

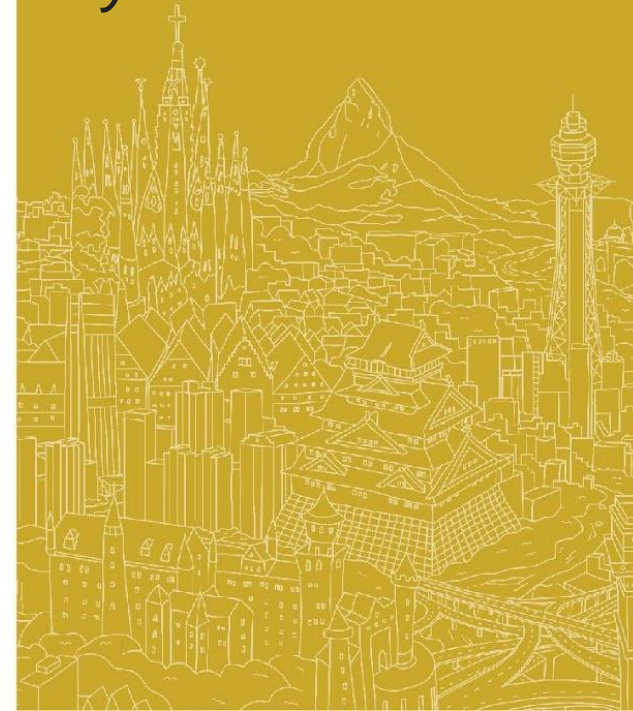
The Challenges of Transdisciplinary Education and Research: What Can Japanese Universities Learn from the European Experience
Graduate School of Advanced Integrated Studies in Human Survivability, Kyoto University. November 6, 2023

Transdisciplinary education and research in College of Sustainable System Sciences, Osaka Metropolitan University

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Takahiro Endo

Professor, College of Sustainable System Sciences,
Osaka Metropolitan University



1. Self-introduction
2. Education program in College of Sustainable System Sciences
3. Experience of problem-based learning program
4. Lessons learned
5. Conclusion

Takahiro Endo

Professor, College of Sustainable System Sciences,
Osaka Metropolitan University



1. Background: Political Science
2. Research Institute for Humanity and Nature, Kyoto prefecture, Japan (2004–2010)
University of Tsukuba, Ibaraki prefecture, Japan (2010–2012)
Osaka Prefecture University, Osaka prefecture (2012–2022)
Osaka Metropolitan University, Osaka prefecture (2022–present)
3. Research topic: Environmental policy, groundwater governance

Osaka Metropolitan University

- Launched in 2022 by merge of Osaka Prefecture University and Osaka City University
- Eleven departments and one college
- 16,000 students



