How to diversify and differentiate bioeconomy? Clues from terroir approaches

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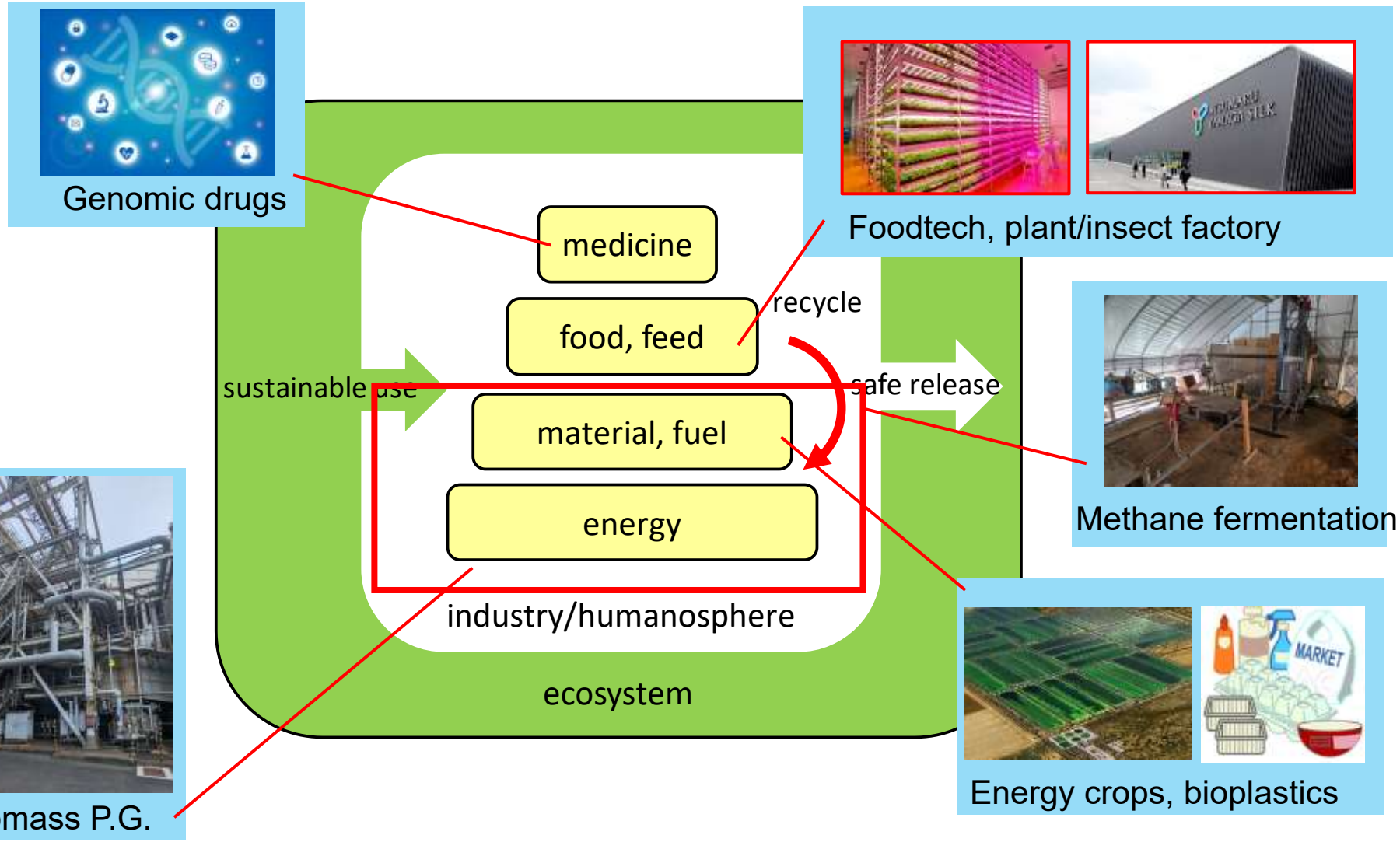
Bioeconomy is not free from competition



Nagothu and Nagano, 2020 modified

Terroir Approach

- The "terroir approach" refers to a philosophy and practice in agriculture, most notably in winemaking, that emphasizes the unique characteristics of a specific geographic location and its environmental conditions in shaping the final product.

Soil, climate, topography, local flora and fauna, Human factor etc.

