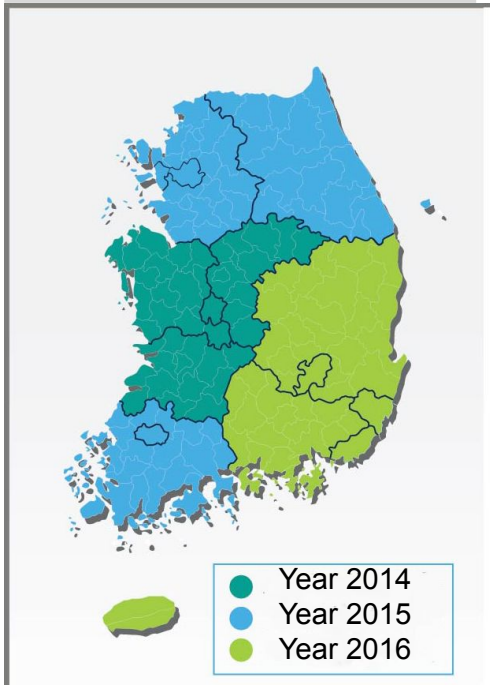
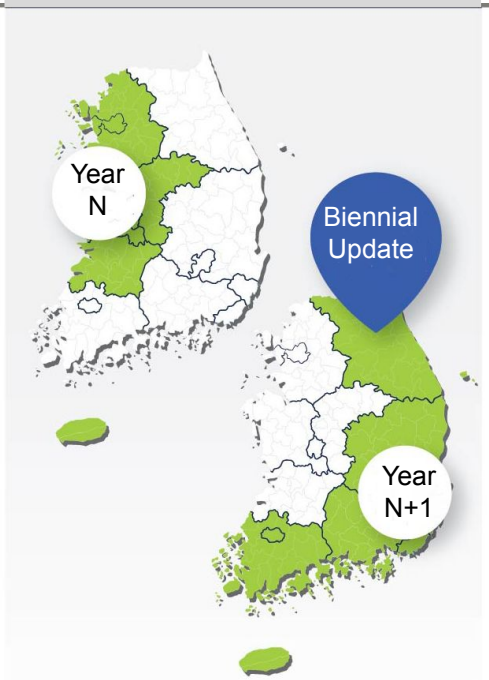
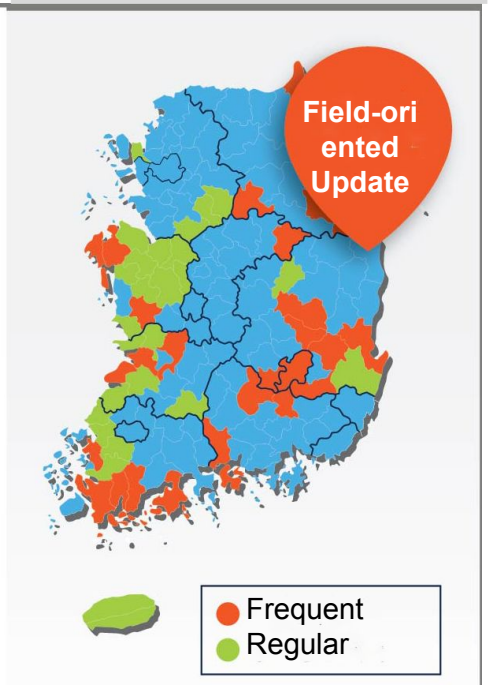
The overlapping analysis and simultaneous visualization of Cadastral and Farm Maps



02 The overview of Farm Map

The history of Farm Map generation



Year 2013~2016	Year 2017~2021	Year 2022 ~
Construction	Improvement and data openness	Consumer-oriented improvement
		
Completed construction of nationwide farm map over 3 years	Annually updated in East and West regions alternately	Nationwide coverage renewed every year

02 The overview of Farm Map

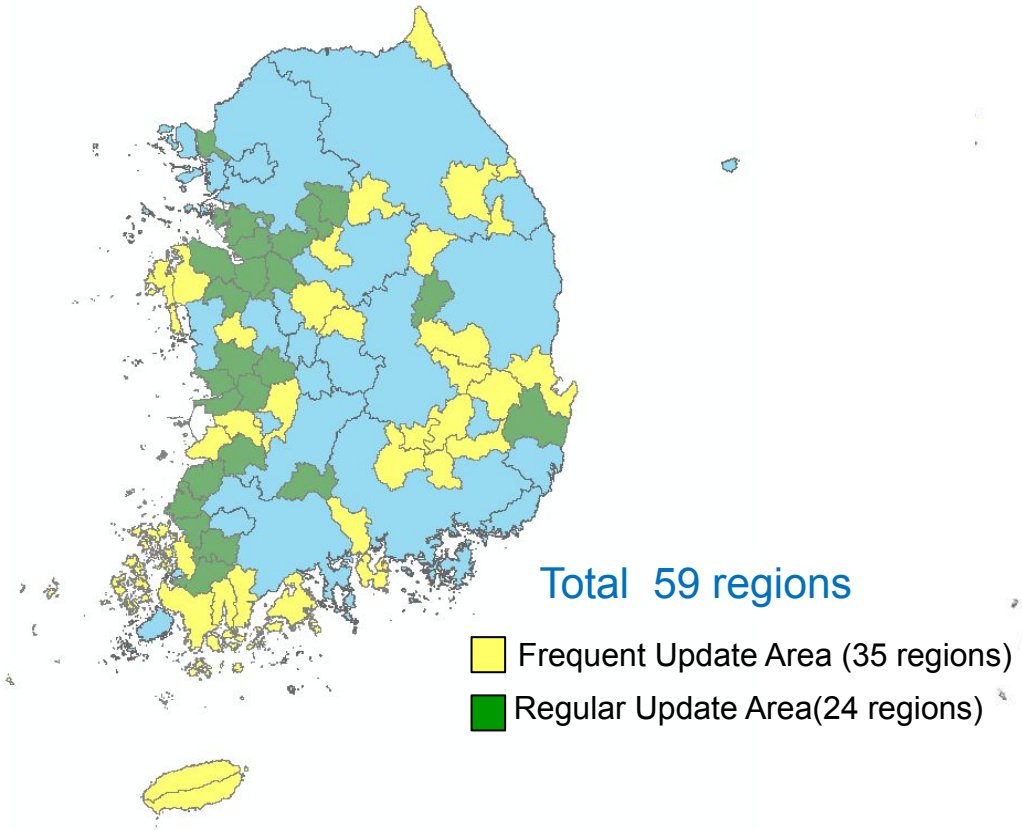
The update status of Farm Map (Year ’22 ~ ‘23]

Renewed area in year 2022

Agricultural land area : 850,296 ha, 56.1%

Number of agricultural land parcel : 5,367,709, 49.6%

* compared to nationwide



Total 59 regions

- Frequent Update Area (35 regions)
- Regular Update Area(24 regions)

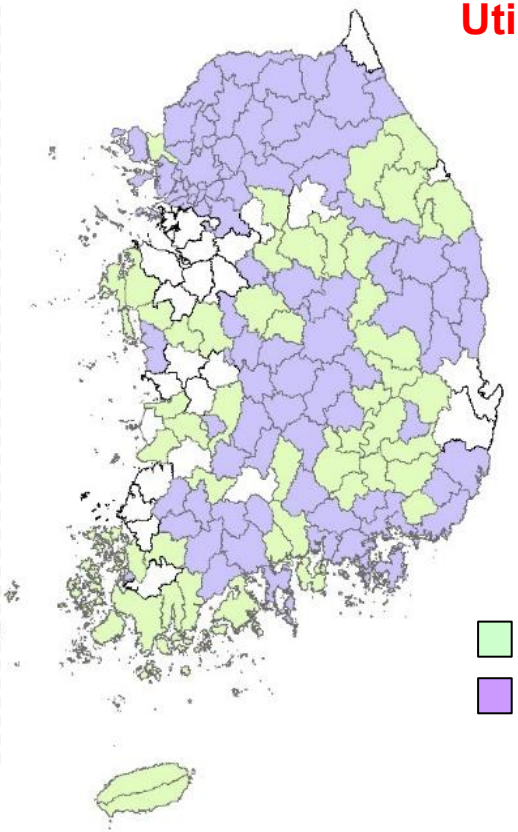
Renewed area in year 2023

Agricultural land area : 1,179,479 ha , 77.8%

Number of agricultural land parcel : 8,683,379, 79.8 %

* compared to nationwide

Utilization demand-driven update



Total 139 regions

- Frequent Update Area (51 regions)
- Regular Update Area(88 regions)

