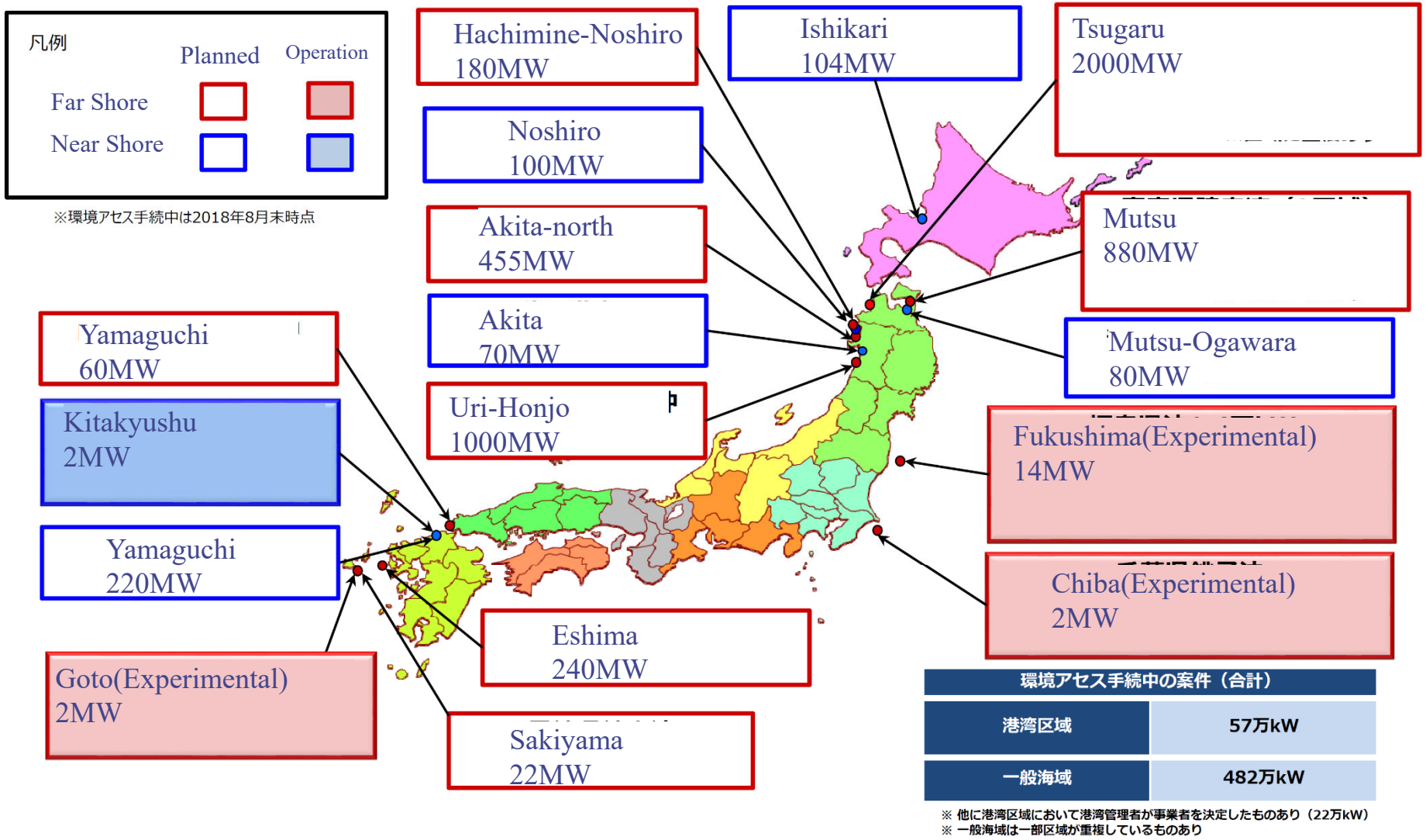
WIND ENERGY SCIENCE CONFERENCE
Mini-Symposium: Can Wind Power Be Socially Acceptable?
26.05, 2021

Coevolution of Technology and Society:
Case Study of Offshore Windfarm in Japan

Yasushi Maruyama
(Nagoya University)

Background Offshore wind farm development



- Potential: 8080TWh(IEA,2018, *Offshore wind technical potential and electricity demand*)
- 10 planned in port area and far shore(10MW-200MW, total 5.4GW)
- Target:90GW in 2050

Legal framework for permission (far shore)

- Bottom up(prefecture) approach authorized/supported by central government
  - Strategic environmental impact assessment financed by national government
  - Stakeholder conference by local government (e.g. community, fishers association…)
  - 5 Promotion area(red dot) and 4 Promising area(yellow dot) in 2021
  - Other 6 areas are preparing
- Competition (tendering) of project initiatives for occupation of the sea area

Competition for Permission to Occupy the Sea Area(Far shore)

Price 120pt.	Business feasibility 120 pt.									
	Capacity to implement projects (80pt.)						**Consensus building with local communities(40pt.)**			
	Experience (30pt.)	Ability to complete the project (35pt.)			Stable power supply (15pt.)		**Consensus building (20 pt.)**		**External benefit for local society (20pt.)**	
	Experience (30pt.)	Feasibility (20pt.)	Project Risk management (15pt.)	financial plan (0pt.)	O & M, price reduction in the future (10pt.)	Advanced Technology (5pt.)	Public engage-ment (10pt.)	Co-benefit with Fishery (10pt.)	Local Economy (10pt.)	National economy (10pt.)
Elements of disquali-fication	No Experience	Immature plan	Serious failure in risk management	Lack of feasibility			Lack of capability in stakeholder management			