<https://www.facebook.com/OsakaPrefectureUniv/>



<https://www.lit.osaka-cu.ac.jp/> Reserved. 3

College of Sustainable System Sciences

An interdisciplinary and purpose-oriented organization



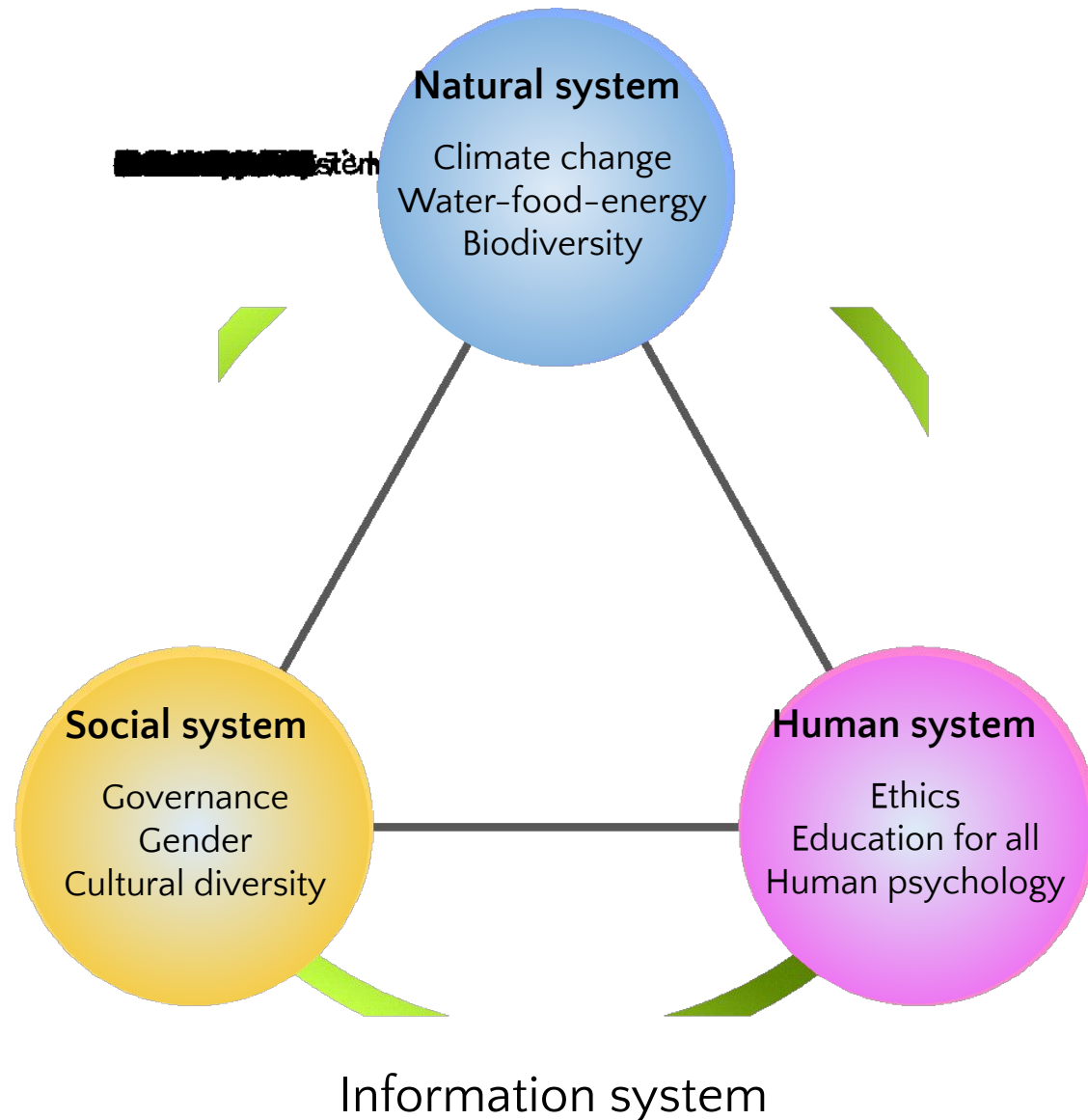
Literature La Economics Business Science

Engineering Agriculture Medicine Life science

Nursing Veterinary medicine

A discipline-oriented organization

The college's educational philosophy



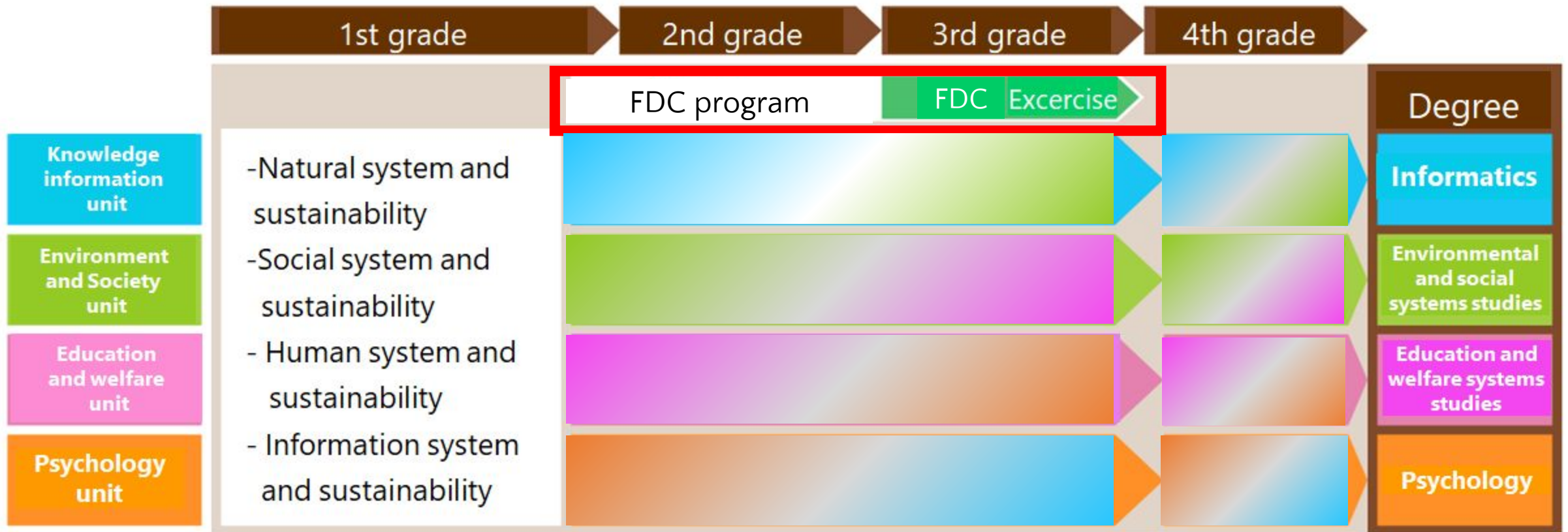
- Transformation to sustainable society
- Four sub-systems
 - natural system
 - social system
 - human system
 - information system
- Developing students with interdisciplinary knowledge

