Achievements & Challenges in R&D to Strengthen the Sustainability of Agriculture in Korea

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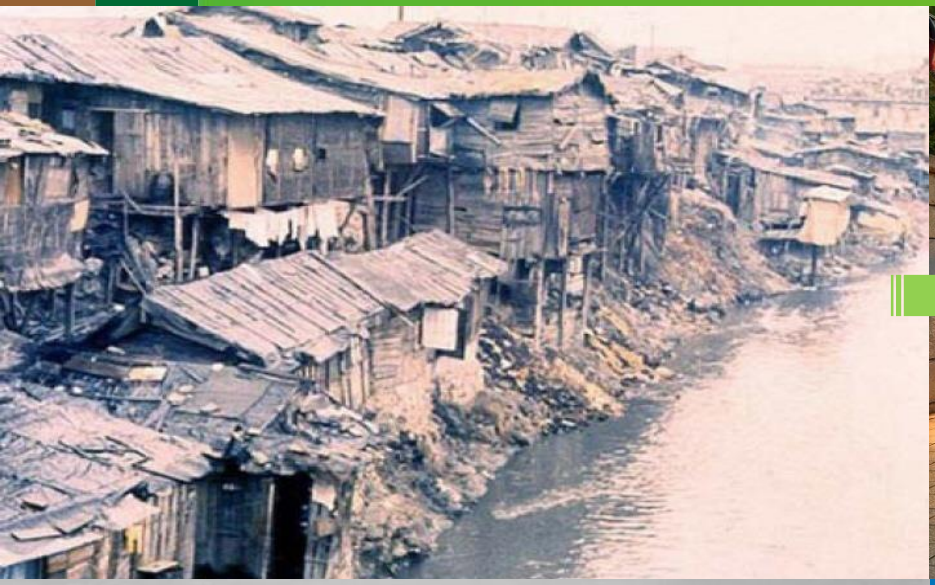
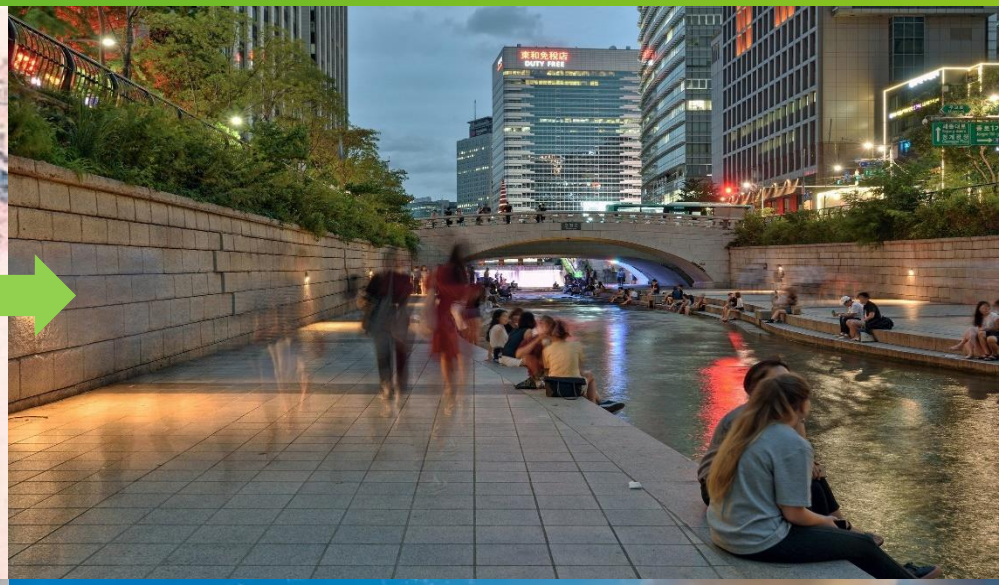
Transformation from a Hopeless Nation to a Country of Hope

Rural Development Administration





1950s-60s

2000s

Four Distinct Seasons in Korea

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Ecosystem of Korea for Nature-based Solutions

