# Establishment of an external geographical area of analysis and study Black Sea Basin that could pose a pollution risk

## Introduction

The Black Sea is a particularly fragile ecosystem, subject to extremely high anthropogenic pressure due primarily to economic activities in the coastal area but also to economic activities in the river basins of rivers and streams that flow into the Black Sea and even from a very large area of the Black Sea Region and the surrounding areas.

The paper will analyze the anthropic pressure on the Black Sea from several points of view:

-hydrological

-socio economic

-political

Anthropogenic pressure is highlighted by various forms of pollution such as:

- pollution by the continuous accumulation of pollutants such as heavy metals, radionuclides, petroleum, herbicides, pesticides and detergents

-significant decrease of biodiversity and severe decline of living resources;

-continuous degradation of seawater quality due to eutrophication

-increasing H2S concentrations in layers below 150m;

## Content

Chapter I entitled "Establishing a geographical area of analysis and study, outside the BSB that could present a risk of pollution on the Black Sea" analyzes the environmental impact using several criteria:

1. Hydrological

2. Socio-economic

3. Political

Chapter II entitled "Identifying the sources of pollution and pollutants in the previously established area with potential risk of pollution on the Black Sea" identifies the main sources of pollution in the Black Sea Basin.

Chapter III entitled "Analysis of measures and strategies adopted so far on indirect pollution of BSB by pollutants in the established outer area" highlights the main measures and strategies adopted against pollution in the Black Sea Basin. The model of measures taken for the largest pollutant in the Danube is underlined.

Chapter IV Conclusions.

## Chapter I "Establishment of a geographical area of analysis and study, outside the BSB, which could present a risk of pollution in the Black Sea".

### I. 1. The impact of water discharges from the Black Sea Hydrological Basin.

The most important factor with a high risk of pollution of the Black Sea is the supply of water from the entire river basin. The hydrological basin of the Black Sea consists of the sum of the basins of large rivers whose water supply is in percentages as follows:

Danube 200 km3 (57.5%),

Dnieper 43.5 km3 (12.5%),

Rioni 13.37 km3 (3.8%),

Dniester 9.1 km3 (2.6%),

Chorokhi 8.71 km3 (2.5%),

Kizil-Irmak 5.90 km3 (1.7%),

Sakarya 5.60 km3 (1.6%),

Yesil-Irmak 5.30 km3 (1.5%),

Codori 4.17 km3 (1.2%)

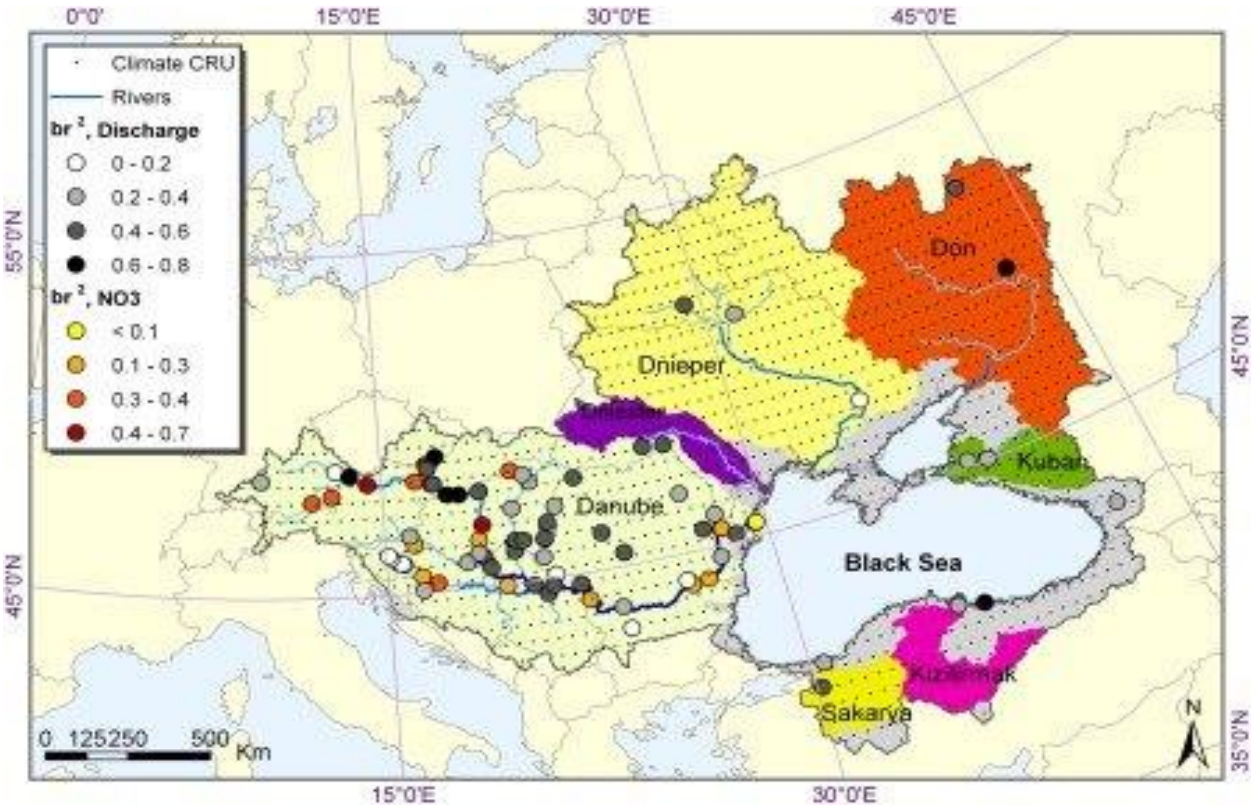


**Fig.1 The Black Sea river basin with the component rivers**

Otherwise, the rivers in the Black Sea basin can be divided into three categories:

(1) large rivers rising in the mountains, with a catchment area of more than 1 500 km2 and an average annual flow of more than 100 m3 / s.

