June 18, 2026

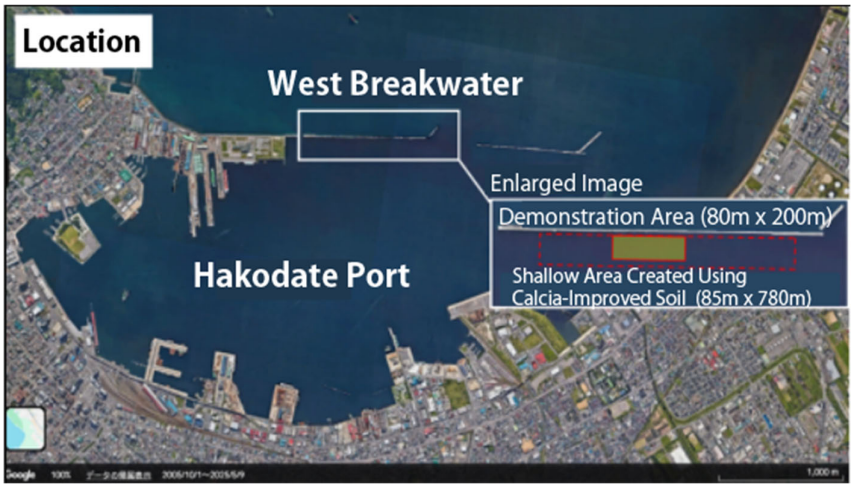
Hakodate Port Decarbonization Promotion Council

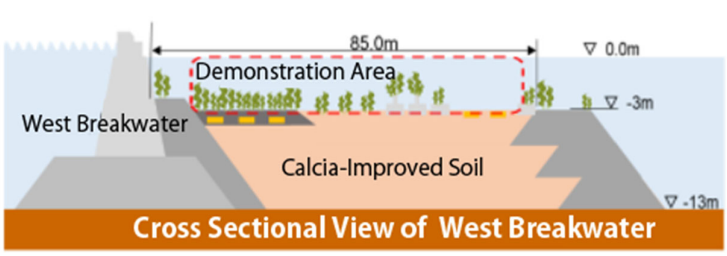
Japan Blue Economy Research Group, PT-B Project Team

Demonstration Research on Seaweed Bed Creation in Shallow Waters Using Calcia-Improved Soil at the Hakodate Port West Breakwater

The Japan Blue Economy Research Group, a member of the Hakodate Port Decarbonization Promotion Council, has established a dedicated project team* to promote demonstration research on seaweed bed creation.

In collaboration with the Council, the project team has published a report summarizing its FY2023–2026 demonstration research on seaweed bed creation and blue carbon sequestration in the Calcia-improved shallow areas at the West Breakwater, which was constructed by the Hakodate Development and Construction Department of Hokkaido Regional Development Bureau, Ministry of Land, Infrastructure, Transport and Tourism.





The research has demonstrated seaweed bed creation technologies focusing on two seaweed species: kelp and Akamoku (please see pictures 1-4 below).

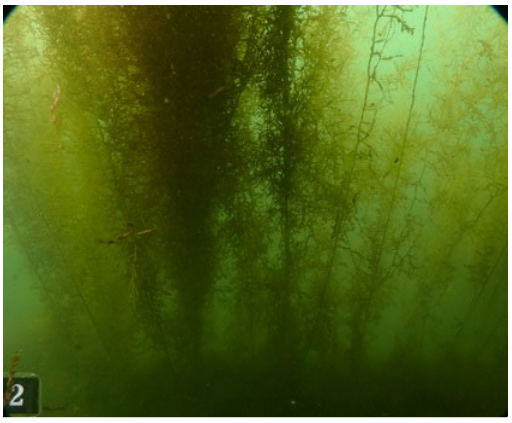
- Regarding kelp beds, the project team examined substrate materials (made of Calcia artificial stones[*1]) and fertilizers[*2] for bed creation, while comparing growth conditions with and without parent kelp (using spore bags and seeded strings).
- Regarding Akamoku beds, the project team has evaluated different fixation methods for Akamoku embryos (such as the drain rope method, geogrid mesh method, and spore bag method on armor stones), while verifying growing-out methods from juvenile shoots to adults and estimating blue carbon sequestration.

The research has verified the effectiveness of grow-out methods for both kelp and Akamoku beds. Furthermore, the blue carbon sequestration was estimated at 4.5t-CO_2 in a scenario where Akamoku beds expand across the entire West Breakwater area.

The project team will continue monitoring at Hakodate Port, while aiming to provide extensive feedback of the insights gained from this demonstration research.

Pic. 1- Kelp Growth on Calcia Artificial Stones

Pic. 2 - Akamoku Settlement onto Drain Ropes



Pic. 3 - Akamoku Settlement onto Geogrid Meshes

Pic. 4 - Akamoku Settlement onto Armor Stones

<Notes>
*1: Artificial stone manufactured by compounding dredged soil with steelmaking slag, ground granulated blast-furnace slag, and a binding agent, followed by solidification and crushing

*2: Bagged seaweed fertilizer consisting of a steelmaking slag and humus soil mixture, supplying iron, nitrogen, phosphorus, and other nutrient salts to marine areas

*3: A seaweed bed creation technology that supplies substrates with zoospores and eggs by placing mature seaweeds, such as kelp and Akamoku, into mesh bags

*4: For kelp aquaculture, zoospores released from parent kelp are settled onto strings and ropes, and grown into young shoots before being utilized in the sea

*5: In addition to blue carbon, CO_2 sequestration can be achieved by preventing CO_2 emissions through the stabilization of organic carbon in dredged soil, and by capturing and fixing atmospheric CO_2 using steelmaking slag in the improved soil.

These findings are scheduled to be published in the Japan Society of Civil Engineering journal (Civil Engineering in the Ocean 2026).

*Japan Blue Economy Research Group, PT-B Project Team
(Demonstration Research on Seaweed Bed Creation Technologies in Shallow Waters Using Calcia-Improved Soil)

Participating companies: Penta-Ocean Construction Co., Ltd. (lead organization), Nippon Steel Corporation, JFE Steel Corporation, TOA Corporation, Toyo Construction Co., Ltd., Wakachiku Construction Co., Ltd., Fudo Tetra Corporation, Yaguchi Port Construction Diver Co., Ltd.