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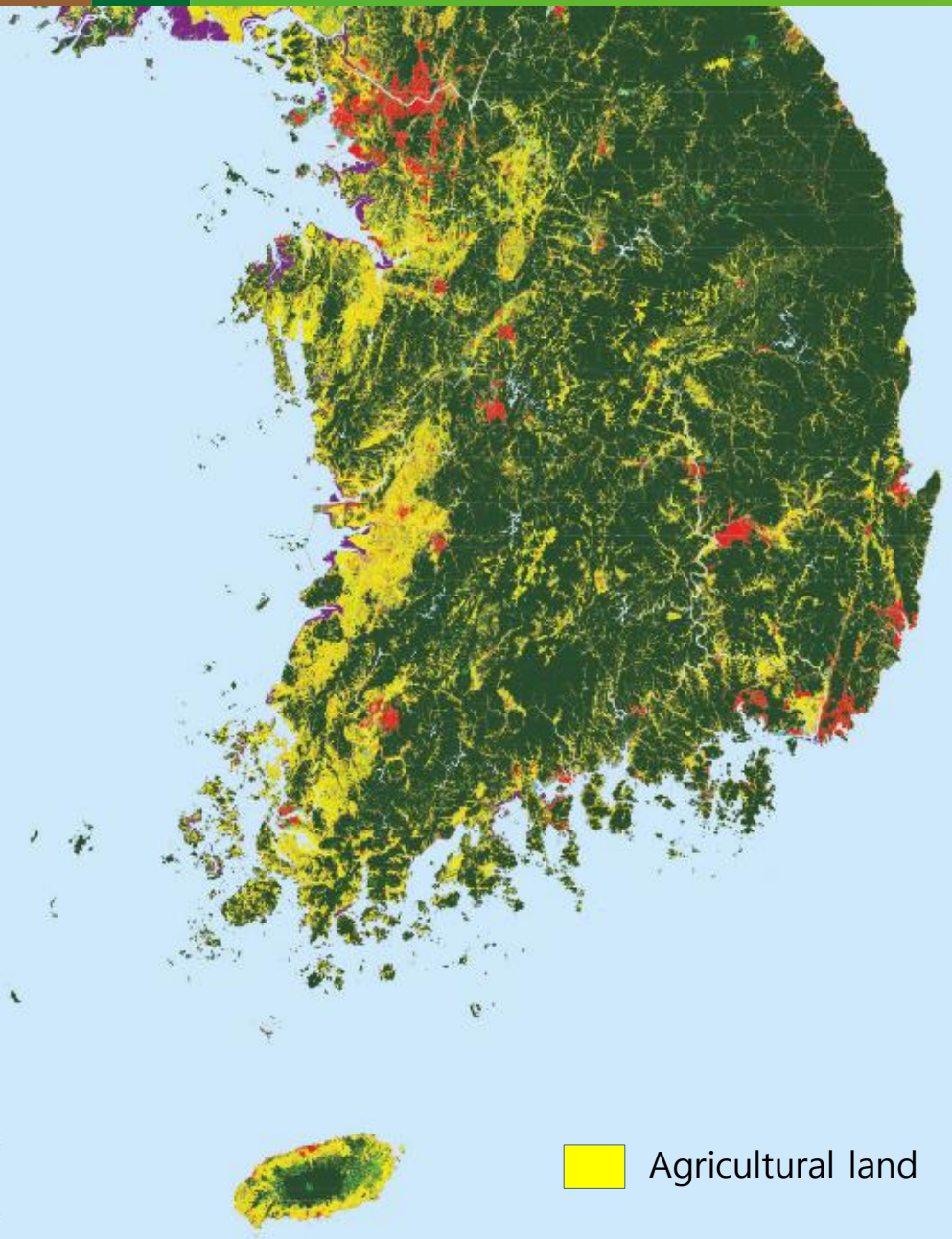
