
# Experimental marine ecosystem accounts in France

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MAIA conference. 20/09/2022

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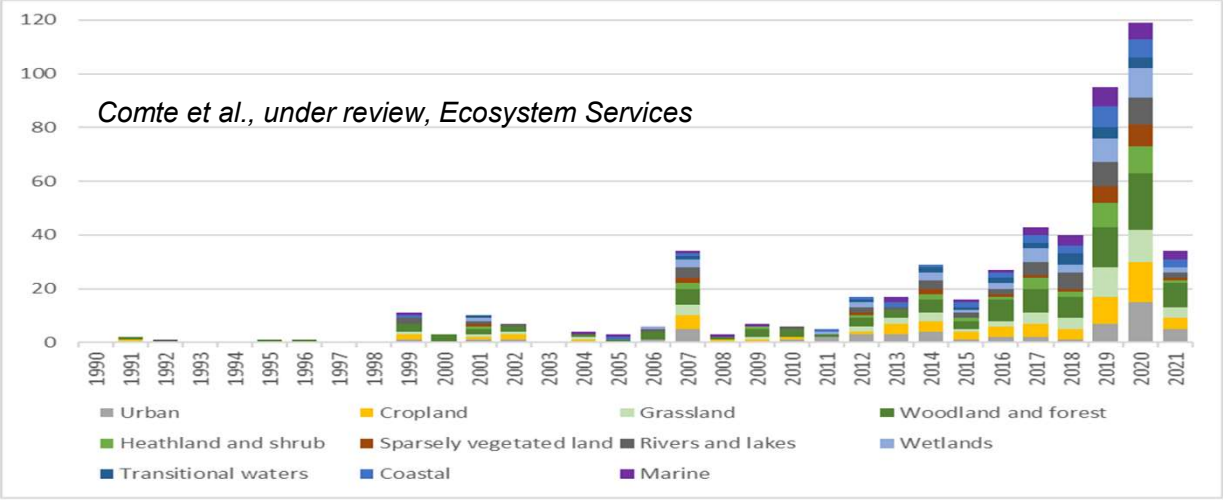
# Overview of MAIA supported innovation efforts in France

| Account | Scale | Status | Type of publication | Reference |
|---|---|---|---|---|
| Global framework | Conceptual | Published | Working Paper | Comte, A., Kervinio, Y., Levrel, H., 2020. Ecosystem accounting in support of the transition to sustainable societies – the case for a parsimonious and inclusive measurement of ecosystem condition. CIRED working paper 2020-76 |
| Extent and condition accounts for marine ecosystems | French Economic Exclusive Zone | In development | Technical report +code | |
| Monetary account of ecosystems liabilities | Conceptual | In development | Research article | Kervinio Y., Surun C., Comte A., Levrel H., (in prep), Focusing on what matters – Structuring ecosystem accounts for assessing an ecological debt in monetary terms. One Ecosystem |
| Monetary account of marine ecosystems liabilities | French Economic Exclusive Zone | In development | Research article | |

| Workshops organized & attended | Date | Participants |
|---|---|---|
| MAIA initial national workshop | June 2019 | AgroParisTech, CIRED, French environment ministy/sustainable development (MTE/CGDD/SEEIDD), Ecological Accouting Chaire, French environment ministry/marine planning (MTE/DML), (SDES), French environment ministy/statistics |
| MAIA presentations | July 2019 | Marine information system, French Biodiversity Office, National biodiversity observatory, AMURE laboratory |
| International Marine Ecosystem Accounting Workshop | October 2019 | More than 20 participants |
| MAIA marine accounts for marine spatial planning | October 2019 | French environment ministry/marine planning (MTE/DML) |
| Workshop on accounting innovation for environmental policies | January2021 | AgroParisTech, CIRED, French environment ministy/sustainable development (MTE/CGDD/SEEIDD), Ecological Accouting Chaire, French environment ministry/marine planning (MTE/DML), (SDES), French environment ministy/statistics, CEREMA, French Biodiversity Office |
| MAIA Marine Accounting Webinar | May 2021 | WUR, SYKE, NIWA, Global Ocean Accounts Partnership,Fisheries and Oceans Canada; National University of Ireland, AgroParisTech & CIRED |
| Symposium of the Ecological Accounting Chair | June 2021 | More than 100 participants |
| OSPAR Natural Capital Accounting Special Meeting | July 2021 | More than 30 participants |
| MAIA final national workshop | June 2022 | AgroParisTech, CIRED, French environment ministy/sustainable development (MTE/CGDD/SEEIDD), Ecological Accouting Chaire, French environment ministry/marine planning (MTE/DML), (SDES), French environment ministy/statistics, French Biodiversity Office |

# Innovation needs on marine accounts

- Less developed than terrestrial ecosystems (13% Comte et al., under review ES)
- Limited conceptual or case studies (Lai et al., 2018; Dvarskas, 2019; Hooper et al., 2019; Wang et al., 2018; Franzese et al., 2017)
- Marine economic accounts, but not linked to SEEA EA (Fenichel et al., 2020; Greaker et al., 2017; Luazzani et al., 2019)



# Resources mobilized for marine ecosystem accounts

- Marine Strategy Framework Directive (MSFD): Levrel et al., 2014, scientific reports on good ecological status and cost of degradation
- CarpeDiem (Quemmerais-Amice et al., 2020)
- French assessment of ecosystems and ecosystem services (EFESE)
- Not mobilized but interesting : ES recreation (Martin et al., 2018); input-output model and restoration (Cordier et al., 2011)


Marine Policy

The maintenance costs of marine natural capital: A case study from the initial assessment of the Marine Strategy Framework Directive in France


Ecological Economics

Analysis

Integrating Cultural Ecosystem Services in an Ecosystem Satellite Account: A Case Study in the Gulf of Saint-Malo (France)

# Marine ecosystem extent and condition account

- MAIA funding : Adrien Comte (postdoc), Solène Legrand (intern), Léopold Virieux (intern)
- Involved partners: Ifremer, Ministry for the environment (MTE/CGDD), French Biodiversity Office
- Workshop with Ifremer, MTE/CGDD, Chaire Comptabilité Ecologique, French Biodiversity Office

# Marine Strategy Framework Directive

European directive adopted in 2008

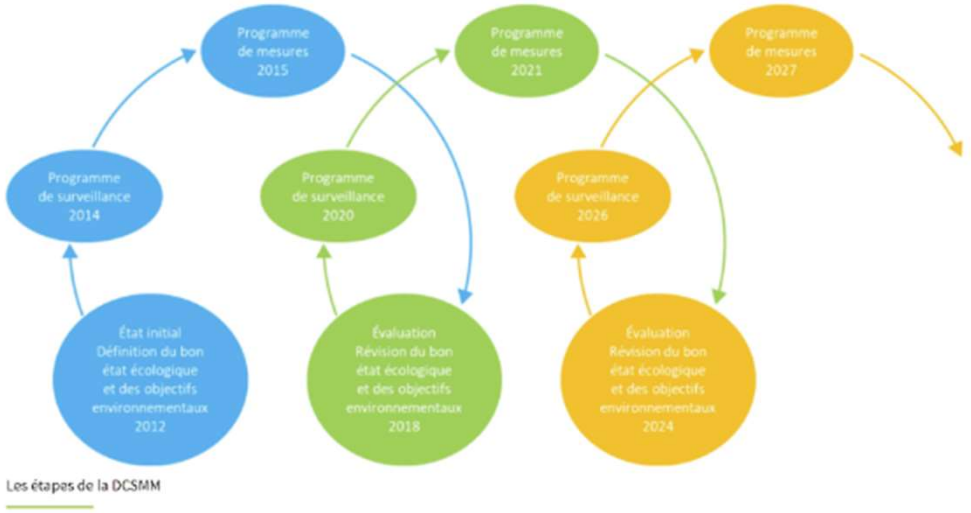
-Ambition to achieve a “good ecological status” for all the european countries

In France : organised in cycles of 6 years :