(2) medium-sized rivers with their sources in the spurs of Caucasian ridges and mesheti, with a catchment area of 100 to 1 500 km2 and an average annual flow of up to 50 m3 / s.

(3) Small rivers with a catchment area of less than 100 km2 and an average annual flow of less than 5 m3 / s.

There are about a thousand rivers that flow into the Black Sea and all are significantly different in both water volume and basin size. These have not been fully studied.

Long-term hydrological observations are available for most rivers in the former USSR, while the data sets available for the other rivers are sporadic and static observations. However, the existing data sets on the total discharge of fresh water into the Black Sea estimate between 294 k3 per year and 474 km3 per year.

Thus, the flow of the river into the Black Sea is dependent on the geographical area and on average rivers supply 348 km3 of fresh water a year at sea.

Of this amount, 86% is the contribution of the 10 large rivers and streams that flow into the Black Sea.

The volume of water discharged on average annually in the sea calculated by country is:

from Romania The Danube discharges approximately 200 km3 of water (57.5%).

from Ukraine 55.5 km3 (15.9%),

from Georgia 46.0 km3 (13.2%),

from Turkey 38.0 km3 (10.9%)

from Russia 6.5 km3 (1.9%),

from Bulgaria 1.8km3 (0.52%).

**Georgia Coast**

A large number of small and medium-sized rivers fall into the sea along the Caucasus coast. The size of their basins increases to the south, as the main ridge of the river basin of The Caucasus is moving away from the sea. Only river runoff with basins larger than 50 km2 was calculated because the flow from smaller rivers is insignificant and only have a local impact in their estuaries. Flow from Caucasian rivers is calculated from data based on regular hydrometric observations of the river and by the generally accepted method for calculating flow in mountainous countries, based on a link between river discharge and altitude. There is a significant increase from north to south in the unit discharge, from 6-7 liters / s to 70 liters / second.

An exception is Adjara, where the unloading in several of these keys does not vary, or decreases only slightly, with the altitude. Both the morphology and the dynamics of the river channel affect the transport of the load by loading and deposition at sea. The river channel is itself modeled and determined by a complex system of natural phenomena that constantly flow throughout the area of the river basin. Indeed, river channel processes are as subject to zonation as other natural phenomena.

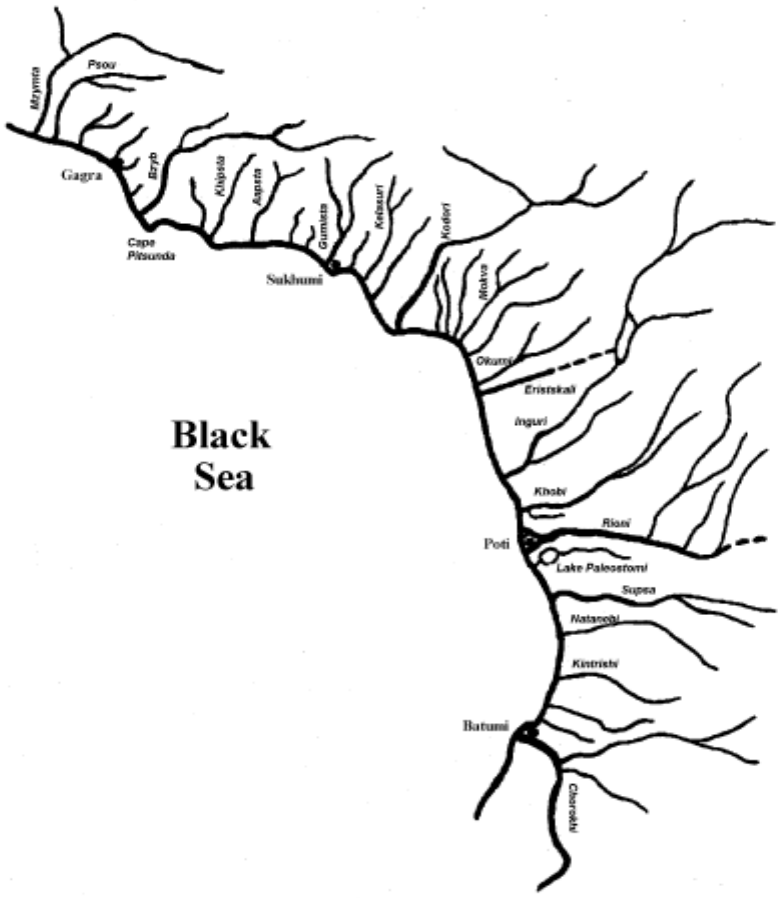


**Fig.2 Georgia Coast**

The different characteristics of the river channel processes have a significant effect in general on the discharge of the river load into the sea, especially on the dynamics of the process on the coastal area; the volume and size of the particles is a factor of their strength and intensity.