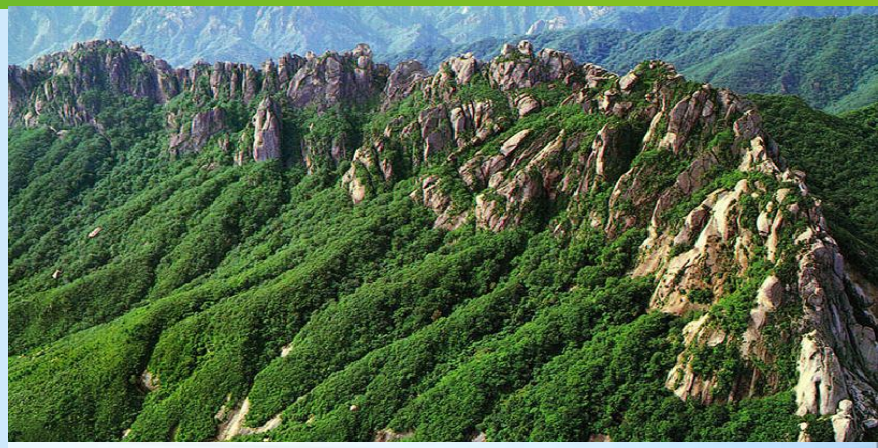
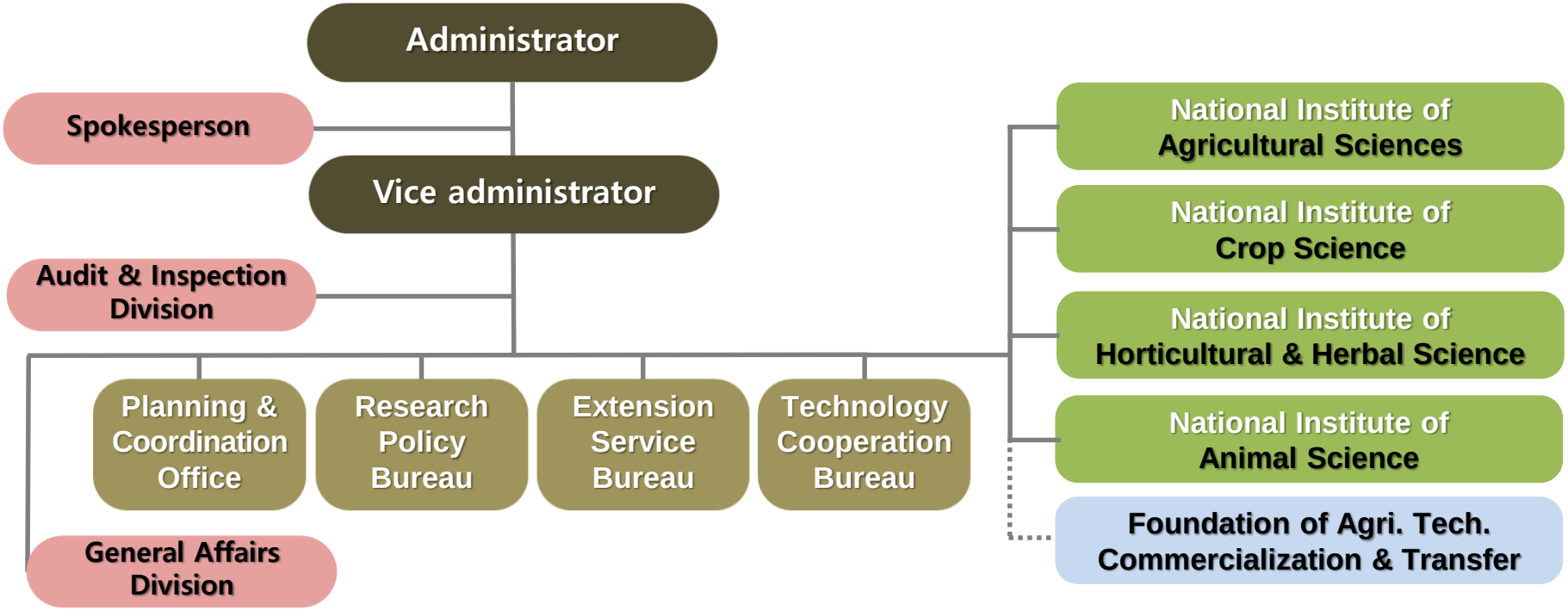




