

Towards Multifunctional Marine Planning

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UTS Workshop - Sustainable Water and Electricity

Our devices have gone from single to multi-function

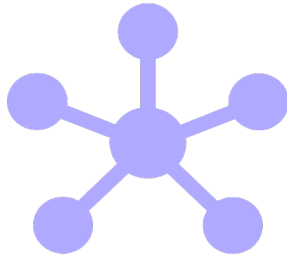


Why not design the use of space multifunctional too?

Multifunctional planning connects ecosystems with artefacts and practices produced by societies such as materials, technologies, and infrastructures to simultaneously provide multiple functions by clustering services using the same structure, resource, or location.

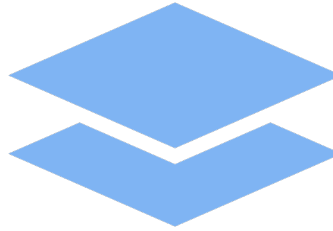
Byrnes et al., 2014; Przedzimirska et al., 2021; Barquet & Green 2022.

Multifunctionality



Co-use

Same resource



Coexistence

Economic interactions



Co-location

Spatial proximity

Combination of Services

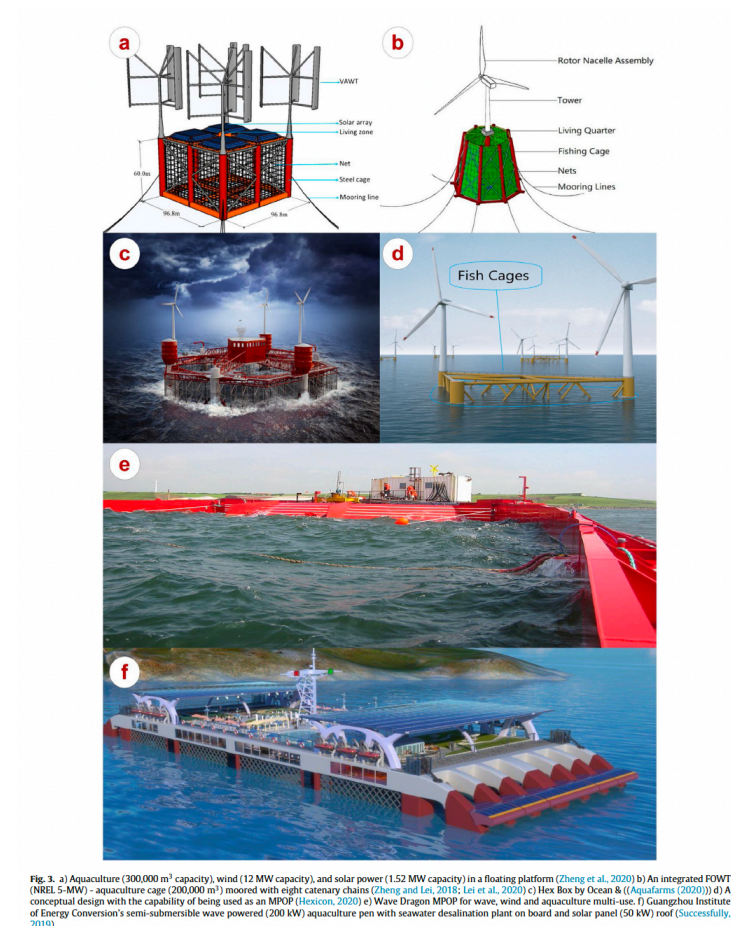
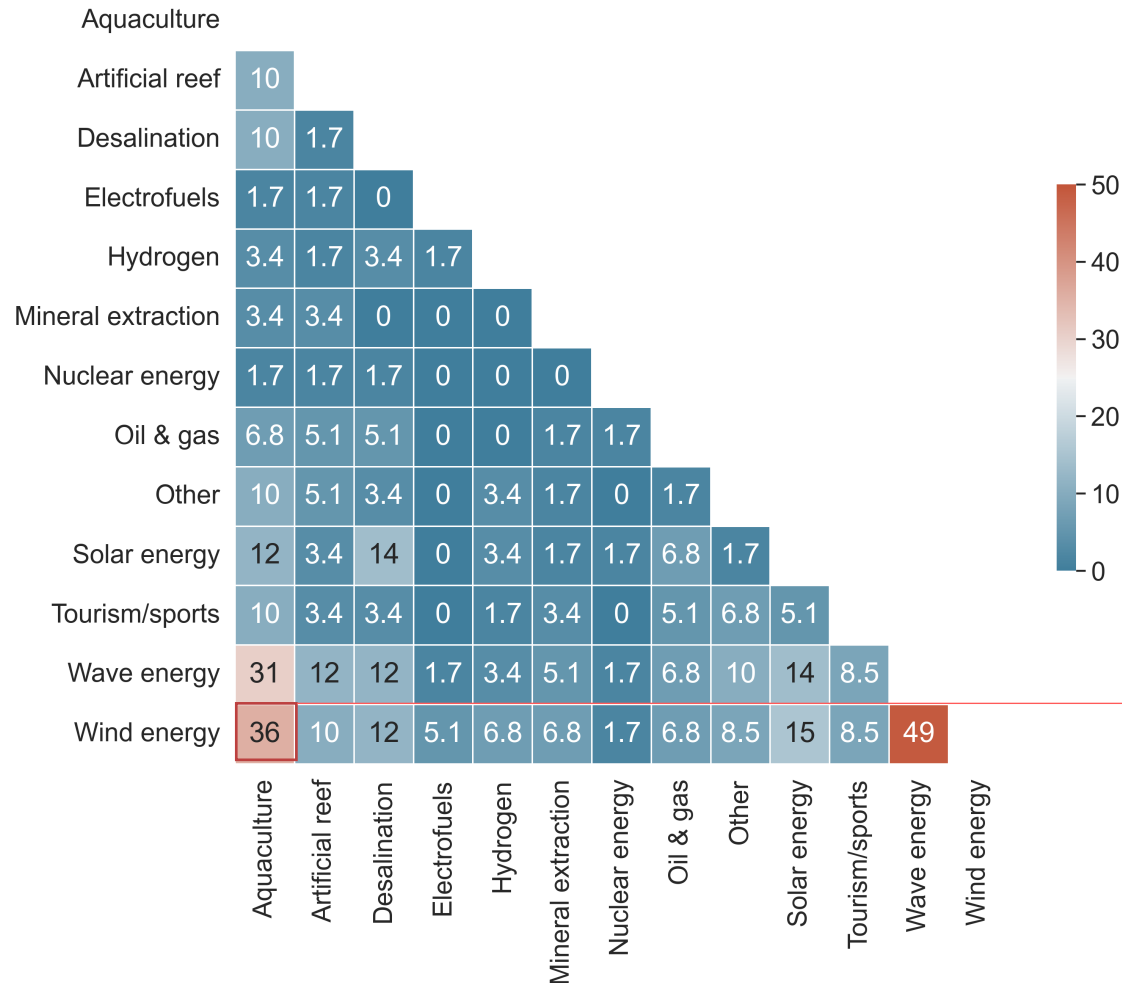


Fig. 3. a) Aquaculture (300,000 m³ capacity), wind (12 MW capacity), and solar power (1.52 MW capacity) in a floating platform (Zheng et al., 2020) b) An integrated FOWT (NREL 5-MW) - aquaculture cage (200,000 m³) moored with eight catenary chains (Zheng and Lei, 2018; Lei et al., 2020) c) Hex Box by Ocean & (Aquafarms (2020)) d) A conceptual design with the capability of being used as an MPOF (Hexicon, 2020) e) Wave Dragon MPOF for wave, wind and aquaculture multi-use. f) Guangzhou Institute of Energy Conversion's semi-submersible wave powered (200 kW) aquaculture pen with seawater desalination plant on board and solar panel (50 kW) roof (Successfully, 2019).

