



PROTECT THE BLACK SEA AND ITS ANIMALS

CONNECTING SEAS

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General facts about the Black Sea


↗ The Black Sea is located between Western Asia and Eastern Europe. It is bordered by the countries Ukraine, Turkey, Russia, Romania, Georgia, and Bulgaria.

↗ The Romanian fishing area is comprised between Sulina and Vama-Veche. Coastline extends for over 240 km, which can be divided into two main geographical and geomorphologic sectors:

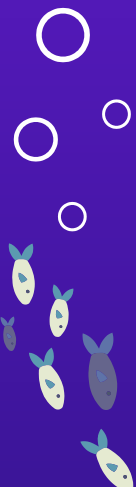
- the northern sector
- the southern sector




The Black Sea is home to diverse living things. These organisms take many forms, from the tiniest single-celled plankton to the larger animals as hammerhead shark, dolphins and seals.



Here, near our country,
in The Black Sea we can
find more and more
spectacular animals on
the verge of extinction



What do you think are the marine
animals that need our help?



Together
for better

Spiny Dogfish



Many species of fish

**Some
examples**



Dolphins



Sturgeon



Factors that led to the endangered marine animals

Lack of food because the overfishing

Global warming

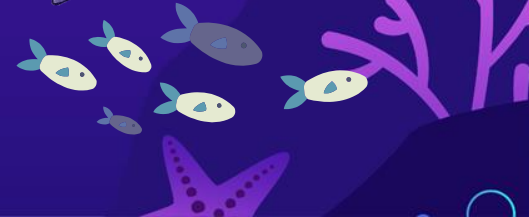
Plastic pollution

Noise pollution

Illegal hunting

Fishing nets

Hydrogen Sulfide





Sea warming



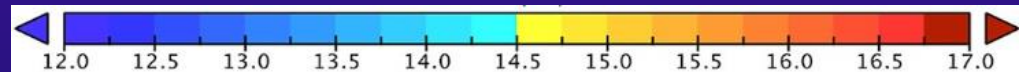
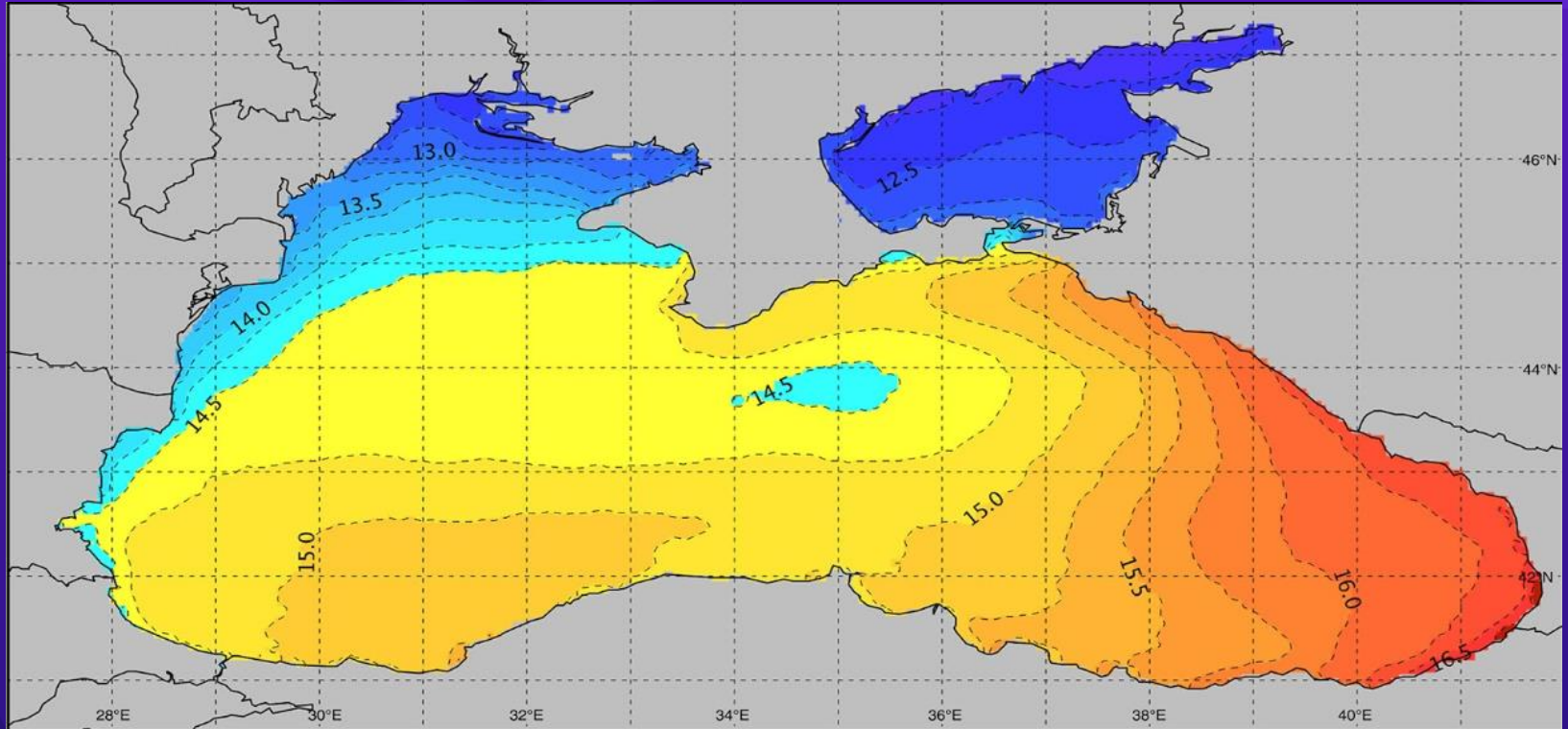
- The Black Sea provides climate regulation
- Carbon emissions from human activities are causing **sea warming, acidification** and **oxygen loss**

