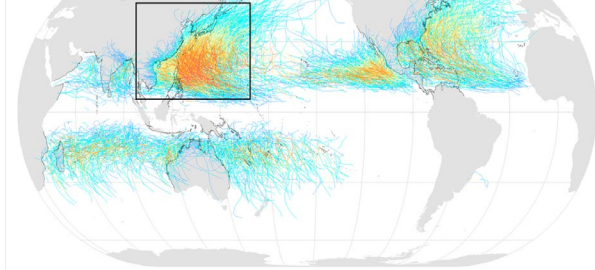


# Future Design of the Regional Circular and Ecological Sphere

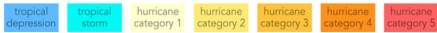
adapting to Climate Change and Depopulation by utilizing Unused Farmland in Japan

Tropical Cyclones, 1945–2006

The impact by climate change

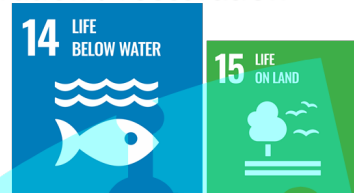


Saffir-Simpson Hurricane Scale:

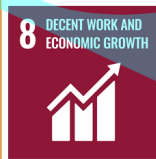


All tropical cyclone tracks from 1945 to 2006. Equal-area projection.

Nature conservation / restoration



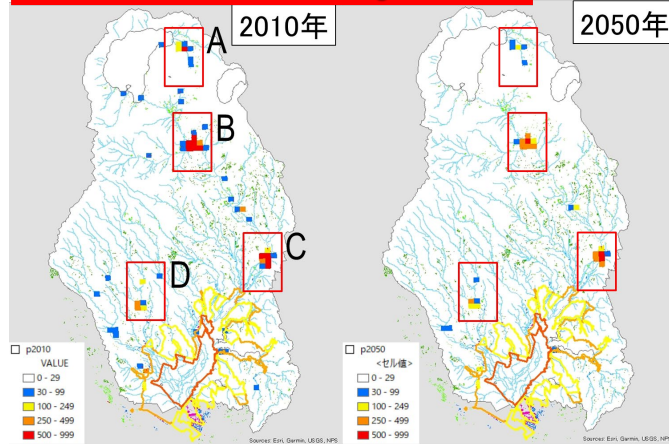
Disaster prevention / reduction



Water resources & Energy



The future land-use design in 2050



Kyoto University, C-PIER  
(Research Professor)

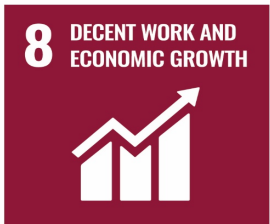
Center for Environmental Biology and Ecosystem  
National Institute for Environmental Studies  
(Senior Researcher) Satoshi KAMEYAMA

# Synergetic Strategies

## Sustainable Development Goals on Climate Change and Protecting Healthy Ecosystems



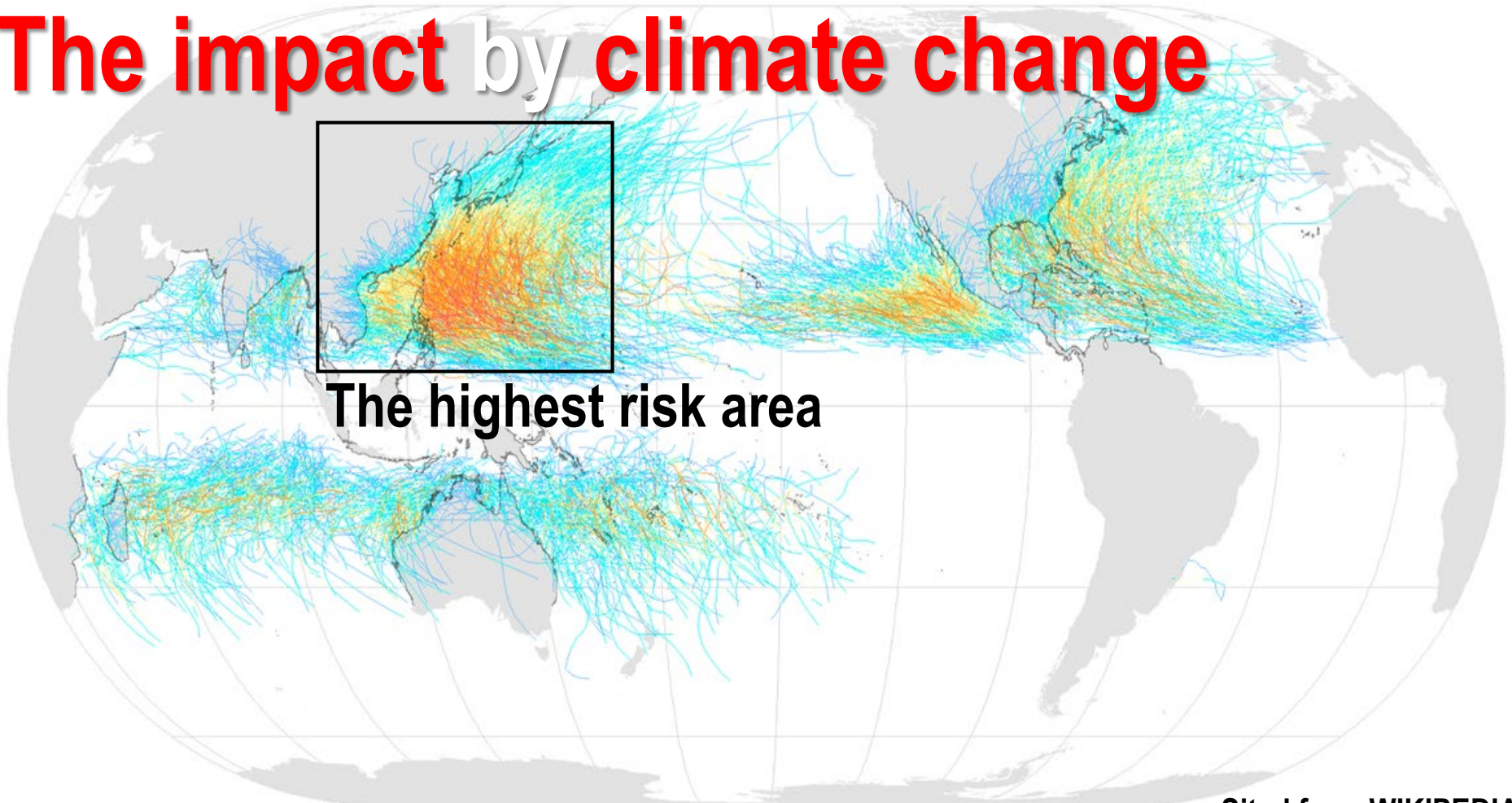
SUSTAINABLE DEVELOPMENT GOALS



??? Beyond Win-Win ???