Naturally a differentiation strategy that grasps brains and stomachs of people

Japanese terroirs often connects to sea bays are part of terroirs in Japanese concept

Blue carbon (UNEP, 2009)

- Of all the carbon absorbed by living organisms on Earth, 55% is taken up by marine life.
- Coastal areas, which make up less than 0.5% of the total ocean area, account for nearly 80% of the ocean's entire CO_2 storage potential.
- The rate of CO_2 absorption per unit area in these coastal ecosystems (**Mangroves, salt marshes, sea grasses)** is 5 to 10 times higher than in forest ecosystems.

UNEP (2009) Blue Carbon: The Role of Healthy Oceans in Binding Carbon

Unlike other types of carbon, blue carbon is subject to conservation rather than proactive industrial use

Japanese Dashi or “soup stock”, fundamental to Japanese cuisine, is totally blue carbon based

Konbu: Saccharina japonica

+

Katsuobushi: Bonito fish flakes
Smoked and fermented

+
sometimes

Shitake: Lentinula edodes

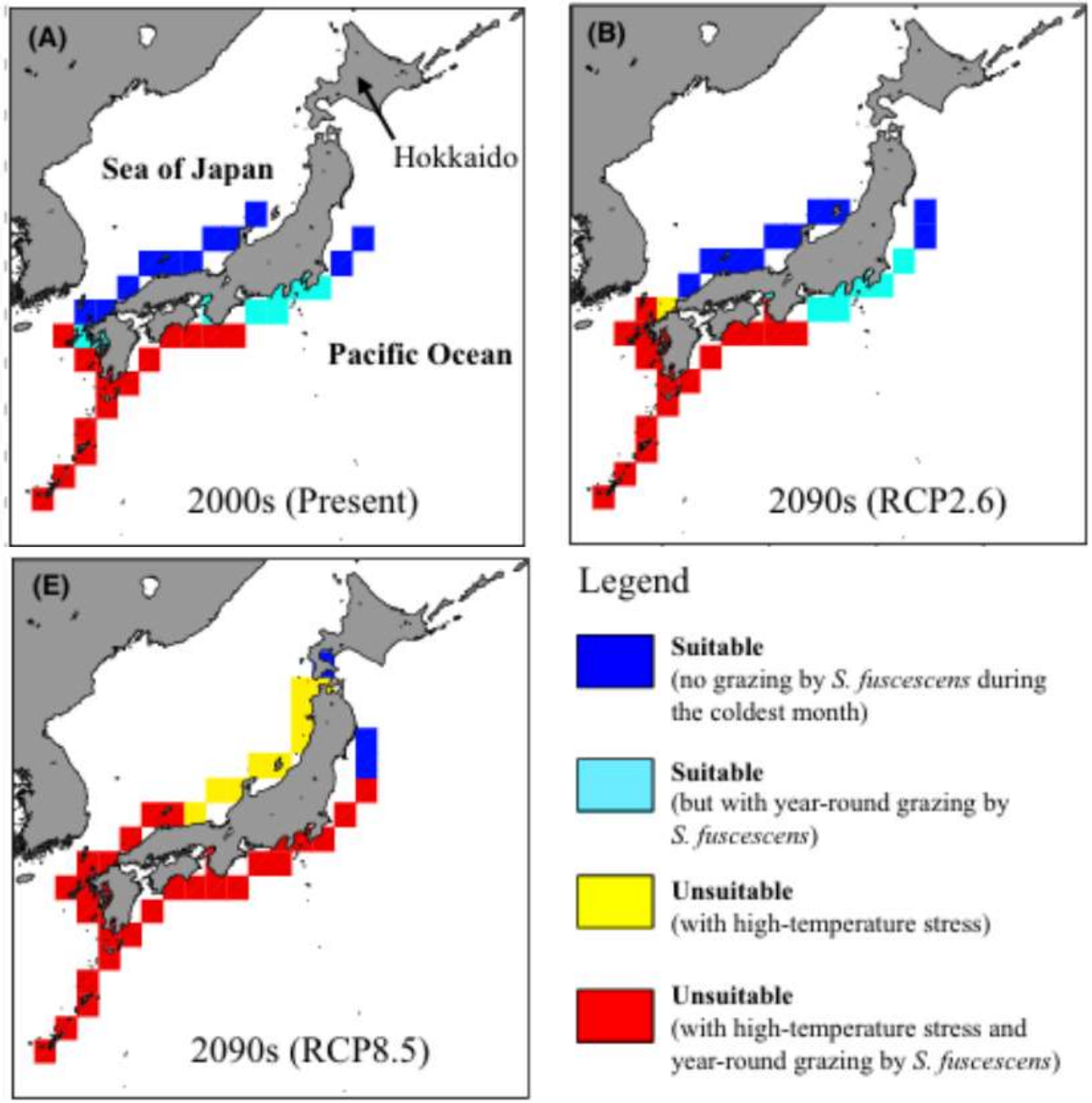
In 2024 Japan quantified its blue carbon sink as 350,000 t

