BioBoost+

Boosting the Frequency and Scale of Marine Biodiversity Monitoring Using Digital Imagery and Artificial Intelligence

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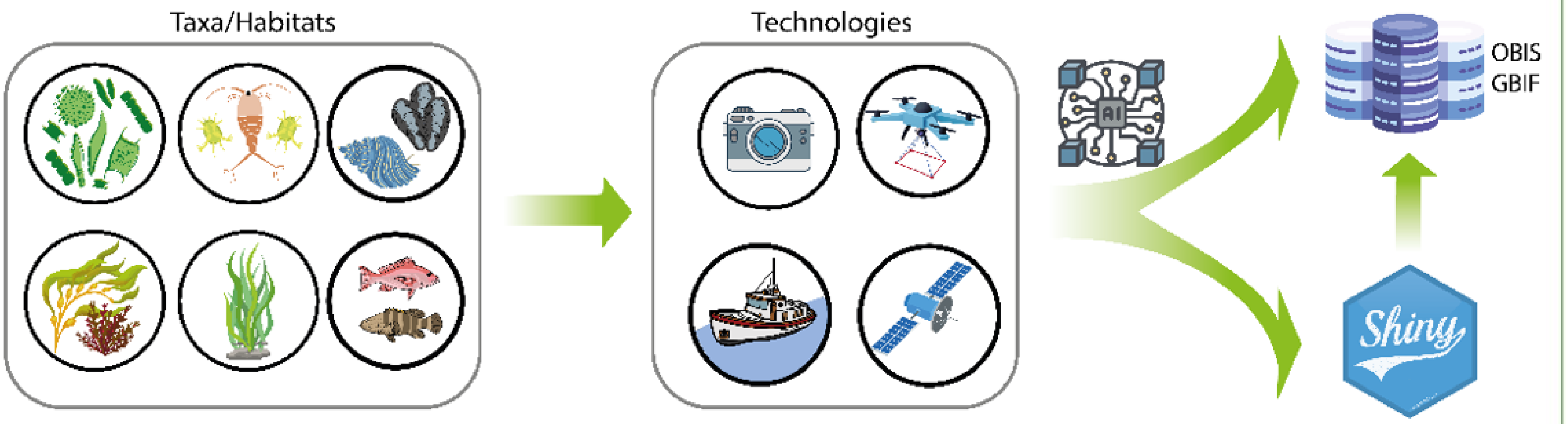
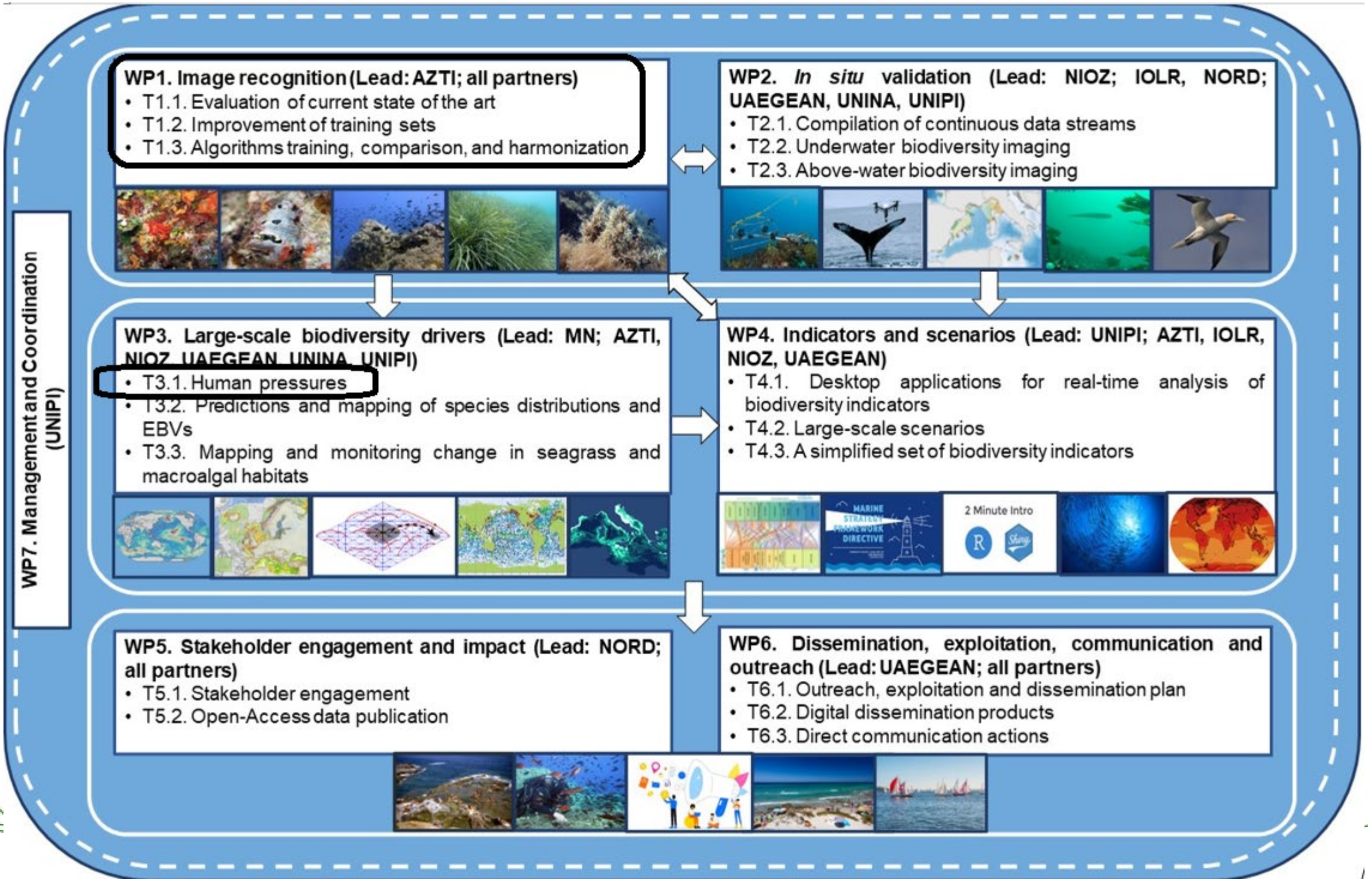
Resumen y objetivos