Headquarters (4 Bureaus), 4 national institutes, 1 public institution



- **Personnel**: 1,901 (RS) + 2,315 (TA)
- **Budget** (2021): US$ 997 M (R&D 83%, Operational Expenses 12%)

- ✓ 9 Provincial Agricultural Research Extension Services
- ✓ 156 City/County Agricultural Technology Centers

Sharing Innovative Experiences with the World

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●	**KOPIA** (Korea Program on International Agriculture)	22 countries	
○	**AFACI** (Asian Food & Agriculture Cooperation Initiative)	13 countries	
○	**KAFACI** (Korea-Africa Food & Agriculture Cooperation Initiative)	23 countries	
○	**KoLFACI** (Korea-Latin America Food & Agriculture Cooperation Initiative)	12 countries	
■	**KoRAA** (Korea RDA Alumni Association)	10 countries	
▲	**RAVL** (RDA Abroad Virtual Lab.)	5 institutions	
■	International organization	13 institutions	
■	National Research Institution	21 institutions	

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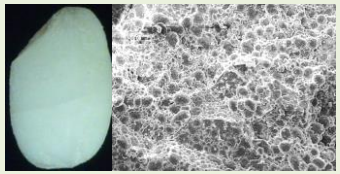
Science & Technology

Breeding varieties



Brewing "*Seolgaeng*"

"*Hangaru*" for rice flour

Farm mechani -zation

Seedling nursery

Transplanting and Pest control

Processing

Rice soju

Rice snack

Gluten-free rice bread

Export support

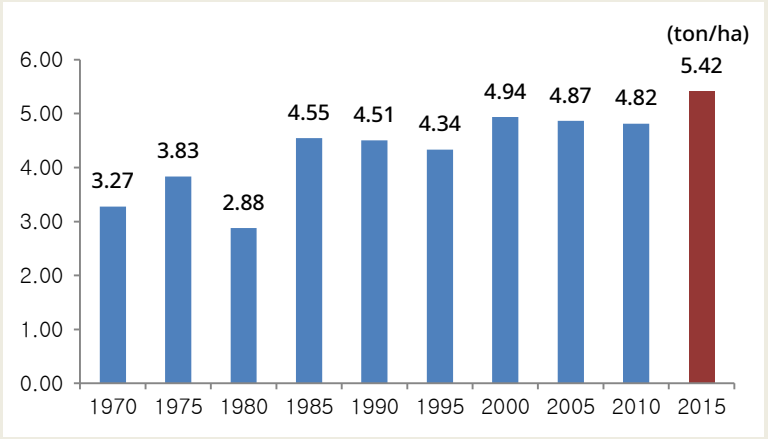
RPC tech.

Cup-bop

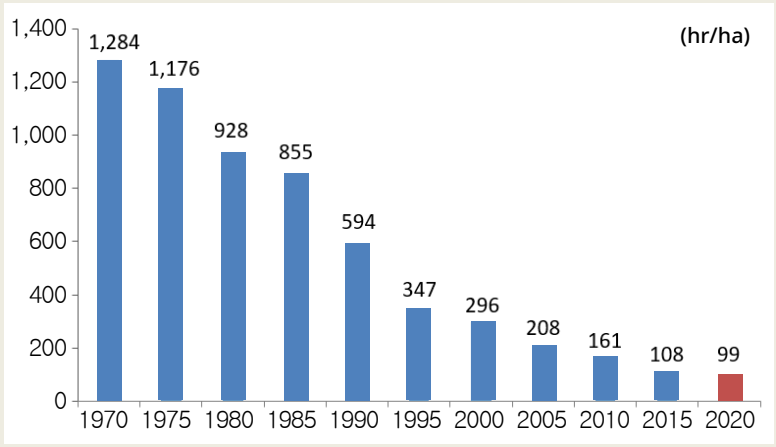
Rice cake soup, ice cream

Impacts

Increase of productivity : 65.4%



Decrease of labor hours : 92.3%



Science & Technology

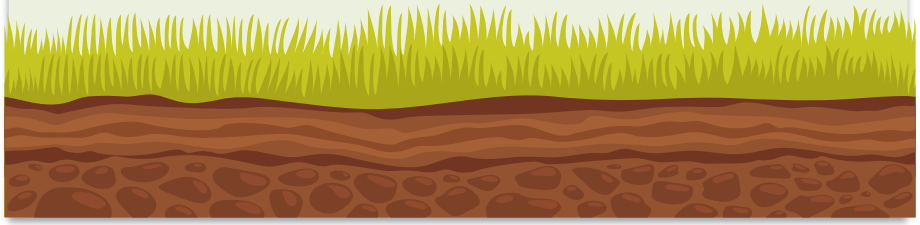
Soil survey (1969~1999)

