

# Decision analysis in the marine environment

## A System-level approach towards sustainable decision-making



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### HOW CAN DECISION ANALYSIS SUPPORT MSP?

Decision theory helps us understand how choices are made. Using tools from decision analysis, complex decisions can be broken down into manageable parts, making it easier to analyse options and take informed action<sup>1</sup>. This is especially important when dealing with uncertainty and changing societal values, which require a clear and structured approach.

### ASSESSING UNCERTAINTY TO SUPPORT DECISION MAKING IN WATERWAYS

#### SCENARIOS

Designing structured alternative plausible future scenarios

This analysis will explore how **key driving forces** interact and influence long-term policy decisions and their uncertain outcomes, including:

- Societal environmental values
- Technological developments
- Regulatory changes and policy uncertainties.

Scenario 1

Scenario 2

Scenario 3

Scenario 4

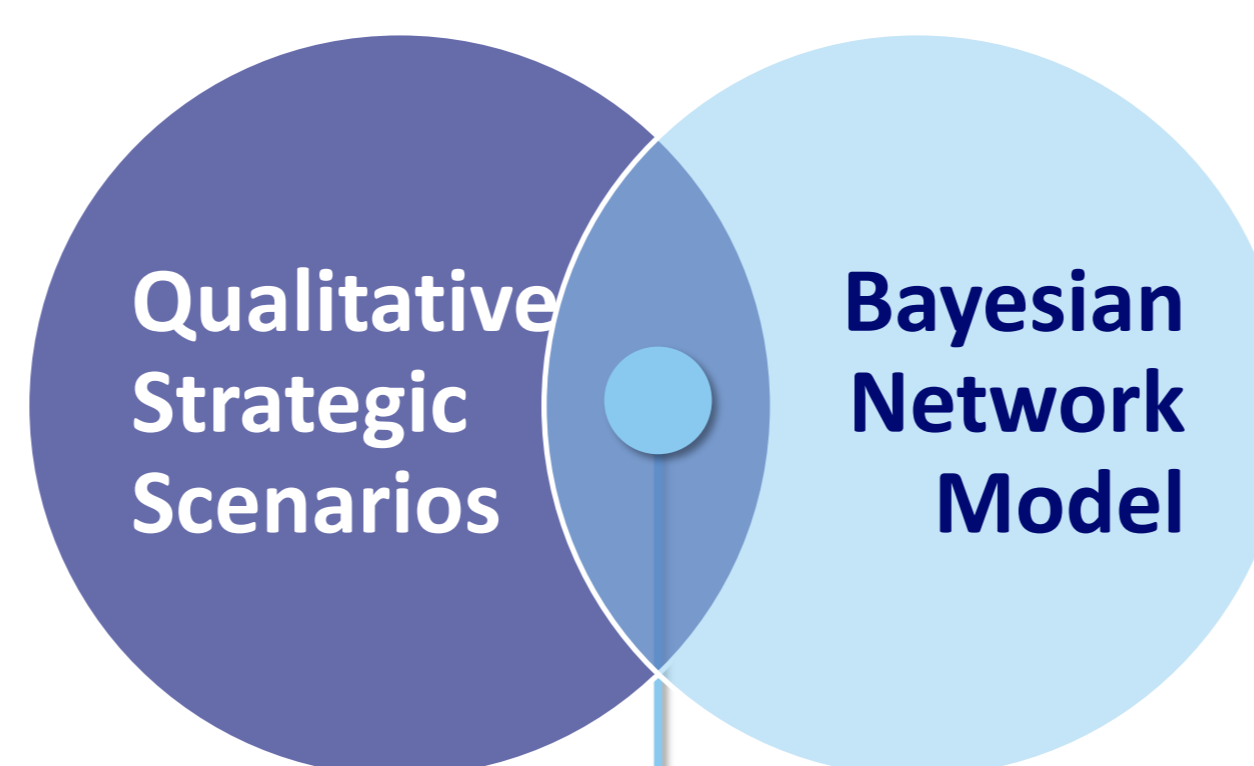
Influence Diagrams

It helps test **which decisions could lead to more sustainable outcomes** by exploring possible future scenarios.

Using **MSP scenarios** as a starting point supports the mapping of broader interdependencies and cause-effect relationships. This approach helps to explore how the system might evolve under different policies and regulations aiming long-term sustainability.

#### Translation

Integration of qualitative and quantitative methods.



