marine spatial planning global

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MSPglobal 2.0
National Training in Ghana

Accra, 29 and 30 January 2024

Organised by:

unesco
Intergovernmental Oceanographic Commission

SDGs Advisory Unit
Office of the President

WATER RESEARCH INSTITUTE
Quality Research for Sustainable Development

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4. Data and assessments for MSP

Joel Ngueuko Kamdoum, IOC-UNESCO

unesco
Intergovernmental Oceanographic Commission

SDGs Advisory Unit
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Data and information: MSP Phases

IOC-UNESCO's MSP phases

SETTING THE SCENE

DESIGNING THE PLANNING PROCESS

ASSESSMENT FOR PLANNING

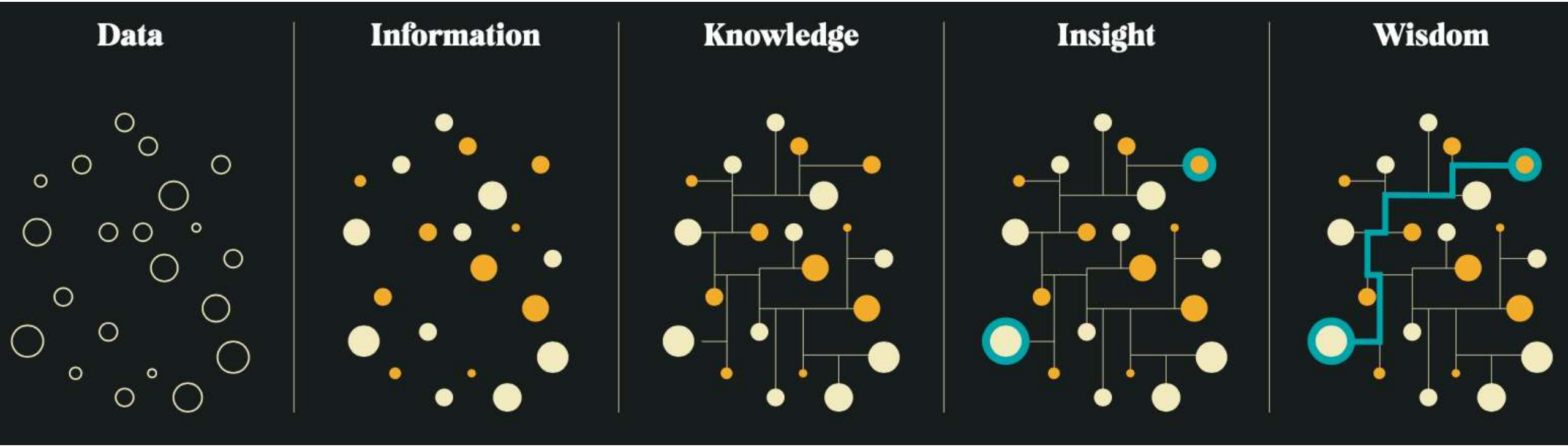
DEVELOPING THE PLAN

ENABLING IMPLEMENTATION OF THE PLAN

MONITORING, EVALUATION & ADAPTATION

Data and information

From Data to Insight



Source: Commonwealth Secretariat, 2021

Best available information

- ✓ **Lack of information is not an excuse** to delay starting to plan
- ✓ **Stakeholders often know more** than the government and are often willing to share information
- ✓ **No fear to mapping**

"Perfect is the enemy of good"

Voltaire

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

“The science we need for the ocean we want”

Data Management and setting the scene

Data Management

- Documentation and **metadata**:
  - ✓ Projections
  - ✓ Scale accuracy
  - ✓ Data types
  - ✓ Confidence levels
  - ✓ Sources and contacts
- Techniques for data management:
  - ➢ **Atlases**
  - ➢ **Geodatabases (GIS)**
  - ➢ **Data Portals**

Data management is as important as the data themselves

Source: IOC-UNESCO, 2009

Question #1: What is the data that we need?

How to start?

- ✓ ***Review of available data:*** look for spatial and temporal information that covers most of the marine management area; it is often unproductive to spend time collecting fine-scale data sets for small sub-areas of the marine management area because, when taken together, they are frequently not comparable
- ✓ ***Knowledge gaps:*** some field work may be undertaken

Source: IOC-UNESCO, 2009

Initial data collection and mapping can be done through specialized inter-agency working groups and by consulting experts on various topics

Data and information: Needs and input

- **Historical:** oceanographic, climate and coastline change data
- **Present:** Diagnose environmental, socio-economic and cultural conditions
- **Future:** Trends, new demands of ocean space, suitability maps, potential areas for biodiversity conservation, climate change
- **Alternative scenarios**
- **Public information system**

MSP Input Data required for analysing initial conditions
Oceanographic spatial information (ocean temperature, waves, currents…)
Data on marine environment (eutrophication level, benthic habitat status…)
Marine conservation (extension and objectives of Marine Protected Areas...)
Information on coastal and maritime activities (aquaculture, ocean energy facilities, harbours…)
Socio-economic information (coastal population, unemployment,
Governance information (administrative units, prospecting pe

Participatory mapping as a source of data and information

Participatory mapping is a map-making process that attempts to make visible the association between land or ocean and local communities by using the commonly understood and recognised language of cartography (IFAD, 2009). Maps present spatial information at various scales, using a paper or a digital map, serve as a medium of empowerment by allowing local communities to represent themselves spatially.

Type	Description
Data catalogue	A data list, its availability and how to source
Database or data portal	Online direct access to datasets
Data viewer or GIS mapping tool	Service to display spatial data
Knowledge platform or information service	Service which aggregates data into information product (e.g. factsheets)
Decision support tool or assessment tool	Method or specialised tool to support further analysis and interpretation

Source: UNESCO-IOC/European Commission, 2021

Data and information: Outputs

- A **permanent solution to access the data** needed i.e definition of an agreed routine for data management
- A **diagnostic**, including inventory maps of human activities and biodiversity hotspots
- As **assessment of the (relative) importance** of different sea uses, ecosystem services and carrying capacity
- An assessment of possible **conflicts and compatibilities** between human uses and environment
- An assessment of **suitability for marine space development**

Source: UNESCO-IOC/European Commission, 2021

Historical Data

Historical Data

Orthophotography of 1956

Source: REDIAM, 2016

Historical Data

Orthophotography of 2012

Source: REDIAM, 2016

60 years of changes

1956

Historical data gives the **context**!

2012

Source: REDIAM, 2016

Existing conditions

Existing conditions

Examples of data needs to assess the existing conditions

List of spatial data to characterise the environment:

- Oceanographic features like currents, convergence zones, upwelling
- Bathymetry and depth
- Priority areas for conservation (e.g. MPAs, Biosphere Reserves, EBSAs, etc.)
- Benthic geomorphology, shallow and deep
- Deep corals and reefs
- Key ecosystems and community-forming species (e.g. coral reefs, seagrasses, mangroves)
- Distribution and abundance of key species (e.g. cetaceans, turtles, elasmobranchs, seabirds, fish, invertebrates)
- Breeding areas
- Nursery areas
- Feeding or foraging areas
- Seasonal differences, taking into consideration different life stages of species
- Sea-surface temperature (SST)

(...)

Examples of spatial data needs to assess the existing socio-cultural conditions

- Maritime and underwater cultural heritage
- Coastal features
- Sunken and buried features
- Use of coast and sea
- Past use of coast and sea
- Religious and other socio-cultural areas
- Traditional land tenure
- Cultural ecosystem services

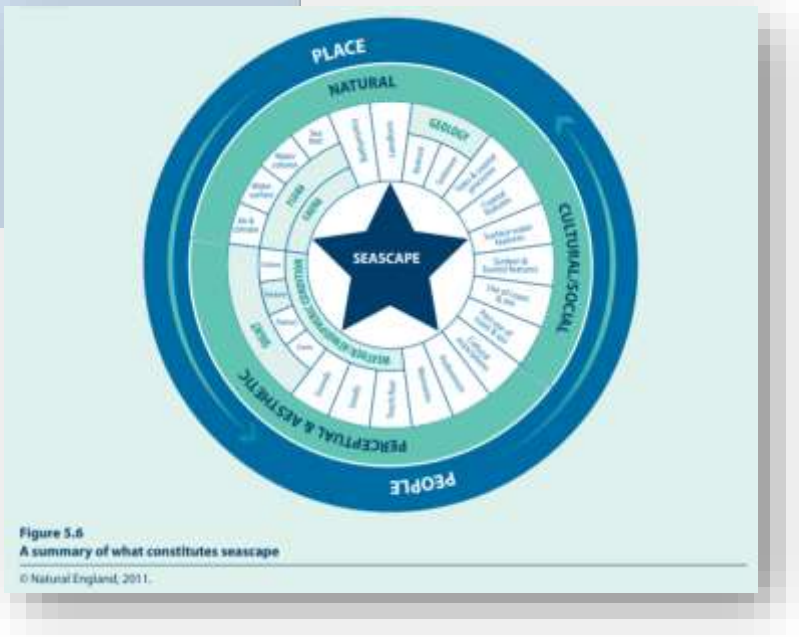


Figure 5.6
A summary of what constitutes seascape
© Natural England, 2011.

Source: UNESCO-IOC/European Commission, 2021

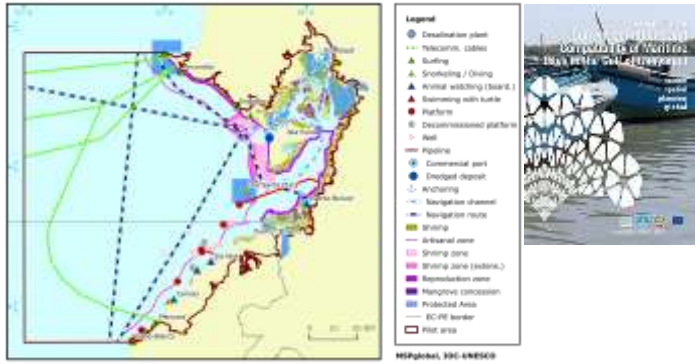
Existing conditions

Examples of data needs to assess existing sectoral conditions

List of spatial data related to maritime uses:

- Fisheries
  - Fishery areas (e.g. commercial, traditional, recreational, etc.)
  - Spawning and nursery areas
  - Important fishery ports
  - Fish migration
  - Fishing density
  - Restrictions
- Aquaculture
  - Zones
  - Installed infrastructure
- Tourism
  - Recreation and tourism areas and routes
- Maritime transport
  - Port infrastructures and protection zones
  - Anchoring areas
  - Dredging and dumping areas

(...)



