



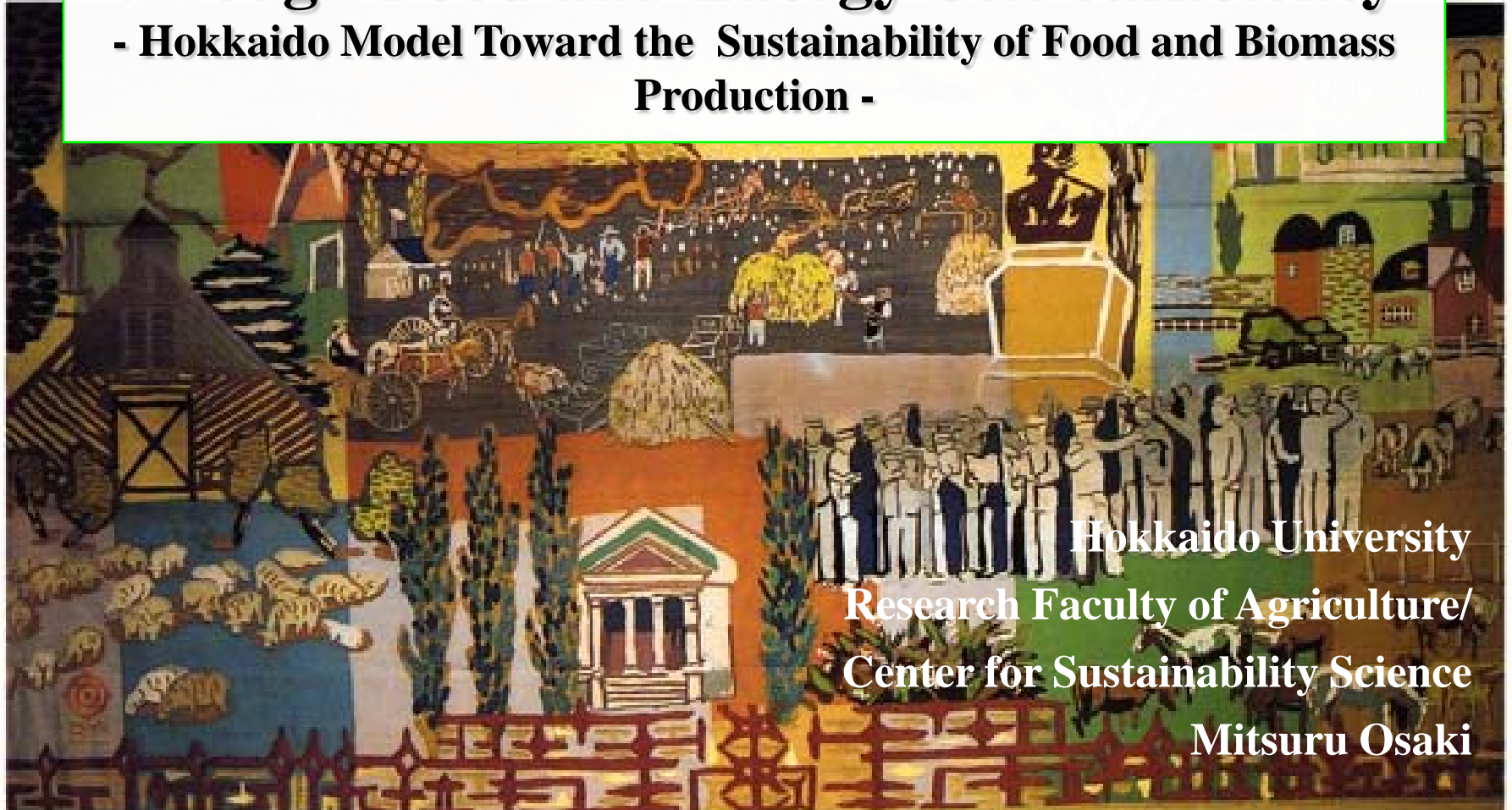
Title	Independency of Japan's Agriculture through Food and Energy Self-sufficiency : Hokkaido Model Toward the Sustainability of Food and Biomass Production
Author(s)	Osaki, Mitsuru
Citation	Sustainability Weeks 2009 Opening Symposium "International Symposium on Sustainable Development - Recommendations for Tackling the 5 Challenges of Global Sustainability-". Session 5, Toward the Sustainability of Food and Biomass Production. 2 November 2009. Sapporo, Japan.
Issue Date	2009-11-02
Doc URL	http://hdl.handle.net/2115/40105
Type	conference presentation
File Information	5-1Osaki.pdf



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Independency of Japan's Agriculture through Food and Energy Self-sufficiency

**- Hokkaido Model Toward the Sustainability of Food and Biomass
Production -**



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Center for Sustainability Science
Mitsuru Osaki**



Contents

- **Food Crisis**
- **Concept of the Hokkaido Model**
- **Model of Food and Energy Self-sufficiency**
- **New Agricultural Design**



Contents

- **Food Crisis**
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What is Agriculture in 20th century ?