Simulation

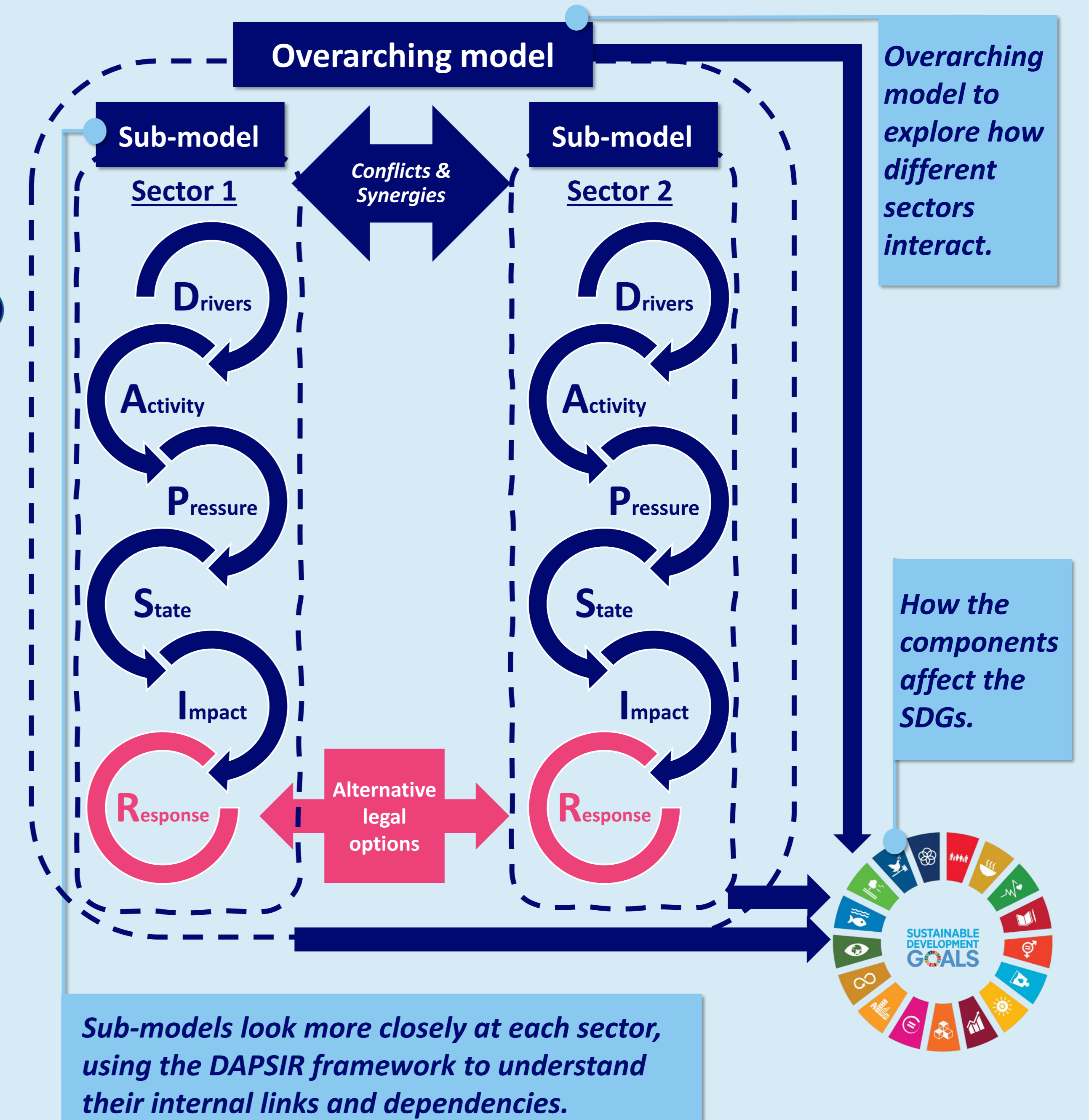
Combining both methods allows for a **deeper understanding of possible futures** by bringing together the precision of quantitative analysis with the broader insights of qualitative exploration.

#### SYSTEM-LEVEL

Testing the impact of uncertainty for alternative legal options

At the core of this analysis is a **system-level approach** that uses sub-models to explore different sectors, while an overarching model reveals how they are connected and how they relate to key SDGs.

- Leverages published Bayesian Network models
- Incorporates the DAPSIR framework to map cause-effect relations and impacts on sustainability



### KEY TAKEAWAY

This study aims to understand the **long-term impacts of human activities** by identifying key drivers, mapping cause-effect relations, and testing different policy options to assess the **robustness of policies under a range of possible future conditions** and support the long-term sustainability of the Baltic Sea waterways.



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<sup>1</sup>Hemming V. et al. Conservation Biology, 2021. <https://doi.org/10.1111/cobi.13868>