Consensus building composes 1/6 of total points

Challenge

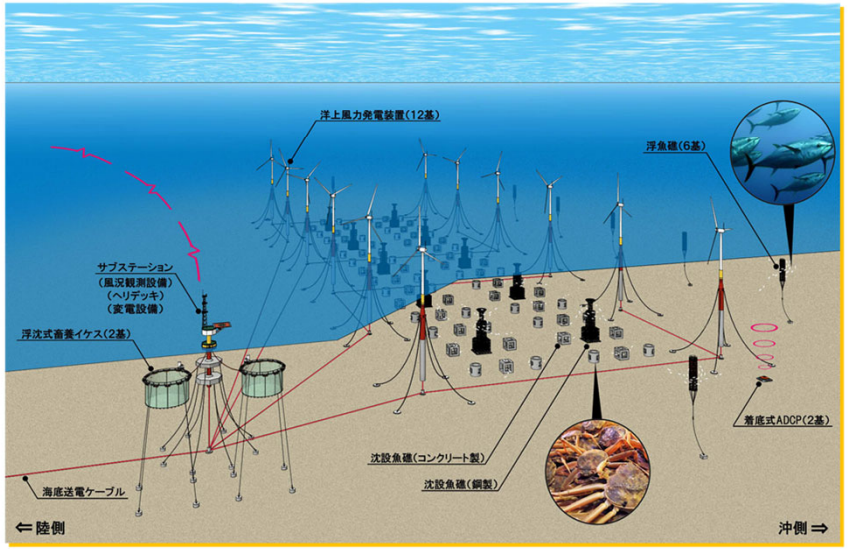
- Stakeholder management
  - Social acceptance in general
  - Fisher
    - Near shore(1-3km): Simple and stable fishery right
    - Far shore(2/3km-): Complex and dynamic fishery right (Yearly licensed fisheries)
      Difficulty in compensation
- Strong pressure for cost efficiency
  - Limited budget for compensation