- Fossil fuel depend type-
Agriculture
- Fertilizer & Chemicals Use

Fossil fuel depend type-Agriculture

- **Large consume of fossil fuel (shortage, global warning)**
- **Big machinery (soil compaction)**
- **Chemicals (high impact on environment)**
- **Mono-cropping (soil erosion, disease)**



Success

Large Scale Production/Transportation

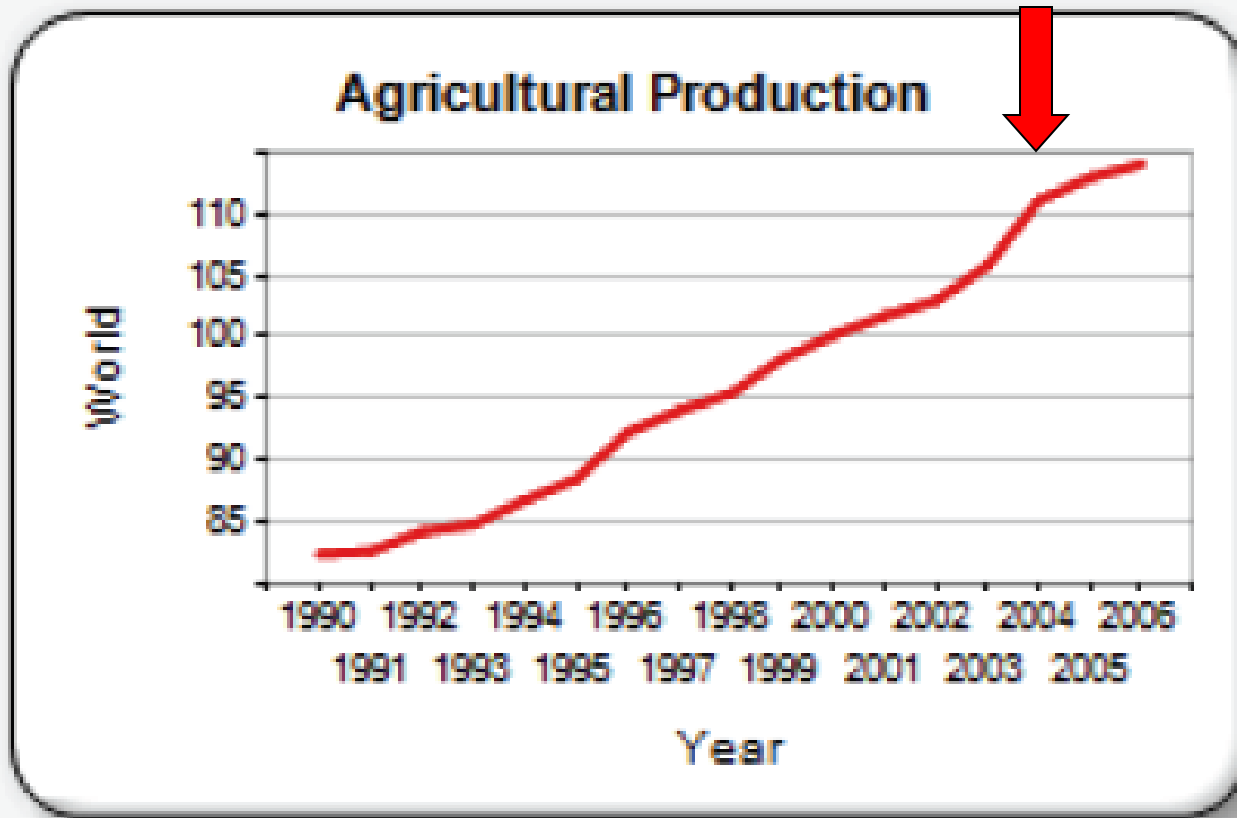


Cause

- **Flooding Cheap Foods in the World Market**
- **Decreasing Agriculture Status/Values**
- **Degradation Land/Environment**

Total Agricultural Production in the World

Getting Slow Down



What is main Function on World Cereals Production?

Cereals Production =

Area X Unit productivity

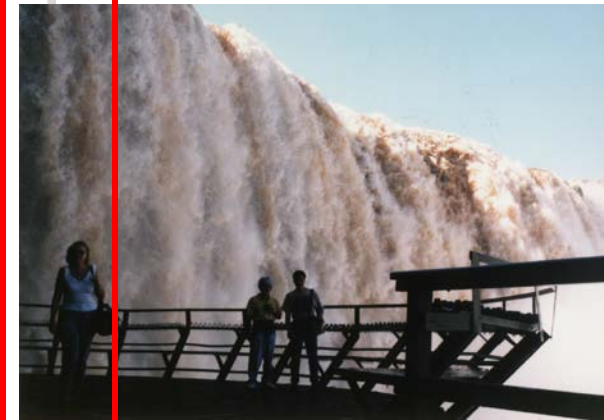
(Forest) (Fertilizer, Chemicals)

Climate Chang and Global Warming affect already seriously on Agriculture



Dry up Iguazu Fall in 2006

As of July 24, 2006 a severe drought in South America had caused the river feeding the falls to become parched, reducing the amount of water flowing over the falls to 300 m³ (80,000 gallons) per second, down from the normal flow of 1,300 m³/s to 1,500 m³/s (350,000 to 400,000 ga/s). By early December, the flow was spectacular again, according to visiting tourists. This was unusual, as normally dry periods last only a few weeks.



