

# **Blue Carbon: Reconnecting with the Sea and Cities, Building Sustainable Communities**

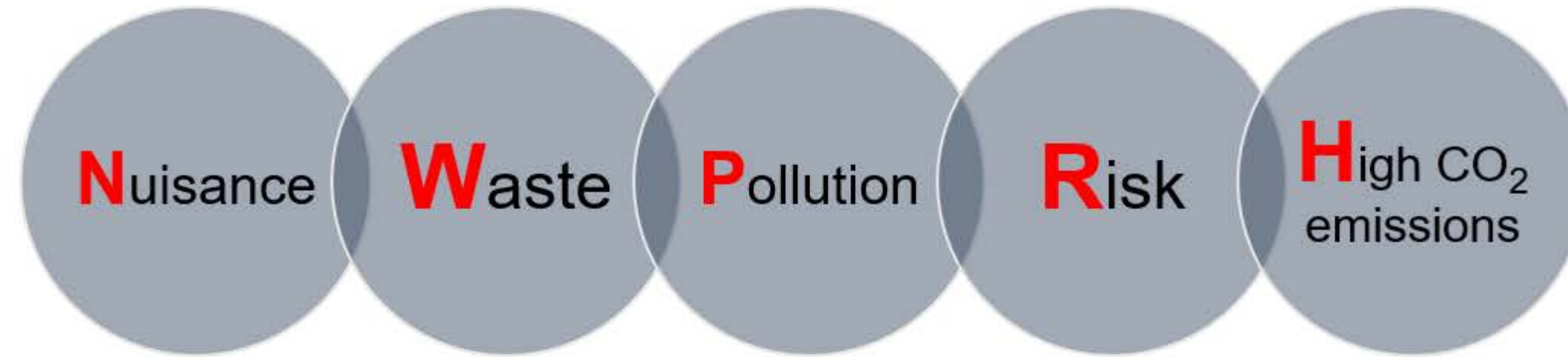
@ISAP: SDGs International Forum

Masato Nobutoki  
Director, EX Research Institute Ltd.  
Invited Professor, Kobe University

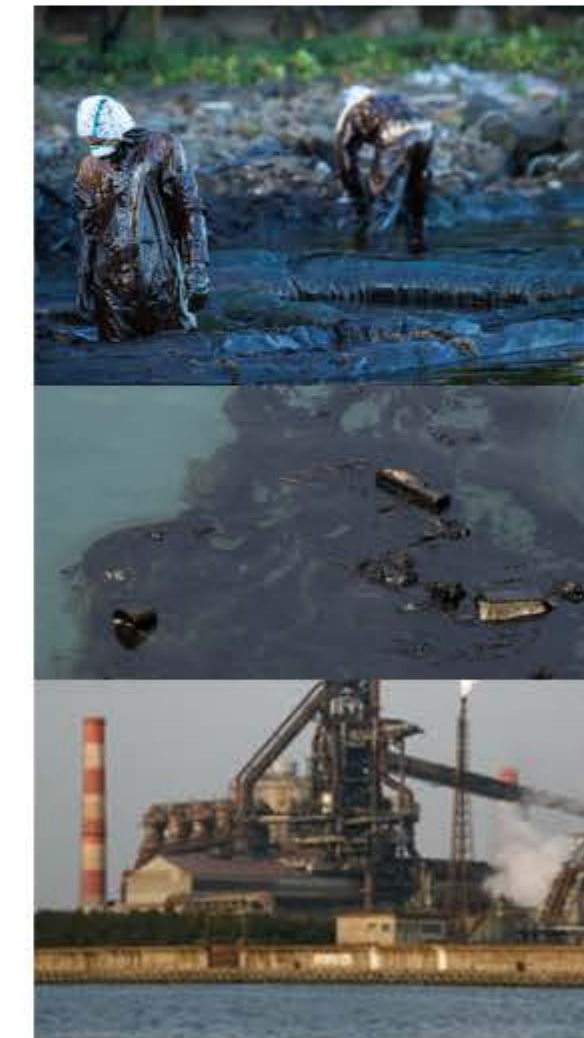
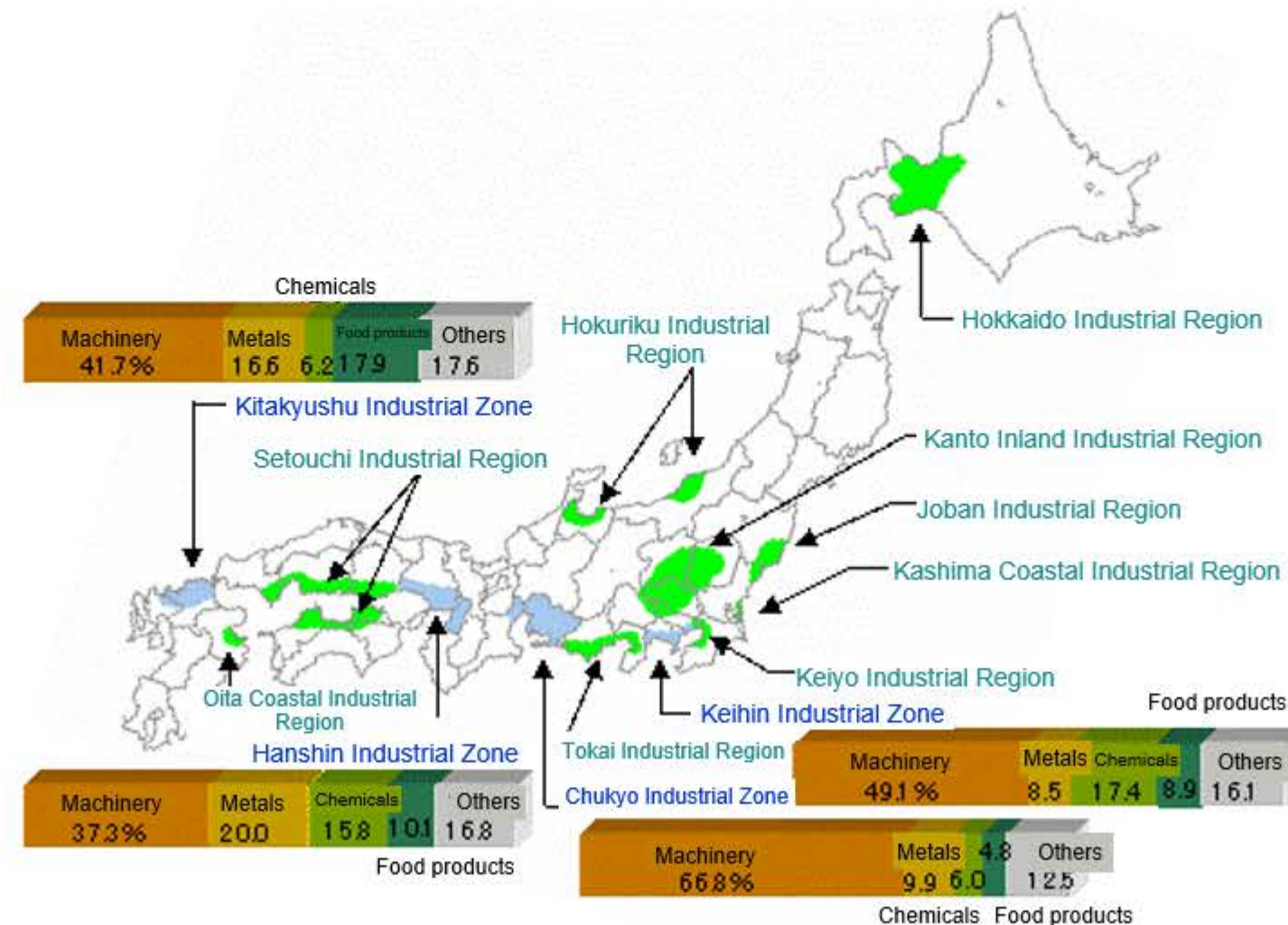
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# Past Challenges in Japan's Coastal Areas

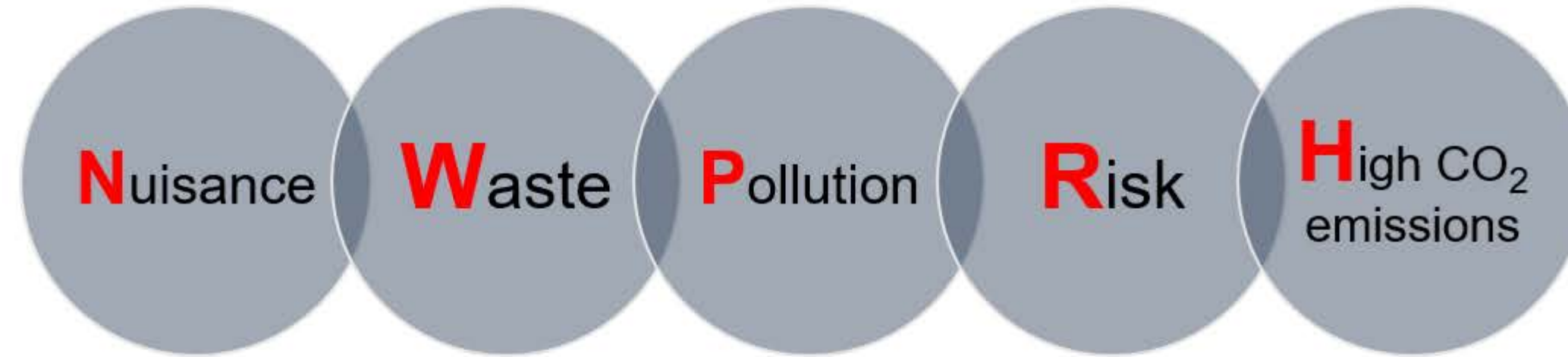


- Coastal areas once served as locations where locally unwanted facilities were concentrated.
- Past coastal development involved industrial zones and districts, land reclamation, alteration of bay topography, seabed depressions formed by marine sand extraction, and the destruction of traditional coastal landscapes (natural beaches and coastal vegetation).





# Renewing the Use of Japan's Coastal Areas

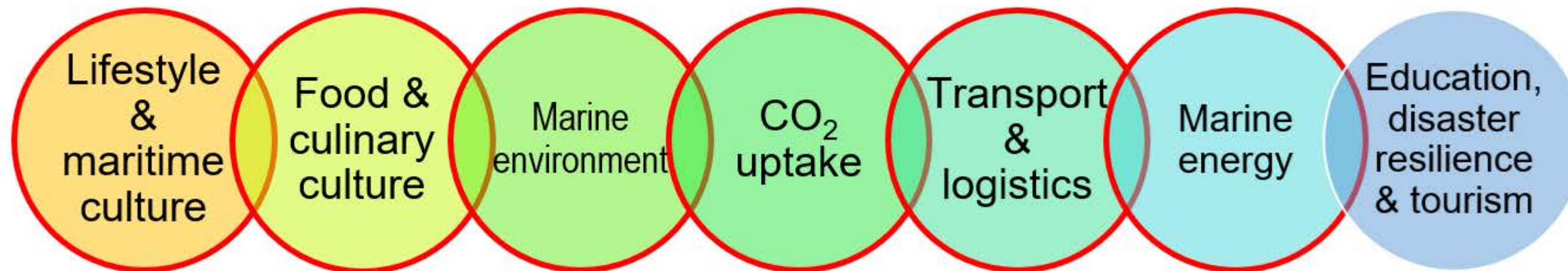


**An era of creating the sea's multifaceted value**

With the Earth now recognised as a stakeholder, we are undergoing a major shift towards a sustainable era in which industries, activities, and businesses that fail to consider environmental impacts can no longer remain economically viable.



