Ksamil-Albania photo wikipedia

EXPLORING THE SEA FLOOR: UNDERSTANDING ALBANIA'S MARINE ENVIRONMENT"

GIFT WORKSHOP

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INTRODUCTION

- Deep waters play a key role in the marine ecosystem, affecting the climate, biodiversity, and nutrient cycles.
- Their dynamics are influenced by natural forces such as ocean currents, gravity, and temperature.
- In addition to the ecological impact, they represent an important source of renewable energy.

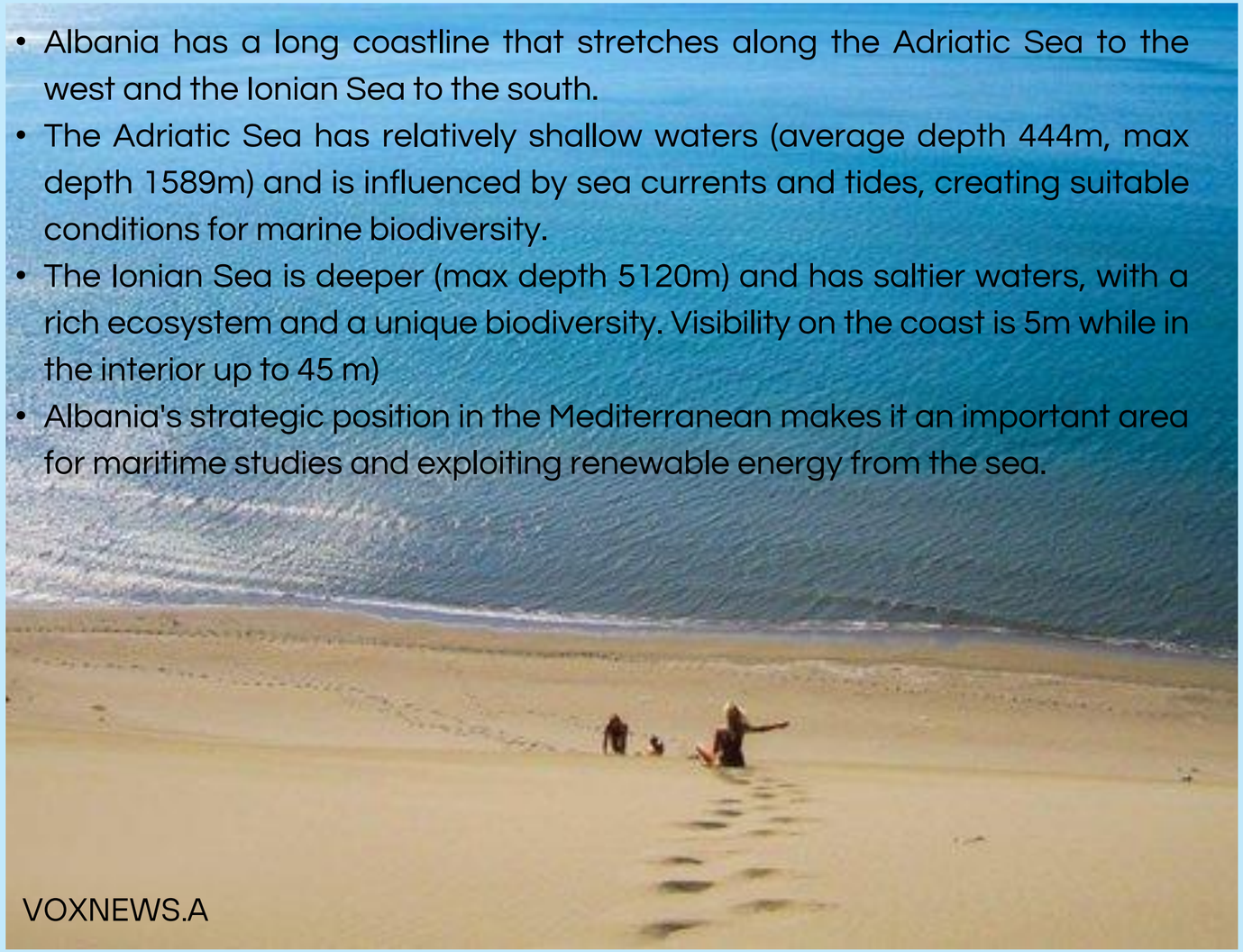
This presentation will analyze the movement of deep waters, the formation of waves, their impact on the ecosystem and the possibilities for harnessing marine energy in a sustainable way.