Fishery co-benefit model of offshore windfarm

洋上風力発電等の漁業協調の在り方に関する提言

《第２版》

―着床式および浮体式洋上ウィンドファームの漁業協調メニュー―

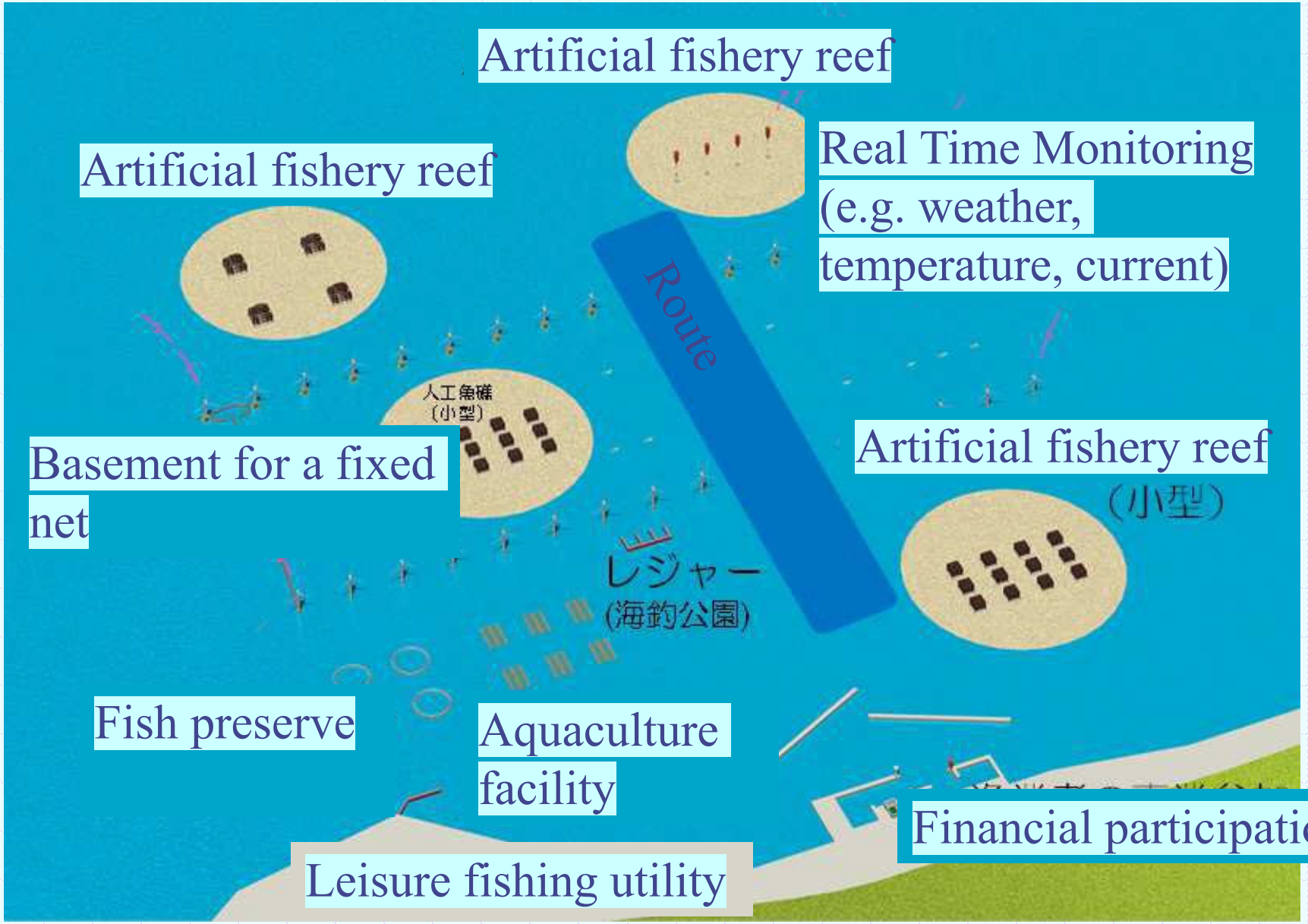


（浮体式洋上ウィンドファームにおける漁業協調メニューの概念図）

Research Institute for Ocean Economics

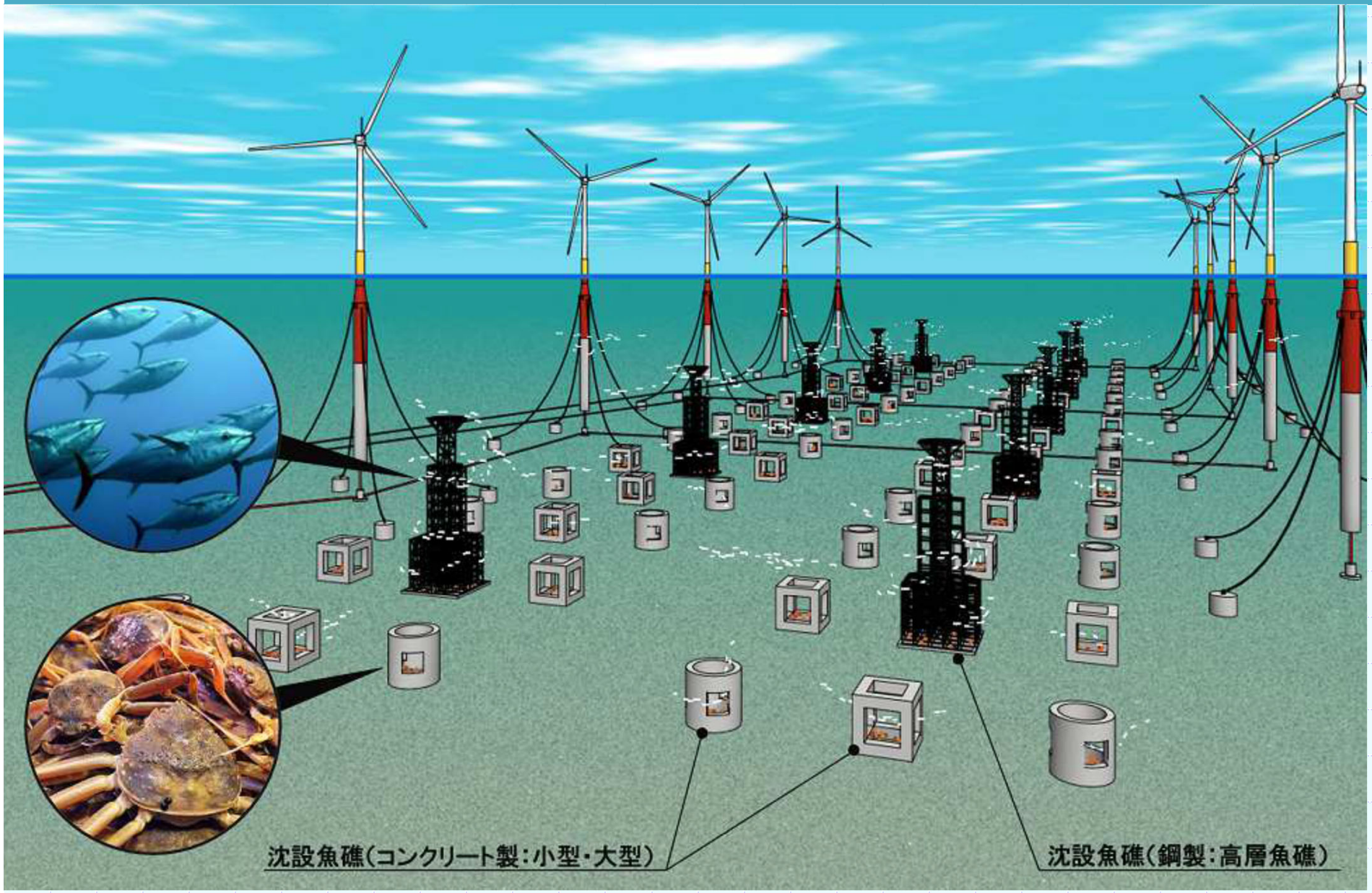
http://www.rioe.or.jp/2015teigen.pdf

Overview



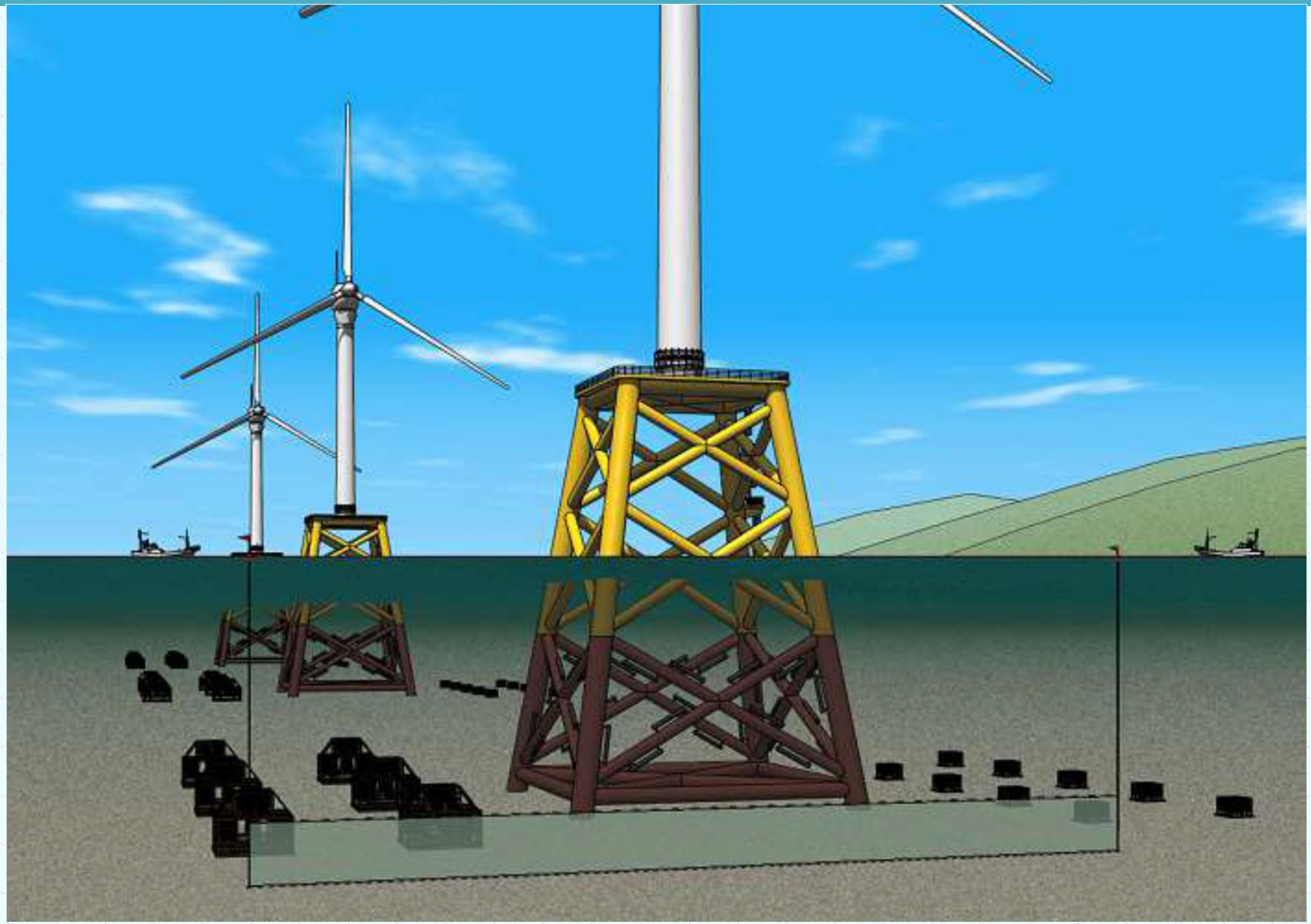