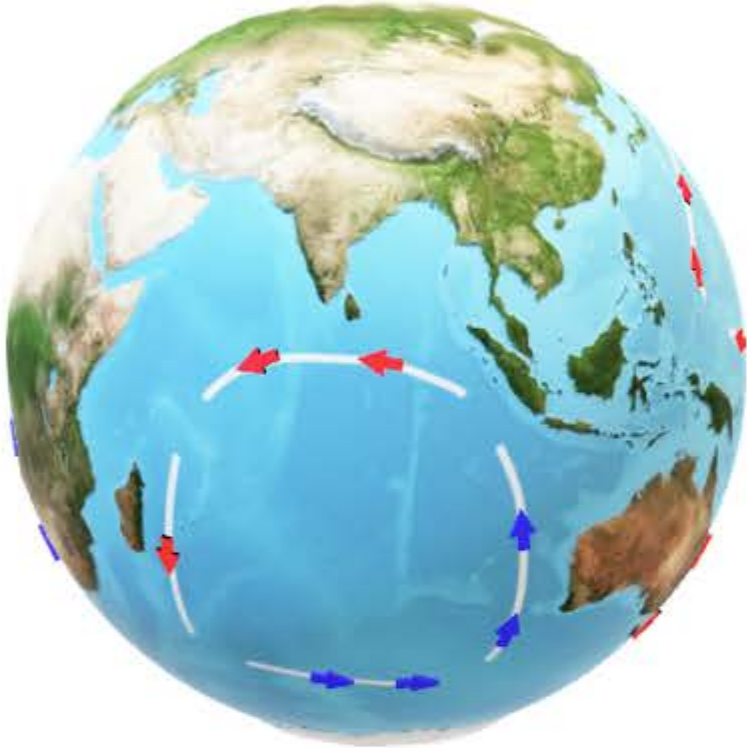
**Connecting the sea, people, and local communities through new multi-sector clusters**



A major transformation towards a sustainable Seto Inland Sea coast where the sea, people, and local communities flourish together



*A turning point in urban development from the 20th to the 21st century?*



☆ **The realities of the sea and port as seen from Yokohama**

☆ Is it truly an international port?

(Where does it rank globally in container throughput?)

☆ In Yokohama, citizens can access only 1.4 km of its 140 km coastline (just 1%).

They rarely eat locally caught seafood and do not—or cannot—swim in the sea.

☆ The benefits and drawbacks of 20th-century, heavy-industry-led urban development

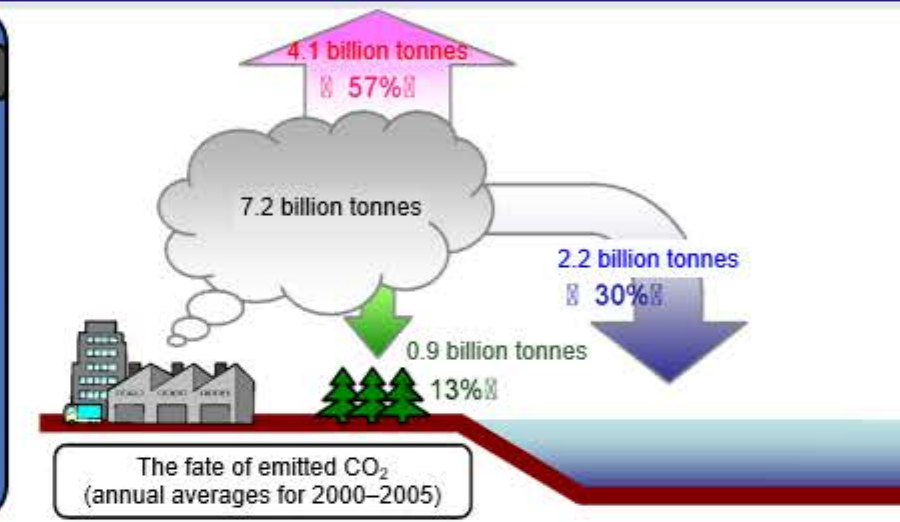
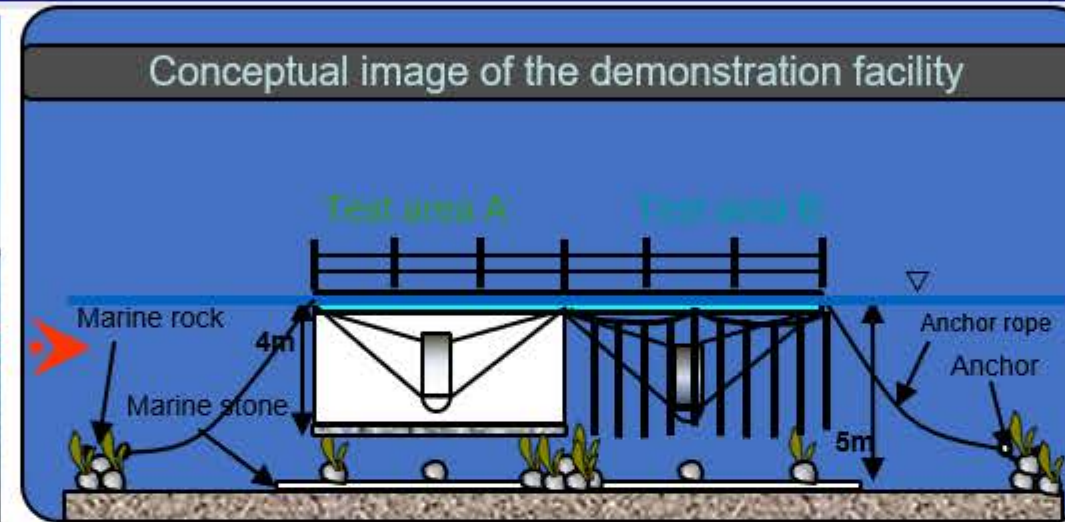
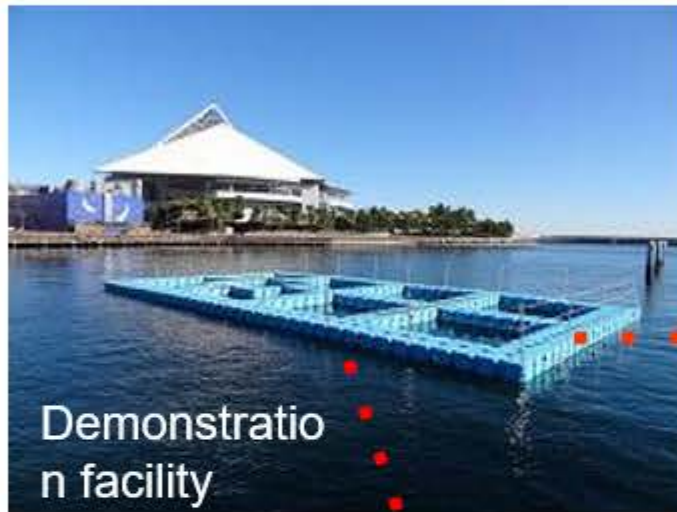
☆ Waterfronts in port districts are used almost entirely for logistics.

☆ Should we not reconnect with the sea through food, resources, and energy in the future?



# Yokohama Blue Carbon Project

Of the 7.2 billion tonnes of CO<sub>2</sub> emitted globally each year, **approximately 2.2 billion tonnes are taken up by the world's oceans**, 0.9 billion tonnes by terrestrial ecosystems such as forests, and 4.1 billion tonnes remain in the atmosphere. The world's oceans bind an estimated 55% of all carbon in living organisms. This is called “blue carbon”. (Source: Adapted from a United Nations Environment Programme report)

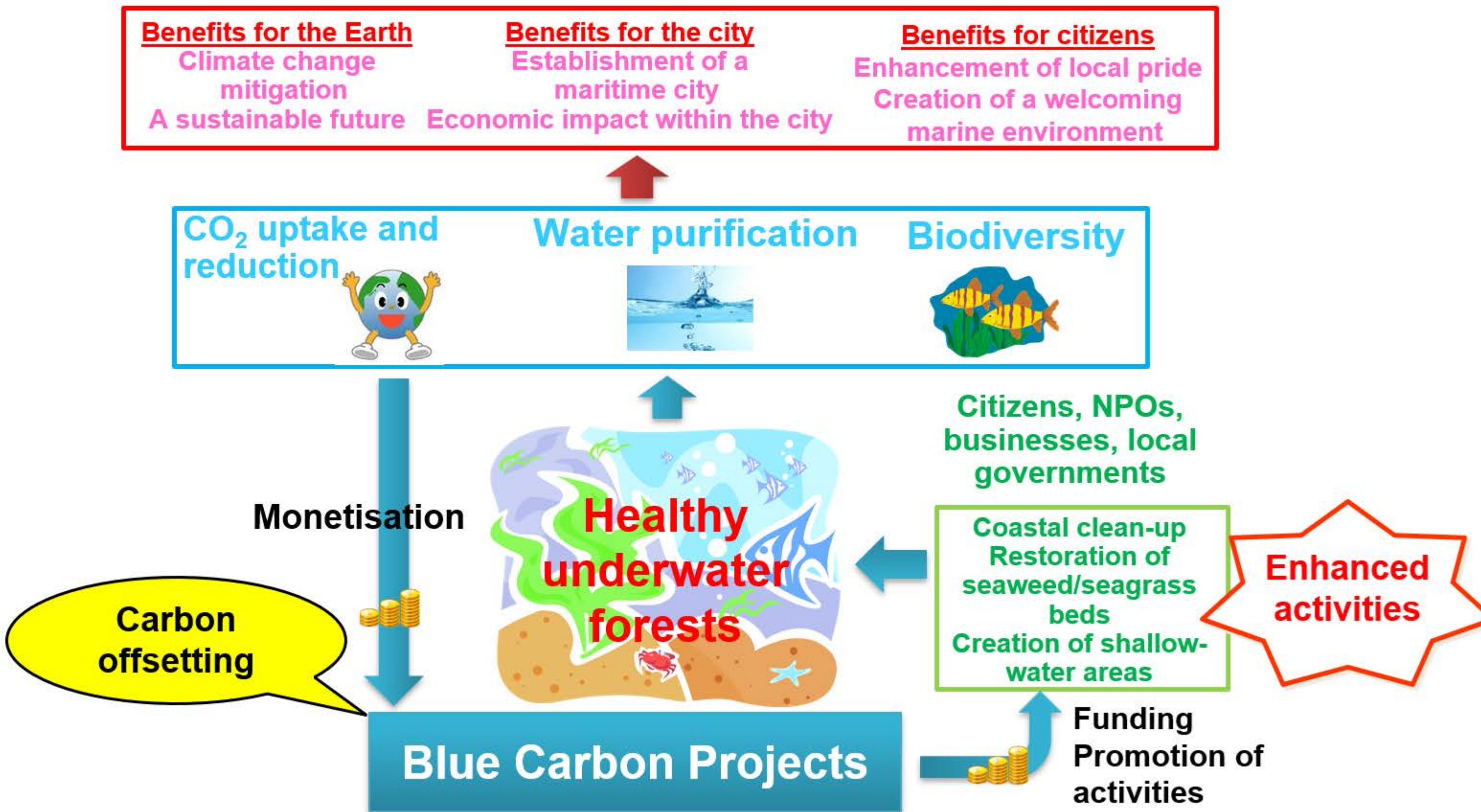


## Environmental education: Wakame harvesting event





# Objectives of Blue Carbon







Promoting understanding  
and fostering pride  
among citizens of a  
maritime city, while  
supporting fisheries,  
biodiversity, education,  
and more