Soil monitoring (1999-present)

- 6,724 points in total, every 4 years
- Physicochemical properties

Soil analysis (1980-present)

- About 450,000 point, every 4 years
- Chemical properties
- 10,865 thousands data

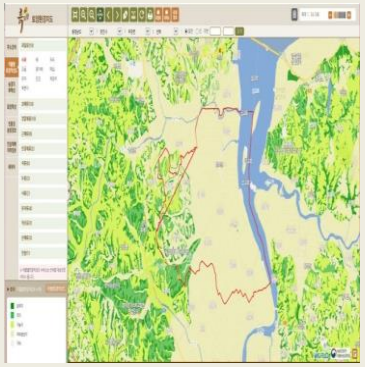


Impacts

GIS-based soil information of Korea

Fertilizer recommendation

Crop suitability



✓ Accumulation of technologies for greenhouse

: Multi-variable control of environmental factors

• Temperature/Light • Water/Nutrient • Energy • Automation

Insulation

Supplemental Lights

Automatic growth analysis

Multi-variable control of environmental factors

Rain harvest

Cooling and heating

Control of soil moisture and nutrients

Energy saving

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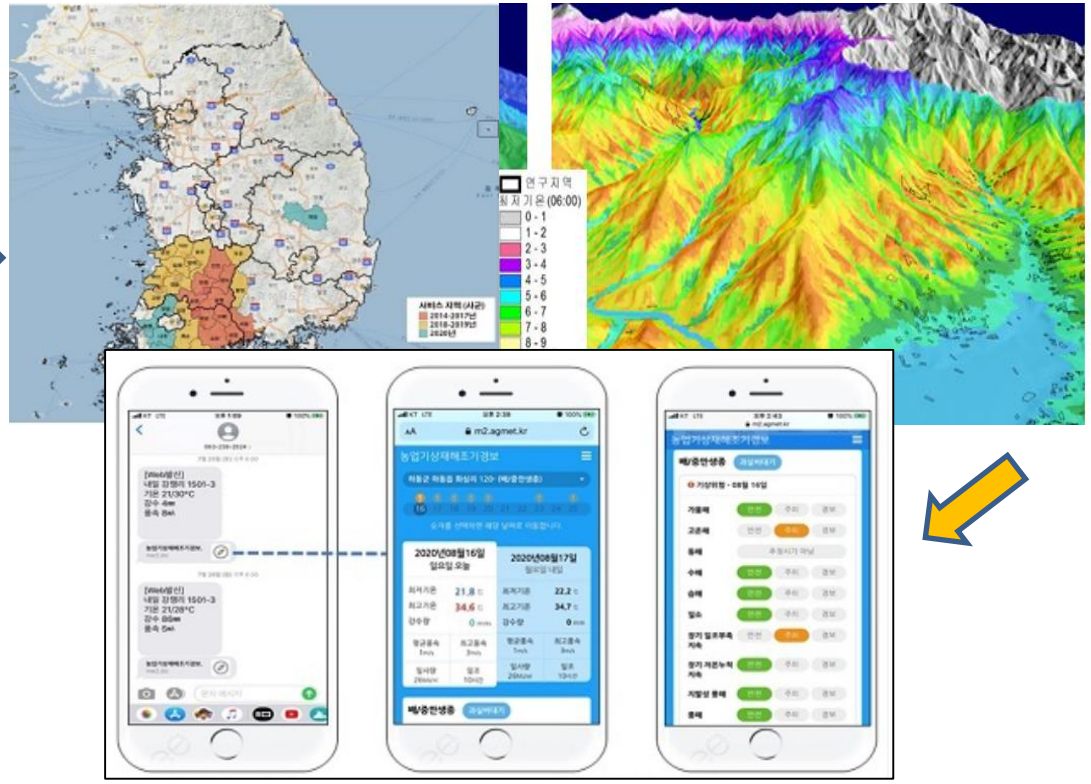
- ✓ **Production of agrometeorological and agro-climatic forecast information**
- ✓ **Early warning service for agrometeorological disasters**