http://www.rioe.or.jp/2015teigen.pdf

Artificial fishery reef



http://www.rioe.or.jp/2015teigen.pdf

Artificial fishery reef

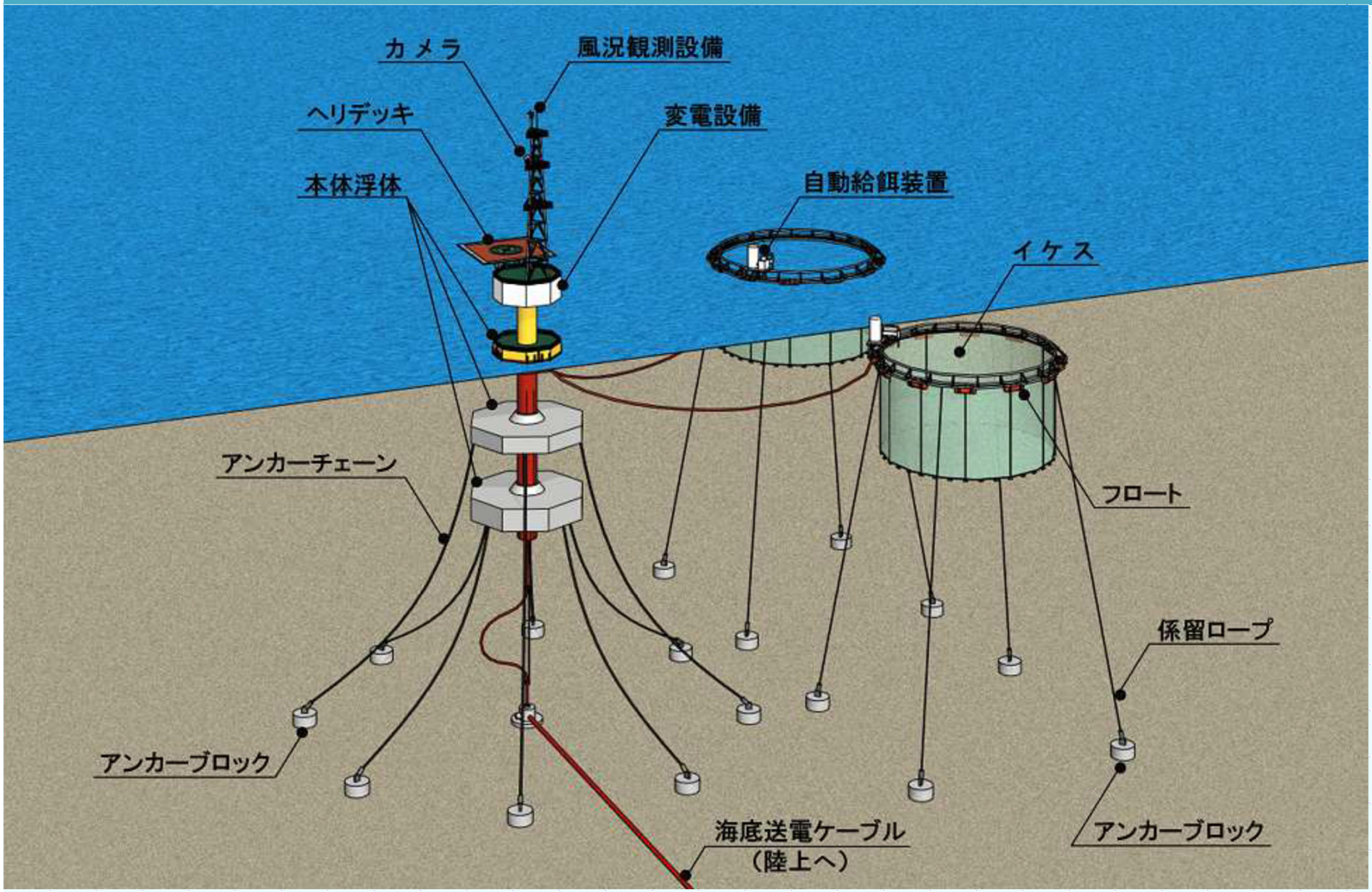


洋上風力発電等の漁業協調の在り方に関する提言
http://www.rioe.or.jp/2015teigen.pdf

Aquaculture facility for seaweed

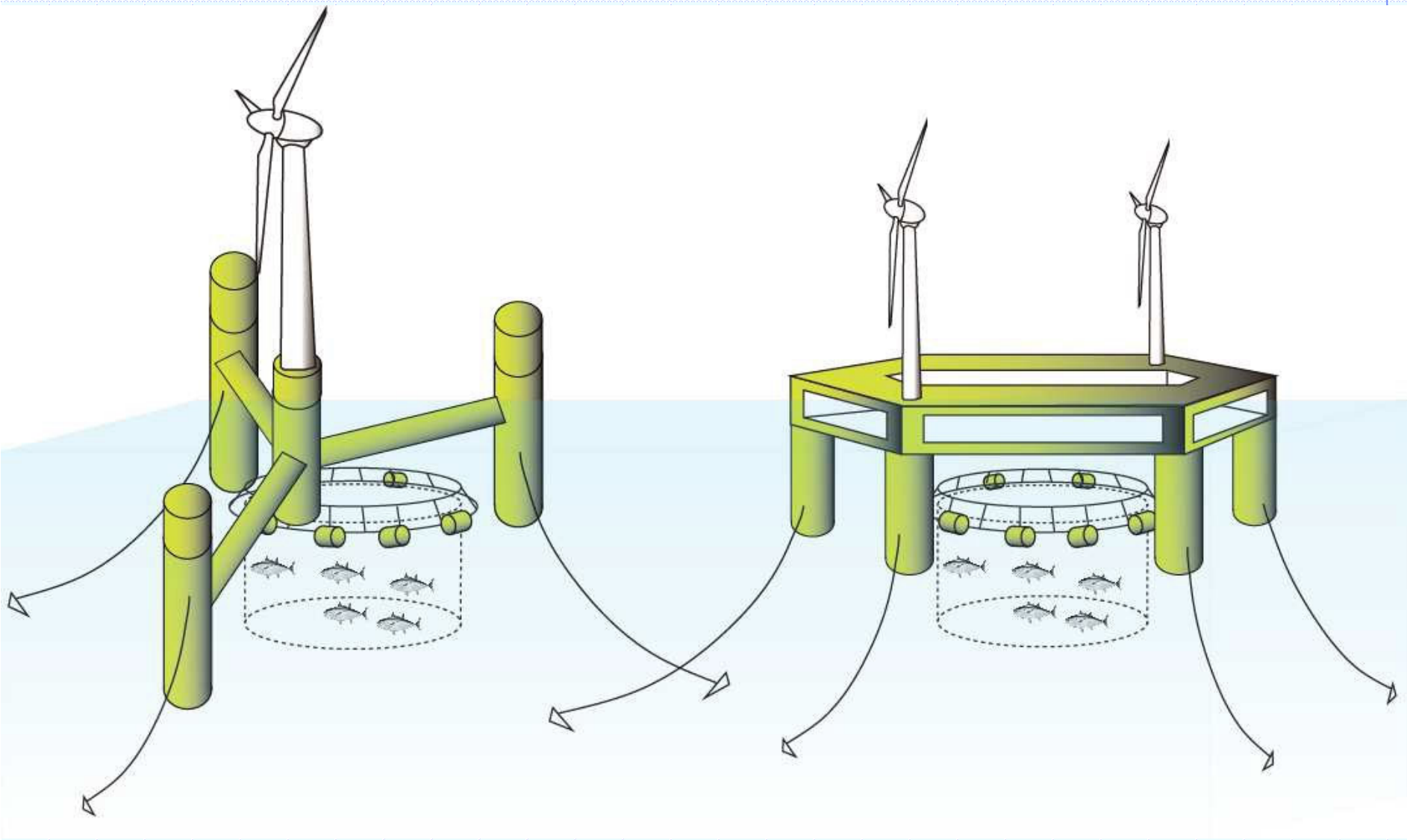
http://www.rioe.or.jp/2015teigen.pdf

