18 December 2024.
PRIMAFF Symposium on “Environmentally Friendly Agricultural Policy and Realization of Sustainable Agriculture: Toward the Diffusion of Organic and Biodiversity-friendly Agriculture“

Promotion of Environmentally-friendly Agriculture and Development of a Comprehensive Assessment Framework for Its Local Impacts

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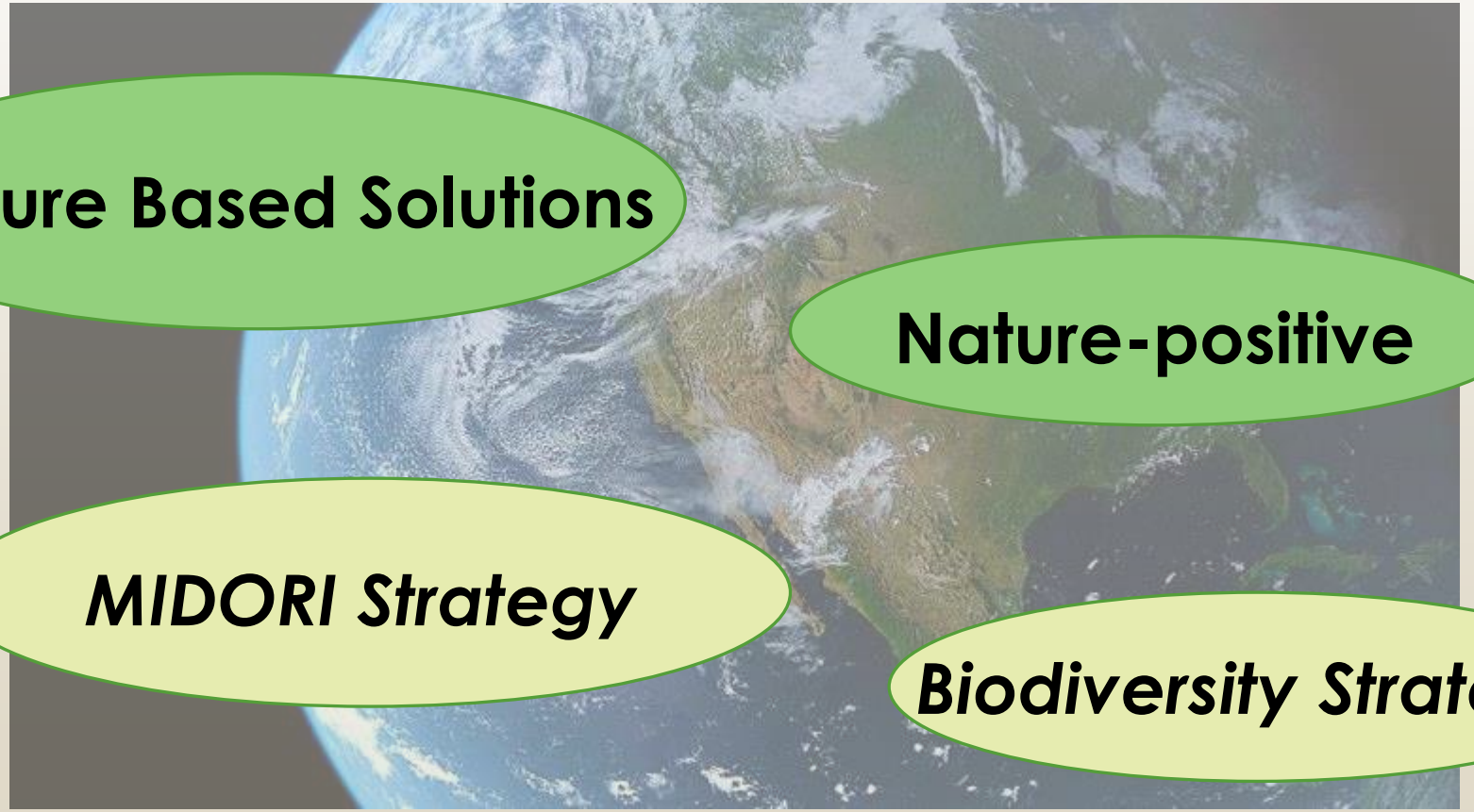
Outline

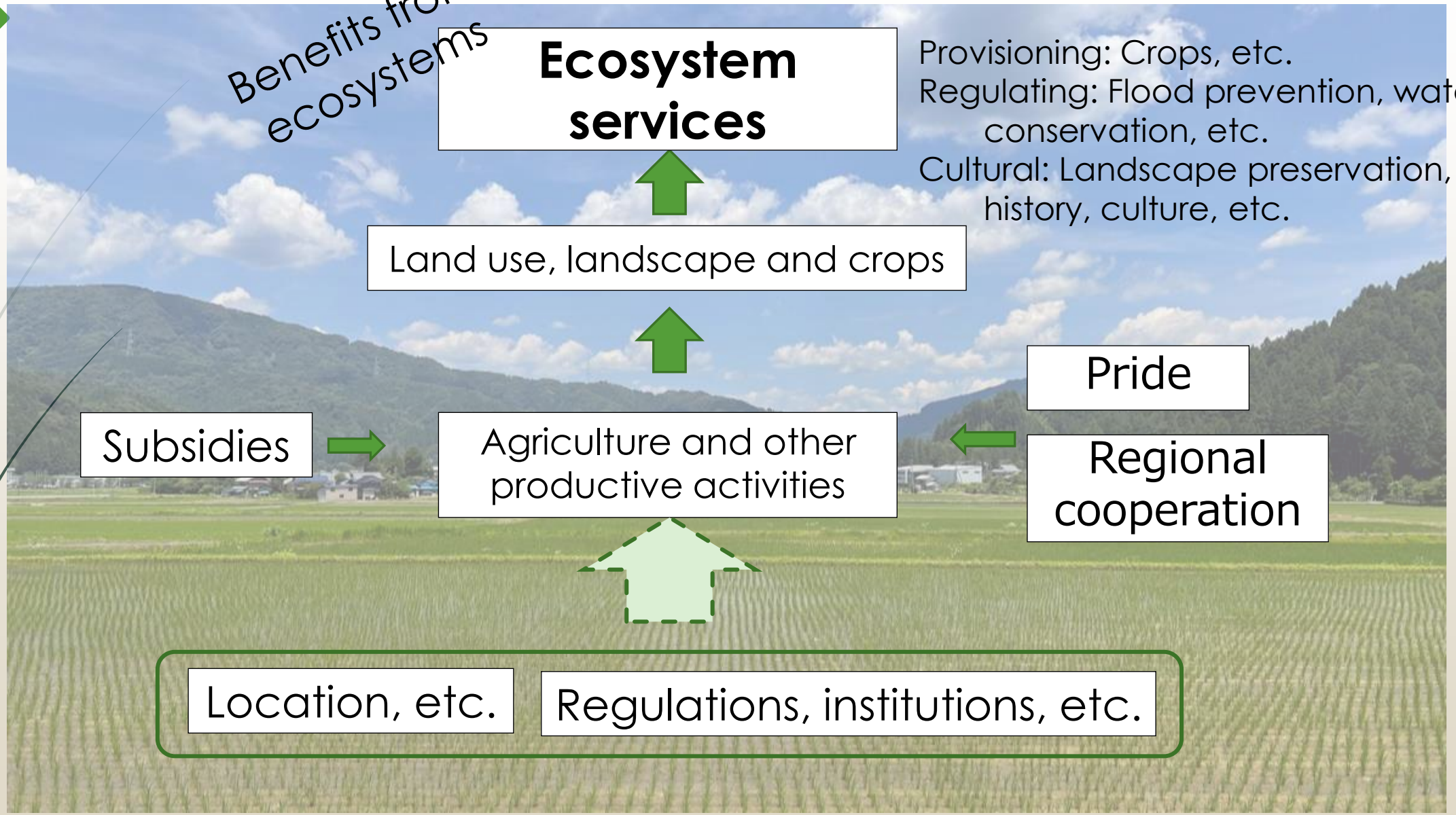
1. Introduction
2. Study area
3. Initiatives of Agricultural Public Corporations
4. Assessment by Ecosystem Services
5. Conclusion

