

Adaptação às alterações climáticas e sustentabilidade no planeamento e uso do oceano

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Ciências
ULisboa



Encontro Ciência '19

Lisboa, Portugal

O que é o Ordenamento do Espaço Marinho?



Processo público que visa **organizar os diferentes usos** no oceano e as interações entre estes usos para **atingir um equilíbrio** entre o desenvolvimento económico e a proteção ambiental



Ferramenta para **atingir a sustentabilidade** no meio marinho

STEP 1 Establishing Authority

STEP 2 Obtaining Financial Support

STEP 3 Organizing the MSP Process

STEP 4 Engaging Stakeholders

STEP 5 Analyzing Existing Conditions

STEP 6 Analyzing Future Conditions

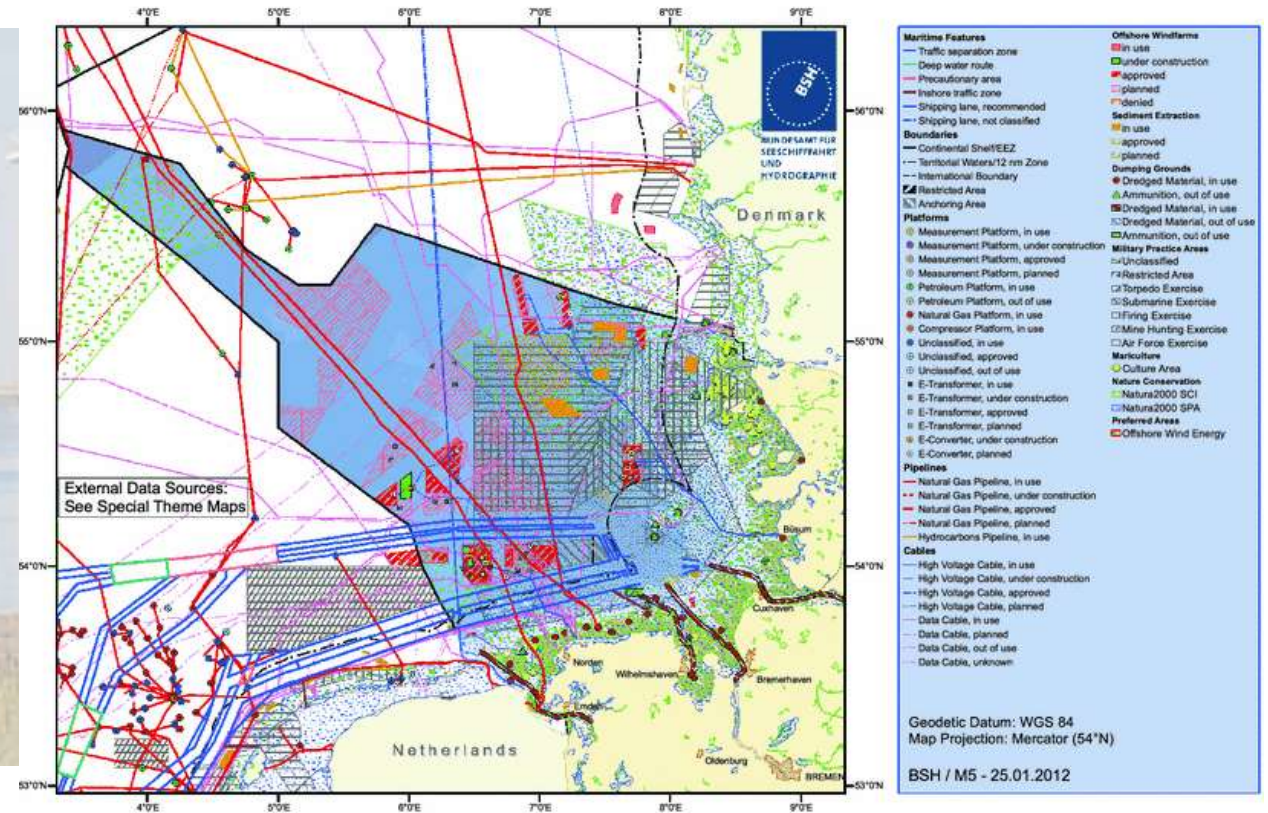
STEP 7 Developing the Plan

STEP 8 Implementing the Plan

STEP 9 Evaluating Performance

STEP 10 Adapting the Process

North Sea: Existing and Perspective Uses and Nature Conservation



http://www.bsh.de/en/Marine_uses/Industry/CONTIS_maps/index.jsp

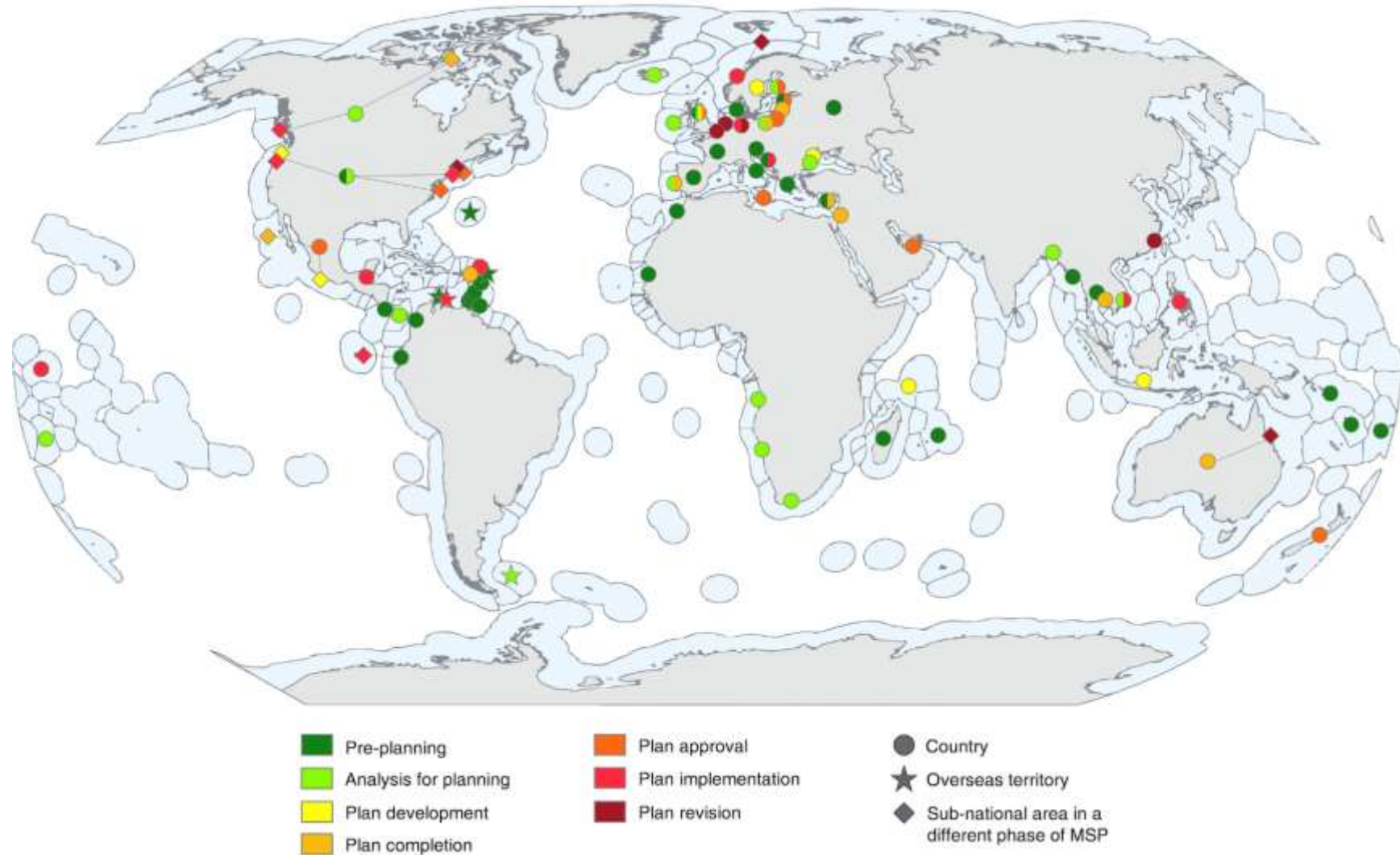
Em 2018:

70 países

45% estados costeiros

53% ZEE do mundo

Frazão Santos et al. (2019)
World Seas, Vol. 3, Chp 30



Desafios do Ordenamento do Espaço Marinho



**Alterações
Climáticas**

Quadro político e
institucional

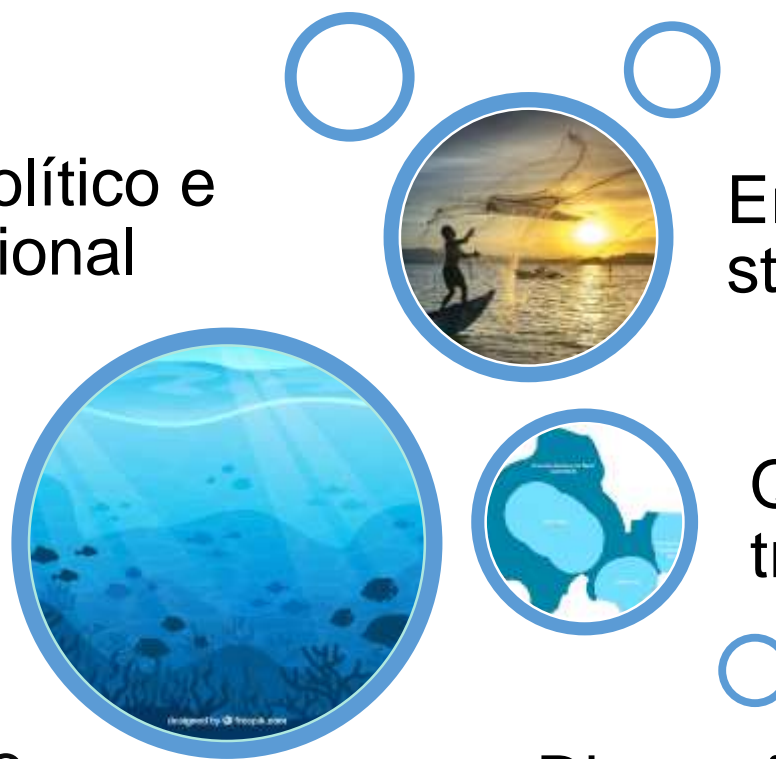
Envolvimento de
stakeholders

Sustentabilidade ambiental

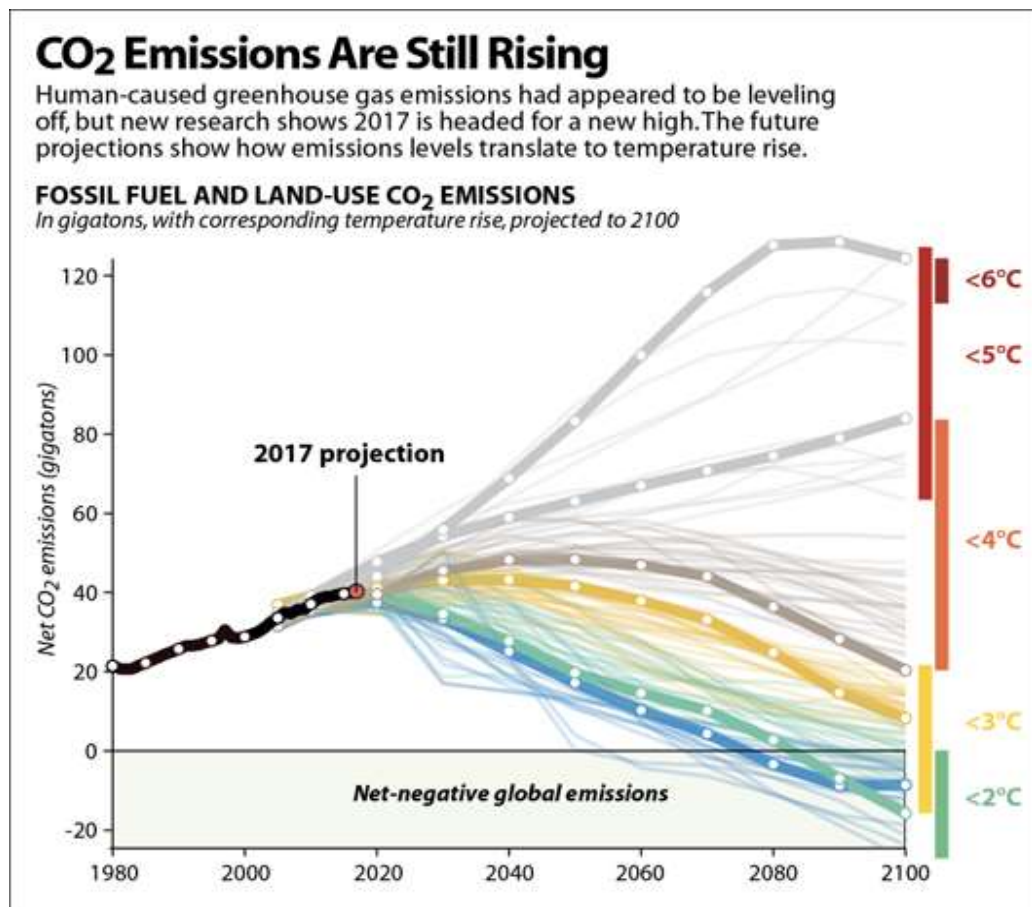
Questões
transfronteiriças

Monitorização e avaliação

Dimensão humana

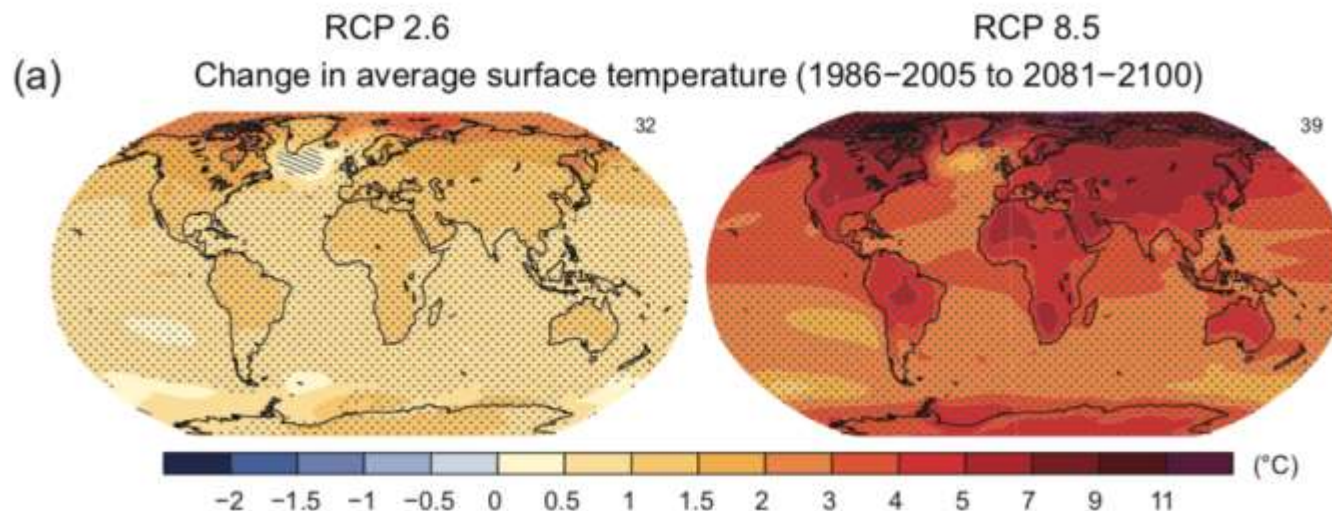


Alterações Climáticas



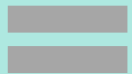
SOURCE: Global Carbon Project 2017

InsideClimate News