At the same time
disclosed constar
decreasing blue c
habitat in the last
years

Data: GHG inventory of Japan 2024

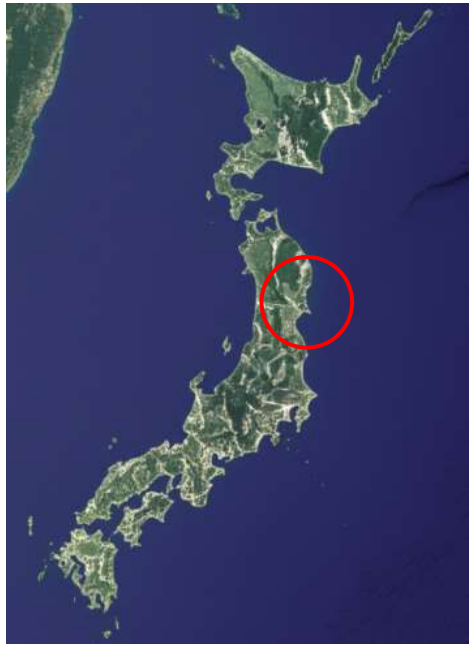
Climate change impacting seaweed

- Seaweed beds are diminishing around the coast of Japan
- Rising sea water temperature directly affects growth
- Increased eating pressure from sea urchin and fishes



Takao et al. (2015): Ecology and Evolution, (5)1, 213-223

Founder of basin approach in Japan



Mr. Shigeatu HATAKEYAMA,

Oyster farmer in Kesenuma, Japan, witnessing frequent occurrence of red tides in his bay in late 1960s to 1970s, started planting broadleaf trees in mountains upstream.

"Forest is longing for the sea,

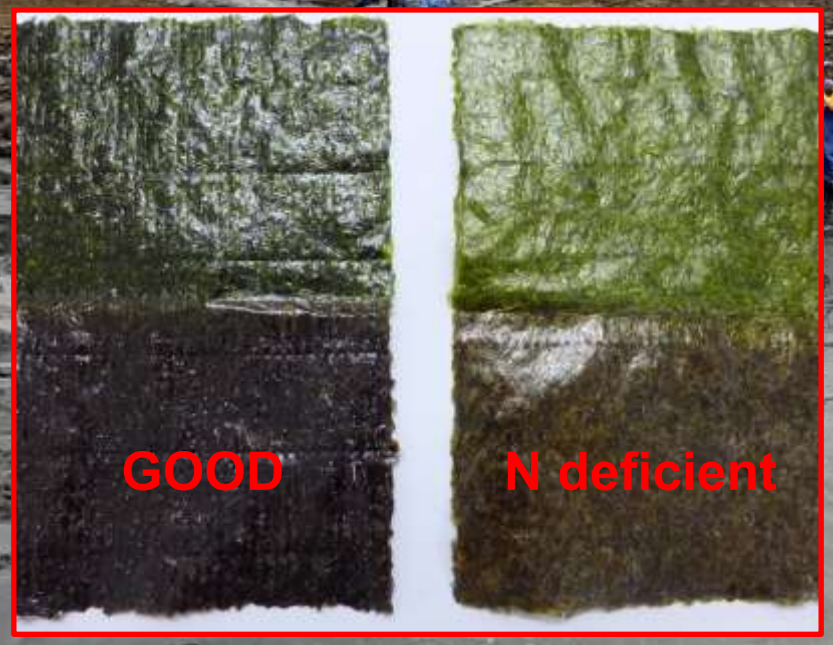
sea is longing for the forest"