# Tropical Cyclones, 1945–2006

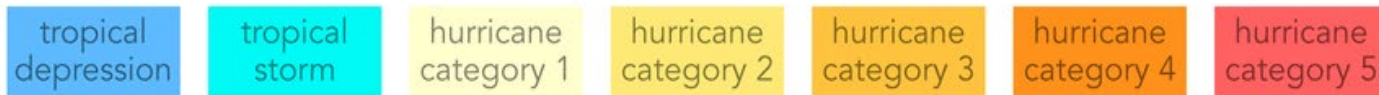
## The impact by climate change



The highest risk area

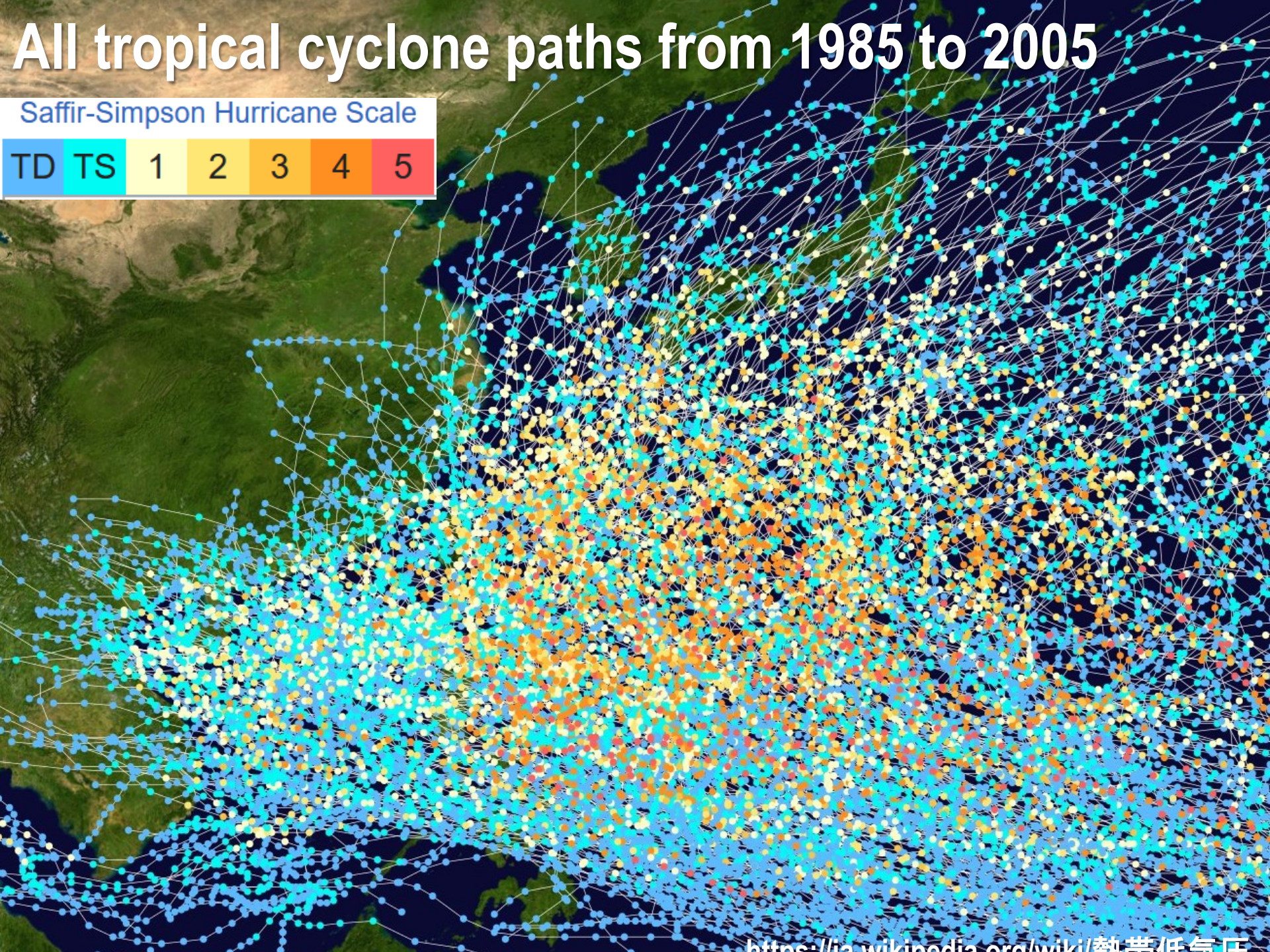
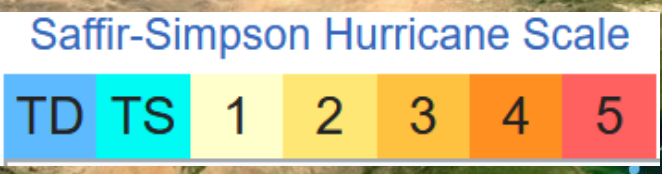
Sited from WIKIPEDIA  
(Tropical cyclone)

Saffir-Simpson Hurricane Scale:



All tropical cyclone tracks from 1945 to 2006. Equal-area projection.

# All tropical cyclone paths from 1985 to 2005



# Climate change and “extreme” weather



Economic loss  
(Shinkansen)  
276 Million \$



## 台風 19 号 (10日3時現在)

Size / strength	Large/Violent
Direction / Speed	北 10km/h
Central pressure	915hPa
Max. wind speed	55m/s
Max. instantaneous wind speed	75m/s

=270km/h

The path of the typhoon (19) in 10 Oct. 2019.

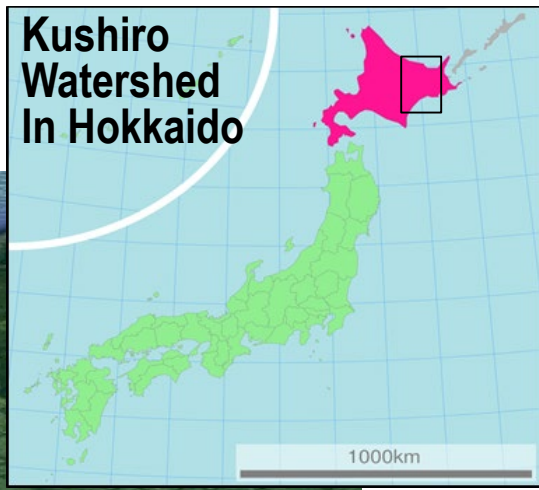
# Japan is the county of “DISASTER”



The bank break of the Chikuma River flowing through Nagano Prefecture. Flooding damage occurred extensively in the basin  
Image from **BBC NEWS JAPAN 2019/10/22**