Learning process



Interdisciplinary curriculum that transcends academic boundaries

Future design course



Student in this course is required to join internship provided by external an organization.

Problem-based learning program

- Required subjects for 3rd year students
- A student can enroll in any PBL program regardless of the unit s/he belongs to.

Natural science

Business prediction
Educational information system
Environment restoration
Health care science
Information network
Local environment and information
Science of production system
Service design

Social science

Education for sustainable development
Environment studies
Gender study
Private firms and sustainable society
Regional development
Social research methods
Urban society

Human science

Collaboration study
Cultural representation
Education guarantee
Lifelong learning
Living and playing
Philosophy of co-existence

- Marine engineering, biology and environmental policy
- Research project by team

Research topic by Endo team

Year	Research topics	Content of study
2013-2015	Ecosystem services of local agricultural ponds	GIS, text mining, questionnaire survey
2016	Azumino groundwater governance project	
2017-2018	Analysis of local elementary / junior high school songs by GIS	
2019	Disaster emergency well system in Osaka Prefecture	
2020-2021	Interview about disaster experiences and virtual evacuation training	
2022	Text mining: Changes in groundwater issues in newspaper articles	
2023	Water outage in Wakayama city by an infrastructure accident	

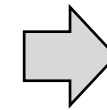
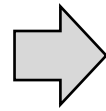


環境省 Ministry of the Environment 名水百選30周年記念 **名水百選選抜総選挙** [本文](#) [お問い合わせ](#) [環境省](#)