- The warming sea effects:
 - observed changes in the biogeography of organisms ranging from phytoplankton to marine mammals
 - changing community composition
 - altering interactions between organisms

- Temperature is an important driver of species' growth, reproduction, and survival
- Rising ocean temperatures causes marine organisms to shift their spatial distributions, which eliminates prey's spatial refugia
- These asymmetries disrupt key species interactions like predation, resulting in greater predator-prey overlap and prey consumption



Surface temperatures (1982 - 2015)



~Spiny Dogfish~

General characteristics



➤ Scientific name: *Squalus acanthias*

- lat. *Squalus* = shark, gr. *acanthias* = spines

➤ Family: Squalidae

➤ Class: Chondrichthyes

➤ Maximum length:

- male: 39 inches
- female: 49 inches

➤ Weigh: ~8 pounds

➤ Key characteristics:

- white spots on their side
- large eyes
- slender body
- pointy snout
- strong jaws
- sharp teeth

➤ Skin:

- brown or gray along the top of their body
- brownish/grayish on the top, fades to white or pale color on the belly

➤ Spiny Dogfish are **unique** in that they have **two spines** that they use for self-defense

- if they are attacked, they will use these two spines to arch their backs and inject poison into their attacker

➤ Preferred habitat: saltwater

- optimal pH: between 6.5 and 8.5)
- water temperature: 6 to 15°C

➤ Preferred depths to swim: between 160 and 490 feet beneath the surface

➤ Lifespan: typically between 20 and 24 years

➤ These sharks often hunt for food in a larger pack of up to 1,000 Dogfish

➤ Food: octopuses, crabs, squid, smaller sharks, jellyfish, shrimp, sea cucumber

- they use their very strong jaws and sharp teeth to bite their prey
- during winter, they consume less food because they spend more time in deeper water
- during spring and summer, they swim towards the coasts where it is warmer, and they can find more food

Spiny Dogfish

- **Sexual maturity:**
 - males: 11 years
 - females: 12 to 14 years
- **Mating:**
 - offshore waters
 - internal fertilization
 - after fertilization, a hard shell forms around the embryos to keep them protected; this shell will shed off after 4 to 6 months, but the young fish will continue to gestate for 18 to 20 more months
- **Total gestation period:** about 2 years, **the longest of any vertebrate**
- **Pups:**
 - between 2 and 11 each litter
 - on average: 6
 - between 20 and 33 centimeters long