-Initial evaluations

-Survey

-Policies adjustment

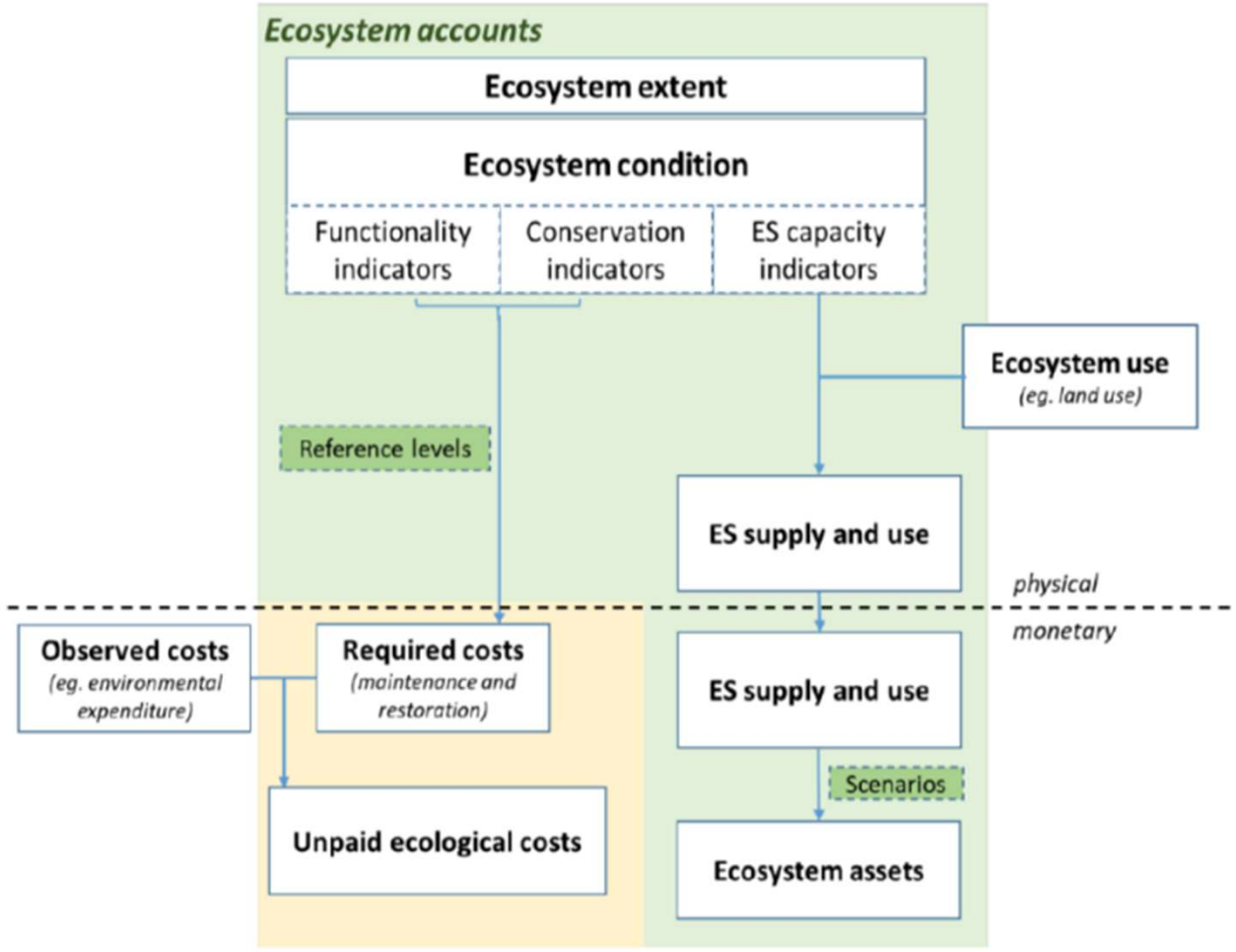


Les étapes de la DCSMM

# The descriptors : structure of the GES and environmental objectives


Source : https://msfd.eu/site/good-environmental-status/

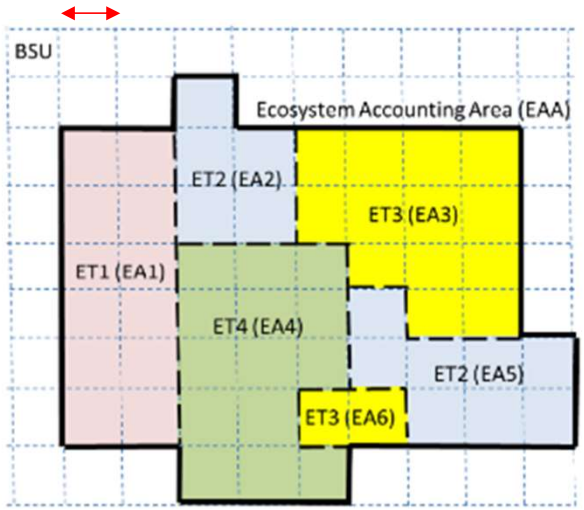
# Conceptual framework of ecosystem accounts with maintenance costs