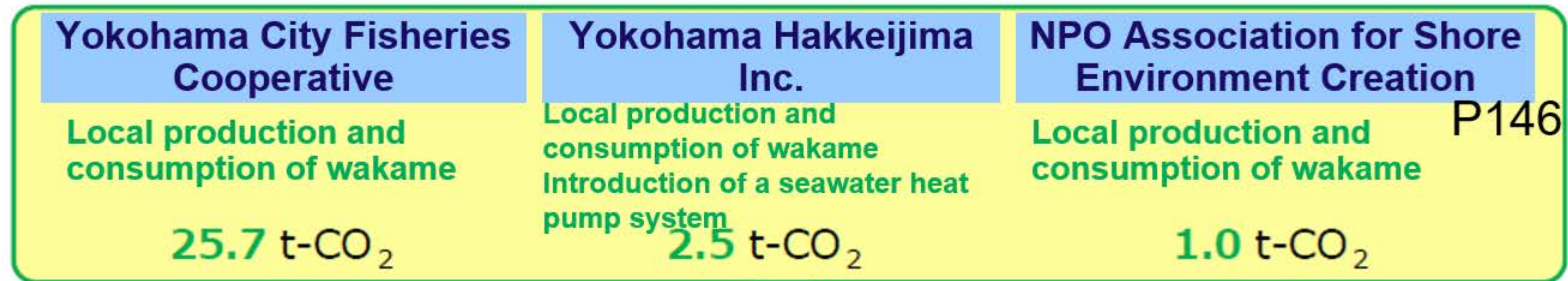




## Carbon offset certification (FY2016)



Certified credits can be traded in units of 0.1 t-CO<sub>2</sub> **29.2 t-CO<sub>2</sub>**



- ◆ Energy use in event operations
- ◆ Travel by athletes and staff
- ◆ Energy use associated with business activities

CO<sub>2</sub> emissions **29.2 t-CO<sub>2</sub>**

Purchase of offset credits  
**Carbon offsetting**

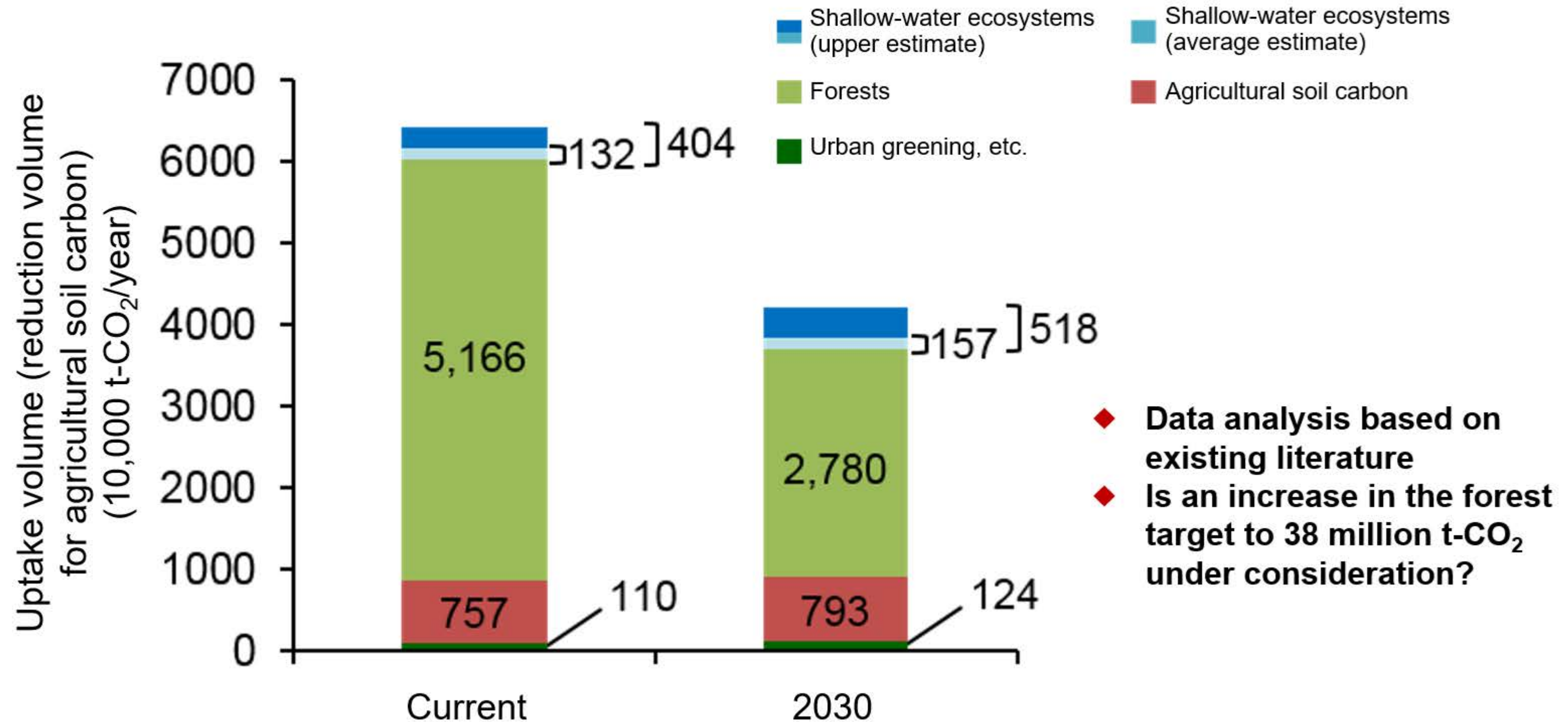


Carbon offsetting equivalent to **3,300** cedar trees



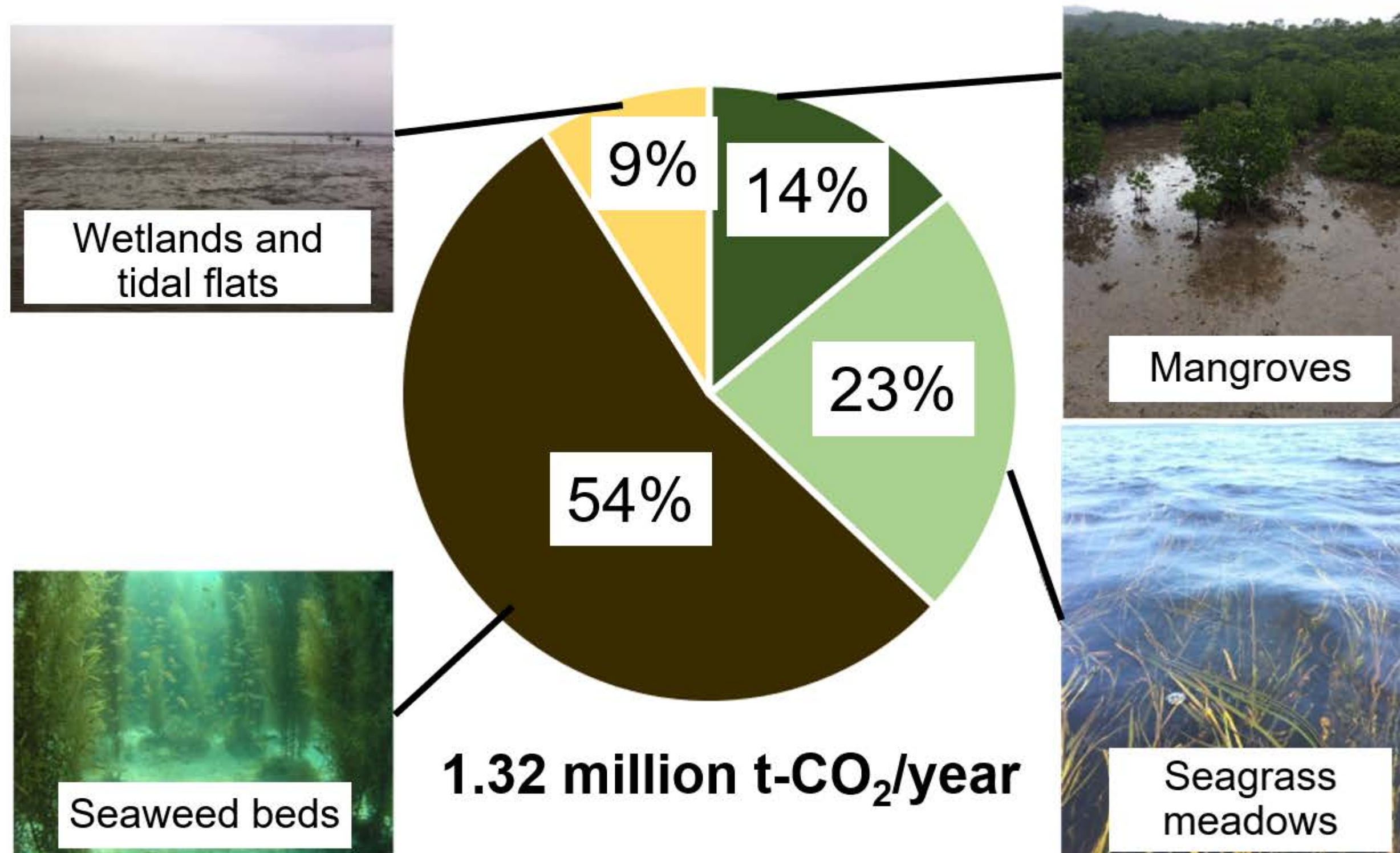


## Comparison of shallow-water ecosystems (mangroves, wetlands & tidal flats, seagrass meadows, and seaweed beds) with other carbon sinks





# Seaweed beds as a major carbon sink





R&D → Policy & planning → **Implementation**

## Background and objectives

- To promote climate change mitigation projects in coastal areas, the Japan Blue Economy Association (JBE) was established under the Act on Research and Development Partnership concerning Mining and Manufacturing Technology to conduct research on the quantitative evaluation of environmental benefits, funding mechanisms, and other approaches needed for implementation.
- This is the first technology research association established in Japan in this field, including blue carbon.