General characteristics



Overfishing

THREAT: HUMANS

- The shark population has seen a big decrease over the years. At one time, they were the most abundant species of sharks, but now the International Union for Conservation of Nature has given them a classification of **vulnerable** globally

it takes females longer to reach sexual maturity, which makes it harder for the population to grow quickly

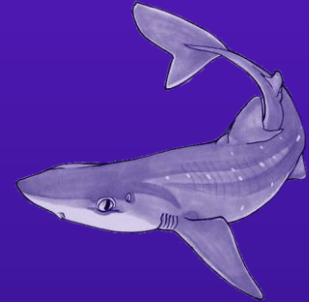
Why do you think these sharks are so impacted by overfishing?

smaller litters of young

longer gestation period than many other species of fish

Overfishing

➤ In 2010, Greenpeace International added the spiny dogfish to its **seafood red list**. "The Greenpeace International seafood red list is a list of fish that are commonly sold in supermarkets around the world, and which have a very high risk of being sourced from unsustainable fisheries"



➤ In the Romanian fisheries, Spiny dogfish was mainly as **by-catch** in the trawlers catches; when the number of trawlers has been high, also the dogfish catches were higher

Other causes of spiny dogfish population reduction

Eutrophication

overabundance of algae and plants

↓
decompose

↓
large amounts of CO₂

↓
the pH of seawater lowers = ocean acidification

- slows the growth of fish and shellfish
- prevent shell formation

● Invasions of marine habitats by native and/or non-indigenous gelatinous species

● accidentally spread worldwide through shipping traffic

● they settle and dominate local food webs

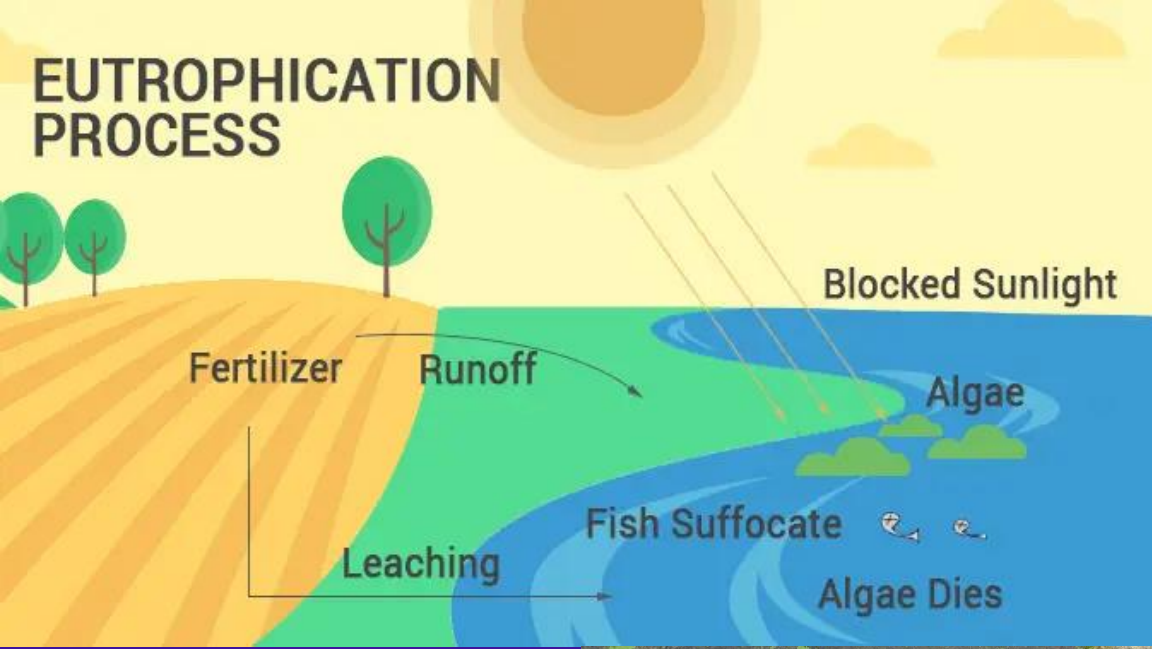
● stressed by pollution, eutrophication and overfishing

● diminishes the size of native population

● significantly alter the community structures and ecosystem functioning

● **Mnemiopsis laiydi invasion and outburst in Black Sea**

EUTROPHICATION PROCESS







Dolphins


- They are some of the largest marine animals in the Black Sea.
- Dolphins are not fish, they are mammals - which means that they feed their calves with milk, and they use lungs to breath air.
- To breath they have to coming up to the surface.
- ➤ In the Black Sea live three species of dolphins: the common dolphin, the bottlenose dolphin, and the common porpoise.