Thus, the altitude and slope of the adjacent land has a significant impact on shoreline morphology and marine deposition, an impact regulated by changing canal processes along the entire length of the river.

**Turkish coast**

The southern Turkish coast of the Black Sea stretches for 1,450 km and stretches over two continents. This area can be divided into three regions, in terms of its physical geography:

(1) the coastal province of the North Anatolian Mountains, which runs parallel to the coast for 1 150 km from the border with Georgia to the Sakarya River;

(2) the lowlands of the Kocaeli Peninsula, from Sakarya to the Bosphorus (140 km);

(3) the hilly terrain of the Çatalca Peninsula or Eastern Thrace, the European part of Turkey, from the Bosphorus to the Bulgarian border (160 km).

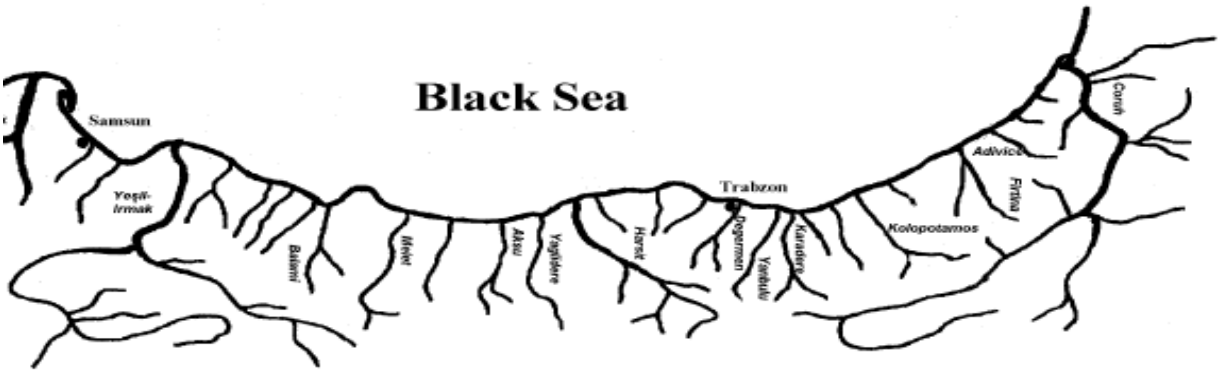


**Fig.3 East Coast of Turkey**

The mountains of northern Anatolia that stretch along the Black Sea coast are not a continuous chain and are split in several places by deep valleys that run parallel to the coastline. Only the Yesil-Irmak and Kizil-Irmak deltas and the Ince Burun peninsula (Sinop promontory) go, in the middle of the region, in the wide coastal plains.

These areas are further divided into the Eastern Pontic (from Chorokhi to Kizil Irmak, at a distance of about 590 km) and Western Pontic (from Kizil Irmak to Sakarya, about 560 km).

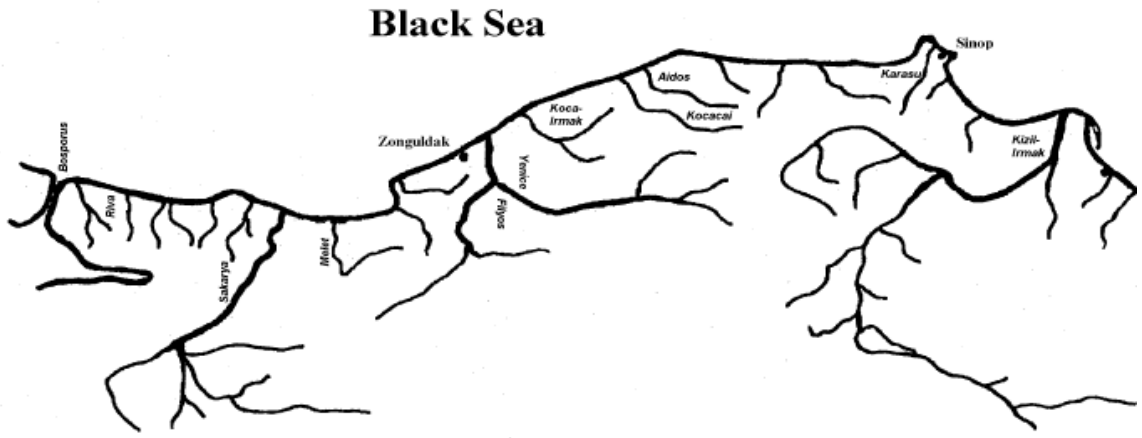


**Fig.4 West Coast of Turkey.**

Kizil-Irmak, 1,355 km long, with a basin area of 78,646 km2, is the largest Turkish river flowing into the Black Sea. It rises in Kizil Dagi, deep in Anatolia. Starting as a typical alpine river it gradually becomes a plain and lowland river, where its main course has a width of 100-300 m and its sandy bottom.

It is peppered with many islands, has a low-level shores and a sandy or muddy bottom. Its download is strictly controlled. The sea reaches near Bafra, through a wide coastal plain. At sea, near its mouth, are well-defined underwater banks.

The largest river in the region is the 228 km long Filyos, with a catchment area of 13,156 km2, which rises in the Köroglu Mountains. Floods are typical of the river, especially in the fall.

In its lower course the river flows peacefully through a wide valley. The river bed is about 100 m wide, branched, with many sandy islands scattered in it.