# The endless TRILEMMA in watershed management

**Nature conservation / restoration**



**Disaster prevention / reduction**



**Kuroishi Wetland National Park**

**Special Protection-area**

**Kuroishi City**

**Water resources / Energy**



# The change of population

**Myanmar**

**2020**



Population **54,409,794**

**Japan**

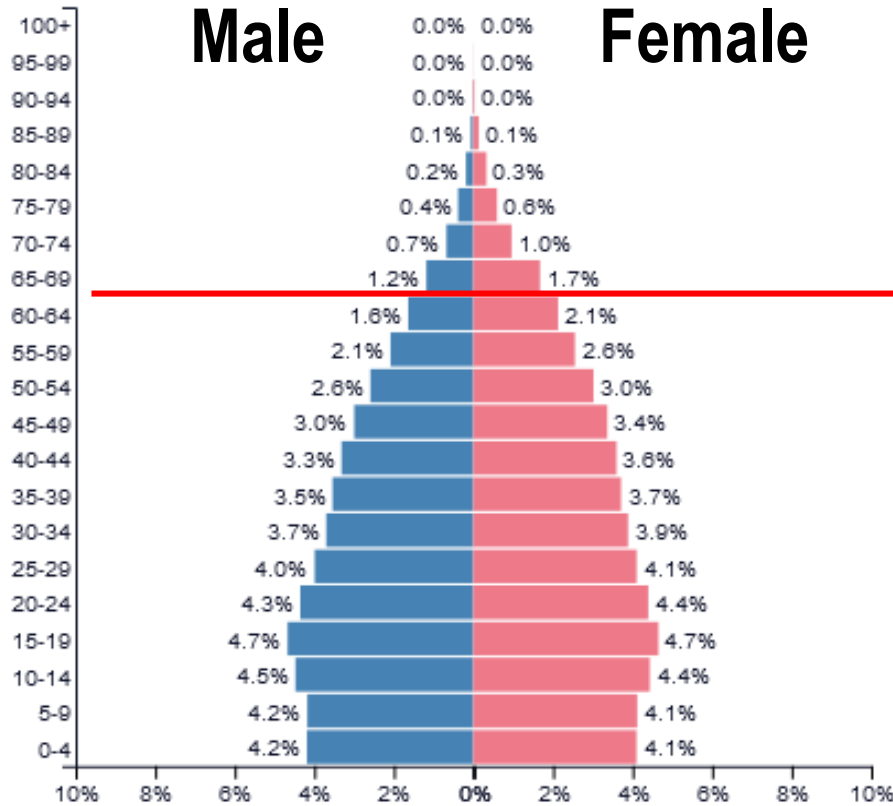
**2020**



Population **126,476,458**

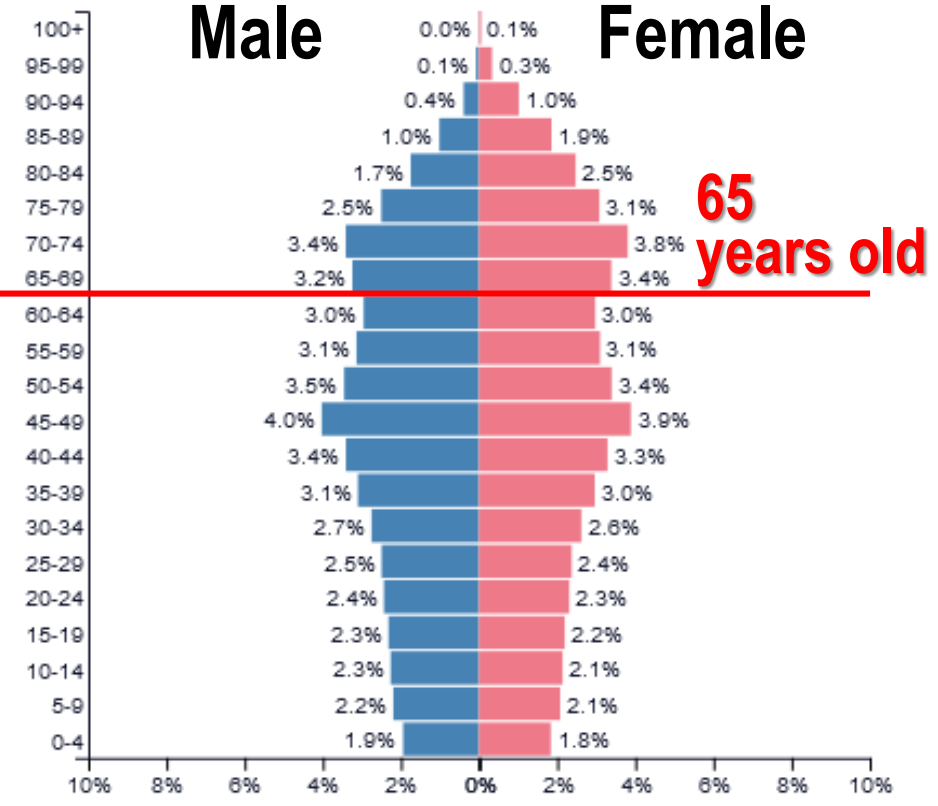
**Male**

**Female**



**Male**

**Female**



**65 years old**

Population

Population **62,253,423**

**2020 2050**

Population

Population **105,804,023**

**2020 2050**



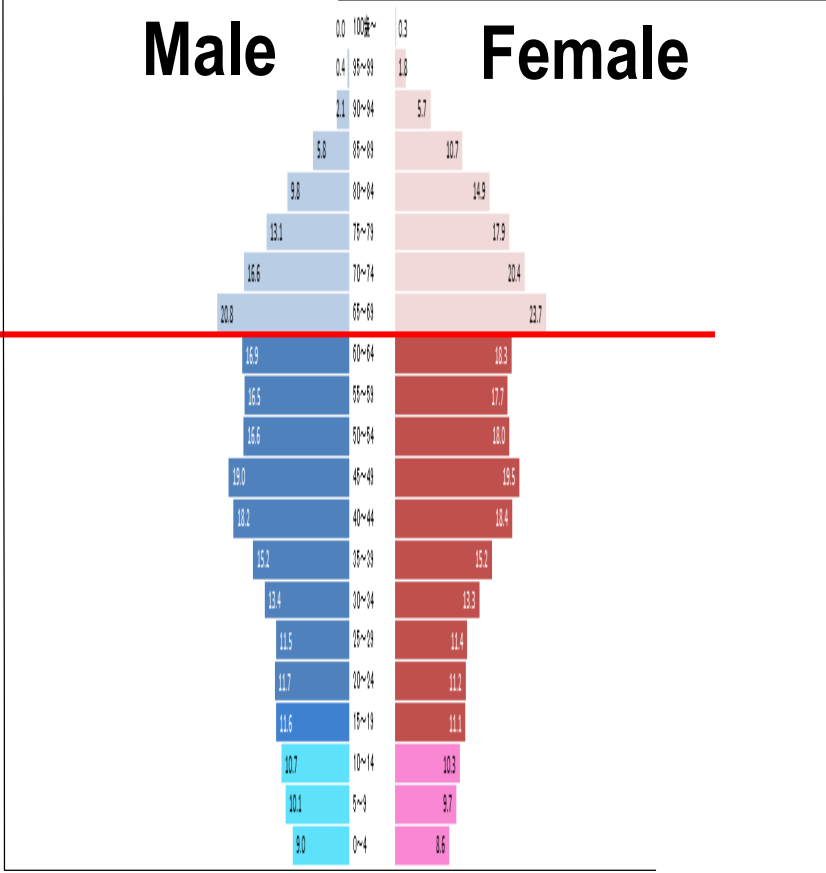
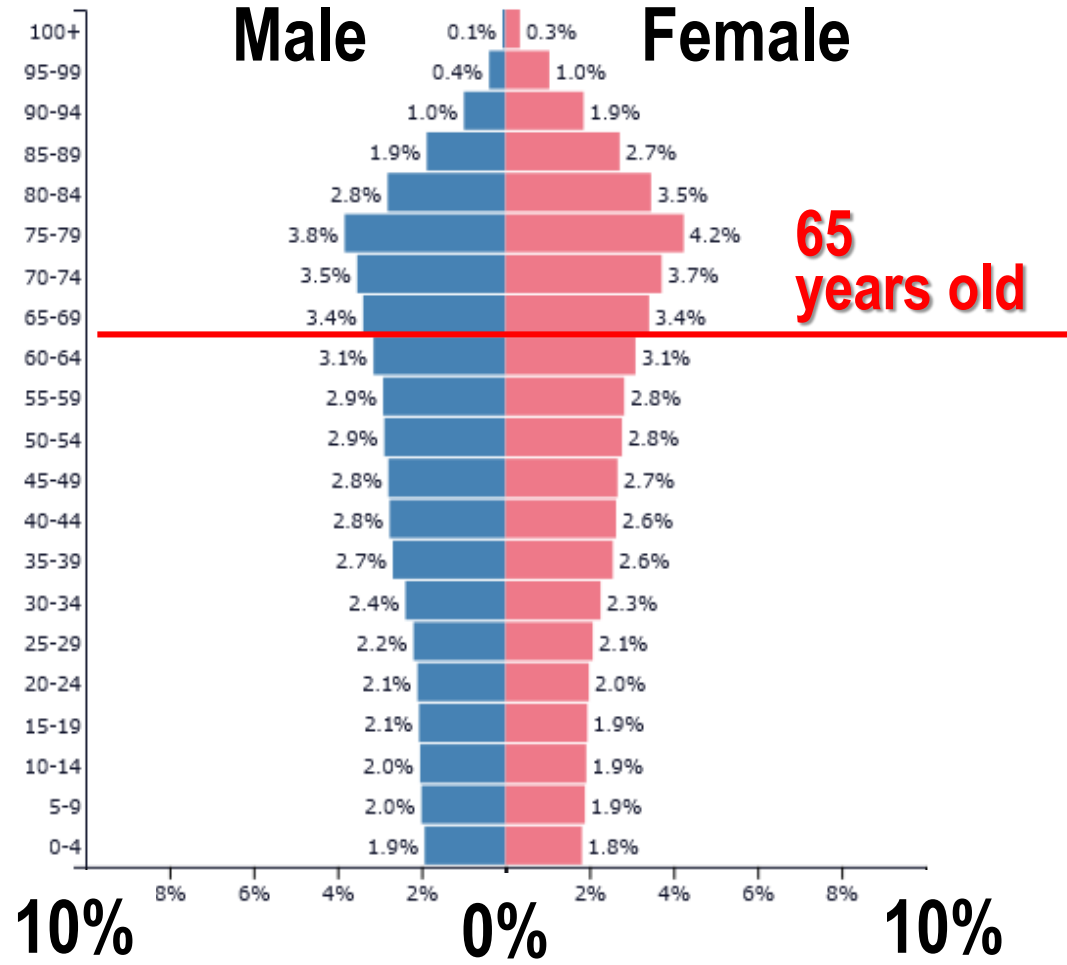