Combination of Services

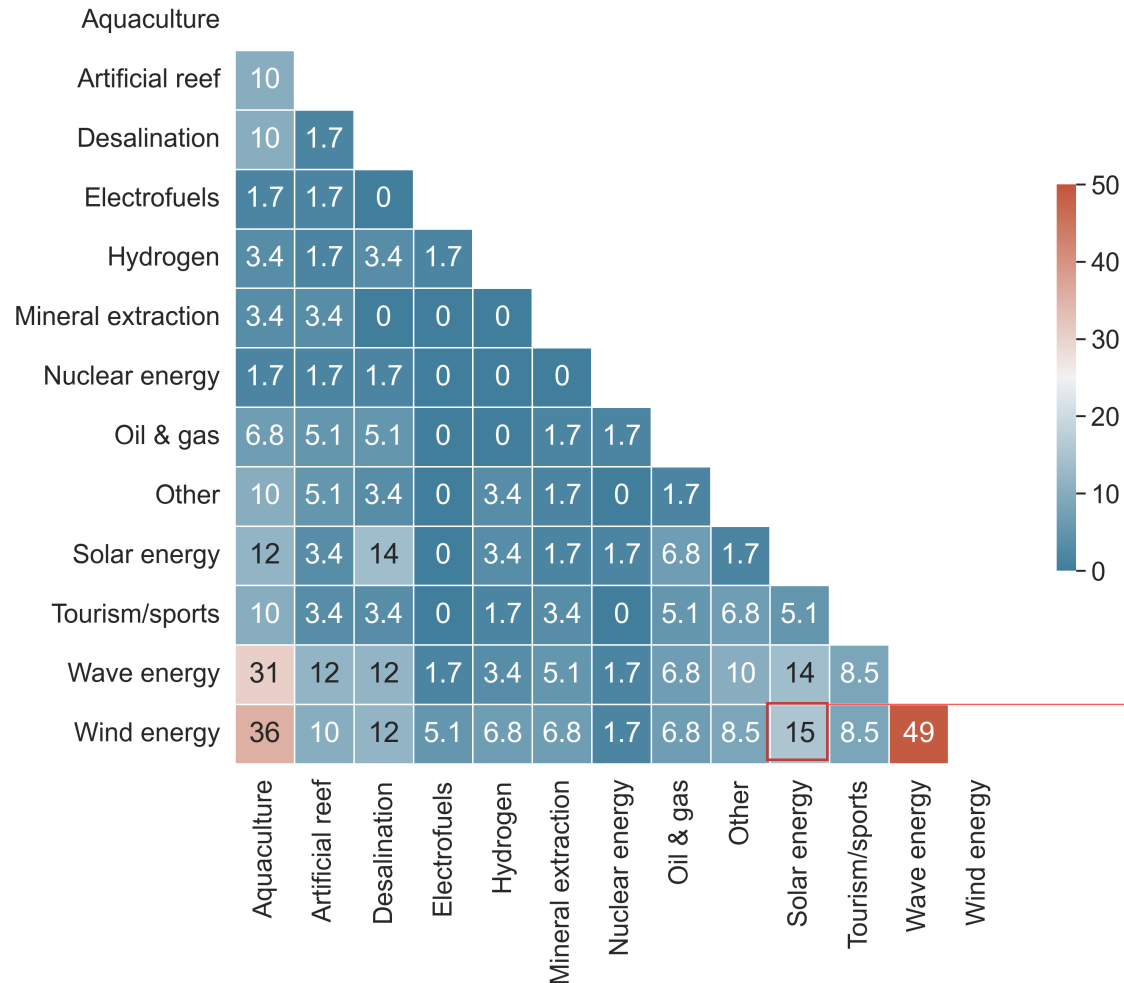
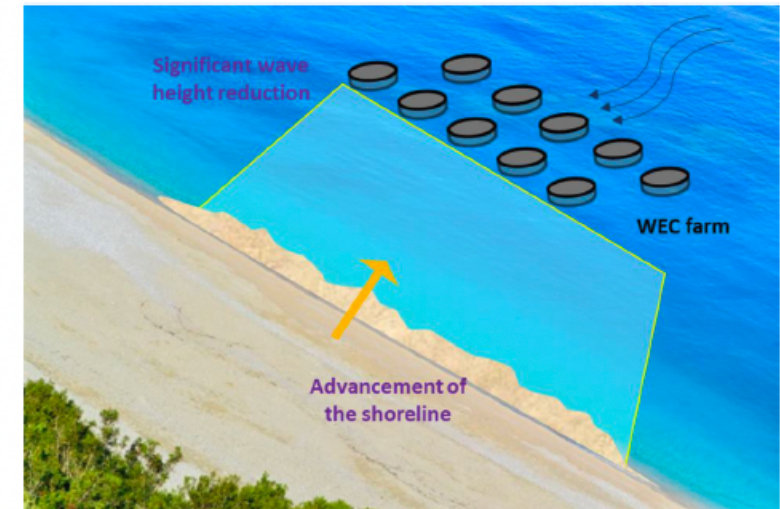