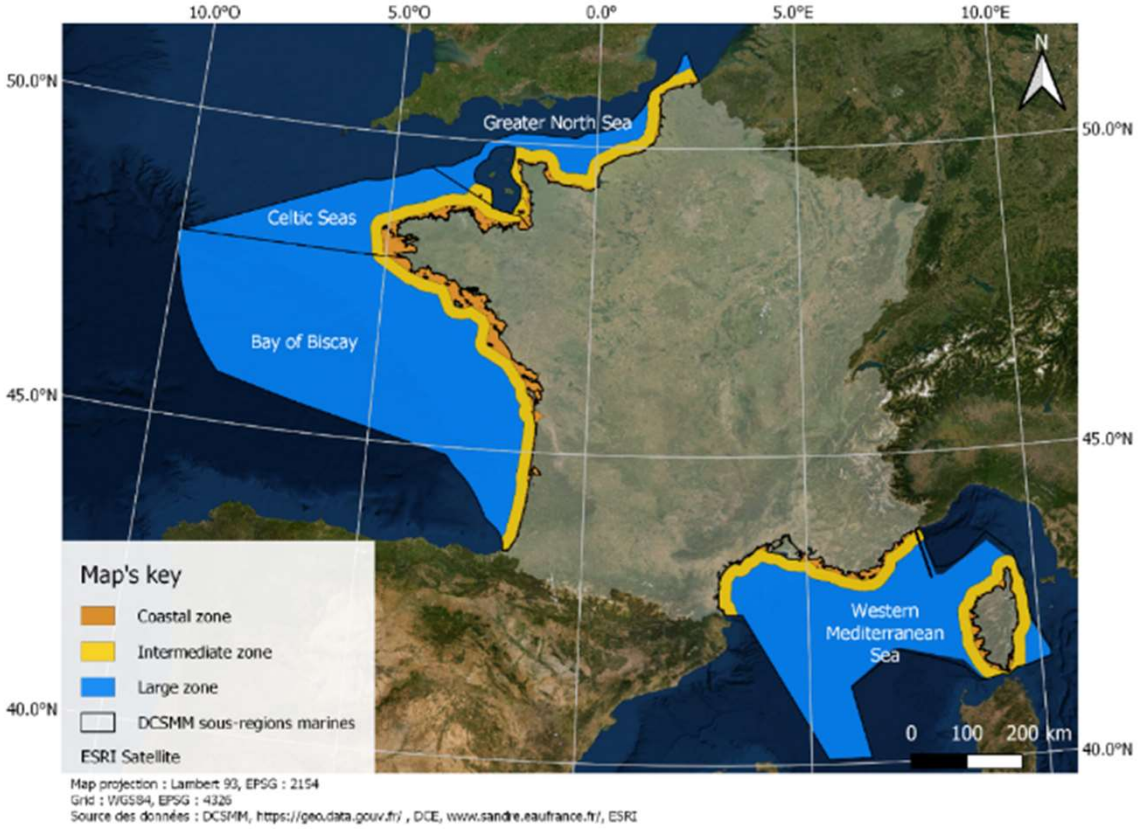

Comte, A., Kervinio, Y., Levrel, H. 2020. CIRED Working Paper 2020-76

# Spatial model of ecosystems

1 arc minute ↔ 1/60th degree ~1800m

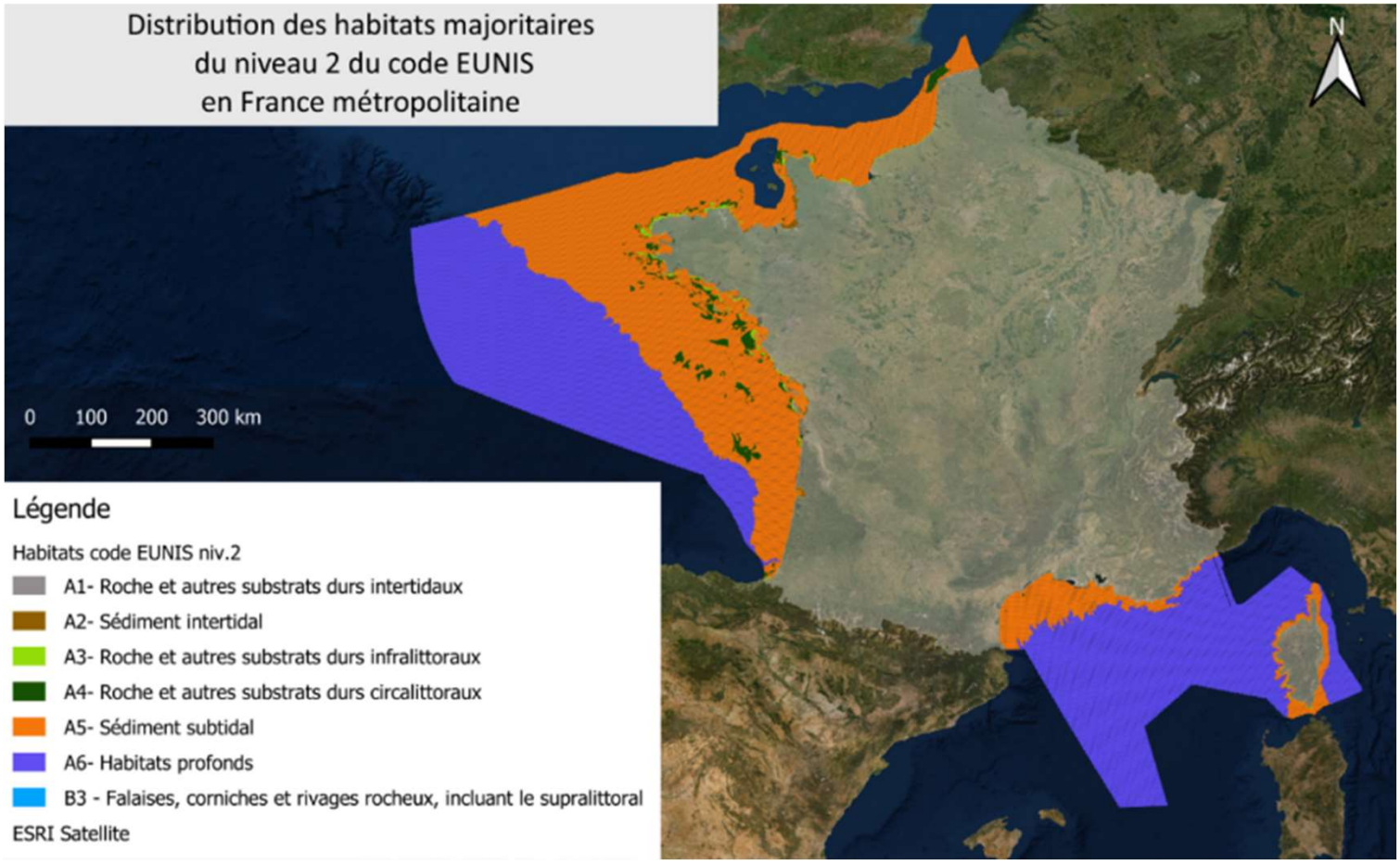



Source: Adapted from SEEA EEA Figure 2.4 (UN et al., 2014b). Note that Ecosystem Assets (EA) represent individual, contiguous ecosystems. Ecosystem Types (ET) are EA of the same type.




EAAs: Metropolitan Exclusive Economic Zone, Marine Sub-Regions, Distance from Shore, Fishing zones

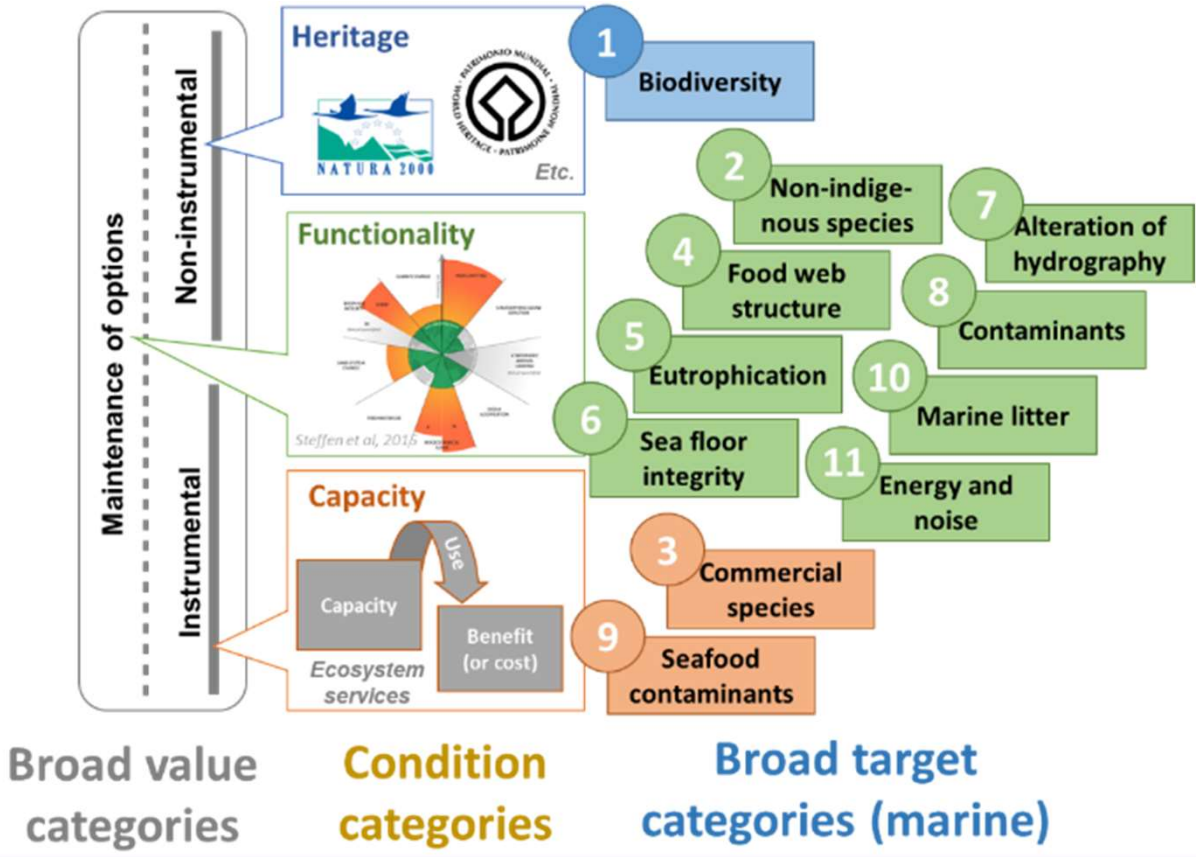
# Extent account : benthic habitat map




Source: datasets adapted from the CarpeDiem project; Quemmerais-Amice et al. (2020)

# What kind of ecosystem accounts do we need ?

- Need for
  - plural valuation of ecosystems (Pascual et al., 2019)
  - Link with policy & management needs
- *Focusing on what matters*
  - Ecosystem services
  - Non-instrumental values
  - Complexity, uncertainties, resilience and tipping point




