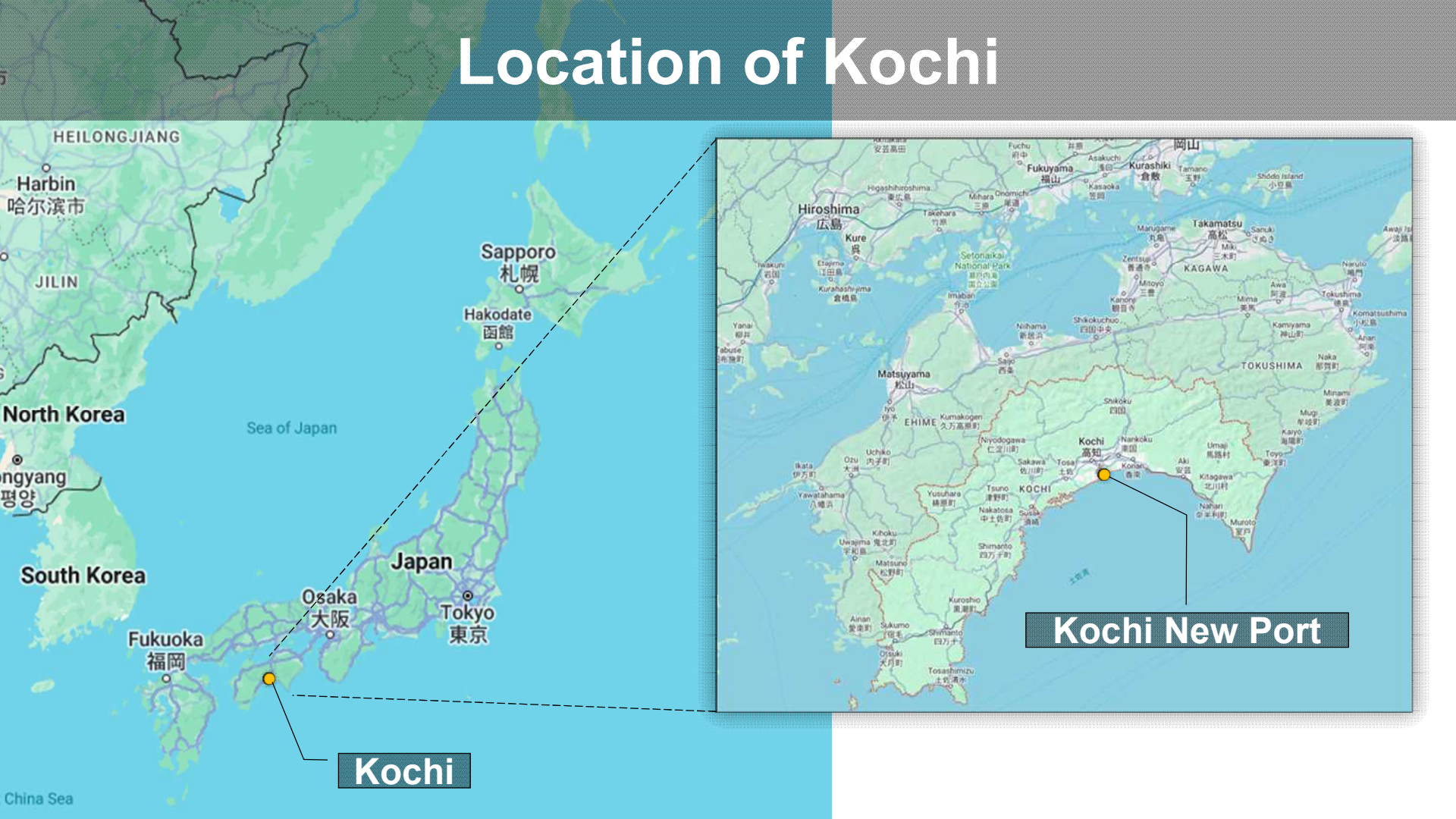
A Resilient Port:
Best Practices on Innovative Environmental Protection and Disaster Prevention Measures