GEOGRAPHICAL POSITION OF THE SEAS IN ALBANIA

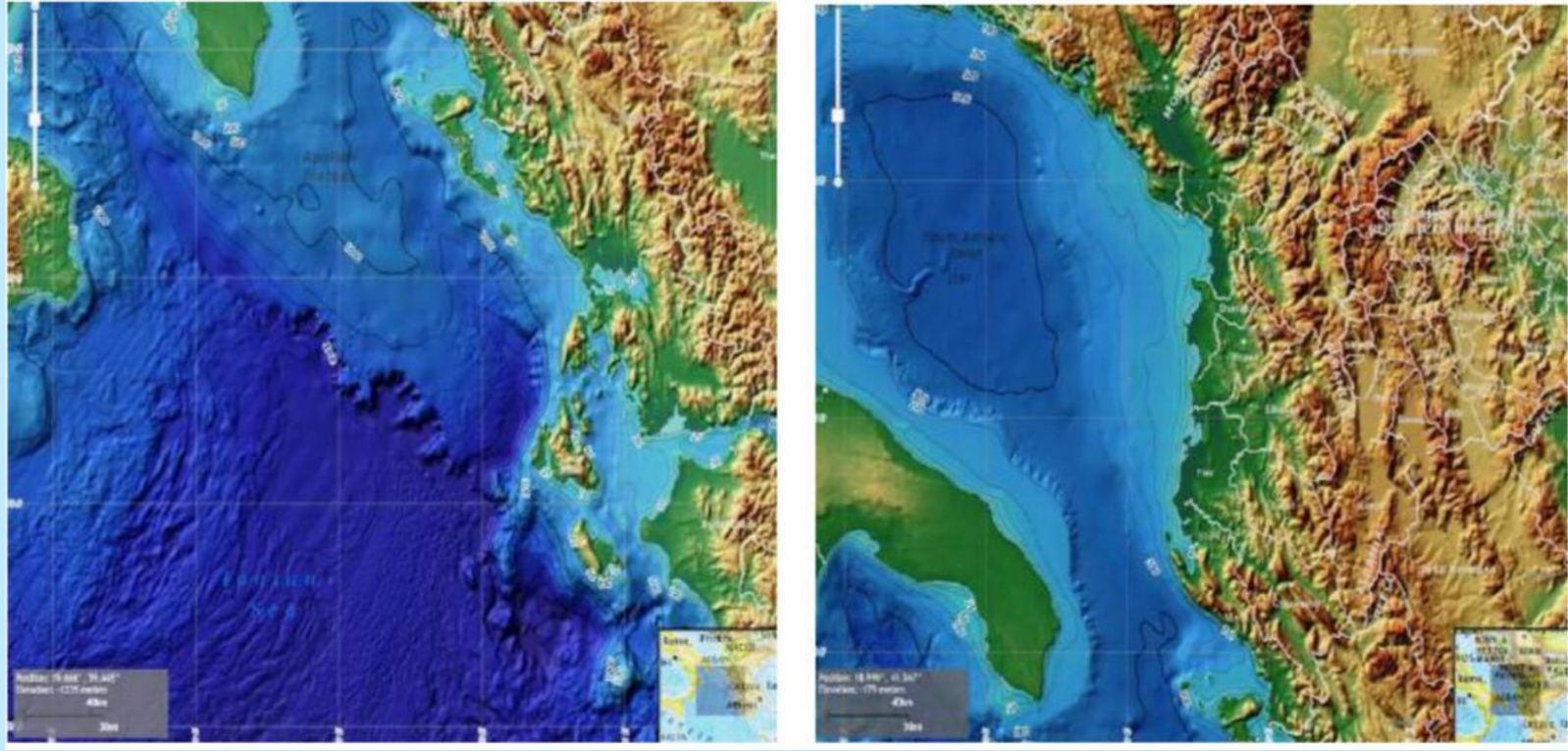
The map of the Mediterranean sea Wikipedia

Topographic map of the Albanian Riviera. Wikipedia

- Albania has a long coastline that stretches along the Adriatic Sea to the west and the Ionian Sea to the south.
- The Adriatic Sea has relatively shallow waters (average depth 444m, max depth 1589m) and is influenced by sea currents and tides, creating suitable conditions for marine biodiversity.
- The Ionian Sea is deeper (max depth 5120m) and has saltier waters, with a rich ecosystem and a unique biodiversity. Visibility on the coast is 5m while in the interior up to 45 m)
- Albania's strategic position in the Mediterranean makes it an important area for maritime studies and exploiting renewable energy from the sea.



GEOGRAPHICAL MAP OF THE ADRIATIC AND IONIAN SEAS.



THE STRUCTURE OF THE IONIAN SEA AND THE ADRIATIC SEA.

WHY ALBANIA?

The Reason

ALBANIA HAS A COASTLINE RICH IN BIODIVERSITY AND INTERESTING PHYSICAL PHENOMENA.

- Albania has a coastline rich in biodiversity and interesting physical phenomena.
- The impact of tides and sea currents on the Adriatic and Ionian Seas is an area of great interest for researchers.
- Tidal and ash energy could be an opportunity for renewable resources in the future.
- Albania has a coastline of about 476 km, which includes rich marine ecosystems and areas important for biodiversity.
- The energy of tides and sea currents can generate up to 3 terawatt-hours of energy per year in the Mediterranean region, including the potential of Albania.
- About 30% of marine species in the Adriatic and Ionian Seas are at risk from pollution and climate change.
- Albania has a coastline rich in biodiversity and interesting physical phenomena.
- The impact of tides and sea currents on the Adriatic and Ionian Seas is an area of great interest for researchers.

Tidal and ash energy could be an opportunity for renewable resources in the future.