03 The production process of Farm Map

Production Process

Gather basic and reference data

Farmland Change Analysis

- Spatial analysis
  - building / road
  - facility / region
- AI analysis
  - classfication
  - dection

Extraction of agricultural land where changes may occur

Farm Map Update

Extracted polygon priority update

- arial photography interpretation
- boundary shape update
- property valueupdate
- hstory data building

Data Inspection

(96% accuracy achieved)

- Full automatic inspection
  - Property valaue
  - Object relation
- Sampling inspection
  - AI Sample extraction (5% sample)
  - Shape inspection

Expert Inspection and certification

Data Openness

- Frequent Providing
- Annual Opening

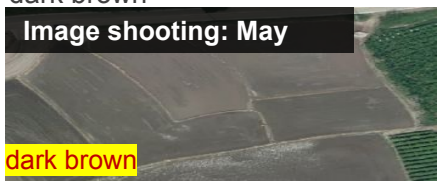
03 The production process of Farm Map

Guidelines for updating : Arial photography Interpretation criteria

Rice paddy A flooded field of arable land used for growing semiaquatic crops, most notably rice, wangol, kites and taro

irrigation period : May ~ June

Reading criteria : an arable land filled with water. Image color-a dark brown

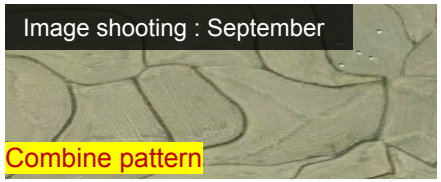


growing period : July ~ September

Reading criteria : Smooth texture as rice grows . Image color-a blue green

harvest season : September ~ October

The pattern of harvesting path using the combine



resting stage : November ~ April

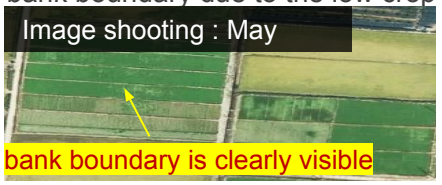
Period of plowing the field to prepare the next cropping. Image color-a brown

Nelumbo: planting(April), drainage of residual water(May), harvest(Sept.)

Compared to rice fields, rough texture and wider cropping interval

Java water-dropwort: planting(April), harvest(June ~ August)

The brighter texture color compared the rice filed, and clearly visible bank boundary due to the low crop height



03 The production process of Farm Map

Guidelines for updating : Arial photography Interpretation criteria

Field	A land that grows herbaceous crops of one year without watering

Pattern after plow (before seeding)

Reading Criteria : Rough pattern and bright brown due to plow


Pattern during growth (after seeding)

Reading Criteria : crops are growing, and furrows are observed


Pattern during growth (growing period)

Reading Criteria : Rough pattern compared paddy field, and some pattern of harvesting crops


Vine plant

Reading Criteria : Vine plants (such as Five-flavor magnolia vine) are read as fields

Turnell(Tunnel)

Reading Criteria : Crop protection and heat Insulation using vinyl film and wire

Mulching

Reading Criteria : The process of covering the surface of the soil using branches, vinyl film for soil conservation

03 The production process of Farm Map

Guidelines for updating : Arial photography Interpretation criteria

orchard — A land where fruit trees are grown for at least three years

Fruit tree (except for grape)

Reading Criteria : the pattern of plating crops is similar to the filed, but the planting interval is wider. The shape of the fruit tree's head is a circle

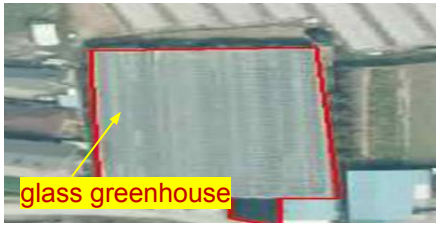
Grape

Reading Criteria : Some facilities are installed to protect against rain. The pattern is similar to facility, but interval is narrow.

Facility — A land where special structures such as greenhouses and greenhouses are installed for the cultivation of crops

Vinyl greenhouse & Glass greenhouse

Reading Criteria : The color is white because of light reflection. A bumpy pattern is visible.



Vinyl greenhouse with vinyl removed

Reading Criteria: The frame of facility is observed when the plastic film is removed.

03 The production process of Farm Map

Guidelines for updating : Arial photography Interpretation criteria

Non-cultivated land Non-cultivated land(graveyard, transmission tower, building, reclaimed land) in agricultural fields

Graveyard


Rock


Transmission tower

Building

04 How to improve Farm Map

Updating method by visual reading(limitation)

- Data update quality varies depending on worker's capabilities
- Decreased efficiency as a reference method for reading reference information
- Quality control through sampling and visual reading methods

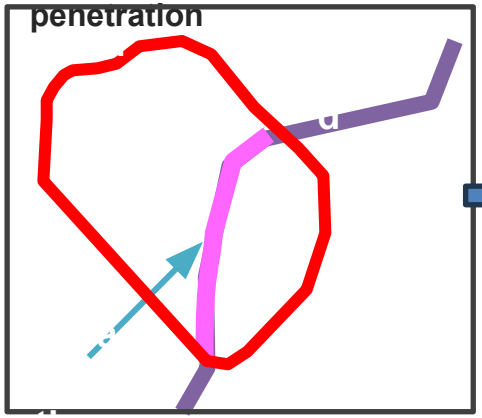
Updating method based on change analysis(advantages)

- Minimize quality degradation and improve efficiency due to difference in capabilities or each worker by updating based on detection and reading information by AI
- Quality improvement through full inspection using AI and intensive management of detected change targets

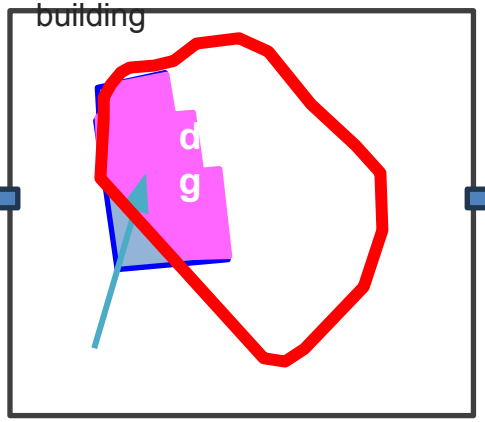
Increased efficiency

- **Focus on updating farmland extracted as a result of change analysis**
- **Reduced updating work time and consistent quality**
- **Total quality inspection rather than sampling using AI**

Analysis of road penetration



Overlap analysis with building



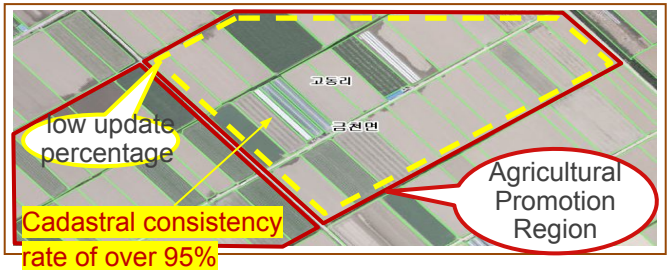
Application of classification and facility detection by AI

04 How to improve Farm Map

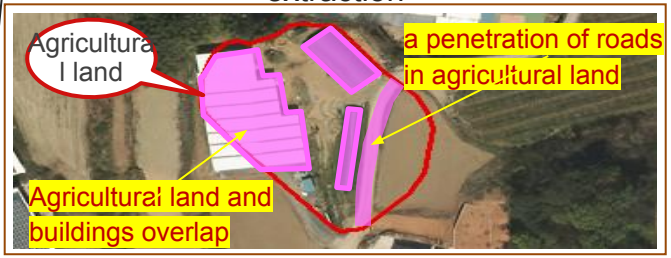
The analysis of agricultural land changes using administrative information

