

PROTECTION AND ENHANCEMENT OF THE TERRITORY AND NATURAL CAPITAL

“Natural capital” plays a key role in development, as it provides resources and services, defines the ecological limits of socio-economic systems and at the same time mitigates the impacts/effects of human activities. In this context, the Division operates through the Biodiversity and Ecosystem Services Laboratory and the Observations and Measurements for Environment and Climate Laboratory.

Strategic areas:

- development of methodologies and technologies for environmental characterisation, protection and remediation of terrestrial, river, marine and transitional environments;
- definition of the cognitive and strategic framework for the development and protection of ecosystems and natural resources, for the reduction of vulnerability, mitigation of effects and adaptation to change;
- implementation of studies and experiments to predict and assess the impacts of climate change on ecosystems and their resilience;
- support to public administrations for the definition of national regulations and the application/reception of European directives, for the development of strategies for environmental management;
- participation in international networks for the building of infrastructure and services for the environment;
- collaboration with enterprises for the development of prototypes and innovative tools for environmental observation, protection and remediation;
- development of biotechnologies for cultural heritage and bioremediation of contaminated environments.

Infrastructure: for surveys at sea.

Laboratories: for studies in ecology and environmental characterisation, microbial biotechnology for the environment and cultural heritage, ecotoxicological assessments, analysis of environmental matrices.

Observatories: atmospheric, ecosystem and oceanographic at the Lampedusa Climate Observation Station, Antarctic Meteo-Climatological Observatory, atmospheric Observatory of Madonie (Piano Battaglia 1750 m, Palermo), Smart Bay S. Teresa (La Spezia).



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PROTECTION AND ENHANCEMENT OF THE TERRITORY AND NATURAL CAPITAL



DEPARTMENT FOR SUSTAINABILITY

- Efficient use of resources and closure of cycles
- Sustainable Materials
- Models and technologies for risks reduction
- **Protection and enhancement of the territory and natural capital**
- Biotechnology and agroindustry
- Technologies and methodologies for health protection

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DEPARTMENT FOR SUSTAINABILITY



BIODIVERSITY AND ECOSYSTEM SERVICES

OBSERVATIONS AND MEASUREMENTS FOR ENVIRONMENT AND CLIMATE

The Biodiversity and Ecosystem Services Laboratory conducts research in the fields of characterisation, protection, planning and management of ecosystems, conservation of biodiversity and assessment of ecosystem services, including the use of bio-indication methodologies, aimed at assessing environmental quality, the effects of climate change and human impact.

Specifically, the Laboratory:

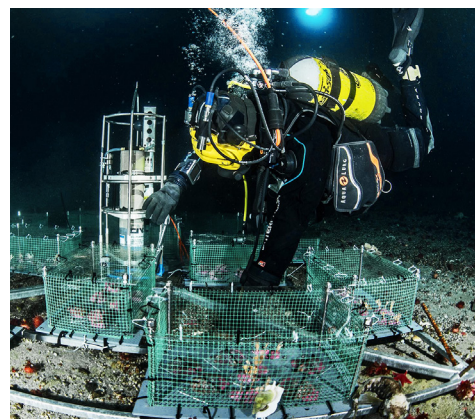
- carries out studies for the understanding of environmental mechanisms and for the assessment of long-term trends on ecosystems induced by natural changes and/or anthropic activities, focusing on biodiversity of aquatic and terrestrial environments and employing an integrated and multidisciplinary approach;
- develops the knowledge base required for spatial environmental planning and for the definition of conservation measures (Protected Areas, Natura 2000 Network, Ecological Networks, etc.);
- designs and implements short, medium and

long-term observation systems within the framework of national and international programmes for environmental observation and the assessment of the evolutionary trends;

- defines and develops criteria, procedures, integrated systems and technologies (in cooperation with public administrations, green and blue economy entrepreneurs and technology clusters) for the protection of natural resources;
- defines monitoring strategies and methodologies to support management, and works together with industrial partners to promote the development of appropriate observation and measurement technologies;
- creates tools/infrastructure for data storage and dissemination to the research community, local operators and the public;
- promotes scientific culture and knowledge for the enhancement and conservation of natural capital.



Monitoring of river fauna



Submarine laboratory in the Ross Sea (Antarctica)

The Observations and Measurements for Environment and Climate Laboratory carries out studies and research activities for the characterisation and remediation of the territory and understanding of the climate system and its variability, with the aim of contributing to the knowledge of the environment and climate, employing a multidisciplinary approach centred on the measurement, analysis and interpretation of environmental and climate parameters collected both during specific measurement campaigns and as part of long-term observations.

The Laboratory offers consultancy and specialised services in the field of planning and implementation of initiatives to develop, protect and restore the environment and cultural heritage in support of the public administrations.

In these areas, the Laboratory carries out



Cultivation of microbes for bioremediation applications



Sampling for remediation monitoring

research, investigations and assessments related to:

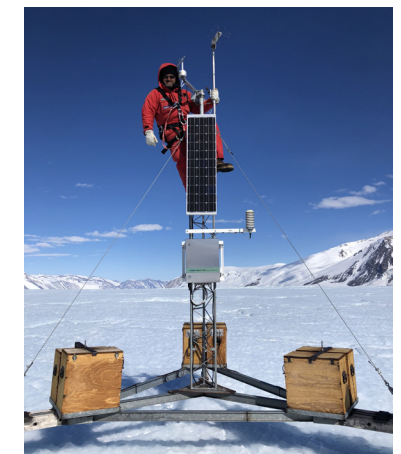
- the characteristics, behaviour and fate of natural elements (and their compounds) and organic contaminants in natural and anthropized environments, studying solid, liquid and gaseous matrices;
- the development and validation of innovative analytical methods, procedures and analytical/diagnostic systems for land characterisation and remediation;
- microbial diversity, identifying the potential and applicability of microorganism-mediated processes as a resource for environmental technologies and for the conservation and restoration of cultural heritage;
- the technological development of sensors for environmental measurements, the improvement of industrial processes and the conservation of cultural heritage;

- the environmental and health impact of plant protection products, providing technical and scientific consulting to national and international institutions in charge of their regulation, including the development of information systems to support the choice of plant protection products in agriculture;
- the understanding of the climate system, particularly in the Mediterranean and polar regions, based on long-term observations of key atmospheric parameters and components;
- the development of methods and instruments for earth and climate observation by in situ measurements and remote sensing techniques from the ground and space;
- process studies aimed at understanding the mechanisms that modulate climate variability, induced by natural changes and/or human activity;

- the study of the interactions between the atmosphere and the ocean and their role in the processes that regulate the climate on a regional scale;
- the design and implementation of measurement campaigns and the definition of observational strategies for the development and verification of geophysical and environmental models, in particular for atmospheric dynamics and air quality models;
- the participation in national and international measurement networks and infrastructures for the study of the climate by managing integrated observatories and measurement stations in the Mediterranean (Lampedusa, Madonie, Sicily), Antarctica (Mario Zucchelli Station and Dome C) and the Arctic (Thule, Greenland).



Lampedusa Station for Climate Observations



The Antarctic Weather-Climate Observatory weather station



Instruments for seawater characterisation



ENEA ecotoxicology laboratory, Portici (NA)



Buoy of the Lampedusa Oceanographic Observatory