INAP 2024 in SUBIC BAY
Port of Kochi, JAPAN

Location of Kochi



Port of Kochi


Wholesale market


Domestic freight shipping base


Thermal and biomass power plants


Oil terminal


Shipyard and lumber industrial park

Kochi New Port


Terminals for container, bulk and cruise ships

Outline of Kochi New Port

Container ship

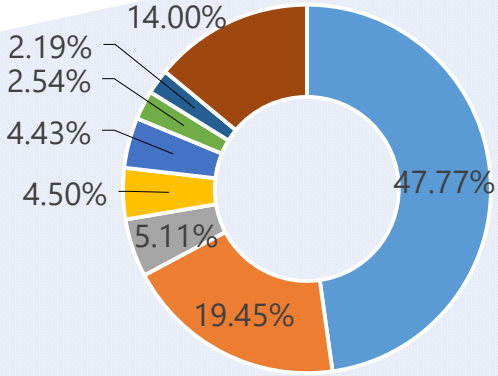
Cruise ship

Bulk carrier (limestone)

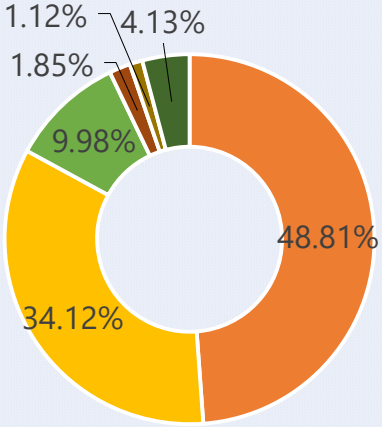
Cruise ship (two ships can call at the same time)

Exports & Imports

Export

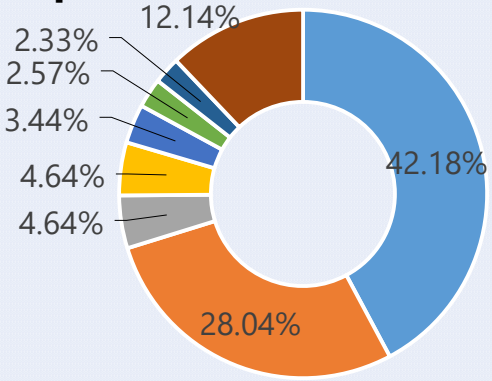


- Limestone
- Chemical fertilizer
- Non-metallic mineral
- Stationery, exercise and recreational goods, musical instruments
- Paper and pulp
- Electrical machinery
- Industrial machinery
- Others
- Total

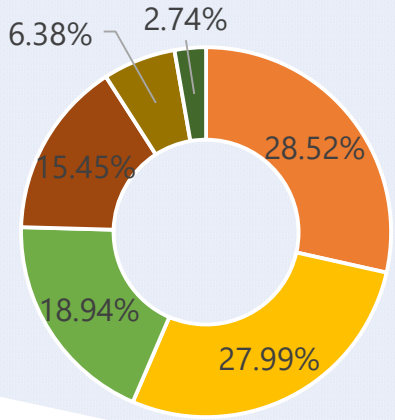


- Taiwan
- South Korea
- China
- Malaysia
- Vietnam
- Others
- Total

Import



- Coal
- 薪炭 Firewood and charcoal
- 製材 Lumber
- 鉱 Dye, paint, synthetic resin and other chemical products
- 化学工業品
- 化学製品 Steel

