

SHELLTER

Final News

The SHELLTER – Reuse of aquaculture waste in the development of construction materials) project, promoted by Instituto Superior Técnico (IST) - Universidade de Lisboa (UL) and NOFIMA (norwegian institute of food fisheries and aquaculture research), through the Bilateral Funds program financed by EEA Grants, was developed from September 1, 2022, and August 31, 2024. The PIs of the project were Professor Inês Flores-Colen from the Department of Civil Engineering, Architecture and Environment from IST- UL, member of the research unit CERIS (Civil Engineering Research and Innovation for Sustainability) and senior scientist marine biotechnology Runar Gjerp Solstad from NOFIMA.

The main goal of this project was to contribute to the creation of opportunities for the exploitation of oyster shell waste from aquaculture or from invasive species collection as an industrial product for companies that are committed to the sustainability of construction materials. Consequently, the project encompassed five main activities.

- Field research and data collection on waste: a literature review was carried out in scientific papers, technical reports, government websites, a visit to a cooperative and the site of shell farms in the Algarve, a visit to communities in Norway affected by invasive oysters, participation in seminars/events on aquaculture, and publication of papers and presentations at international conferences. The activity included a survey conducted in Olhão, Faro and Culatra Island to collect data and build the bivalve circuit (focus: producers and intermediaries). The survey was extended to Oslo, focusing on the perception of researchers and the construction industry.

SHELLTER

Final News

- Technical feasibility of oyster shells in the development of construction materials: the different types of shells studied were washed, dried, and crushed into different particle size. The characterization of the shells included several physical-chemical tests, which were carried out on shells thermal treated at temperatures in the 100 °C -1000 °C range. The comparison between oyster shells from Portugal and Norway was made with shell powder and as aggregate in the composition of coating mortars.
- Assessment of the environmental and economic impacts of the oyster shell life cycle and its effect on the local economy and society: the life cycle analysis of oyster shell waste as a raw material and its transformation into a construction product (different origins of the waste, pre-treatments, particle size, etc.), quantifying the impacts of the processes, considering 12 different scenarios.
- Database and roadmap for the use of oyster shell waste in construction: Development of a database through a face-to-face survey and on Google Forms (Portuguese, English), which obtained more than 110 responses. The analysis integrated different points of view and engagement of stakeholders (researchers, associations, construction companies, fishermen, bivalve consumers). This open-access database (<https://data.mendeley.com/datasets/cyyy6mwktp/1>) can be fed and extended in the future. The roadmap (978-989-95625-5-4) sought to facilitate the understanding of the steps and challenges associated with the application of oyster shells in construction materials (Portuguese, Norwegian and English) and its main topics are: i) Conceptual

SHELLTER

Final News

framework; ii) State of the art;iii) Future scenario; iv) Development strategy and; v) Research contribution.

- Communication and dissemination of the results: including social news, online and in person meetings, participation in 5 conferences (ICCE 2022, CEES 2023, ESICC 2023, REHABEND 2024, Net-Zero Future 2024), 1 seminar (XXIV Aquaculture Seminar in Setubal), 1 festival (Marés – Culatra Island), participation in an episode of 90 seconds of science (radio), the organization of SHELLTER Final Workshop, with the presence of various target-groups (as researchers, manufacturers, public and private institutions), as well as the joint publication of 4 papers in international journals, and the supervision of a master's dissertation, and one doctoral (in progress).

In this context, the Instituto Superior Técnico (IST) has collaborated actively with NOFIMA. Collectively, we have accomplished the set objectives and forged new opportunities to reuse aquaculture waste (especially oyster shells) into building materials and boost the blue economy. The SHELLTER Team expresses its gratitude for the funding and the opportunity to tackle new challenges that have emerged from this Bilateral Cooperation.