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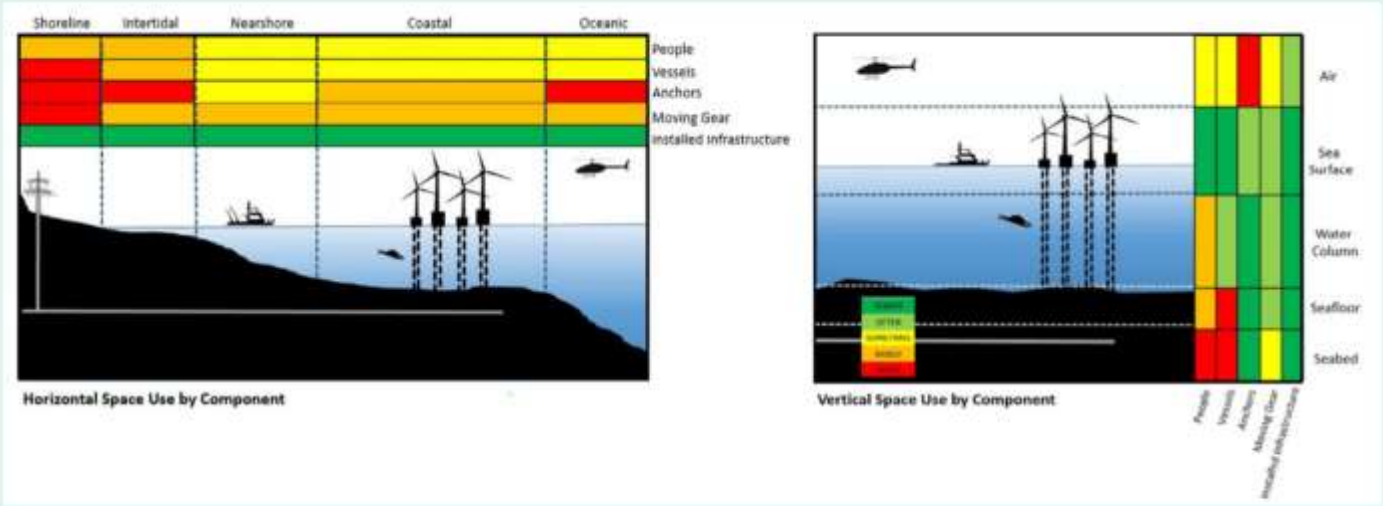
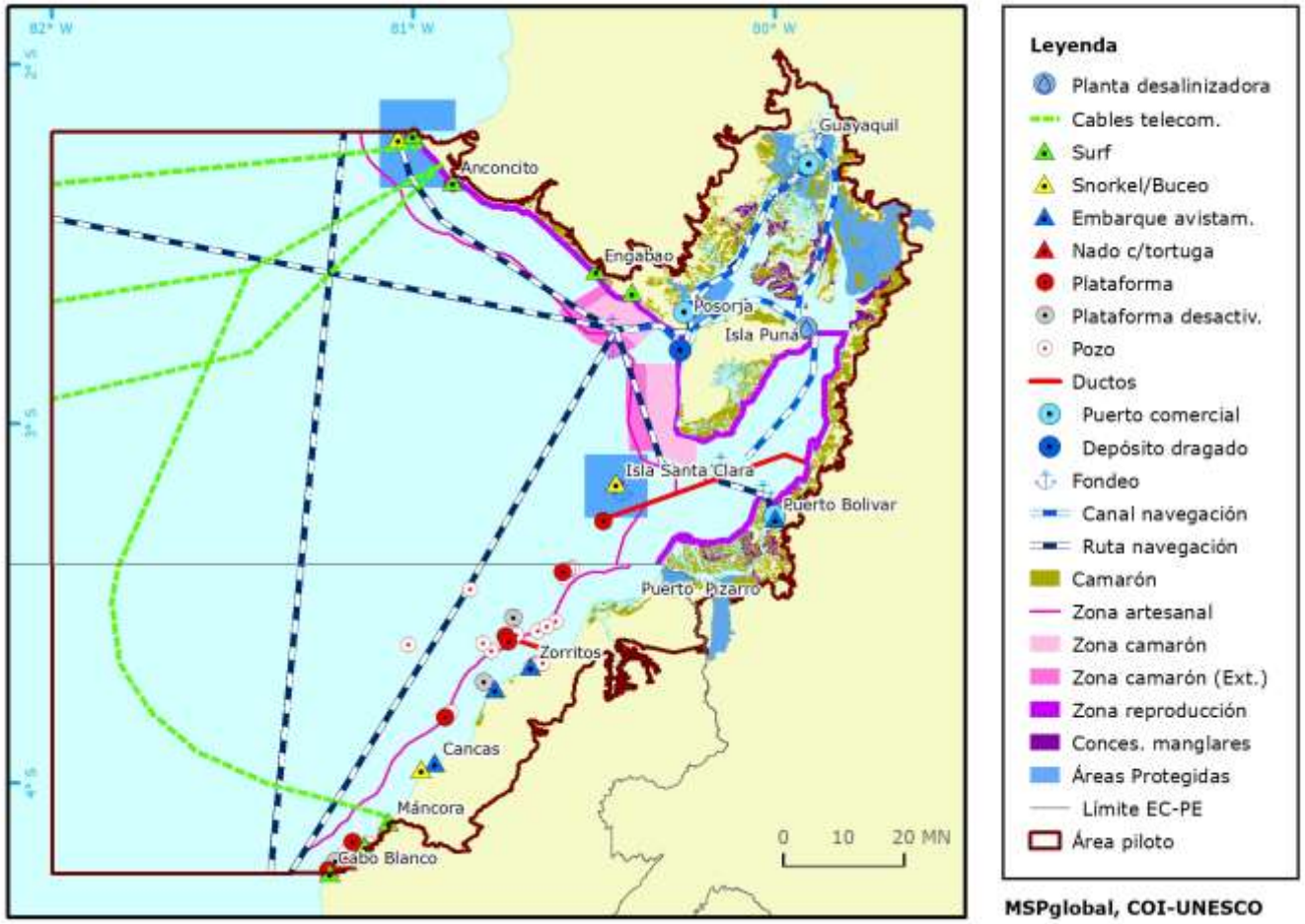


© NOAA, 2020.

Source: UNESCO-IOC/European Commission, 2021

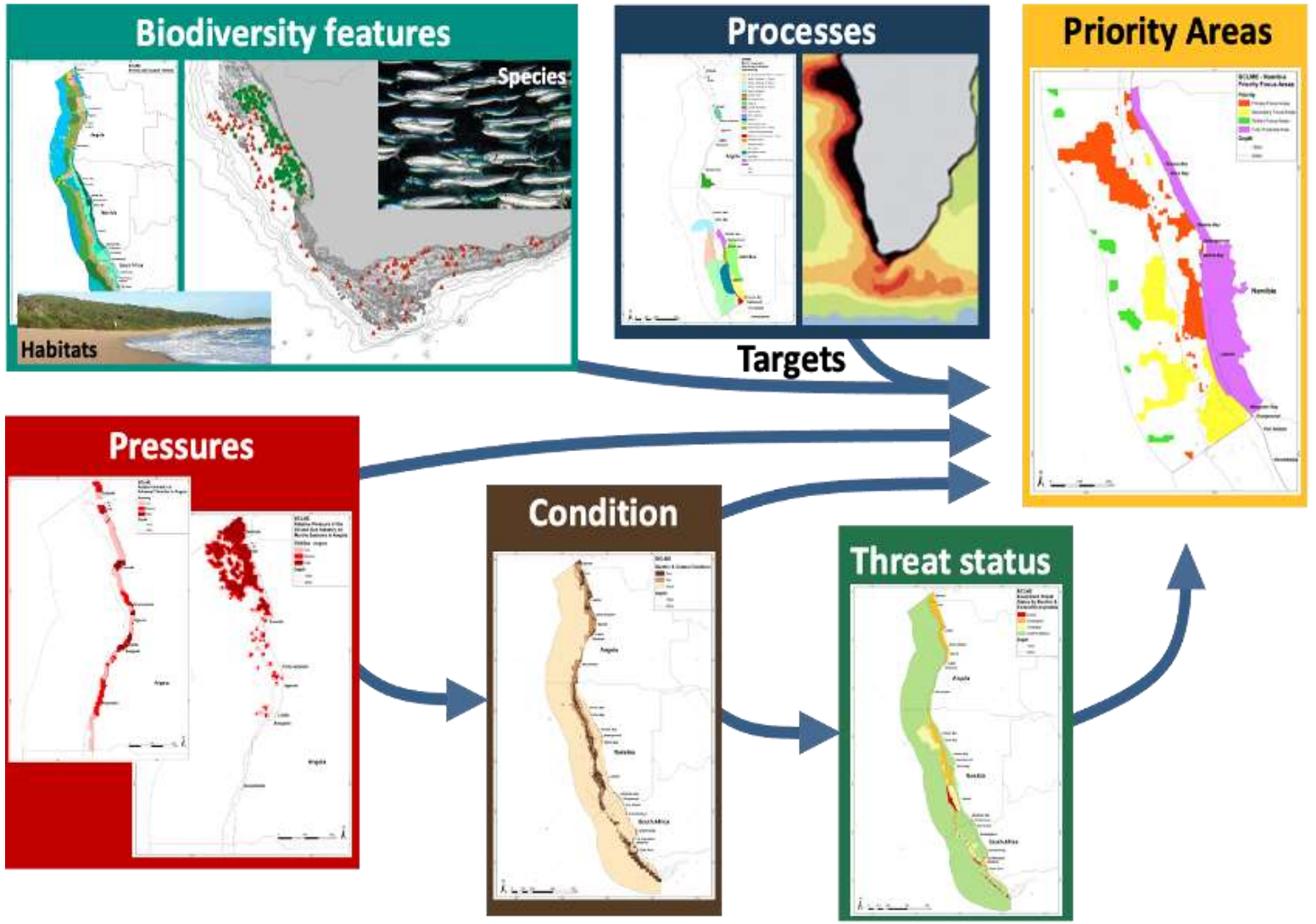
Current conditions

- **Present:** Diagnose environmental, socio-economic and cultural conditions



Source: UNESCO-IOC/European Commission, 2021

Example: Namibia



Sources: Finke et al., 2020; Harris et al., 2019; Holness et al., 2014; Kirkman et al., 2019

Example: Gran Canaria (Spain)

This approach analysed, updated and reused benthic habitat spatial information efficiently by using common data structure. Data sets on benthic habitats were harmonised following INSPIRE Directive principles and applying standardised classification systems:

1. European Nature Information System (EUNIS) – 26 habitat classifications

2. Marine Strategy Framework Directive Classification – 12 habitat classifications;

3. Spanish national standard on marine habitats and species – 43 classifications. Applying EUNIS standard makes it possible to harmonise national mapping with the European Marine Observation and Data Network (EMODnet)

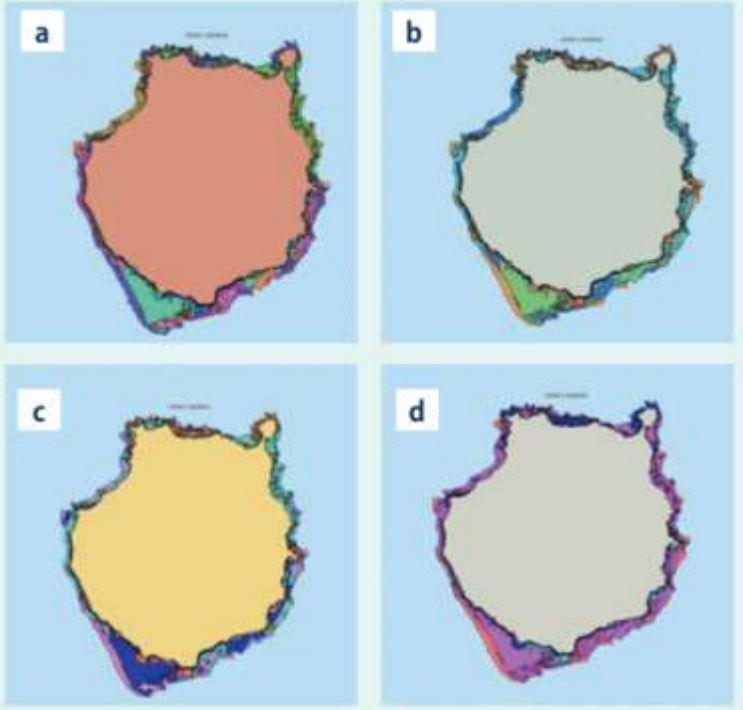


Figure 5.4
a. Gran Canaria (Spain) non-harmonised benthic habitat map; **b:** applied EUNIS classification system; **c:** applied Spanish national classification system for marine habitats; **d:** applied Marine Strategy Framework Directive Classification.

Source: PLASMAR Consortium, 2020.

Source: UNESCO-IOC/European Commission, 2021

Ecological, environmental and oceanographic conditions

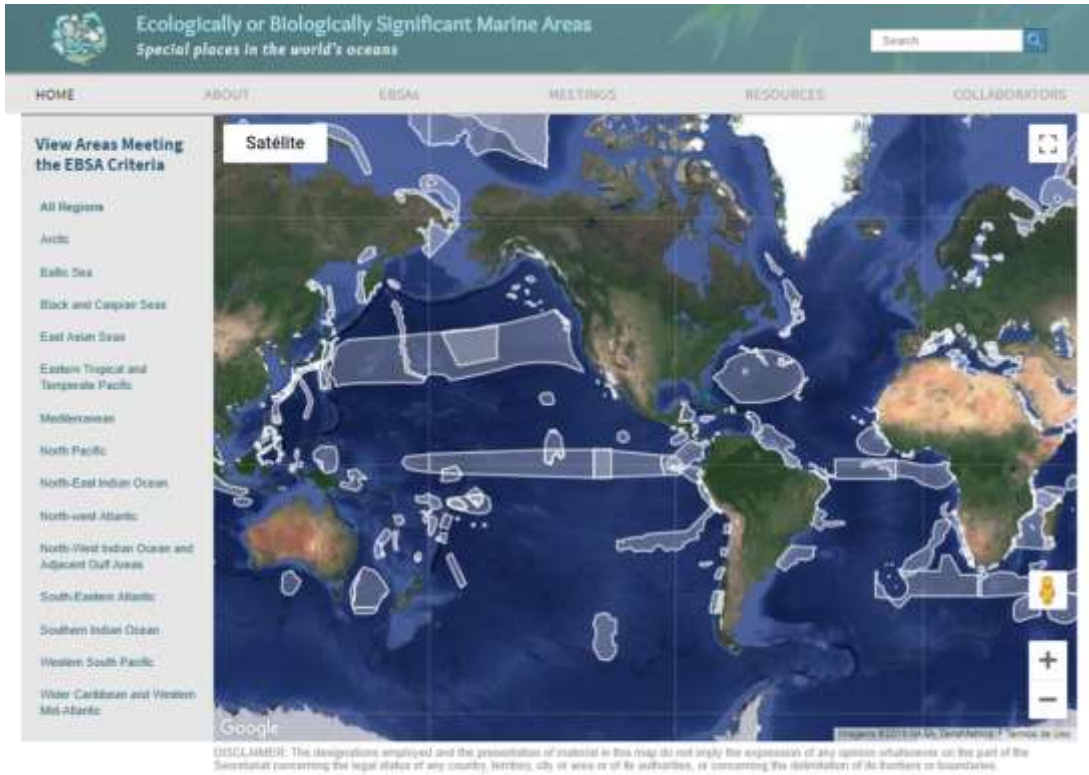
- The Ocean is **not homogeneous** (diversity in space and time)
- **Some places have much greater importance** than others for particular species, ecosystems, or processes and, hence, for humans too