***Three ecosystems condition categories derived from values and targets***

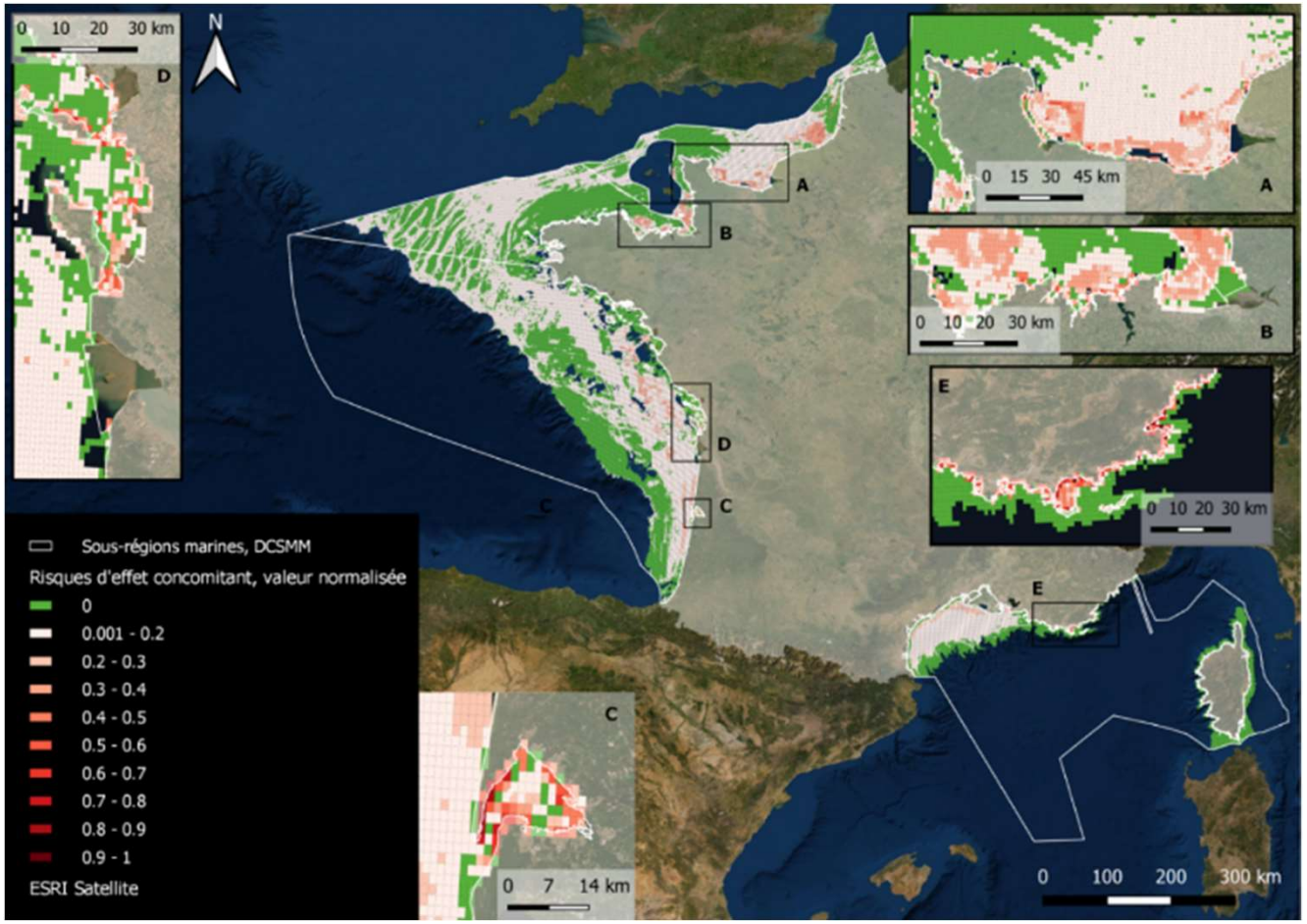
source: adapted from Comte et al, 2020

# List of indicators for the dimensions of marine ecosystem condition

| Dimension | Current condition | Descriptors of the MSFD | Link to policy documents |
|---|---|---|---|
| Heritage | -Abundance of species (marine mammals, birds)<br>-Red list<br>-State of protected areas | -D1<br>(-D6) | MSFD, Habitat Directive, OSPAR, Barcelona, Natura2000 |
| Capacity | -Fish stocks<br>-Water quality | -D3<br>-D9 | MSFD, WFD |
| Functionality | -Non-indigeneous species<br>-Trophic levels<br>-Physical integrity<br>-Eutrophication<br>-Marine debris<br>-Nurseries & feeding grounds<br>-Resilience metrics | -D2<br>-D4<br>-D5<br>-D6<br>-D8<br>-D10<br>-D11 | MSFD, OSPAR, WFD |

-Available
-Uncertain
-Not available

# Condition account : integrity of the seafloor approximated as risk of concomitant effects of physical pressures

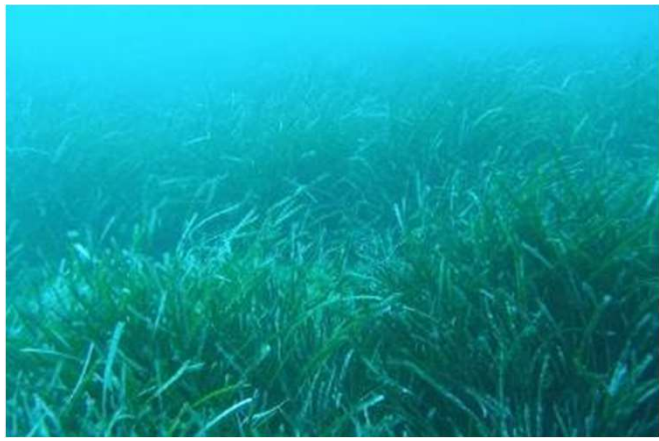


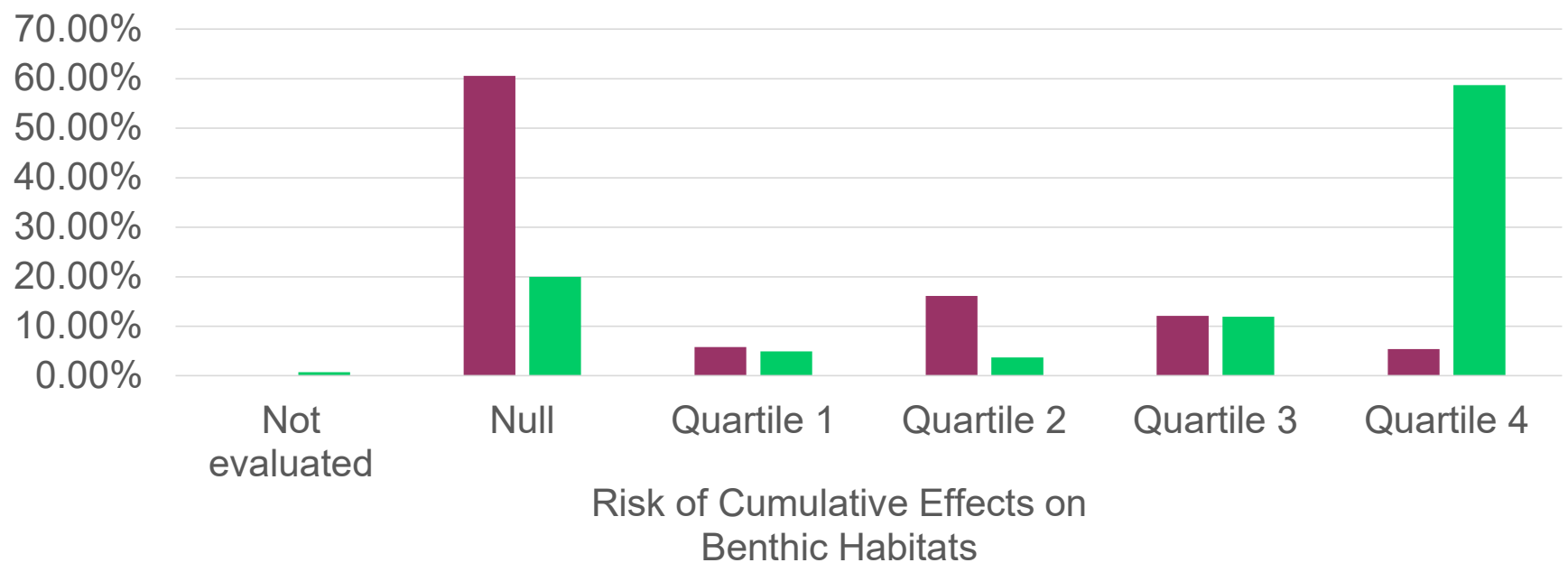

**Projection carte** : Lambert 93 / EPSG : 2154

**Source** : projet MAIA, France

**Data** : CarpeDiem, OFB

# Condition of benthic habitats Distribution of the risk on physical integrity





# Potential indicators for reference/target conditions

| Dimension | Current condition | **Reference condition** | Link to policy documents |
|---|---|---|---|
| Heritage | -Abundance of species (marine mammals, birds)<br>-Red list<br>-State of protected areas | -Non-declining abundances and surfaces<br>-Level of captures<br>-No-net loss of biodiversity<br>-Protection of species and habitats<br>-number of strandings | MSFD, Habitat Directive, OSPAR, Barcelona, Natura2000 |
| Capacity | -Fish stocks<br>-Water quality | -MSY<br>-Contaminants levels | MSFD, WFD |
| Functionality | -Trophic levels<br>-Physical integrity<br>-Eutrophication<br>-Marine debris<br>-Nurseries & feeding grounds<br>-Resilience metrics | -Pollutants levels<br>-Thresholds of chemical and biological variables<br>-Trends in marine debris<br>-Non-declining surfaces | MSFD, OSPAR, WFD |