After Filyos we reach the beginning of the Kocaeli peninsula, with the character of a gradually rising uplands, never higher than 442 meters. The climate here is one of relatively mild winters (6 ° C), a significant amount of precipitation (over 800 mm per year) and frequent humid winds offshore (23, 67). To the west, the terrain gradually decreases and several small rivers enter the sea here. The discharge of the unit in this region is 10 l / sec.km2.

Sakarya, 824 km long, with a catchment area of 56,504 km2, flows through the Adapazari plain and reaches the sea near Karasu. The unit discharge of this river is less than 3.15 l / sec.km2. As it crosses the plain, the river channel is 100-200 m wide, with low banks and slight curves.

The main rivers in the Turkish part of the Black Sea basin (Kizil-Irmak, Yesil Irmak and Sakarya) and some of the medium-sized rivers (Riva, Karasu, Gyulyuk) are under pressure from the impact of human activity. Intensive river management (reservoir flow control and water use for irrigation and energy) began in the 1950s and so far15 different types of dams have been built along these rivers and more are planned.

## Bulgarian coast

Other major rivers on this western coast of the Black Sea are the Camcea and Velika but their discharge is closely regulated and used in water distribution and cultivation systems.

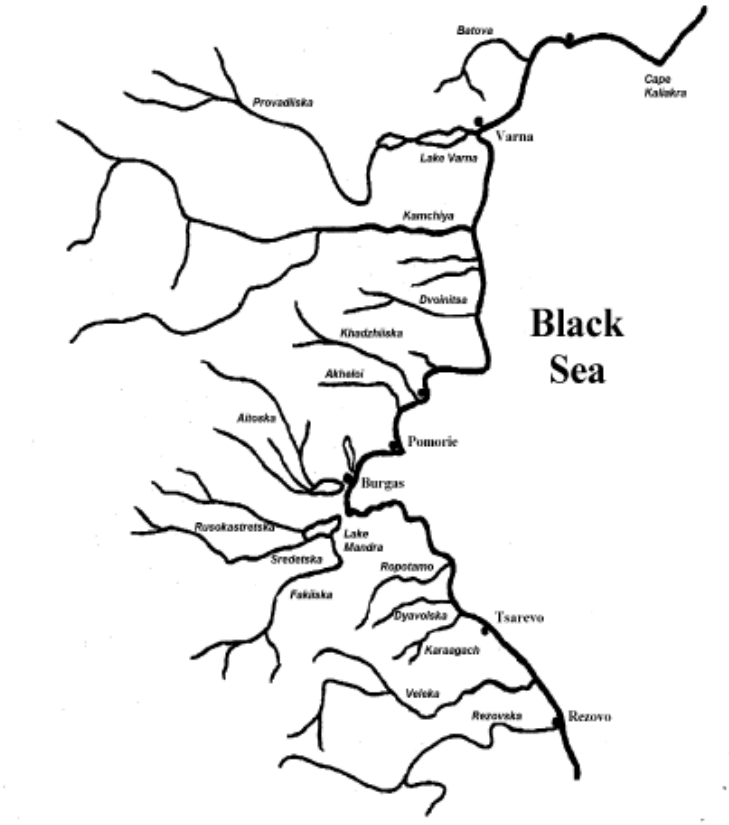


**Fig. 5 Coast of Bulgaria**

All other rivers are small (river basins smaller than 500 km2) and their waters come from the low hills of Istranca, Stara Planina and the eastern part of the Danube plains which are not very wet. The water outlet at the mouth of the river is not significant and the discharge of the unit does not exceed 4 l / sec.km2.

In the northern part, after the Batova river, the land turns into karst and there are almost no constant watercourses.

The West Coast stretches over the territory of Romania and Ukraine.

A typical feature of the west coast of the Black Sea is the number of "estuaries" (lagoons and dams) with many smaller rivers flowing into them.