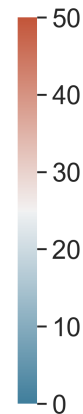
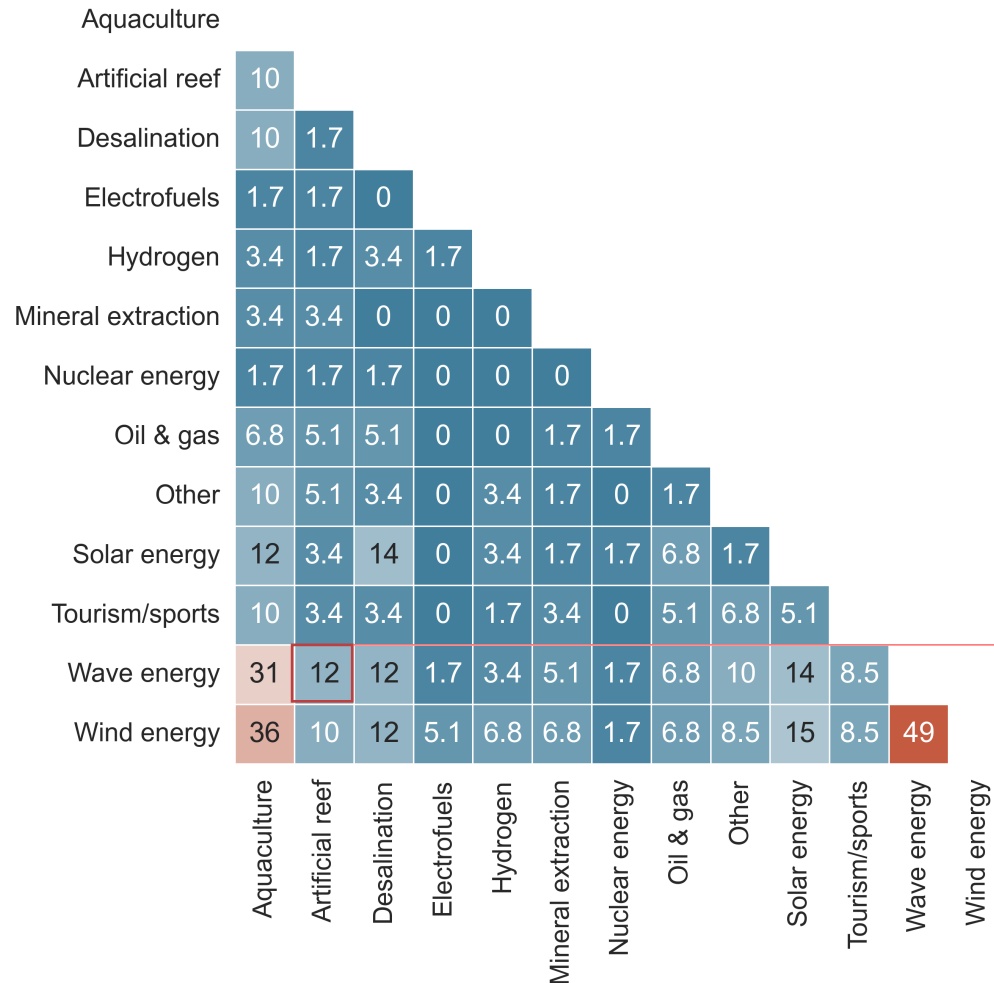