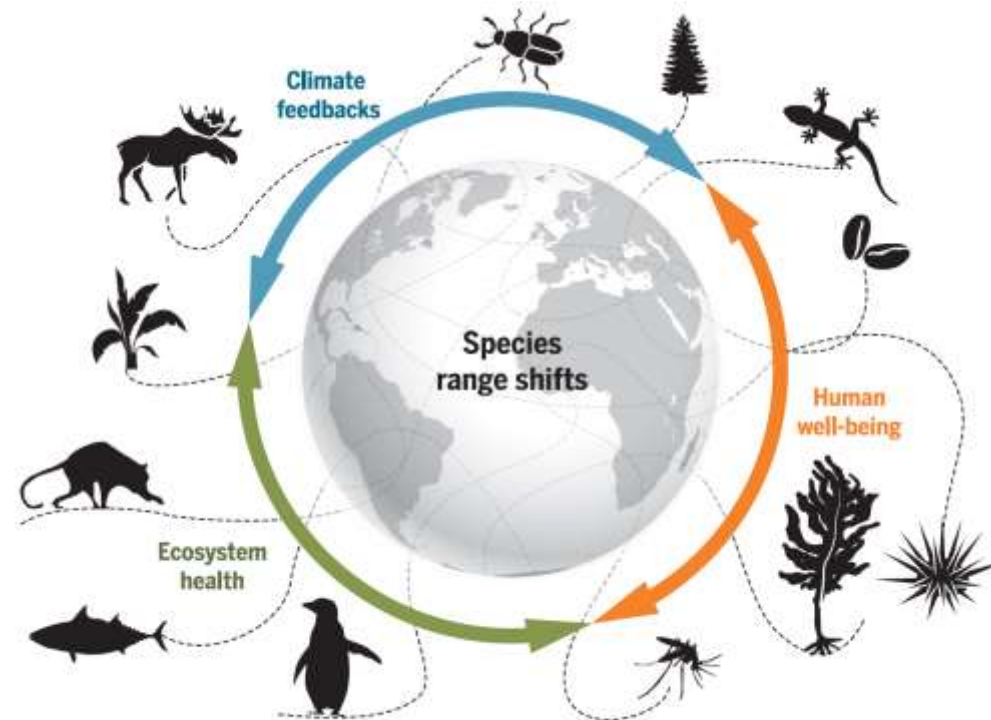


Redistribuição dos bens e serviços do oceano

- O meio marinho e os seus organismos
- Os usos relacionados com os setores da economia azul



Bem estar humano!



As the global climate changes, human well-being, ecosystem function, and even climate itself are increasingly affected by the shifting geography of life.

Pecl et al. (2017)
Science

Conflitos:

- Uso-uso
- Uso-ambiente
- Legais



OEM












E agora? Como é que isto se inclui no OEM?



E agora? Como é que isto se inclui no OEM?



Como é que o OEM vai ser afetado

		Drivers of change							
		PRIMARY						SECONDARY	
									
		WARM	ACID	HYPH	DSHIFT	SLR	CIRCW	EXT	DISHAB
Fisheries		●●●	●●	●●	●●●●	●●	●●	●●●	●●
Conservation		●●●	●●	●●	●●●●	●●	●●	●	●
Aquaculture		●●●	●●	●	●●	●	●●	●●●	●●●
Tourism		●●	●	●	●●	●●	●●	●●●	●
Shipping		●●●	●	●	●	●●	●●	●●●	●
Energy		●●	●	●	●	●●	●●●	●●●	●
Mining		●	●	●	●	●	●	●●●	●

Frazão Santos et al. (2016)
Nature Geoscience

Como é que o OEM pode-se adaptar

Adaptação do OEM às Alterações Climáticas

Como é que o OEM pode-se adaptar

O Ordenamento do Espaço Marinho **não pode antecipar** cada um dos possíveis cenários e planear para cada um deles...