# The current local area is the future of Japan

**Japan  
2050**



Population **105,804,022**

**Hokkaido  
2019**



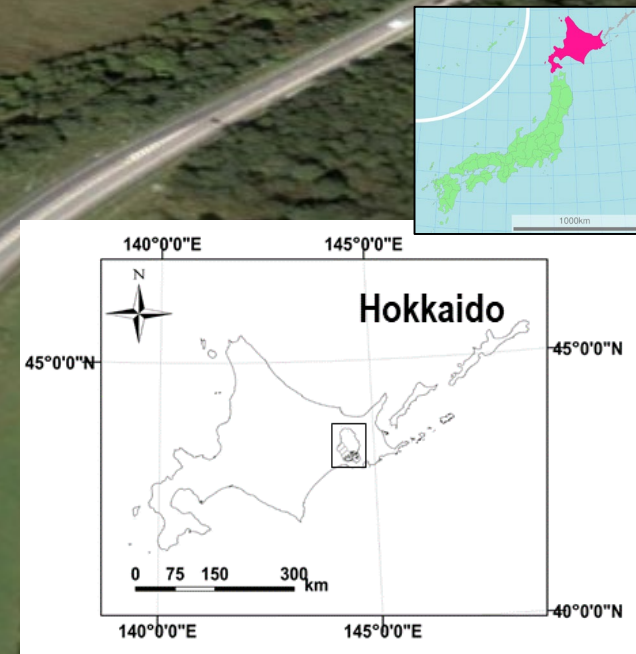
# Unused farmland;

Nowadays, rapidly increasing in whole Japan.

But these lands are **important keys for land use conversion**

幌呂川

In Japan of the future (2050),  
What is **effective land use** for a society in  
**harmony with nature?**

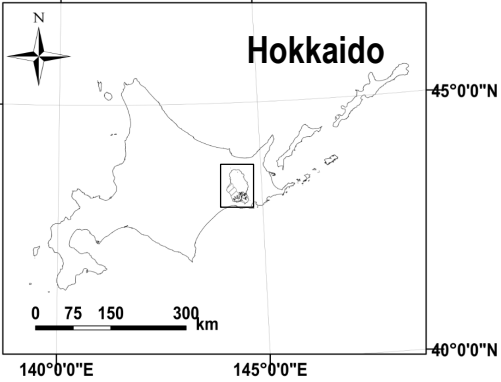


# 【Study area】

144°20'0"E

144°40'0"E

140°0'0"E 145°0'0"E



Kushiro River watershed  
Area:2204.7km<sup>2</sup>

Kushiro Watershed

43°40'0"N

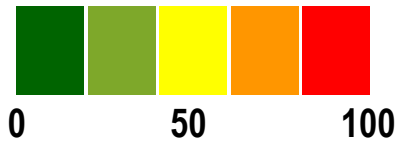


43°20'0"N

43°40'0"N

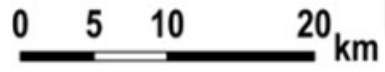
2014-2015年

The ratio of unused area in the field (%)



