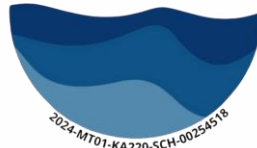


BLUE OCEAN

ERASMUS+ PROJECT



TEACHING MATERIAL

BlueOcean: mainstreaming a Blue Education Area in Europe and the Pacific Ocean Schools
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Marine Living Resources Processing: food, bio-based transformation and bioenergy



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Lesson 1: Seafood fishing and processing in the Aeolian Islands

Duration: 12:07 minutes

Goals:

- Learn about the history and importance of fishing in the Aeolian Islands as an integral part of the local cultural identity and intangible heritage;
- Explore the main traditional fishing and fish preservation techniques, understanding their economic and social function, both past and present;
- Promote Aeolian gastronomy as an expression of culture and sustainability, recognizing the connection between sea, territory, and cuisine;
- Reflect on the contemporary challenges of tourism, innovation, and environmental protection, to understand how the Aeolian Islands can become a model of sustainable fishing in the Mediterranean;
- Foster in students a sense of belonging and respect for local traditions, promoting a modern and responsible vision of marine resources.

Description

The lesson, led by Professor Giuseppe Scalogna, explores the topic of fishing and fish processing in the Aeolian Islands, a volcanic archipelago of extraordinary natural and cultural value. After an introduction to the Aeolian maritime tradition, the main traditional fishing methods are analyzed - such as lampara fishing, tuna fishing, pots, and longlines - which demonstrate the profound connection between local communities and the sea.

This is followed by an exploration of fish preservation techniques, including salting anchovies, tuna bottarga, and smoking swordfish-practices born out of necessity and now symbolizing gastronomic excellence.

The final section is dedicated to Aeolian cuisine, with emblematic dishes such as squid ragù, Aeolian-style swordfish, and Lipari octopus salad, examples of a tradition that combines simplicity, freshness, and local identity.

The lesson concludes with a reflection on the importance of reconciling tradition and sustainability, so that the Aeolian Islands can serve as a virtuous model for the protection of the sea and Mediterranean coastal cultures.

Lesson 2: *Seafood processing*

Duration: 05:42 minutes

Goals:

- Explore the connection between restaurants, local fishing, and sustainability in the Aeolian Islands;
- Understand the importance of collaboration between chefs and fishermen to enhance the local area and promote a circular economy;
- Reflect on how Aeolian culinary tradition can coexist with contemporary gastronomic innovation;
- Raise awareness among young students about restaurant professions and direct knowledge of the sea, fish, and cooking techniques;
- Promote an ethical and sustainable vision of kitchen work, based on respect for seasonality and natural resources.

Description

This video interview offers an in-depth look at the relationship between catering and sustainability in the Aeolian Islands. Set in a family-run restaurant, the conversation revolves around the principles of short supply chains, local ingredients, and respect for seasonality. Chef Manuel Lazzaro explains how Aeolian cuisine is based on simplicity and the valorization of authentic ingredients such as ancient grains, local capers, and the catch of the day, the result of ongoing collaboration with the archipelago's fishermen.

Key themes emerge, including sustainable fishing using pots and longlines, marine protection, and the need to reconcile the establishment of marine protected areas with the protection of fishermen's work.

Another key aspect is the involvement of young people: training in hotel schools, combined with firsthand experience in the kitchen and at ports, is seen as the best way to instill passion, skills, and respect for the local area.

The interview concludes with a reflection on the future of Aeolian cuisine, understood as a synthesis of tradition, innovation, and environmental responsibility.

Lesson 3: *Bythos: a virtuous model of sustainable blue economy*

Duration: 14:34 minutes

Goals:

- Understand the meaning of Marine Living Resources Processing and the concept of Bio-Based Transformation applied to marine resources;
- Know the BYTHOS project as a concrete model for a sustainable blue economy and the valorization of fish waste;
- Analyze the role of marine biotechnology in transforming fish waste into useful resources for health, cosmetics, and the environment;
- Reflect on the importance of scientific research and international cooperation (Italy-Malta) in promoting sustainability and innovation in the smaller islands;
- Promote greater environmental awareness and an active approach to circular and blue economy practices among young people.

Description

Professor Arianna Fonti's lecture addresses the sustainable valorization of marine resources through the BYTHOS (Biotechnologies for Human Health and Blue Growth) project, an Italian-Maltese initiative coordinated by the University of Palermo. BYTHOS represents a concrete model of a circular blue economy, in which fish processing waste is transformed into high-value products, such as bioactive molecules (BAM) and marine collagen, with applications in the cosmetics, pharmaceutical, and food sectors. The goal is to reduce the environmental impact of the fishing industry, minimize organic waste, and create new economic and employment opportunities on smaller islands, often penalized by disposal costs and dependence on external suppliers. Among the most significant innovations is the FRAP Unit (Fish Residue Automated Processing Unit), a mobile automated processing unit capable of converting fish waste into meal and oil that can be stored at room temperature, ideal for island contexts and small businesses.

The project also stands out for its social and educational dimension, promoting the inclusion of young people and women and encouraging the creation of sustainable, local businesses. BYTHOS has received significant European recognition, including the 2024 RegioStars Award and a special mention for innovation in waste management.