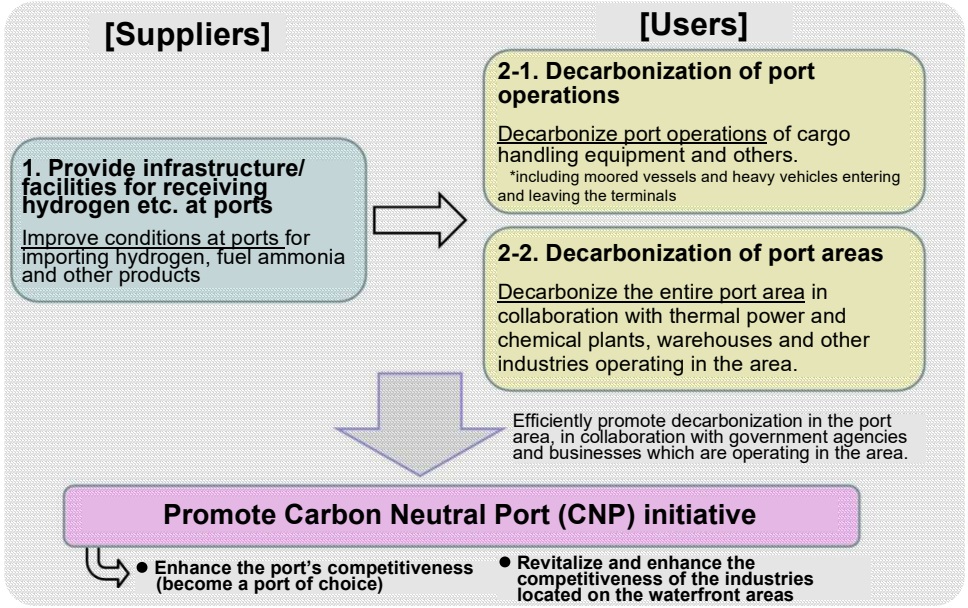


- South Korea
- Indonesia
- Russia
- Australia
- USA
- Others

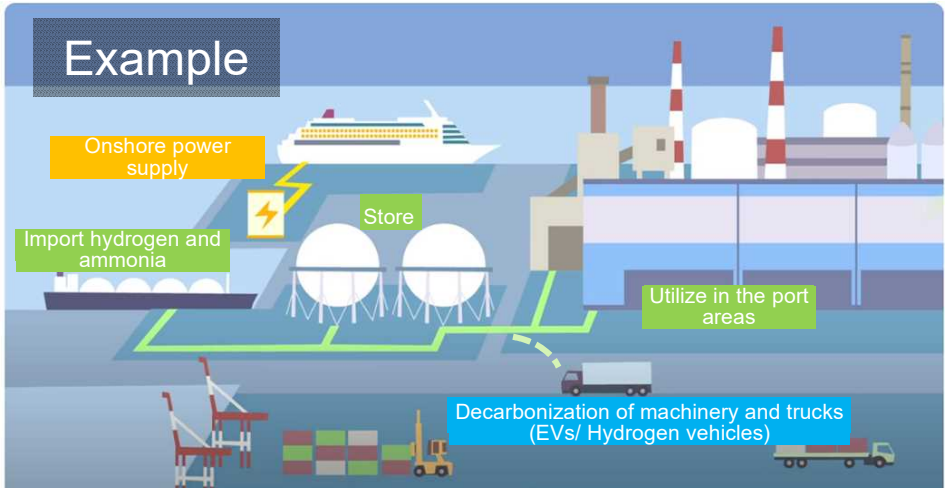
Initiatives on Environmental Protection

The Goal of Carbon Neutral Port (CNP) Initiative

- Contribute to enhancing the competitiveness of Japanese industries and ports, and achieving a decarbonized society by promoting decarbonization efforts in ports and harbors.
- Ministry of Land, Infrastructure, Transport and Tourism (MLIT) promotes the Carbon Neutral Port (CNP) initiative and the improvement of decarbonization-friendly port functions.