## Board members

|                           |                                                                                                                                                                 |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| President Tomohiro Kuwae  | Head of the Coastal and Estuarine Environment Research Group, Port and Airport Research Institute, National Institute of Maritime, Port and Aviation Technology |
| Director Masato Nobutoki  | Invited Professor, Kobe University                                                                                                                              |
| Director Atsushi Watanabe | Ocean Policy Research Institute, Sasakawa Peace Foundation                                                                                                      |
| Auditor Teruo Yashiro     | Certified Public Accountant                                                                                                                                     |

## Members (as of establishment in 2020)

National Institute of Maritime, Port and Aviation Technology  
Sasakawa Peace Foundation  
Tomohiro Kuwae

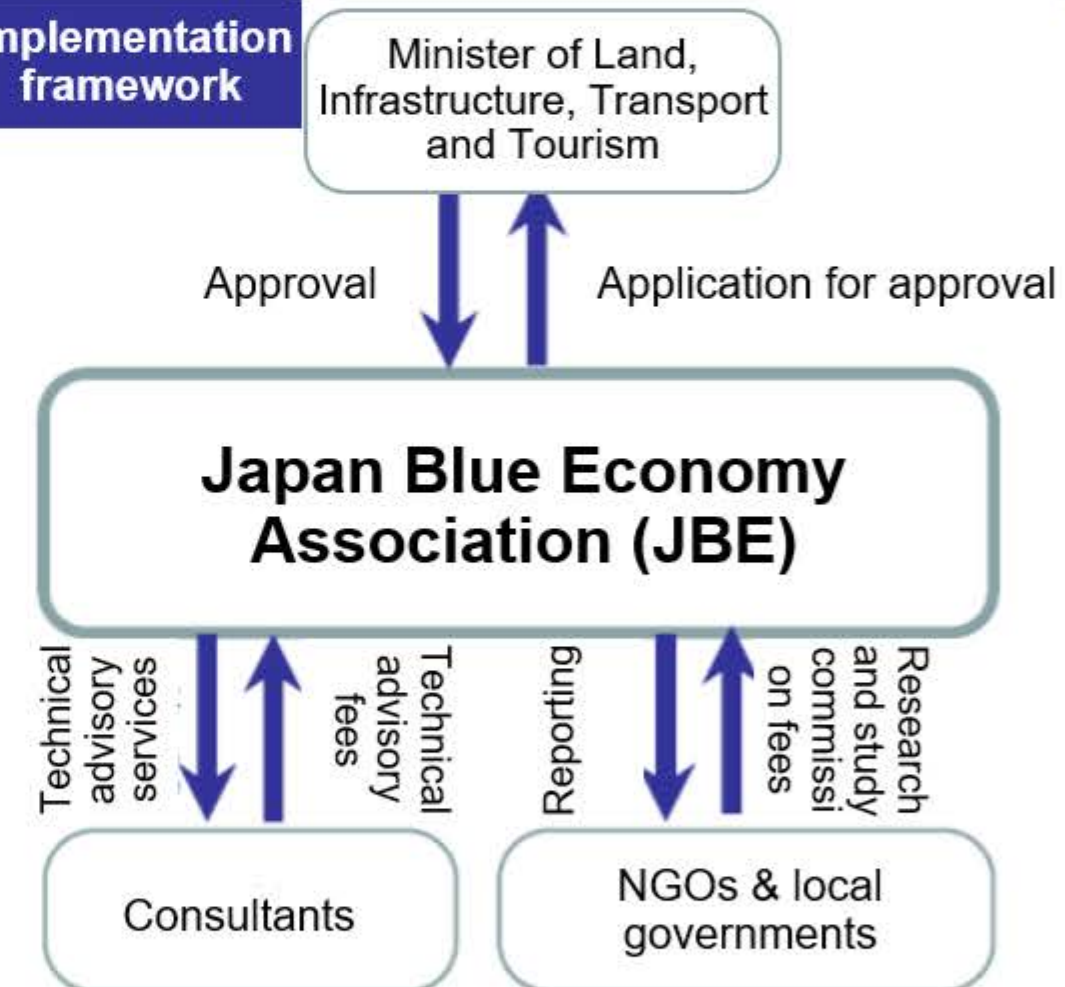
\* Following its establishment, JBE plans to broaden its membership by welcoming new member organisations, including the Waterfront Vitalization and Environment Research Foundation, SCOPE, JAPIC, public-interest incorporated associations and foundations, NGOs/NPOs, universities, and researchers.

## Business overview

The Association conducts the following research activities:

- 1) Quantitative evaluation of environmental value in coastal areas
- 2) Creation and enhancement of environmental value in coastal areas
- 3) Formation of social consensus for the implementation of item 2
- 4) Introduction of new funding mechanisms for areas where item 2 is implemented

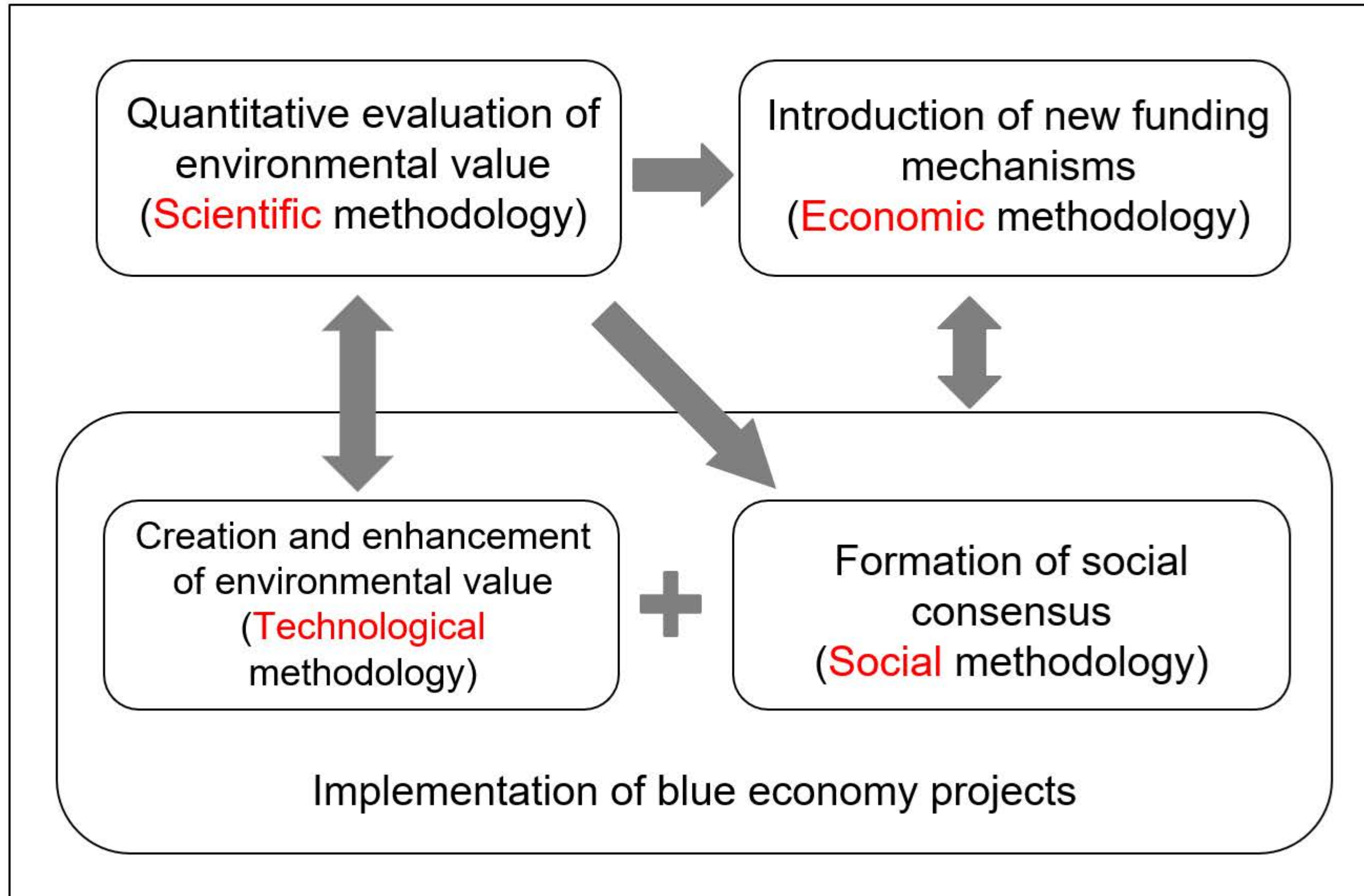
## Implementation framework



Blue Economy: Economic growth driven by the sustainable use of ocean resources, with blue carbon ecosystems—particularly seaweeds—playing a central role.



