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# Newsletter no.12

## The State Of The Environment On The Greece Coast

## Project title: *''Leave your Environmentalist Spirit Online for the Black Sea Basin'' - Spirit BSB online*

**The project consortium consists of 4 parteners:**
LP Coordinator - ***Association for the Protection of Human Being and Environment for a Sustainable Development in the World-ECOM, Romania***
P1- ***Sinop University, Sinop, Turkey***
P2-***Chamber of Agriculture of Trabzon, Turkey***
P3-***International Center for Social Research and Policy Analysis in Tbilisi, Georgia***.

According to the Project Implementation Plan, within the activity ***T2.1 Development of "Pollution and solutions in BSB - Manual for everyone"*** we made a manual. This manual contains several topics. Through these newsletters we present these topics. Today we choose to present you:

## The State Of The Environment On The Greece Coast

The Black Sea is a sea in Southeastern Europe. It is bounded by Europe, Anatolia and the Caucasus, and drains through the Mediterranean into the Atlantic Ocean, via the Aegean Seas and various straits. The Bosphorus Strait connects it to the Sea of Marmara, and the Strait of the Dardanelles connects that sea to the Aegean Sea region of the Mediterranean. These waters separate eastern Europe and western Asia. The Black Sea is also connected to the Sea of Azov by the Strait of Kerch.

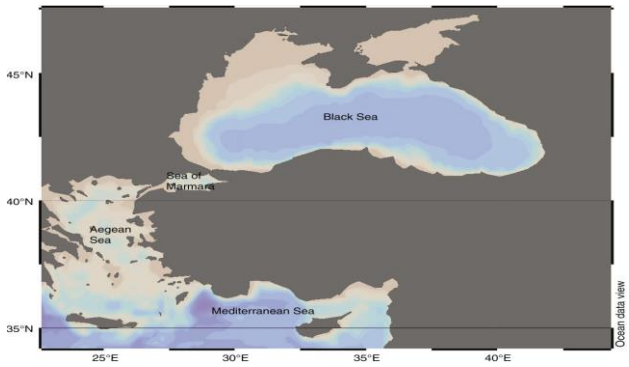


**Figure 1. Showing the Black Sea, Sea of Marmara, Aegean Sea and Mediterranean Sea**

The Mediterranean both joins and divides Europe, Asia, and Africa, continents as different, in their way, as any on Earth. It covers 2,500,000 $km^2$ and the deepest point being more than 5000 m. The Mediterranean is one of the most beautiful of seas, in the case of richness and variety. In parts of the north and west, industrial waste is poured directly into the sea, while on the south coast and in the east, many countries striving for development are adopting the very technologies that have been shown to be so damaging in the European countries. Urban wastewater is discharged into the sea without any kind of treatment. Oil tankers leave behind them a trail of pollution. The fishing grounds are relentlessly exploited, while animals, such as the monk seal, the marine turtles, and the dolphins, are in real danger of disappearing from the sea. There are big cities, industrial plants, and agriculture around the Mediterranean. The scale of anthropogenic activities in the plain increases pollution dramatically occurs. Tons of many heavy metals, together with persistent synthetic compounds, enter and urban sewage reaches to the Mediterranean via the rivers every year. As a result the risk of disease is so high. Toxic metals and synthetic chemicals, lack of oxygen, and too many nutrients make life hard for the aquatic organisms of the Mediterranean. The marine life of the Mediterranean has seen a remarkable change in the lives of the people around its shores, linked by a massive increase in pollution, from domestic, industry, and intensive farming (Bat and Arici, 2018).

Some 480 million people live in the countries of the Mediterranean basin and they make demans on its resources.Waters from cities and towns, factories and farms run into the Mediterranean, some come directly from the coasts, however most runs from major rivers namely the Nile, the Ebro, the Rhône and the Po. Together with the unremitting pressure from the effects of the fishind and touristic activities that are destroying the natural life of the marine ecosystems.

The Aegean Sea is a semiclosed sea as a part of Mediterranean. The Aegean Sea covers nearly 214,000 $km^2$ in area and the sea's maximum depth is 3543 m. This sea is the connection for oil transportation between Black Sea and Mediterranean Sea. Shipping is the major problem in the Aegean Sea; approximately 90,000 vessels reach its straits per year (Öztürk et al., 2006). Besides dense international shipping traffic, there is considerable local maritime traffic caused by cruising and yachting. Eutrophication is one of the most visible dangers facing the sea. Algal blooms cause decay used up the oxygen in the water and killed thousands of fish and other organisms in nearly every summers. Even when marine biota are not killed outright, the effluent has an effect. Blooms have also been reported in Elefsis Bay in Greece and in Izmir Bay in Turkey. There have been enormous increases in energy consumption, the extraction of raw materials and their transportation across the sea and beyond and in manufacturing and consumption. There is now strong evidence that clear signs of deterioration in the health of the marine ecosystem and changes that its shores with massive increase in contamination, from domestic, industry, touristic and intensive farming.