Reference: Website of MLIT

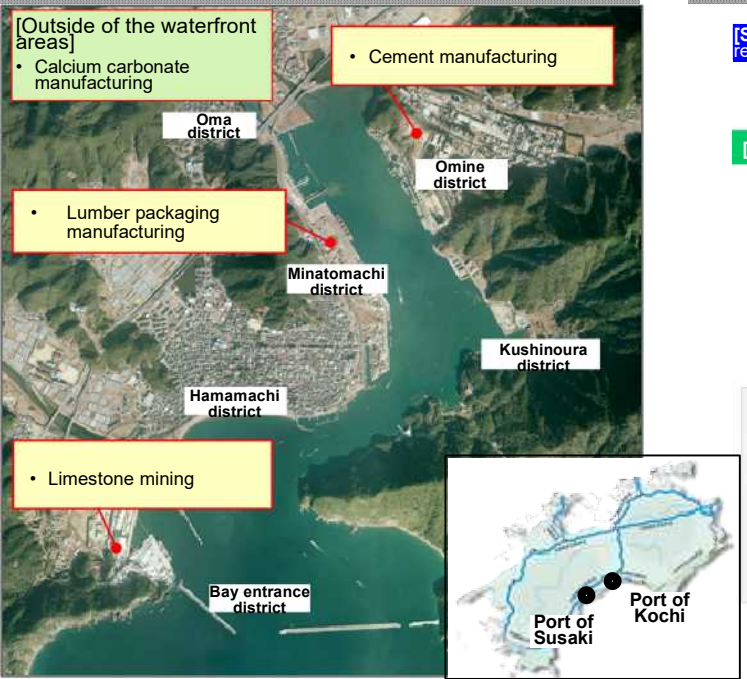


Reference: Prepared by Kochi Prefecture based on the MLIT's website (YouTube)

Examples of the Port of Susaki

- Kochi Prefecture's goal is to reduce greenhouse gas emissions by 47% from the FY2013 level by FY2030, and to net-zero by FY2050.
- At the Port of Susaki, where the level of carbon dioxide emissions are high, companies and port stakeholders are working to develop plans to promote decarbonization since FY2023.

Main companies using the Port of Susaki



Plans to promote decarbonization at the Port of Susaki

[Supply] Provide infrastructure/facilities for receiving hydrogen etc.

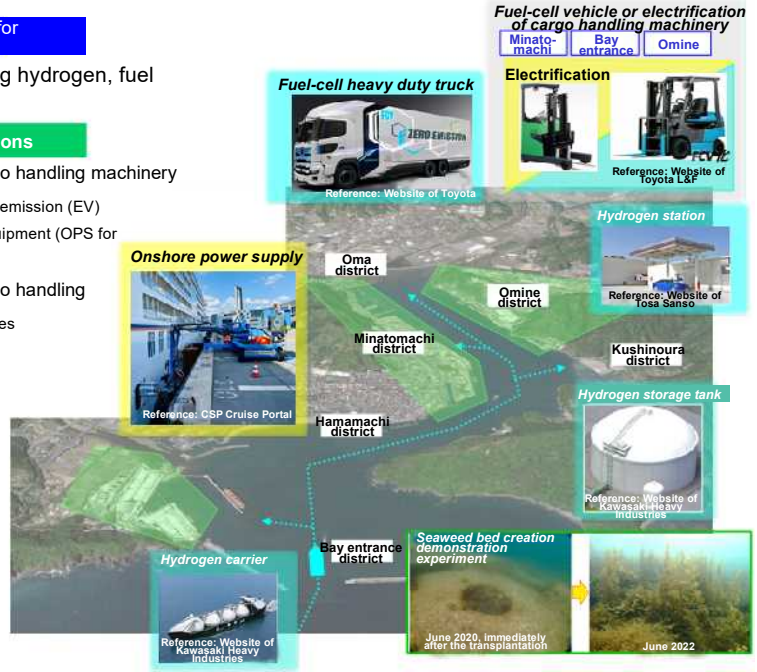
■ Improve conditions for importing hydrogen, fuel ammonia and other products

[Use] Decarbonization of port operations

■ Decarbonize port operations of cargo handling machinery and others.
- Promote the use of fuel-cell or low CO_2 emission (EV) cargo handling machinery and trucks
- Install onshore power supply (OPS) equipment (OPS for moored vessels)
- Blue carbon; and other measures

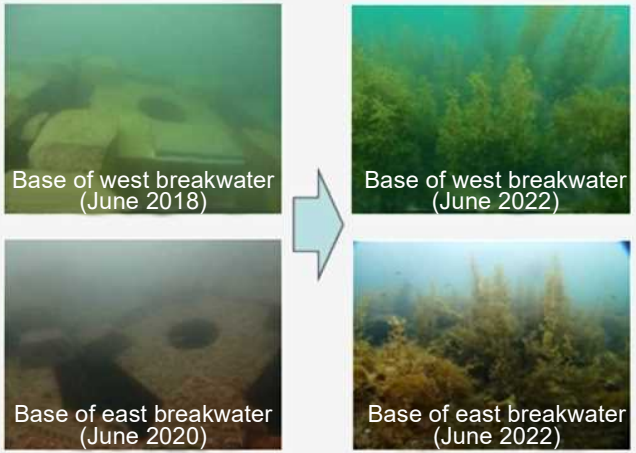
■ Decarbonize port operations of cargo handling machinery and others
- Promote energy efficiency of port facilities (warehouses, lightings etc.)