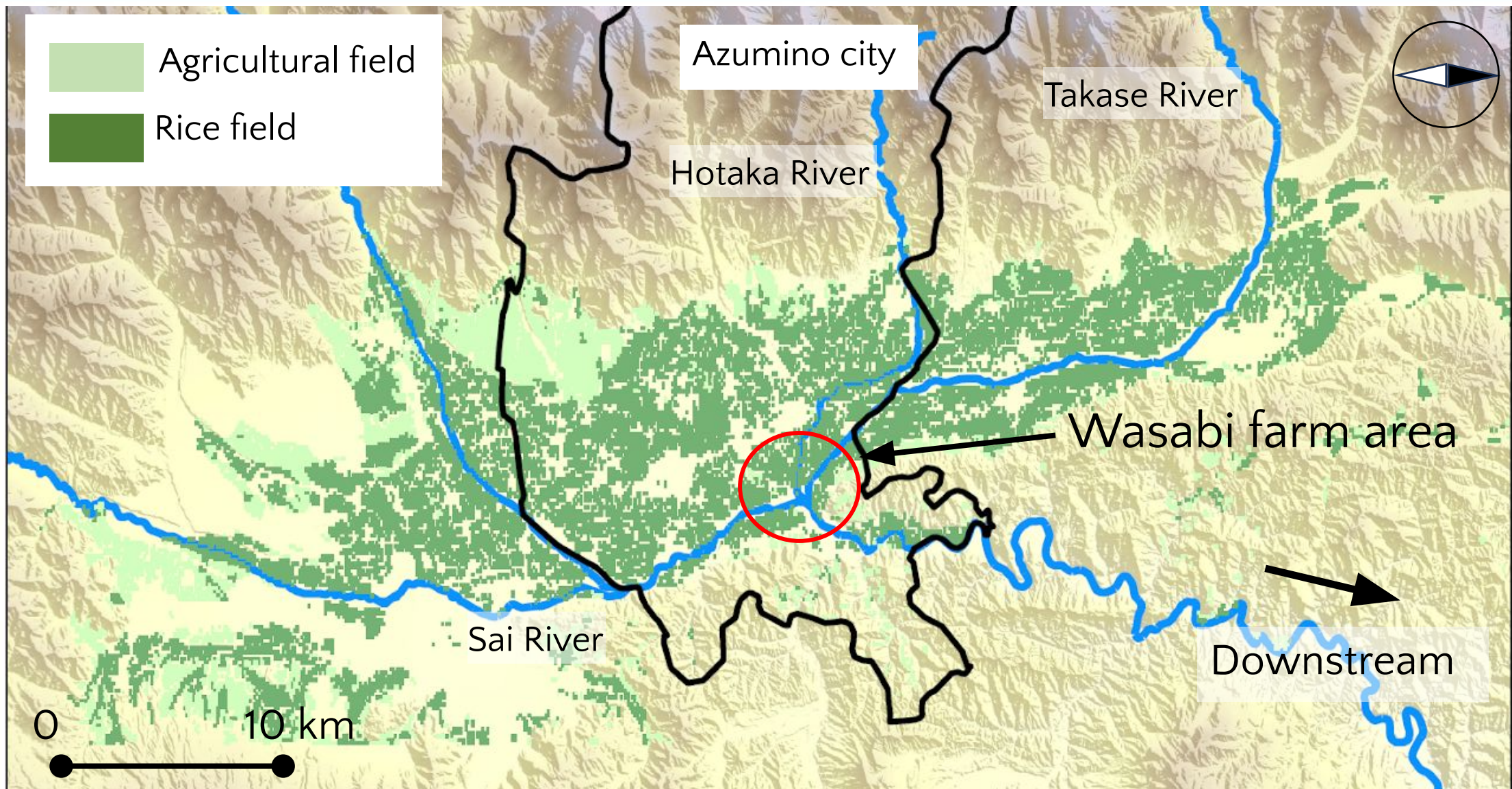
観光地部門	景観部門	秘境部門	おいしさ部門
結果発表			
 観光地 として 素晴らしい名水 部門	 景観 が 素晴らしい名水 部門	 秘境 として 素晴らしい名水 部門	 おいしさ が 素晴らしい名水 部門
			
第1位 安曇野わさび田湧水群 第2位 塩釜の冷泉 第3位 まつもと城下町湧水群 第4位 水前寺江津湖湧水群 第5位 島原湧水群 観光地として素晴らしい名水部門に参加した名水の情報	第1位 安曇野わさび田湧水群 第2位 大杉の清水 第3位 かつらの千年水 第4位 菊池水源 第5位 轟溪流 景観が素晴らしい名水部門に参加した名水の情報	第1位 農川ホタルの里湧水群 第2位 鷹入の滝 第3位 金峰山湧水群 第4位 恵利原の水穴(天の岩戸) 第5位 剣山御神水 秘境として素晴らしい名水部門に参加した名水の情報	第1位 おいしい栗野の水～丹波の雫～ 第2位 わかさ瓜割の水 第3位 大雪旭岳湧水 第4位 月山自然水 第5位 清流 長良川の雫 おいしさが素晴らしい名水

Groundwater problem in Azumino city

- Complaints from local wasabi farmers about decreasing artesian groundwater
- A research showed that groundwater volume decreased by approximately 125 million m³ over the 21 years from 1986 to 2007 (approximately 6 million m³/year).
- Land use change (decrease of rice fields) have considered as the main cause.