Source: IOC-UNESCO, 2009

Knowing which places are most important to conserve and which places are compatible with development is central to the art of MSP

Criteria for identifying ecologically or biologically significant marine areas

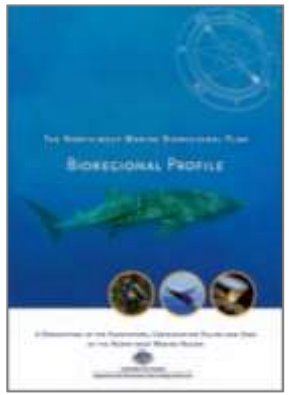
- Uniqueness or rarity
- Special importance for life history stages of species
- Importance for threatened, endangered or declining species and/or habitats
- Vulnerability, fragility, sensitivity or slow recovery
- Biological productivity
- Biological diversity
- Naturalness

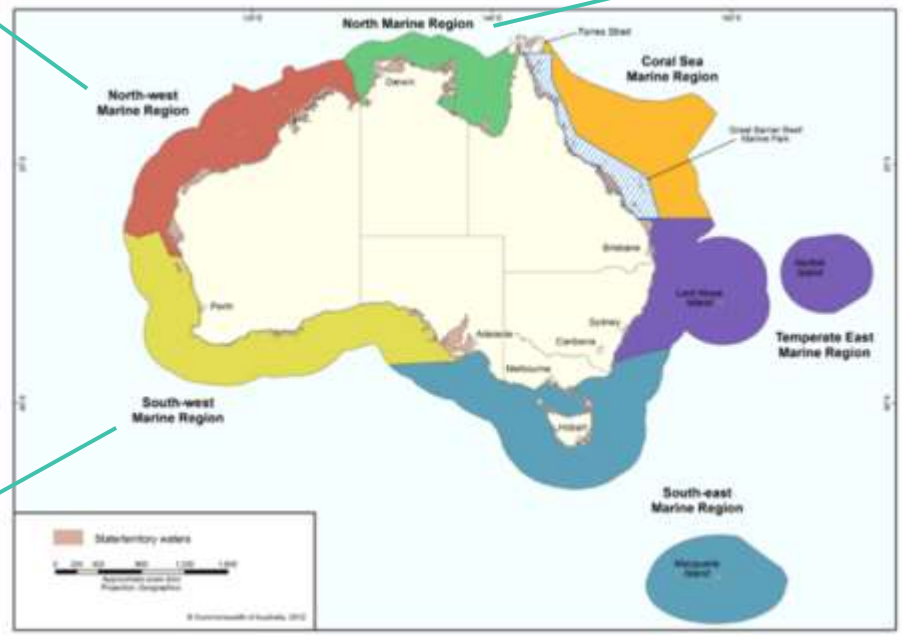


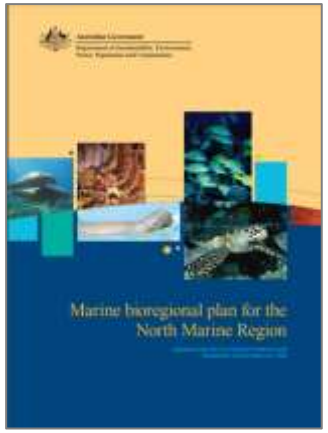
Example: Australia

Bioregional profiles

- ✓ MSP plans based on marine bioregions represent a way to achieve ***ecosystem-based management***
- ✓ These plans recognize the value of ***ecosystem services***



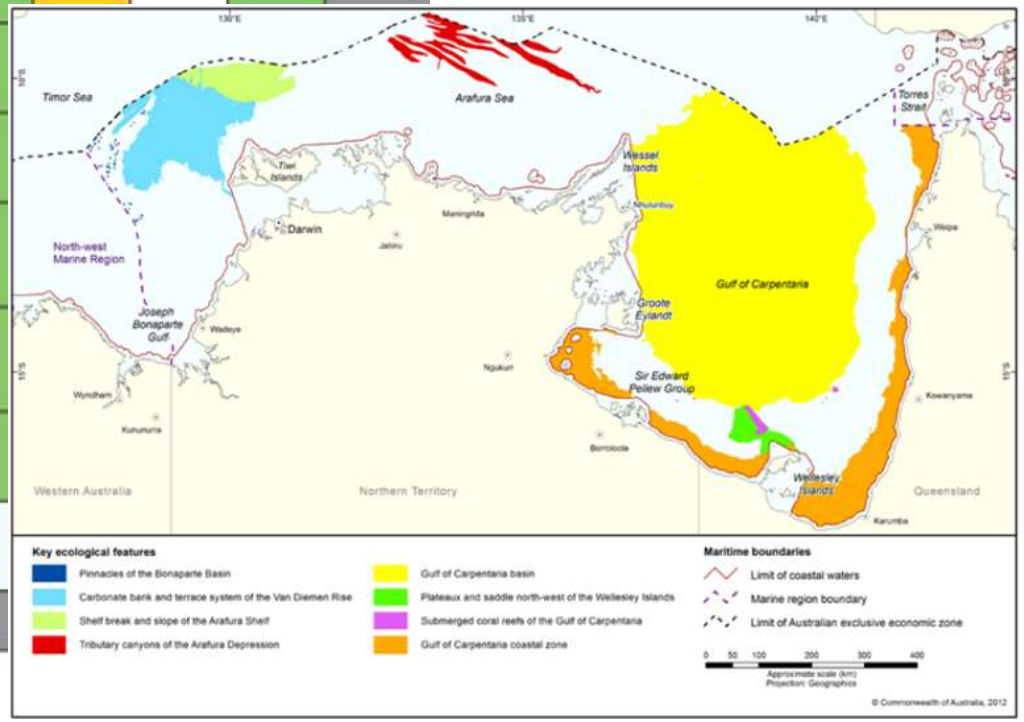




Source: Commonwealth of Australia, 2012

Key ecological feature	Pressure[1]									Pressure[1]								
	Sea level rise	Changes in sea temperature	Changes in oceanography	Ocean acidification	Chemical pollution/ contaminants	Nutrient pollution	Marine debris	Noise pollution	Light pollution	Physical habitat modification	Human presence at sensitive sites	Extraction of living resources	Bycatch	Oil pollution	Collision with vessels	Invasive species	Changes in hydrological regimes
1. Pinnacles of the Bonaparte Basin																	
2. Carbonate bank and terrace system off the Van Diemen Rise																	
3. Shelf break and slope of the Arafura Shelf																	
4. Tributary canyons of the Arafura Depression																	
5. Gulf of Carpentaria basin																	
6. Plateaux and saddle north-west of the Wellesley Islands																	
7. Submerged coral reefs of the Gulf of Carpentaria																	
8. Gulf of Carpentaria coastal zone																	
Historic Shipwrecks																	
Florence D shipwreck																	

Legend: of concern; of potential concern; of less concern; not of concern; data deficient or not asse



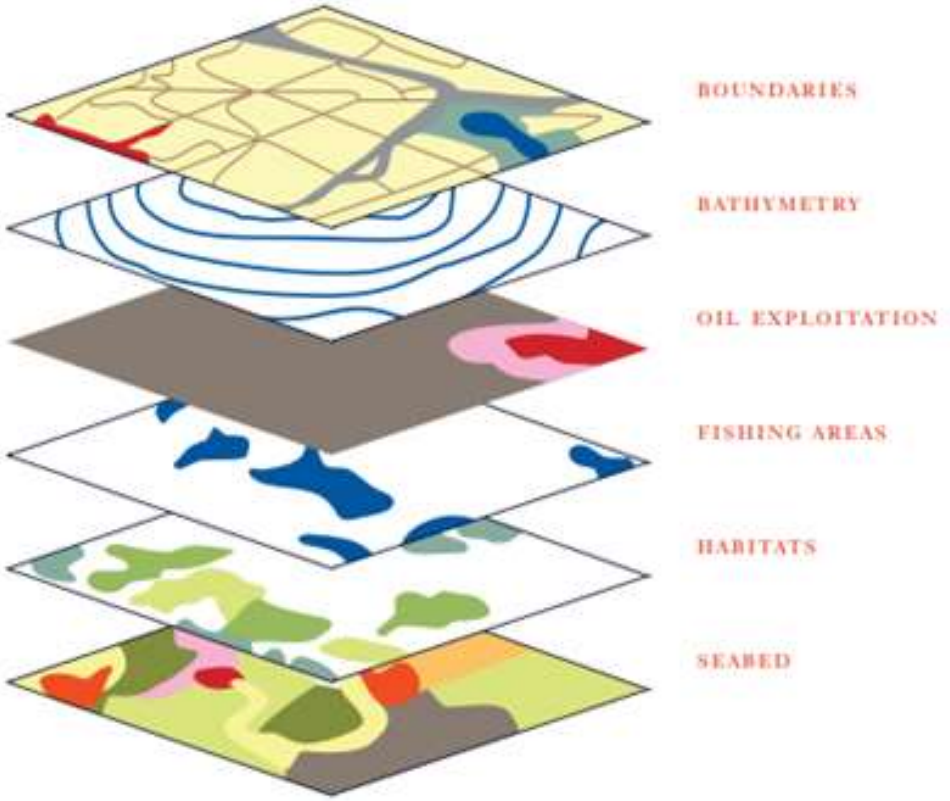
Source: Commonwealth of Australia, 2012

Human activities

- **Some areas are more economically valuable** than others
- Address **offshore and onshore aspects** of each activity
- Connecting offshore activities with **onshore communities**
- **Cultural areas**

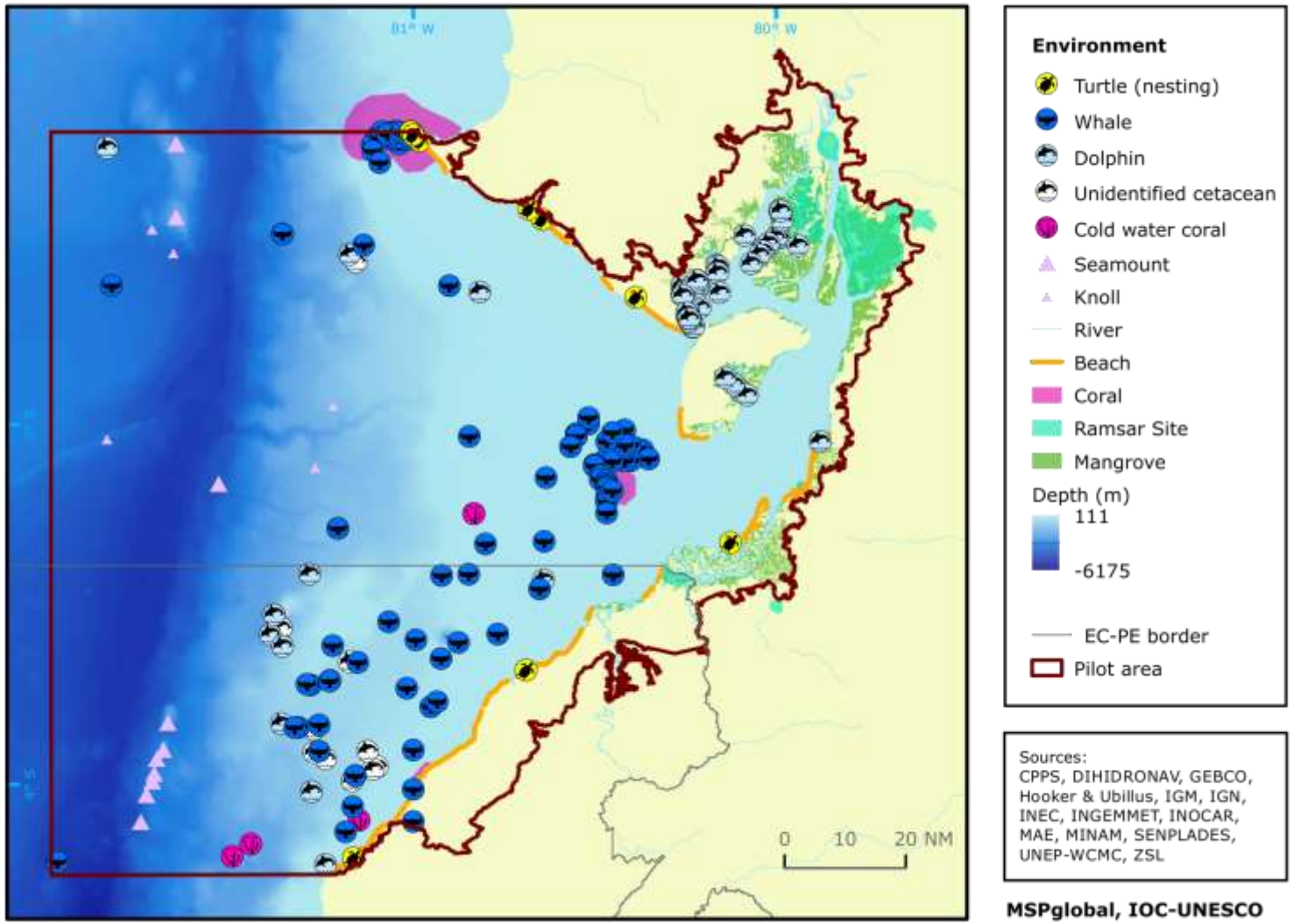
Source: IOC-UNESCO, 2009

Preparation of current conditions



Source: TPEA, 2014; FAO, 2016

Example: Gulf of Guayaquil (Ecuador and Peru)