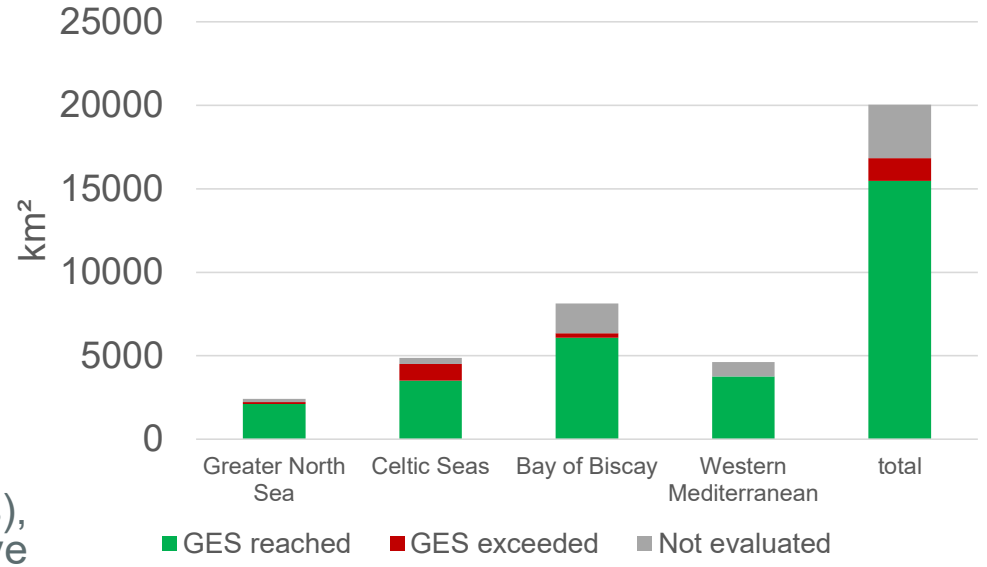
-Available
-Uncertain
-Not available

# Some examples of environmental targets and good ecological status

## D5 : Eutrophication.

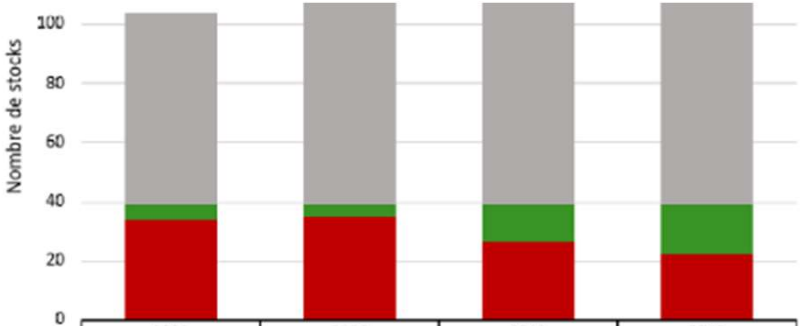
Objectives : 1) Reduce nutrient inputs (nitrates and phosphates), particularly from rivers leading to eutrophied marine areas.

2) Reduce nutrient inputs (nitrates and phosphates), particularly from small coastal rivers that flow into sensitive marine areas due to their confinement or the presence of habitats sensitive to these inputs.



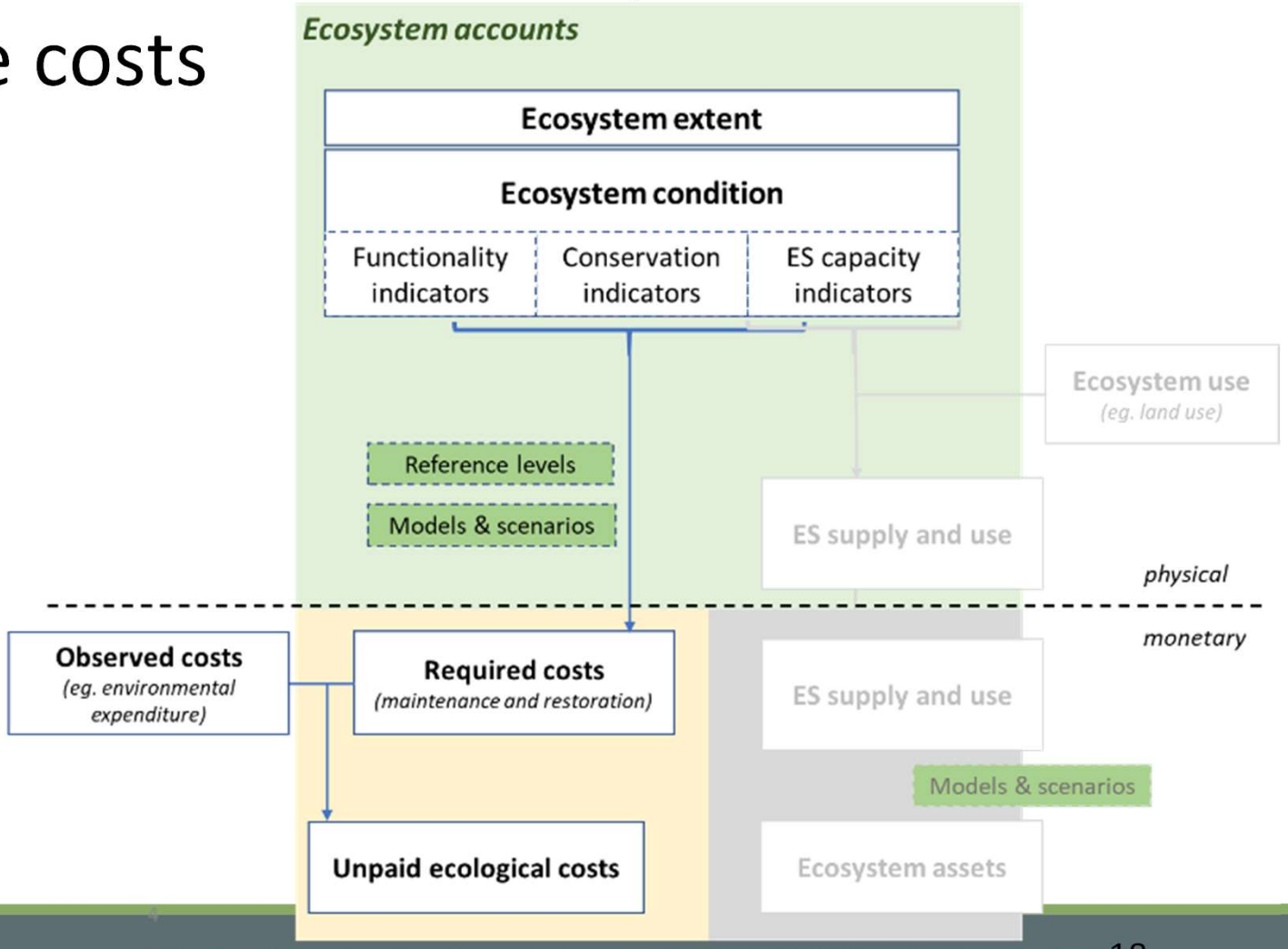

## D3 : Fish stocks

Objective : 1) According to the Common Fisheries Policy (CFP) adjusting fishing mortality to achieve maximum sustainable yield (MSY) for fish stocks covered by international and European recommendations




| | 2000 | 2006 | 2012 | 2018 |
|---|---|---|---|---|
| BEE non évalué | 65 | 76 | 76 | 76 |
| BEE atteint | 5 | 4 | 13 | 17 |
| BEE non atteint | 34 | 35 | 26 | 22 |