Illustration: Hikaru Hayashi

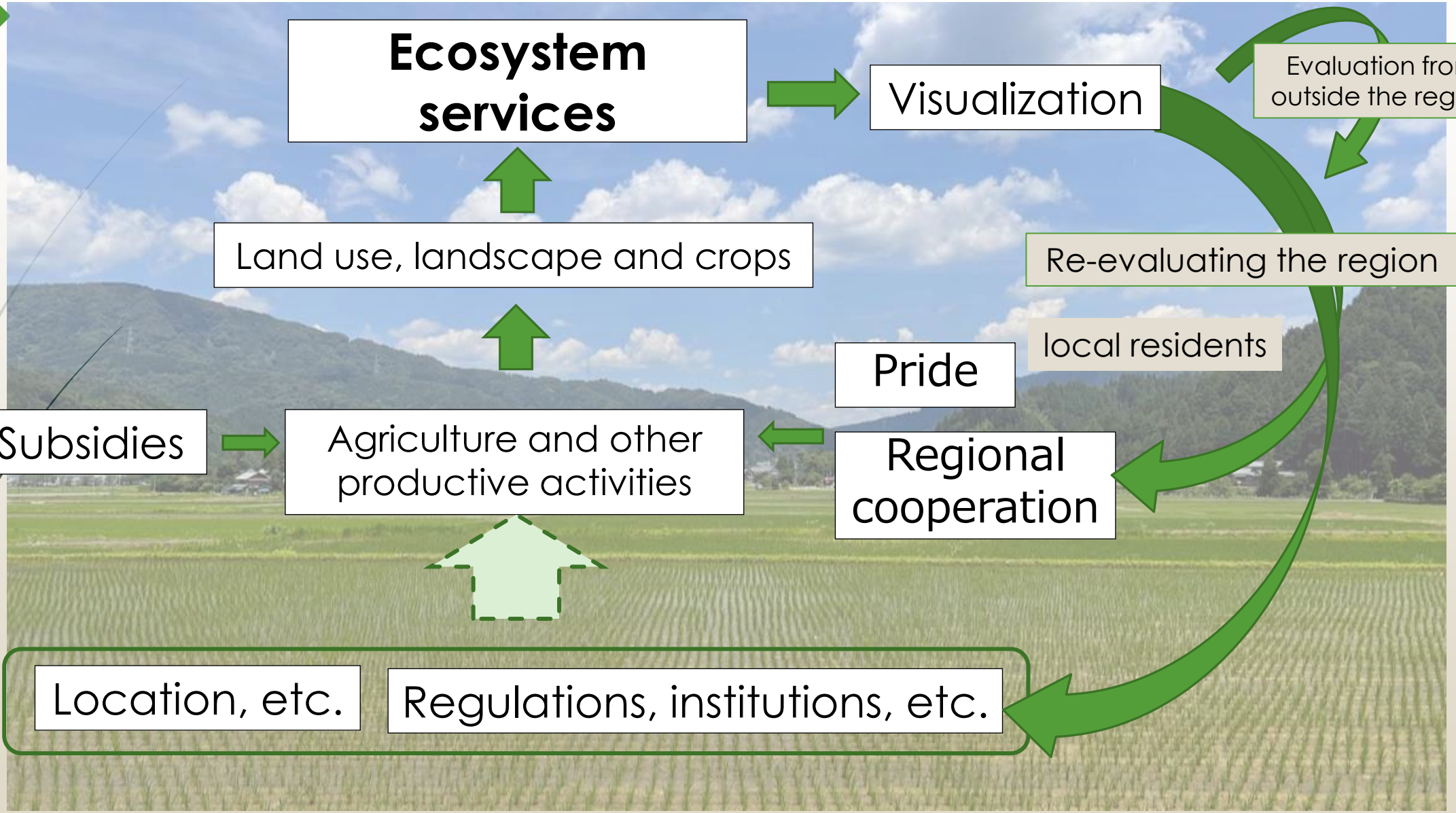
Introduction

Depopulation and aging of producers -> Productivity enhancement
Climate change -> Food systems in harmony with the environment





Source: Betwell et al.(2002) and our interview survey



Source: Betwell et al.(2002) and our interview survey

It is important to promote environmentally friendly agricultural production activities and to have a correct understanding of the benefits that can be obtained through these activities, as well as to make decisions and build consensus.

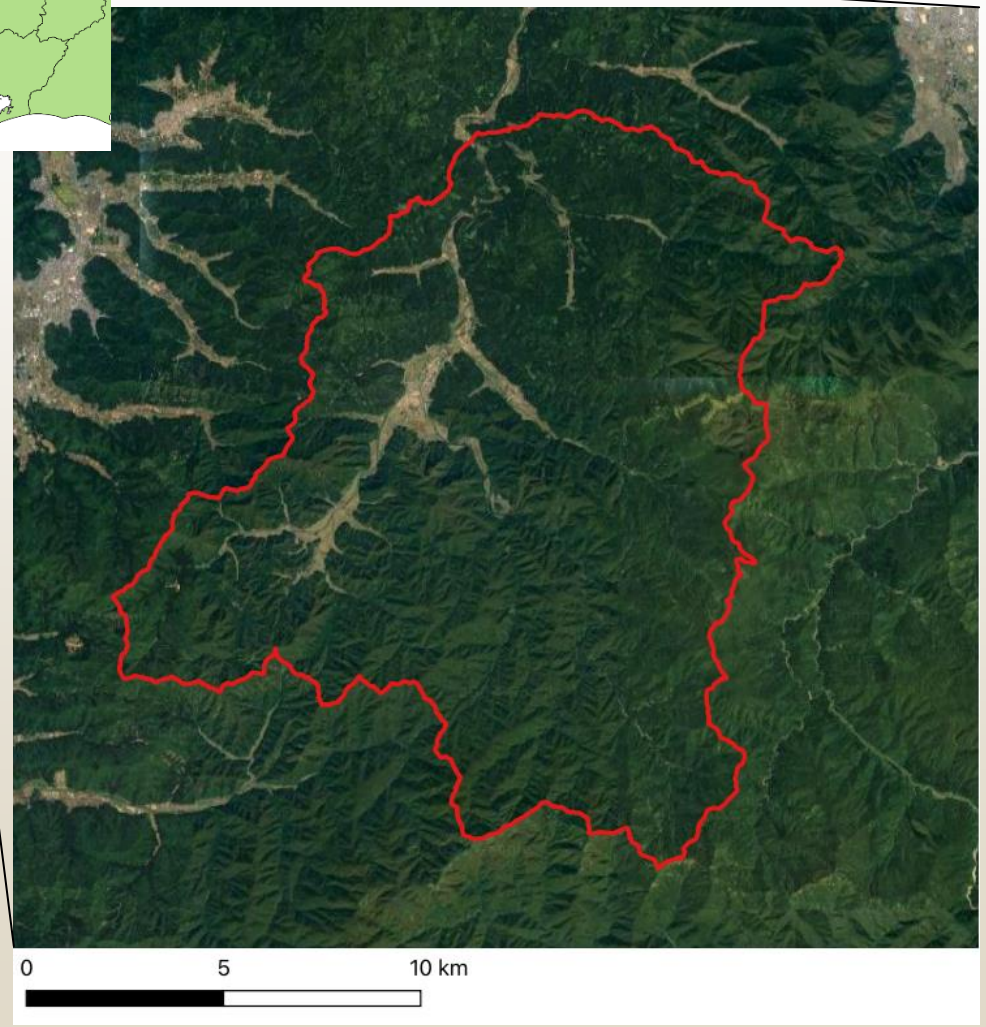
1. Environmentally friendly agriculture in Ikeda Town, Fukui Prefecture, Japan.