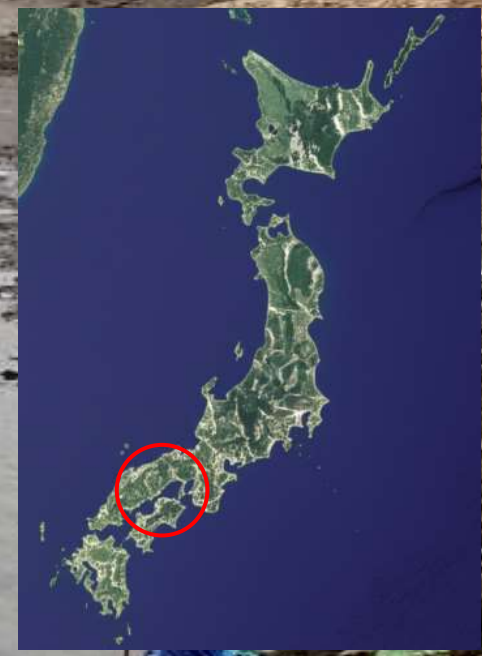
His approach greatly improved quality of oysters and added terroir value. Widely known through school textbooks, taxpayers understand the connectivity.

Science later revealed importance of Fe_2O_3 for productivity of sea

Courtesy: NPO Mori wa Umi no Koibito

Fishermen (seaweed growers) in Awaji Islands are assisting rice farmers for draining siltation from agricultural ponds





Recently inner seas became too clean (N deficient) resulting in declining quality of “nori”. They are trying to enrich N with drained silt. Their trial led to adaptive