THE REA SON

CAPTURE AND RELEASE INTO THE SEA OF THE VLORA TURTLE

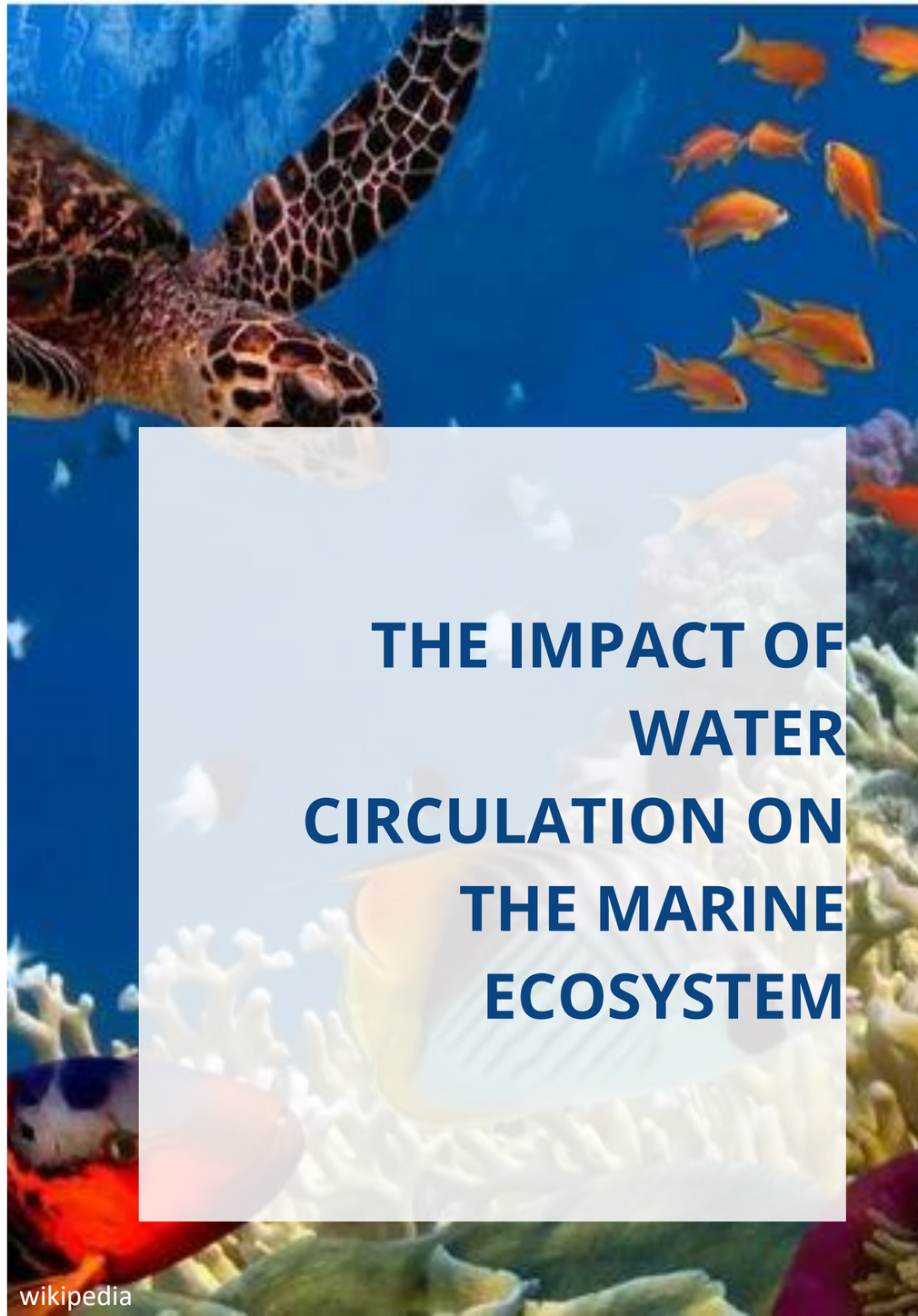
Photo from Marina Vlorë

DEEPWATER DYNAMICS AND THEIR IMPORTANCE

- The movement of deep water is influenced by factors such as gravity, ocean currents, and temperature.
- Waves and water circulation play a key role in the distribution of nutrients and oxygen at depth.
- This movement helps create special habitats for marine organisms that live in extreme pressure and temperature conditions.
- Deep water also has an impact on the global climate, as it acts as temperature regulators through the thermohalide circulation.
- Their impact also extends to coastal erosion and the carbon cycle, helping to regulate the level of carbon dioxide in the atmosphere.

DID YOU KNOW THAT THE ADRIATIC SEA HAS ONE OF THE MOST REGULAR CURRENTS IN THE WORLD?

- Its water moves in a slow counterclockwise circulation, bringing fresh water from the Ionian Sea through the Strait of Otranto and turning it along the east coast!
- This steady current affects nutrient distribution, water temperature, and the spread of marine organisms. Thanks to this, species such as Posidonia oceanica, octopuses and sea turtles have adapted their lives to this constant movement of water."



Adriatic and ionian sea are rich in biodiversit

Photo from Marina Vlorë

WAVES AND THE MOVEMENT OF WATER

- Waves are formed by the influence of wind, gravity, and tectonic activities.
- The force of the tide affects the creation of water energy, which can be harnessed for renewable purposes.
- Albania, with its coast, has the potential to develop energy from the tide and sea wind.
- In addition to impacting energy, waves help transport sediments and form coastlines.

The impact of waves on the construction of coastal structures such as ports and protective barriers is an important factor in coastal engineering.

ALBANIA, WITH ITS COAST, HAS THE POTENTIAL TO DEVELOP ENERGY FROM THE TIDE AND SEA WIND.

WAVES

Types of waves:
Wind waves (capillary and gravitational)
Tsunami (seismic waves)
Tidal waves.