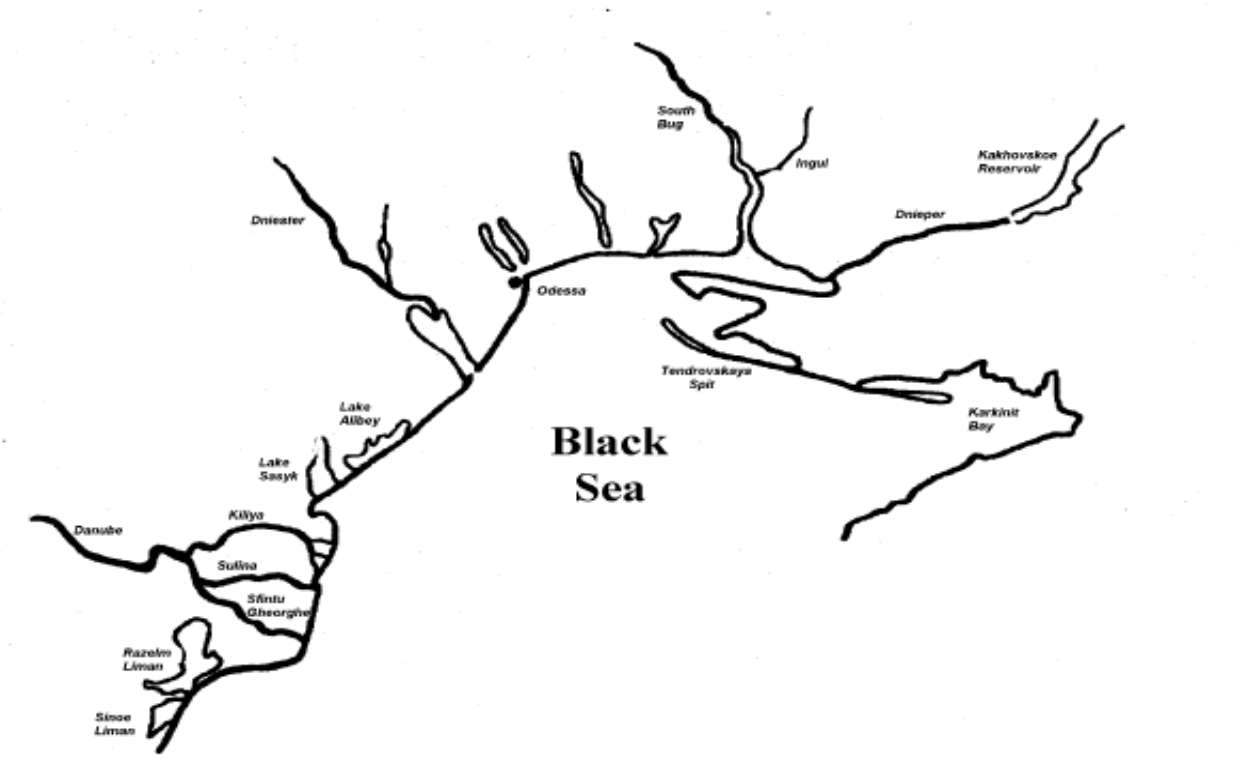


**Fig.6 North West Coast**

## Romanian seaside

The main feature of the northwestern part of the Black Sea is that it has so many large rivers flowing into it, rivers that have their source far from the sea, in the Alps, the Balkans, the Carpathians and the Eastern European Platform.

The magnificent Danube delta opens in the northern part of Romania's coast. The delta covers an area of 5,640 km2, the river basin covers 817,000 km2 and the length of the river is 2860 km. The river has its source in the Alps region, in the Schwarzwald Mountains region and flows through eight countries to the sea.

From its source to the Vienna region (970 km) is an alpine river; from there to Turnu-Severin (950 km) it gradually becomes a plain river and then for another 940 km it flows along like a clearly identifiable plain river.

## Ukrainian coast

In contrast to the Danube, the major rivers of Ukraine do not fall directly into the sea, they flow into estuaries that eventually reach the Black Sea Dniester, 1,441 km long, with a catchment area of 72,100 km2, begins in the Carpathians at an altitude of about 900 meters. The springs can be classified as alpine, and the channel has developed alluvial forms.

After the city of Galich, the river becomes a plain in features. The river has hydroelectric power plants Dnestrovskaya and Dubosarskaya banks and acts as a reservoir for them. Many lakes have been created in its tributaries and along the entire basin, water is withdrawn from the river channel in large volumes.

Traditionally, gravel was taken from the Dniester bed for construction materials - in Moldova alone 1.5 million m3 of alluvium is removed every year. At 155 km from its mouth, the river divides into the Dniester itself, and its left branch, Turunchuk. The floodplains of the Dniester, a flat swampy delta system, begin near the mouth. Turunchuk removes 51% to 69% of the water discharge and 25% to 79% suspended load. Bed powers continue in the Dniester. Tanks and quarries for construction materials have a huge impact on the characteristics of the river and on the amount of loading of the river and its particle size has often decreased. Within its lower limits, the channel contains most of the fine sands (30%) very fine (45%) with particle size.

The average particle size decreases below the river to 0.19-0.12 mm. The southern bug, 857 km long, with a catchment area of 63,700 km2, passes into Bugliman, its basin is located between Podolsk and the Cis-Dneprian Mountains and its lower courses flow through the lower steppes of the Black Sea with its loam loess in the neighborhood, where the river channel is generally a simple wide and straight flood, cut only in Neogene limestones in its lower areas. River flows are composed of mud and sand and the mouth of the river is muddy mud. The floodplains are the lower surface of a former estuary, composed of clays.

The Ingul river basin, 341 km long, with a catchment area of 9,700 km2, is generally spread over the high Cis-Dneprian areas (Pridneprovskaya vozvyshennost). The river channel is regulated by low pressure dams. In its lower areas, in the low areas of the Black Sea, the Ingul Canal first passes through free and forced meanders and then gets lost in the floodplains for 50 km. Canal formation tasks include mud and sand, and at the mouth of the river, near Bug liman, the loads are muddy (87). The Dnieper, 2,285 km long, with a catchment area of 503,000 km2, rises in the Valdai hills (Valdaiskaya vozvyshennost), its waters at an altitude of 253 m.

The river crosses the mixed and deciduous forest areas in the north, forest and steppe in the central part and steppe in the south. Usually, the rivers in the Dnieper basin are fed by snow, while to the south the proportion of water from underground sources increases. Much of the river's discharge comes from spring floods. Due to the flatness of the Dnieper basin and its geological structure, the channel formation loads tend to be sandy.

The Dnieper and the rivers in its basin are heavily regulated and used extensively in water supply management and cultivation. The river is free only in its upper area and in the discharge area. It is extracted in many places for building materials.