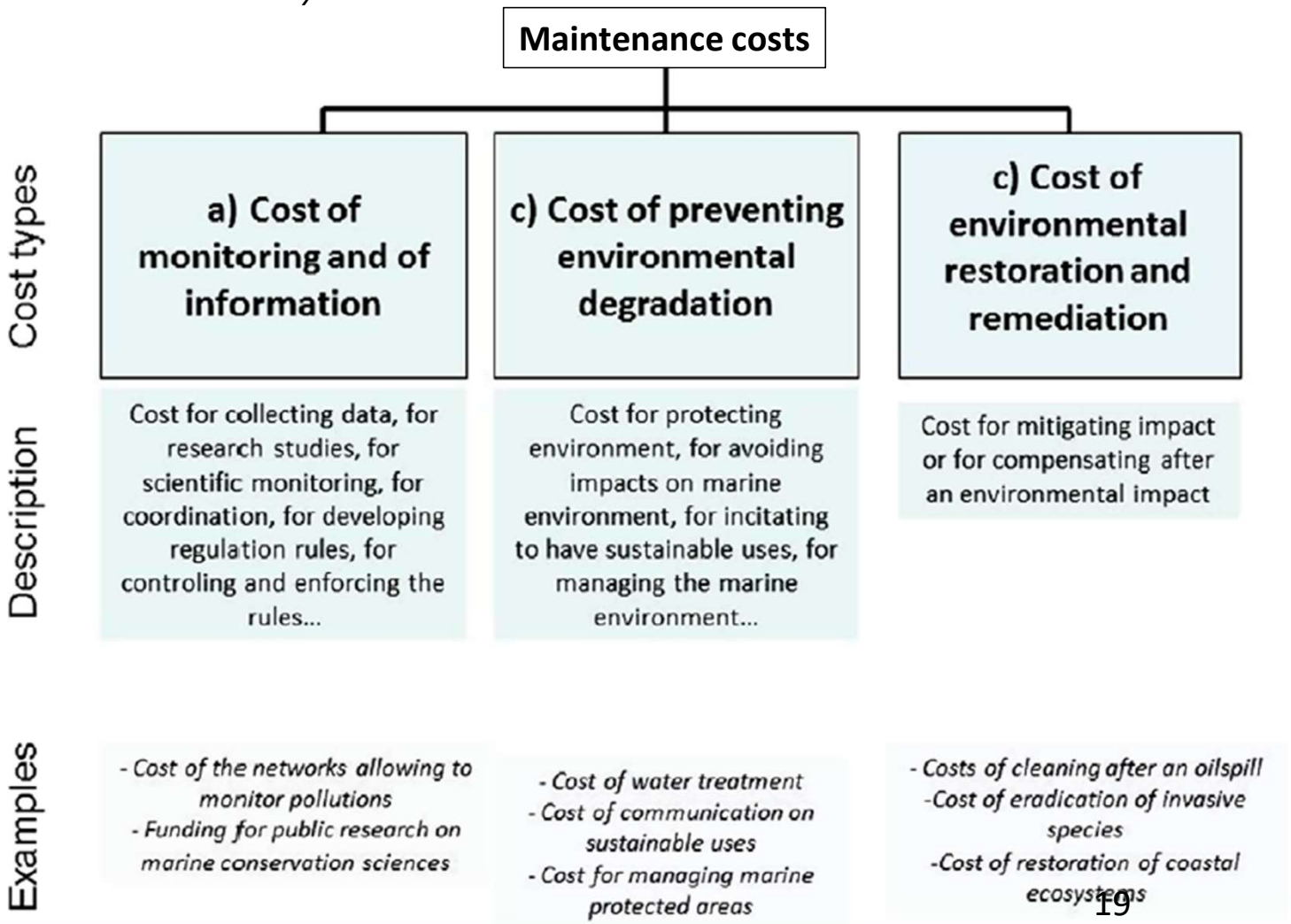
# Conceptual framework of ecosystem accounts with maintenance costs




*Adapted from Comte, Kervinio, Levrel. 2020. CIRED Working Paper 2020-76*

# What kinds of costs can be included?

*Source: adapted from Levrel et al. 2014. Marine Policy*

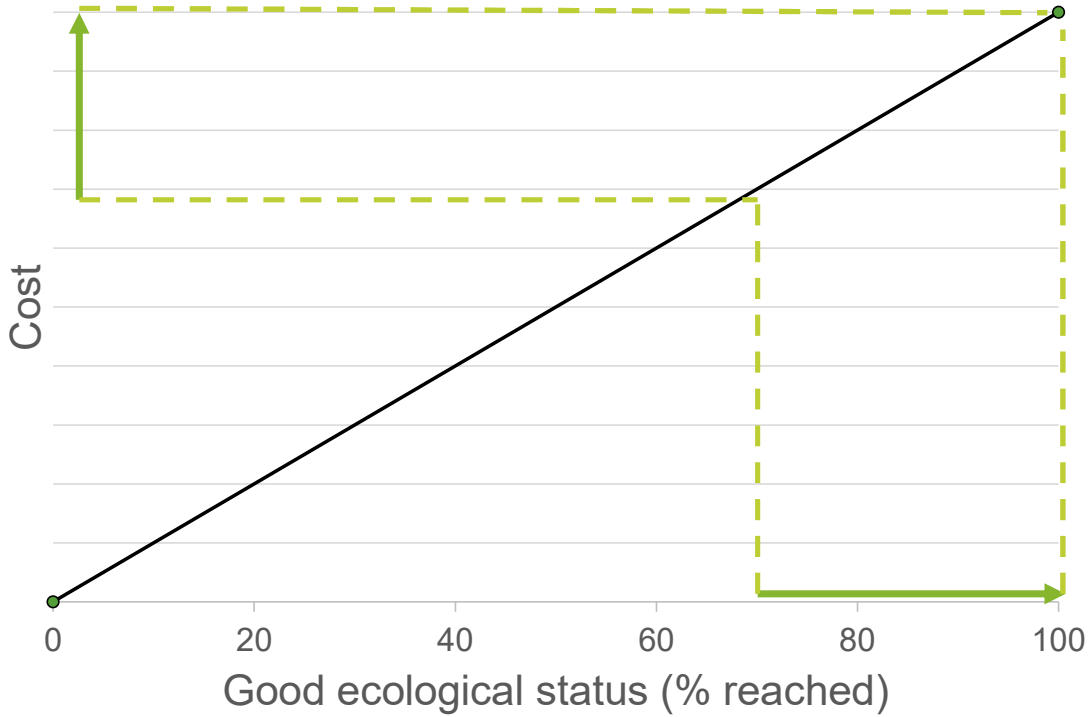


# Application to French marine ecosystems

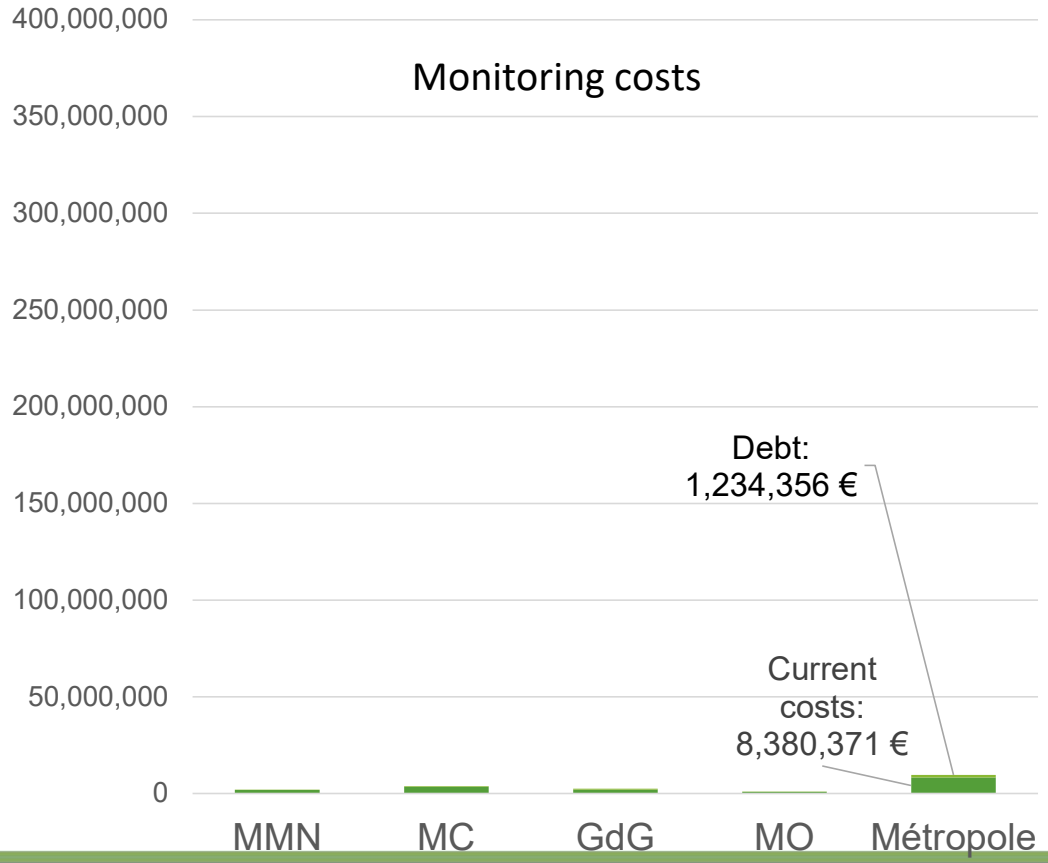
| Descriptor | Source | Kind of data used |
|---|---|---|
| Biodiversity | OFB, 2020 | Financial needs estimates for the application of sea-based Natura 2000 sites |
| | Scemama et al., 2020 | Report on the evaluation of the Natura 2000 network costs for marine habitats |
| Fishing stocks | (Foucher et Delaunay 2018) | MSFD scientific assessment |
| | (Mongruel, Bailly, et Jacob 2019) | Degradation costs synthesis, MSFD evaluation |
| | French government | Bundle of decrees on fishing vessels outings |
| Eutrophication | (Devreker et Lefebvre 2018) | MSFD scientific assessment |
| | (Mongruel, Bailly, et Jacob 2019) | Degradation costs synthesis, MSFD evaluation |