# Development of four methodologies



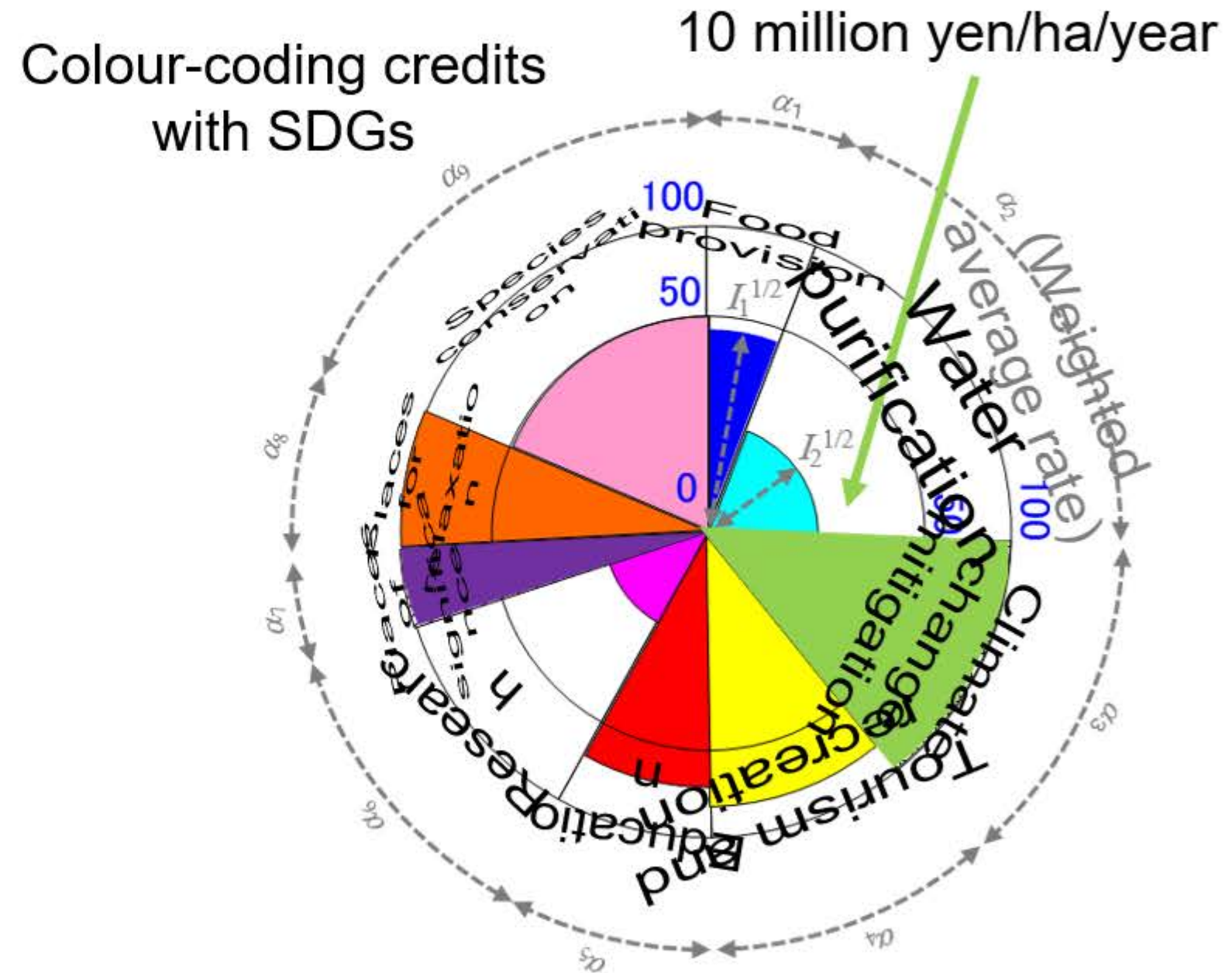


# 1: Quantitative evaluation of environmental value (Scientific methodology)



Published in April 2020

Handbook on the Quantification of  
Environmental Value in Coastal Areas

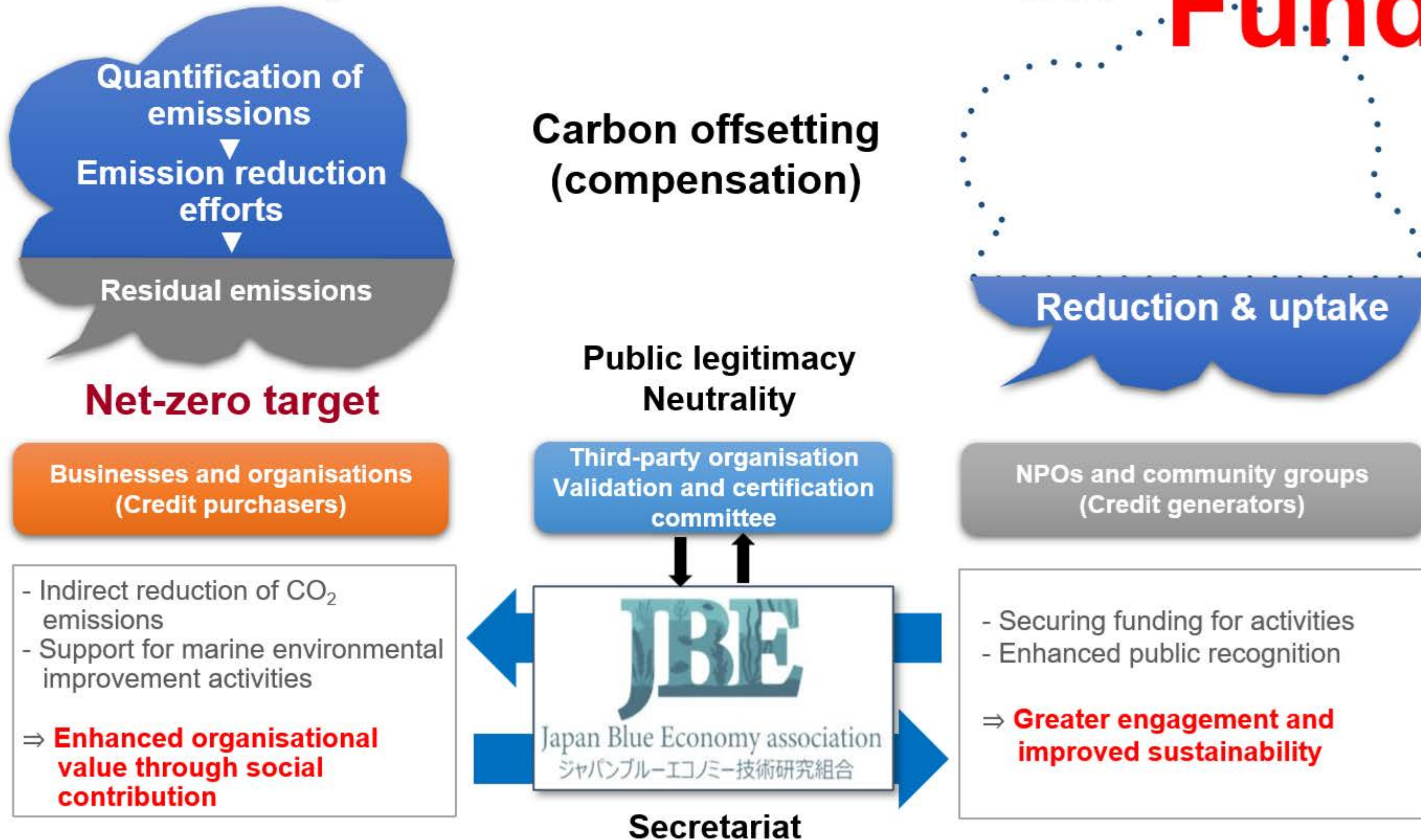


[Illustration] The environmental value of seaweed and seagrass beds is five times greater than their blue carbon value (50 million yen/ha/year).



## 2. Introduction of new funding mechanisms (Economic methodology)

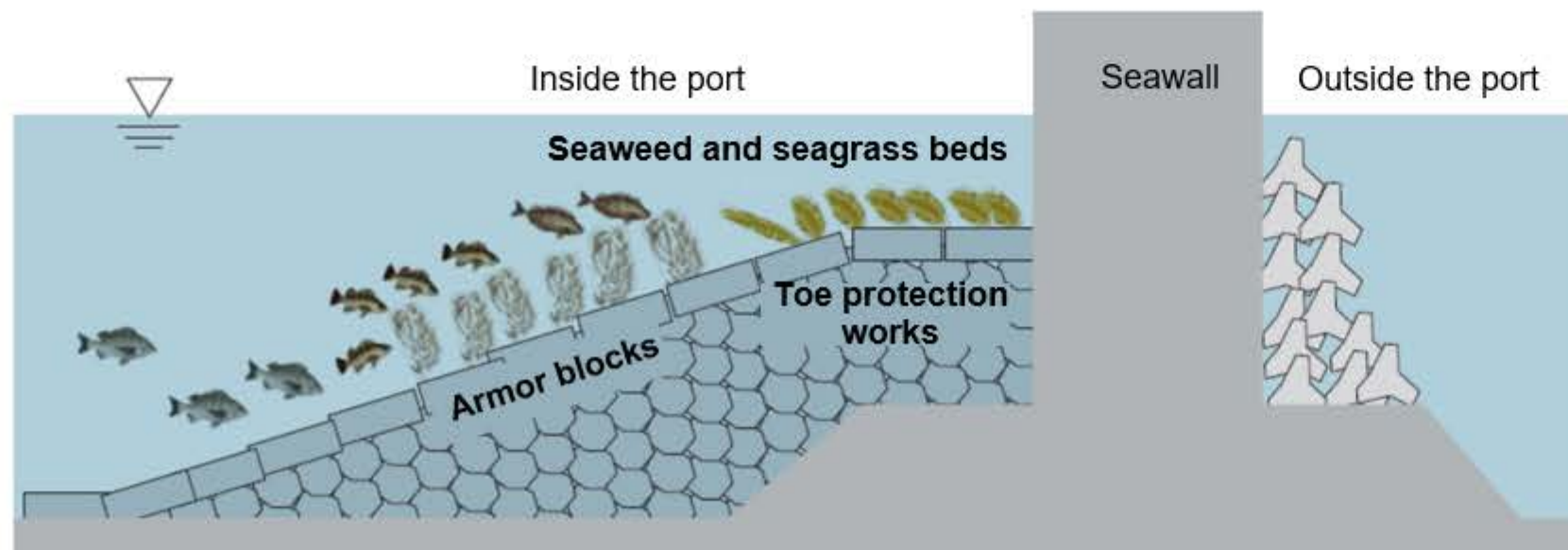
# Funding



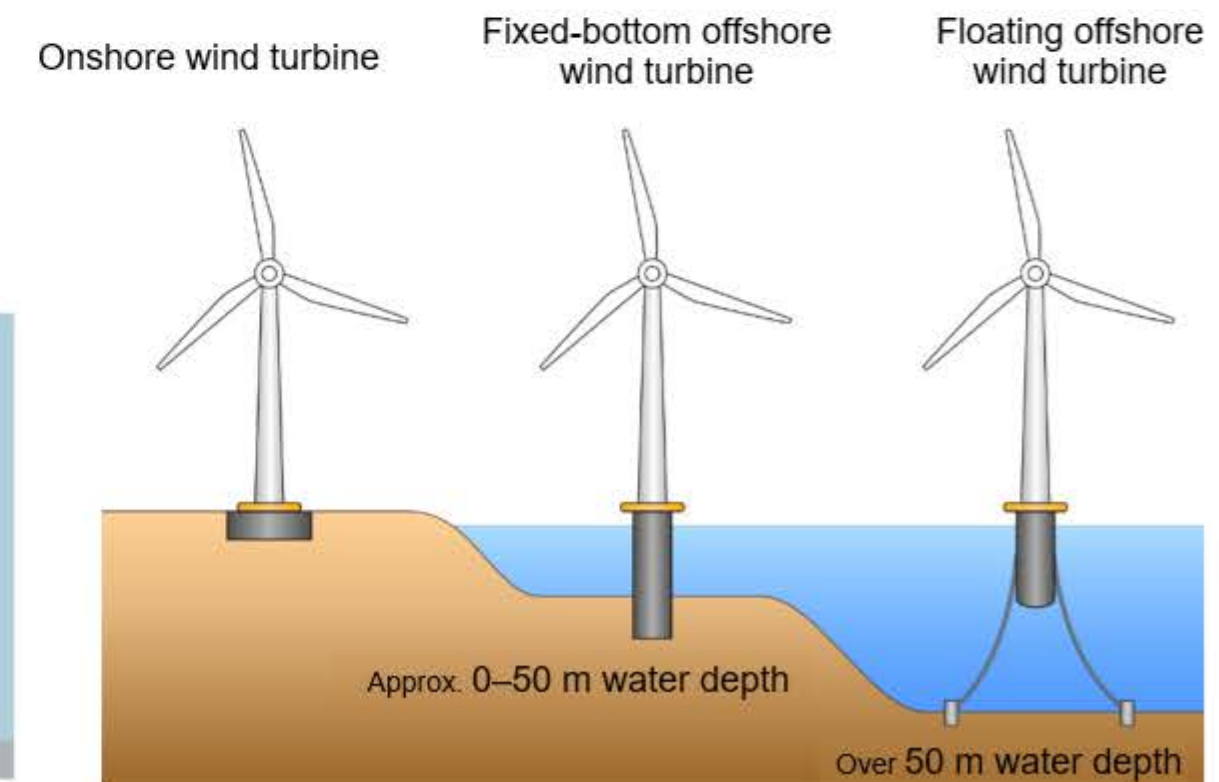


### 3. Creation and enhancement of environmental value **Resources** (Technological methodology)

- ◆ Development of technologies to enhance CO<sub>2</sub> uptake by ecosystems (quality enhancement)
- ◆ Identification of new carbon sinks (quantity expansion)



Practical Green Infrastructure (2020)