Cenários com grande incerteza, erros, custos...

Estabilidade
para os
usuários



Flexibilidade
Adaptabilidade



... mas pode proporcionar **mecanismos de adaptação** para um futuro incerto e dinâmico

**Just in
Time**

**Adaptive
Management**

**Dynamic
Ocean
Zoning**

**Anticipatory
Bidding For
Use Rights**

**Just in
Case**

**Ocean
Zoning**

**Anticipatory
Zoning**

Adaptação do OEM às Alterações Climáticas

- Flexibilidade
- Adaptabilidade



Integrating Climate Change Adaptation in Ocean Planning

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Operational Approaches

- 1. JUST IN CASE (JIC)**
 - Very detailed planning approach (+)
 - Anticipates future needs and problems (+)
 - Very rigid nature, does not allow for interaction among different actors (-)
 - Low flexibility and adaptability, which can lead to inability to respond to strong challenges (-)
 - SDG 13: ○ SDG 14: ○
- 2. JUST IN TIME (JIT)**
 - Self-organized, bottom-up process that encompasses cooperation and interaction with different social actors (+)
 - Small scale planning that better promotes coordination (+)
 - Considers different future scenarios (+)
 - Achieving general consensus can be challenging (-)
 - SDG 13: ●●●●● SDG 14: ●●
- 3. ADAPTIVE MANAGEMENT (AM)**
 - Iterative, self-learning process that allows for change concerning flexibility in management (+)
 - Participative process (+)
 - Highly recommended to climate change adaptation (+)
 - Recognizes the importance of natural variability, ecological resilience and social dynamics (+)
 - Can be combined with DOM and AZ (+)
 - Requires rigorous compliance with involved steps (+)
 - Requires monitoring to reduce uncertainty (to provide the process with the information needed to enhance future management) (-)
 - Requires high level of knowledge on the system at the beginning to avoid primary failures, which can be costly (-)
 - SDG 13: ●●●● SDG 14: ●●●●
- 4. DYNAMIC OCEAN MANAGEMENT (DOM)**
 - Approach that cannot replace others, but acts as a complementary one, especially compatible with AM (+)
 - Potential to be very useful by incorporating real time data, which allows for better integration of management measures with ocean dynamics (+)
 - Ensures high flexibility in human zone spatial boundaries (+)
 - Existing tools focus on migratory and/or pelagic species that undergo changes in their distribution under climate change scenarios (+)
 - Existing tools focus on fisheries: positive results by increasing closed areas (e.g. overfishing) and avoiding bycatch (-)
 - More studies needed regarding fisheries (-)
 - Implies higher costs due to technological dependence (-)
 - SDG 13: ●●●●● SDG 14: ●●
- 5. OCEAN ZONING (OZ)**
 - Used as an integrative tool among sectors by recognizing socio-ecological vulnerabilities (+)
 - Usually associated to MSP, has an holistic perspective (+)
 - Through the integration of ecosystem based management, can help achieving Good Environmental Status (+)
 - No flexibility can be increased when combined with DOM due to dynamic boundaries (+)
 - Can be exclusionary and result in the prioritization of ocean economy instead of ensuring a participative and integrated scenario with a strong environmental perspective (-)
 - Lacks flexibility and does not include climate change adaptation considerations (-)
 - SDG 13: ○ SDG 14: ●●
- 6. ANTICIPATORY ZONING (AZ)**
 - Approach used to create place-based governance areas (+)
 - Can be used to identify different zones and categorize them by a logic system, in which ecological vulnerable ecosystems can be prioritized (+)
 - Requires a monitoring system, and this could be combined with AM (+)
 - Very high potential to be used as a precautionary legal tool to protect most vulnerable ecosystems or those with regulatory gaps (+)
 - Can be potentially used as an excuse to select in advance areas for extractive activities in the future leading to situations presented in ABFUR (-)
 - SDG 13: ●●● SDG 14: ●●●
- 7. ANTICIPATORY BIDDING FOR FUTURE USE RIGHTS (ABFUR)**
 - Results from combining DOM and AZ. Consists in allocating use rights to private entities or groups that will prioritize a specific use in a certain area (previously zoned)
 - Allows for other non-prioritized uses to be considered (+)
 - Flexibility is ensured by the possibility of negotiating use rights among users, which make the boundaries of the designated zones more dynamic (+)
 - Can result in user exclusion from areas with key resources, leading to exclusionary, undemocratic processes. Prioritization of the ocean resources through bidding of use rights is not compatible with ecosystem processes, since the externalities associated to the uses exceed users' capacity to face them (-)
 - SDG 13: ● SDG 14: ○●