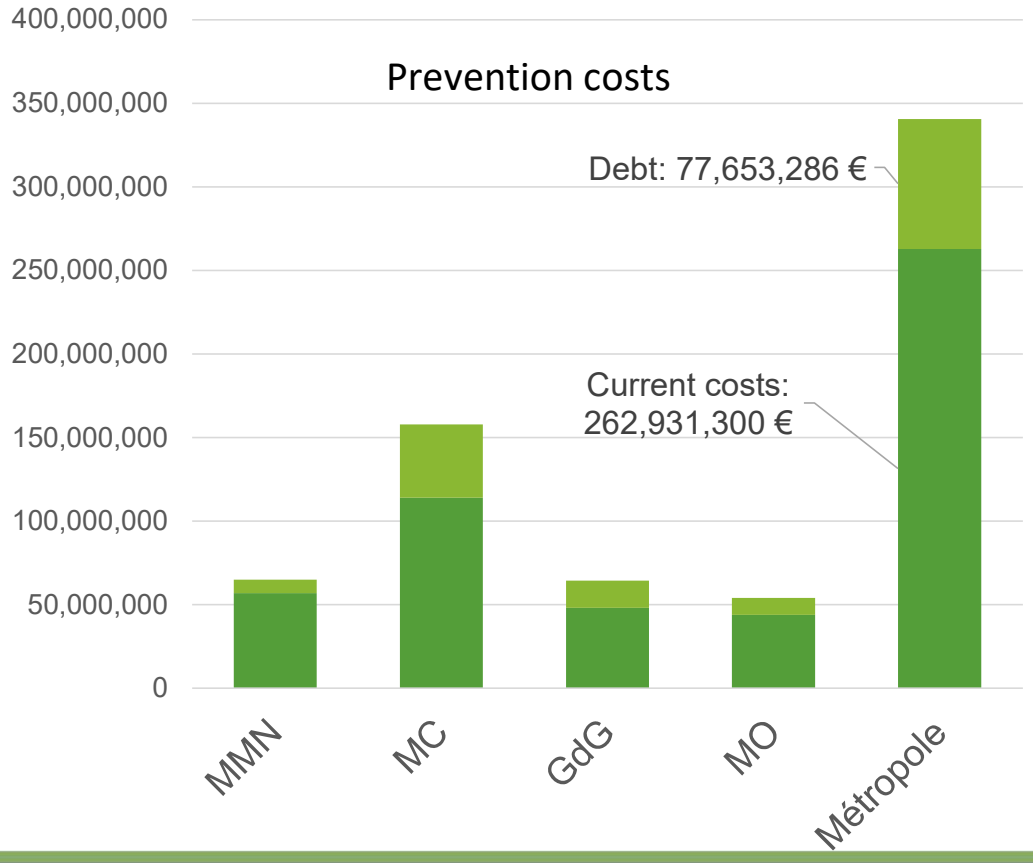
# First approximations of unpaid ecological costs

- Linear relation between ecosystem condition and cost
- Unpaid ecological cost are yearly expenses
- Only monitoring costs and avoidance costs, no restoration costs for eutrophication and fishing
  - ➢ Natural regeneration