Aquaculture facility for fish



http://www.rioe.or.jp/2015teigen.pdf

Aquaculture facility for fish

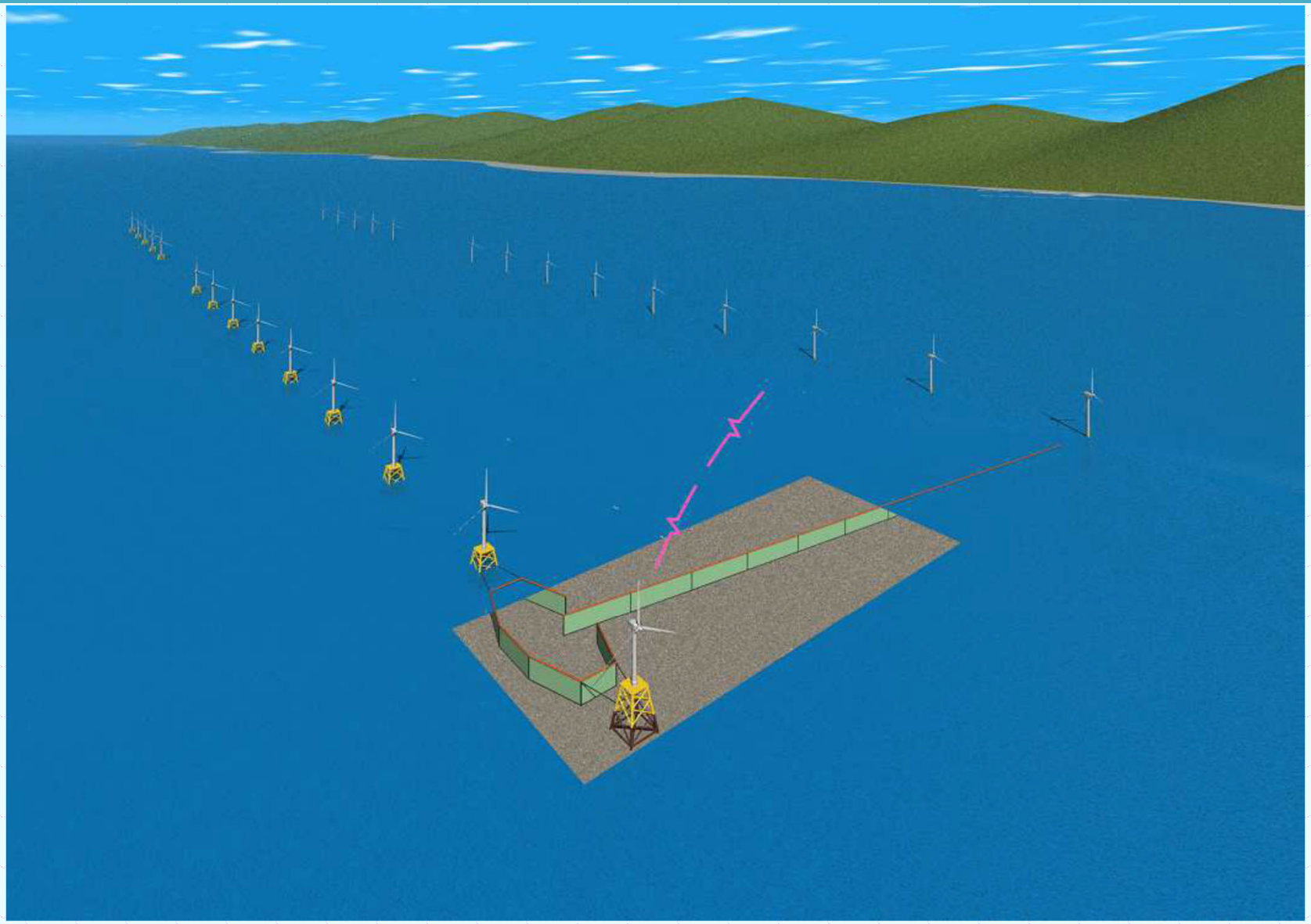


http://www.rioe.or.jp/2015teigen.pdf

Aquaculture facility for seashell

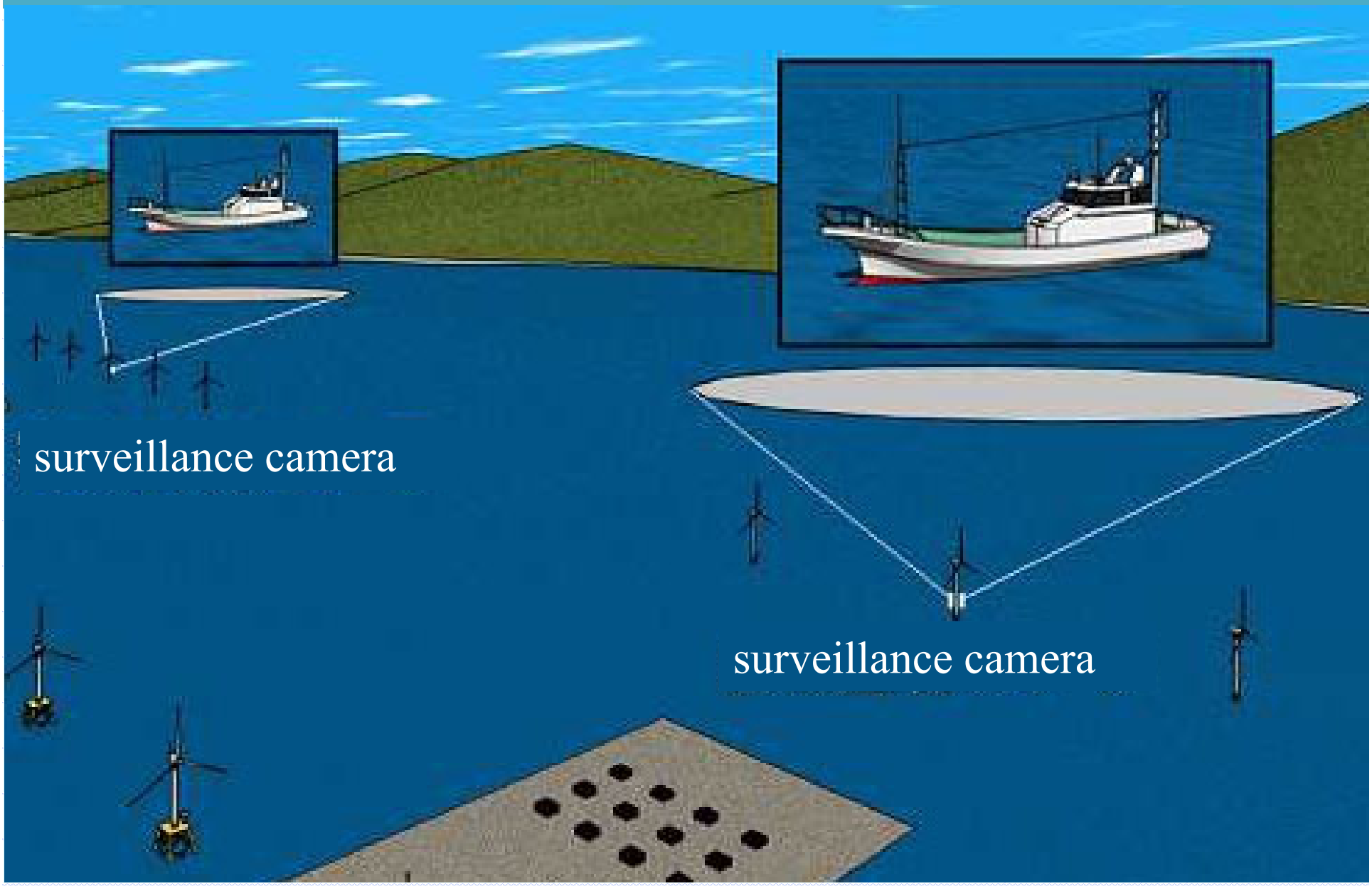
http://www.rioe.or.jp/2015teigen.pdf

Basement for fishing net



http://www.rioe.or.jp/2015teigen.pdf