Geospatial Information	Unit Analysis Method		Unit Analysis Results
Agricultural Promotion Region	Region	Agricultural land with a high cadastral consistency	Agricultural land with low update percentage (Agricultural conservation area)
Cadastral matching rate	Agricultural land with high cadastral consistency between agricultural development region and farm map is selected		
Land category	Rice Paddy /Field/ Facility / Orchard)	An entire agricultural land	Agricultural land update with high priority - Candidate with no update
	Agricultural land that does not overlap with the cadastral land is selected		
Road	Road	An entire agricultural land	Agricultural land update with high priority - Candidate with road
	Modified agricultural land with road is selected		
Building	Building	An entire agricultural land	Agricultural land update with high priority - candidate with building
	Agricultural Land with building is selected		
Large-scale housing sites, industrial complexes, Road	Housing sites, industrial complexes, Road	An entire agricultural land	Agricultural land update with high priority - Candidate to be updated
	Agricultural land with housing sites, industrial complexes, road is selected		

Extract regions with infrequent updates



Road/Building overlapping farmland extraction



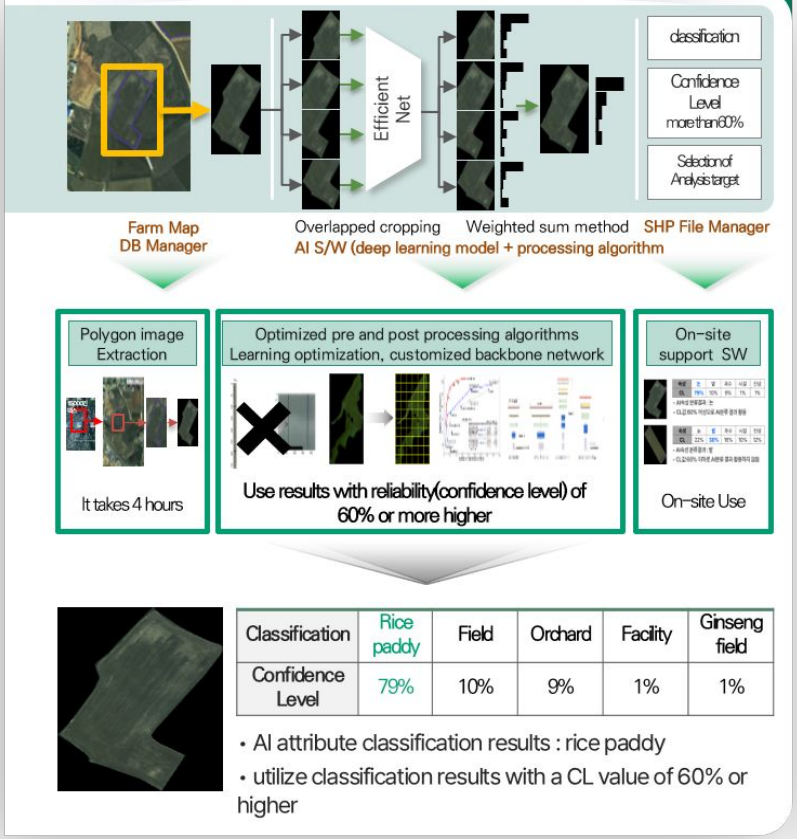
Extract regions planned for residential development

04 How to improve Farm Map

The analysis of Farmland changes using artificial intelligence(AI) model

Effect of Use : improves farm map construction efficiency compared to existing visual construction methods through effective identification of changing farmland

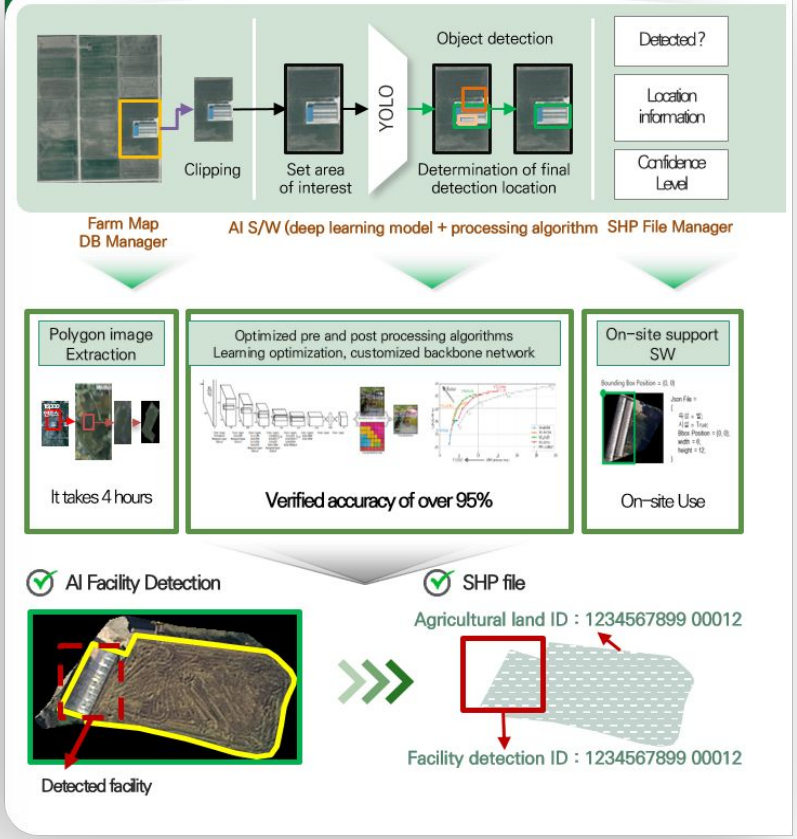
Agricultural Land Classification Model



Classification	Rice paddy	Field	Orchard	Facility	Ginseng field
Confidence Level	79%	10%	9%	1%	1%

- AI attribute classification results : rice paddy
- utilize classification results with a CL value of 60% or higher

Facility Detection Model

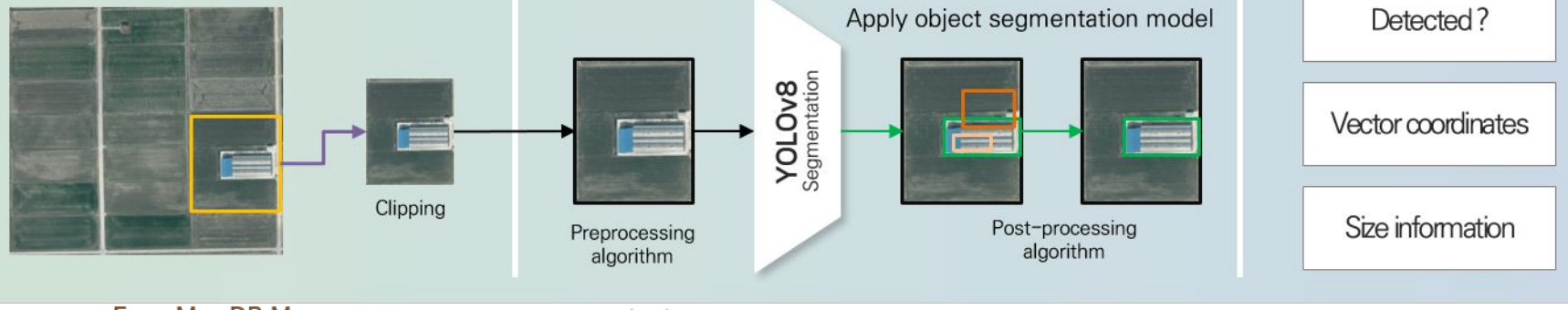


04 How to improve Farm Map

The direction of Automatic Farm Map update using artificial intelligence(AI) model

Effect of Use : automatic boundary generation using AI segmentation models for man-made facilities such as greenhouses