   A case of a town promoting environmentally friendly agriculture.
   It also circulates resources within the region.

2. Comprehensive Assessment Framework by Ecosystem Services

   Comprehensive visualization of ecosystem services received from agricultural lands. In particular, mapping of cultural services.

Study area: Ikeda Town



Total area	19,465 ha
Forest	17,853 ha (forest cover 91.7%)
Farmland	601 ha (of which paddy fields 500 ha)
Population	2,486 (921 households)
Percentage over 65 years	44.8%
Number of farm households	233 (of which 125 are agricultural management entities)
Agricultural production	490 million yen (of which rice 300 million yen)
Timber sales	47 million yen

Source: Ikeda town (2021)

Source: author using google maps.

Local resource-linked circular agriculture

Yuuki-Genki-Shojiki Agriculture
Life-friendly rice farming, etc.

Production

Sales

Ikeda Town Market '*Coppoi-ya*' in supermarkets in Fukui City.
"*Kotte Kote Ikeda*" in Ikeda town, etc.

Collection

Collection of food scraps from the town by a NPO (town residents)

Soil preparation

Production of manure "*Dokonjo*" at the Agri-Power Up Center

Trends in the amount of manure produced at the Agri-Power Up Center (unit: tons)

- 50% of the fields in Ikeda town where environmentally friendly agriculture is practiced use manure produced in the town.
- In addition to the manure produced at the Agri-Power Up Center, manure is also produced in other areas of the town.
- Most of the manure is used in the fall (200 tons from the Aguri Power Up Center and 600 tons from other areas in the town).
- However, the number of cattle has been decreasing in recent years and there are concerns about a decrease in the amount of cattle manure.

	2019	2020	2021	2022	2023
Cattle manure	356.6	302.8	354.9	318.1	338.7
Rice husks	0.1	0.0	2.0	0.0	0.0
Back compost	2.3	22.1	19.1	0.0	4.0
Residues from households	65.5	60.4	57.7	54.8	47.3
Restaurant Residue	6.2	4.2	1.2	0.1	0.6
Rice bran	3.0	4.3	3.0	3.0	3.3
Total	433.7	393.8	437.8	375.9	393.8

Source: Interview with Ikeda Town Agricultural Public Corporation

Environmentally Friendly Agriculture in Ikeda Town

Yuuki-Genki-Shojiki Agriculture

- The goal is to reduce the use of chemical fertilizers and pesticides as much as possible (field crop).
- Started in 2000 and certified according to Ikeda Town's own cultivation standards.
- The products are sold at the Ikeda Town Market "Coppoi-ya" located in a supermarket in Fukui City.
- 130 producers, and the number of production plots is 345 (in 2023).

Life-friendly rice farming

- The goal is to reduce the use of chemical fertilizers and pesticides as much as possible in rice farming.
- Started in 2007 and certified according to Ikeda Town's own cultivation standards.
- Direct sales at "Kotte Kote Ikeda" and "Coppoi-ya", as well as through the Internet.
- 102 producers, 186.1ha of certified area (FY2023)

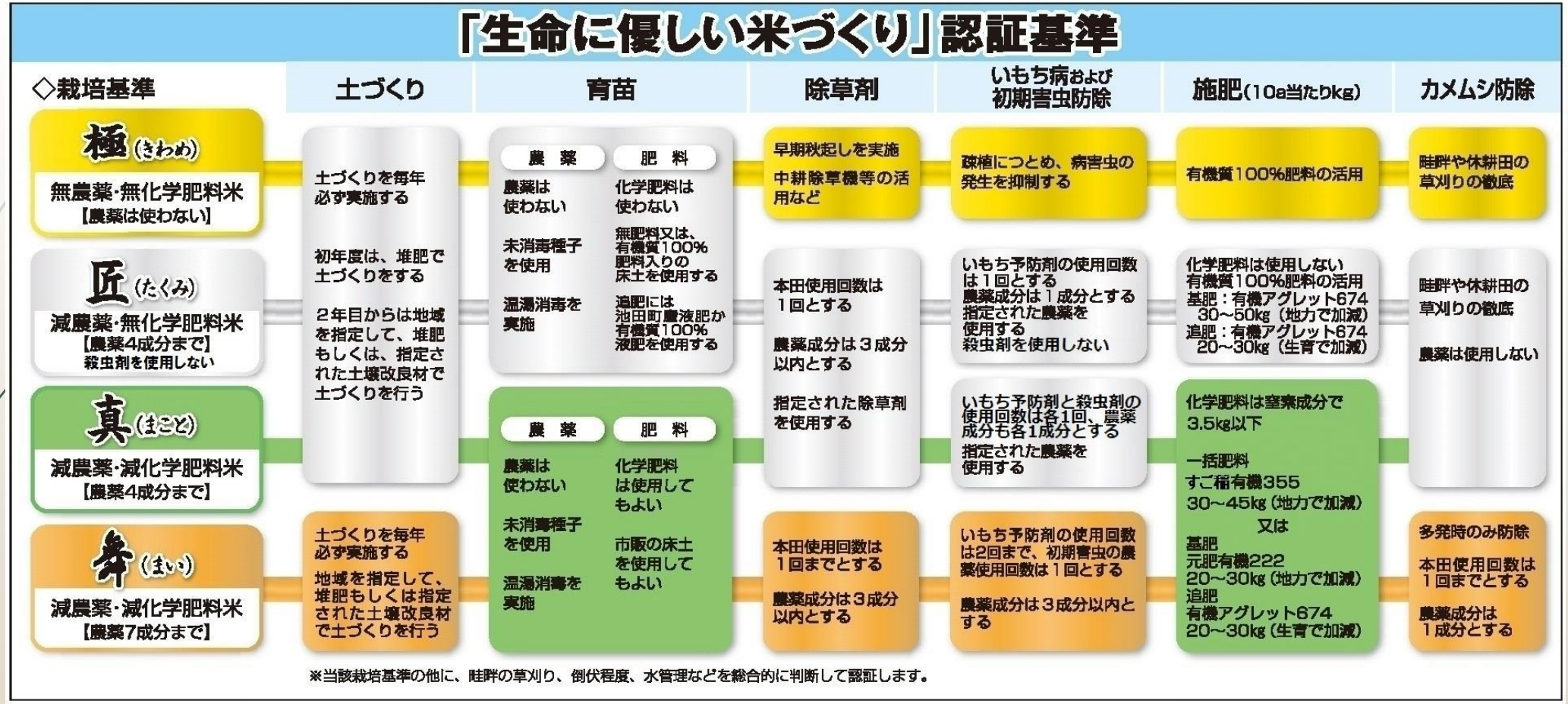
Source: Interview with Ikeda Town Agricultural Public Corporation

Source: Ikeda Toqn website
(https://www.town.ikeda.fukui.jp/kurashi/nougyou/1013/p001403_d/fil/saibaigoyomi.pdf)

Certification Procedures
- Production Plans.
- Cultivation records.
- Installation of signage in the field.
- Biannual inspection.

As well as the application of organic fertilizers:
- Water Quality Survey.
- Survey of living creatures.
- Mowing not only in the field.

Emphasizes consideration not only for farmland, but also for the surrounding creatures and landscape.