BioBoost+ busca aumentar la frecuencia y las escalas espaciales del monitoreo de la composición (y/o abundancia) de especies que forman parte de los hábitats marinos mediante la integración de Inteligencia Artificial (IA) para imágenes digitales.

Actuaciones



WP1. Improving species image recognition and processing (M1-M18)

WP1 develops AI to identify and enumerate species of plankton, benthos, and fish, and abundance of birds and marine mammals from photographs and video.

Task 1.1. Evaluation of current state-of-art. *This task*: (1) organises workshops among partners to share knowledge and move towards harmonization of AI methodologies and (2) create content for stakeholder workshops (WP6) with other interested projects or institutions.

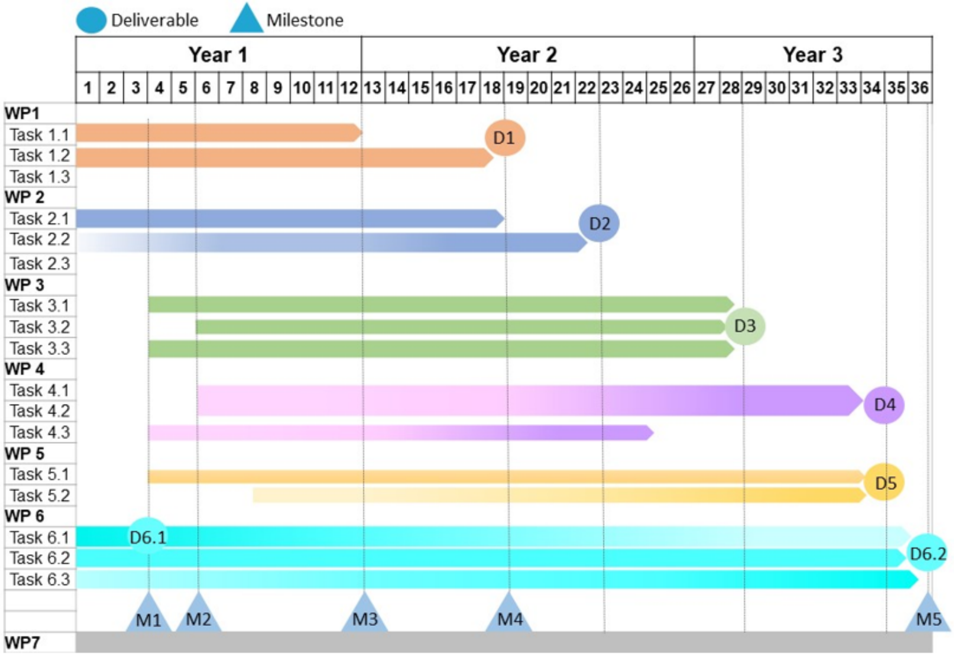
Task 1.2. Improvement of training sets. The task focuses on the identification of species and habitats to generate training sets with statistical validation. The quality of training sets determines the accuracy of the AI process, and how it can be reapplied beyond the immediate use in a project.