General characteristics





DOLPHIN ECHOLOCATION



Sounds produced by dolphins - sounds like whistles, snapping, trilling - resound far in sea: water is much better transmitter of sounds than air. Some of dolphins sounds are ultrasonic ones - we can't hear them. These very high frequency sounds are used for ECHOLOCATION . Echolocation is a sensory sonar system that dolphins use for communication and for locating things in their environment like their prey.



SONIC POLLUTION



But marine noise pollution from increased shipping activity, construction and sonar is causing major problems for sea life. Sound is louder in the water because the waves carry more energy. The concern is that the noise interferes with the dolphins echolocation. The noise not only causes the dolphins to grow silent and lose their hearing over time, but it also inhibits their echolocation.



Solutions to The Black Sea Sonic Pollution

1. Raising awareness. As more people become aware of the problem of noise pollution in The Black Sea, more will take action to protect dolphins from its impacts.
2. Decrease noise in The Black Sea by decreasing the speed of boats and vessels we travel in/ For safety, we should reduce the speed to less than the legal limit.
3. Implementing a system similar to RO-ALERT that detect the noise level in the sea and sounds/notifies whenever the noise is over normal limit.



Another MAJOR problem that dolphins have to face are the FISHING NETS

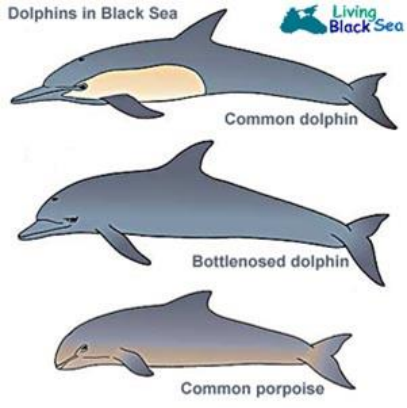


Every year, hundreds of dolphins in the Black Sea are accidentally killed in fishing nets. Known as 'bycatch' this is the biggest cause of harm and death to dolphins today.

As mammals, dolphins need to rise to the surface to get enough air to breathe, but once they're inside the fishing nets, they're stuck. And trawling nets may remain in the water for several hours. In most cases, the dolphins will drown in the nets.

ghost nets





THE SAD TRUTH

“ The other day, a dolphin failed on Mamaia beach. Another was found dead in the North Cliff area.

After the first laboratory tests, it turned out that both were perfectly healthy, but they had deep cuts on the body caused by fishing nets. ” - article from 2008

“Eleven dolphins have failed in the last month on the beaches of the Romanian seaside, say volunteers of the non-governmental organization Mare Nostrum. ” - august 2013

“In this year, 127 dolphins failed on the beaches of Romania. For 83 of the common porpoises and 6 bottlenosed dolphins, the cause of death was identified as catching in fishing nets, followed by asphyxia. ” -article 2011