Example: Gulf of Guayaquil (Ecuador and Peru)

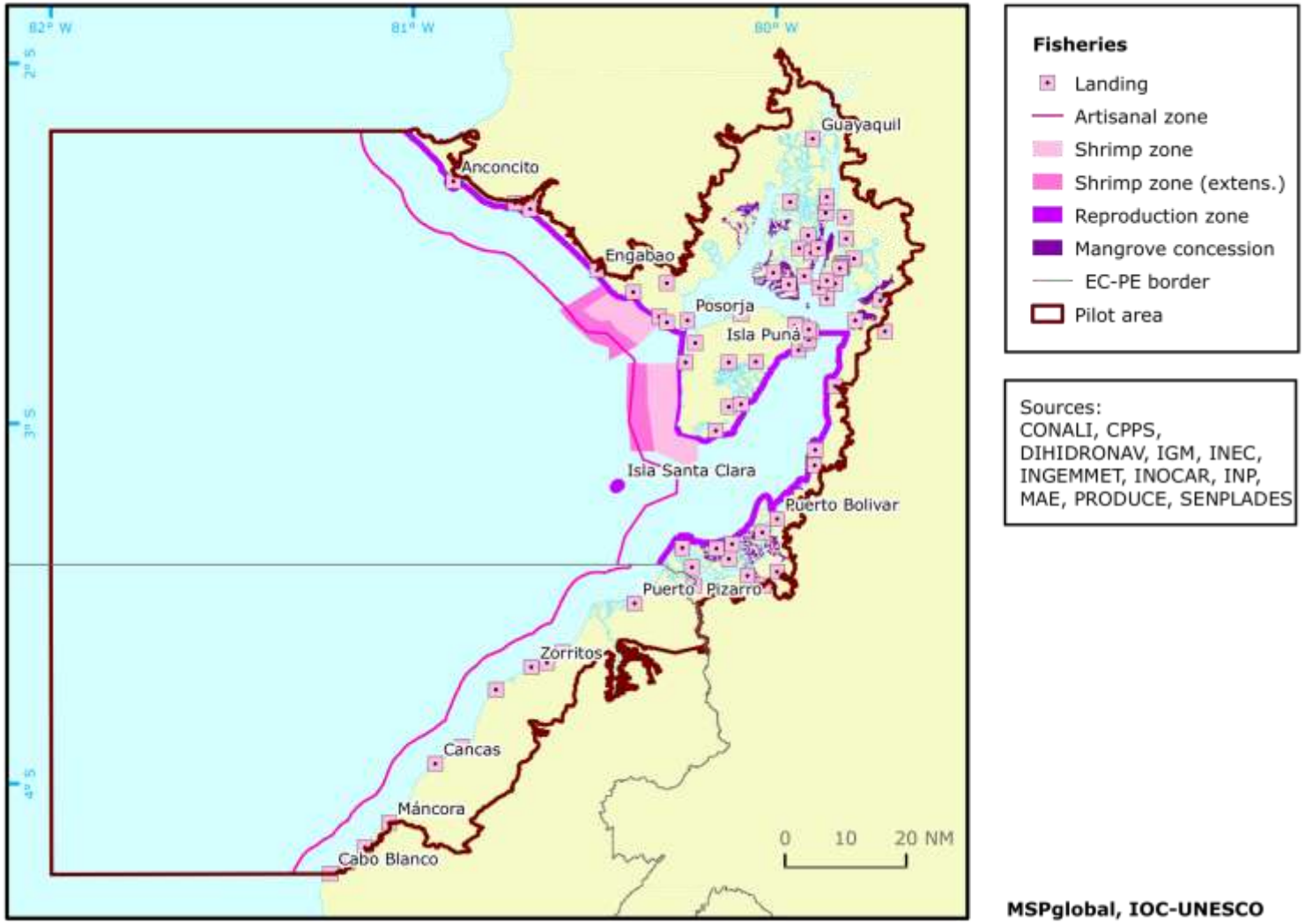
Conservation

- Protected Area
- Biosphere Reserve
- EC-PE border
- Pilot area

Sources:
DIHIDRONAV, IGM, INEC, INGEMMET, INOCAR, MAE, SERNANP

MSPglobal, IOC-UNESCO

Example: Gulf of Guayaquil (Ecuador and Peru)



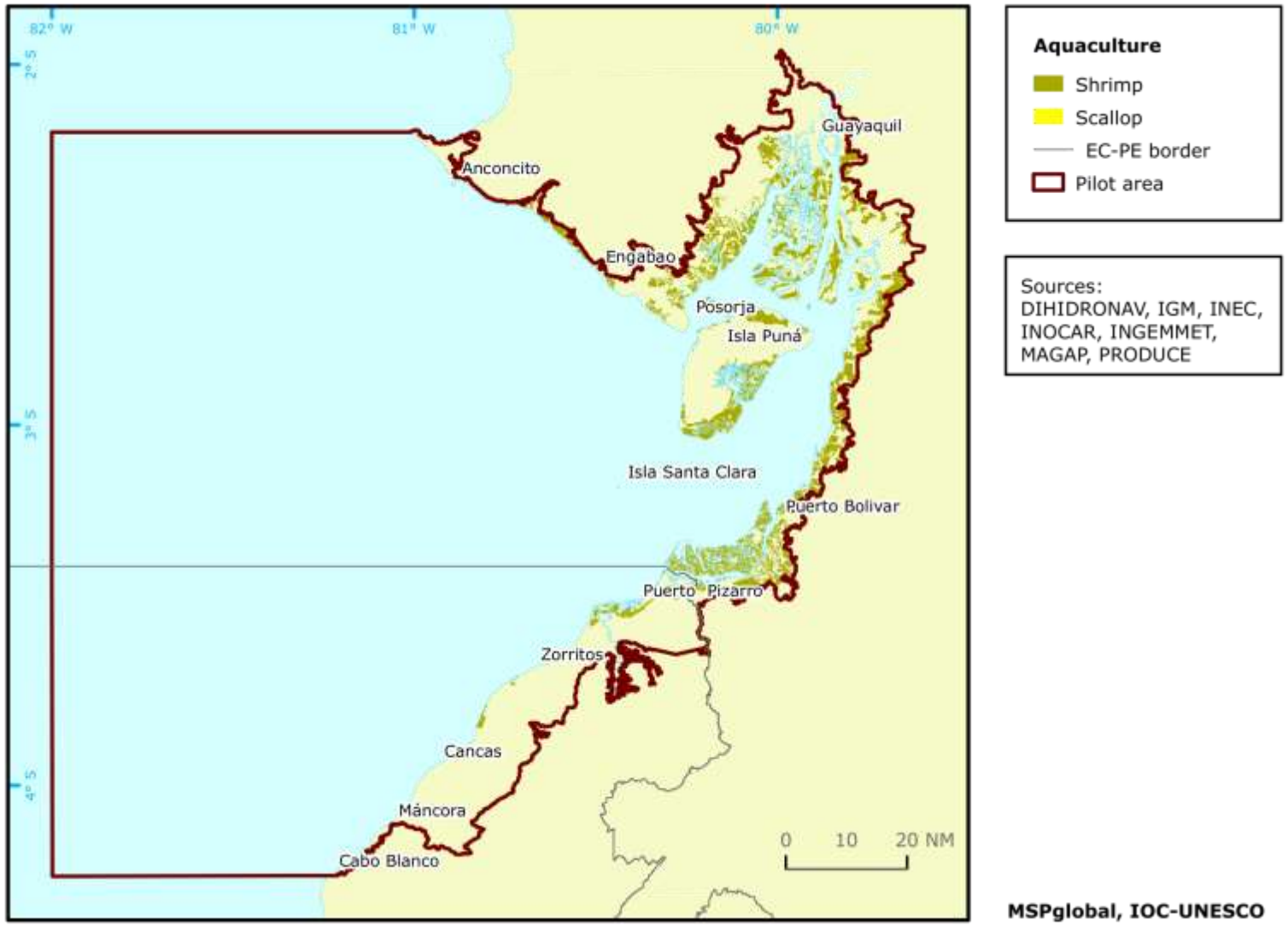
Fisheries

- Landing
- Artisanal zone
- Shrimp zone
- Shrimp zone (extens.)
- Reproduction zone
- Mangrove concession
- EC-PE border
- Pilot area

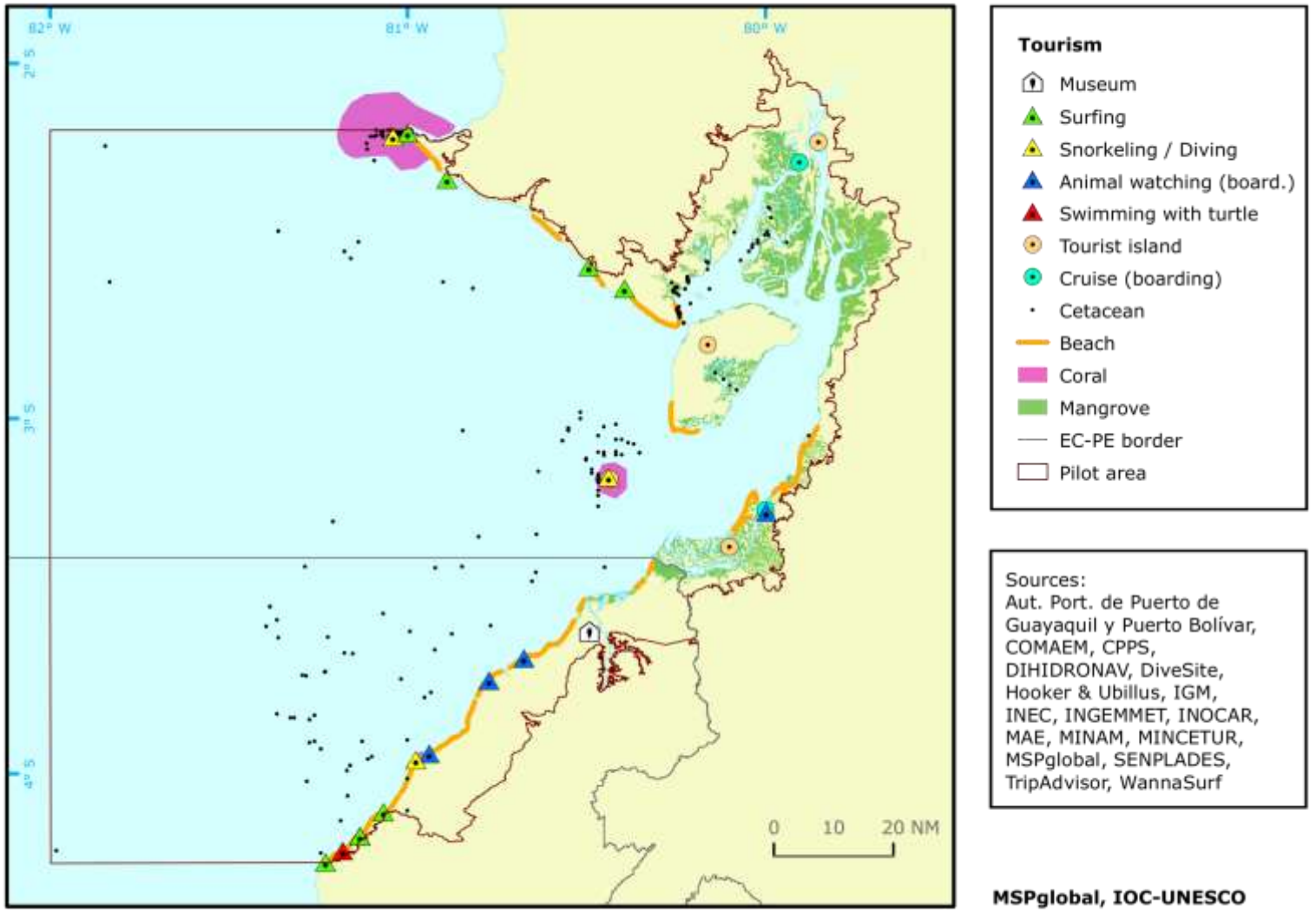
Sources:
CONALI, CPPS, DIHIDRONAV, IGM, INEC, INGEMMET, INOCAR, INP, MAE, PRODUCE, SENPLADES