Task 1.3. Algorithms training, comparison, and harmonization. State-of-the-art algorithms are tested and compared across different types of data. It is likely that there is no single best algorithm for all types of species (e.g., plankton, benthos or fish) or digital devices (e.g., scanner, cameras, video cameras). The harmonization of data time-series when new devices or methodologies are applied is also addressed.

Socios/cronograma

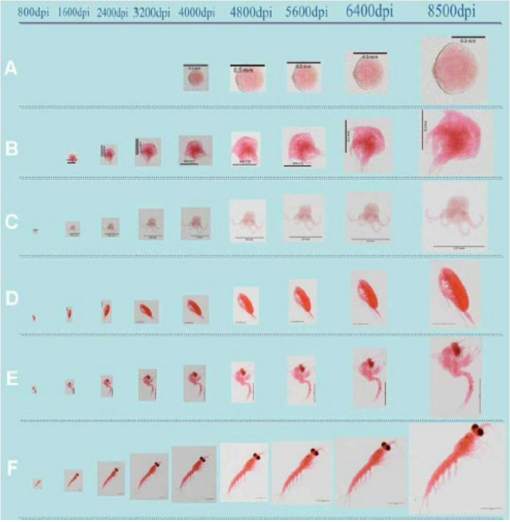
Deliverables (D) and Milestones (M)

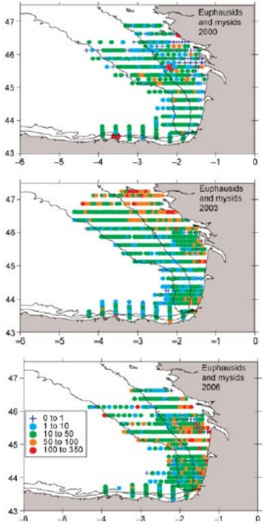
D1. Report on advances for species identification within the project.
D2. Report on the results of biodiversity imaging in all demonstration sites.
D3. Artificial intelligence models for predicting species occurrences and spatial mapping of biodiversity, pressures and EBVs.
D4. List of suitable indicators in Shiny Apps proofs-of-concept for end-to-end data pipelines.
D5. Report with supporting code of workflows for data management from sampling to publication.
D6.1. Outreach, exploitation and dissemination Plan including website and social media.
D6.2. Final report on dissemination and outreach, presenting the implementation of the dissemination and outreach plan with Policy brief presenting the results of BioBoost+ in an accessible form for managers and policy makers.
M1. Kick-off meeting and internal technical workshops (WP1) **M2.** First stakeholder workshop. **M3.** Implementation of demonstration sites of cabled and buoy-mounted camera systems and aerial monitoring campaigns. **M4.** All regional workshops completed. **M5.** Final stakeholder workshop.