Greece is a country of the Balkans, in Southeastern Europe, bordered to the north by Albania, North Macedonia and Bulgaria; to the east by Turkey, and is surrounded to the east by the Aegean Sea, to the south by the Cretan and the Libyan Seas, and to the west by the Ionian Sea which separates Greece from Italy. Reuters (2007) informed that most coastal cities, including the capital Athens, northern port city of Thessaloniki and Patra in southwestern Greece, are indicated by the United Nations and the European Environment Agency to be major contaminants owing to partly untreated industrial and household wastewater. The U.N. Environment Programme and the European Environment Agency pointed out that the bay of Elefsis near Athens with about 1,000 industrial plants, including shipyards, iron and steel works and refineries, was polluted by heavy metals, among other things. The nearby Saronic Gulf washing the capital's southern coastline is similarly polluted with industrial and primary treated.


**Figure 2.** Geography of Greece (from By Captain Blood - Originally created for English Wikipedia, CC BY-SA 3.0)

It is known for many years that heavy metals can be extremely toxic, however believed that anthropogenic activities disharged insignificant anounts into the environment compared to natural geological processes. Discharges from industrial and sewer pour directly into the river and the sea. Voutsinou-Taliadouri and Varnavas (1995) studied on Cd, Pb, Cr, Cu, Zn, Mn, Ni, Co and Fe concentrations in surface sediment samples from Thermaikos Gulf. They indicated that that Pb, Cu and Zn had the same source of contamination in the following order of importance: the sewage outfall, the industrial zone and the Axios River.

Voutsinou-Taliadouri et al. (1999) studied on trace elements, pesticides and PCBs levels in sediments of Thermaikos bay where was influenced by anthropogenic activities. They found rrganic carbon contents were between 0.47% and 3.30 %, Fe 1.94-3.00 %, Cr 121-305 ppm, Ni 60-120 ppm, Mn 460-1350 ppm, Zn 73-220 ppm, Co 14-20 ppm, Cu 17-60 ppm and Pb 20-180 ppm. Total PCBs concentrations ranged from 0.8 to 88.2 ng/g, while total DDTs ranged from 1.5 to 22.8 ng/g. Atrazine ranged from <0.1 to 0.8 ng/g, simazine and alachlor ranged from <0.1 to 0.3 ng/g. It was concluded that organic carbon and Pb, Cu, Zn and Cr showed a clear influence from the three anthropogenic contamination sources, namely the industrial zone, the port and the sewage outfall (Voutsinou-Taliadouri et al., 1999).

Aloupi and Angelidis (2001) studied on geochemistry of natural and anthropogenic metals in the coastal sediments of the island of Lesvos in the Aegean Sea. They found that only sediments of the harbour of Mytilene were contaminated with the discharge of untreated urban effluents.

Pavlidou et al. (2002) studied on the hydrology and to estimate the ecological status of the coastal ecosystem of the Strymonikos Gulf impacted by the riverine waters of the Strymon River. Total hydrocarbon concentrations in sediments were found between 19.2 and 95.9 µg/g, whereas total polycyclic aromatic hydrocarbon (PAH) values varied between 107.2 and 1019 ng/g. DDTs showed the highest levels of all the organochlorines determined, whereas polychlorinated biphenyl (PCBs) clevelss were low. It was concluded that Riverine input seemed to be the major source for all the compounds.

Stamatis et al. (2002) studied on Cu, Pb, Zn, Cr and Ni amounts in surface sediment samples from Strymonikos and Ierissos Gulfs. They showed that the sediment of Ierissos Gulf is more polluted with Cu, Pb and Zn as compared to that of Strymonikos Gulf. The

most contaminated area for Pb, Zn and Cu in both gulfs is the benthal area situated near the load-out facility of the mining operations in Stratoni Bay. It was indicated that the inshore northwest region of Ierissos Gulf is one of the most contaminated coastal ecosystems of the east Mediterranean by Pb and Zn (Stamatis et al., 2002).

