



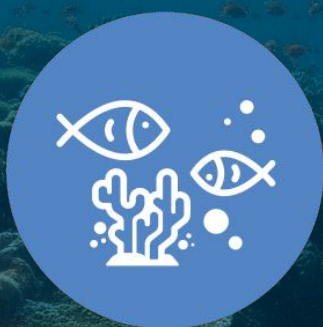
DTO-BioFlow

Integration of biodiversity monitoring
data into the Digital Twin Ocean



dto-bioflow.eu

**EXPLORE MORE
USE CASES**



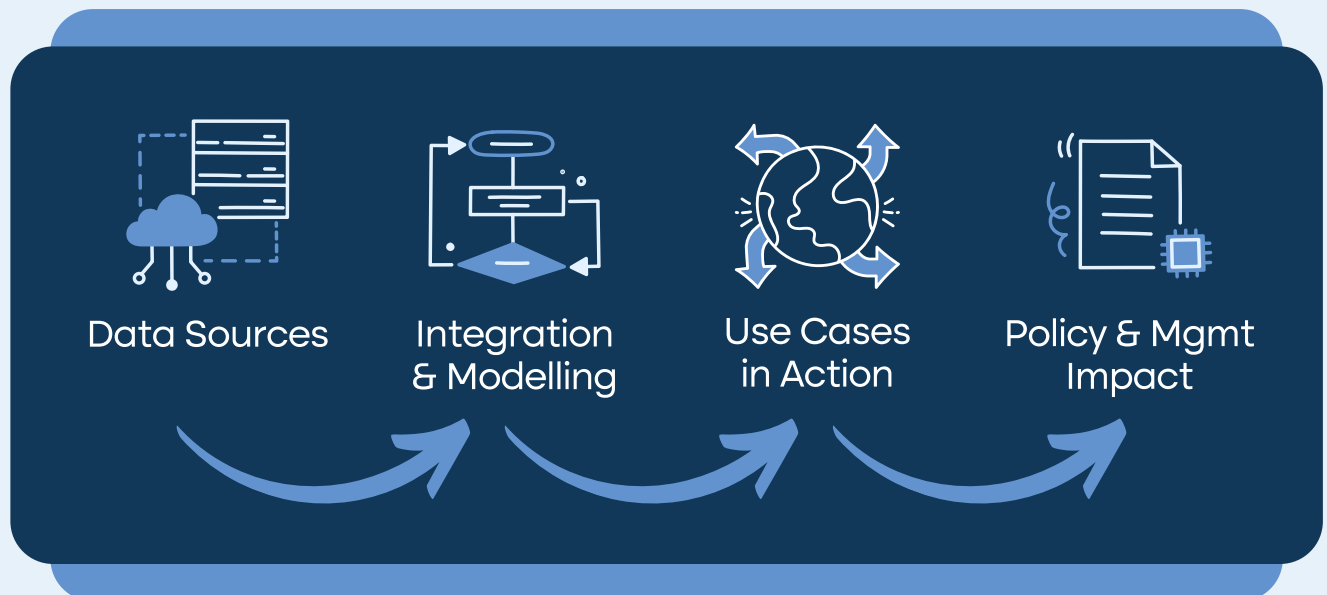
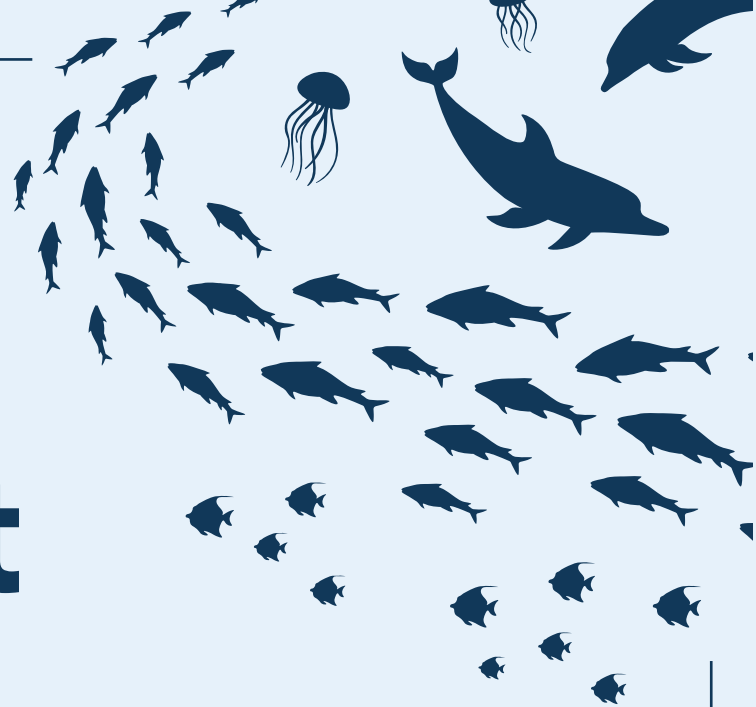
From Data to Decisions: DTO-BioFlow Use Cases

DUC 4 - Delivering evidence-based
knowledge to support spatial planning
of sustainable mariculture.



Funded by
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From Insight to Impact



The Demonstrator Use Cases (DUCs) are at the heart of the DTO-BioFlow initiative, translating complex scientific capabilities into tangible digital solutions for marine biodiversity monitoring and management.

Designed to showcase the power of an **end-to-end digital approach**, these use cases connect cutting-edge biodiversity observations with AI-enhanced models, analytical tools, and the infrastructure of the Digital Twin of the Ocean (DTO).

Each DUC serves as a living example of how real-world marine challenges can be addressed through integrated digital workflows. They all address a pressing challenge for ocean sustainability and propose an integrated, evidence-based solution.



DUC 8 focuses on the machine learning for ocean colour seasonal forecasting.

Chlorophyll-a and primary production are key indicators of marine ecosystem health, carbon cycling, and fisheries productivity. This use case **applies machine learning to improve seasonal forecasting** of these variables, supporting more effective monitoring and marine management.

Challenge

Seasonal forecasts are limited by computational complexity and model uncertainty.

Current systems struggle to predict primary production and chlorophyll variability across regions and depths in a resource-efficient manner.



Solution

This DUC applies machine learning to combine satellite ocean colour data with ocean physics forecasts to produce seasonal forecasts.

The approach increases accuracy while reducing computational costs, enabling scalable and accessible predictions.

Data and monitoring networks used

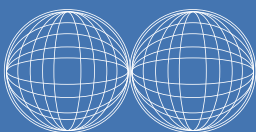
Physical ocean reanalyses and forecasts, biogeochemical data & more.



Expected Outputs

Seasonal forecasts of ocean colour, chlorophyll and primary production

Insights into the global carbon cycle and plankton dynamics, and their response to physical drivers



Digital Twin Capabilities Demonstrated

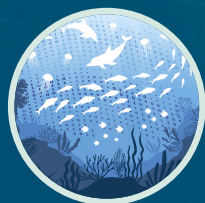
- **Climate response anticipation:** Forecasts biological changes linked to ocean variability
- **Management support:** Informs fisheries, aquaculture, and ecosystem monitoring strategies
- **What if Scenarios:** Enables low-cost exploration of how physical changes affect ecosystems and the global carbon cycle

Useful for

- Environmental agencies and research institutions
- Climate modelers and marine scientists
- Ocean governance bodies

Learn more on development and read the publications

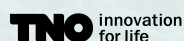
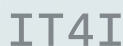




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Consortium



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