  : Offering farms in 29 counties with information through internet (https://agmet.kr) and cell-phone (text and applications)



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✓ Develop field-focused & low-input resource cycling technologies

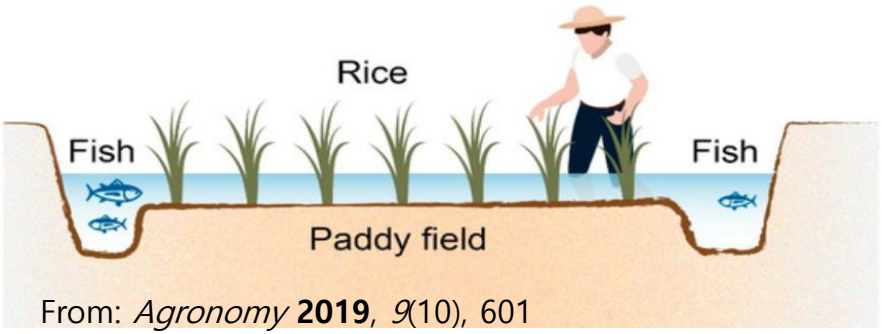
: Soil/nutrient management technologies using organic resource

: Manuals for organic seed production, rice–fish farming system etc.

✓ Fostering professional rural leaders via international cooperation

: International Federation of Organic Agriculture Movement (IFOAM)

* Organic Farming Innovation Awards (OFIA)



From: *Agronomy* **2019**, *9*(10), 601

✓ Conservation of agricultural genetic resources in National Genebank

: Plant 266,649, microorganism 25,992, livestock 33,864, and insect 387 accessions

: 'World Seed Vault' for safety duplication of 27,325 germplasm from national genebanks around the world

National Genebank (HQ)

National Genebank (Duplication)

Med-term(4°C, 30% RH)

Long-term(-18°C)

Cryopreservation(-196°C)

DNA bank(-80°C)

✓ Strategy for carbon neutral agricultural 2050

[Smart Farm] Expansion of smart farm and smart animal farm using 4th industrial technology

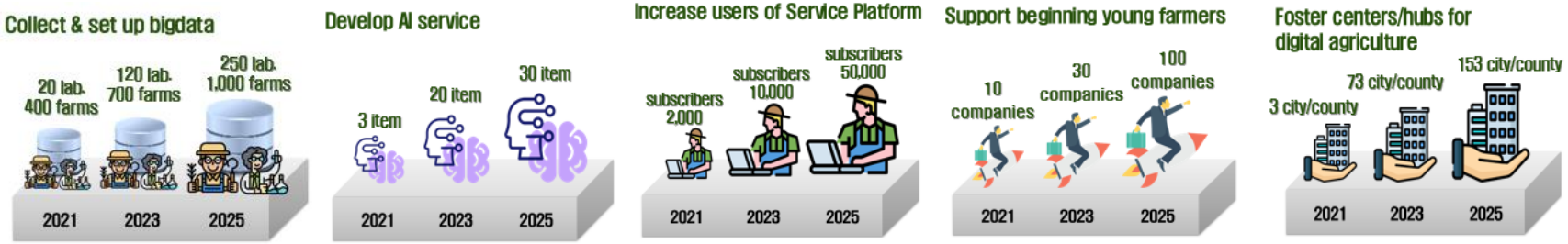
[Low-carbon Agricultural Technology] Shallow irrigation, substitute of chemical fertilizer, expansion of organic farming, supply of low methane feed, and enhancement of livestock recycling *etc.*

[New & Renewable Energy] Heat pump using underground heat, wood pellet boiler, LED lights, insulation curtain in greenhouse, circulation system with water curtain *etc.*

