Indicator species for agrobiodiversity in rice paddy field: Research and its application to a new eco-labelling scheme in eastern rural Taiwan

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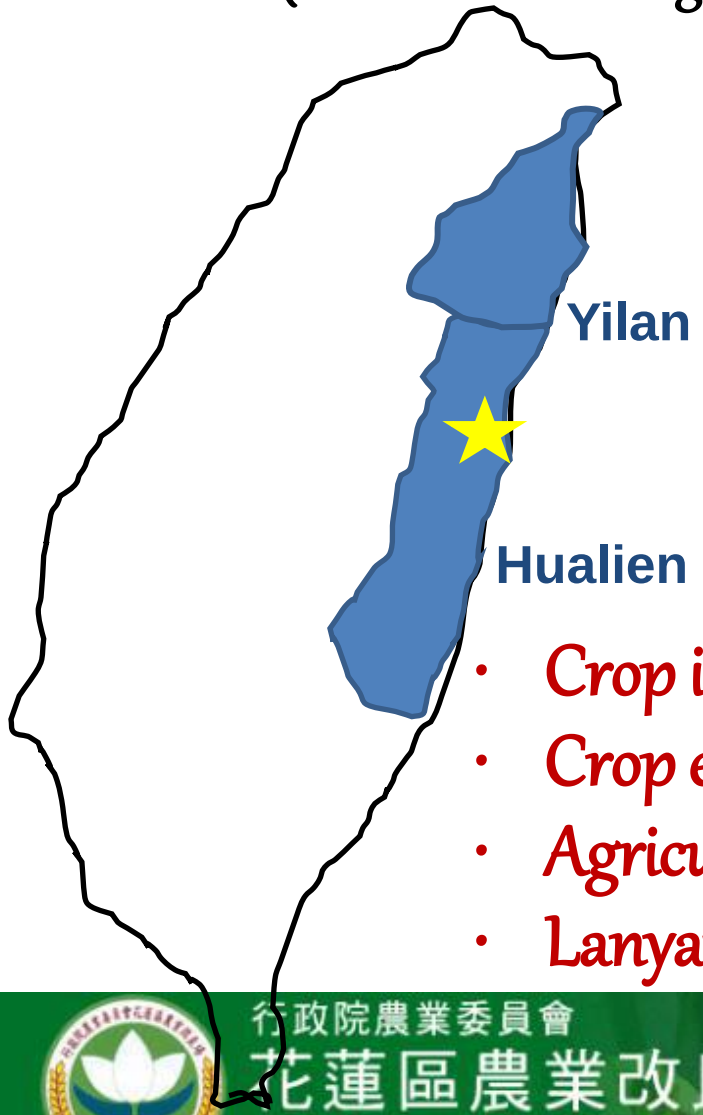
About HDARES

(Hualien District Agricultural Research and Extension Station)



- Crop improvement secion
- Crop environment section
- Agricultural Extention section
- Lanyang Branch Station

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Eco rice paddy field

- **Paddy fields occupy around 150,000 hectares and cover about 19% of the arable land in rural Taiwan.**
- **Artificial wetland as freshwater habitats.**

Ecosystem services & agricultural biodiversity matters

- Pest&Disease-Using diversity allows farmers to limit the spread of pests and diseases.
- Resilience-Managing climate risks with more crop options
- Nutrition&health- A diverse diet is the basis of food pyramids
- Sustainability- Diverse crops and land use sustains a variety of pollinators
- Traditional knowledge- passing on knowledge about local medicinal plants and traditional recipes

- **Organic farming can increase biodiversity in paddy fields and enhance pest prevention and control, pollination and soil development.**
- **Can we rely on some way to judge a farm's biodiversity?**