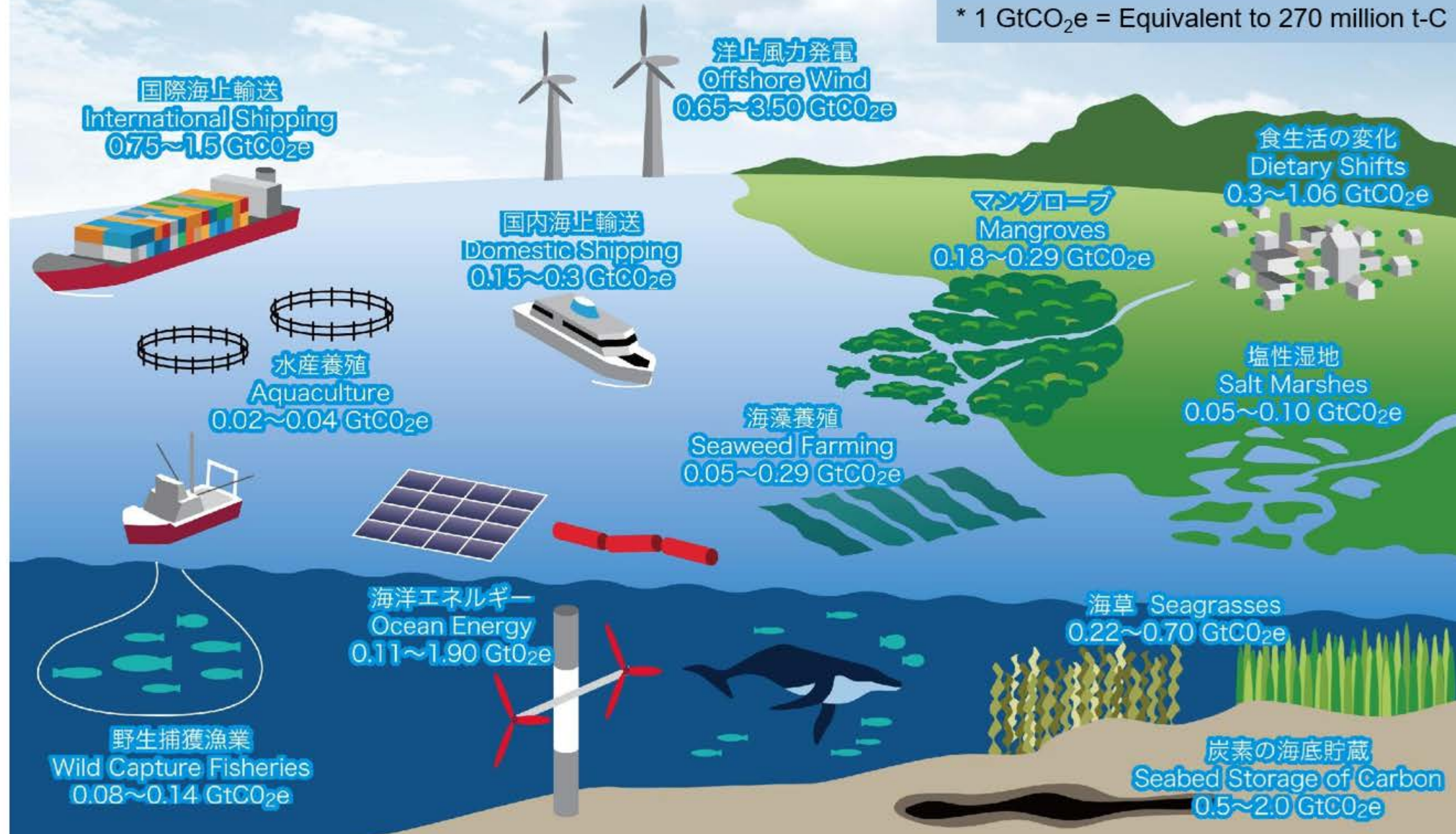


<https://ja.wikipedia.org/wiki>



# All these are eligible for crediting

\* 1 GtCO<sub>2</sub>e = Equivalent to 270 million t-C

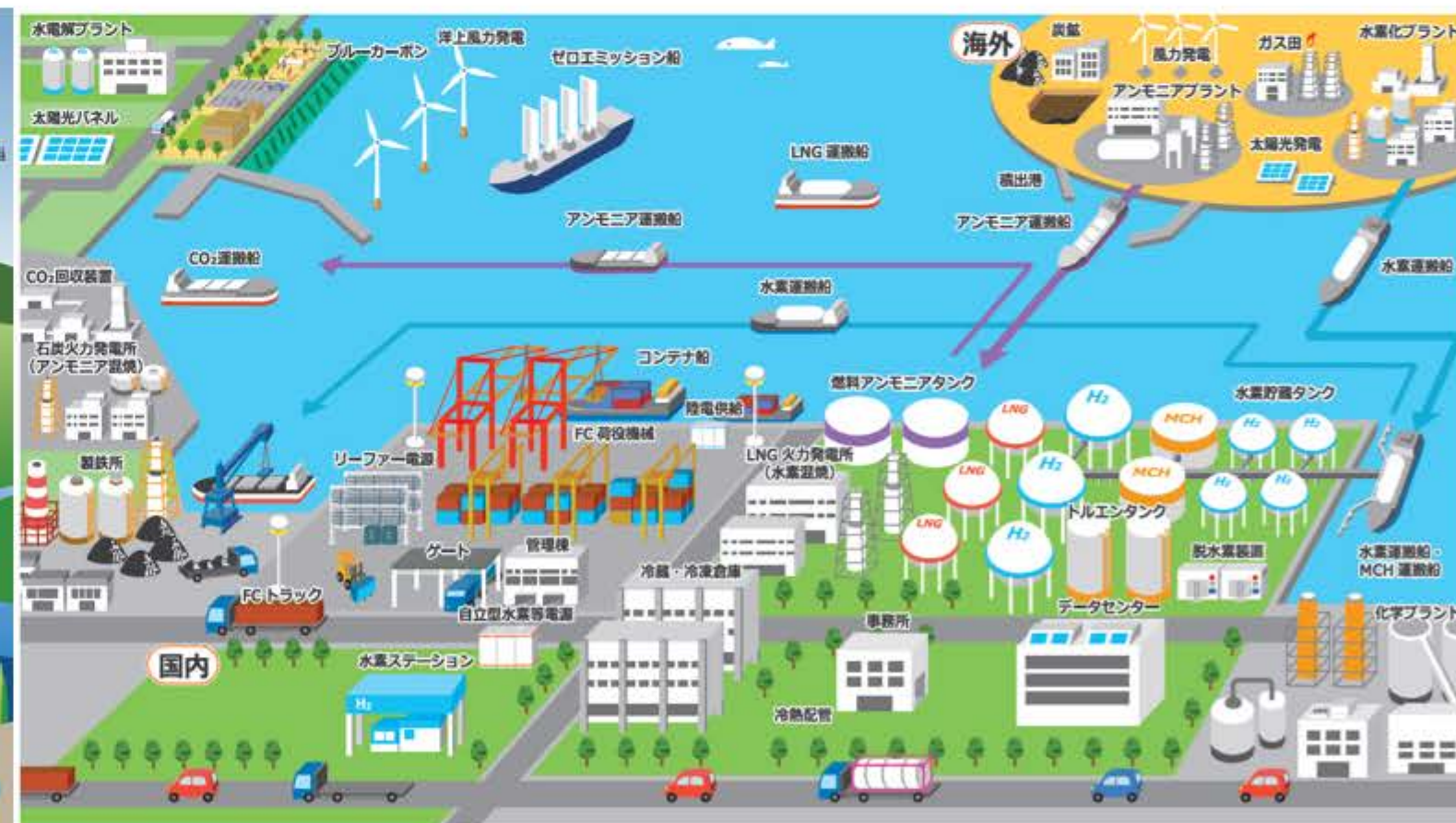
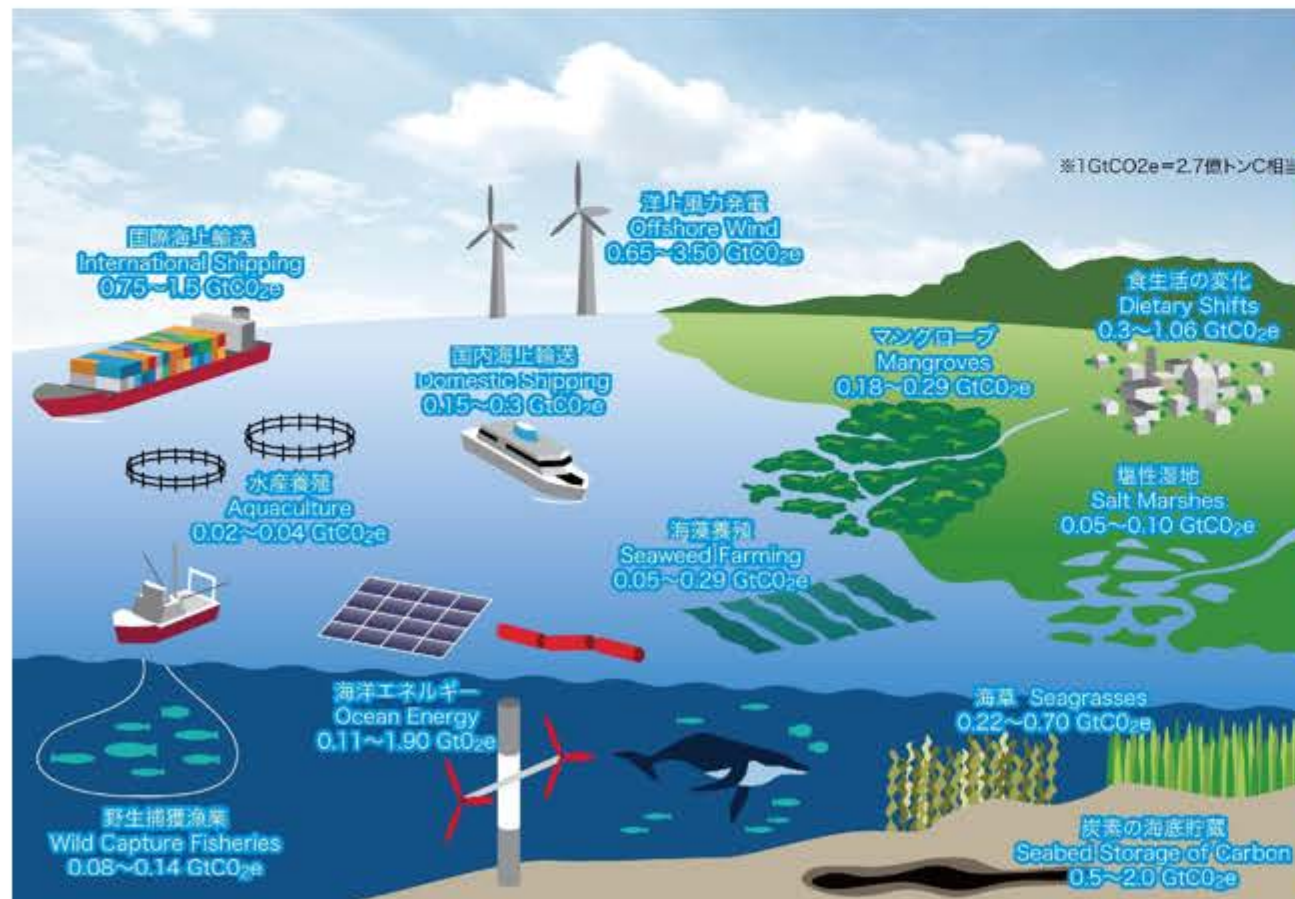




## 4. Formation of social consensus (Social methodology)

# People

- ◆ What are the barriers to and catalysts of behavioural change?
- ◆ How can these be leveraged?