Facility Detection and Segmentation Model

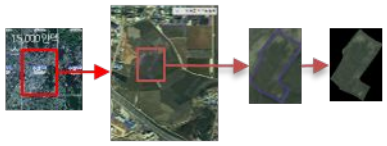


Farm Map DB Manager

AI S/W (deep learning model + processing algorithm

SHP File Manager

Polygon image Extraction

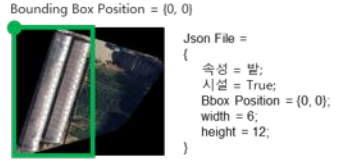


Polygon image Extraction SW

Optimized pre and post processing algorithms + Segmentation Model

Applying the latest YOLOv8 model

On-site support SW



SHP file creation

05 The utilization service of Farm Map

Utilization-oriented Farm Map's Open API (Application Programming

User Guide

- Issuance of authentication key
- Example of use
- OpenAPI specification

Map API

46 types

Data API

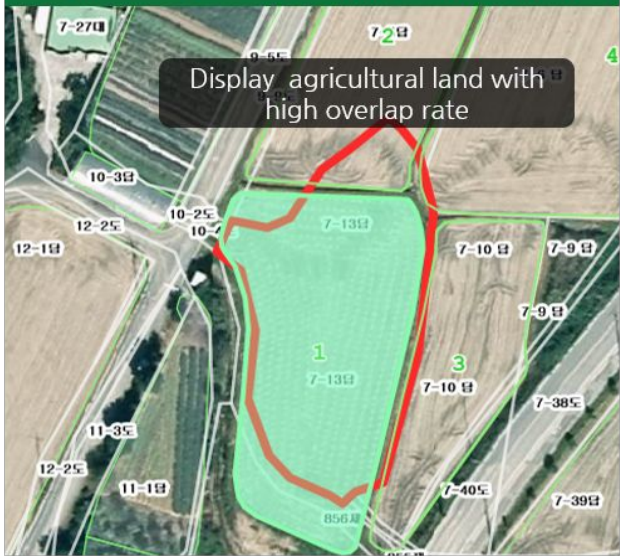
7 types

WMS/WFS

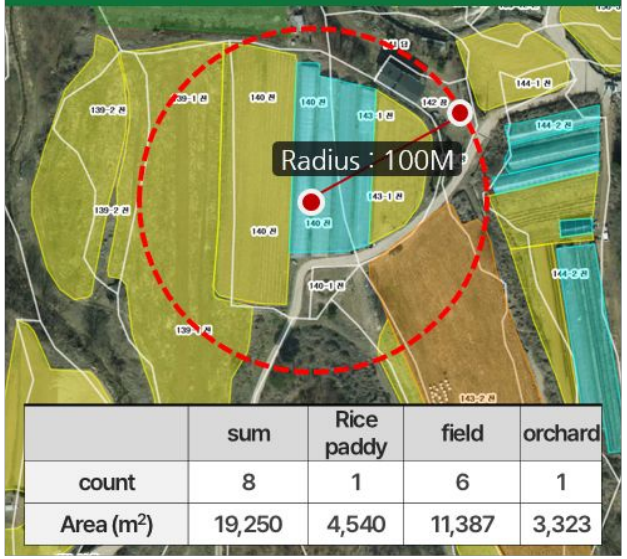
Open API

Use cases

Utilization of cadastral map oriented work



Radius analysis centered on current location



	sum	Rice paddy	field	orchard
count	8	1	6	1
Area (m^2)	19,250	4,540	11,387	3,323

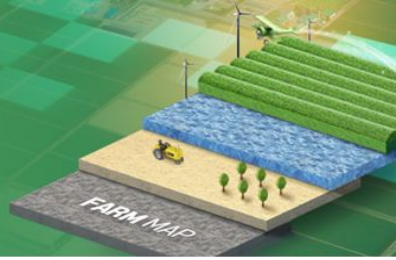
Support Service

Customer Support Matters

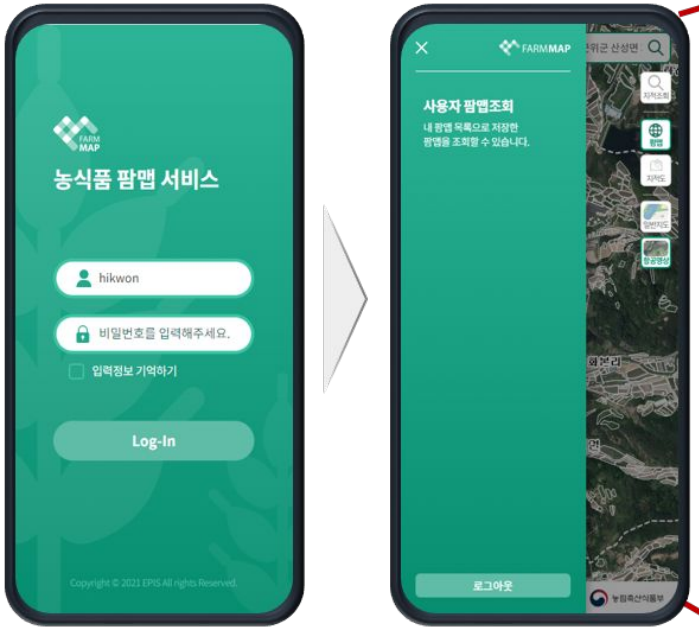
Interface specification	Sample application	MashUp sample	User Guide book
			

05 The utilization service of Farm Map

Mobile Farm Map Service



Provides mobile web services for immediate use in the workplace.



[https://agis.epis.or.kr/ASD/mobile/main.do]

[Connection method for mobile web]

* Serch for 농식품 팜맵서비스 on the portal (NAVER, DAUM)

* QR code shooting

06 The use cases of Farm Map

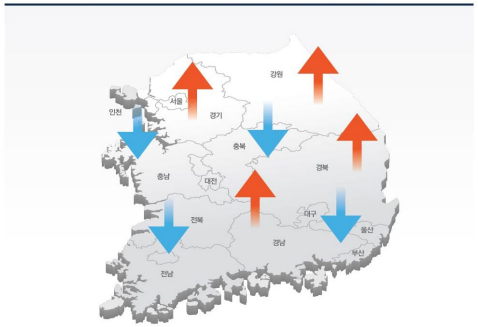
Application Areas

Application Field		Main Content	Demand Agency
Agricultural Production Statistics	Report of intention to cultivate & survey area	Garlic cultivation intent report and survey	Korea Garlic Association
	Cultivation production Survey	Collect information cultivation status of winter crops through drone photography	Korea Rural Economic Institute Jeju Provincial Office
Farmland Field Condition Inspection	Farmland inspection	Used as basic information to check the implementation of agricultural subsidies and agricultural product certification	National Agricultural Products Quality Management Service
	Agricultural land survey	Farm survey set management to calculate agricultural production statistics	Statics Korea
	Efficient use of farmland	Basic data for activating the use of idle farmland and maintaining production infrastructure in agricultural promotion areas	Korea Rural Community Corporation
	Survey on state-owned land	Check the status of use of national property	Korea Asset Management corporation
Disaster Management	Livestock epidemic analysis	Epidemiological analysis of livestock infectious disease outbreaks	Animal and Plant Quarantine Agency
	Flood damange analysis	Water disaster risk assessment in agricultural sector	Korea Institute of Civil Engineering and Building Technology
Energy Policy	Greenhouse energy status survey	Greenhouse and energy use status survey	Ministry of Agriculture, Food and Rural Affairs
	Renewable energy	Assessment of renewable energy potential in rural areas	Korea Institute of Energy Research
	Energy demand survey	Estimation of expected heat demand for agriculture	Korea district Heating Corporation

06 The use cases of Farm Map

Consumer Cultivation Intention Survey

Previous Garlic/Onion Producer Cultivation Reporting Method



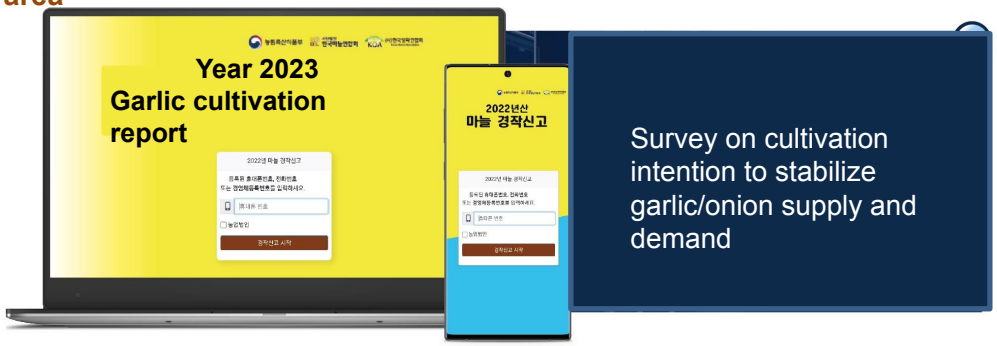
- Statistics vary by survey organizer
- Inconvenient investigation reporting method