The Dnieper Canal (downstream of the Kakhovskaya power station) is relatively straight and 500–600 meters wide. The Dnieper Delta begins at the confluence of the Ingulets, near the Dnieper estuary. Here the river channel is divided into a complex branching network. The Dnieper and the Liman Bug together form the Dnieper-Bug Liman.

Given the natural conditions of the Black Sea basin as a whole, it must be reiterated that the loading and unloading of rivers from the Black Sea rivers takes shape in various forms, natural and climatic conditions. The vertical and horizontal zonation of the natural basin characteristics are clear. Thus, the flow of rivers into the Black Sea is dependent on geographical area and, on average, rivers supply 348 km3 of fresh water per year in the sea.

Of these, 86% is contributed by the ten major rivers.

The Black Sea basin and the sea itself form a single unified natural system.

Rivers form a link between land and sea, feeding the marine reservoir with water discharge and exit from erosion and stripping.

As a result, the RAU-ESTUAR-MARE chain can be considered as a unified natural system.

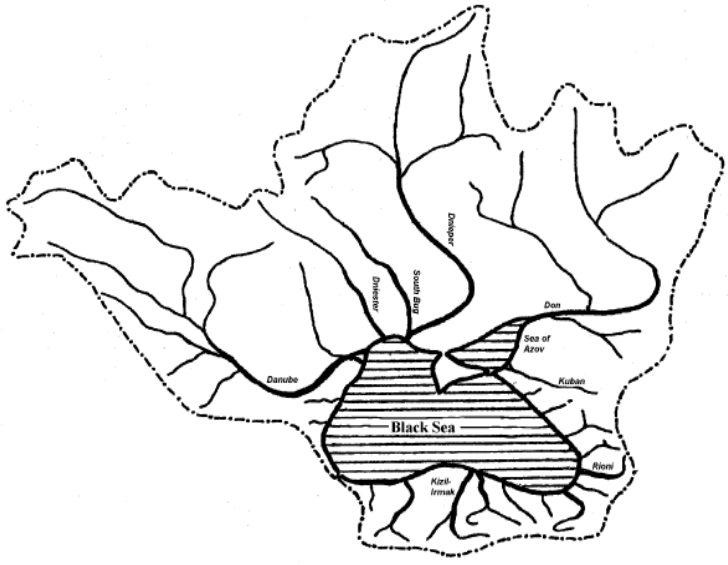


**Fig.7 Black Sea river basin**

These quantities are discharged into the sea from rivers that are controlled and managed for various purposes.

- Under natural conditions, the spill would have been more than 381 km3.

- In addition to the surface discharge, at least 17 cubic kilometers of fresh water reach the Black Sea from underground sources.

- Precipitation contributes another 238 km3 (average rainfall 562 mm).

Thus, the annual volume of fresh water entering the Black Sea (river water plus rainfall plus underground sources) is on average 603 km3. Under natural conditions, without human interference, this figure would be 636 km3.

With water, 52.2 million cubic meters of river enter the sea each year. Of these, 11.7 million m3 form continental banks and deposits, such as beaches, and 40.5 million m3 reach deeper waters and are involved in current sedimentation processes (mainly within the continental shelf). Under natural conditions, the total amount of river discharge discharged would be at least 95.0 million cubic meters.

Underwater canyons currently contribute their own form of adjustment to discharge and about 2 million cubic meters of sediment on a large scale are transported along these outlet channels to greater depths.

Under current conditions (and allowing flow control) comes the largest amount of river loading from the Danube, with 30.0 million cubic meters. Chorokhi contributes 4.92 million m3, Rioni 3.54 million m3, Sakarya 2.23 million m3, Filyos 2.17 million m3 and Dniester 1.00 million m3.

The flow of water and loading of the river in the Black Sea has a very diverse nature and depends on the natural conditions of the adjacent land mass and the sea itself. The whole process is also subject to the prevailing geographical conditions.

## I .2 The impact of socio-economic activities in the Black Sea Region on the environment.

Another criterion for analyzing anthropogenic pressure is the analysis of economic activities in the Black Sea area. Socio-economic drivers in sectors related to the Black Sea) are:

- pressure on the environment;

- the social and economic consequences of environmental change;

- the response of riparian countries (Romania, Bulgaria, Georgia, the Russian Federation, Turkey and Ukraine) to addressing challenges at national and regional level and promoting sustainable development.

The data and information sources used are:

i) national ICZM reports and the BS region for the BS Commission for 2009-2014;

ii) reports and policy documents of international organizations and projects;

iii) open statistical data produced by national and international agencies;

iv) scientific publications.

The conceptual framework for understanding the environmental changes in the marine and coastal ecosystem of the Black Sea in recent decades is based on the model D -> P -> S -> I -> R (Drivers -> Environmental pressures -> Changes in environmental status -> Socio-economic impacts -> Political responses)

First, the socio-economic impulses represented by sectors directly or indirectly related to the Black Sea have been more than ever dependent on political processes that have an impact on the socio-economic conditions of riparian countries.

The social and economic conditions of the riparian states are not homogeneous: Bulgaria and Romania are EU member states, Turkey is negotiating EU membership, the Russian Federation is implementing its own socio-economic policy, Georgia and

Ukraine have declared their intention to join the EU. However, all riparian states make a significant investment to increase economic growth rates, improve the quality of life of their population.