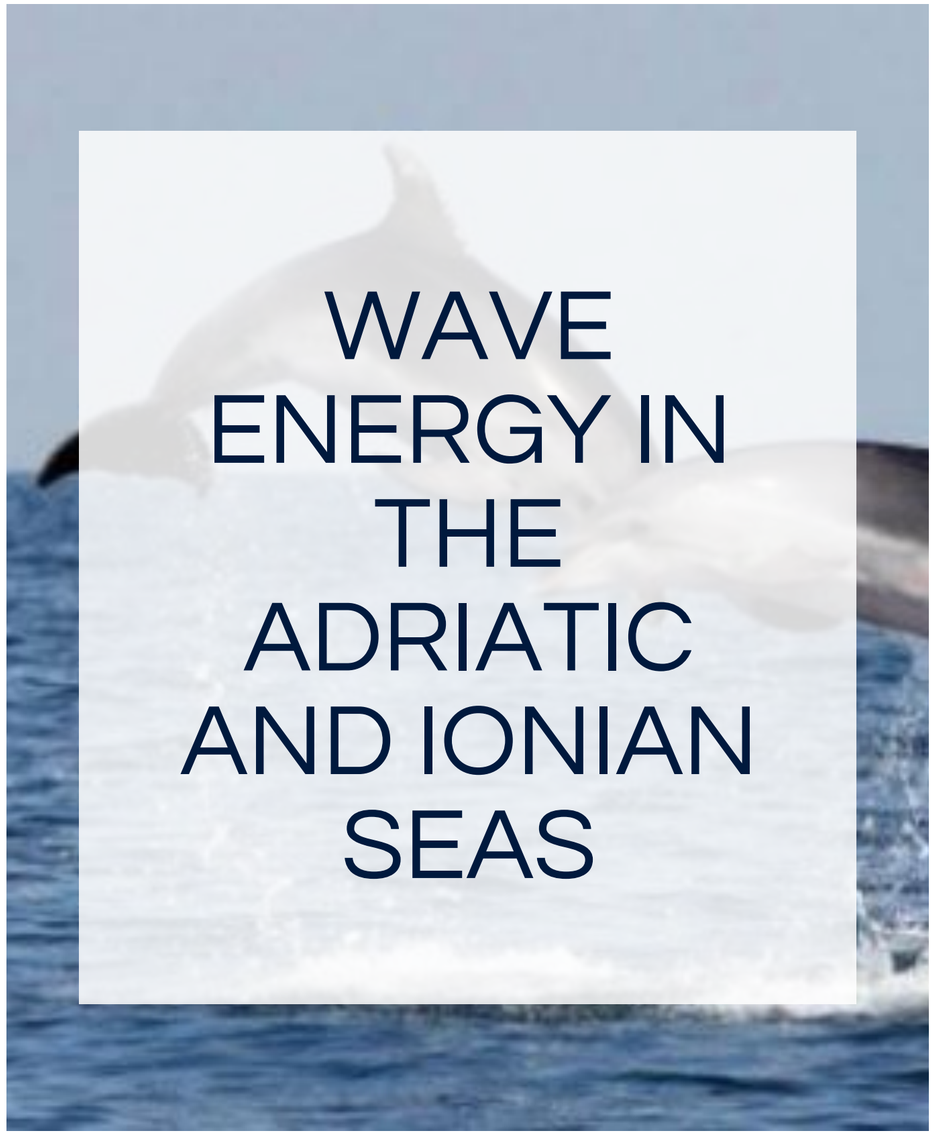
WAVE DYNAMICS

•Wavelength (λ): The distance between two ridges.
•Amplitude(A): The height of the wave from the mean sea level.
•Wave speed: It is affected by the wind, the depth of the water and other factors.