		Training datasets (WP1)	In situ validation & satellite data (WP2 &WP3)
Color codes		Phytoplankton; Zooplankton; Benthic invertebrates; Habitats (seagrasses, macroalgal forests); Fish; Birds; Mammals; Human pressures.	
Sub-Arctic	NORD	Replicated zooplankton samples collected in 2 fjords twice yearly since 1980. Annual benthic samples at 6 stations in 3 fjords from 350m-570m depths since 2013 with associated environmental data.	Since February 2023, a video camera continuously feeds to computer via cable to a collaborating commercial scuba diving centre in a Marine Protected Area in Saltfjord, Norway (fish, birds, invertebrates). More cameras will be installed to increase spatial replication and habitat covered. Also, video monitoring by a kelp farm to assess its environmental impact.
Temperate	NIOZ	Replicated timeseries of phytoplankton, birds and mammals	Continuous zooplankton sampling (pump system). Monitoring seagrasses and mussel beds using drones.
	AZTI	Around 25 years of spatial data of plankton in Bay of Biscay (millions of images). Around 400 to 600 points sampled every year. Preserved samples that allow reprocessing to check new approximations and data harmonization. Benthic images from Autonomous Reef Monitoring Structures (hundreds of images).	AI algorithms to automatize image recognition of plankton, invertebrates, seagrasses, macroalgal forests, fish, birds, mammals.
Sub-tropical	MN	5000 fish images at replicated sites along the Mediterranean French coast.	Distribution of benthic habitats (seagrasses and macroalgal forests) from satellite data. Distribution of human pressures from satellite data.
	UNIPI	6000 photoquadrats of rocky shore macroalgal forests and associated benthic communities sampled between 2005 and 2022 within (20 sites) and outside (10 sites) in the Tuscan Archipelago	Since 2022, two cabled camera have been installed at Pianosa Island in the Tuscan Archipelago, continuously sending images of benthic invertebrates at the Information Center. Two additional cabled cameras will be installed to increase replication and habitat coverage (macroalgae and seagrasses).
	UNINA	Thousands of photoquadrats of macroalgal forests and understory communities (including invertebrates) along the Campania and Apulia region within and outside Marine Protected Areas in replicated sites between 2001 and 2022. Regional maps of seagrasses over multiple years.	One cabled cameras will be installed at Porto Cesareo and one at Torre Guaceto MPAs along the Apulian coast of Italy to monitor seagrasses and macroaglal forests. Drones will be employed to monitor ongoing restoration sites of macroalgal forests.
	UAEGEAN	More than 3000 annotated photoquadrat image samples of macroalgae and invertebrates sampled between 2014-2022 in the Greek Ionian, Aegean, and Levantine Seas.	Two cabled cameras will be installed in the Aegean Sea to monitor benthic invertebrates and macroalgae. Distribution of benthic habitats (seagrasses and macroalgal forests) from

Resultados esperados





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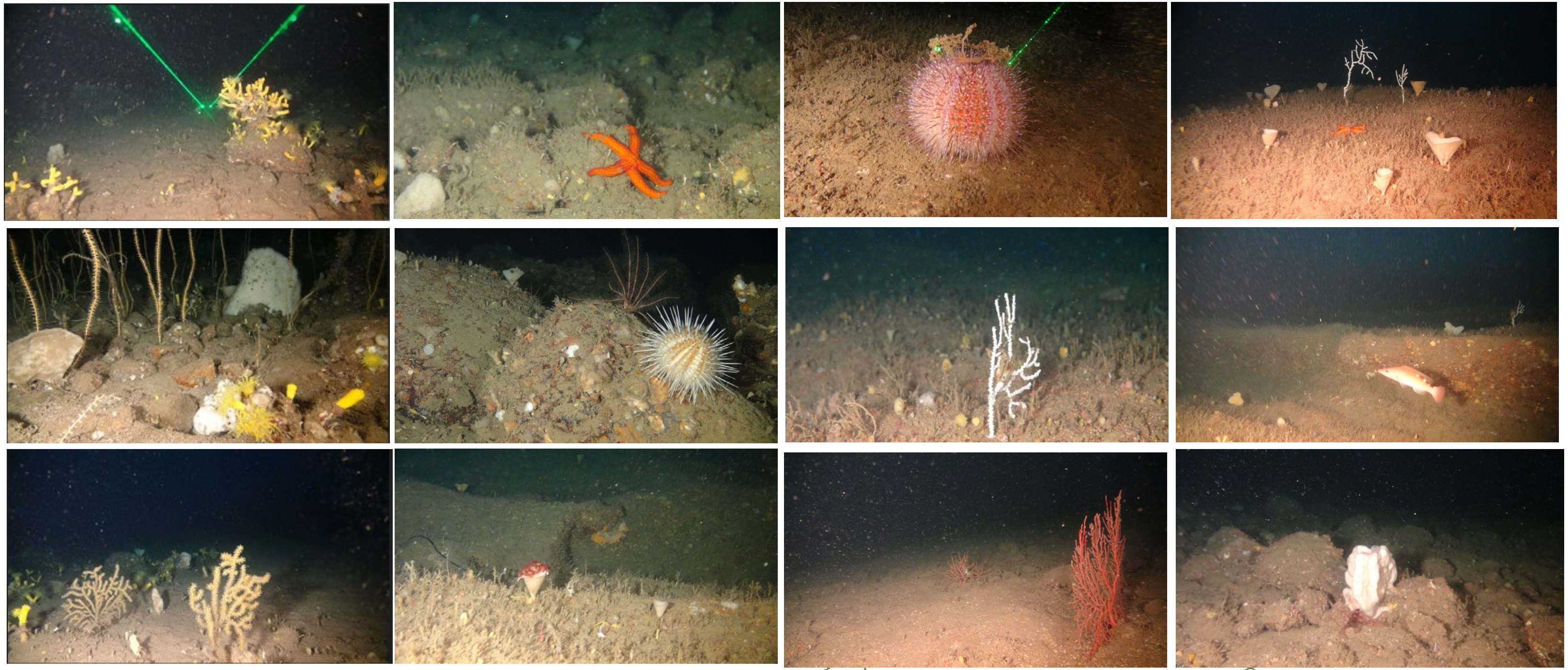
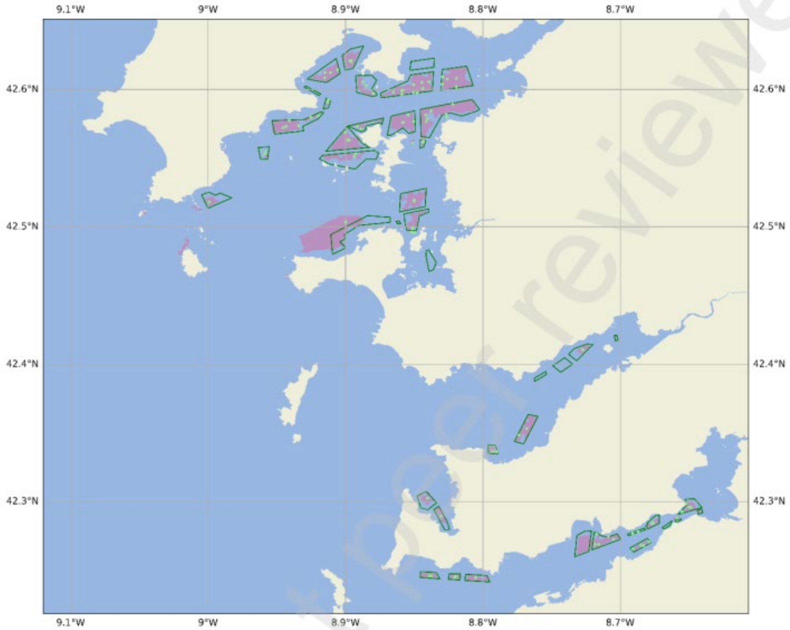
Resultados esperados