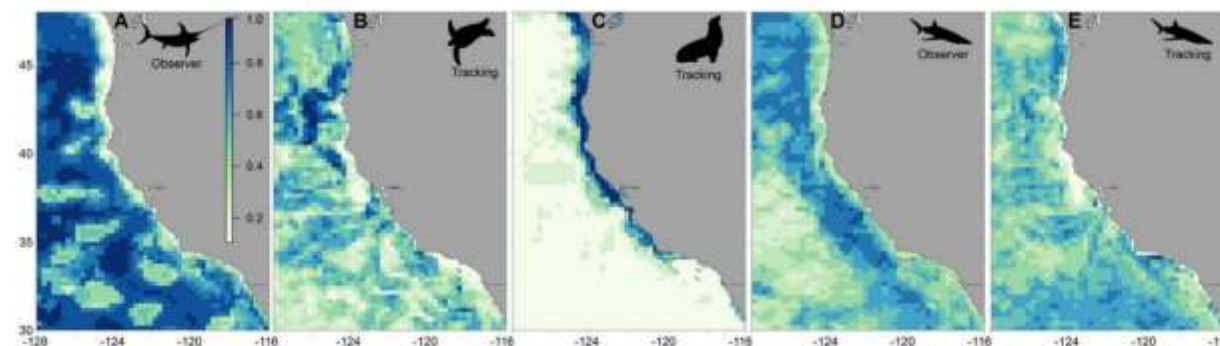
SDG RELEVANCE: None ○ Low ● Medium ●● High ●●●

Exemplo e caso prático



DYNAMIC OCEAN MANAGEMENT (DOM)

- Approach that cannot replace others, but acts as a complementary one; especially compatible with AM (+)
- Potential to be very useful by incorporating real time data, which allows for better integration of management measures with ocean dynamics (+)
- Ensures high flexibility in human uses spatial boundaries (+)
- Existing tools focus on migratory and/or pelagic species that undergo change in their distribution under climate change scenarios (+)
- Existing tools focus on fisheries: positive results by decreasing closed areas (in time/space) and avoiding bycatch (+)
- More studies needed regarding fisheries (-)
- Implies higher costs due to technological dependence (-)
- **SDG 13:** ●●/●●●● **SDG 14:** ●●



Hazen et al. (2018)
Science



Focalização **mais ou menos sustentável em função da estratégia escolhida**

SDG RELEVANCE: None ○; Low ●; Medium ●●; High ●●●

Caso prático: O Ártico

- Área altamente sensível às alterações climáticas
- Em função da gestão dos usos, 2 tipos de cenários:
 - a) Recursos biológicos mais protegidos, atividades menos prejudiciais apesar das alt. climáticas
 - b) Aproveitando os impactos das alt. climáticas, desenvolvimento de mais atividades





Obrigada!