MSPglobal, IOC-UNESCO

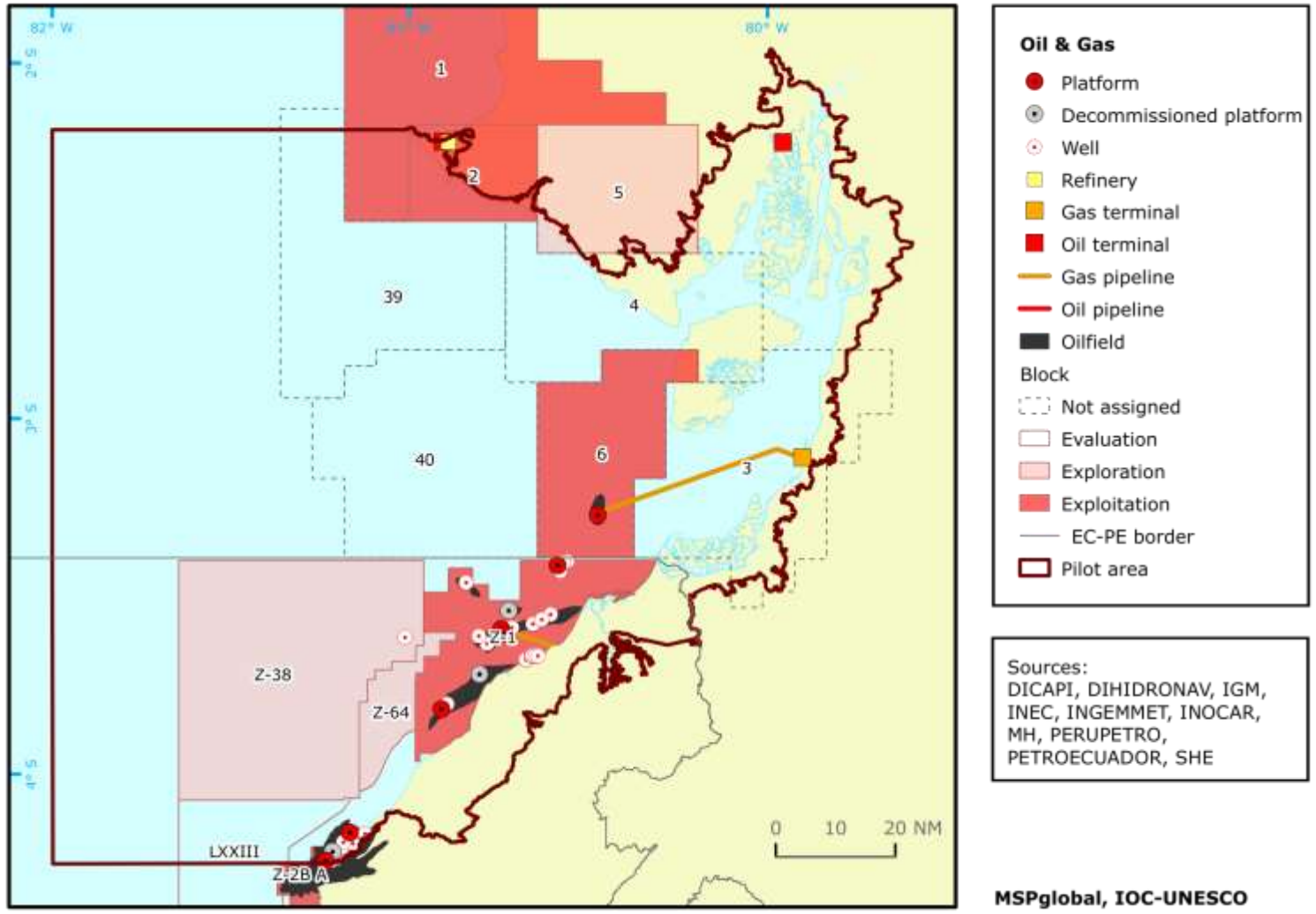
Example: Gulf of Guayaquil (Ecuador and Peru)



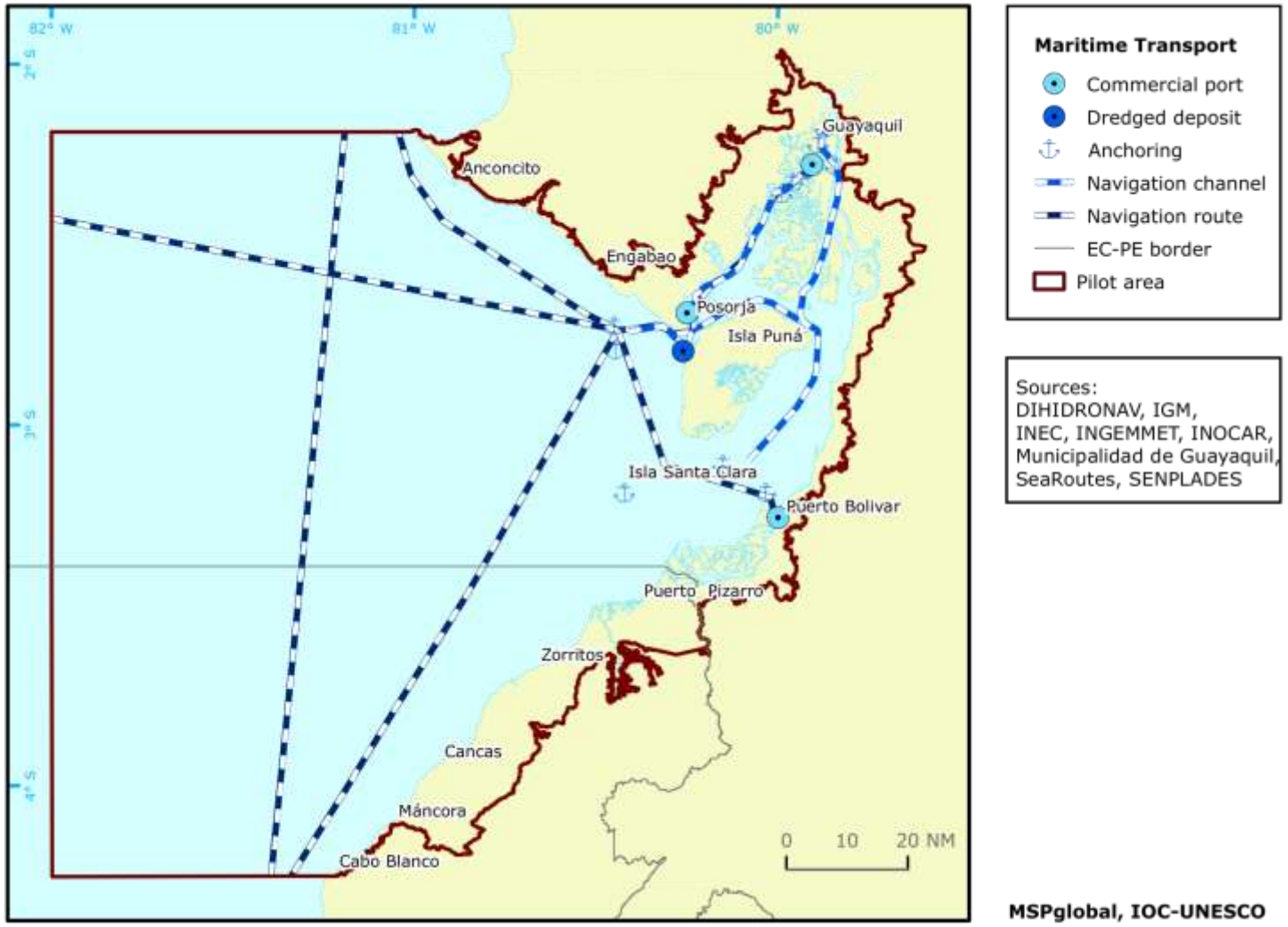
Example: Gulf of Guayaquil (Ecuador and Peru)



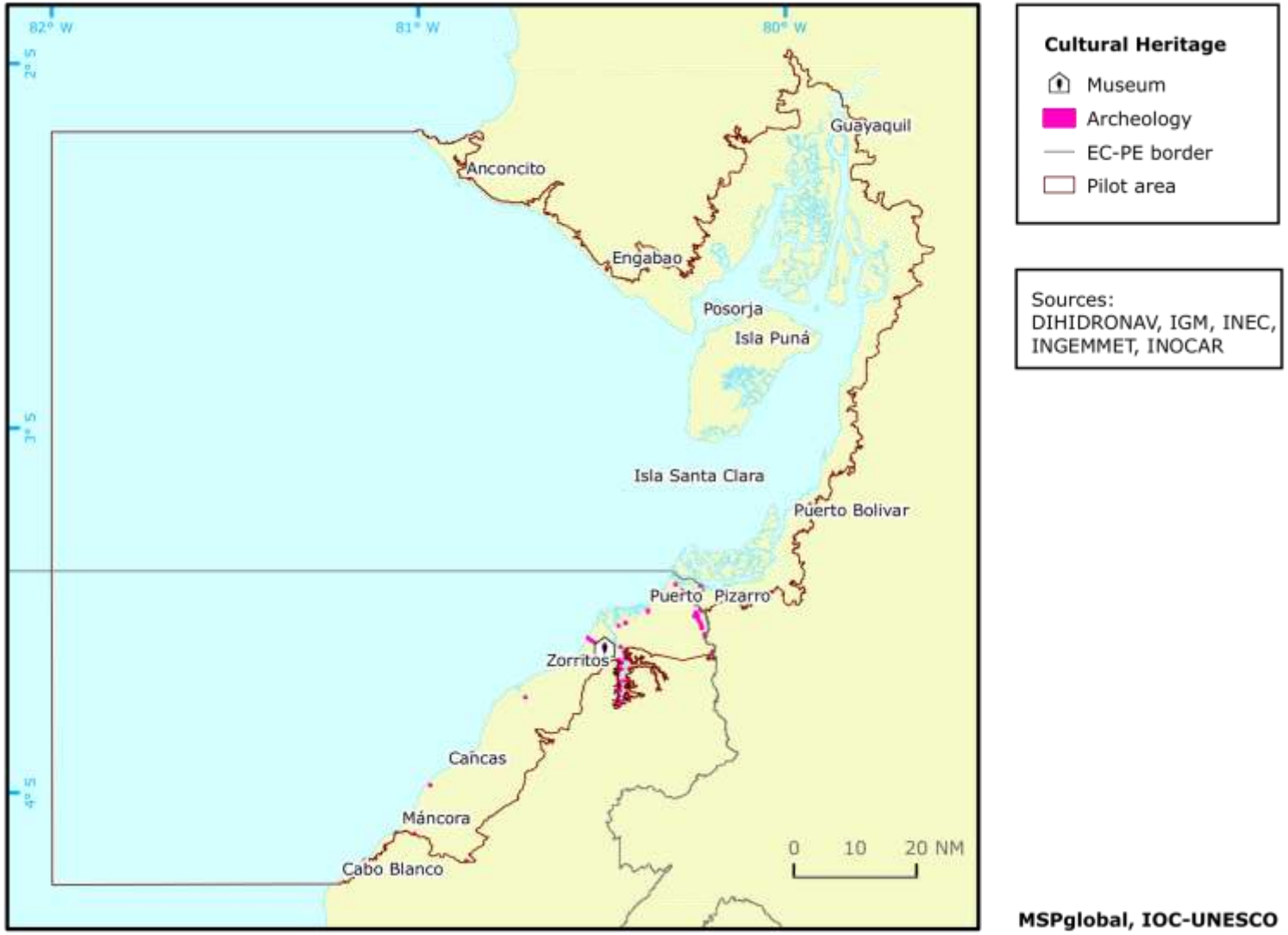
Example: Gulf of Guayaquil (Ecuador and Peru)



Example: Gulf of Guayaquil (Ecuador and Peru)



Example: Gulf of Guayaquil (Ecuador and Peru)