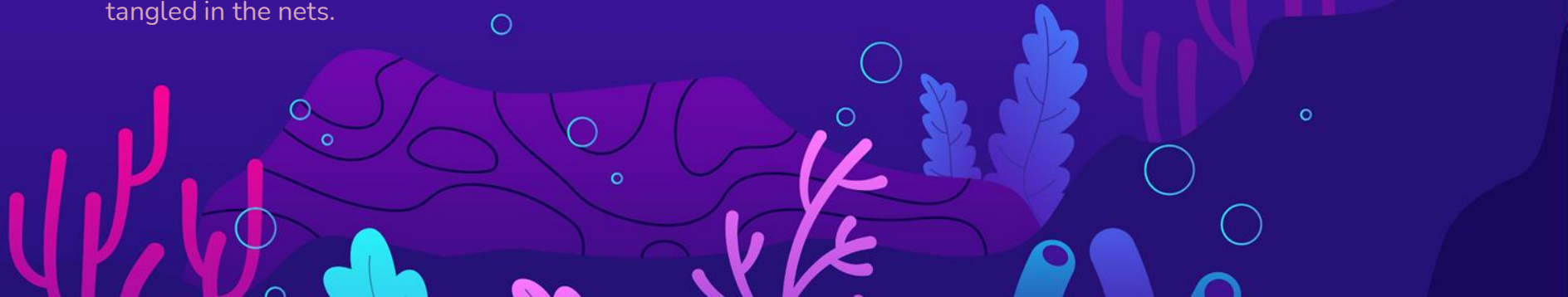
“So far it is only clear the cause of a dolphin's death: he was caught in a fishing net and died asphyxiated.”

1965 300.000 dolphins

2019 40.000 dolphins

What could be done so that fishing nets are no longer one of the biggest fears of dolphins?

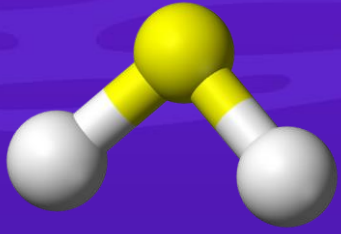
1. We should invest in quality nets that don't hurt the dolphins; moreover, the fishing nets that are lost in the sea should be reported and later on searched.
2. We could attach video cameras to the fishing nets, and if the sailors would see dolphins on the camera, they could quickly withdraw the net.
3. Stop OVERfishing - besides the fact that overfishing leaves dolphins without food, it increases the likelihood of dolphins accidentally getting tangled in the nets.



The Black Sea - nearly uninhabitable because of Hydrogen Sulfide

Along with the issues we created for the marine ecosystem, it is also important to note that the Black Sea isn't the most friendly environment for marine life. The marine animals in the Black Sea are on the verge of extinction because of the presence of large Hydrogen Sulfide quantities, that is resurfacing from the depths of the sea. Now, over 90% of the water in The Black Sea is anoxic because of this, it being the largest oxygen-free marine system.





Hydrogen sulfide

What is Hydrogen Sulfide?

Hydrogen Sulfide is an extremely hazardous gas with the chemical formula H₂S. It has a pungent rotten-egg smell and is colourless, flammable and corrosive. H₂S is usually produced in a process known as anaerobic digestion, done by sulfate-reducing microorganisms.



The Black Sea is the world's largest water body containing H₂S, produced by sulfur reducing bacteria. Below 200 meters, the H₂S production is believed to be around 10 000 tons per day, with the concentration of this substance increasing regularly until 1000 meters, reaching an almost constant value at 1500 meters deep.

The effects of H₂S on marine life

Toxicity to plants

Sulfide has complex effects on photosynthesis, cell division, respiration, assimilation and fermentative ability in cyanobacteria and unicellular algae. Some species and strains of algae could multiply in the presence of 250-500 μM sulfide, whereas others are inhibited in 30-60 μM sulfide.

Toxicity to macro-invertebrates

Aquatic invertebrates have been studied in terms of the tolerance levels and adaptations to sulfide. In tolerance studies, sulfide exposure was coupled with hypoxia or anoxia

Toxicity to marine fishes

Sulfide tolerance differs among marine fishes from a salt marsh, an enclosed bay and the open coast, being high, intermediate and low, consistent with the relative sulfide levels that may be encountered in these habitats.



The Black Sea's "Triangle of Death"

Urban myth or a real, dangerous place?

Russian folklore stories describe a "white whirlpool" sinking birds, ships and small islands to the bottom of the sea. Various news outlets blame the mysterious disappearances of planes from WW2 and ships on this alleged "Triangle of Death". As incredible as it may seem, this strange Bermuda-like Triangle might actually exist, all due to the H₂S in the depths of the Black Sea, and, allegedly, it's even located near the Snake Island, at only 45km from Sulina.