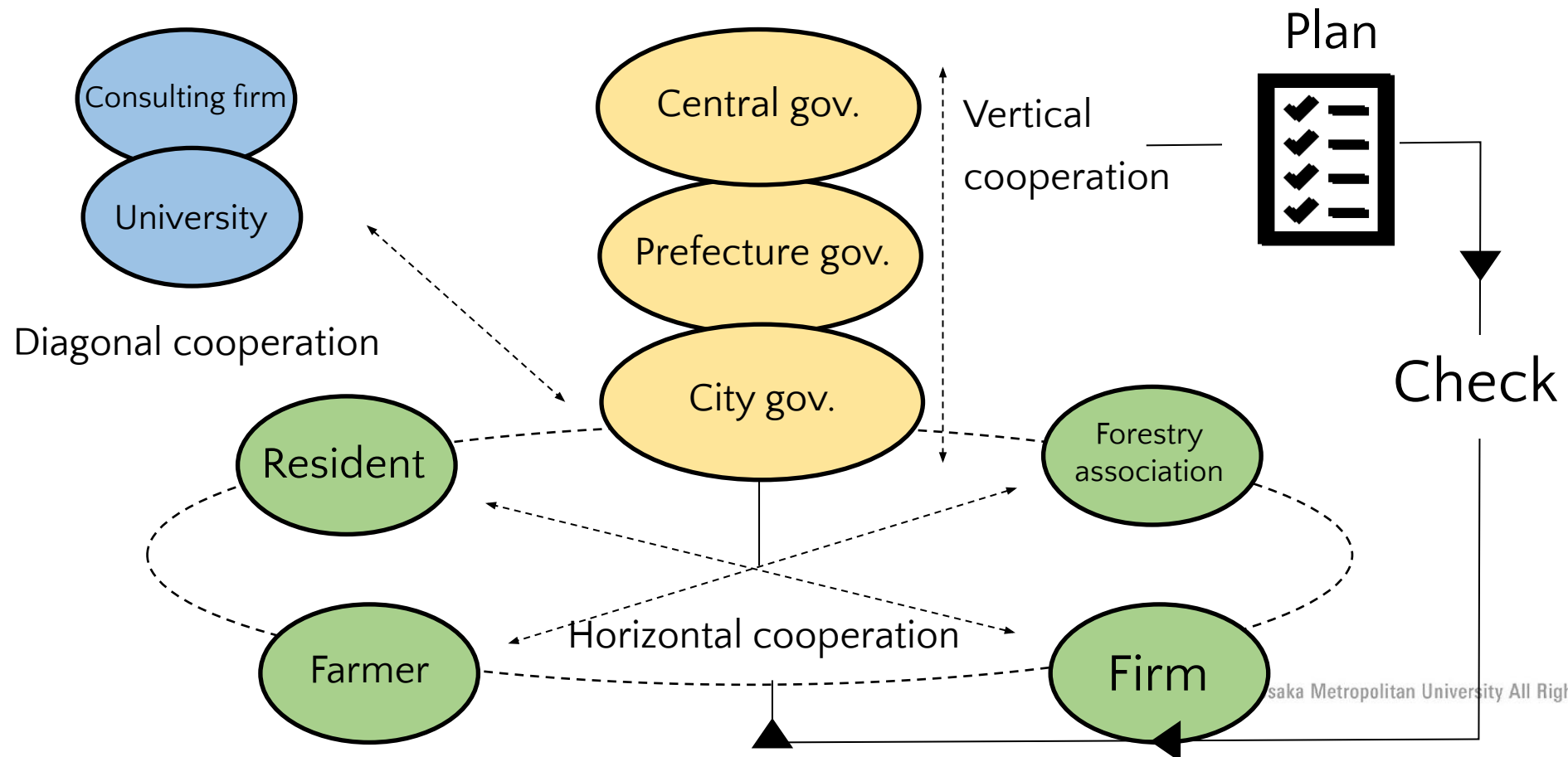


Land use and groundwater resource



Groundwater governance

Overarching framework of groundwater use laws, regulations, and customs, as well as the processes of engaging the public sector, the private sector, and civil society (Megdal et al. 2015)