Resultados esperados



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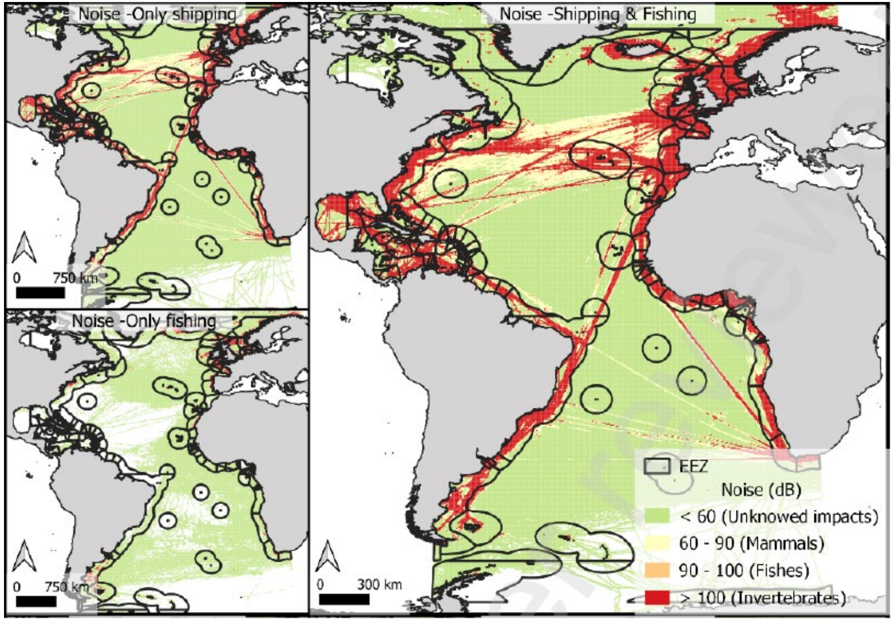

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