H₂S and the "Triangle of Death"

This almost paranormal place is suspected to actually just be the area in the Black Sea where the most H₂S is produced. Its presence in large quantities explains the chaotic appearance of this place (ABC News states that there is an accumulation of gas "burning" on the surface of the water). Not only that, but it could also explain why the bodies of the people on board of the vehicles that disappeared here were never found, since the high concentration of H₂S in the depths of the sea could have disintegrated them.

The Movile Cave

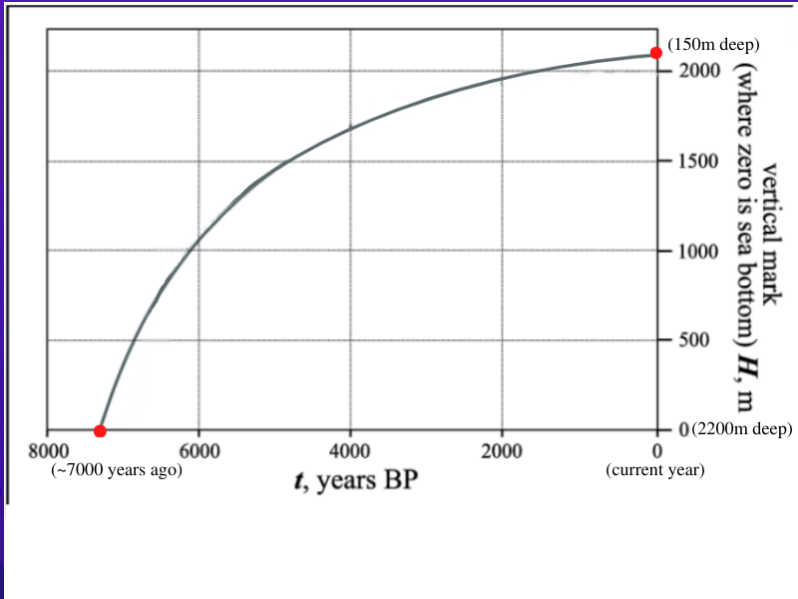
The Movile cave, located near Mangalia, is the house of a particularly peculiar ecosystem, that even NASA presented interest in, pointing out the similarities between the conditions in this cave and those on Mars. Although, I think it's even more interesting that the life there relies solely on chemosynthesis, made possible by the hydrogen sulfide deposits in the sea. Among the species living there, scientists discovered 35 new species unknown to the scientific world.



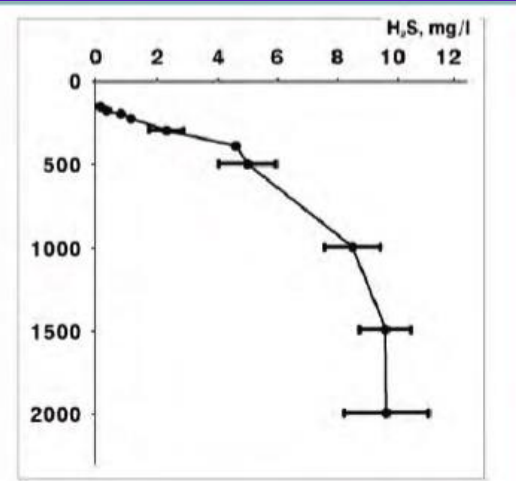
Alongside being the prime toxic gas used in chemosynthesis, the chemosynthetic bacteria in this cave supporting the entire ecosystem, hydrogen sulfide also takes great part in shaping the cave. Thus, reactions involving hydrogen sulfide produce sulfuric acid, which, over time, starts eroding the limestone walls of the cave, making it larger, which results in more CO₂ production.



Statistics & Graphs



depth, m	H ₂ S, mg/l
150	0.19
175	0.40
200	0.83
225	1.14
300	2.34
400	4.64
500	5.02
1000	8.48
1500	9.56
2000	9.60



What can we do about it?