Sawidis et al. (2002) studied on trace metal concentrations in marine macroalgae from different biotopes in Greek coasts of the Aegean Sea. Zn levels in *Cladophora* and Gracilaria were 57.9 and 155.3 mg/kg dry wt. from Kalochori, respectively. They found similar trend for Mn in both seaweeds from same site but not for Ni and Cu. It was indicated that increased amounts near industrial areas of Thessaloniki and Volos were most probably the results of mnicipal sludge and industrial wastes. Similarly high Mn levels were found in the Thermaikos Gulf reflected discharges of water from industrial activities as hihg Cu levels at Krini. Sawidis et al. (2002) pointed out that Cu levels in *Enteremorpha* and *Ulva* from contaminated sites ranged from 20 to 70 mg / kg dry wt. and 14 to 134 20 to 70 mg / kg dry wt., respectively.

Grimanis et al. (1978) studies on As, Cd, Co, Cu, Fe, Hg, Rb, Sb, Se, and Zn levels were in two edible fishes *Sargus annularis* and Gobius niger caught from polluted and unpolluted areas of the Aegean Sea. Increased levels of As were found in the edible tissues of *Sargus annularis* from the polluted areas studied. The highest Hg value found in Mytelene Harbor as 0.46 ppm wet wt. and it was concluded that both fish from the upper Saronikos Gulf and Mytelene Harbor were safety for human consumption (Grimanis et al., 1978).

Kelepertzis (2013) studied on Pb, Zn, Mn, Cu, Ni, Cr levels in the limpet Patella sp. were collected from a typical control coastal site (Artemida) and a metal contaminated marine environment (Stratoni), situated in Greece. It was pointed out that high Pb, Zn and Cu levels in Patella sp. from Stratoni should be imputed to geological-mineralogical factors, owing to the natural enriched heavy metal substrate of the broader mineralized region. It was also indicated that the importantly higher Pb, Zn and Cu levels Patella sp. from Stratoni might be directly related to contamination of the marine environment owing to the past mining activities.

Giannakopoulou and Neofitou (2014) studied on the heavy metal (Cr, Cu, Zn and Cd) levels in the body tissues of two fish species namely Mullus barbatus and Pagellus erythrinus from Pagasitikos Gulf in Greece. They showed that metal levels in the edible parts of both fish had no any risk for human consumption.

Valavanidis (2018) very recently detail reviewed of the last 20 years studies on environmental pollution of marine and coastal areas in Greece and attracted attention that Greece with a coastline of approximately 18,000 km medium and severe marine and coastal environmental pollution has an important issue for Greece in the last decades. In this review, it has been stated that the biggest problem of the Greek coastal ecosystem and marine protected areas is erosion with a share of 30%. Valavanidis (2018) pointed out that the major significant marine contamination includes discharges of ship fuel, untreated discharges of municipal and industrial liquid and solid waste, agricultural and stock farming effluents, depletion of marine species by overfishing, overexploitation of living marine resources and coastal loss of marine ecosystem. It has also been reported that the rapid spread of tourism and urbanization in the coastal areas, and the threat of sea and coastal degradation. It has also been stated that sewage continues to be the largest source of contamination (Valavanidis, 2018). Greece also has a wide variety of environmental problems mainly from stock farming sewage, agricultural effluents, municipal and industrial waste due to its large number of coastal sea areas and semi-enclosed bays. It was reported the untreated sewage effluent of 600-750,000 $m^3$ per day accumulated toxic contaminant at Saronikos Gulf in where, very large amounts of Sn, As, Cr, Au, Hg, Ag and Zn were determined at around 8-200 times greater than in the surrounding uncontaminated sediments (from Valavanidis, 2018). It was emphasized that the Gulf of Thermaikos, close to the city of Thessaloniki, is also a semi-closed bay with serious pollution problems (Valavanidis, 2018). Similarly, Mavrakis et al. (2004)

demonstrated that the Elefsis Gulf has some of the biggest industrial compounds in Greece, including two oil refineries, two steel industries, two cement factories, and one industry of munitions. Big warehouses and oil distribution facilities, three units of used lubricant processing, one paper mill, a lot of chemical industries, industries and manufacturers of plastic products, quarries and a lot of little units also be there (Mavrakis et al., 2004). The Euboea Gulf has also been contaminated from municipal wastes, industrial effluents, land washout and shipping since the early 1960s (from Valavanidis, 2018). It can be said that the Amvrakikos Gulf has many environmental problems owing to agricultural effluents. It has been explained that similar environmental problems occur in the Greek islands (from Valavanidis, 2018).

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Joint Operational Programme Black Sea Basin 2014-2020
Association for the Protection of Human Being and Environment for a Sustainable Development in the World – ECOM
March 2022
Joint Operational Programme BlackSea Basin 2014-2020 is co-financed by the European Union through the European Neighbourhood Instrument and by the participating countries: Armenia, Bulgaria, Georgia, Greece, Republic of Moldova, Romania, Turkey and Ukraine.