Press release:

An international team has demonstrated the effectiveness of marine ecosystem restoration interventions

The publication has just appeared in the prestigious international journal: **Nature Communications** https://doi.org/10.1038/s41467-025-57254-2

Over the last 100 years, humans have destroyed or damaged a large part of marine ecosystems. There are many examples of shallow and deep ecosystems being under pressure and a high proportion of assessed marine species and habitats continues to be in 'unfavourable conservation status' in Europe and elsewhere.

The EU Nature Restoration Regulation (NRR), sets out an ambitious framework to restore degraded ecosystems across Europe for the benefit of people nature and the climate, as part of the EU's broader commitment to halt biodiversity loss and address climate change.

The European Commission has strongly supported the law on the Restoration of Nature through which, in the coming months, it will lead all member states to define the objectives and priorities for the restoration of all ecosystems in their countries. In particular, the law will require EU member states to restore 20% of degraded marine habitats by 2030, 60% by 2040 and 90-100% by 2050.

To create widespread consensus and develop a national plan for the restoration of marine ecosystems and at the same time incentivize investments in this direction, it is necessary to demonstrate that the interventions are successful and economically advantageous. In this way, it will also be possible to involve civil society and private companies to stimulate the development of new business sectors and new employment. For example, in the European Project REDRESS **https://redress-project.eu/**, restoration interventions are leading to the development of new technologies, with specialised underwater robots and vehicles capable of operating in deep environments.

In this study published by Nature Communications, researchers from REDRESS and other EU projects working in 16 countries (including Italy and Greece) analyzed the results of 764 marine ecosystem restoration interventions around the world. The restored habitats include seagrass meadows, tropical coral reefs, Mediterranean coralligenous, macroalgal forests, animal forests, mangroves and even deep environments.

This analysis demonstrated that marine ecosystem restoration is highly successful in over 64% of cases.

Ecological restoration interventions were surprisingly effective even in areas where human impact has not been completely removed, demonstrating that it is possible to initiate restoration also in areas characterized by multiple impacts such as the Adriatic in Italy. These results demonstrate the immediate feasibility of a global plan of "blue restoration" also for deep-sea ecosystems affected by trawling.

Fig. 1 | Marine ecological restoration in some soft and hard-bottom shallow-water habitats can now draw from largely established and standardised protocols. Upper panels: a nursery for brown macroalgae to aid in restoring hard bottoms at shallow depths (left panel) and the transplant of habitat-forming species (e.g., gorgonians) for hard-bottom restoration in the Western Mediterranean Sea (right panel). Lower panels: transplant of the endemic Mediterranean seagrass (*Posidonia oceanica*) (left); cultivation of pillow corals (e.g., *Cladocora caespitosa*) on hard bottoms (central); rearing of deep-water corals for subsequent transplanting into a defaunated deep-sea habitats (right).

The benefits of restoration, according to the calculations reported in this study, are multiple, both to achieve contribution to climate change mitigation objectives and to promote blue growth and employment. Furthermore, the economic benefits can make investments in the sector profitable. For example, the restoration of macroalgae forests produces a value between 55,000 and 190,000 euros/hectare/year. However, the costs of restoring deep marine environments remain high, which can cost 5 to 50 times more than coastal ecosystems. This could make the mining of polymetallic nodules unprofitable considering the restoration costs that are necessary following these highly destructive activities.

Already today, over 350 European companies are ready to launch themselves into this new restoration sector which will see a growing market with new products in the field of environmental restoration in the coming years also thanks to the law on the Restoration of Nature. Technologies developed for restoration will also be useful for offsetting damage to marine habitats due to the development of ports, dams, marine cables, oil platforms, offshore wind and other human activities that can cause environmental impacts.

Professor **Roberto Danovaro**, from Polytechnic University of Marche in Italy and coordinator of **REDRESS** says: "*The development of new technologies for the restoration of marine ecosystems today allows us to intervene on increasingly larger areas". And he adds: "The effectiveness of ecological restoration interventions at sea is such that it leaves no doubt about the possibility of aiming with*

conviction in this direction". Dr **Chris Smith**, Director of Research from HCMR and principal investigator for **REDRESS** in Greece says: "*In the last decade, thanks to very important EU projects like MERCES and now **REDRESS**, significant scientific advances have been made and are being made for many ecosystem types in Europe including the deep sea*". **Nadia Papadopoulou** from HCMR, WP leader and member of the Steering committee of REDRESS, says: "*multiple applications of interventions and technological innovations keep producing new success stories, providing solutions and proving marine restoration is both feasible and beneficial for humans and nature*". The REDRESS First Annual Meeting was held in Heraklion, Crete in March 2025 under the organization of HCMR. The meeting saw the participation of a large audience including members of the Consortium, members of the Advisory Board, and members of the DG Research & Innovation and DG Environment including the EU Project Officer. https://redress-project.eu/first-annual-meeting-crete-2025/

References and contacts:

Public access:
https://www.nature.com/articles/s41467-025-57254-2

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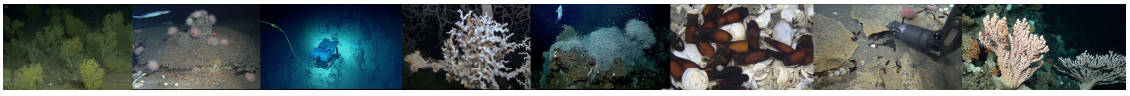
Nature Restoration Law: https://www.consilium.europa.eu/it/policies/nature-restoration/

European Commission VIDEO on Nature Restoration Law: https://audiovisual.ec.europa.eu/en/video/I-270369

REDRESS project: https://redress-project.eu/
REDRESS NEWSLETTER: https://redress-project.eu/newsletter/newsletter-02/
https://redress-project.eu/first-annual-meeting-crete-2025/



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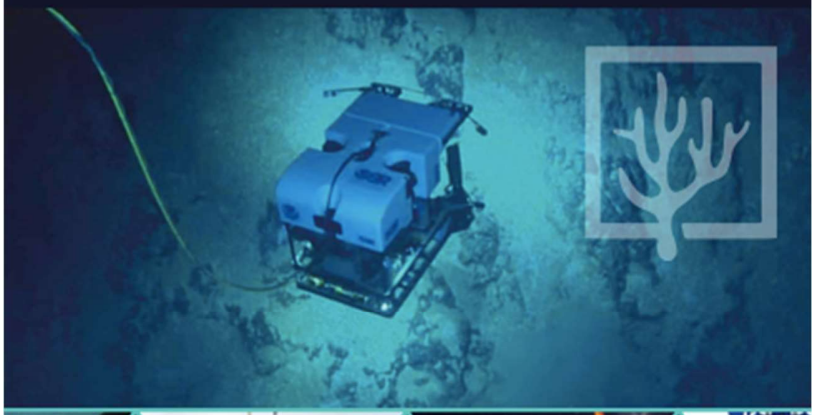
RESTORATION OF DEEP-SEA HABITATS TO REBUILD EUROPEAN SEAS

A TECHNOLOGICAL CHALLENGE:

- Apply the most advanced technologies to develop nature-based solutions to restore deep-sea habitats
- Develop new technologies to expand deep-sea restoration at large spatial scales
- Use cutting-edge technologies to monitor the success of restoration interventions in different deep-sea habitats



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