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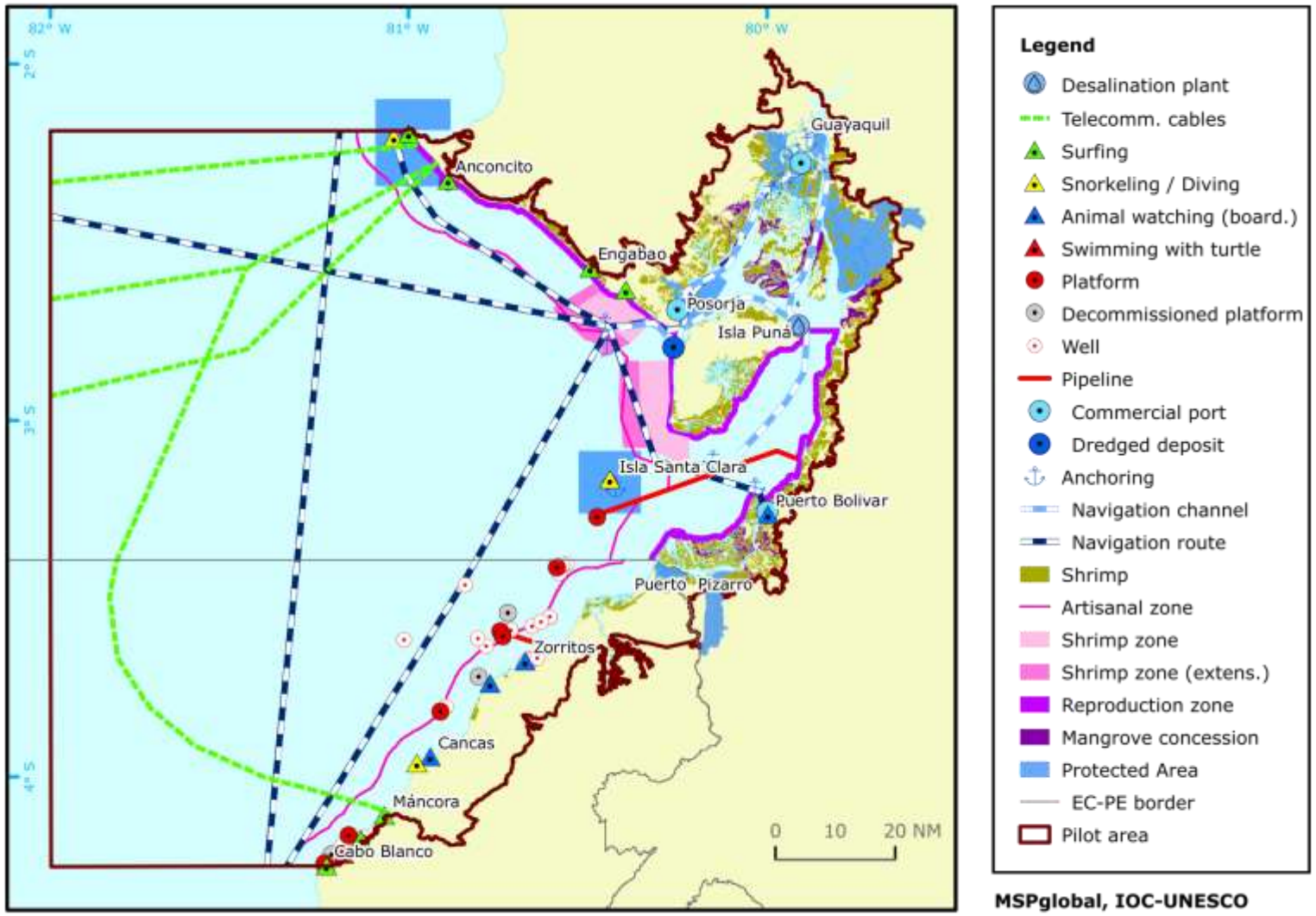


Other Socio-economic Data

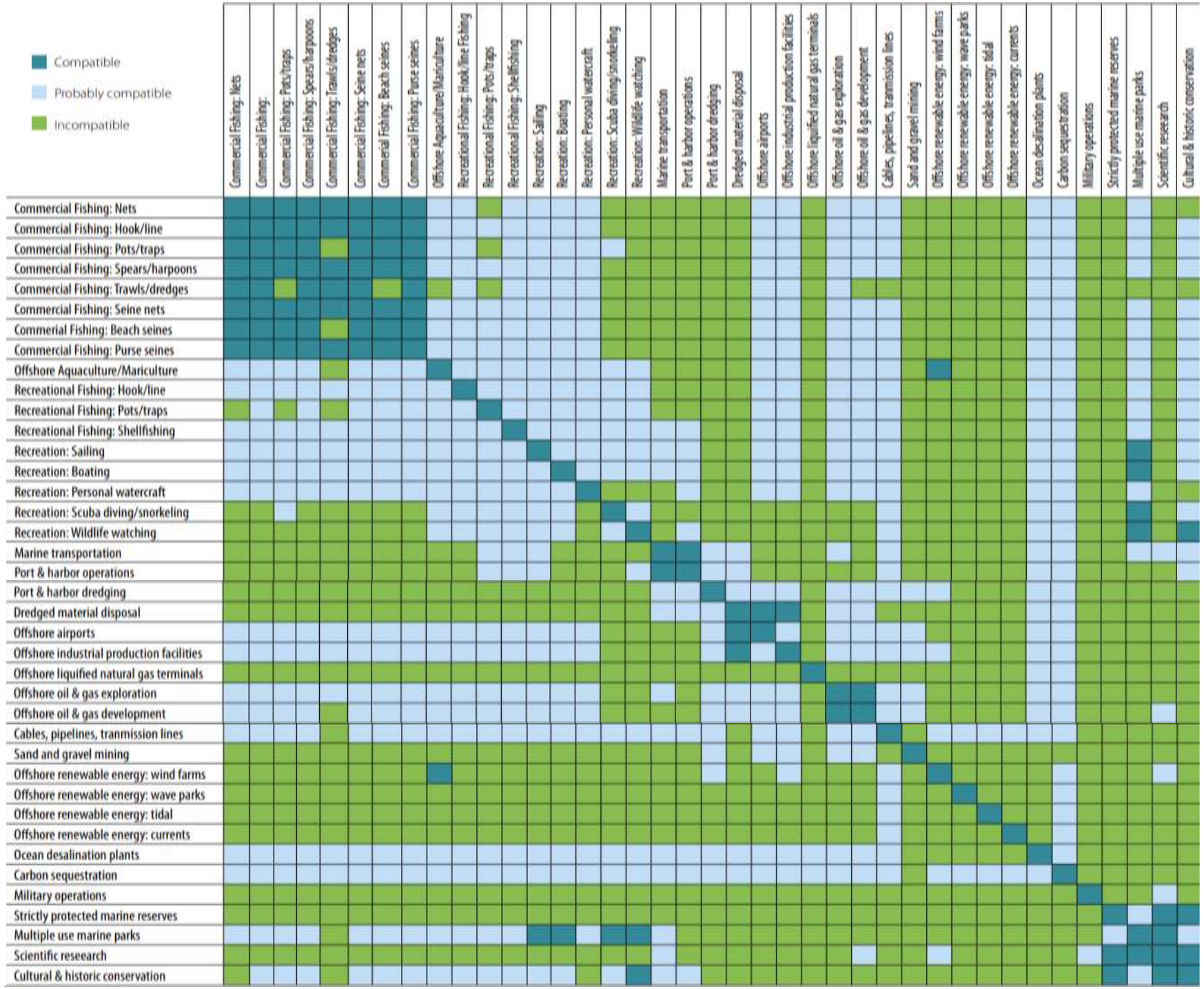
- Statistical data

Some tips

- **Boundaries of analysis** need to be **broader** than **boundaries of the plan**
- Data analysis is an essential early (and continuing), but **not an end in itself**
- **Summarize the data collection** (e.g., Atlas)
- **Data portals** are currently good practice for sharing data among planners and stakeholders
- **Data collection is only one element** of this step
- **Decision support tools** for data analysis need to be used

Source: IOC-UNESCO, 2009

Conflicts and Compatibilities



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Source: IOC-UNESCO, 2009

Future conditions

Future conditions

- **Projection of current trends** in the spatial and temporal needs of human uses
- **Estimation** of spatial and temporal needs for the **new demands** of marine space

Source: IOC-UNESCO, 2009

A forecast is a description of a relatively unsurprising projection of the present

Future conditions: Mexico

Box 5.12

Mapping suitable areas for spatial development

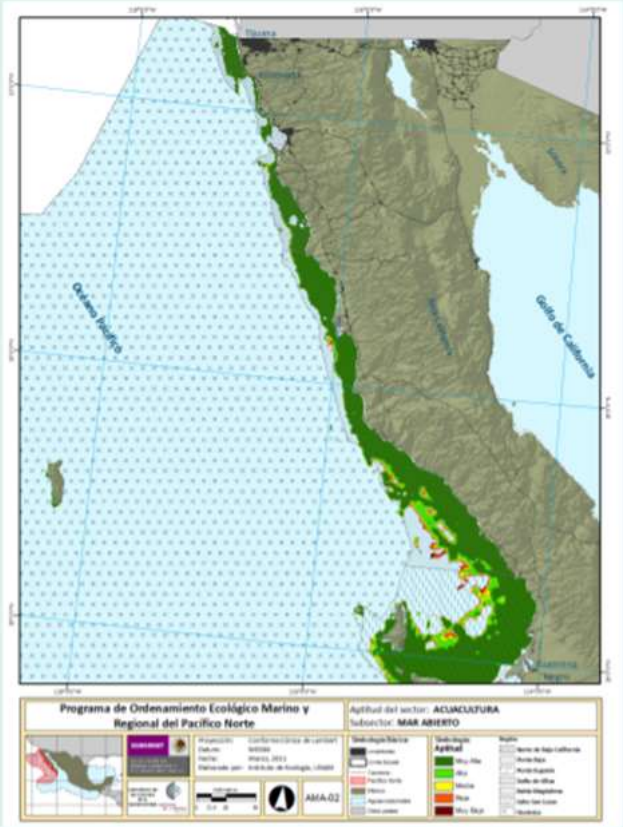
In the diagnosis phase of Mexican MSP processes, suitability maps are developed to identify areas with the best conditions for each sector (including conservation).

A multi-criteria modelling analysis is carried out according to the steps below (LANCIS UNAM, 2020):

(1) Identify the objective of the sector regarding the use of the territory
(2) Identify the attributes that the sector requires to develop its activities
(3) Identify the relative importance of the attributes
(4) Transform attributes to an equivalent scale
(5) Integrate the suitability map into the geographic information system
(6) Validate the suitability map

The results mean that areas of higher value have the best conditions for the development of the activity, while areas of less value will require some kind of technology to compensate for the lack of ideal conditions, which will create additional costs for the sector.

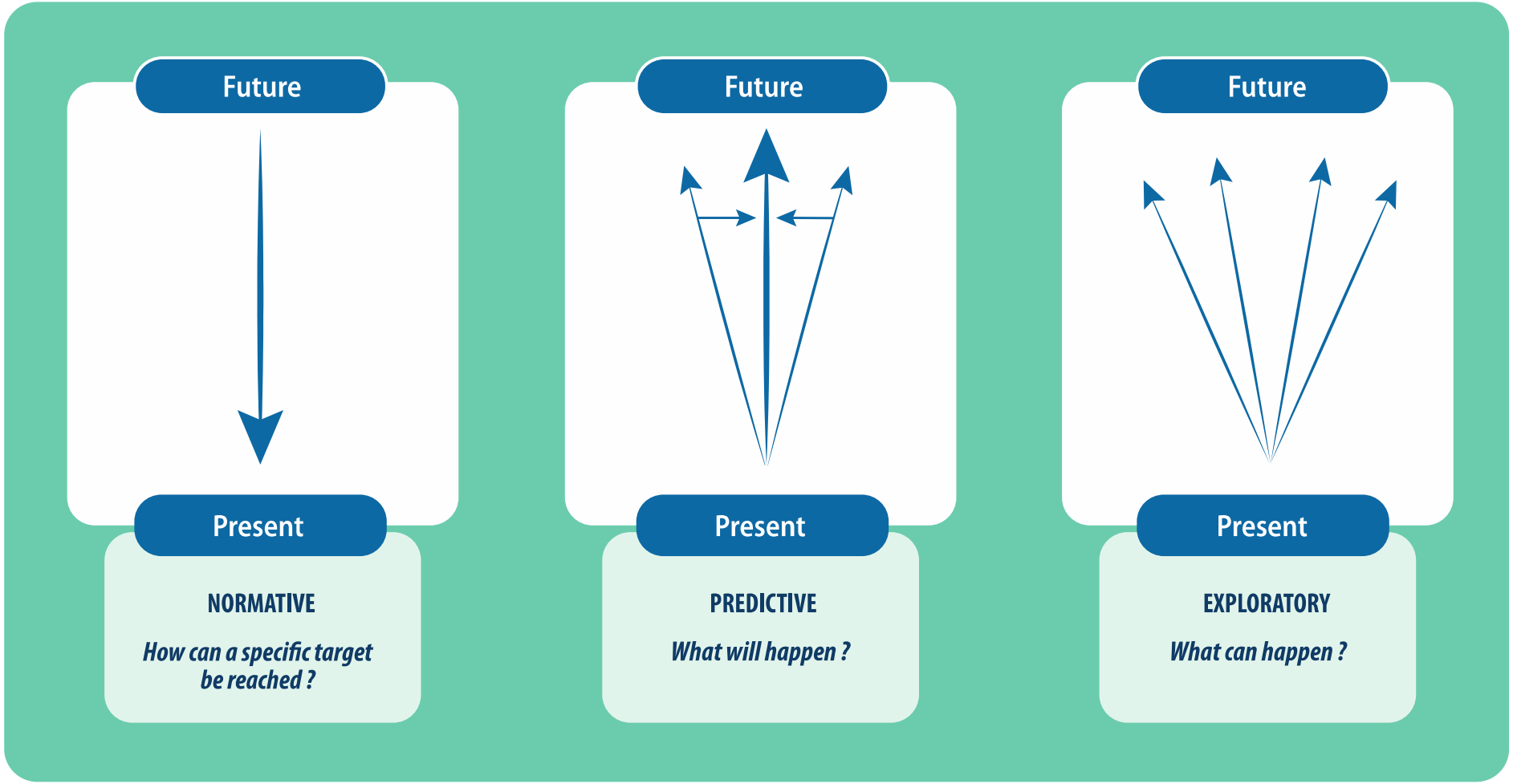
The North Pacific planning process developed suitability maps for aquaculture, fisheries, maritime transport and infrastructures, tourism and conservation. The combination of these sectoral suitability maps resulted in a first draft zoning for the region. The different zones identified are units with specific characteristics that are suitable for a group of sectors (SEMARNAT, 2019).