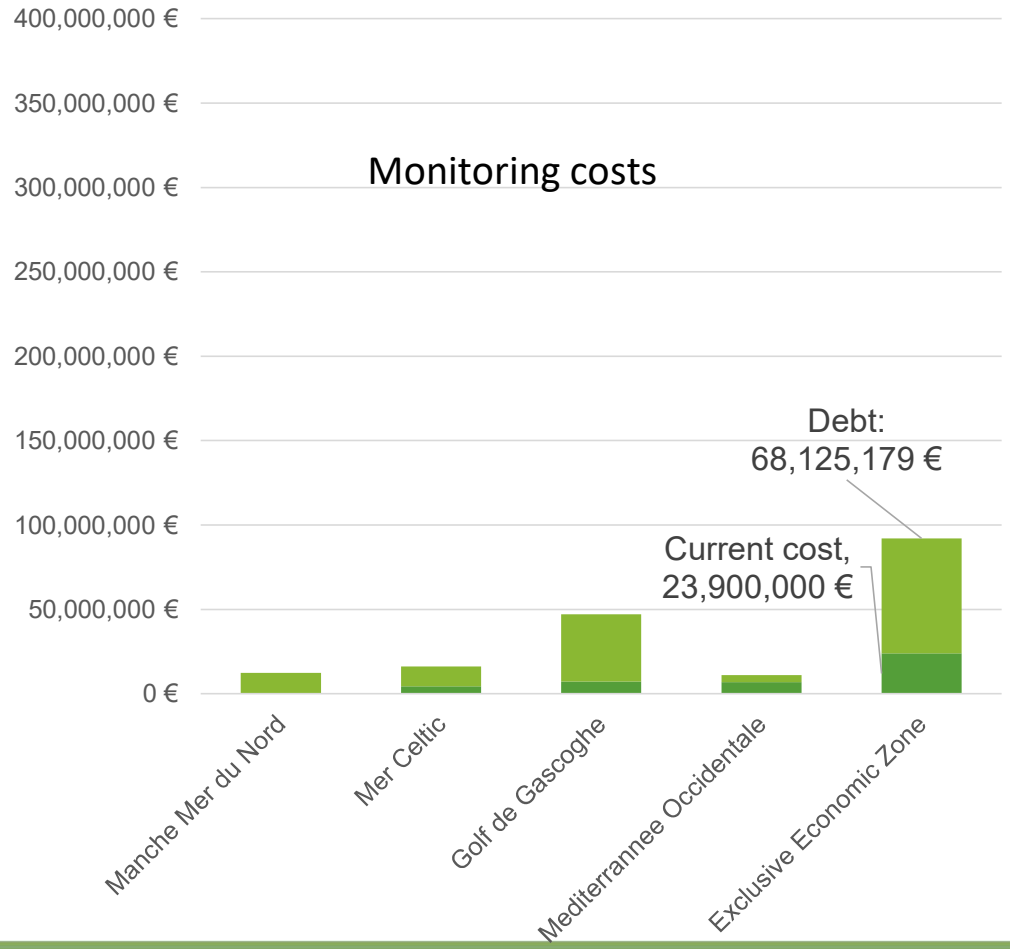


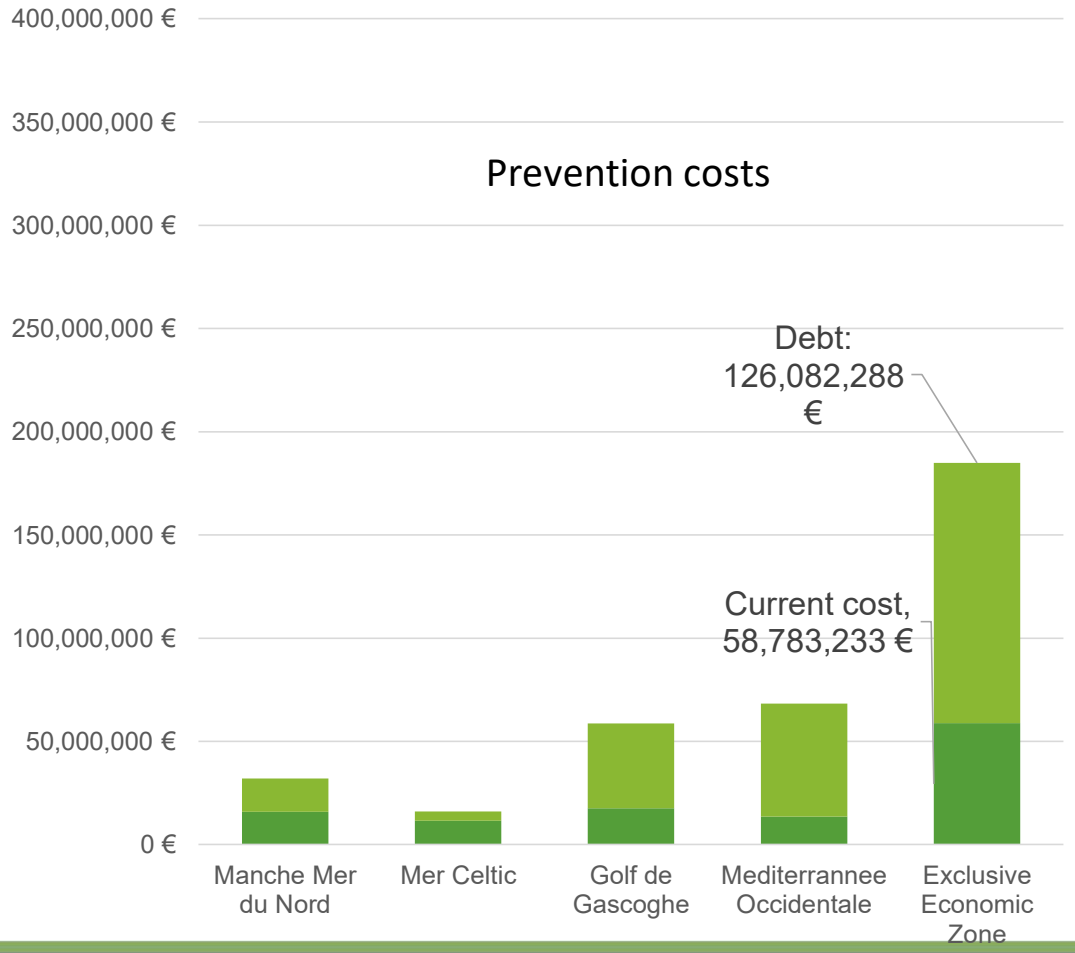
# Unpaid ecological costs for eutrophication



# Unpaid ecological costs for fishing



# Yearly UEC for France by sub-region and for France

| | ECNS | CS | BoB | WM | France |
|---|---|---|---|---|---|
| D1 - OFB | 19,911,500€ | 19,911,500€ | 19,911,500€ | 19,911,500€ | 79,646,000€ |
| D1 - DOCOBs | 2,834,750€ - 3,825,000€ | 2,834,750€ - 3,825,000€ | 2,834,750€ - 3,825,000€ | 2,834,750€ - 3,825,000€ | 11,339,000€ - 15,300,000€ |
| D3 - MSFD | 28,287,000€ - 100,832,000€ | 26,144,000€- 94,145,000 | 81,054,000€ - 408,958,000€ | 58,724,000€ - 99,683,000€ | 194,207,000€ - 703,618,000€ |
| D1 + D3 + D6 – outing of trawlers | 91,534,000€ | 35,164,000 € | 144,486,000€ | 16,008,000€ | 287,192,000€ |
| D5 - MSFD | 3,049,000€ - 8,209,000€ | 29,074,000€ - 44,207,000€ | 2,164,000€ - 16,874,000€ | 213,000€ - 10,320,000€ | 34,500,000€ - 79,583,000€ |

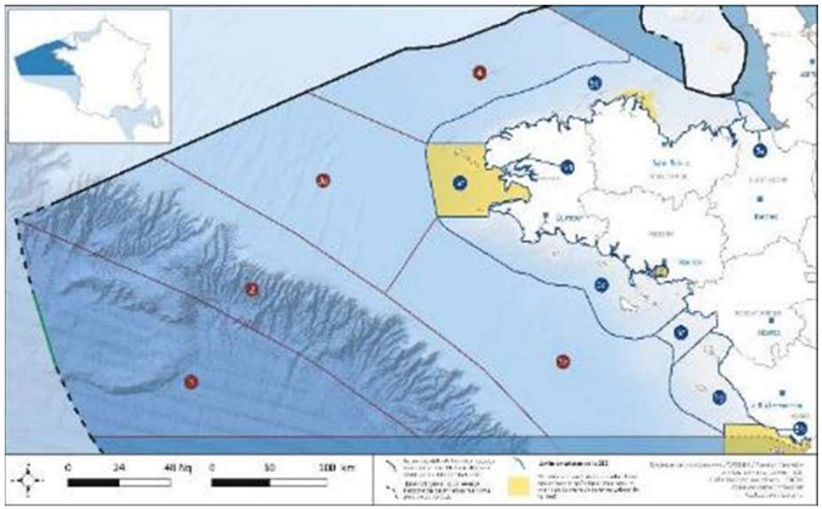
# Policy use of marine ecosystem accounts

- Facilitate the examination of applications for offshore development permits under Article L219-4 of the French Environmental Code.

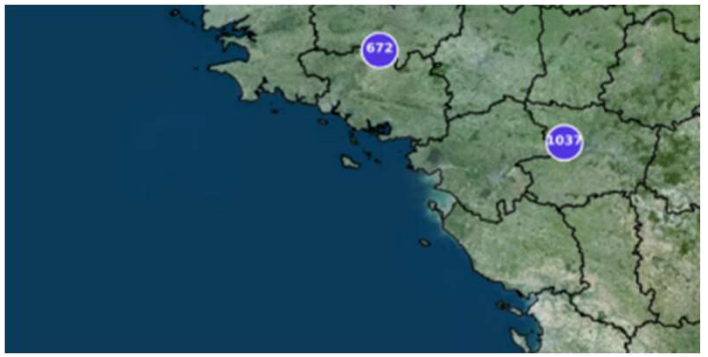
- Build standardized indicators to monitor the achievement of specific policy objectives, including spatially-explicit strategic objectives
- Monitor environmental degradation & restoration
- Assist in the identification of data gap
- Harmonize and integrate existing ecosystem monitoring processes
- Ease access to data

- Analyze trends over time and between countries
- Foster the development of more integrated policies
- Relate state of ecosystems to economic agents

Inform marine spatial planning



Coupled with compensation measures



# What policy use for cost-based valuations of ecosystems ?

- Complement new dashboard of indicators of wealth : Make ecosystem degradation visible in the nations' performance indicators (GDP) to raise awareness and put solutions on the agenda
- Contribute to biodiversity resource mobilization efforts : Facilitate the calculation of the costs of marine degradation required in the initial assessment of the MSFD implementation cycles
- Build standardized indicators to monitor the achievement of specific policy objectives
- Foster the creation and dissemination of data on feasible actions, their impacts and their costs : Lead to a fairer distribution of means and resources allocated to projects with a positive environmental impact
- Support the design of innovative policy instruments such as ecological taxes and permits
- Annex to the Finance law
- Residual impacts of European Directive (WFD, MSFD), budget needs to attain Good Ecological Status and green deal restoration objectives

# Conclusion from the National workshop

| Choice on a scale (15 answers) | 1 (absolutely not) | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 (totally) |
|---|---|---|---|---|---|---|---|---|---|---|
| Do you think extent and condition marine ecosystem accounts will be integrated in policy-making? | 1 | 1 | 3 | 2 | 2 | 0 | 2 | 1 | 0 | 0 |
| Do you think marine ecological debt accounts will be integrated in policy-making? | 3 | 3 | 1 | 2 | 3 | 1 | 0 | 0 | 0 | 0 |

- Marine accounts are not on the political agenda (Eurostat will require terrestrial accounts)
- Marine accounts not on the agenda of the MSFD next cyle

# Thank you for your attention

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