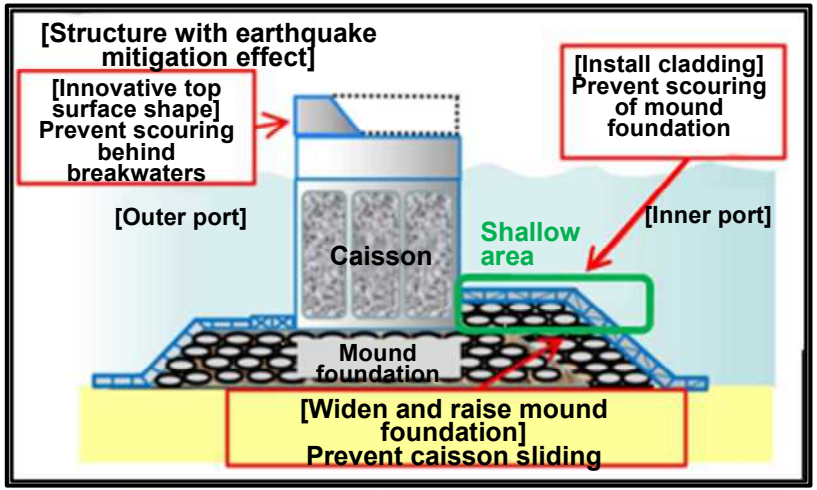
Legend
- : Hydrogen related initiatives
- : Electrification related initiatives
- : Hydrogen supply
- : Entrances and exits for vessels and vehicles; cargo handling areas



Impact of Blue Carbon on Ecosystems

- Installation of plates that make effective use of steel slag at the Port of Susaki's breakwaters.
- Conducted demonstration experiments to create seaweed beds, which have proven effective in expanding the distribution of seaweed beds.





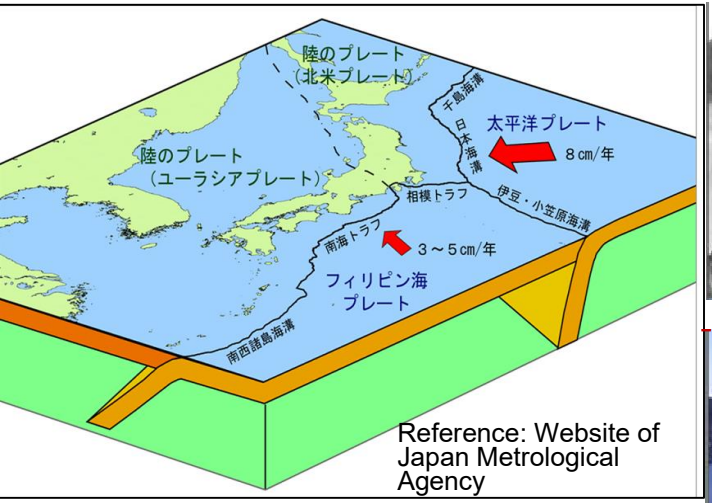
Fish in the seaweed bed at the base of east breakwater

Fish in the seaweed bed at the base of west breakwater

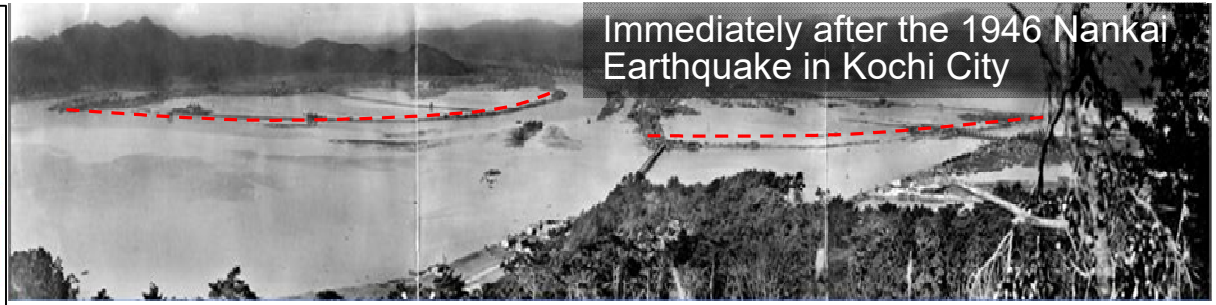
Initiatives on Disaster Prevention Measures