ALBANIA, WITH ITS COAST, HAS THE POTENTIAL TO DEVELOP ENERGY FROM THE TIDE AND SEA WIND

AVERAGE WAVE HEIGHT FOR EACH MONTH

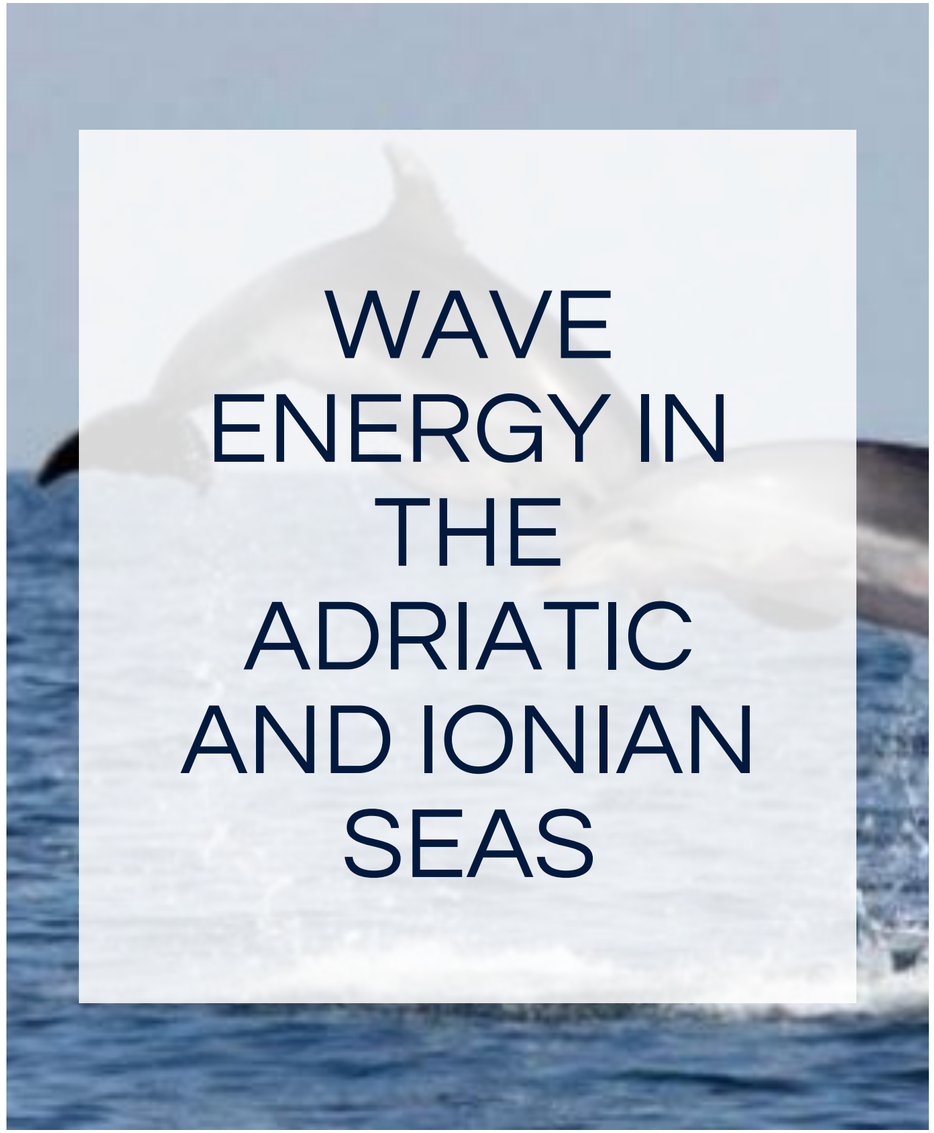
Month	Adriatic Sea (m)	Jon Sea (m)
January	1.5 - 2.5	2 - 3.5
February	1.5 - 2.8	2.2 - 3.8
Mars	1.2 - 2.3	2 - 3.2
April	1 - 2	1.8 - 3
Maj	0.8 - 1.8	1.5 - 2.8
June	0.5 - 1.5	1 - 2.5
July	0.4 - 1.2	0.8 - 2
Augus	0.4 - 1.2	0.8 - 2
September	0.6 - 1.5	1 - 2.5
October	1 - 2	1.5 - 3
November	1.2 - 2.5	2 - 3.5
December	1.5 - 2.8	2.2 - 3.8



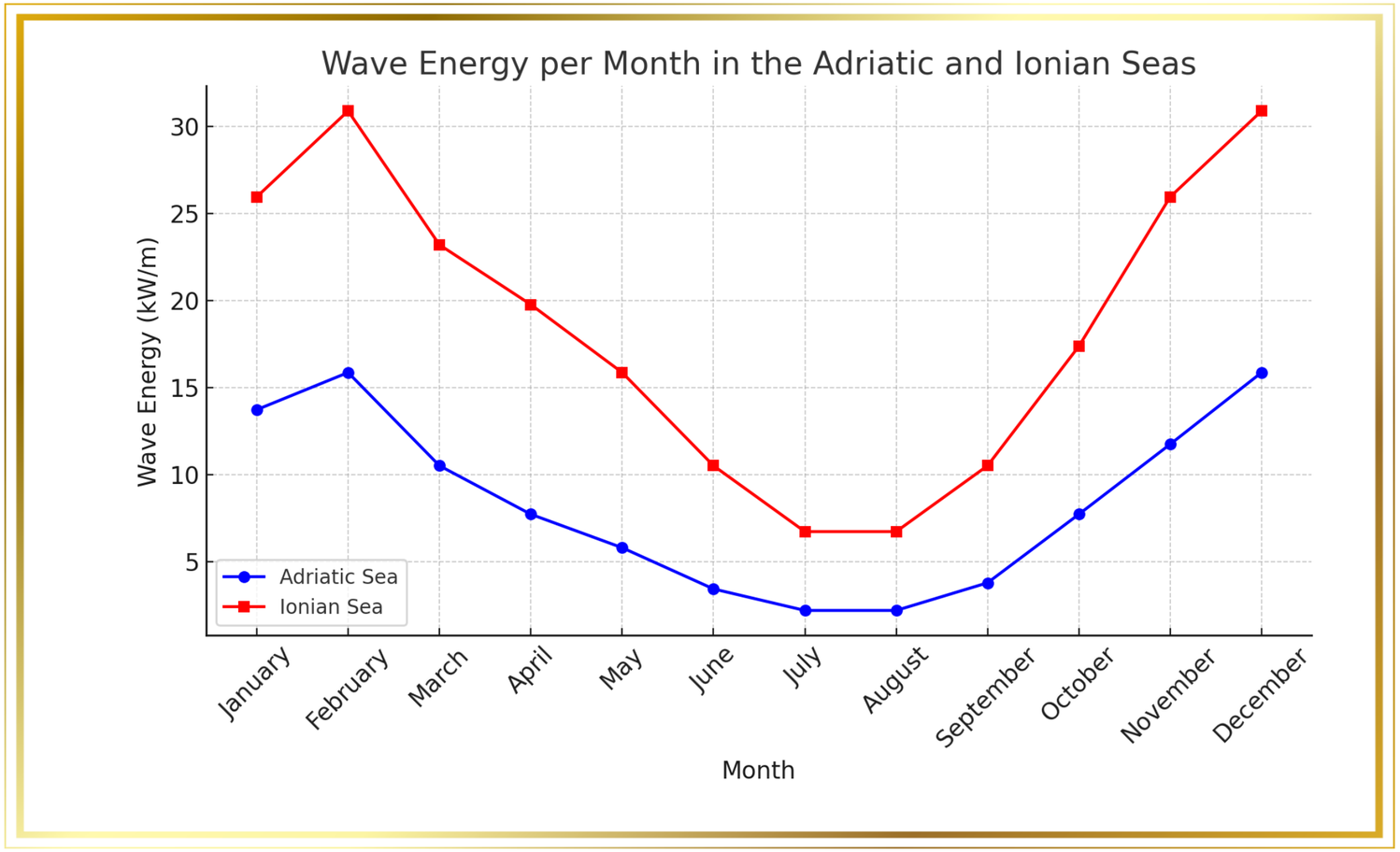
WAVE ENERGY IN THE ADRIATIC AND IONIAN SEAS