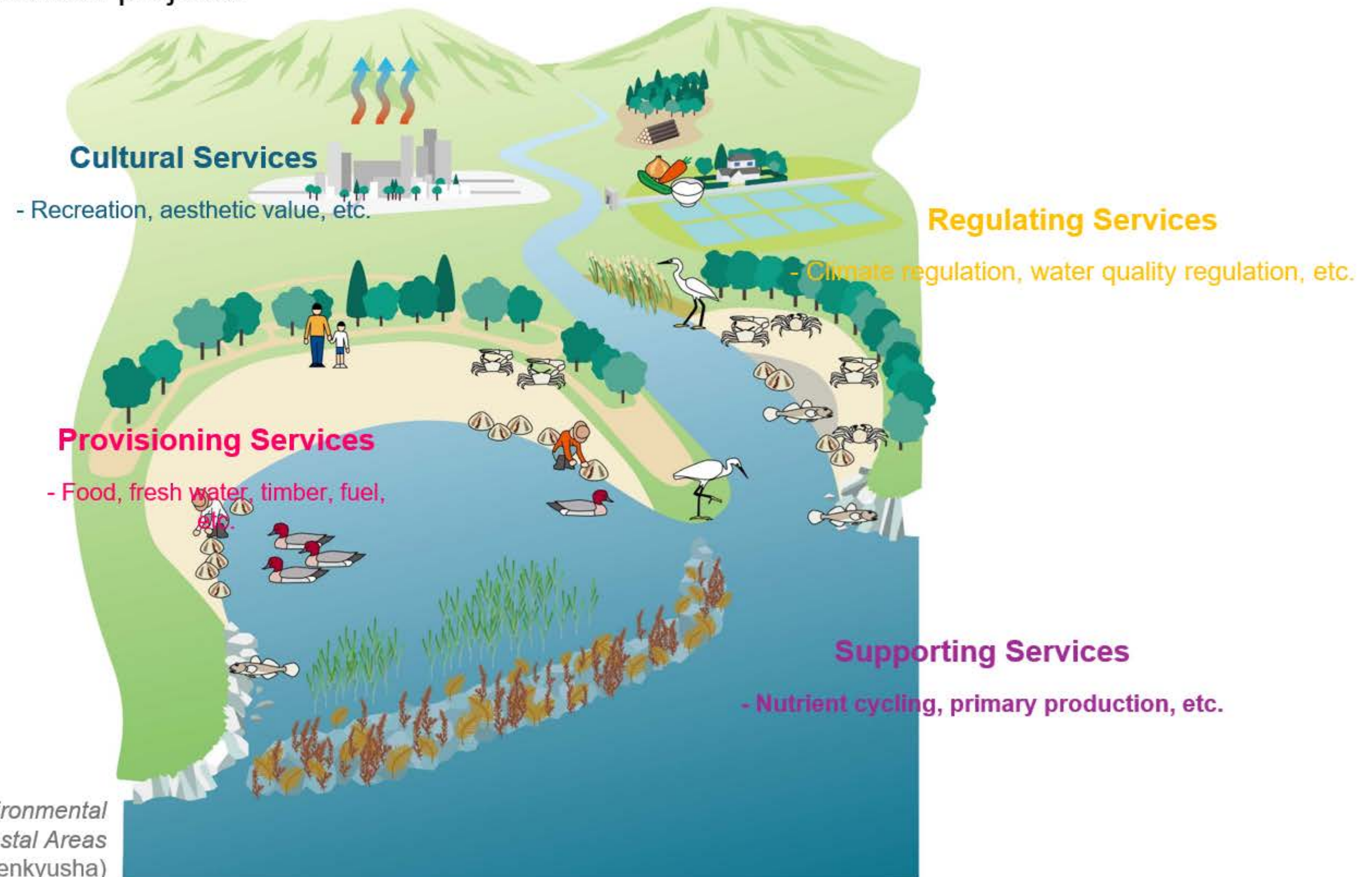


Capacity building and nudges??



# Overview of the Integrated valuation Method for Coastal Ecosystem Services (IMCES)

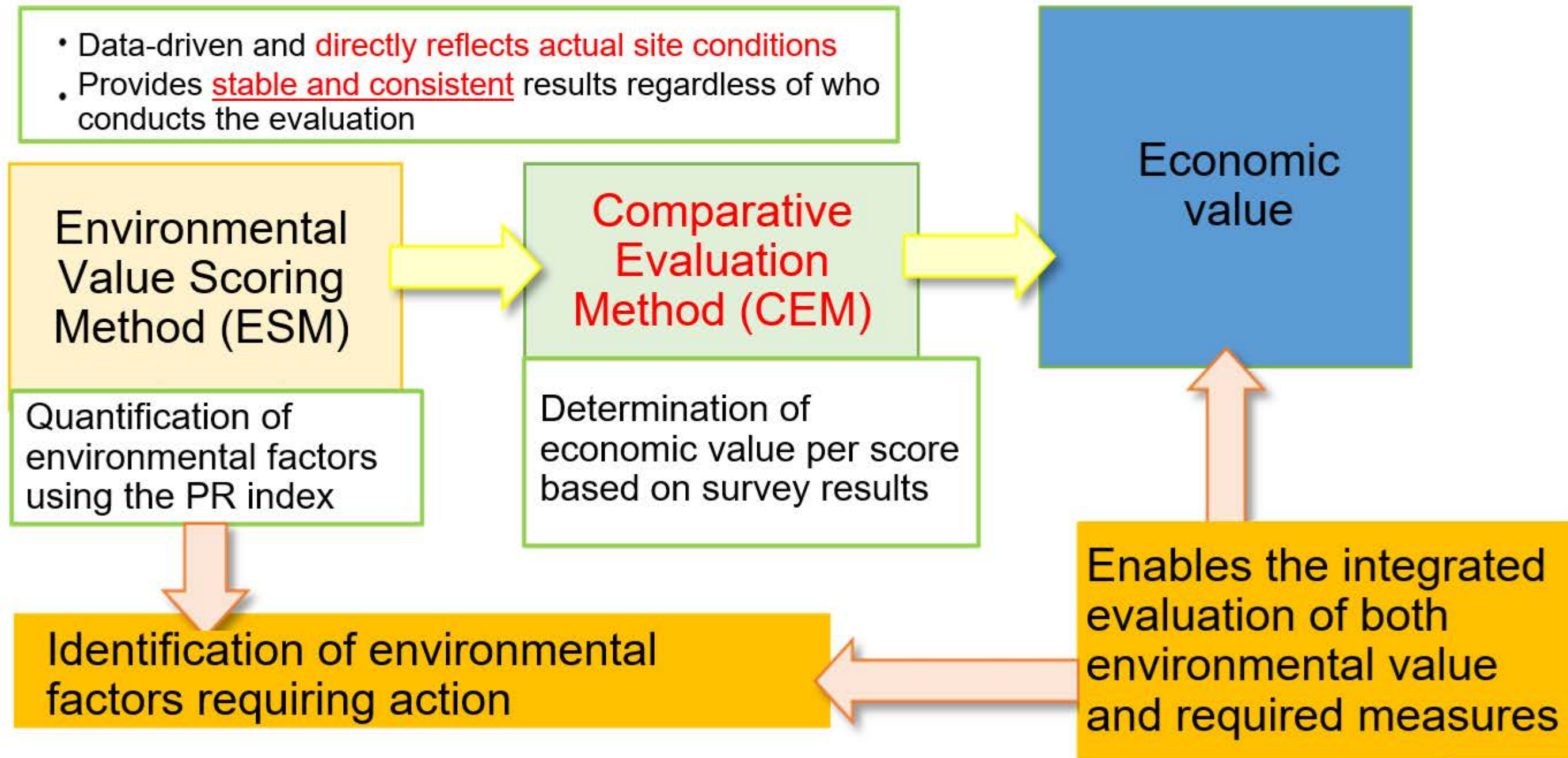
- Evaluation of the diverse environmental values (ecosystem services) of coastal areas and their condition is essential for coastal conservation and restoration projects.
- IMCES was developed by the National Institute for Land and Infrastructure Management (NILIM) as a new method for comprehensively evaluating both environmental condition and environmental value in conservation and restoration projects.





## IMCES Evaluation Framework

- IMCES consists of a two-stage evaluation framework: ESM quantitatively evaluates environmental values based on environmental data, while CEM assesses the economic value per score.
- ESM also evaluates the implementation status of relevant measures and the surrounding environmental conditions, enabling the identification of actions needed to maintain and enhance environmental value.





# Ten Environmental Values and Indicators Defined in IMCES

| Type of environmental value                   | Description of value                                                            | Data required for quantification                                                                     | Economic evaluation method                               |
|-----------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| Food provision                                | Value derived from the provision of fishery products as food                    | Catch volume or fish biomass                                                                         | Market price method<br>Comparative evaluation method     |
| Coastal protection                            | Value derived from protecting coastlines                                        | Coastal topography                                                                                   | Replacement cost method<br>Comparative evaluation method |
| Water purification                            | Value derived from the decomposition of organic matter by living organisms      | Benthic biomass<br>Sediment characteristics (organic carbon content)                                 | Replacement cost method<br>Comparative evaluation method |
| Climate change mitigation                     | Value derived from carbon sequestration by organisms and sediments              | Seaweed and seagrass biomass<br>Benthic biomass<br>Sediment characteristics (organic carbon content) | Market price method<br>Comparative evaluation method     |
| Tourism and recreation                        | Value derived from recreational activities such as shellfish gathering          | Annual number of visitors                                                                            | Travel cost method<br>Comparative evaluation method      |
| Education                                     | Value derived from environmental education                                      | Annual number of visitors                                                                            | Comparative evaluation method                            |
| Research                                      | Value derived from research activities                                          | Annual number of papers and reports                                                                  | Comparative evaluation method                            |
| Places of long-standing cultural significance | Value derived from festivals, rituals, and other traditional cultural practices | Number of rituals and festivals held annually                                                        | Comparative evaluation method                            |
| Places for everyday relaxation                | Value derived from walking and resting                                          | Annual number of visitors                                                                            | Travel cost method<br>Comparative evaluation method      |
| Species conservation                          | Value derived from the presence of diverse species                              | Maximum number of species recorded annually                                                          | Comparative evaluation method                            |

Source: *Handbook on the Quantification of Environmental Value in Coastal Areas*  
(Seibutsu Kenkyusha)



## Blue Carbon Credit Study Group on Nori Aquaculture launched

The **Blue Carbon Credit Study Group on Nori Aquaculture** was established and is conducting research to support the branding of 'Hyogo Nori' as a decarbonised product.

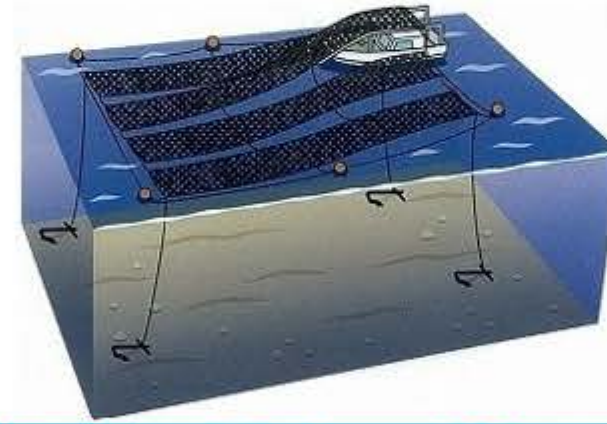


### Research on the blue carbon potential of cultivated nori

- Clarification of CO<sub>2</sub> uptake and sequestration mechanisms during the cultivation process
- Research on methods for estimating CO<sub>2</sub> sequestration
- Assessment of the potential for blue carbon credits



Nori thallus



About 20% of nori is torn off by wind and waves.