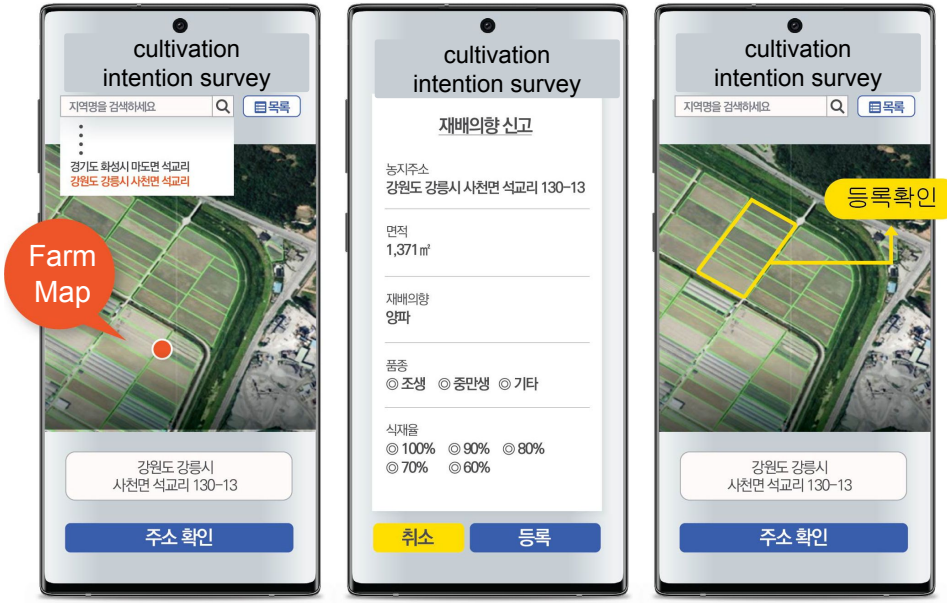
- Differences in production due to lack of consistency in reporting method

The need to increase the participation rate in cultivation reporting and calculate accurate data

Current Garlic/Onion Producer Cultivation Reporting Method

Operation of mobile service for reporting and investigating cultivation area





06 The use cases of Farm Map

The survey of agricultural production status using aerial photography

Agricultural Observation Survey

Telephone survey of sample farms + Door-to-door investigation

Investigation of cultivation intention, area, growth situation, production area transaction trends, etc.

Takes a lot of time and money

Difficulty collecting accurate date depending on field conditions

Investigation using drones to quickly and accurately collect information.

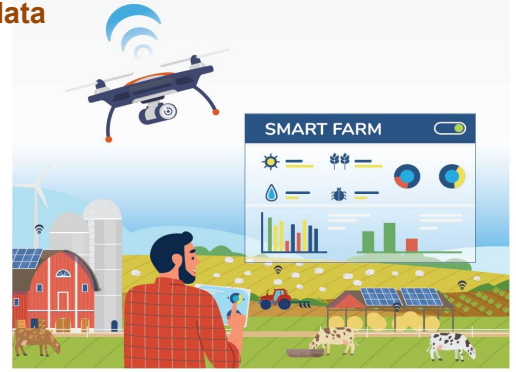
\+

Cultivation status survey using drone photography based on Farm Map

Effect of reducing investigation period, cost and work time

Drone filming and flight planning for each parcel using Farm Map

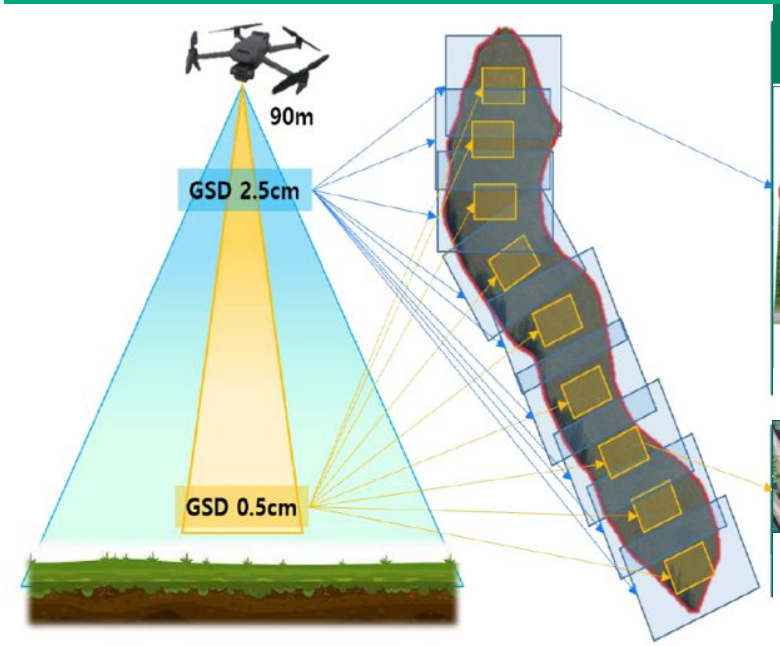
Easy to identify target site and collect cultivation status data



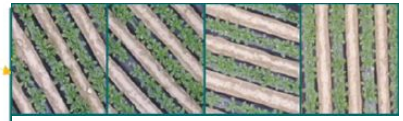
06 The use cases of Farm Map

The survey of agricultural production status using Drone photography

High-resolution images and occupied area confirmation for crop classification

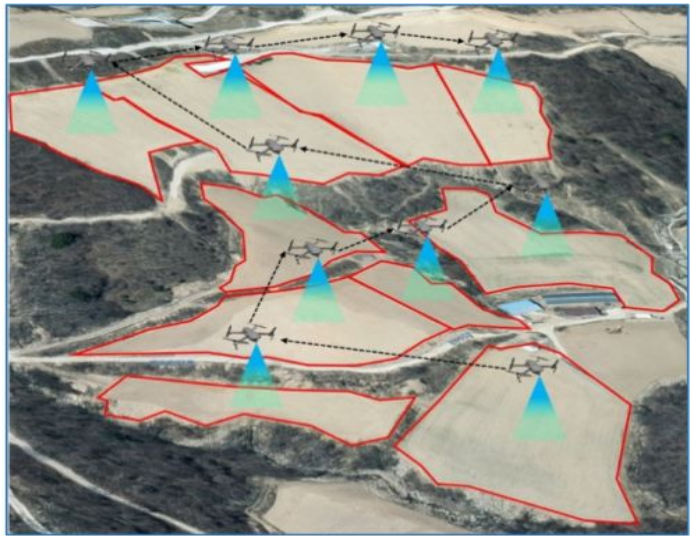


Cultivation items and area calculation



Item identification and classification

Automatic creation of drone route using Farm Map



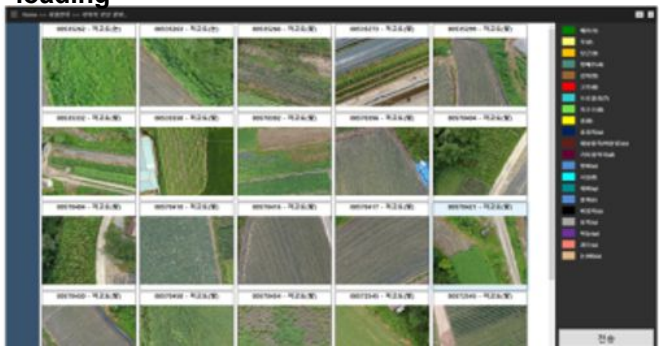
Drone Photography examples by GSD (garlic)

06 The use cases of Farm Map

The survey of agricultural production status : Statistic Generation Procedure

Item interpretation and production area calculation using drone photography

① High-solution image loading



② Item identification

③ Building Item properties

④ Wide-field image loading

⑤ Image correction
Farm Map boundary display for congestion judgment

⑥ Occupied area classification by cultivation item
Automatic calculation of occupied area