Test site

Kushiro Wetland  
Area:176.74km<sup>2</sup>



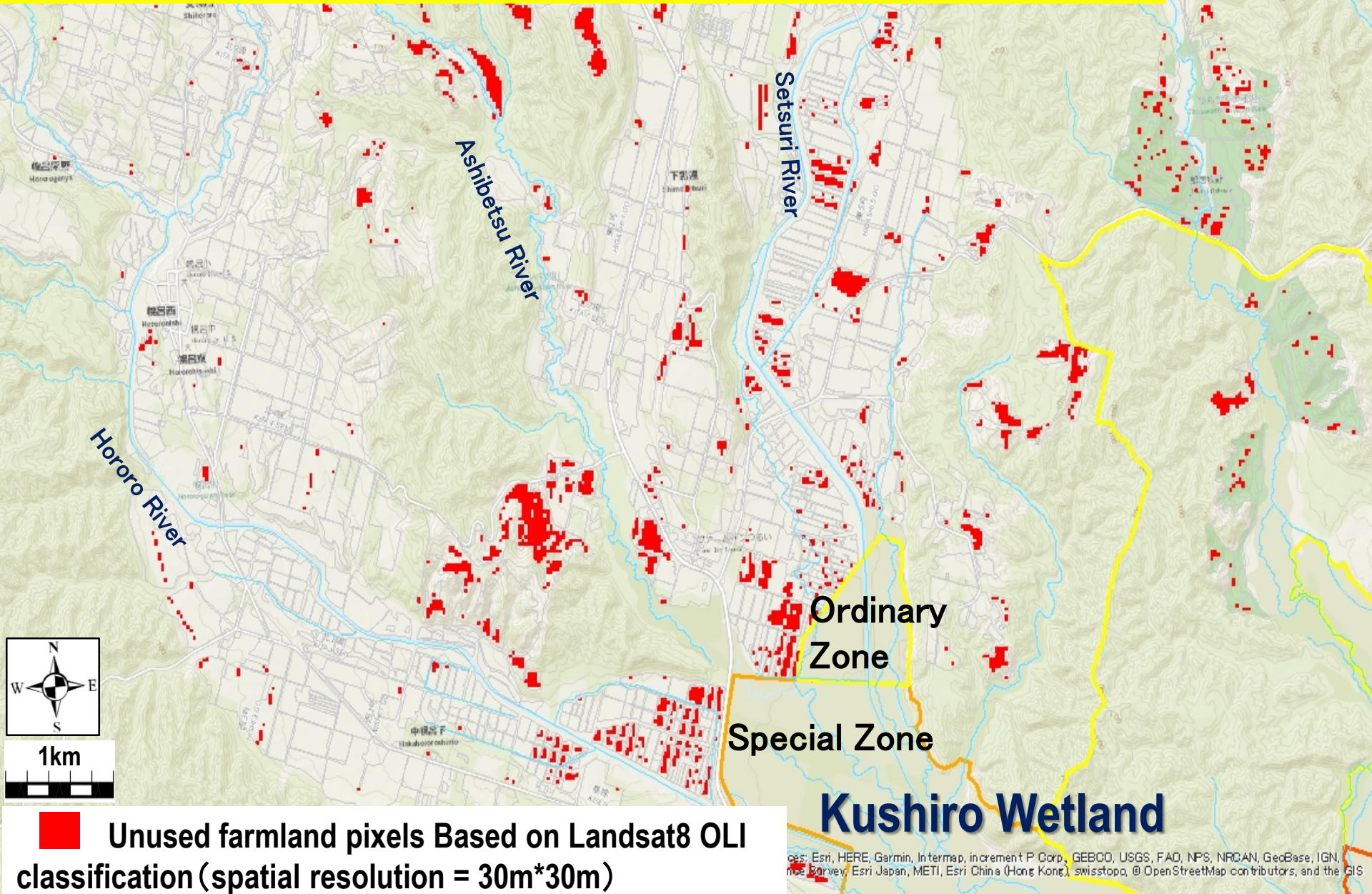
43°40'0"N

144°00'0"E

144°20'0"E

144°40'0"E

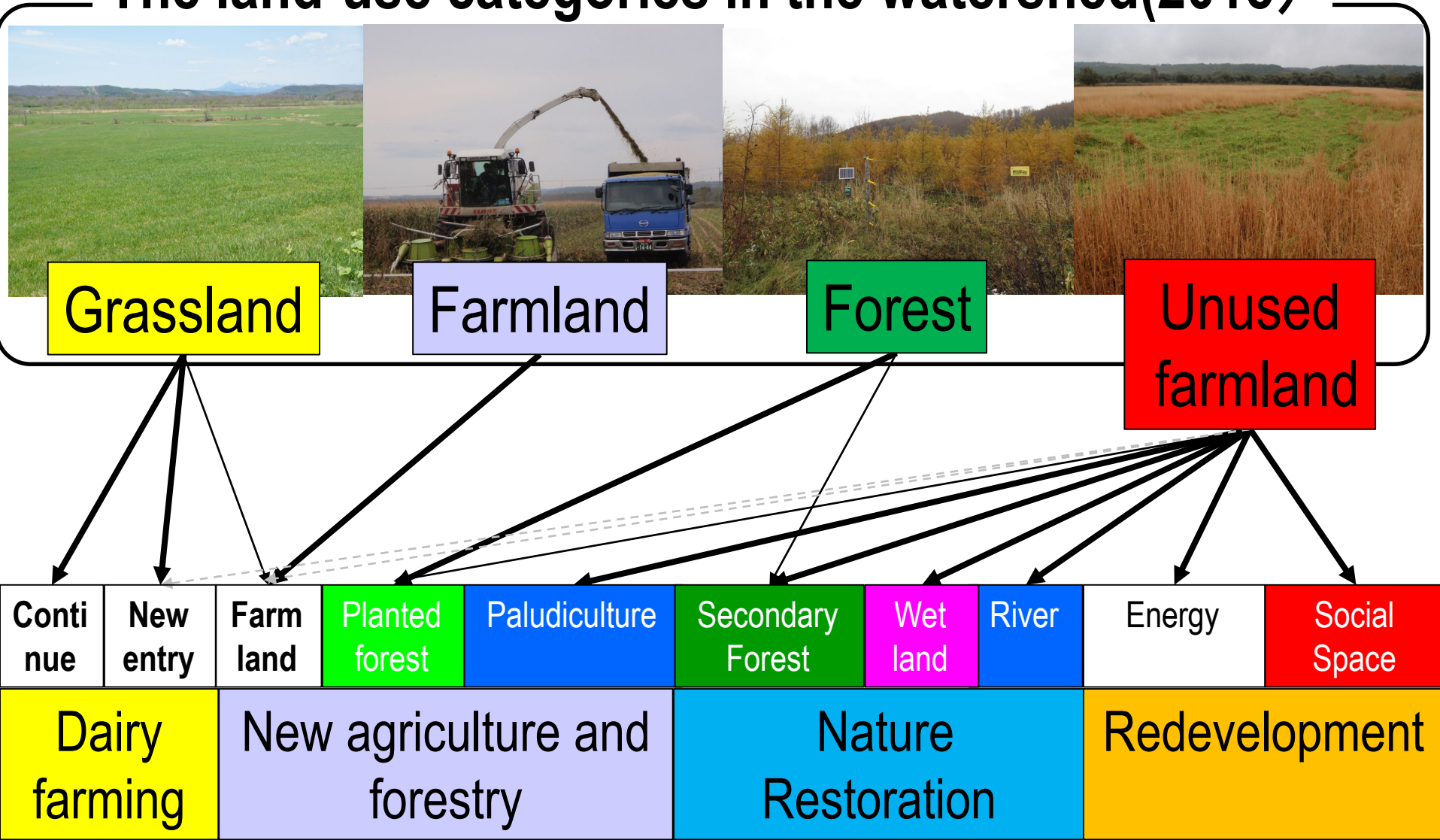
# The spatial distribution of unused farm land in Kushiro Watershed