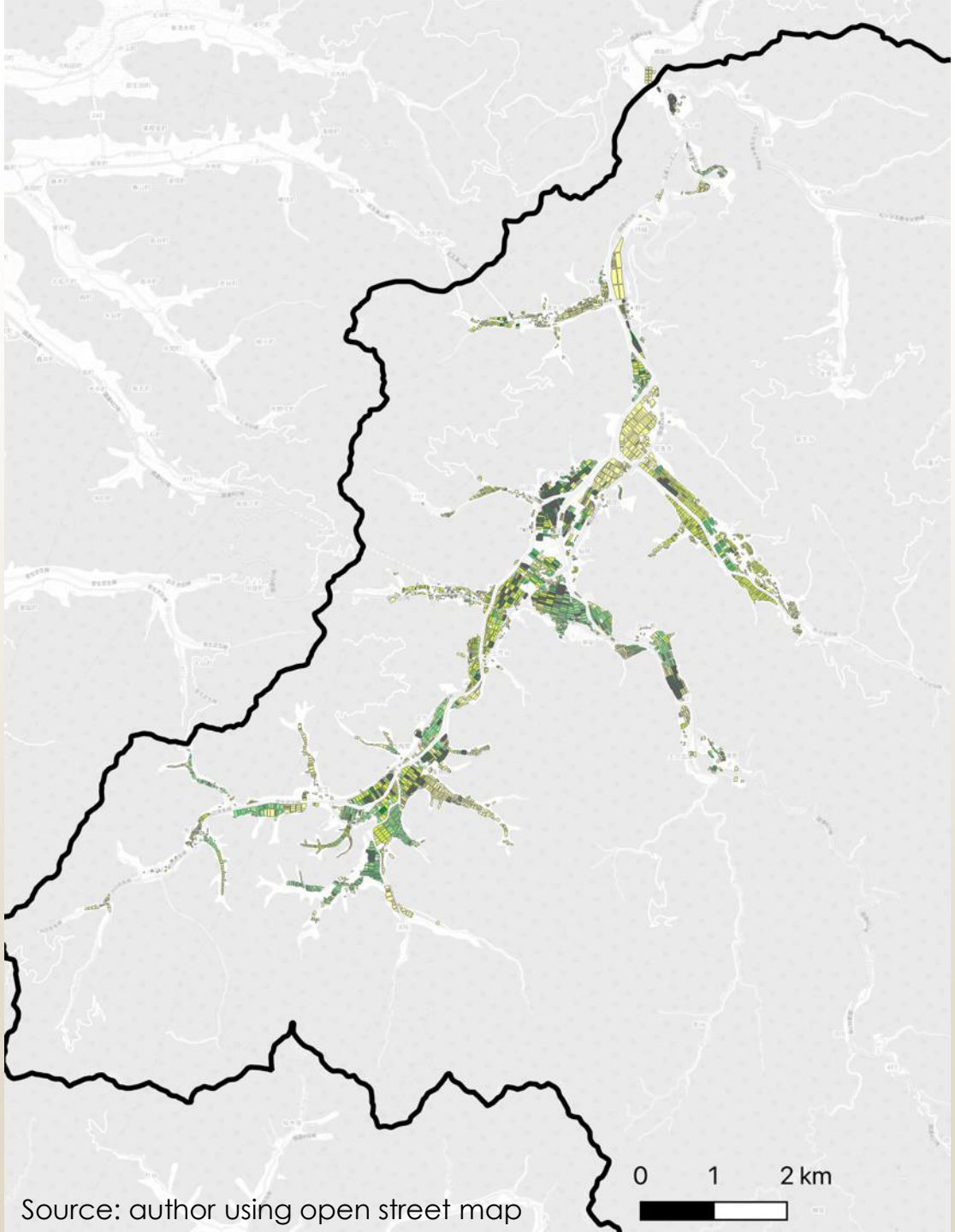


Source: Ikeda Toqn website
（https://www.town.ikeda.fukui.jp/kurashi/nougyou/1013/p001403_d/fil/saibaigoyomi.pdf）

Status of life-friendly rice farming (acreage and number of producers)

	Pesticide usage, compared to conventional cultivation	Chemical fertilizer usage, compared to co nventional cultivation	2022		2023		2024	
Kiwame	Disused	Disused	1.6 ha	3 pers.	2.5 ha	4 pers.	1.5 ha	4 pers.
Takumi	80% reduction	Disused	38.4 ha	22 pers.	43.4 ha	20 pers.	40.9 ha	19 pers.
Makoto	80% reduction	More than 50% reduction	31.9 ha	14 pers.	27.7 ha	13 pers.	33.0 ha	14 pers.
Mai	65% reduction	More than 50% reduction	91.4 ha	64 pers.	112.4 ha	65 pers.	96.7 ha	62 pers.
Total acreage			163.3 ha	103 pers.	186.0 ha	102 pers.	172.1 ha	99 pers.
Percentage of arable paddy fields in the town			39.9 %		45.5 %		42.1 %	
Percentage of area planted to staple rice			61.4 %		69.3 %		64.2 %	

Source: Ikeda Tawn website and interview with Ikeda Town Agricultural Public Corporation
Note: Chemical fertilizer is calculated by nitrogen content, and the chemical nitrogen content should be less than 3.5 kg/10a.Note: The area of arable paddy fields in the town is assumed to be 409 ha.



Source: author using open street map

Environmentally friendly agriculture is being practiced for:

- Approximately 40% of the town's paddy fields
- Large area of the region

- *Kiwame*
- *Takumi*
- *Makoto*
- *Mai*
- Conventional farming
- Others

Summary

Region-wide circulating agriculture involving the town's residents
About **40% of the paddy fields** in the town are used for environmentally friendly agriculture.

Issues

- If one of the elements of the circulation stops, everything stops.
- As producers are aging, the circle of circulation is becoming smaller and smaller.
- Need to motivate producers.
- Young energy is needed.

Comprehensive Assessment Framework by Ecosystem Services

Agricultural Production Activities → How do people benefit?

Collaborative research group led by Tokyo University of Agriculture and Technology
(Provisioning and Regulating services)

PRIMAFF
Social Science Approaches
(Cultural services)

Visualization of ecosystem services

Collaborative research group

Water quality, water source cultivation, soil physicochemical properties, soil microorganisms, nutrients

PRIMAFF

Landscape, biodiversity, food culture, recreation

Relationship between agricultural production activities and rural landscapes

Farmer

Location

Environmental and soil conditions

Support program

Agricultural Production, Land Use

Cultural services

- Preservation of natural landscapes
- Recreation and tourism opportunities
- Inspiration for culture, art and design
- Mystical experiences
- Knowledge of science and education

Note: Referred to TEEB classification

Mapping is used to analyze where people perceive cultural services in the region.

Survey overview

Date: March 2024

Location: Ikeda Town, Fukui Prefecture

Investigators:

- Participants in the Ikeda Town Sports Festival
- Ikeda Town Elementary School (5th and 6th year students), Junior High School (1st, 2nd and 3rd year students)
- Others (visitors to *Kotte Kote Ikeda* and coffee shops)

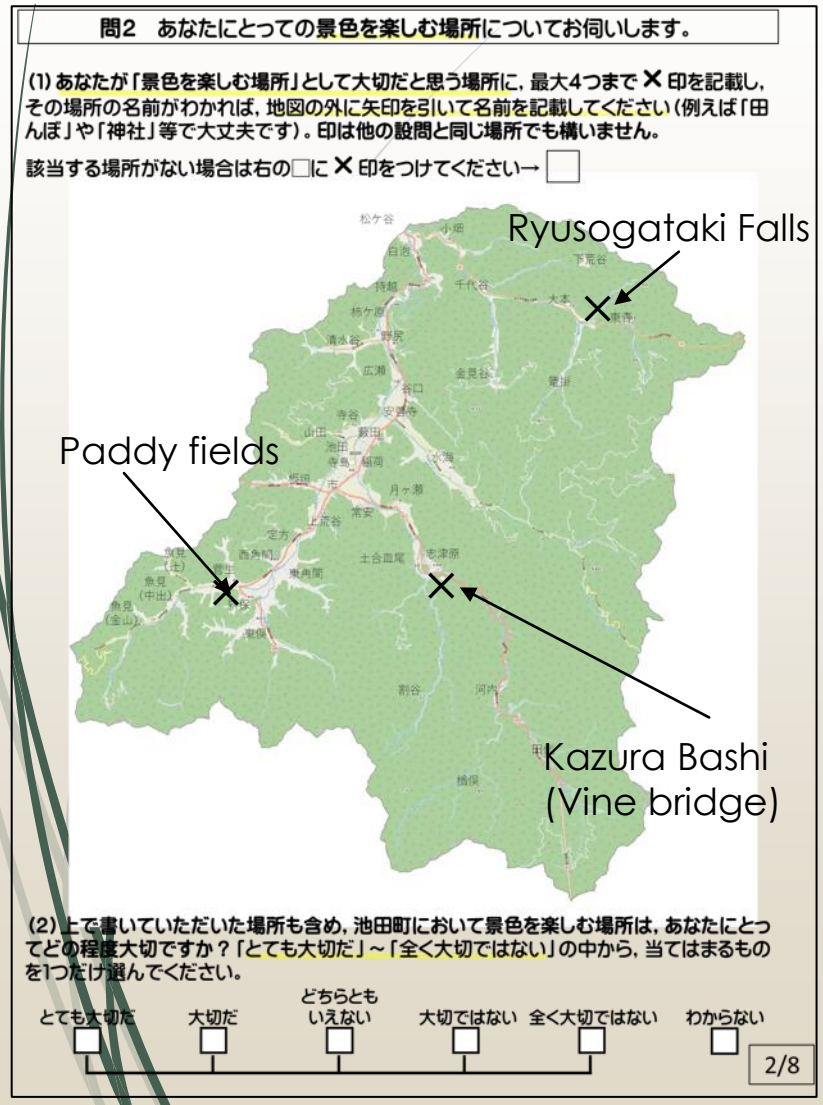
Method:

Mapping the questionnaire survey results using maps

Items covered:

Landscape, recreation, biodiversity, food supply, economic value, history and culture

Questionnaire Overview



Respondents: 111 persons (of which valid responses was 99)

Sex	Inside the town	Outside of town
Male	46	6
Female	40	6
No Answer	1	

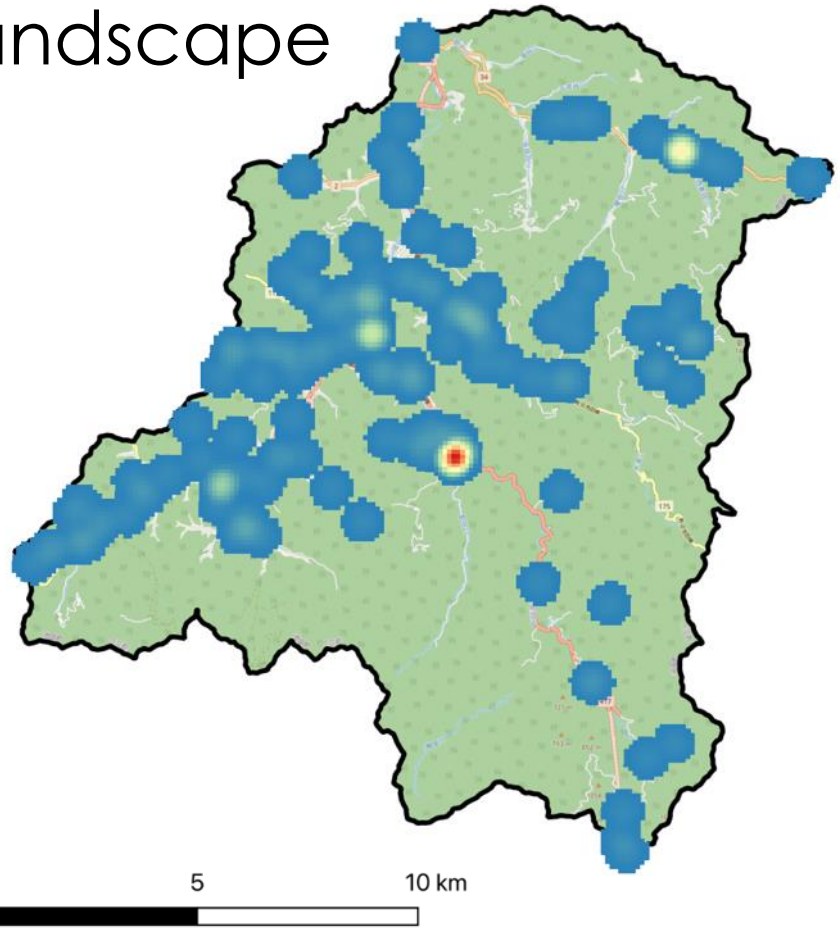
Age	Inside	Outside
10-19	49	0
20-39	8	4
40-59	19	3
60-79	8	5
Over 80	2	0
No Answer	1	

Occupation	Inside	Outside
Agriculture and forestry industry relations	6	0
Company employee, etc.	26	10
Others	3	1
High School/University students	2	1
Junior high school	33	0
Elementary school	16	0
No Answer	1	0

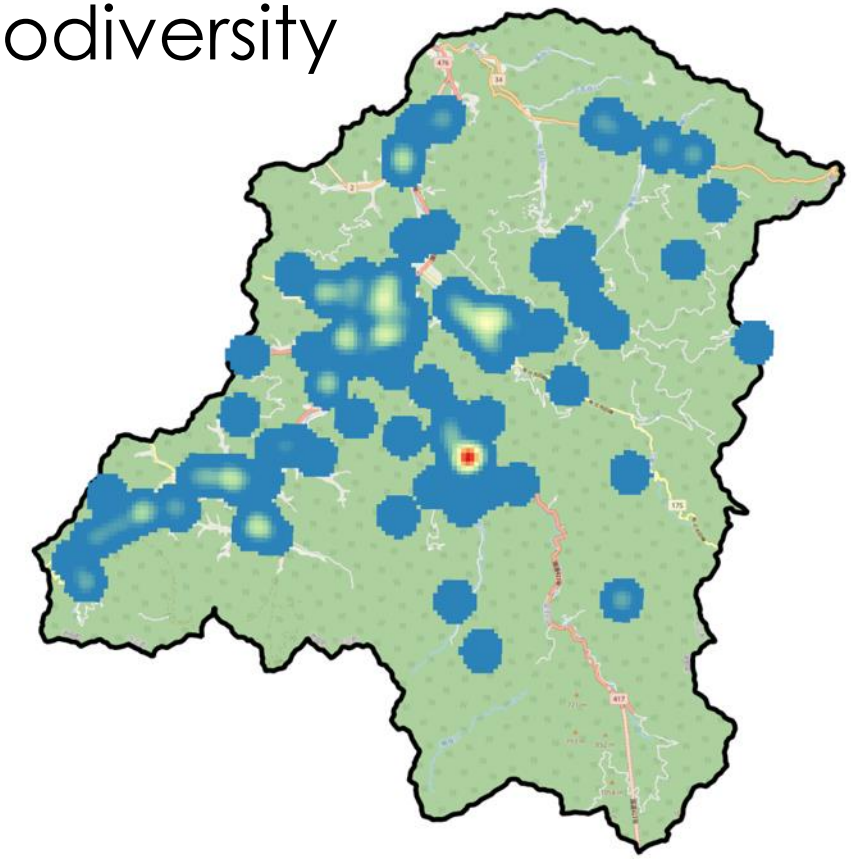
In this study, the results of (1) are mainly used.
Heat maps were created using "x" to locations.
Names of places were tabulated and frequency of occurrence was examined for specific places.