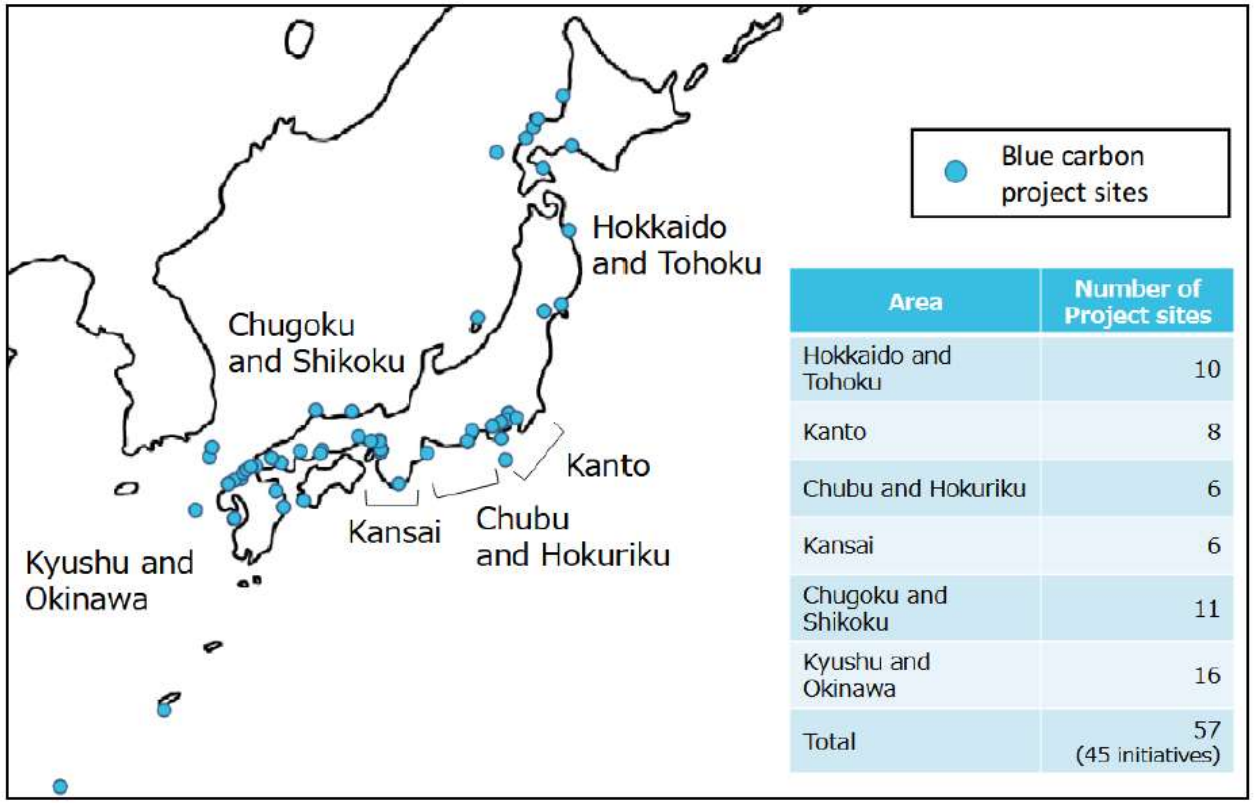
Cabbage-fed sea urchin

- To protect seaweeds, sea urchin is often removed by fishermen
- Kanagawa Fisheries Experimental Station found that removed sea urchin can be grown with cabbage leftover
- Sea Urchin is one of the most expensive sushi material
- This innovation is quickly adopted by other areas. In June 2025 sushi restaurant giant announced adopting this approach for its sushi material.

https://www.youtube.com/watch?v=4__eLjXx2qo

Many blue carbon projects are being implemented

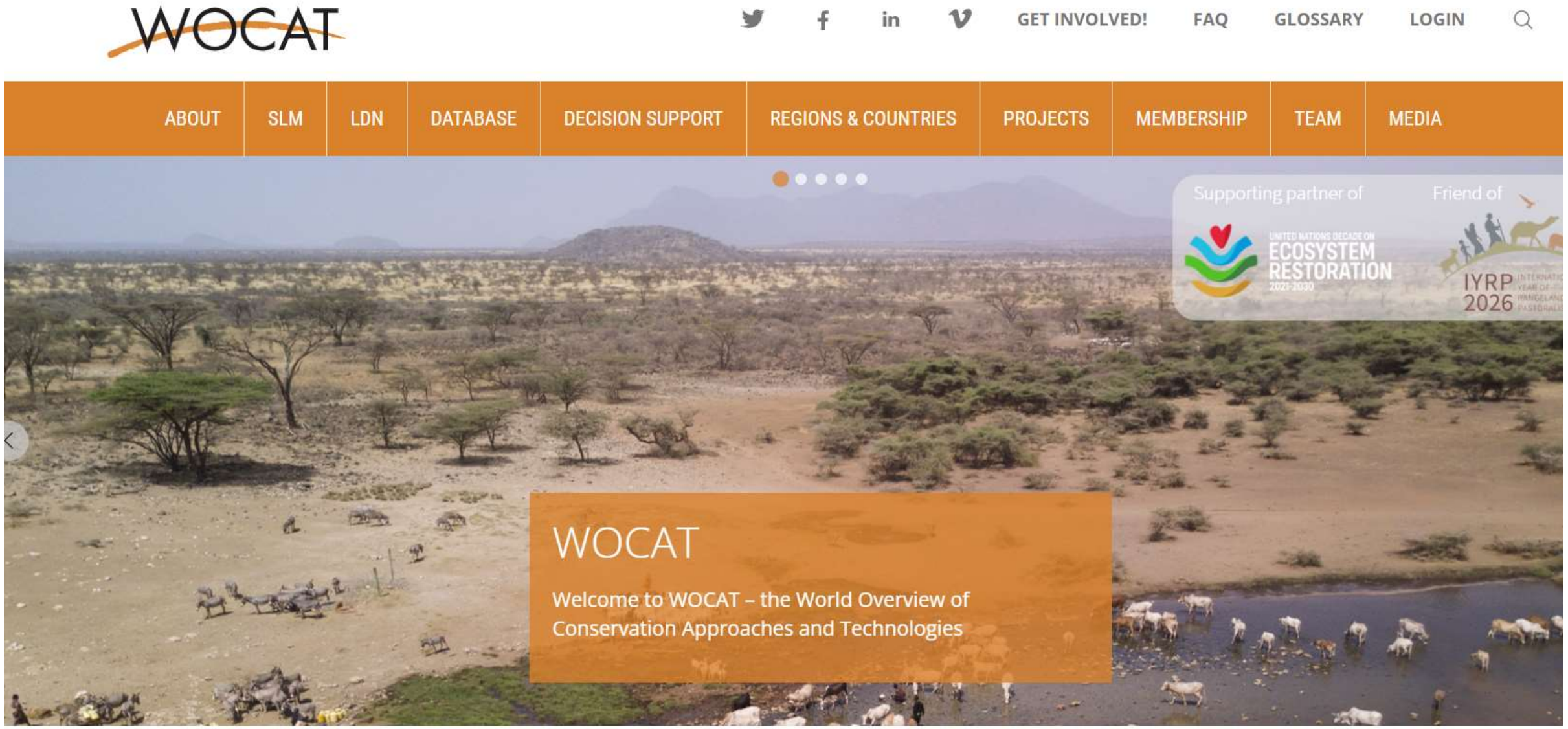
- Some are carbon-credit based.
- Above may not be enough for wider acceptance and understanding by tax-payers
- Sharing information of good governance quickly manipulates