**Fig.8 The Black Sea Economic Region**

The coastal zone of the Black Sea coastal states comprises terrestrial and marine parts and represents an extremely complex socio-ecological system, which develops and operates under the pressure of political, social, environmental, economic, cultural, governance and other interdependencies.

Socio-economic development of coastal communities based on the exploration of valuable natural resources: land, water and their minerals, biological, recreational and other constituents thereof. At the same time, the prosperity of coastal communities is sufficiently dependent on national and international socio-economic trends.

GDP (per capita) data for BS countries could demonstrate the difference in the development of their level of economy. The Russian Federation demonstrated the best results during the reporting period. Bulgaria, Romania and Turkey comprise a group of countries with similar GDP levels and trends. Ukraine and Georgia have the lowest GDP in the BS region. The global economic crisis of 2008 affected the socio-economic development of the Black Sea riparian states.

Since 2010, the economies of all BS countries have shown recovery trends. This process was ongoing without interruption until 2009 - 2014. Sectors directly or indirectly related to the Black Sea and the adjusted coastal regions are the area of various economic activities.

In the period 2009-2014, similar to previous years, economic activities directly related to the Black Sea in all riparian countries included the following key sectors:

Transport and ports, Fishing, Tourism, Offshore gas and oil exploitation.

Most maritime economic activities are typical of all Black Sea riparian countries, despite having different natural resources and a different level of economic efficiency. These activities have stimulated the development of the urban area, as well as other support industries in the coastal regions. As a result, there is a fairly intense expansion of urbanized areas and related infrastructures observed in all countries of the Black Sea Region.

The built-up areas almost doubled in the 10 km strip buffer zone located along the Black Sea coast between 1992 and 2014. Urban expansion to and along the coast, mainly adjusted to large cities, is 4% coastal area in Georgia and up to 12% in Turkey. This process is ongoing and is one of the main factors affecting the environment. Therefore, urbanization has been included in the list of key economic sectors in coastal regions.

The Black Sea has been divided into exclusive economic zones (EEZs) for years, and the exploration and exploitation of marine natural resources by riparian countries is restricted within the boundaries determined and regulated by national laws and international agreements.

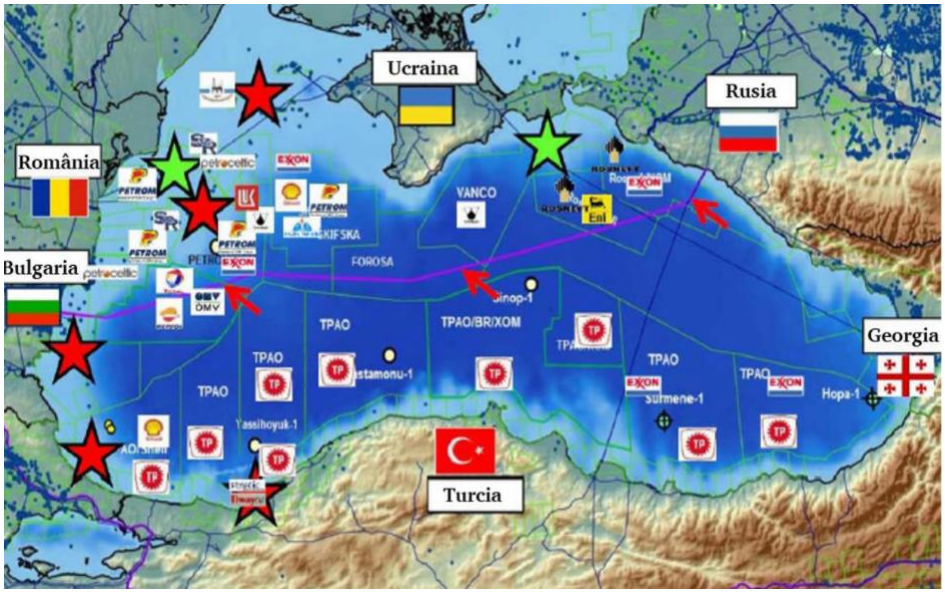


**Fig.9 Exclusive economic zones of the Black Sea**

Shipping and ports.

The Black Sea is the east-west and north-south intersection of diverse relationships, including political, economic, societal, religious, scientific and more. BS offers many traditional and new opportunities for cooperation in different sectors for riparian countries. The sea plays the role of geo-political, economic and trade center and is now considered an access point to coastal countries, as well as an entry point into the European Union, the Balkans, the Caucasus, Central Asia and other regions. Therefore, economic activities, related to the exploitation of marine and marine resources as a transitional route and the way nations and states connect, are traditional and have a long history. Traditional maritime sectors are the most important providers of jobs.

The region also has remarkable opportunities for the development of river / maritime transport: river and canal systems offer opportunities for Rotterdam on the North Sea (via the Danube and Rhine) or in the Caspian Sea ports (via the Volga and Don) from BS ports. These opportunities will be used in the coming years. Unfortunately, during the reporting period, river / sea transport capacity was not used, and the contribution of the river fleet to passenger and freight transport was minimal in Ukraine. In this sense, the Dnipro River, the third largest river in Europe, was not exploited as a means of transport.

Tourism.

Tourism plays an important role in economies and generates a significant contribution to the GDP of BS countries. Turkey is a leader in tourism development in the BS countries, followed by the Russian Federation and Ukraine. In 2013, Turkey received

37.8 million foreign visitors, the Russian Federation - 28 million, Ukraine - 25 million. In 2013, Turkey ranked 6th in tourist arrivals and 12th in earnings.

