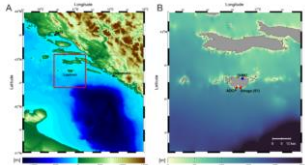


Protection and sustainability of biological diversity in the sea and on the islands of Dalmatia (eastern coast of the Adriatic)

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The purpose of this presentation is to introduce you to (1) Island Trapped Waves - an oceanographic phenomenon, and two (2, 3) ecological problems along the eastern coast of the Adriatic.

1) **Island trap waves (ITWs)** appear around the island of Lastovo in the southern Adriatic (Fig. 1).



Lastovo is one of small number of islands globally where **Island Trapped Waves (ITWs)** are observed during the stratified season. ITWs are **internal waves driven resonantly around the island** by daily tides and winds. The Lastovo ITWs are characterized by the wavelength equal to the circumference of the island (accidentally) with resonance bounded to occur at some point around the island and range of phase shifts around the island in clockwise propagation. ITWs generate daily **oscillations of the thermocline**, with a range greater than 20 m. ITW range decays away from the coast.

Major ecological processes in the Lastovo aquatorium:

- Summer stratification prevents vertical mixing and supply of nutrients to the euphotic layer, resulting low productivity. Phytoplankton take up nutrients above the thermocline while they are available.
- Zooplankton feed on phytoplankton.
- During daily migrations, zooplankton releases fecal pellets and gradually transfers nutrients to deeper layers.
- Microbes regenerate nutrients in deeper layers.
- Thermocline dynamics supply nutrients to the upper (euphotic) layer and support locally higher net primary production.

Conclusion 1: ITWs in the Lastovo aquatorium regulate marine food webs. They are subject to climate change.

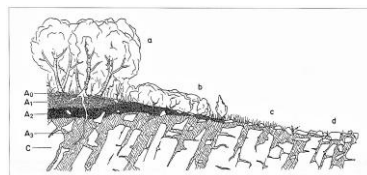
2) **Artificial beaches, shoreface nourishments and over-collection of living resources.**

Rocky shores are affected by: modification of coastal processes (coastal defences, siltation); over-collection of living resources; pollution (oil, eutrophication); global change (climate, sea level). Artificial beaches and shoreface nourishments destroy complex food webs and seriously threaten the functioning of marine ecosystems.

Conclusion 2: Construction on the seashores, artificial beaches, shoreface nourishments and overharvesting of organisms should be prevented more effectively.

3) **The maquis (a thicket with holm oak - up to 5 meters high) on the northern Dalmatian islands is endangered.**

Due to **dry climatic conditions** the growth of maquis lags behind. Degradation stages of climatogenic vegetation (Fig. 4) in the Mediterranean is mostly the result of anthropogenic influence.



Conclusion 3: Taking care of the survival of maquis would be an important contribution to the terrestrial preservation of biological diversity, microclimatic conditions and landscape in the dry N. Dalmatian islands.

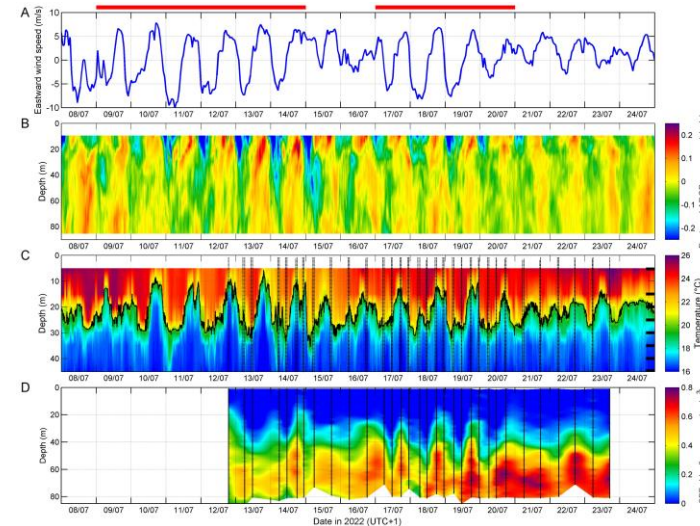


Fig. 2. Observations in July 2022. Eastward wind speed (A), eastward ADCP 350 component (B), temperature data recorded on loggers from the cliff at S1 station (C) and Chl a fluorescence (Chl F) vertical profiles recovered from CTD casts (D) in July 2022. Vertical dotted lines in (C) and (D) indicate CTD casts. Black horizontal ticks in the right part of panel (C) indicate deployment depths of temperature loggers, while the thick black contour indicates the 20 °C isotherm. (Ljubešić et al. 2024). This work was funded by Croatian Science Foundation under the project ISLAND 882 (IP-2020-02-9524).

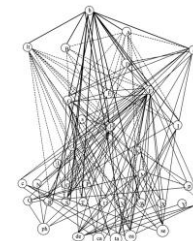


Fig. 3. Case study in the rocky shores of the Catalan Sea (Sala 2004) provided evidence that about 1,350 species are organized in five **trophic levels in the food web**. 151 trophic relationships were determined in 37 broad trophic/taxonomic categories (including humans). There can be **thousands of trophic links in fish** alone. The more links are broken in the food web, the more damage is done to the ecosystem.

Trees and litter 1) produce new **fertile soil**, 2) **regulate humidity and temperature** of soil and air, 3) increase the infiltration of water into the soil (reduce the risk of floods and erosion), 4) bind CO₂.

At the time of the spread of the Aleppo pine, it is necessary to renew maquis with holm oak, which reduces the frequency of fires.