Fig. 1. A prototype of solar and wind energy generator integrated into offshore oil and gas platform (Rosebro, 2006).

Combination of Services



Multifunctional by design rather than by chance

Policy drivers

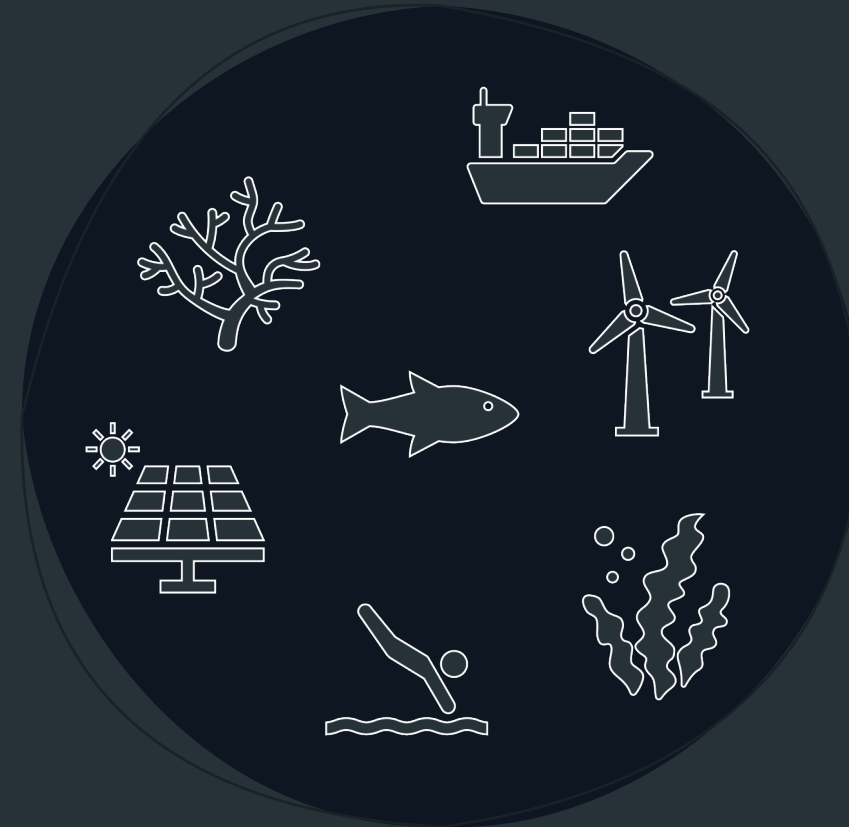
- Marine spatial planning could promote or demand co-location
- Innovation policy and technical development
- Economic incentives and more agile permit processes

Market drivers

- Identify social and economic benefits from co-use
- Business models that enable multifunctionality
- Organization of small and large actors

Multifunctional Marine Spatial Planning

- ✓ Optimize the use of space
- ✓ Deliver multiple benefits
- ✓ More efficient resource use
- ✓ Reduce CAPEX
- ✓ Share OPEX



Thank you!

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