Month	Adriatic Sea (kW/m)	Ionian Sea (kW/m)
January	13.72	25.94
February	15.86	30.87
March	10.50	23.19
April	7.72	19.76
May	5.80	15.86
June	3.43	10.50
July	2.20	6.72
August	2.20	6.72
September	3.78	10.50
October	7.72	17.36
November	11.74	25.94
December	15.86	30.87

- This table presents the calculated wave energy per meter of wave front for each month in the Adriatic and Ionian Seas, based on average wave heights and a typical wave period of 7 seconds.



WAVE ENERGY IN THE ADRIATIC AND IONIAN SEAS



Graph Explanation

Title: Wave Energy in the Adriatic and Ionian Seas during the Year

X-axis (Horizontal): Month (January to December)

Y-axis (Vertical): Wave Power (kW/m)

•**Blue Line:** Represents the Adriatic Sea, with wave energy ranging between **2.20 kW/m** and **15.86 kW/m**.

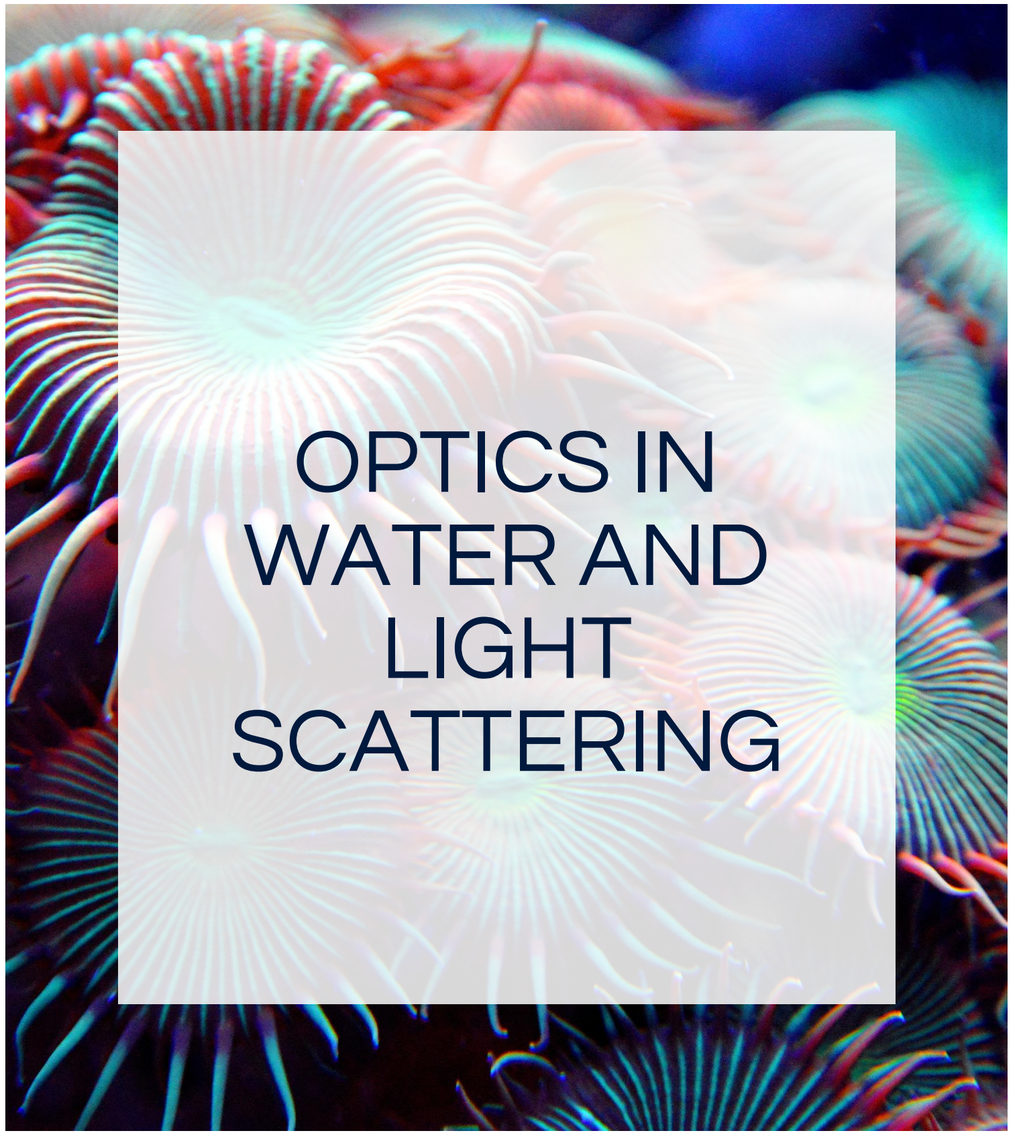
•**Red Line:** Represents the Ionian Sea, with wave energy ranging between **6.72 kW/m** and **30.87 kW/m**.