06 The use cases of Farm Map

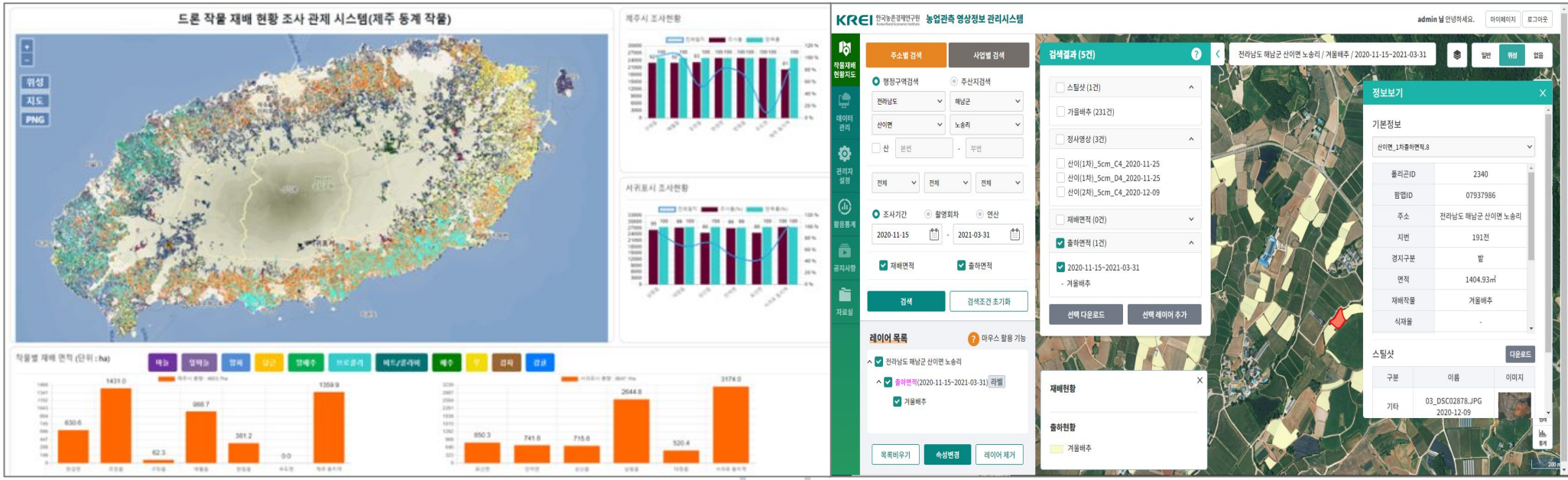
The survey of Jeju island's winter crops production

. **Survey on the cultivation status of all winter crops in Jeju Island using Farm Map and drone photography (October –December 2022)**

- **13 items including winter radishes and carrots**
- **Drone filming and production statistics equivalent to 553 ㎢(55,338 ha) of agricultural land**
- **Used as basic data for supply and demand analysis of agricultural products**

. **Establishment of an integrated survey data management system**

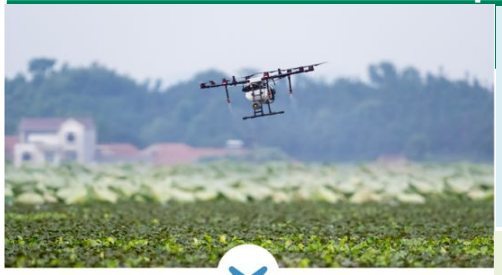
< View and monitor investigation results>



06 The use cases of Farm Map

Pesticide control service

Unmanned disaster prevention using Farm Map



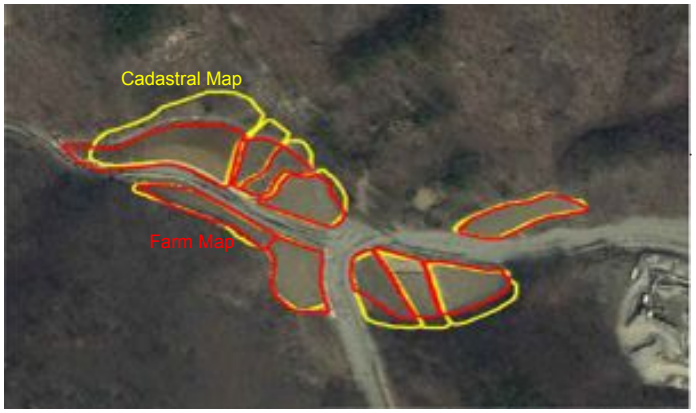
Previous drone pest control had the difficulty of conducting field surveys to secure information on the location and area of agricultural land.

If you use Farm Map

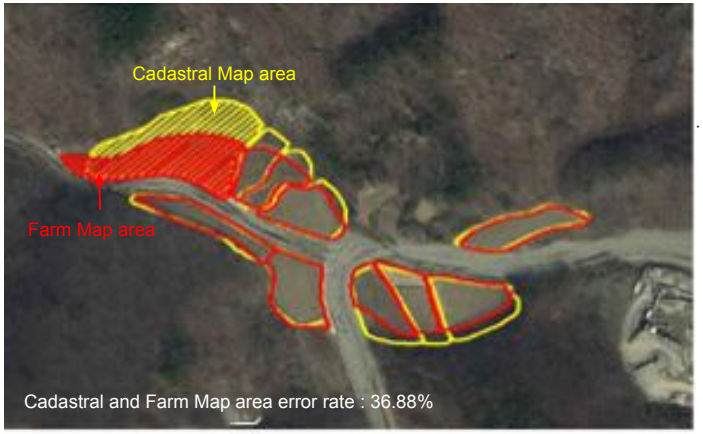
It can be used to identify the exact location and area to be treated, and

to move the drone to the control point and design autonomous flight routes within agricultural fields

	Use of cadastrial map	Use of Farm Map
Spraying amount Analysis	Accurate analysis of spray amount is limited due to difference from actual cultivation area	**More accurate and rapid analysis of spray amount is possible based on actual cultivation are**



Difference between cadastral and farm map



Error in calculating spray amount due to difference in area

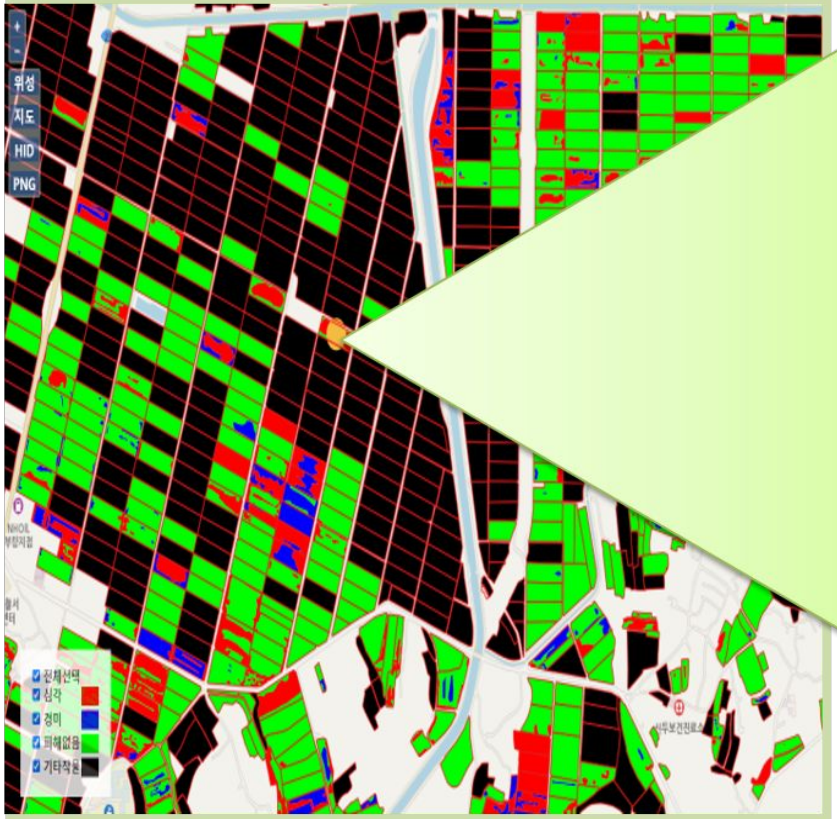
	Cadastral Map	Farm Map
Preliminary survey of disaster prevention areas	On-site visit to obtain information on disaster prevention areas.	Minimize field work by obtaining basic information before visiting aerial pest control sites.
Aviation control plan	Build new type of map for flight path planning	Establish a flight path plan using farmland polygons