2006

From Iguazu Falls From Wikipedia, the free encyclopedia

**Climate Change and Global Warming
affect already seriously on Agriculture**

Dry up at Australia in 2006

Australia suffers worst drought in 1,000 years -Depleted reservoirs, failed crops and arid farmland spark global warming tussle-

•David Dreverman, head of the Murray-Darling river basin commission, said: "This is more typical of a one in a 1,000-year drought, or possibly even drier, than it is of a one in 100-year event." He added that the Murray-Darling river system, which receives 4% of Australia's water, but provides three-quarters of the water consumed nationally, was already 54% below the previous record minimum. Last month it recorded its lowest ever October flows. Inflow this year was just 5% of the average.

•It is also expected to have a serious impact on crops. Last week, the government forecast its lowest wheat crop for 12 years, a 62% decrease on last year.

(from John Vidal, environment editor The Guardian, Wednesday 8 November 2006)

**Climate Chang and Global Warming
affect already seriously on Agriculture**

Excessive heat wave (44.5°C) at Chongqing in 2006

Chinese drought affects millions This is the worst drought in 50 years, Xinhua says **At least 18 million people have been affected by China's worst drought in 50 years, according to the state news agency Xinhua.** The south-western region of Chongqing has been worst hit, but areas of Sichuan and Liaoning are also affected. In Chongqing there has been no rain for more than 70 days, and two-thirds of the rivers have dried up, Xinhua said. Residents in some mountain villages are having to walk up to 2km (1.25 miles) to get water. At least one person is said to have died from heatstroke, and Xinhua estimates the drought has caused economic losses of 11.74bn yuan (\$1.24bn).

World Cereals Production in 21st Century? If continue 20th Century Agriculture

Negative factors (Crisis):

- 1) Limiting of cheap energy (fossil fuel limiting as amount and low Energy Profit Ratio)
- 2) Unbalance of water resources, causing from global warming and wrong land management
- 3) Low soil fertility by soil erosion and in poor nutrient soil
- 4) Saturation of high-yielding technology



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Hokkaido Prefecture

- food self-sufficiency rate: about 200%
- energy self-sufficiency rate: about 8%

- The northernmost prefecture in Japan (43° N)
- Area: 83,456 km²
- Population: 5.6 million (4% of Japan)
- Forested area: 55,424 km² (70% of total area)
- Agricultural area: 9,675 km² (12% of total area)

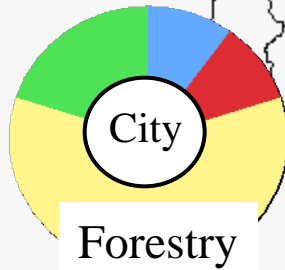
Fossil fuel depend type-Agriculture

What was/is policy of the Hokkaido Agriculture

Large scale/Isolation/Efficiency/

Recommend to Reduce Food (Rice) Production

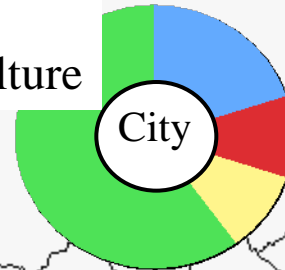
The region centered on forestry



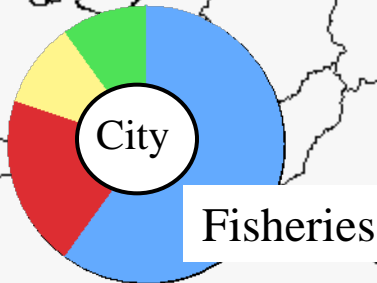
Forestry

The region centered on crop agriculture

Crop agriculture

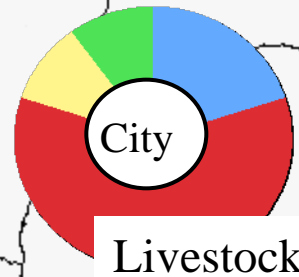


The region centered on fisheries



Fisheries

The region centered on livestock farming



Livestock

Jühnde Village



Förderung durch:

Bundesministerium für Ernährung, Landwirtschaft
und Verbraucherschutz (BMELV)

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Internet: <http://www.bmelv.de>

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Ernährung, Landwirtschaft
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(FNR)

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Fördergegenstand:

Ist die Planungsphase LP 3 bis 6 HOAI mit
Ist die Realisierungsphase mit
Fördersumme BMELV / FNR:
Förderanteil:

280.000 €
1.322.065 €
1.602.065 €
27,7 %

Weitere Fördergeber:



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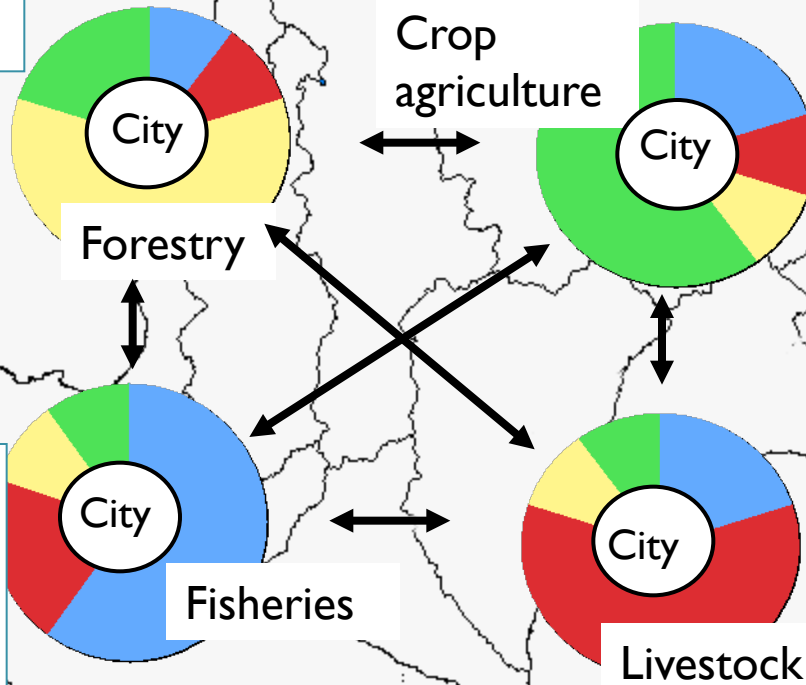
Bio-gas plant



