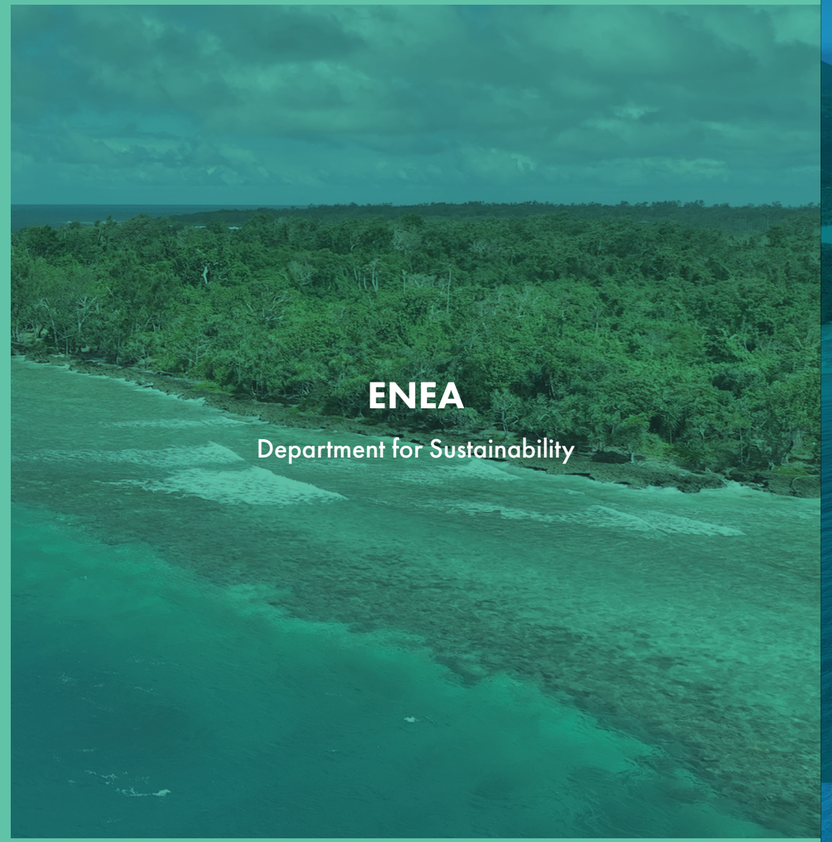

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ITALIAN NATIONAL AGENCY FOR NEW TECHNOLOGIES,
ENERGY AND SUSTAINABLE ECONOMIC DEVELOPMENT

COUNTERING THE EFFECTS OF CLIMATE CHANGE AND PRESERVING BIODIVERSITY:

the Atlas of Marine-Coastal Habitats and Habitat Mapping Technologies developed by ENEA

4 QUALITY EDUCATION
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SUSTAINABLE DEVELOPMENT GOALS

Marine-coastal habitats are at risk. Coral reefs, mangroves, seagrass beds and their associated ecosystems are increasingly vulnerable under the threat of the effects of climate change, such as global warming, ocean acidification, sea level rise, but also extreme events and anthropogenic pressure. In this context, it becomes increasingly crucial to provide public decision makers, government technical officers and institutions, with increasingly detailed information on marine habitats, also useful for planning the marine space of large remote areas.

With the aim of mapping, measuring and remotely monitoring the health status and changes of coastal-marine habitats over time, ENEA has developed an innovative and upgradable tool for the habitat management of coastal environments and coral reefs that combines Earth Observation System technologies (EOS) and digital thematic maps, produced through the processing of free satellite imagery provided by the Copernicus Project of the European Space Agency (ESA).

The intention is to observe the response of the marine ecosystems to climate change, quantify the damage and vulnerability in areas of high naturalistic and economic value, make predictions of future environmental changes and define actions to reduce biodiversity risk factors. The activities also include the sea-truth validation through diving, use of aerial and underwater drones, and use of hardware and software tools for georeferencing the inspected environments.

ENEA can **support SIDS (Small Island Developing States) to sustainably manage and protect marine and coastal ecosystems as it can help to:**

- Identify most vulnerable areas to Climate Change
- Provide cartographic information for Marine Spatial Planning
- Give support for the definition of new Marine Protected Areas as urgent measures to face Climate Change
- Supply information for restoring degraded ecosystems
- Monitor biodiversity and effects of climate changes in the marine environment
- Estimate the value of marine evinronments by means of an Ecological Quality Index

ENEA can **enhance economic benefits** in SIDS as it can help to:

- Identify areas where to concentrate fishing effort to obtain economically valuable results
- Identify coastal areas suitable for new tourism developments
- Explore SIDS' potential for exploiting currents, tides and waves to generate renewable energies

ENEA can **provide capacity building** in SIDS **to promote their sustainable development** as it can help to:

- Increase scientific knowledge
- Develop research capacity and support on the use of Remote Sensing, satellite image interpretation and GIS (Geographic Information System) technologies
- Transfer marine technology
- Supply information for restoring degraded ecosystems
- Increase knowledge on how improve ocean health, bring economic benefits and enhance the contribution of marine biodiversity to the development of SIDS

The Tonga and Vanuatu Projects

The innovative approach has already been applied in the context of the projects "Tonga: Strengthening Protected Area Management" and "Vanuatu: A National Marine Spatial Plan", agreed between the Ministry of Environment and Energy Security (MASE) and the environment ministries of the Kingdom of Tonga and Republic of Vanuatu.



ENEA researchers provided technical assistance to the policy makers of the two archipelagos located in Polynesia and Melanesia, in the western Pacific Ocean, through the creation of a digital cartography of the marine-coastal habitats. In addition, two digital Atlases of Coastal Marine Habitats have been developed which report the classification of habitats, referring to coral reefs, mangrove forests and seagrass meadows. The final objective is to promote the management of marine-coastal areas with the monitoring and protection of marine habitats from the impacts of climate change and anthropogenic pressures.