# Land-use design support system

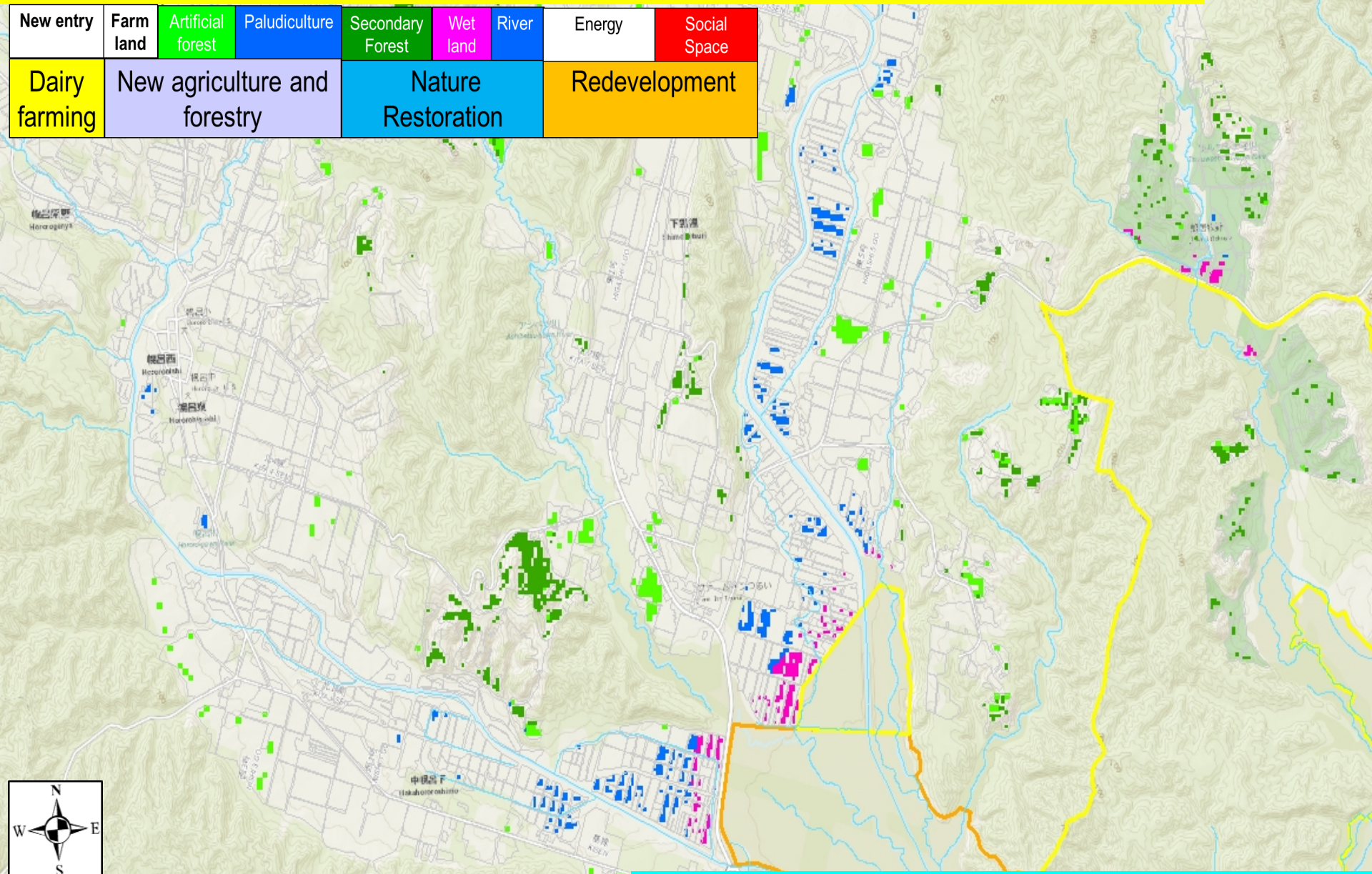
The future land-use=The future of current land-use

## The land-use categories in the watershed(2015)



# Result ; Land use design classified 6 categories

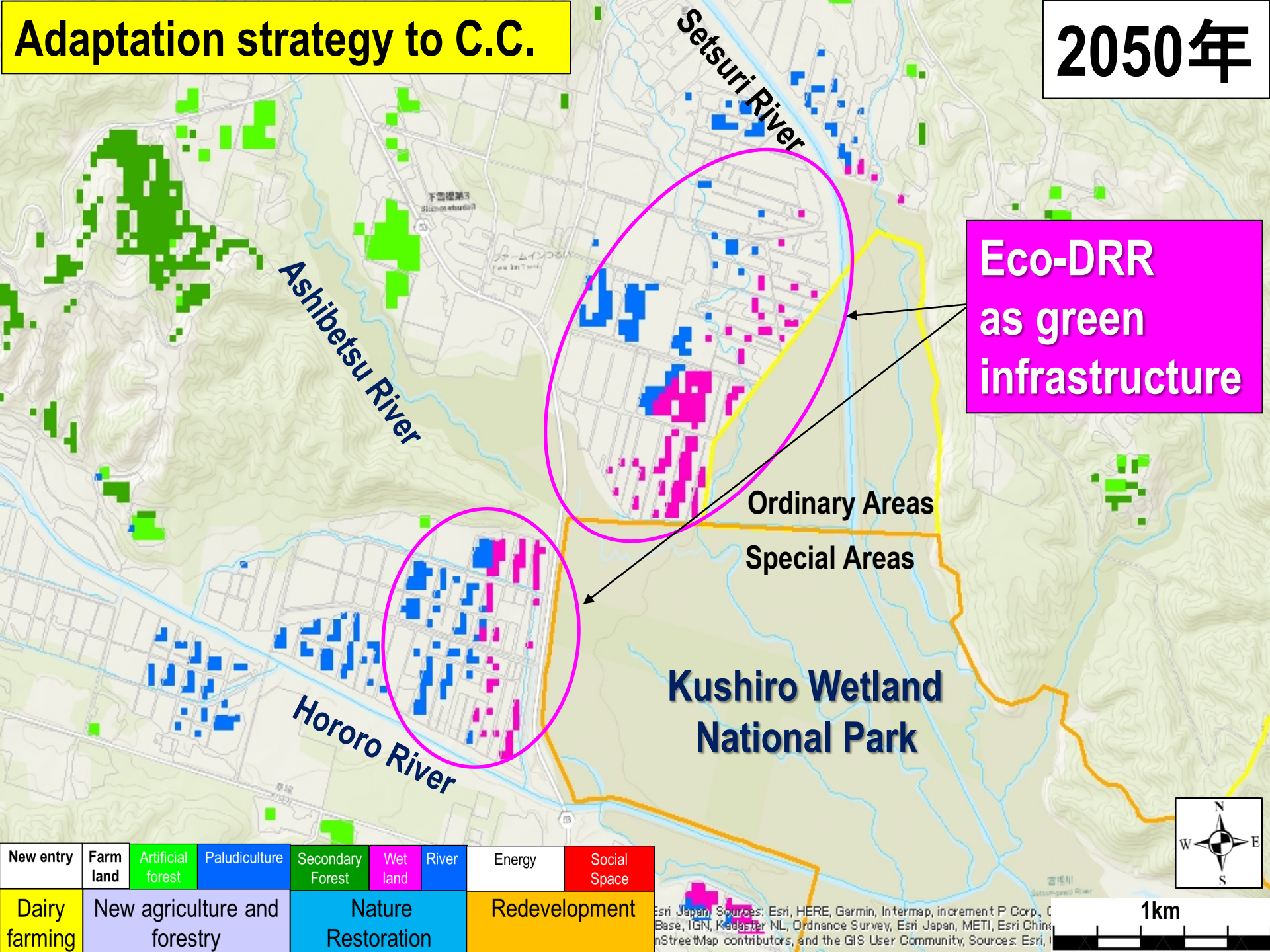
New entry	Farm land	Artificial forest	Paludiculture	Secondary Forest	Wet land	River	Energy	Social Space
Dairy farming	New agriculture and forestry		Nature Restoration			Redevelopment		