06 The use cases of Farm Map

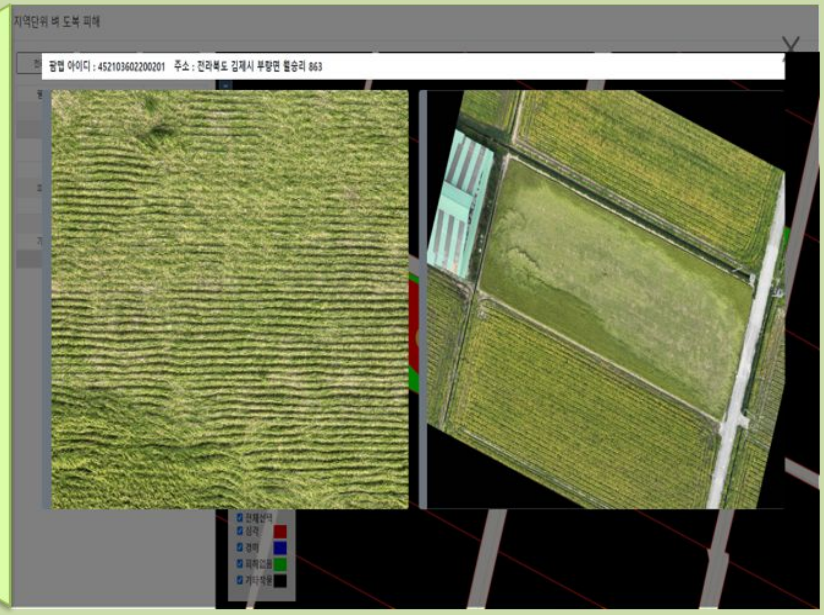
The survey and analysis of disaster damage status

Rice crop drone photography collection analysis study (year 2023, National Institute of Crop Science)

Drone shooting results reflected on site



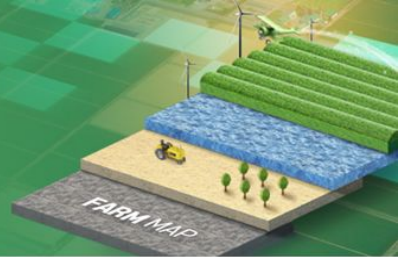
Drone photo of the parcel subject to investigation



Comparison of wide-angle and zoom drone shooting results to determine rice crop damage

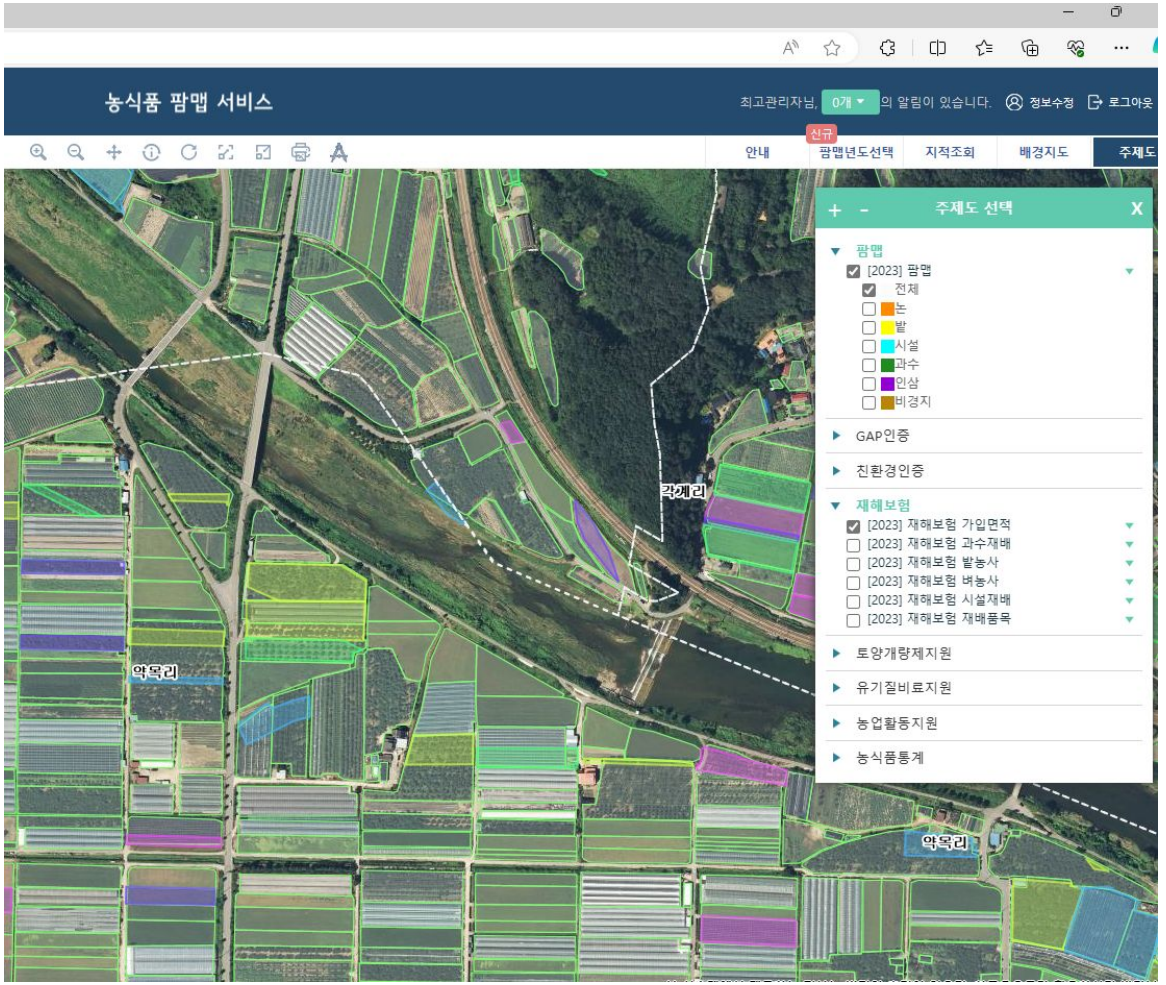
06 The use cases of Farm Map

The survey and analysis of disaster damage status



- We operate agricultural policy insurance and agricultural disaster insurance to ensure compensation for damage to corps, livestock due to abnormal weather, natural disasters, etc.

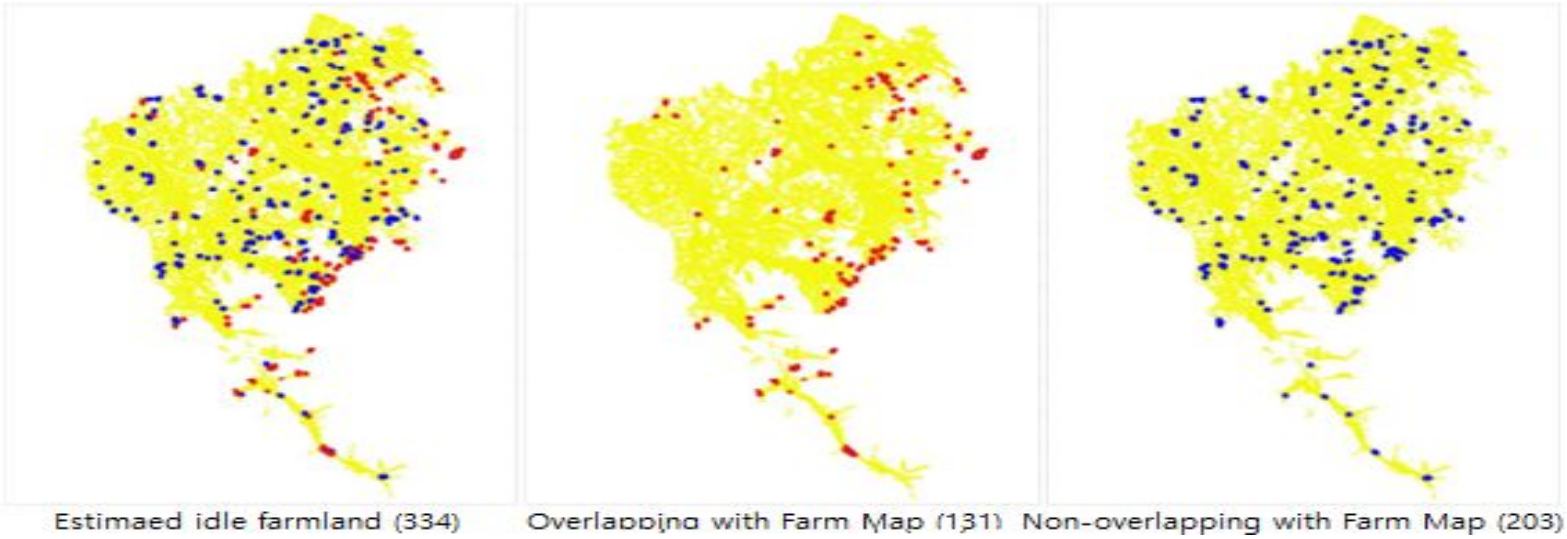
- The area for disaster insurance subscription parcels is checked in advance by combining disaster information and farm maps to conduct a status analysis of areas where agricultural disasters have occurred.