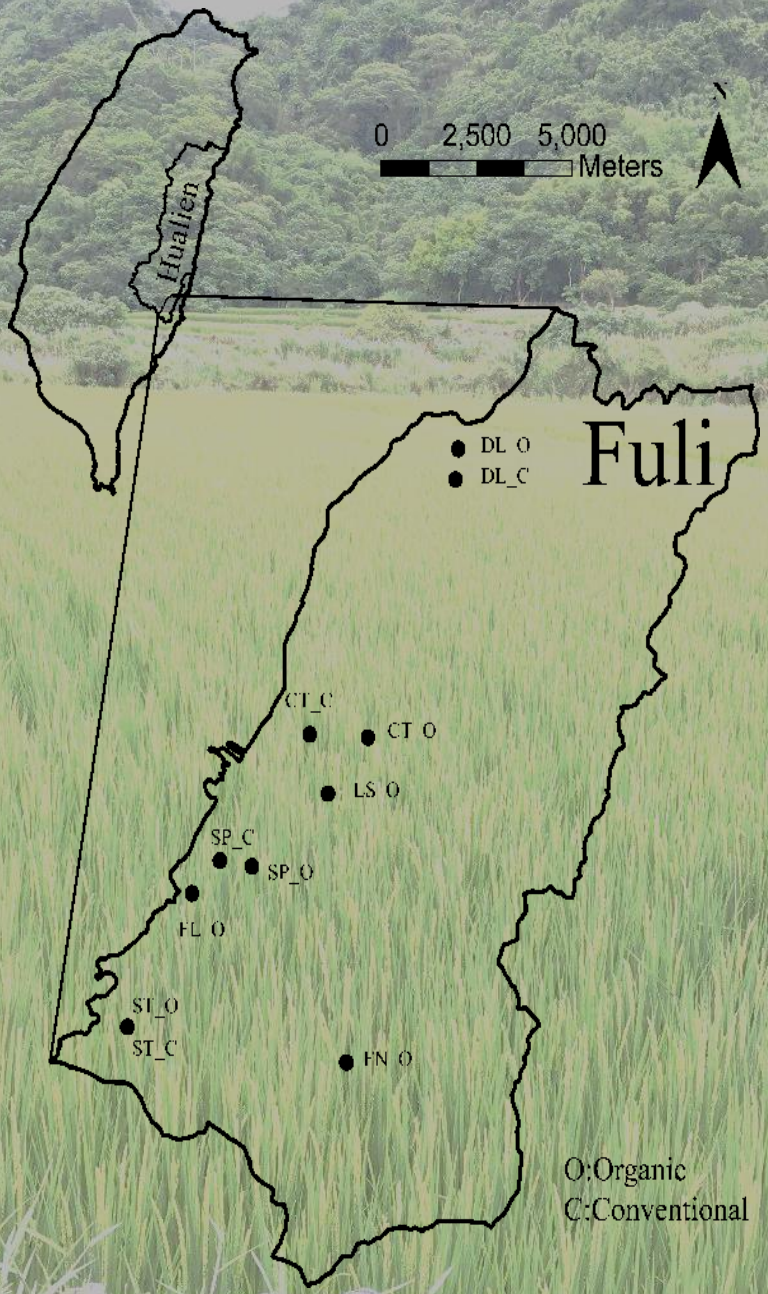


Figure . Location and sample sites of the case study area

principle component analysis (PCA) to demonstrate the main context

- Through the selection of predators, the findings showed that *Tetragnatha maxillosa* Thorell (1895), *Tetragnatha javana* Thorell (1890) ,and *Micraspis discolor* Fabricius (1798) was a positive linear relationship with the richness and abundances of invertebrates in paddy fields.
- They not only had higher frequency of occurrence in organic farm but also higher sensitivity to different farming practices.
- As indicator species to reflect artificial disturbance.
- The results also showed that the conventional farming practices could reduce habitat heterogeneity and cause negative effects on agro-biodiversity of rice paddy farmlands.