Nankai Trough Earthquakes

- The Japanese archipelago lies on the boundaries between four tectonic plates and these plates move away from each other at a rate of a few centimeters each year, which builds up compressional stress. For this reason, Japan is one of the most earthquake-prone areas in the world.
- Large earthquakes occur at intervals of about 100 to 200 years at the Nankai Trough, which lies at one of the plate boundaries. Kochi Prefecture is expected to experience strong tremors and large tsunamis throughout the Prefecture.

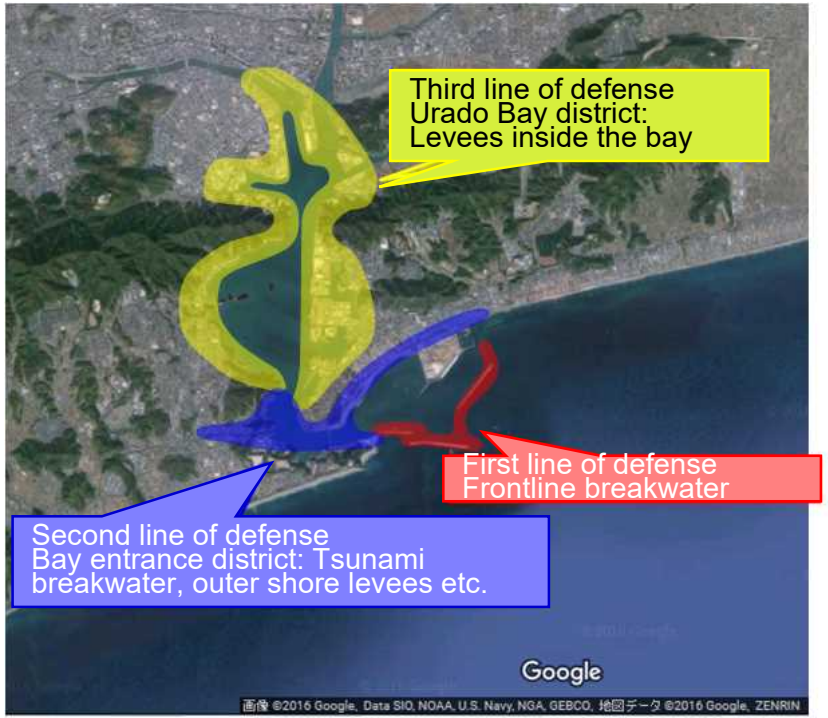


Reference: Website of Japan Metrological Agency



Earthquake and Tsunami Countermeasures in Kochi Prefecture

- Implementation of various measures to mitigate damage from earthquakes, including both hard and soft measures. Large-scale infrastructure projects to minimize earthquake damages are underway in Kochi city which is home to about half of the prefecture's population.



Plan of the triple defense measures at the Port of Kochi coastal areas

First line of defense
Frontline breakwater (port facility)

[Effects]

- Reduce the power of tsunami waves
- Ensure port functions of Kochi New Port

Second line of defense
Bay entrance district: Tsunami breakwater, outer shore levees etc.

[Effects]

- Prevent and reduce the inflow of tsunami in the bay and toward inner cities

Third line of defense
Urado Bay district: Levees inside the bay

[Effects]

- Prevent the collapse of seawalls and flooding in inner cities etc.

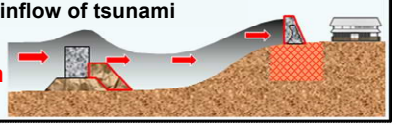
Tsunami Countermeasures

- Promote disaster prevention for tsunamis that occur frequently, by preventing the flow of tsunami in the land areas.
- Promote disaster mitigation for tsunamis of the largest class, which are very rare but cause extensive damages, by buying time for evacuation.