Mapping of results

Landscape



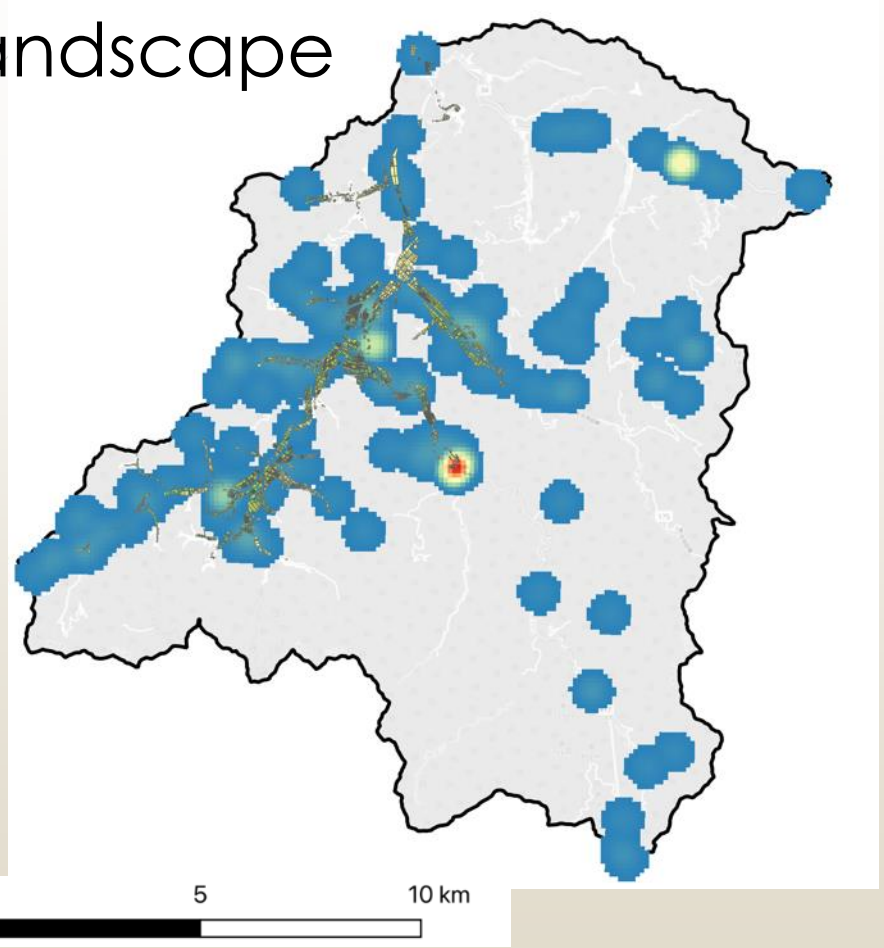
Biodiversity



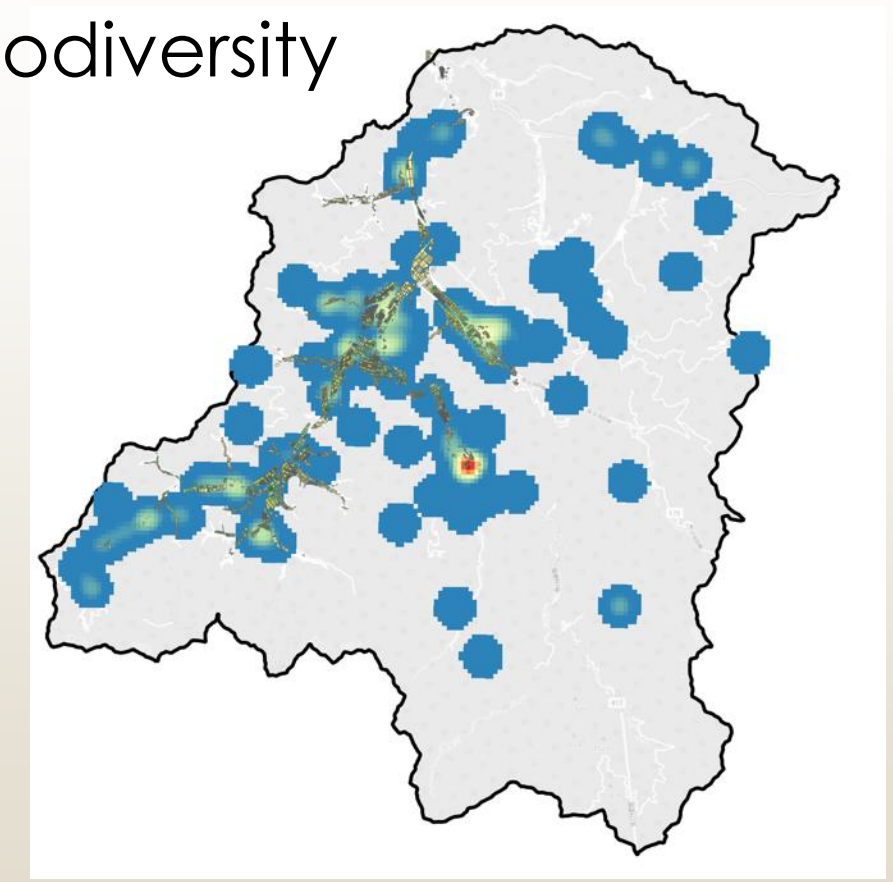
Many respondents chose waterfalls, shrines, and the Kazura Bridge.Many respondents also chose mountains, rivers, and fields, which were dispersed throughout the region.

Mapping of results

Landscape



Biodiversity



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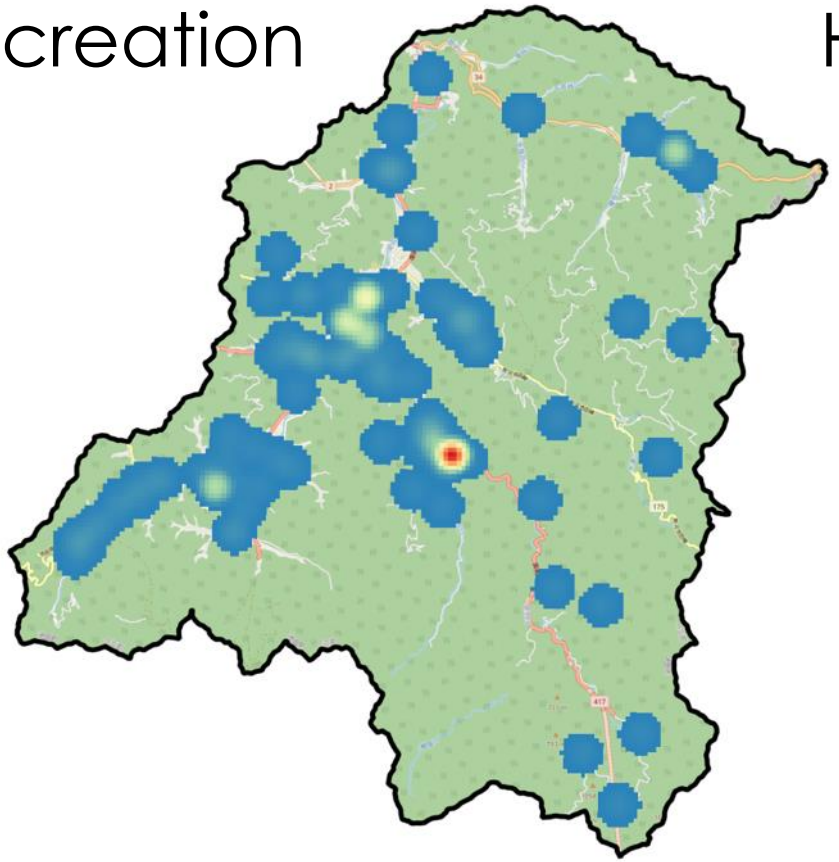
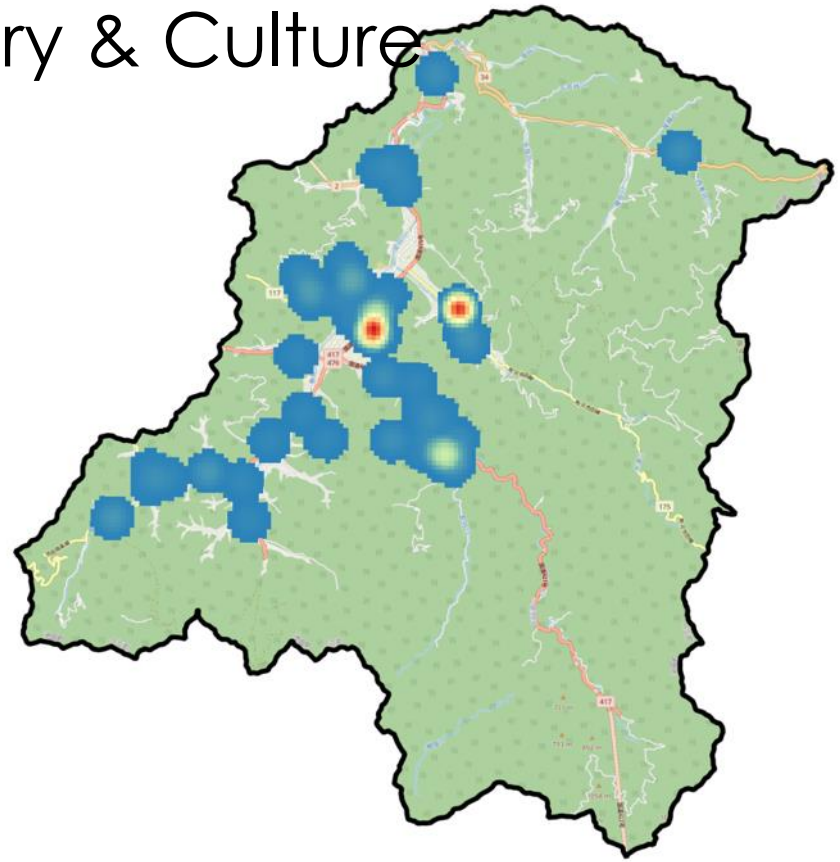
Mapping of results