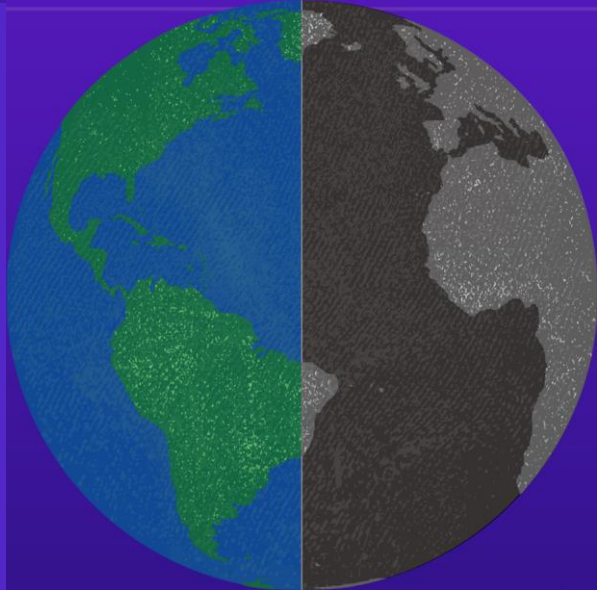
The Hydrogen Sulfide deposits are one of the biggest threats concerning the Black Sea, that put the lives of the remaining marine animals in extreme danger, getting more and more dangerous by the day.

One of the most efficient ways of extracting H₂S is using an electrohydraulic shock which ensures the separation of H₂S, while cleaned water returns into the sea -separation utilising ozone, during which H₂S existing in water is oxidized in the ionized air, and water and sulfur are formed

Unfortunately though, we need the countries that have control over the Black Sea to put their political issues aside and work together to stop this imminent catastrophe.



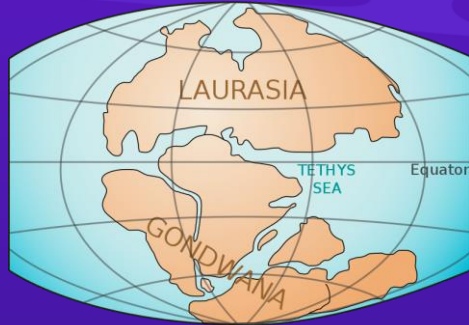
What we aim to portray through this presentation is that we, as humans, may be the ones who caused all of this harm to the dolphins, but we are also the ones who have the power to change things. We are the ones who have the power to say "enough is enough". The marine animals are unable to take initiative, to remove water pollution from The Black Sea, to reduce noise pollution, to stop the overfishing or to modify fishing nets. But we can, and it is our responsibility to do so on behalf of the animals.



The biggest way you can contribute to the cause of marine animals is by your voice. Get the word out and make it loud!



How is Cluj “connecting the seas”?



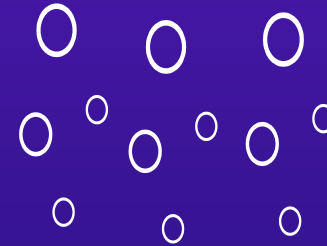
TRIASSIC
200 million years ago

Tethys Ocean: a vanished realm now lying in the mountains.

The Tethys Ocean was a vast marine realm that no longer exists. Remnants of the Tethys Sea remain today as the Mediterranean, Black, Caspian, and Aral seas. Other remains can be found on land and at high altitudes in the mountains.

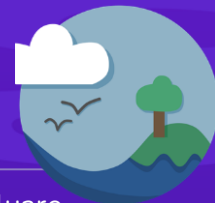


However, we also have here, in Cluj, a place with fossil remains of Tethys sea, as it once covered this area too. We are talking about Corusu, located in Cheile Baciului, a commune in Cluj.



The fossiliferous place Corusu is a nature reserve of a paleontological type. The protected area has a surface of about 2 ha, scraps fossil marine animal and plant debris (fossilized). We can find here fossil remains of marine animals and fossilized plant debris.

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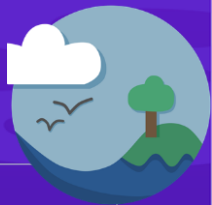
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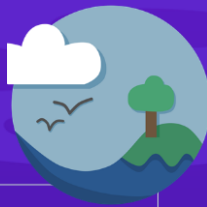
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Summary

- Problems regarding The Black Sea
- Dolphins
- Sharks
- Problems regarding both of them
- Hydrogen sulfide
- References