Looking ahead, the project aims to create a regional blue economy hub capable of replicating this model in other Mediterranean areas, combining science, innovation, and sustainability to protect the sea and foster the growth of coastal communities.

Lesson 4: *Bio-based transformation*

Duration: 12:25 minutes

Goals:

- Understand the significance and importance of the BYTHOS project as a model of a sustainable circular and blue economy;
- Know the role of marine biotechnology in transforming fish waste into useful resources;
- Analyze the operation of the FRAP Unit, a mobile laboratory for processing fish waste;
- Reflect on the involvement of local businesses and the economic and environmental impact of the project on the smaller islands;
- Promote awareness of the professional and innovative opportunities associated with so-called blue careers.

Description

The lecture features a presentation by Dr. Broni Hornsby, European project manager, who illustrates the most innovative aspects of the BYTHOS project, developed in collaboration with the University of Palermo. The initiative stems from the need to reduce waste in the fishing industry, where over half of processed fish ends up as garbage. BYTHOS demonstrates how this waste can become a valuable resource, rich in bioactive molecules and marine collagen, useful in the cosmetics, nutraceuticals, and regenerative medicine sectors.

A key element is the creation of the Lipari Living Lab, a testing space that brings together scientific research and local businesses, and the construction of the FRAP Unit, a mobile laboratory capable of treating fish waste directly on the islands, reducing disposal costs and environmental impact. Fishing, catering, and distribution companies actively participated, discovering new economic opportunities and more sustainable management models.

The project has led to the creation of biotech startups and helped spread the culture of the blue economy, fostering the creation of new professions related to innovation, research, and marine protection. BYTHOS thus represents a virtuous example of how science, business, and community can collaborate to generate local and sustainable development, transforming waste into value and paving the way for a greener and more responsible future.

Lesson 5: *Renewable energy sources: biomass and geothermal energy*

Duration: 13:08 minutes

Goals:

- Understand the role of renewable energy in the ecological transition and in reducing environmental impact;
- Know the operating principles and applications of bioenergy and geothermal energy;
- Reflect on European and national policies promoting the use of clean energy sources;
- Analyze the advantages and challenges of energy production from biomass and geothermal energy;
- Promote awareness of the contribution of citizens and energy communities to sustainability.

Description

Professor Mariangiola Li Vigni's lecture introduces the topic of renewable energy as a fundamental pillar for a sustainable future, focusing specifically on bioenergy and geothermal energy, two lesser-known but crucial sources. After reviewing European goals, such as the Renewable Energy Directive, which aims to achieve 42.5% renewable energy by 2030, and recent Italian initiatives, the lecture delves into how these two technologies work.

Bioenergy comes from biomass - organic materials such as agricultural residues, wood, food scraps, or urban waste - transformed into energy through processes such as combustion, gasification, or fermentation. It produces much lower greenhouse gases than fossil fuels and allows for the production of biofuels such as bioethanol, which can be used for transportation or heating. However, it also presents challenges, such as land use and the costs associated with transporting biomass.

Geothermal energy, on the other hand, exploits the Earth's natural heat, extracted through wells or heat pumps, to produce electricity and heat. Italy boasts a long tradition in this field, from the Larderello power plants to the volcanic potential of the Aeolian Islands, and represents a model of sustainable innovation.

The lesson concludes by emphasizing how the combination of bioenergy, geothermal energy, and other renewable sources, along with the commitment of local energy communities, is the key to building a cleaner, more efficient, and shared energy system.

Lesson 6: *Transformation of Geothermal Energy in Aeolian Islands*

Duration: 11:23 minutes

Goals:

- Understand the geothermal potential of the Aeolian Islands and its connection to underwater volcanic activity;
- Know the geothermal exploration techniques used onshore and offshore;
- Analyze the technical, economic, and administrative challenges associated with the construction of a geothermal well;
- Reflect on the environmental and employment impacts of geothermal energy projects;
- Promote an informed vision of the future of geothermal energy as a sustainable resource at the local and global levels.

Description

The interview, held at the OGS headquarters in Milazzo, features Dr. Francesco Italiano, an expert in volcanology and geothermal energy. He discusses the geothermal potential of the Aeolian Islands, particularly Panarea. The area is home to the largest underwater hydrothermal system in the Mediterranean, with thermal waters reaching temperatures of 140°C and representing a valuable natural energy resource.

The project, part of the PNRR "Green Islands" program, envisioned the construction of a geothermal well approximately 200 meters deep to harness this clean energy, reducing costs and environmental impacts. Dr. Italiano explains that the research techniques are based on integrated geochemical, geophysical, and hydrological approaches to estimate the temperature and pressure of underground fluids and assess the site's energy production capacity.

Despite its high potential, the project has encountered technical and permitting challenges, due both to the lack of suitable space on the island and the loss, over the years, of specialized expertise in the Italian geothermal sector. However, the initiative is planned to be relocated to another area of the municipality of Lipari.

According to Dr. Italiano, geothermal energy could generate significant economic benefits for the islands, boosting employment, spa tourism, and local services. Looking to the future, he hopes for greater political will and international synergy to promote this natural resource, capable of providing clean, continuous energy while fully respecting the marine environment.