Tetragnatha maxillosa

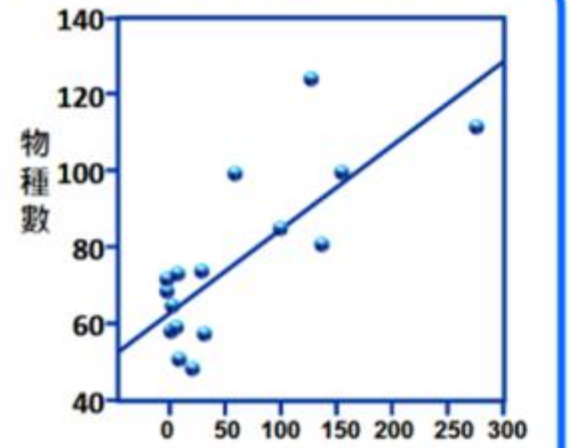
Tetragnatha javana

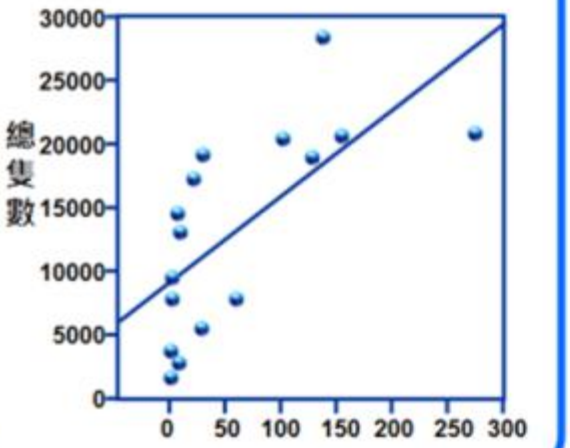
Micraspis discolor

Figure . Three species used as agro-biodiversity indicators and species promoting environmentally friendly ecological farming.

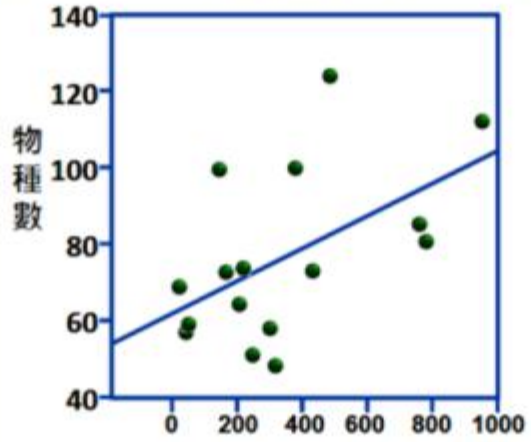
Developing agro biodiversity indicator

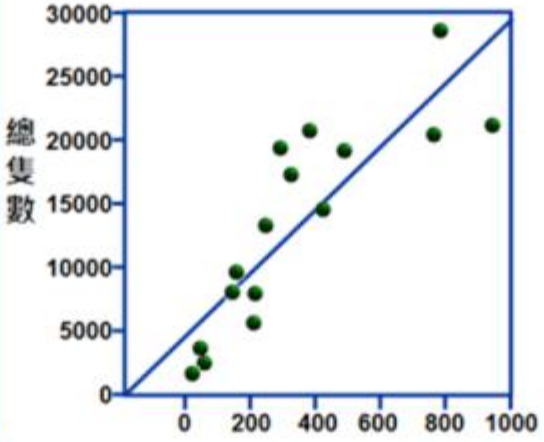
Tetragnatha maxillosa



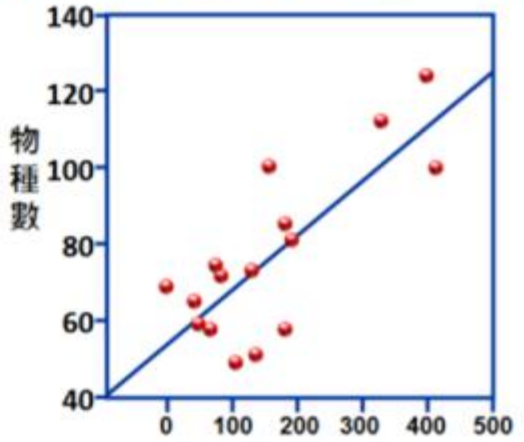


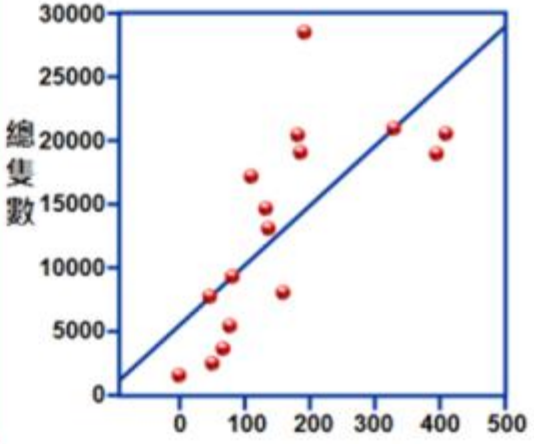
Tetragnatha javana





Micraspis discolor





Increasing Landscape diversity: Hedgerow management techniques for farmland (cooperate with Agribusiness company)

new eco-labelling scheme

- In order to apply the outcome of the research in a way that could benefit both local livelihood and biodiversity, HDARES worked together with:

Tse-Xin Organic Agriculture Foundation

Local farmers

Yin-Chuan Organic private company

Forestry Bureau

- The new eco-labelling scheme has attracted green consumers to purchase the relevant products and encouraged more farmers to participate environmental friendly farming in eastern rural Taiwan.