■Tsunami that occur frequently (L1 type Tsunami)

Prevent the inflow of tsunami

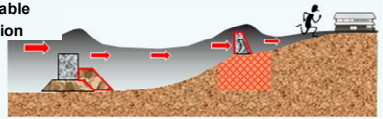
Disaster prevention



■Tsunami of the largest class (L2 type Tsunami)

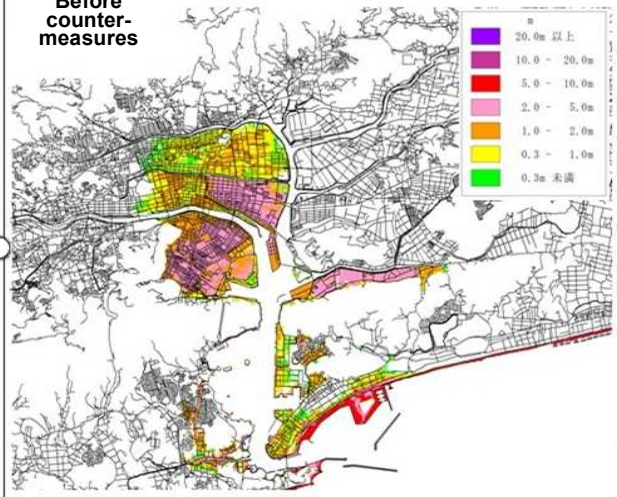
Extend the available time for evacuation

Disaster mitigation



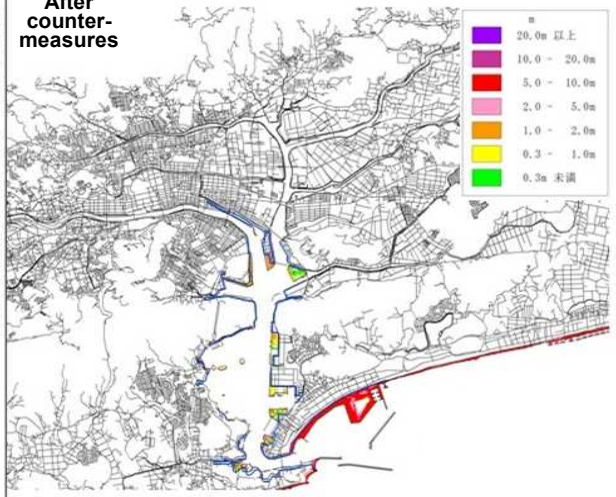
Projected areas of inundation by L1 type Tsunami