The graph illustrates that wave energy in the Ionian Sea is generally higher throughout the year compared to the Adriatic Sea. The peak in both seas occurs in **January and February**, while the lowest values are observed in **July and August**. The Ionian Sea maintains higher energy levels due to its deeper waters and stronger wave activity, making it a more suitable candidate for wave energy harvesting.

IMPACT ON THE MARINE ECOSYSTEM

- Waves and water circulation help naturally purify water and disperse microorganisms.
- Plastic pollution and climate change are negatively impacting deepwater biodiversity.
- Endangered species such as some species of fish and marine mammals are endangered due to pollution and human intervention.
- Coral degradation and habitat loss are a consequence of changes in temperatures and acidification of waters.

Overfishing and industrial activities are endangering the marine food chain and the ecological balance of the deep areas.



OPTICS IN WATER AND LIGHT SCATTERING

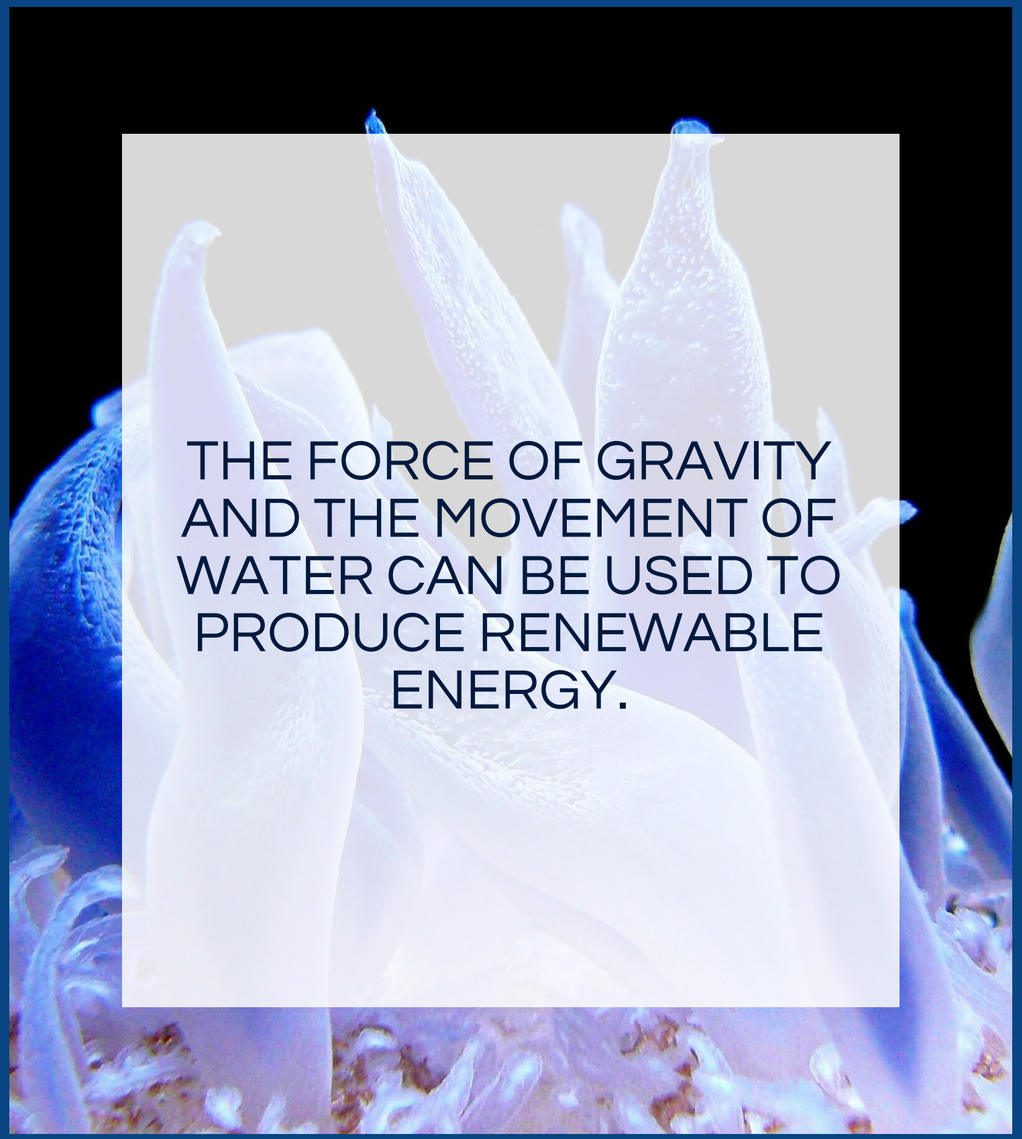
- Light penetrates the water differently, affecting the life of marine organisms.
- In deep waters, the visual perception of living things changes due to the filtering of light from the layers of water.
- Many deepwater species are adapted to bioluminescent light for communication and hunting.
- The absorption of light from water affects the photosynthesis of aquatic plants, determining the areas where plant life can develop.

New underwater lighting technologies are being used to explore the depths of the seas and monitor biodiversity.