**Designed Land- use map in 2010**

# Adaptation strategy to C.C.

2050年



Eco-DRR as green infrastructure

Ordinary Areas  
Special Areas

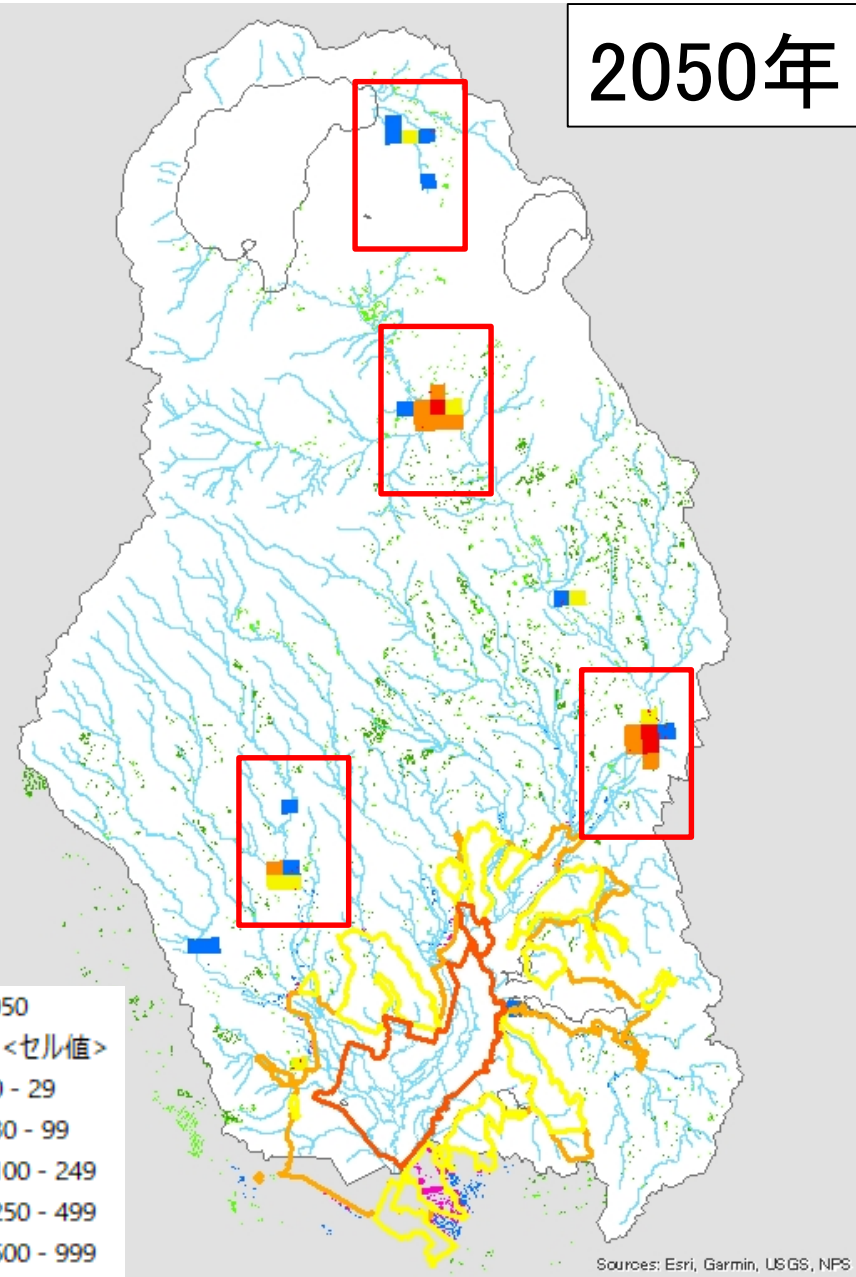
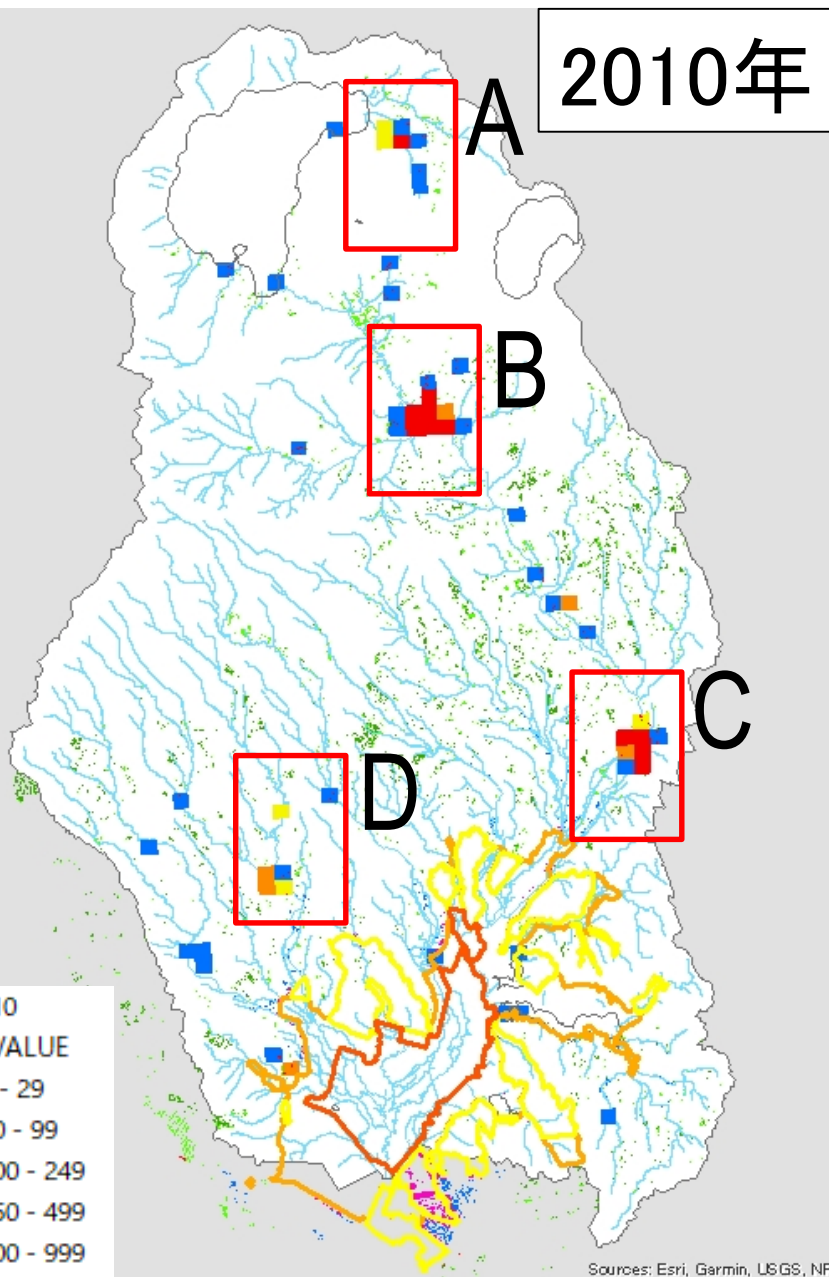
Kushiro Wetland National Park