06 The use cases of Farm Map

The estimation of idle farmland

- Estimated idle farmland analysis data is data that identifies farmland with no cultivation history in administrative data that can be used to investigate the status of idle farmland.
- Once classified as presumed idle farmland, idle farmland is determined through on-site investigation. If the farmland subject to on-site investigation can be reduced using a farm map, the efficiency of the survey project can be increased.
- Spatial information was created by linking the address information from the Korea Rural Community Corporation's estimated idle farmland information analysis data with the basic national land information map and compared with the farm map.
- Of the total 334, 203 overlapped with the farm map and cultivation was confirmed, and 131 did not overlap. We were able to reduce field surveys by 39% (131 locations).



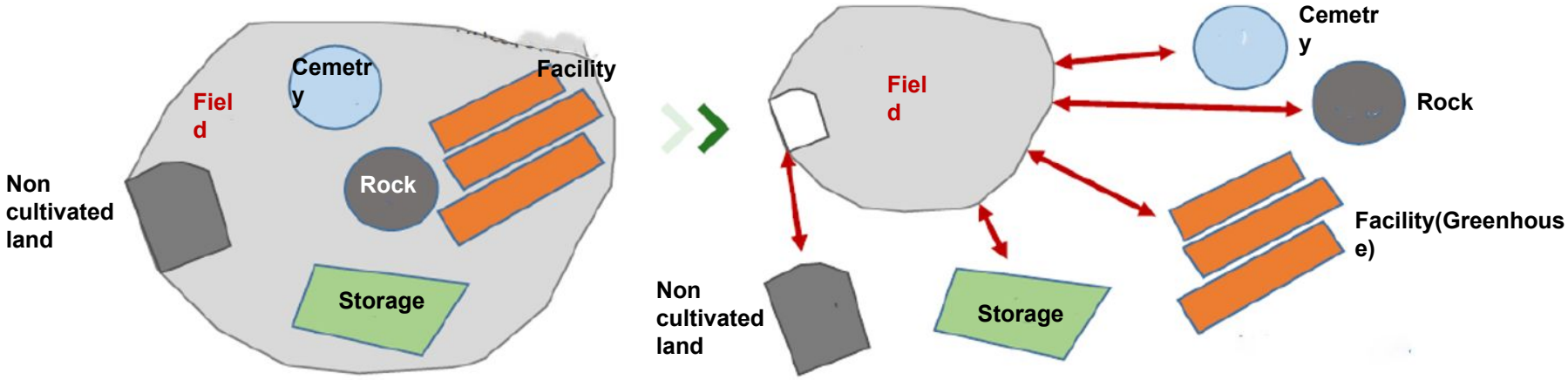
07 Conclusion and Further Advancement

The advancement of Farm Map (To-Be)

Basic information Properties of land that rarely change original purpose of land(land category)

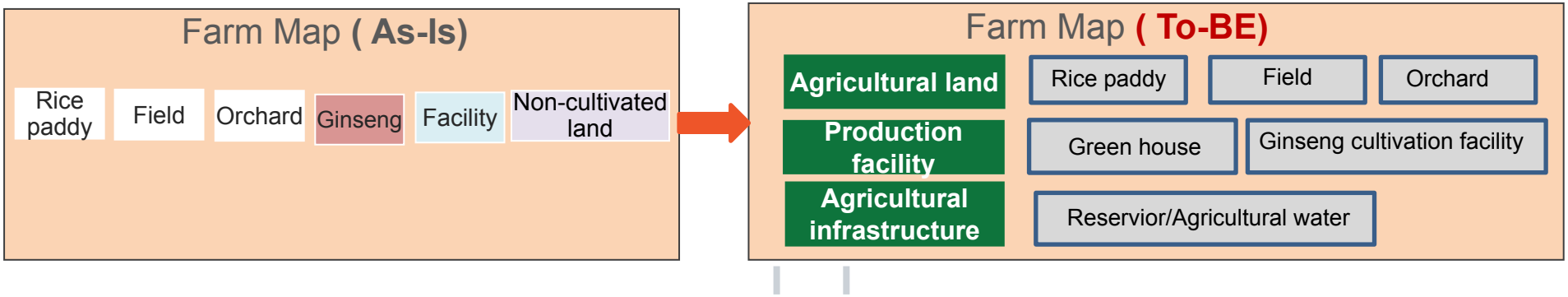
Usage status information Properties that frequently change depending on agricultural land use (double cropping : cultivate potatoes in facilities until the following spring after harvesting rice fields)

Separate agricultural land basic information and use status information (multiple layers)



Difficulty analyzing parcel units as independent objects with no correlation

Separation of agricultural land use status and facility information allows analysis by parcel



07 Conclusion and Further Advancement

The contribution of Farm Map

- Farm Map can be used as basic data to efficiently manage agricultural-environmental resources since it includes agricultural management information in the actual cultivation boundary
- Farm Map can be an important means of estimating the amount of subsidies paid directly to farmers.
- Farm Map can be used for more accurate agricultural statistics and production forecasts for each item, and supply and demand control.
- Farm Map can assist in calculating the scale of support to individual farms, such as support for soil conditioners and organic fertilizers
- Farm Map is an digital map of agricultural land that establishes actual cultivation boundaries, so it helps in establishing realistic national farmland use plans

Background Information – Republic of Korea

Lead Ministry/Agency	Ministry of Agriculture, Food and Rural Affairs Korea Agency Education, Promotion and Information Service in Food, Agriculture, Forestry and Fisheries
Policy mandate	Improving the quality of life of farmers and establishing a comprehensive agricultural and rural spatial information system (Article 32-2 of the Special Act on Promotion of Development of Rural Area)
Legislative mandate (if any)	None
Stakeholders involved	Statics Korea, National Agricultural Products Quality Management Service, Korea Rural Economic Institute, Agricultural Policy Insurance & Finances Services
Interagency collaborations	Ministry of Land, Infrastructure and Transport, Korea Rural Economic Institute, Agricultural Production Organization
Privacy legislation	Personal Information Protection Act. (Build and utilize information within the scope of no restrictions)
Privacy considerations	Personal Information Protection consideration (Build and utilize information within the scope of no restrictions)

Background Information – Republic of Korea

Satellite imagery source(s)	Orthoimage data provided by National Geographic Information Institute
Type of imagery used (optical, SAR, etc.; including satellite system)	Aerial photography with 25cm resolution Profiling ISO 19115-1 and 19115-2 with orthoimage data provided by National Geographic Information Institute
Spatial and Temporal resolution	Aerial photography with 25cm resolution
Ancillary data	Cadastral Map, Road and Building Information, Address Information
Data processing (infrastructure on-site or cloud-based)	Cloud-based Artificial Intelligence change analysis Data processing by Geographic Information System within on-site infrastructure
Area covered by EO data analysis (national/sub-national)	Entire Republic of South Korea peninsula

Background Information – Republic of Korea

Crops covered	The Farm Map itself does not provide crop information. Crop Information is researched through various Farm Map utilization projects.
Statistics produced (ex. Crop type mapping, area estimation)	Calculate production statistics in connection with crop information surveyed through field and remote sensing based on actual farmland cultivation boundary values.
Frequency that statistics are produced	Annual statistics generated
Dissemination of statistics	Data opening through file download and API system
Size of geospatial team	Approximately 360 man/month is invested annually in change analysis, data construction and system operation.
Roles in geospatial team	Analysis of farmland changes, update of farmland digital data and system operation and improvement.

Background Information – Republic of Korea

Data/survey source	None (Not a typical statistical survey)
Lead agency	None (Not a typical statistical survey)
Sampling approach	None (Not a typical statistical survey)
Data collection approach	None (Not a typical statistical survey)
Variables collected	None (Not a typical statistical survey)
Frequency of data collection	None (Not a typical statistical survey)

Thank you

for your attention

Q&A