Recreation



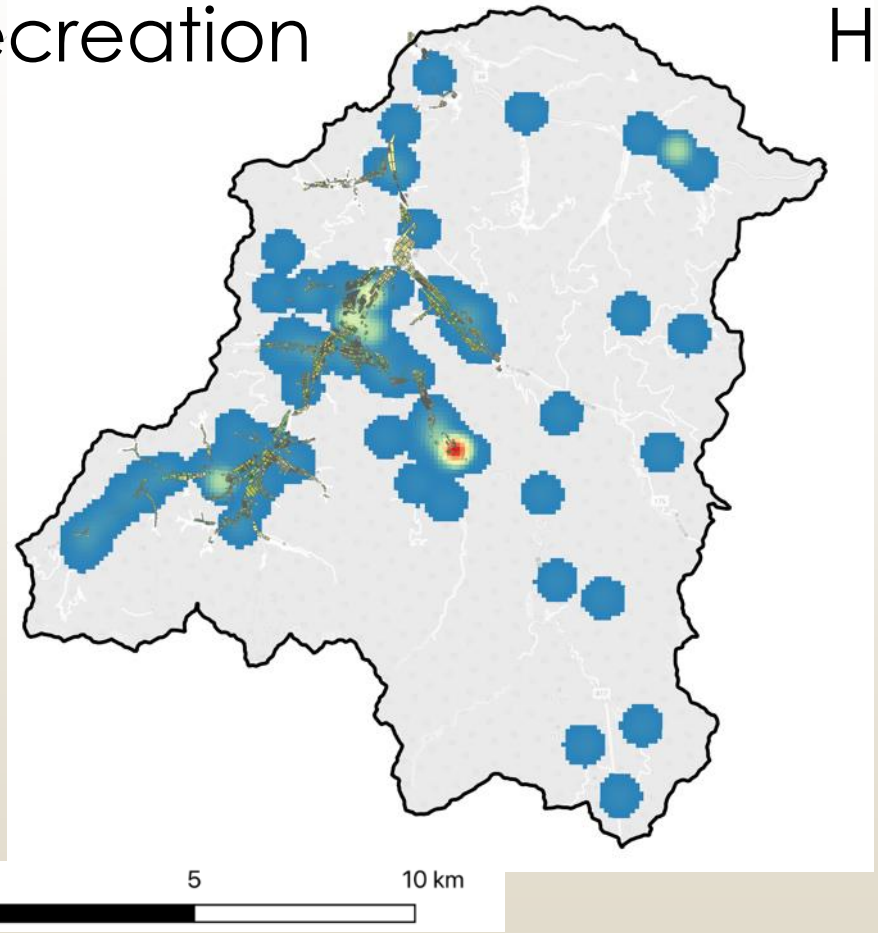
History & Culture



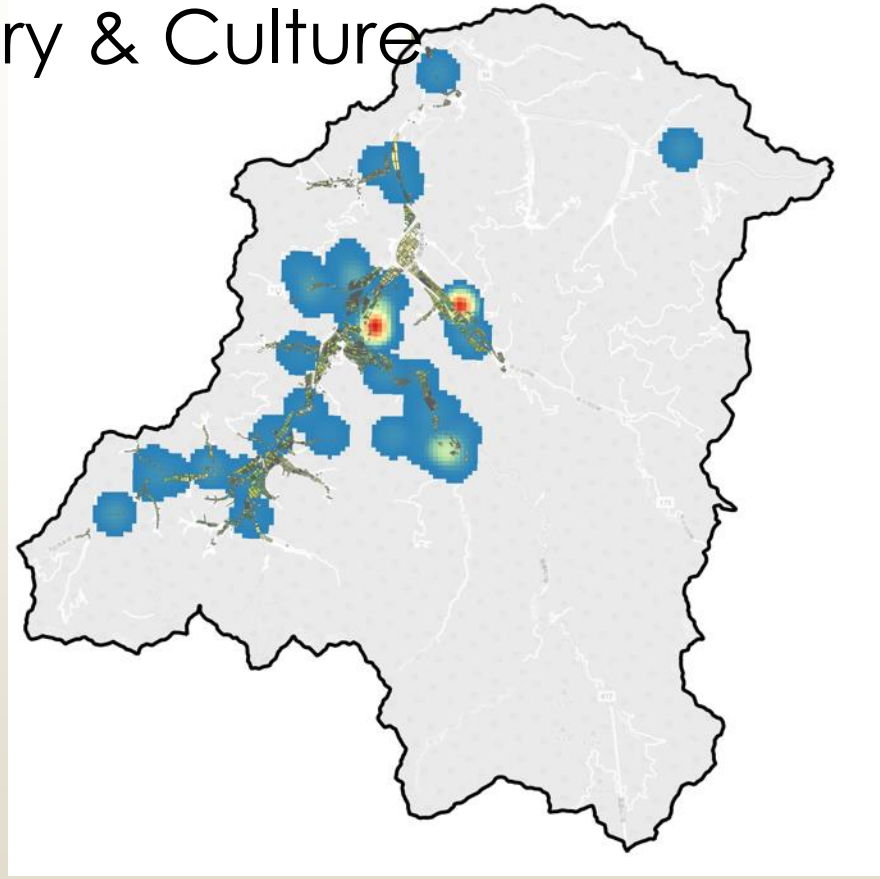
More responses were given for specific locations, such as shrines and recreational facilities.
As for recreation, respondents were also found to be in mountains and rivers.