New entry	Farm land	Artificial forest	Paludiculture	Secondary Forest	Wet land	River	Energy	Social Space
Dairy farming	New agriculture and forestry		Nature Restoration		Redevelopment			

Esri Japan | Sources: Esri, HERE, Garmin, Intermap, increment P Corp., C-Base, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China, InStreetMap contributors, and the GIS User Community, Sources: Esri, |



# The future land-use design and population density in 2050





# Our future design created from peoples communication

Intelligence by communication > Artificial Intelligence

Consultant  
(CTI Engineering  
Co., Ltd.)

Forestry  
Association  
Chairman

Director of  
Remote  
Sensing  
Society

Expert of the ministry  
of environment

Agricultural  
cooperative  
Director

Environment  
NGO President

Session coordinator

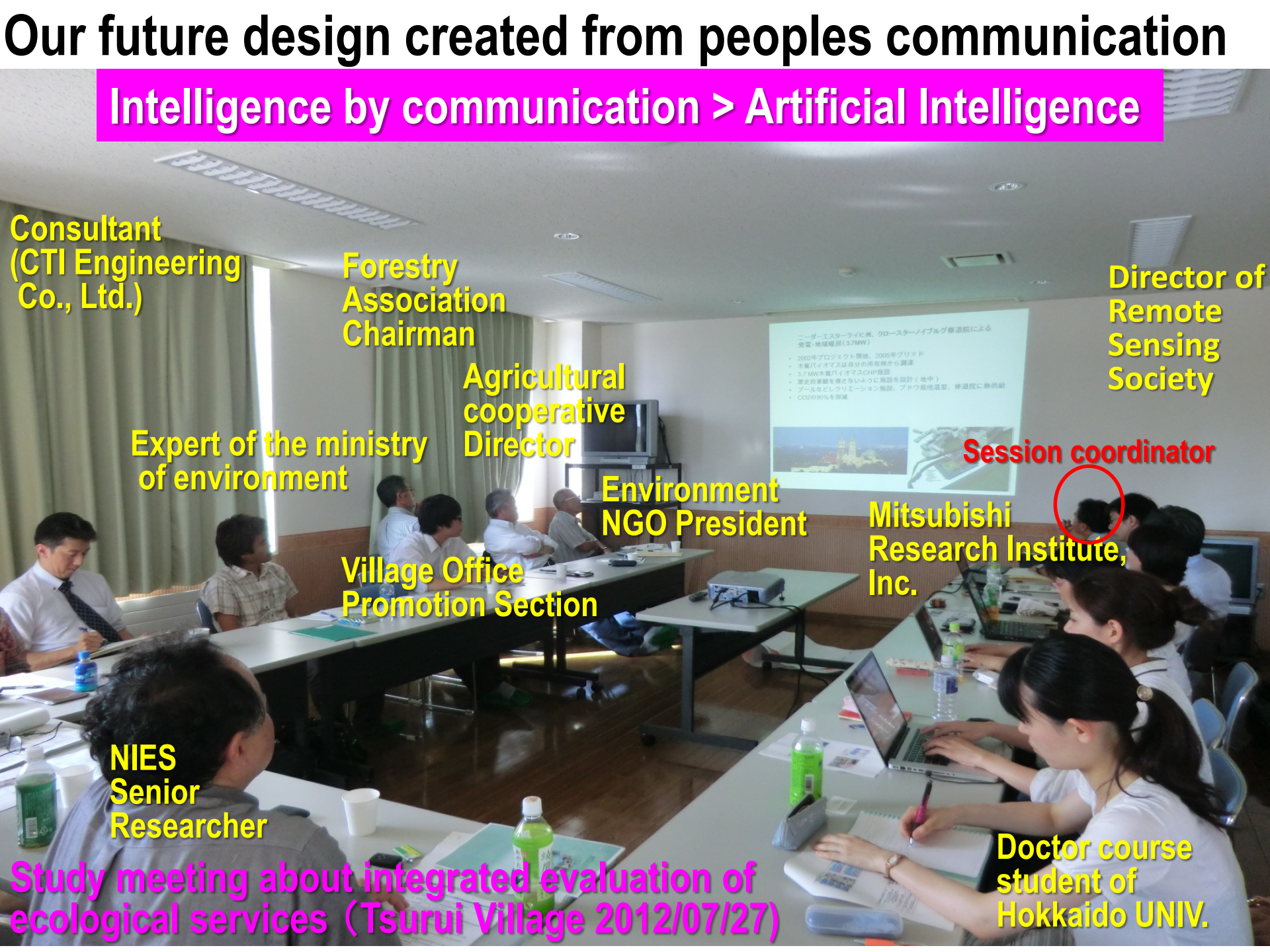
Village Office  
Promotion Section

Mitsubishi  
Research Institute,  
Inc.

NIES  
Senior  
Researcher

Doctor course  
student of  
Hokkaido UNIV.

Study meeting about integrated evaluation of  
ecological services (Tsurui Village 2012/07/27)



# Pioneering spirit and courage to create the nostalgic future



Rice planting in Kushiro watershed (Kuchoro Area) in 1928 June.

**Regional sustainability is the ability of the region and the community to respond to temporal change.**