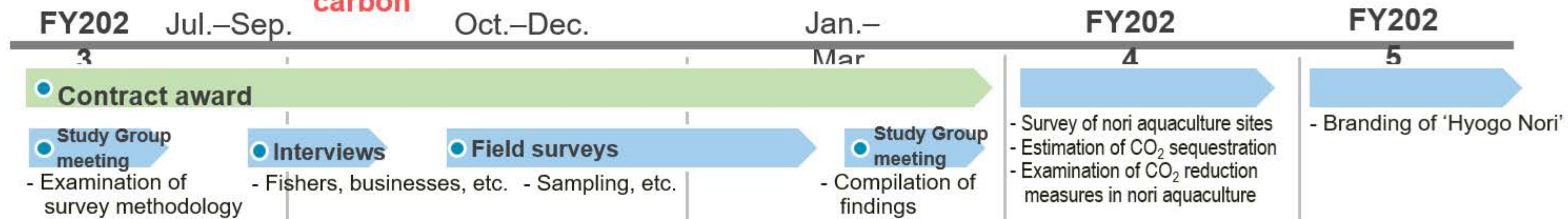
### Promoting decarbonisation through carbon footprinting

- Examination of CO<sub>2</sub> reduction measures in the drying process and energy-efficiency assessments
- Promotion of carbon footprint initiatives

#### [Study Group]

- Chair : Masato Nobutoki (Invited Professor, Kobe University)
- **Member** : Kyosuke Niwa (Professor, Tokyo University of Marine Science and Technology)
- **Member** : Kiyoshi Totsutotsu (Executive Director, Hyogo Fisheries Cooperative Federation)
- **Member** : Noriaki Suga (CEO, Environmental Management Dept., Hyogo Prefectural Government)

[1] Growth amount - [2] Harvested biomass = [3] Total amount of torn-off nori ⇒ **Added to blue carbon**





## Implementation framework for Hyogo Carbon-Zero Nori

### Green carbon generation (Forest management)

- Higashigochi Kabuyama Shared Forest, Hyogo Forest Management Project (Shiso City)

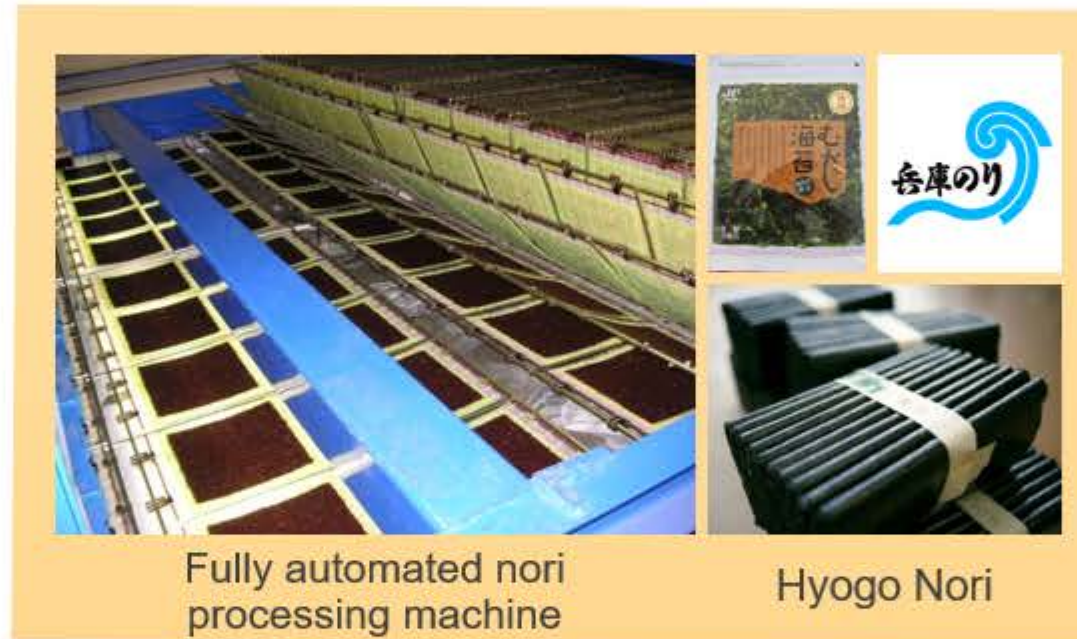
\* 2 t this fiscal year



Extensive artificial seaweed and seagrass beds

Nori cultivation

### Nori drying and processing



Fully automated nori processing machine

Hyogo Nori

By choosing Carbon-Zero Nori, we can support CO<sub>2</sub> reduction, bountiful seas, and forest conservation!



\* Including the cost of J-Credit

Consumers

The retail price is expected to **increase by approximately 4 yen.**

\* Per pack of 10 dried nori sheets



# Promotion Strategy for 'Hyogo Carbon-Zero Nori'

## Promotion of Hyogo Carbon-Zero Nori

- Commercialisation of 'Mukashi Nori' (a premium limited-production product) as Carbon-Zero Nori
- **Press release and sales launch event** to coincide with Marine Day (July)
- Promotion at various events



Logo design

By June

Press release  
Sales launch event

July

Promotion at various events

From August onwards





**Three products co-developed with a 150-year old manufacturer**





# **Launch of THE FISH Craft Beer supporting ocean conservation**







**Workshop for high school students in Chiba Prefecture: Learning about kelp initiatives, making kelp-based skincare lotion, and taking a commemorative photo at the aquaculture site**



# Community Kelp Bath Initiative



*Implemented at 450  
bathhouses in Tokyo and  
122 in Kanagawa  
Prefecture*

**Held over 1500 times  
in total**





**Green tea produced using  
fertiliser made from reused  
kelp from Kelp Bath events!  
Environmental and Welfare Award,  
11th Good Life Award  
(Ministry of the Environment)**



# Agriculture-Welfare Partnership

## Fisheries

横浜 たにや  
ぎょらん工房



×



=



Taniya

Linkline

Hama Kombu Sablé  
cookies

(Herring roe on kelp) (Type B Disability Employment  
Support Service)

Supporting greater employment  
opportunities for persons with disabilities



# Implementing Entity

|                       |                                                                                                                                                                                                                                                                                                                                            |                                                                                     |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Name                  | Maruyamoto Co., Ltd.                                                                                                                                                                                                                                                                                                                       |  |
| Date of establishment | 7 July 2025                                                                                                                                                                                                                                                                                                                                |                                                                                     |
| Head Office           | 1463-6 Anaga, Minamiawaji, Hyogo                                                                                                                                                                                                                                                                                                           |                                                                                     |
| Himeji Branch         | 1555-16 Hamada, Aboshi-ku, Himeji, Hyogo                                                                                                                                                                                                                                                                                                   |                                                                                     |
| Capital               | 100 million yen                                                                                                                                                                                                                                                                                                                            |                                                                                     |
| Shareholders          | Hyogo Bender Engineering Co., Ltd., Minamiawaji Fisheries Cooperative, etc.                                                                                                                                                                                                                                                                |                                                                                     |
| Board members         | Representative Director: Tomio Koiso (Minamiawaji Fisheries Cooperative)<br>Representative Director: Katsuya Honmaru (Hyogo Bender Engineering Co., Ltd.)<br>Director: Hiromitsu Nakao (Minamiawaji Fisheries Cooperative)<br>Director: Shohei Fujii (Hyogo Bender Engineering Co., Ltd.)<br>Auditor: Shina Akizawa (Katsurahama Aquarium) |                                                                                     |

\* On 31 March 2026, the company increased its capital to 100 million yen through a third-party allotment of shares, while remaining within the thresholds stipulated under the Small and Medium-sized Enterprise Basic Act and the Corporation Tax Act.

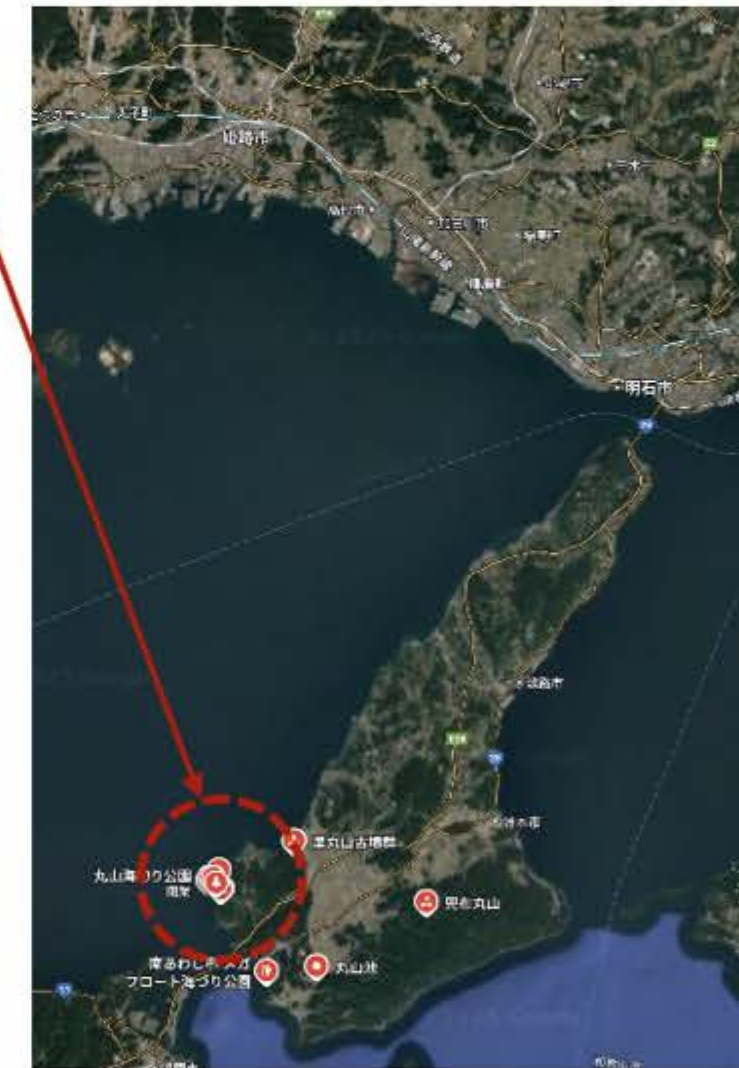
In Maruyama, fishers, local residents, businesses, universities, government agencies, and financial institutions work together to build the future of the fishing village community under the concept of ‘Living, Working, Learning, Playing, Raising Families, and Contributing to Others’. The company name reflects the aspirations of ‘Together **with Maruyama**’ and ‘From **Maruyama** to the World’.



## Maruyama Fishing Port, Minamiawaji City

Maruyama Fishing Port is located in the southwestern part of Awaji Island, Hyogo Prefecture. The surrounding coastline is designated as part of the Setonaikai National Park. The area is blessed with outstanding tourism resources, including Keino Matsubara, a scenic white-sand pine grove stretching approximately 3 km, and panoramic views of the Onaruto Bridge.

Around here



Source: Hyogo Prefecture, <https://web.pref.hyogo.lg.jp/nk16/gyokousyukai/maruyama.html> (Accessed 9 April 2026)



## Regional Revitalisation Initiatives at Maruyama Fishing Port

Maruyamato Co., Ltd. was certified as an **operator** under the Fishing Port Facilities Utilisation Project in August 2025.

Its basic policy is to create local vibrancy and establish a sustainable economic foundation through increased consumption of fisheries products and enhanced interactions among people. Under a collaboration framework involving **fishers, local residents, industry, academia, government, and financial institutions**, it is working to **promote fisheries development and community building in the fishing village** of Maruyama.

### Fishing Port Facilities Utilisation Project

1. Fishing port administrators may formulate plans for promoting the utilisation of fishing port facilities.
2. At fishing ports where such plans have been formulated, entities certified by the fishing port administrator to implement utilisation projects may be granted the following rights and statuses to ensure stable project operation.
  - **Lease of fishing port facilities classified as administrative property (up to 30 years)**
  - **Operating rights for fishing-port water facilities (up to 10 years)**
  - **Long-term occupation rights for water areas and related facilities (up to 30 years)**





## Planned Multi-purpose Facility for Education and Hands-on Learning



\* Based on the preliminary design; subject to minor changes



# ***Thank you for your attention.***



Yokohama Osanbashi Marche