Poaching Prevention Watch

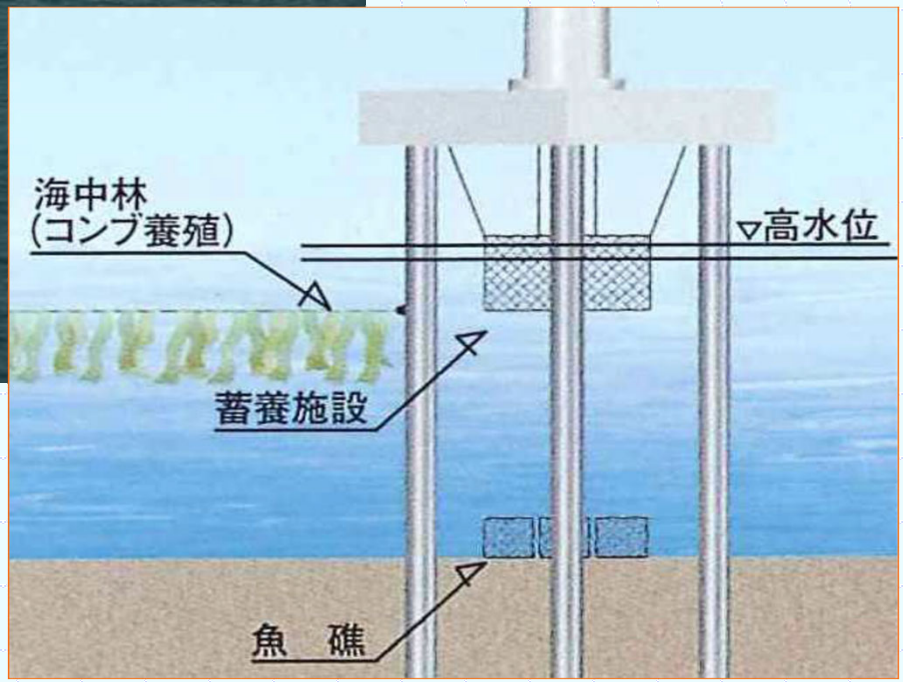


http://www.rioe.or.jp/2015teigen.pdf

Co-benefit for fishery

- Creation of Fishing Ground：Protection and Culture of Fishery Resources, aquaculture, fishing reef…
- Data Collection, Information Service：Oceanographic condition, Hydrographic condition…
- Sightseeing, Recreation：recreational fishery, Fishing Park, Wind Farm Cruise, diving spot…
- Electricity supply：ice plant, marine products factory, aeration for aqua farm, E-Fishing Boat…
- Education：Eco-tourism, training school…
- Participation：Maintenance, Construction, Finance, Equity, …
- Disaster Prevention：Emergency supplies storehouse, Refuge shelter…
- … :Community fund for resource management …