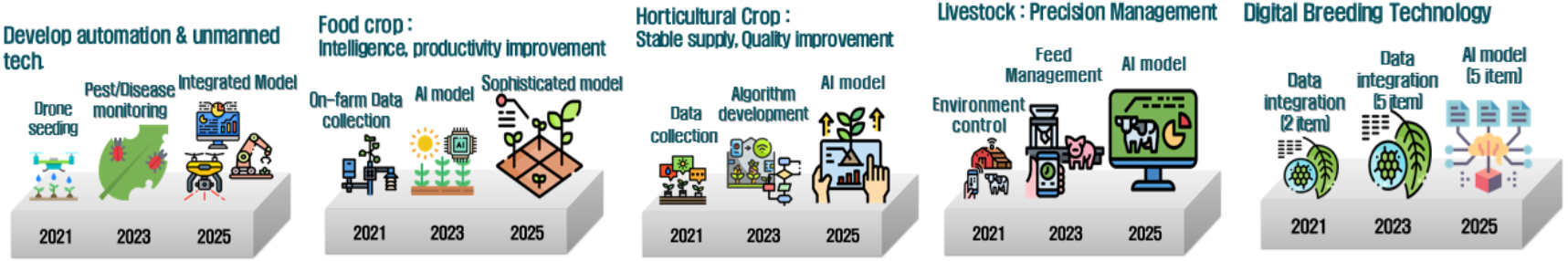
[Participation of Policy for Consumers] Reduction of food waste, improved diet, and efforts to raise awareness to mitigate GHG emissions in the daily life

Development of sustainable GHG reduction technology considering the current agricultural environment and conventional farming methods

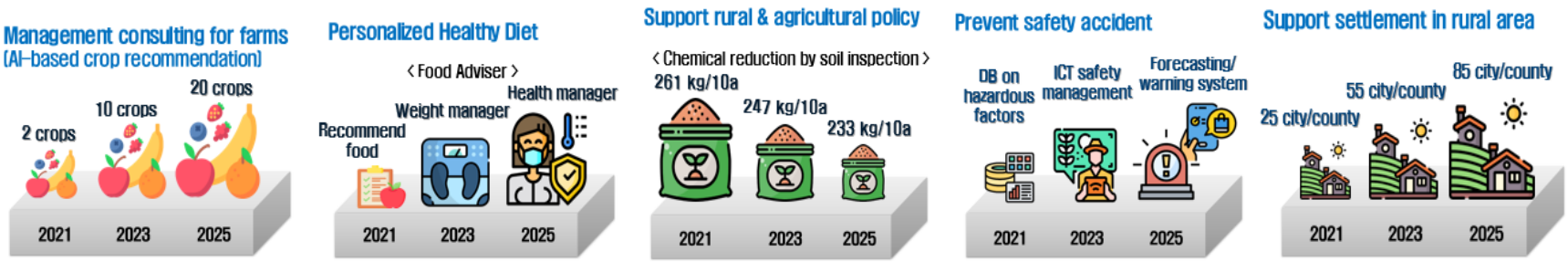
Big Data Ecosystem



Production Technology



Distribution & Consumption



Direct Payment System for public benefit of agriculture

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✓ **Strengthen public benefit functions of agriculture & rural community for sustainable**

: Farm businesses receive direct payments if they meet certain requirements

Optional Direct Payment for Public Benefit	Direct Payment to Preserve Landscape, Direct Payment for Eco-friendliness, Direct Payment for Rice Paddy Utilization, etc.
Basic Direct Payment for Public Benefit	Area Direct Payment (regressive unit price)
	Direct Payment for Small-scale Farms (fixed amount)

'Act on Direct Payment for Public Benefit' came into effect on May 1st, 2020

Considerations for Future Cooperation

- ✓ Work in line with SDG framework, with a focus on no poverty & zero hunger goals.
- ✓ Design & implement collaborative projects that can have a practical impact on the agriculture of the partner country.
- ✓ Explore science and technology-based resolutions
- ✓ Set up an open platform, where scientists can work together and share achievements for better agriculture.

Revolutions in Science & Technology
Determine
Agriculture of Tomorrow

Go Together for *"Big Dream & Big Challenges"*