EXPLOITATION OF ENERGY FROM DEEP WATER

- The force of gravity and the movement of water can be used to produce renewable energy.
- Albania can benefit from the development of tidal and wind energy for a more sustainable economy.
- New technologies are being developed to harness the kinetic energy of ocean currents for electricity generation.
- The use of submerged turbines to generate power is a method that is being studied for its efficiency.

Ocean thermal energy (OTEC) is another potential energy source that uses temperature differences in deep water.



MEASURES FOR THE PROTECTION OF THE MARINE ECOSYSTEM

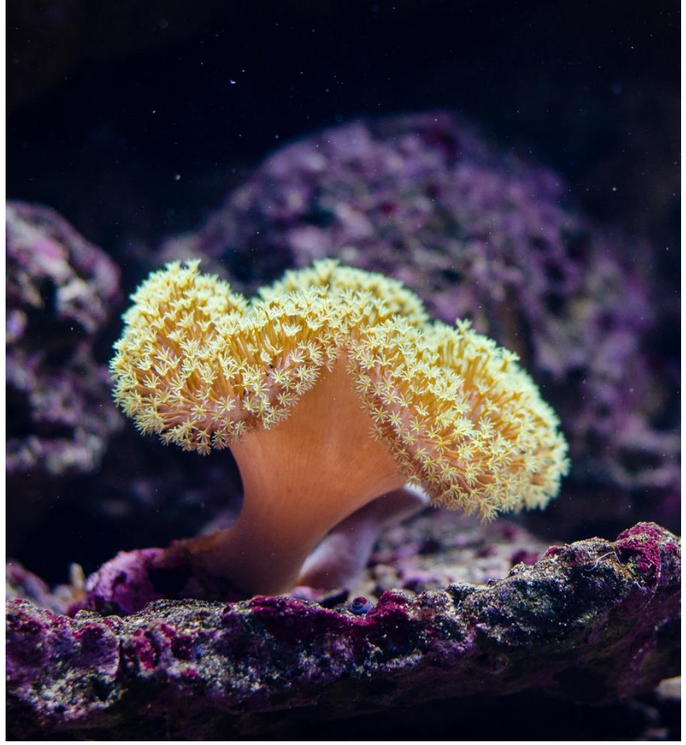
- Reducing pollution and managing plastic waste are important steps for preserving the marine ecosystem.
- Biodiversity protection policies and projects must be implemented to ensure a sustainable marine environment.
- Cooperation at the global level is essential for the sustainable management of the oceans and their resources.
- The creation of marine protected areas can help conserve endangered species and critical habitats.

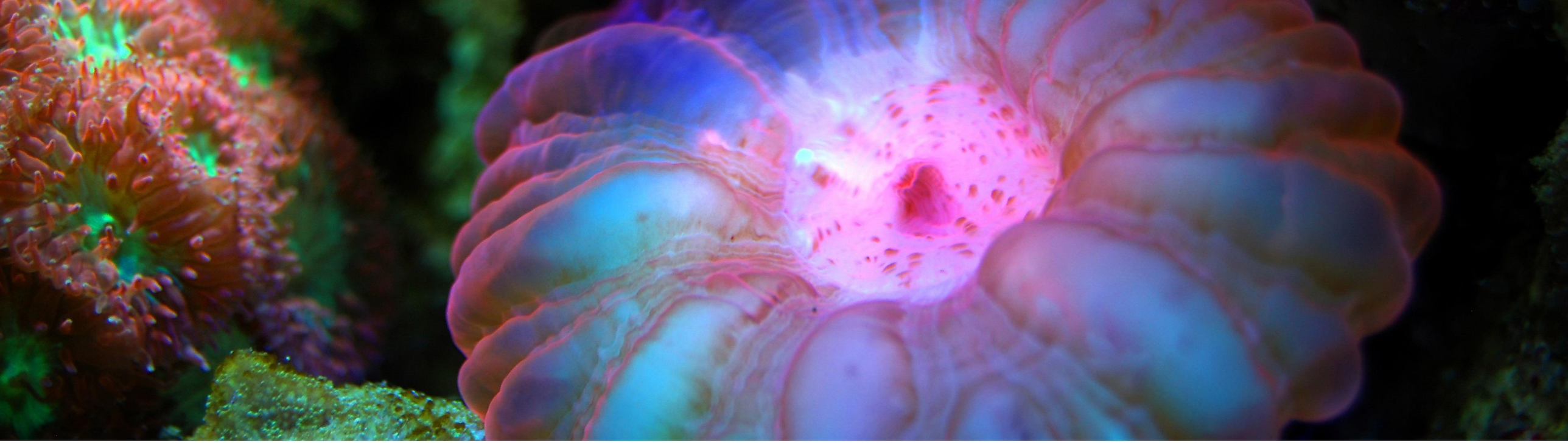
Educating and raising awareness among local communities about the importance of conserving the seas is an important step in the sustainable management of marine resources.

COOPERATION AT THE GLOBAL LEVEL IS ESSENTIAL

Let’s Protect Our Oceans

LET’S PROTECT OUR OCEANS





CONCLUSION

- Studying the dynamics of deep waters and waves is essential to understanding their impact on the ecosystem and sustainable economy.
- Deepwater protection is a necessity for biodiversity and the benefits they offer in the development of renewable energy
- The development of environmental policies and new technologies can help conserve and use these natural resources responsibly.

Investments in scientific research and advanced technologies will help explore and preserve the marine environment sustainably.

MORE INFORMATION

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THANK YOU FOR YOUR ATTENTION

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