Pilot project



http://www.rioe.or.jp/2015teigen.pdf

Pilot project: Marine Energy and Fisheries Symbiosis Center

- Objectives
  - Build a model of cooperation and symbiosis between marine energy and fisheries
  - Coevolution of offshore wind business, fisheries, and marine ecosystems.
- Activities
  - Research
    - Monitoring of seaweed beds, fish, benthic organisms, etc. in the power generation area
    - Resource recovery through seaweed bed propagation and seedling release in the power generation area
  - Increase fishery resources
    - Research and planning for the use of the power generation area as a fishing ground
    - Information gathering and coordination with fishermen in the power generation area
  - capacity building
    - Training of engineers for construction and maintenance of structures for marine renewable energy
    - Training investigators to use state-of-the-art equipment (unmanned submersibles/ROVs, drones, etc.)

“Appropriate technology” for co-benefit

http://www.shibuya-diving.co.jp/publics/index/35/

Co-benefit




Power stations in community

Electricity

Consumer

Electricity fee

Retailer

Electricity

Electricity fee

GOTO Community power

Report of support projects

Community support projects

Donation for community fund



Restoration of agriculture

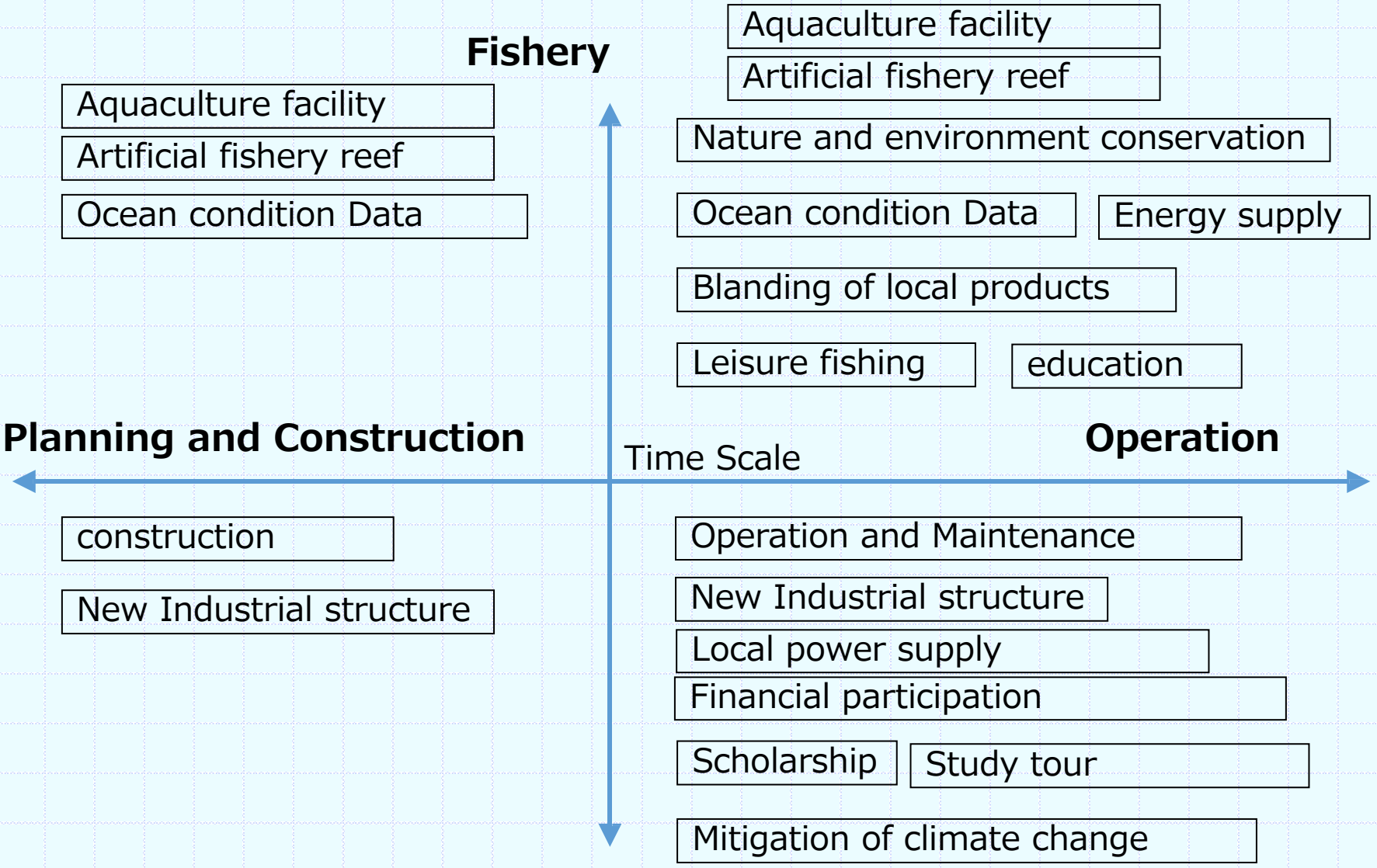
Local products(oil)

Support for travel fee of youth activities

Issues in community

https://510power.com/contribution

Community Co-Benefit Mapping (based on local workshop)



Concluding remarks

- Coevolution of technology and society
  - From compensation to invest
  - Cost effective multi-function infrastructure
  - Appropriate technology
  - Synergy/ Co-benefit with local society
- Variety of stakeholders and distributional justice
  - Specific ⇔ general
  - Intra generation(short term) ⇔ Inter generation(long term)