Mapping of results

Recreation



History & Culture



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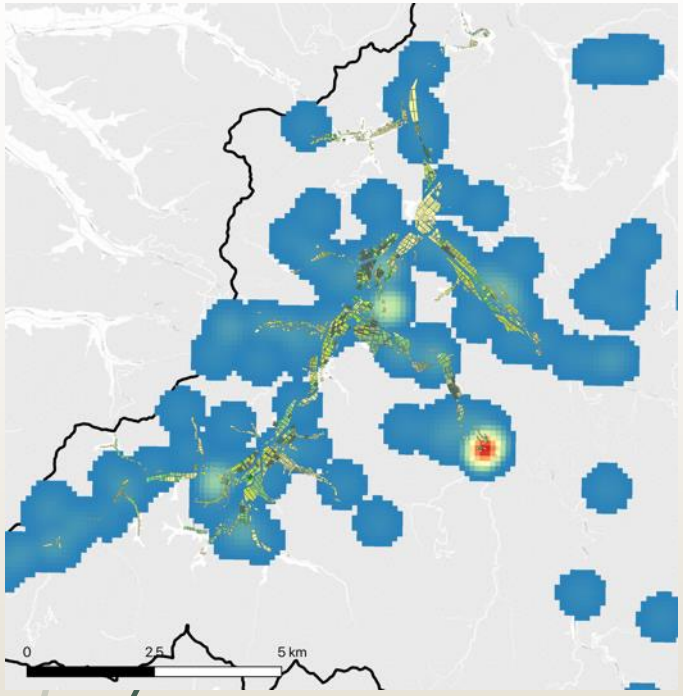
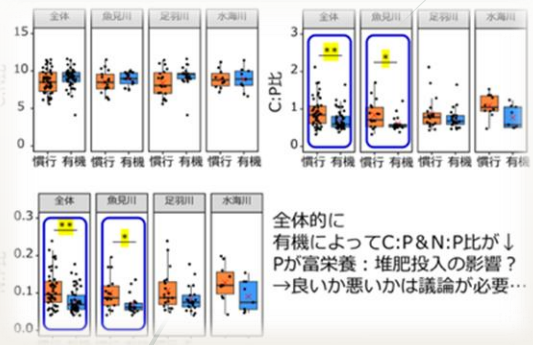


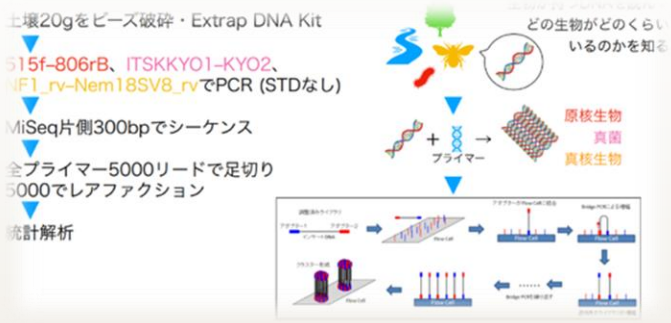
- There are many locations where the heat map and the distribution of agricultural land overlap.
- No statistically significant relationship was found.
- In the interview survey, many respondents answered that the landscape with paddy fields is one of the good points of Ikeda Town.

- People inside and outside the region find various values and benefit from cultural services in and around farmland.
- The preservation of farmlands and agricultural production activities leads to the maintenance and enhancement of cultural services.

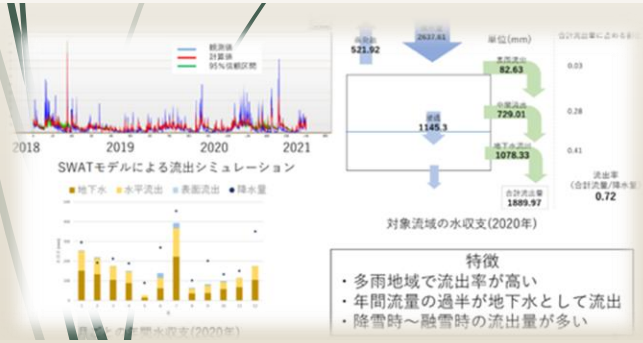
Comprehensive evaluation in conjunction with results of collaborative groups



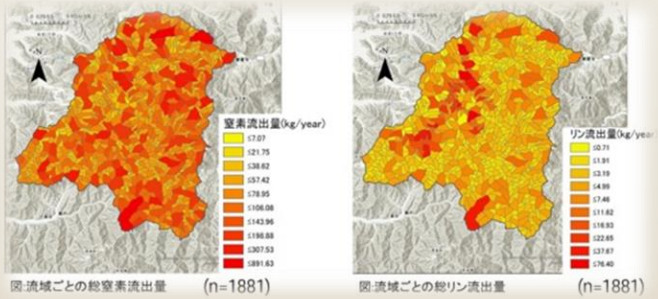
Soil survey of farmlands: Potential for increased accumulation of P



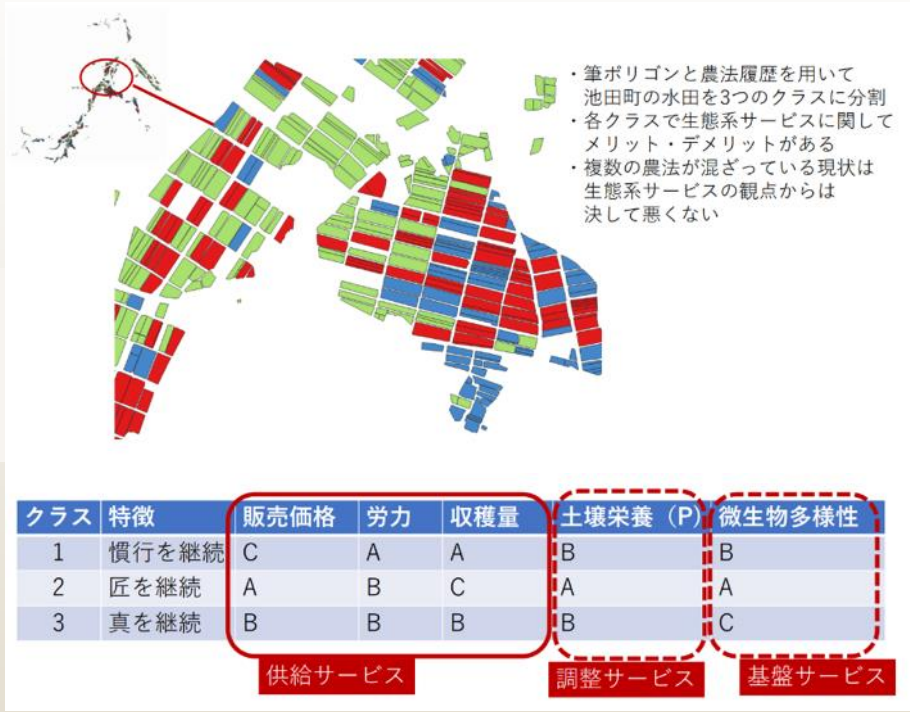
Microbial community structure of farmland: Differences by farming method are small.



River flow and water quality surveys: stable supply of clean water



Simulation of nutrient runoff: P and N runoff may be higher than expected in environmentally friendly agriculture.



クラス	特徴	販売価格	労力	収穫量	土壌栄養（P）	微生物多様性
1	慣行を継続	C	A	A	B	B
2	匠を継続	A	B	C	A	A
3	真を継続	B	B	B	B	C

供給サービス　調整サービス　基盤サービス

Evaluation of provisioning and regulating services: regulating services tend to increase with the continuation of environmentally friendly agriculture.

Source: Excerpts from unpublished documents of the collaborative research group's research results.

Provisioning services: provision of environmentally friendly crops

Regulating services: water quantity control, maintenance of land fertility

Cultural services: landscape preservation, recreation

- Various ecosystem services are received from farmlands and the surrounding environment as a result of agricultural production activities.
- Visualization through mapping
- Analysis of individual services could be done, but further study is needed for a comprehensive framework.

Conclusion

- Environmentally friendly agriculture is being implemented in the region, and environmental considerations are being promoted not only in farmlands but also in the entire region.
- Various ecosystem services are provided, such as environmentally friendly crops, clean water, water source cultivation, and beautiful landscapes.
- However, the relationship between ecosystem services and environmentally friendly agriculture, the relationship between ecosystem services and non-farmland ecosystems such as forests, and the synergies and trade-offs among services have not been analyzed.
- It is also necessary to examine how people feel about the services they are receiving and how to change their behavior.

Thank you for your attention.

Acknowledgments: We would like to thank the Ikeda Town Office, the Ikeda Agricultural Public Corporation, and many other people in Ikeda Town for their cooperation in conducting this study. We also thank photographer Mr. Shinji Abe for providing photographs taken in Ikeda Town, and Mr. Hikaru Hayashi for designing "Onigiri-kun" as the mascot of the study. We would like to express our gratitude to them.