Groundwater governance in Azumino city

Phase	Participants	Outcome
Foundation phase (2010-2012)	City government, Prefectural government, wasabi farmer, bottled water factory, food factory, aquaculture, irrigation district, consulting firm and researcher etc.	Guidelines for groundwater use and recharge
2016	OPU students in environmental studies	Ideas for sustainable groundwater management
Planning phase (2014-2017)	City government, wasabi farmer, bottled water factory, food factory, aquaculture, irrigation district, consulting firm and researcher etc.	Azumino city's basic plan for water management (2017-2022)
Practice and verification phase (2021-present)	City government, wasabi farmer, bottled water factory, food factory, aquaculture, irrigation district, consulting firm, ordinary citizen and researcher etc.	Revised Azumino city's basic plan for water management (2023-present)

Local stakeholders × city government × consulting firm × researcher → transdisciplinary project

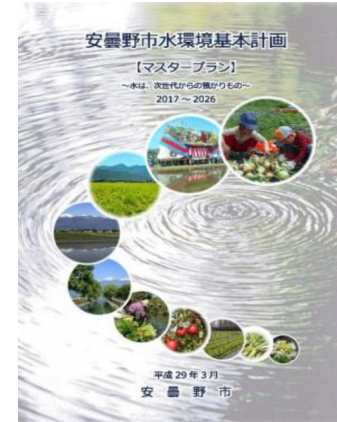
Photographs of learning at site



Ideas from students and the the city's Basic Water Plan

Student proposed 54 ideas.

- 14 ideas on groundwater recharge
ex. [Rain harvesting](#)
- 8 ideas on water conservation
ex. Award system to the best practice
- 7 ideas on water education
ex. Environmental education in cooperation with local farmers
- 22 ideas on social system
ex. public relation in cooperation with local celebrities
- 3 ideas on decision-making body
ex. [Creation of groundwater supporter group](#)



Master plan



Action plan

Six strategies in the plan

1. Groundwater recharge
2. Water conservation
3. Water quality control
4. Education
5. Fund raising
6. Groundwater commission

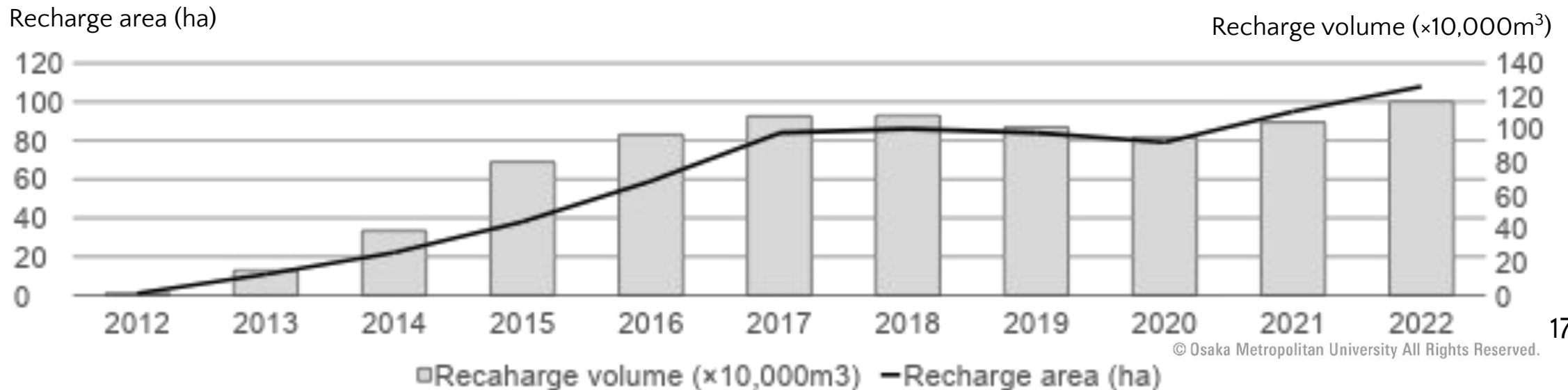
Other transdisciplinary aspects

- Data collection and information sharing
 - Data collection by wasabi farmers
 - Mutual understanding on local groundwater condition



A monitoring well in a wasabi farm

- Groundwater recharge in collaboration with wheat farmers



Lessons learned from Azumino city's experience

- Appropriate collaboration of classroom lecture and field study should be considered.
- Stable funds are necessary to conduct field study continuously.
- Ideas from non-professional people are not always feasible in the short term but may be feasible in the long term.
- How to visualize the effect of groundwater recharge remains to be done.
- Methods of consensus building remains to be investigated.

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Thank you very much.