Concept of the Hokkaido Model: Combination of each featured region

The region
centered on
forestry

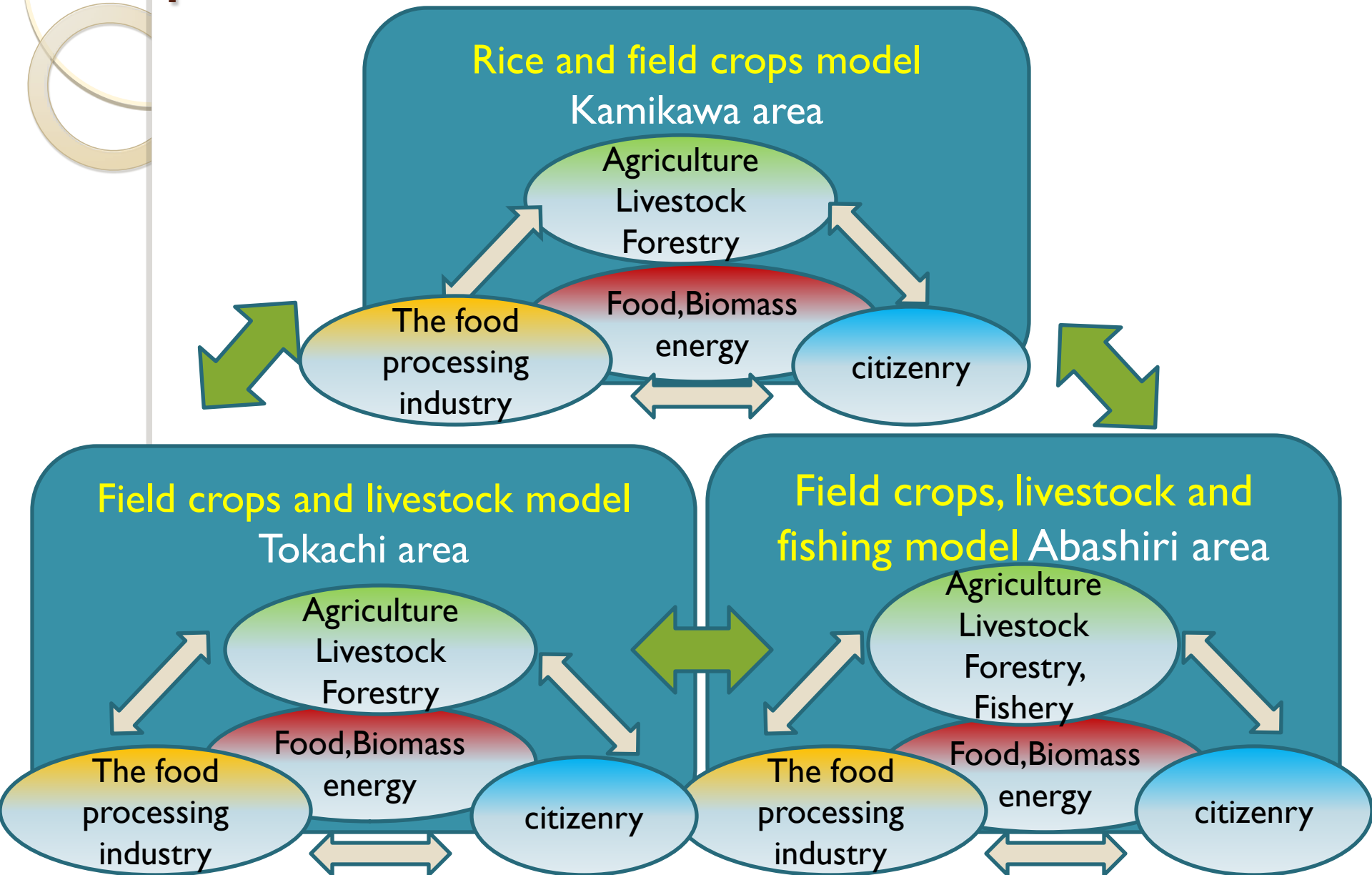
The region
centered on
crop agriculture



The region
centered on
fisheries

The region
centered on
livestock farming

Concept of Hokkaido Model: Complementarities between each area

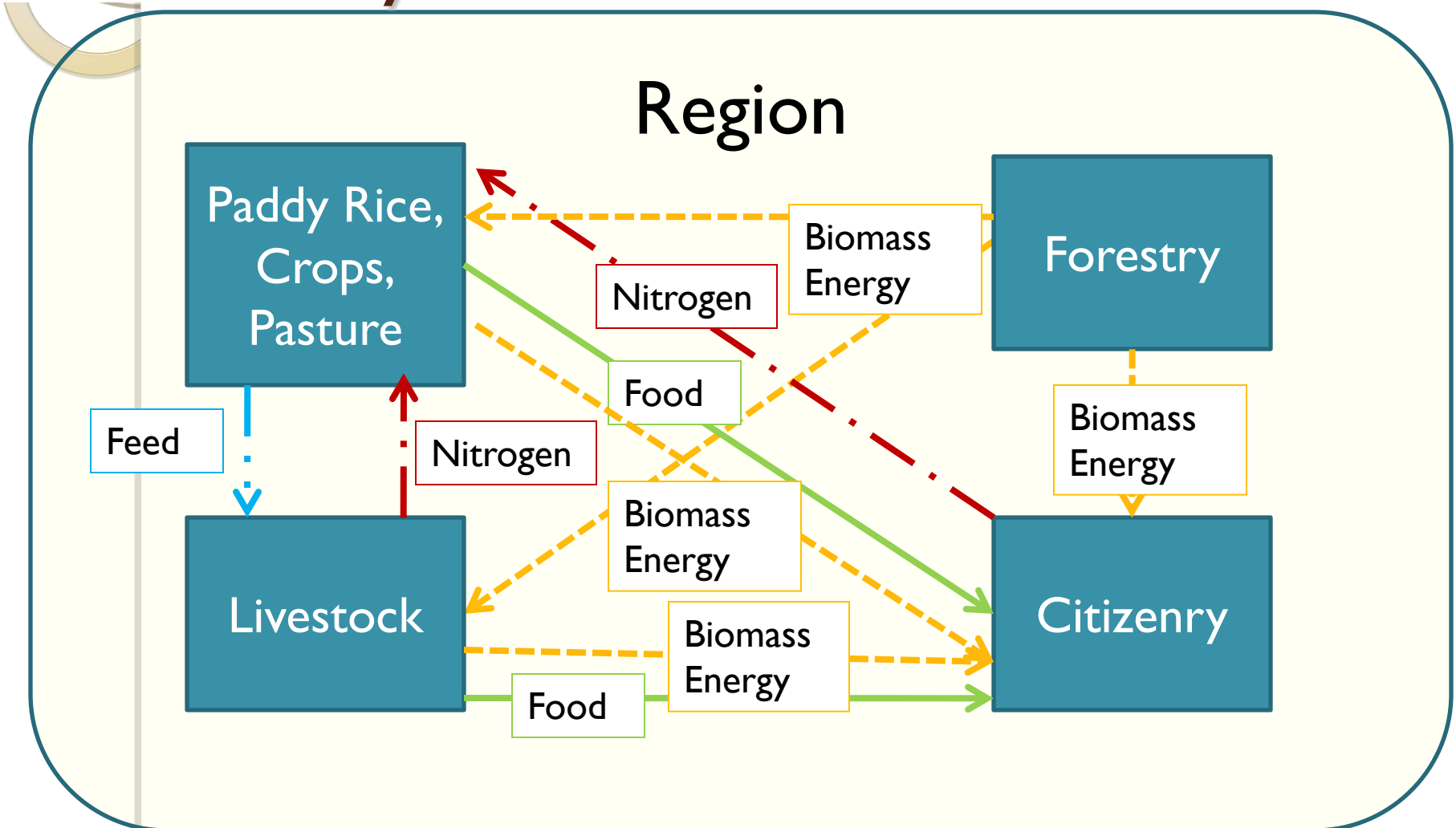




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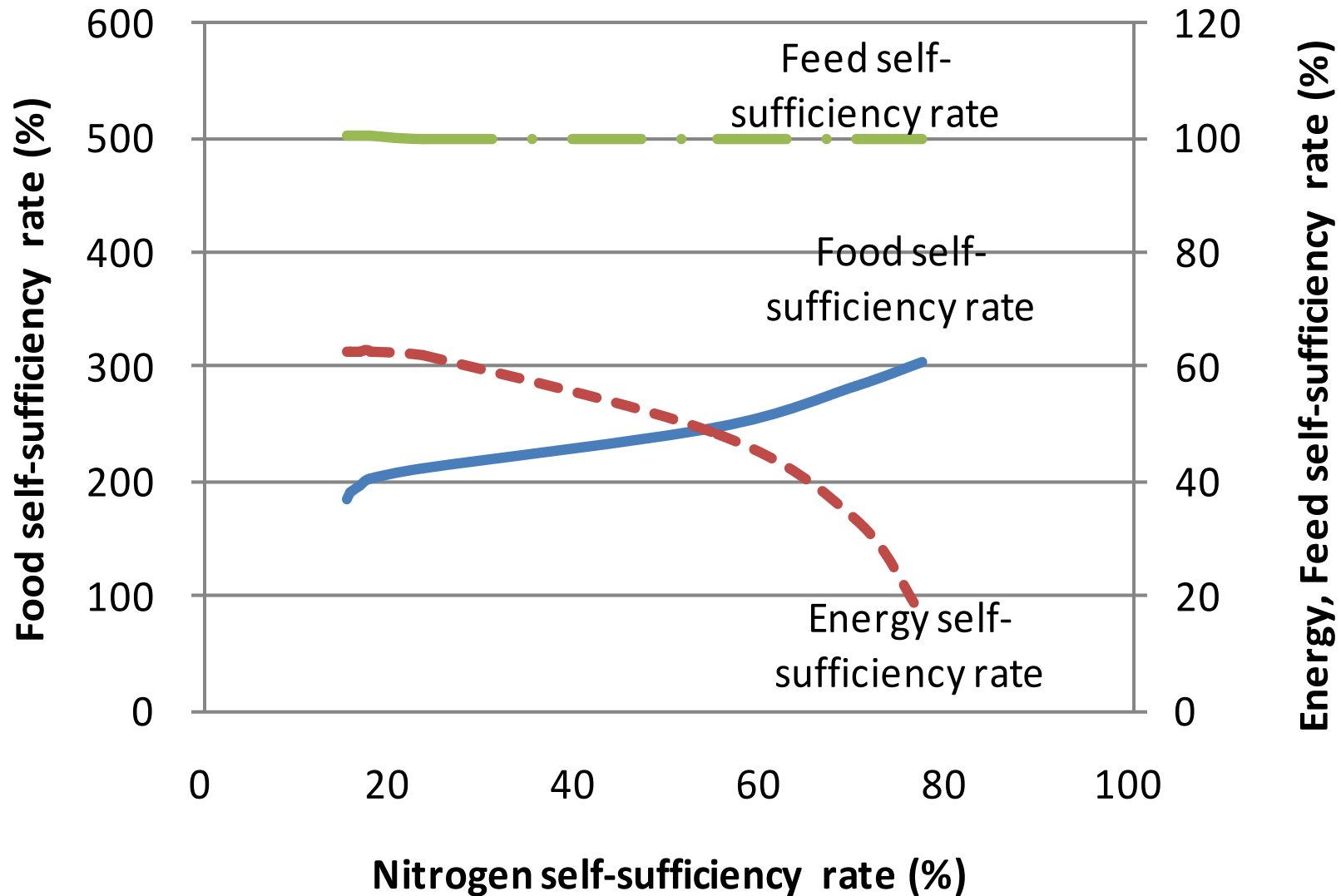
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Concept of material recycling and energy flow among agriculture, livestock, forestry, and citizenry



Results of analysis

Food and energy self-sufficiency rates



Results of analysis

	Current situation	Land use scenario 1	Land use scenario 2	Land use scenario 3
Food self-sufficiency	3 4 9 %	3 0 3 %	2 4 8 %	2 0 0 %
Energy self-sufficiency	0 %	1 7 %	4 8 %	6 0 %
Feed self-sufficiency	8 8 %	1 0 0 %	1 0 0 %	1 0 0 %
Nitrogen self-sufficiency	4 6 %	7 7 %	5 5 %	2 0 %

Conclusion

For the study of food and energy self-sufficiency:

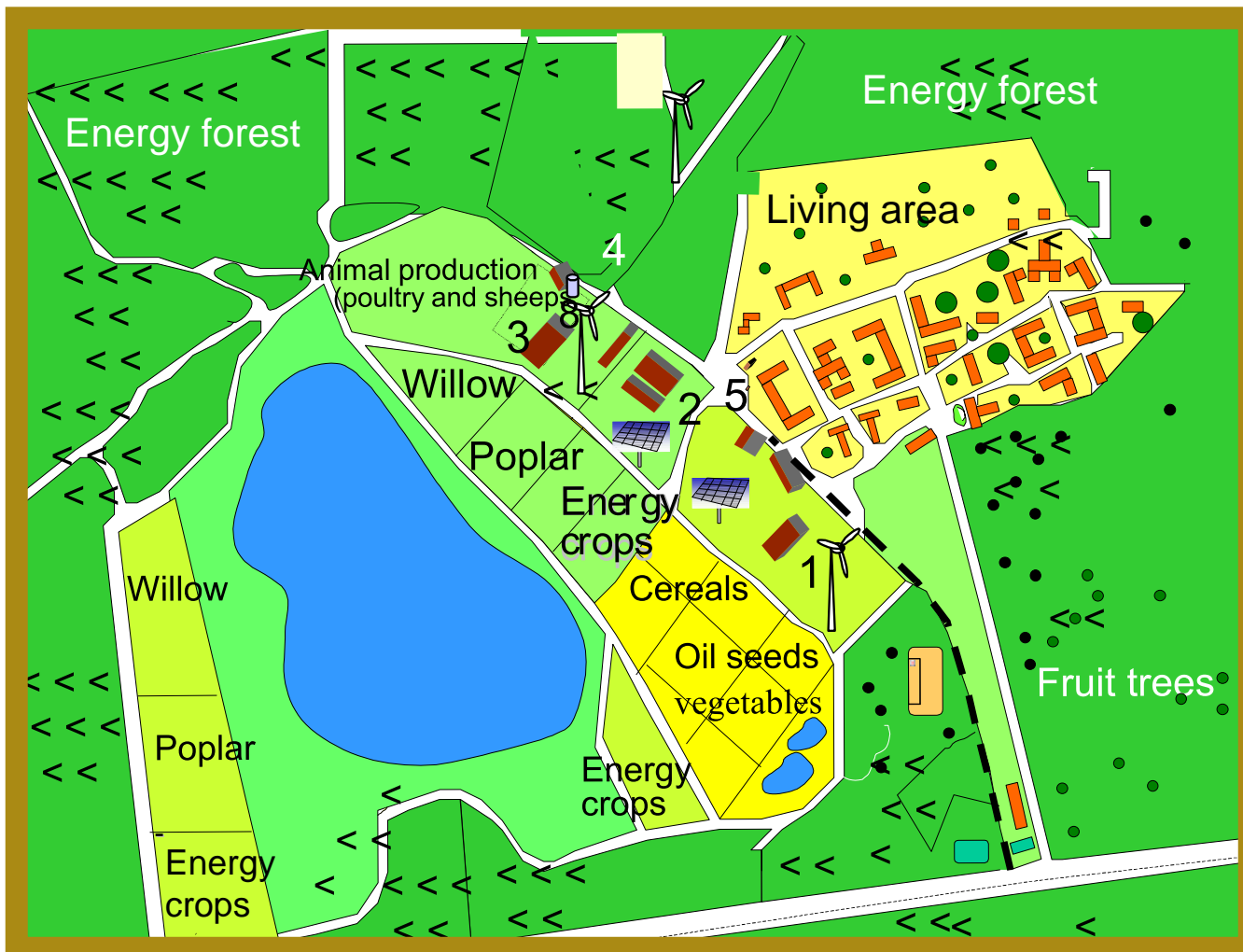
- 1 . Utilization of biomass fitting regional features is important.
- 2 . not only food and energy but also feed and fertilizer have to be considered comprehensively.
- 3 . Concept of organic material recycling among agriculture, livestock, forestry and citizenry is important



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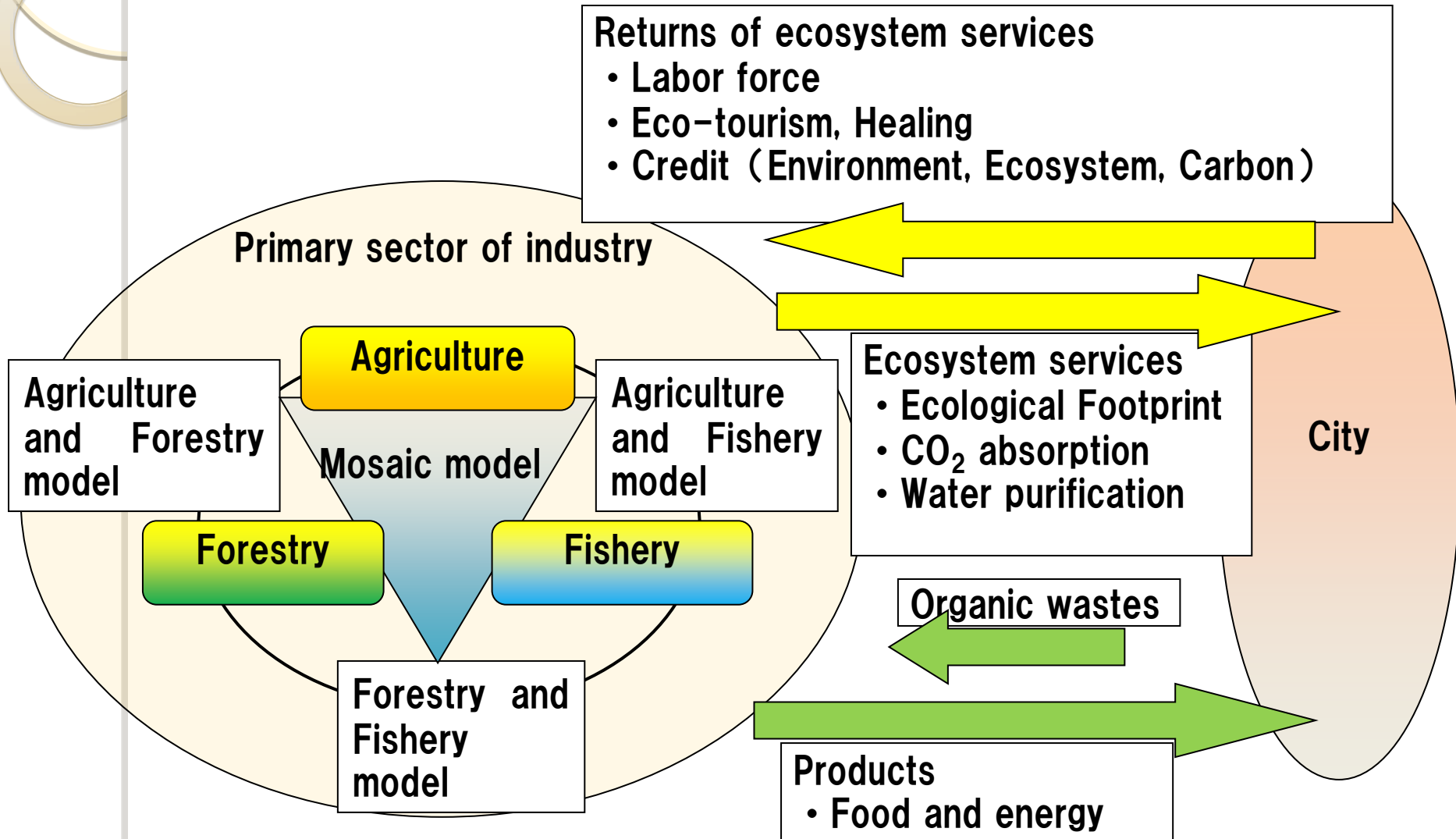
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Energy Farming in Germany