Original Eco-Labelling Scheme

(Endangered species as indicators)

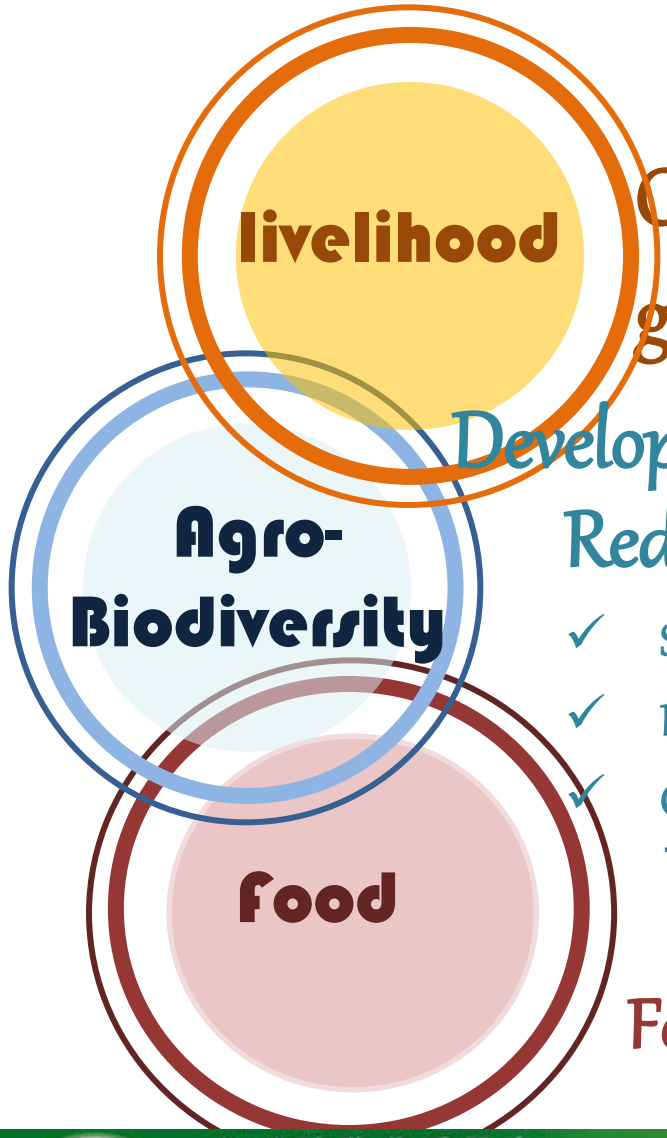
http://enw.e-info.org.tw/content/3634

https://www.fooding.com.tw/article-content.php?aid=100157

Press conference

Figure. We extended the application scale of Green Conservation Label and cooperated with Tse-Xin Organic Agriculture Foundation, farmers, Rice Production and Marketing Group, Agribusiness Company and Forestry Bureau in this case.

What have we done?



Capacity building for farmers& New green labels for products

Developing agro biodiversity indicator species

Reduce chemical input (pesticide & fertilizer)

- ✓ Symbiotic Farming System
- ✓ Biocontrol by bio-materials
- ✓ Conserve nectar-rich flowering plants

Keep crop biodiversity

Food security & safety

The first international conference of Eco-agriculture and Satoyama Initiative, Taiwan (2015)

Prof. Steve Wratten Bio-Protection Research Centre, Lincoln University, New Zealand

Dr. Kong Luen Heong, Former senior scientist of International Rice Research Institute (IRRI)

Mr. Wataru SuzukiIchikawaSatoyama Initiative Coordinator, UNU-IAS

IPSI SATOYAMA INITIATIVE

Partnership (2016)

Dr. Kaoru
Research Fellow, UNU-IAS

Dr. Josef Settle
Department of Community Ecology
Helmholtz-Centre for Environmental Research - UFZ

HELMHOLTZ CENTRE FOR ENVIRONMENTAL RESEARCH – UFZ

MEMORANDUM OF UNDERSTANDING DRAFT (2016)

Challenges to mainstreaming the activities

- For persuade more farmers to do eco-friendly agriculture, the incentive is the key point.
- Elder farmers who lack for spontaneousness to do it as well as lack for variety stakeholders concerning about farmland management.