Area	Number of Project sites
Hokkaido and Tohoku	10
Kanto	8
Chubu and Hokuriku	6
Kansai	6
Chugoku and Shikoku	11
Kyushu and Okinawa	16
Total	57 (45 initiatives)

Source: Case Study on Blue Carbon Initiatives in Japan, MOEJ

Another terroir approach



Some clues from terroir approaches

- Bioeconomy may not be successful if competition is severe among regions. Differentiation and diversification is important.
- People need “terroir” and good stories to empathy
- Initiative by local wisdom is always nice
- Global database of promising elemental technologies and good governance (environmental collaboration and conflict resolution) is necessary for bioeconomy,

  for inspiration, spreading and diversification

Open Planning for a Circular Bioeconomy at Local and Regional Levels

How can stakeholders design diverse circular-bioeconomy addressing locality?

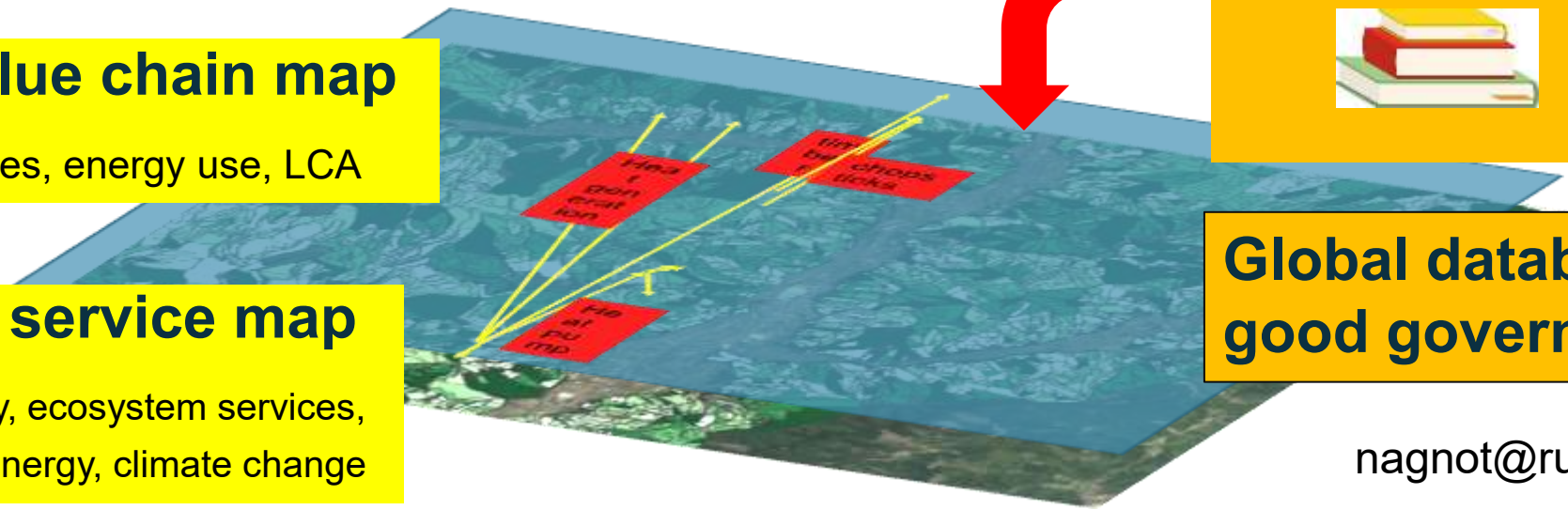
How can we empower bioresource governance across different sectors at regional scale?

Visualization of ecosystem services and industrial value chain is the key.
Stakeholders should be able to refer to global database for inspiration and design.
We are designing tool kits and looking for collaborators

Global database of new bioeconomy technologies

Industrial value chain map

Biomass flow, facilities, energy use, LCA



Ecosystem service map

Biomass productivity, ecosystem services, zoning, renewable energy, climate change

Global database of good governance

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