Before counter-measures



Areas of inundation inside breakwaters: 1,445 hectors

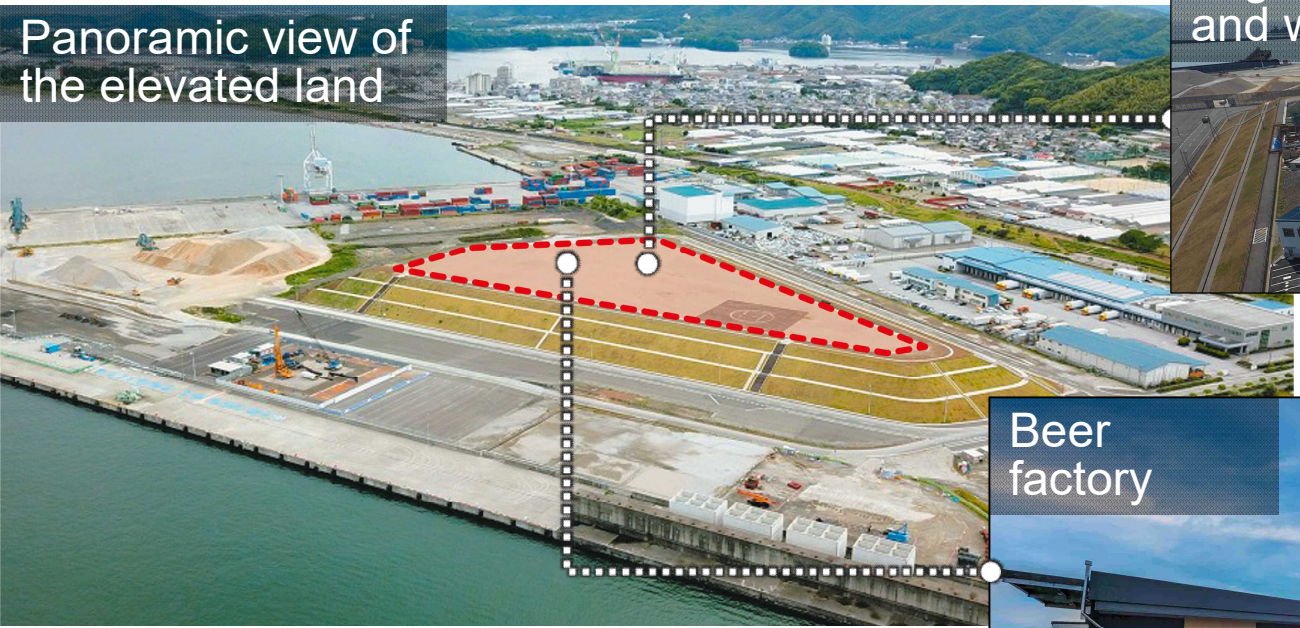
After counter-measures

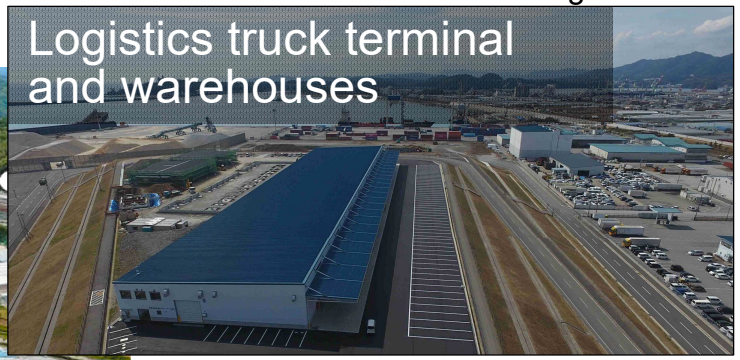


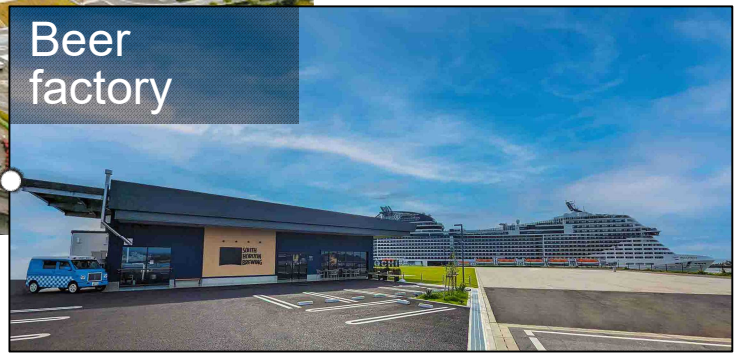
Areas of inundation inside breakwaters: 0 hector

Elevated Land and Business Park at Kochi New Port

- Kochi New Port faces the outer sea, and a large tsunami is expected to strike in a short period of time.
- Developed an elevated commercial land with 17 meters height which will not be inundated even if a tsunami of the largest class strikes.







Storm Surge and Tidal Wave Countermeasures/ Protection of Natural Environment

- Kochi Prefecture is one of the most typhoon-prone areas in Japan and experiences substantial damages from tidal waves and storm surges during the typhoon season.
- Restoration of the beach due to the installation of detached breakwaters contributed to the protection of the environment, providing a spawning ground for sea turtles.

No. of typhoons landed (by prefecture)

Ranking	Prefecture	No. of typhoons landed
1	Kagoshima	43
2	Kochi	26
3	Wakayama	25
4	Shizuoka	22
5	Nagasaki	18

*statistical period: From 1951 to 2023 (Typhoon No.17)

Tidal waves and storm surges during the typhoon season

Effects of beach restoration

Use for recreation and other purposes

Spawning ground for sea turtles

Effects of detached breakwater installation

Eroded beach

Restored beach

About INAP

Promotion of Economic and Cultural Exchanges Through INAP

1. Participation in INAP conferences

Initiatives to strengthen economic and cultural exchanges among INAP members

4. Promotion of international tourism

2. Promotion of economic exchanges

3. Introduction of member country's culture

Thank you for your attention