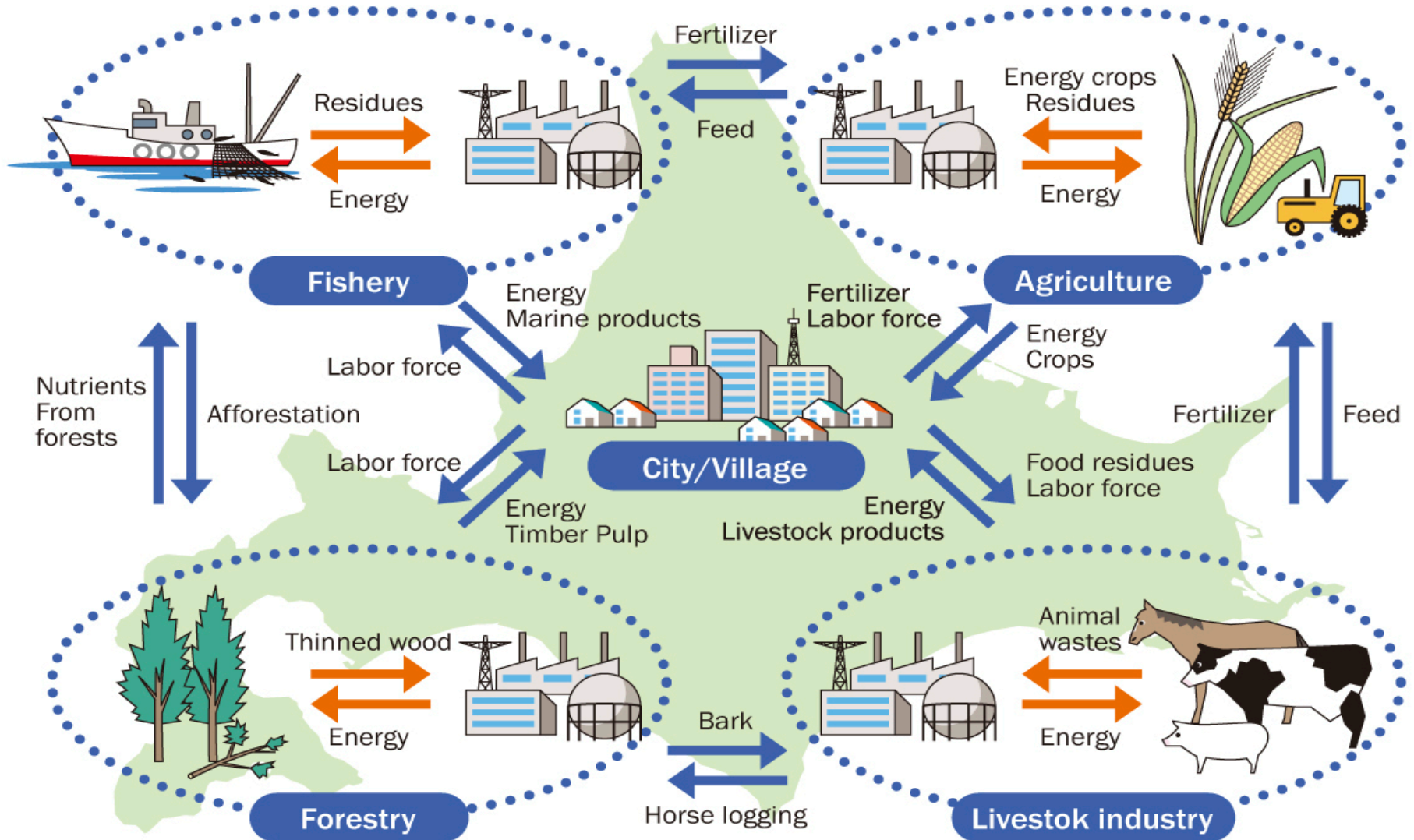


- 1 Thermal and Power unit (Biomass, Wind, Solar) 2 Pelleting, Oil mill, Ethanol unit
 3 Animal husbandry 4 Biogas unit 5 Administration

Mosaic model



New agricultural communities





Acknowledgment

This work was supported by

- the Global Environment Research Fund (Hc-084) of the Ministry of the Environment, Japan,
- and MEXT through Special Coordination Funds for Promoting Science and Technology

THANK YOU FOR YOUR ATTENTION!



クラーク会館 講堂 組帳