4-year project on strategic development and agricultural technique for enhancing ecosystem services for rural villages

Executive organization：

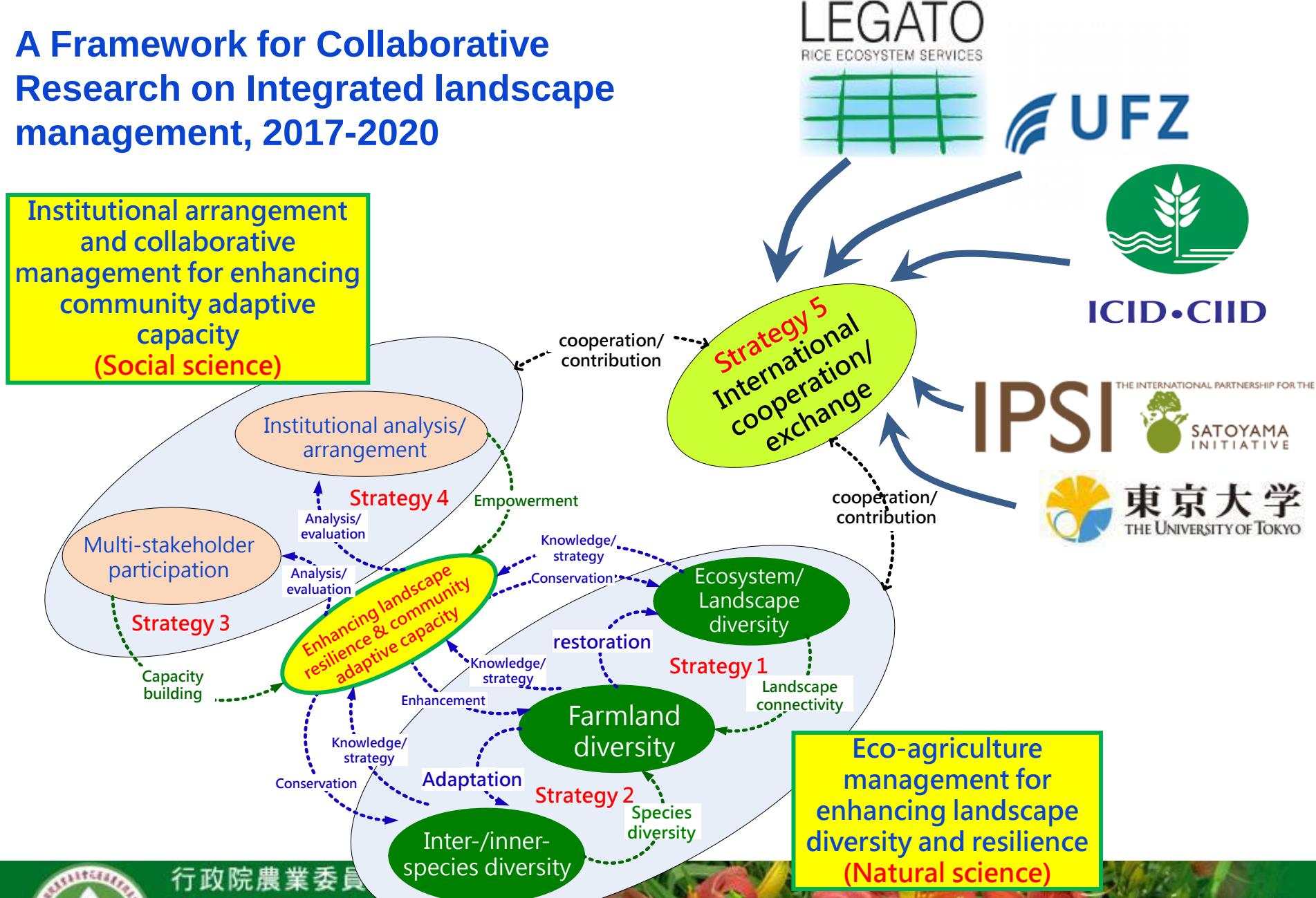
Department of Agricultural Technology, Department of International Cooperation, Department of Irrigation and Engineering,

Hualien District Agricultural Research and Extension Station, Miaoli District Agricultural Research and Extension Station,

National Taiwan University, National Donghwa University,

Chinese Taipei Committee, International Commission on Irrigation and Drainage, Agricultural Engineering

A Framework for Collaborative Research on Integrated landscape management, 2017-2020



Recommendations

- It's necessary that rural communities should spontaneously coordinate related stakeholders for figure out a way to improve agro-biodiversity and livelihood based on scientific research.

Thanks for your attention