© SEMARNAT & LANCIS-UNAM, 2019.
Source: LANCIS-UNAM, 2020.

Source: UNESCO-IOC/European Commission, 2021

Scenario types



Source: UNESCO-IOC/European Commission, 2021

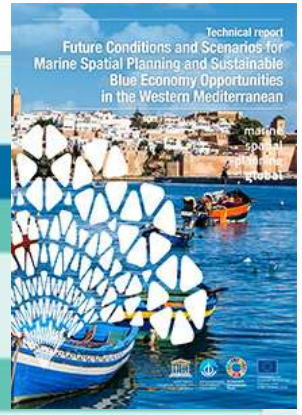
A spatial scenario provides a vision that projects the future use of marine space

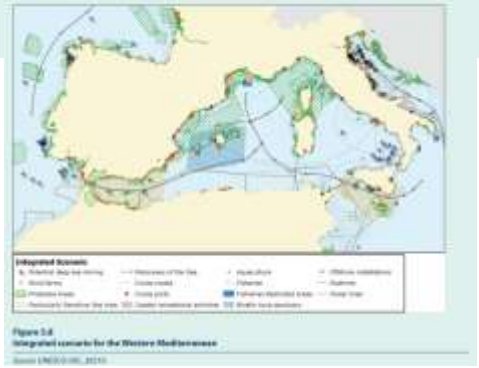
Example: Western Mediterranean

Table 5.2
Proposed visions of each scenario for the Western Mediterranean

Scenarios to 2030	Key drivers
Trend	
Assuming that no integrated maritime policy was in place, sectors grew based on their past trends and future projections. Conflicts are expected to arise in the busiest areas	• Mass tourism • Cargo and cruises • Intensification of fishing
Conservationist	
Conservation is the priority, ecological and biological areas are effectively protected, most impacting activities are reduced until the maximum possible extent and new activities development is based on ecological sustainability factors	• Eco-tourism • 'Green shipping' • Sustainable fisheries and aquaculture • Effective protection of key environmental values • Promotion of renewable energy
Integrated	
Integrated planning and management have led to the application of sustainable Blue Economy strategies at regional level where co-location of activities is a priority led by social and sustainability objectives	• Sustainable tourism • Sustainable maritime shipping • Co-location of activities • Precautionary principle for emerging sectors

Source: UNESCO-IOC, 2021*h*.





Trade-off analysis

Examples of questions to analyse the alternative scenarios

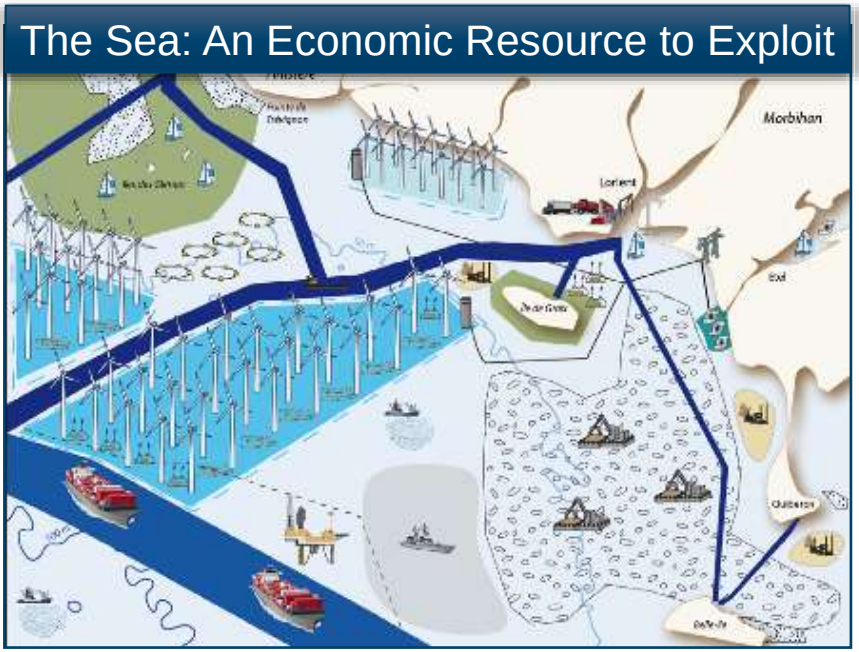
- What are the consequences of each alternative scenario for the different maritime sectors?
- Which steps would lead to each alternative scenario?
- Which are the most intensive and potential areas of future development?
- What kind of spatial impact would the alternative scenarios have?
- What are the possibilities and potential areas for multi-use platforms and synergies?
- How may a sustainable future be reached?
- What is the preferred scenario?
- What is the worst-case scenario? What leads to the worst-case scenario?

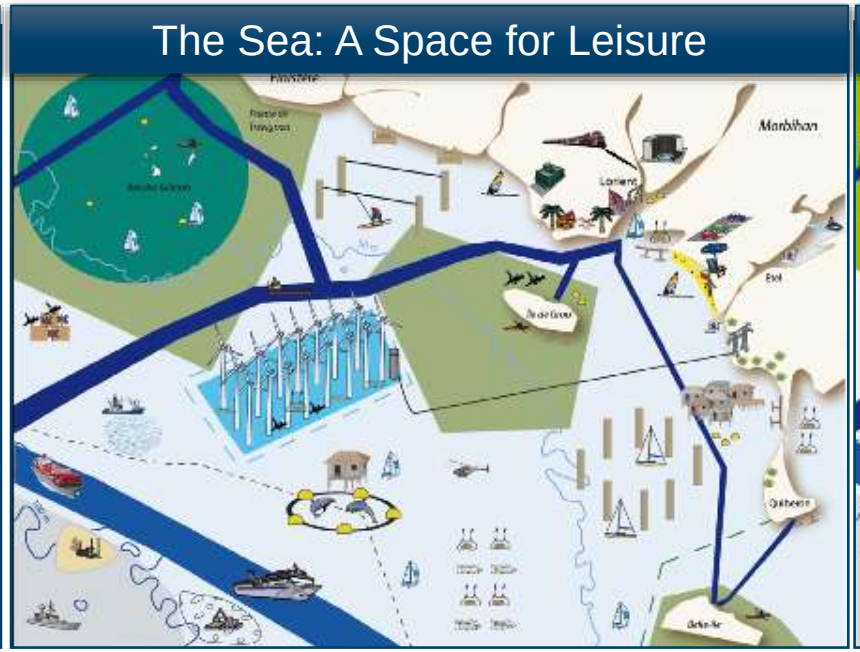
Source: Adapted from Plan4Blue, 2018.

Source: UNESCO-IOC/European Commission, 2021

Example:

- **Future:** Trends, new demands of ocean space, suitability maps, potential areas for biodiversity conservation, climate change
- **Alternative scenarios**





Source: UNESCO-IOC/European Commission, 2021; Mathilde De Cacqueray, University of Brest, 2011

Types of public information system

Type	Description
Data catalogue	A data list, its availability and how to source
Database or data portal	Online direct access to datasets
Data viewer or GIS mapping tool	Service to display spatial data
Knowledge platform or information service	Service which aggregates data into information product (e.g. factsheets)
Decision support tool or assessment tool	Method or specialised tool to support further analysis and interpretation

Source: UNESCO-IOC/European Commission, 2021

Information systems and public data: Pacific SIDS

Marine and Coastal Biodiversity Management in Pacific Island Countries (MACBIO) gathers and consolidates spatial data on behalf of the countries through the development of means for designing marine spatial plans that support ecologically sustainable use and protection of ecologically representative examples of marine and coastal systems.

Source: UNESCO-IOC/European Commission, 2021

Seascape Assessment (SCA): Dover Strait

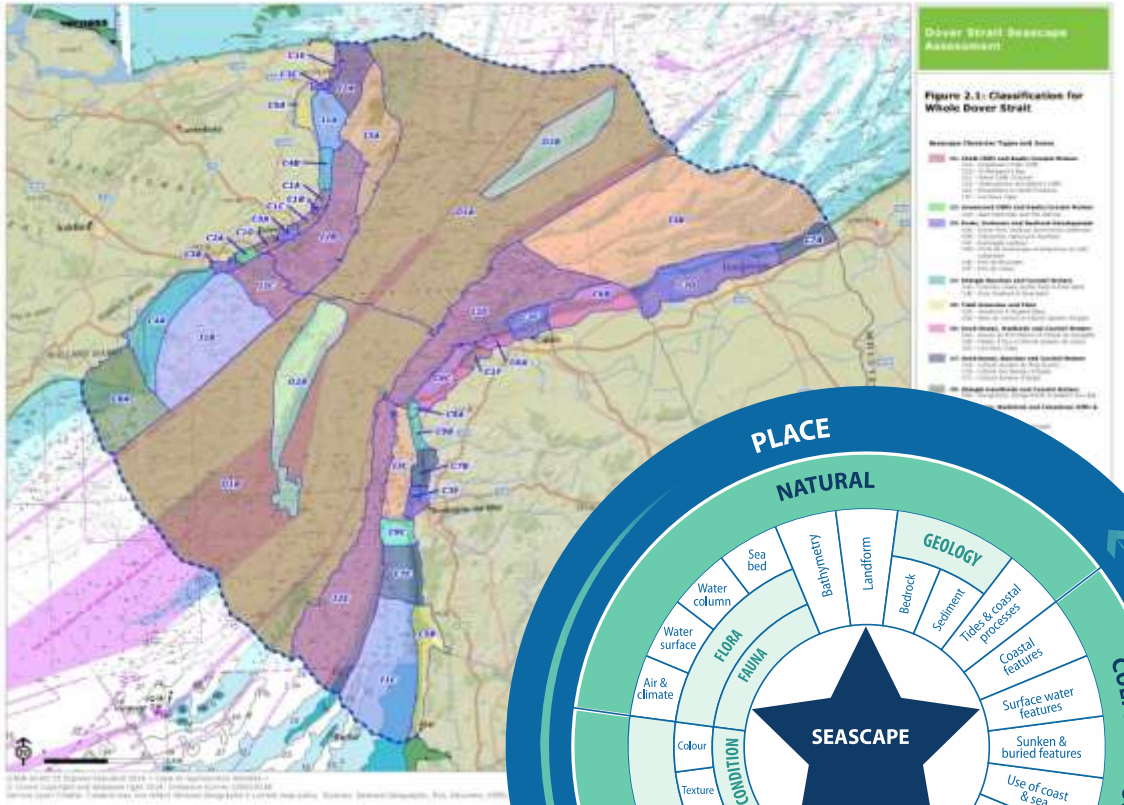
The SCA is undertaken under the following broad steps:

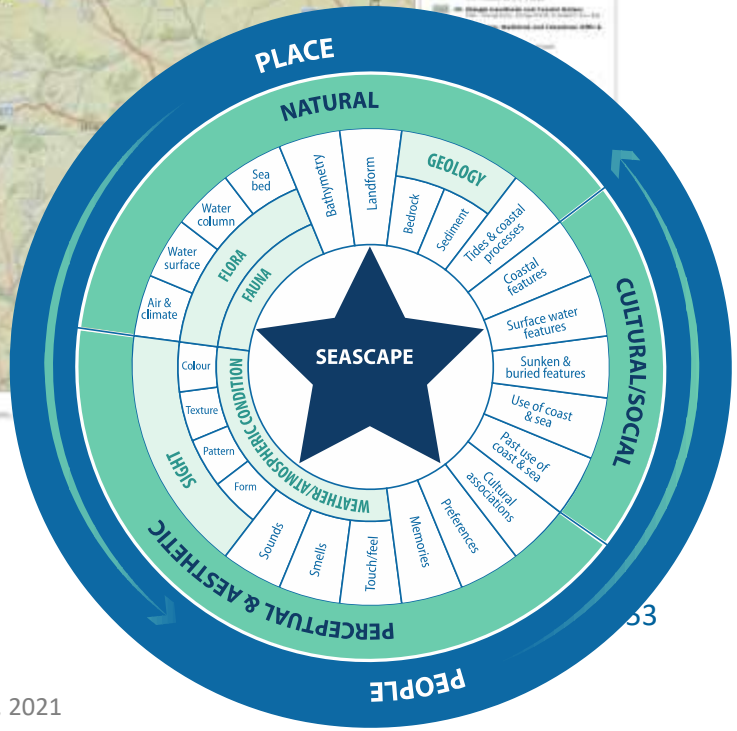
Step 1: Defining the purpose and scope for seascape environment, the

Step 2: Desk study and initial descriptions of natural and cultural influences.

Step 3: Field survey and stakeholder verification to test and refine the draft and describe the seascape character types

Step 4: Classification and description.





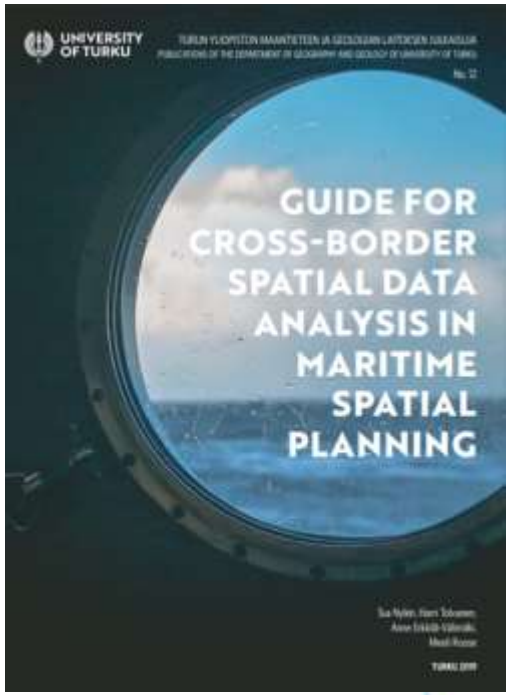
Source: UNESCO-IOC/European Commission, 2021

Transboundary Data Analysis

Transboundary Data Analysis

Principles:

- Guiding spatial data analysis in a **goal-oriented** (instead of data-oriented) way
- Collaborating with **all MSP actors**
- Using the **best available spatial data** and **excluding inadequate data** from the analyses*
- **Documenting** the utilised spatial data and analysis methods and their limitations at MSP every step
- **Sharing** and utilising high quality spatial data **across administrative and sectoral border**



Source: University of Turku, 2019

* Defined year for baseline determine which data are outdated. But some type of data do not change much with time (e.g., geological data)

Transboundary Data Analysis

Steps:

I. Set stage for spatial data analysis in MSP, i.e., a roadmap

- ✓ plan area, spatial scale and timeframe
- ✓ thematic content and spatial interactions to be considered
- ✓ necessary spatial data
- ✓ Evaluation of the available data

II. Collect and manage spatial data

- ✓ Collect existing data
- ✓ Harmonise spatial data
- ✓ Produce spatial data
- ✓ Manage spatial data

Source: University of Turku, 2019

Transboundary Data Analysis

Steps:

III. Analyse spatial data (examine interactions)

- ✓ Plan spatial analyses
- ✓ Analyse spatial data and interactions
- ✓ Transform spatial analysis outputs into meaningful results for MSP

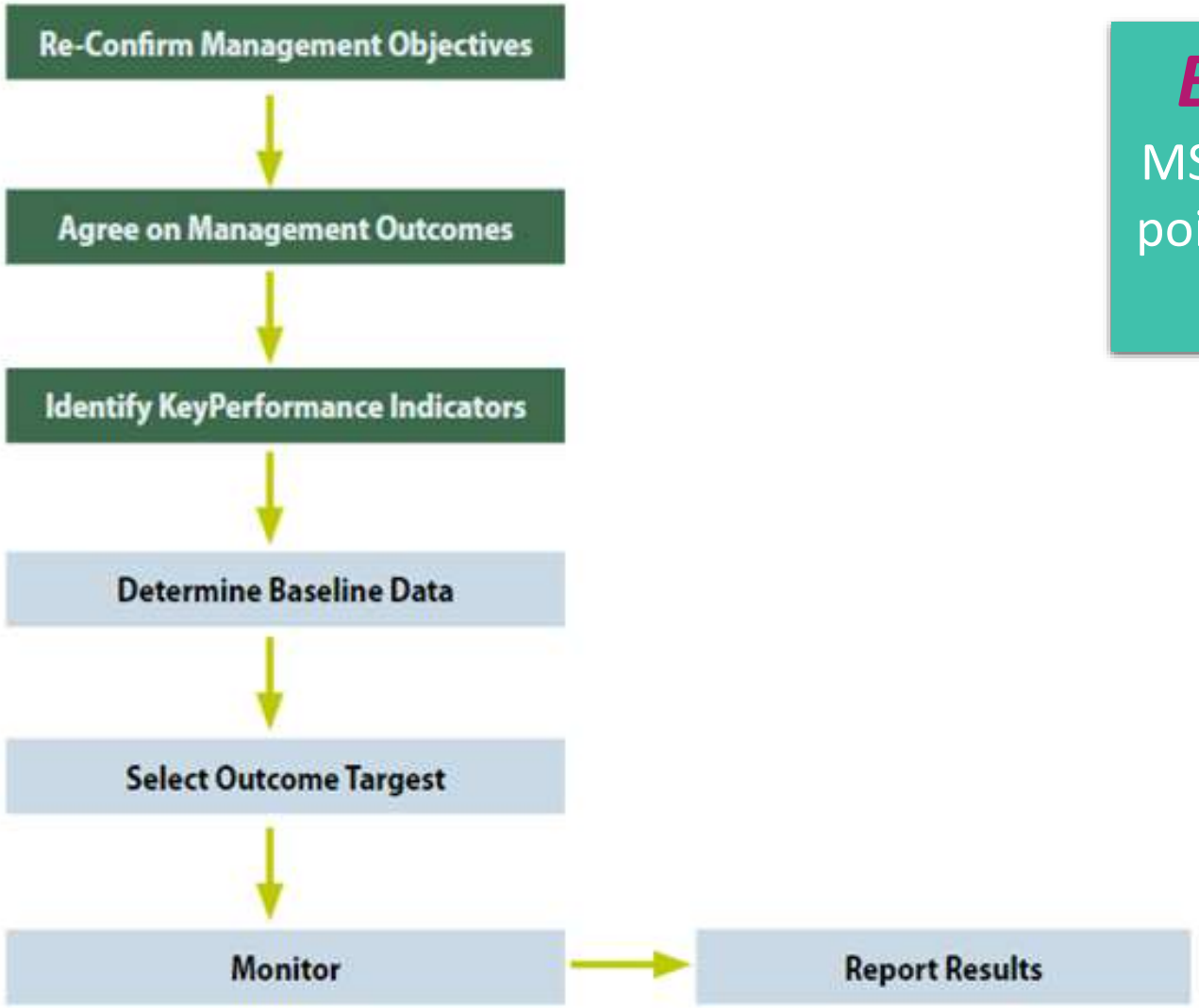
IV. Visualise MSP on maps

- ✓ Visualise spatial information
- ✓ Report spatial data and analyses
- ✓ Store and distribute MSP data

Source: University of Turku, 2019

Monitoring and Evaluation

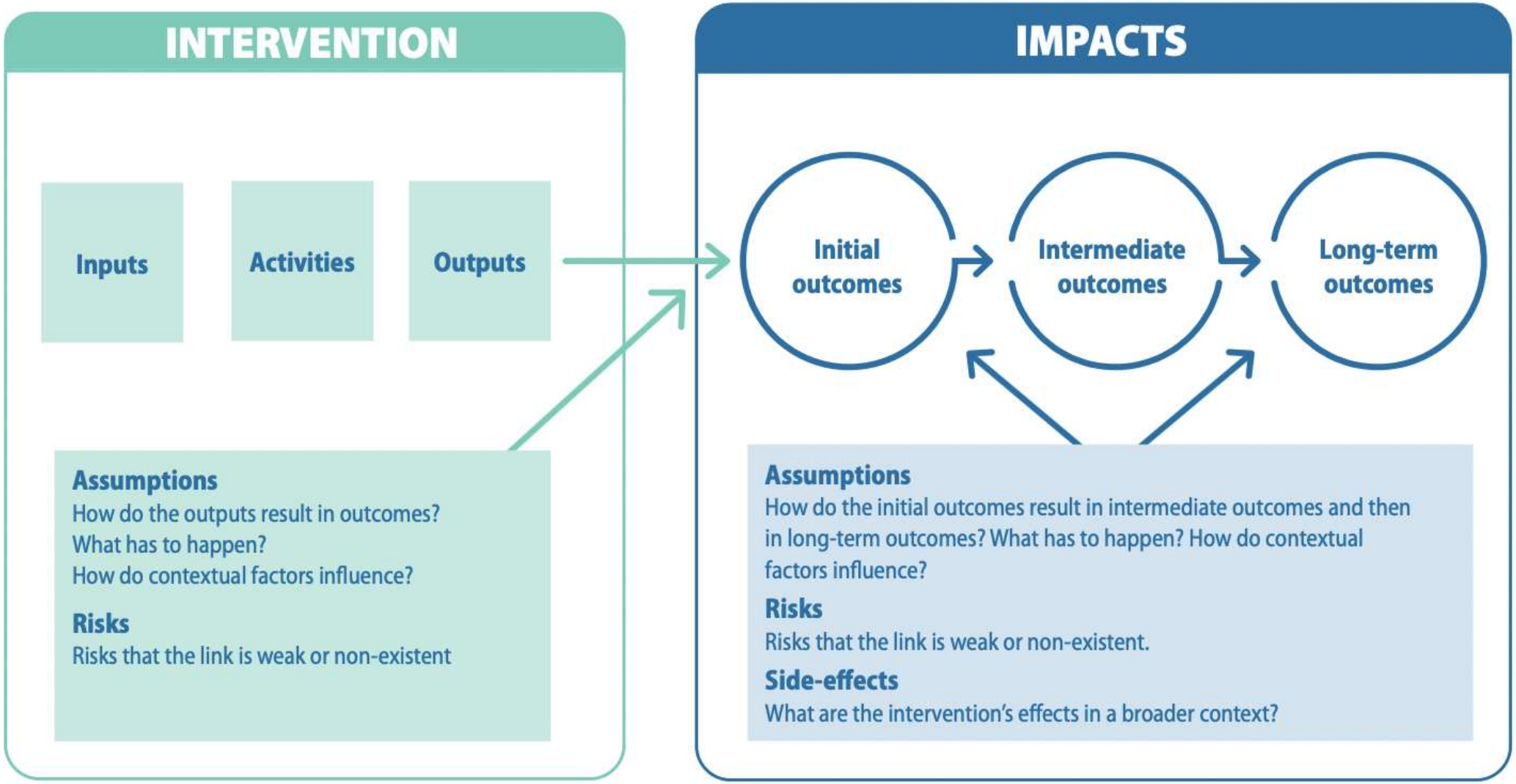
Monitoring system



Baseline = the situation before MSP implementation; it is the starting point for monitoring and evaluation of each indicator

Source: IOC-UNESCO, 2009

Monitoring interventions and impacts



Source: UNESCO-IOC/European Commission, 2021

Indicator = a measure, quantitative or qualitative, of how close we are to achieving what we set out to achieve, i.e., our objectives or outcomes

CHARACTERISTICS OF GOOD INDICATORS

Readily Measurable	On the time scales needed to support MSP, using existing instruments, monitoring programs, and available analytical tools
Cost-effective	Monitoring resources are usually limited: how can effective monitoring be accomplished at least cost?
Concrete	Indicators that are directly observable and measurable rather than those reflecting abstract properties are desirable because they are more readily interpretable and accepted by diverse stakeholder groups
Interpretable	Indicators should reflect properties of concern to stakeholders; their meaning should be understood by as wide a range of stakeholders as possible
Grounded in Theory	Indicators should be based on well-accepted scientific theory, rather than on inadequately defined or poorly validated theoretical links
Sensitive	Indicators should be sensitive to changes n the properties being monitored, e.g., able to detect trends in the properties or impacts
Responsive	Indicators should be able to measure the effects of management actions to provide rapid and reliable feedback on their performance and consequences
Specific	Indicators should respond to the properties they are intended to measure rather than to other factors, i.e., it should be possible to distinguish the effects of other factors from the observed response

Source: IOC-UNESCO, 2009

Thank You!

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