The favorable climate of the Black Sea basin and the remarkable natural features - including mineral springs and beautiful beaches - have made the region an important destination for leisure and health tourism, the Crimeea peninsula being the most important. Leisure infrastructure and seaside resorts in Bulgaria, Romania, Ukraine, Russia and Georgia are very active, but are less developed on Turkey's BS coast (where tourism focuses mainly on the Aegean Sea and the Mediterranean). The tourism potential in the Black Sea basin area is rich and diverse, including spa and medical tourism, culture, nature, eco and agrotourism, adventure, cave and mountain tourism and tourism related to cooking, rivers, hunting and diving, and winter tourism (skiing). Coastal tourism has been a significant economic sector in terms of number of visitors and revenue generated. In Bulgaria, Turkey, Romania the sector has a significant contribution to regional GDP compared to other maritime activities. It is less developed in Georgia, Ukraine and the Russian Federation. However, it remains a fast-growing sector, offering significant potential for future development.

Coastal tourism is one of the most promising economic sectors in Turkey's blue economy. Cruise tourism in the Black Sea, as well as coastal tourism, is noted for its potential. Coastal tourism in Ukraine has played an important role in the national economy and is a sufficient contribution to regional GDP. Odessa, Yalta, Sevastopol and Kerch were among the main tourist centers on the Black Sea until 2014. The Odessa area has become the main coastal destination for visitors to Ukrainians in neighboring countries. The territories around Odessa, Sochi and Batumi are also well-established tourist destinations. However, the tourism potential of the Black Sea is not yet fully developed, mainly due to limited investment, insufficient transport infrastructure, inadequate tourist facilities and relatively poor quality of services.

In 2014, the conflict between Ukraine and the Russian Federation affected the tourism sector in both countries. Coastal tourism activities have failed significantly in Crimea, however the attractiveness of other destinations in the Black Sea - Odessa and Sochi regions, Georgia Coast, etc. seems increased. Anapa, Gelendjik and Sochi on the Caucasus Black Sea coast are famous destinations for coastal tourism. The common trend in the sector is to increase the number of visits (see, for example, data for the Bulgarian coast). The economic crisis of 2008 has affected the sector, but is recovering. The continued expansion and diversification of tourism in recent decades in the BS countries make it one of the largest and fastest growing economic sectors. Unfortunately, despite the very positive impact on employment and income, the growth of the tourism industry creates environmental challenges especially in coastal areas and requires a sustainable management approach.

Oil and gas exploration and exploitation.

This includes offshore hydrocarbon industries and pipelines, located on both adjusted land areas and the Black Sea aquatic area. Deposit estimates are different. The Western Black Sea Basin is considered an area with the most promising oil deposits. It has a shelf with a depth of about 100 m for the main part. The area is located mainly in the water of Ukraine, covers about 50 thousand km2 and covers the Gulf of Odessa with the adjacent gas province. The surface comprises an exploited deposit and six deposits in the stage of preparation for exploitation or development. The total gas resources surveyed in this area are 1.5 trillion m3.

Deposits in the northwestern part of BS are estimated at 495.7 billion m3 of natural gas and 50.4 million tons of oil, Prikerchenskay area - 321.2 billion m3 of natural gas and 126.8 million tons of oil, continental slope - 766.6 billion m3 of natural gas and 232.6 million tons of oil create opportunities to meet energy demand.

Exploration and production of oil and mainly offshore gas in the Black Sea are in production fields (Ayazli off the coast of Turkey, Galata and Kaliakra off the coast of Bulgaria, the fields Ana, Doina, Delta, Pescarus and other fields off Romania, Odessa Gulf off the coast of Ukraine the Russian Federation is conducting explorations and planning the exploitation of the Tuapse oil field).

The recent discovery of new gas fields on the Romanian continental shelf of the Black Sea has the potential to strengthen the role of this sector. Offshore oil and gas exploitation are already the third largest employer in Romania's coastal economy.

The Black Sea area not only contains hydrocarbon deposits, the Sea is an important transit route for oil supplies to Russia and the Caspian countries to the EU and a significant energy market in itself. However, this situation not only creates opportunities for the region. The interests and maritime power of the EU and third countries in the region raise specific issues that require further coordination efforts to achieve a common vision. The Russian Federation is the world's largest exporter of natural gas and one of the largest producers of gas, as well as the largest exporter and producer of oil. The Russian Federation produces gas and oil mainly outside the BS. In 2014, companies in the Russian Federation began exploiting gas on the Black Sea shelf after the annexation of Crimea and the withdrawal of Ukrainian offshore gas platforms. Meanwhile, the Russian Federation has succeeded in transporting oil, and Russian container loads, using well-developed freight terminals, are the main transport segment in the short sea shipping sector. Natural gas and crude oil are mainly transported through pipelines.

The Odessa-Brody pipeline is an oil pipeline that connects the Ukrainian cities of Odessa on the Black Sea and Brody near the Ukrainian-Polish border (674 km). The pipeline was built to supply oil delivered to the Odessa oil terminal in oil-exporting countries. The pipeline was used in reverse for transporting oil in both directions.

There are plans to extend the pipeline to Płock and, in addition, to Gdańsk, Poland. The famous Blue Stream is a major trans-Black Sea gas pipeline that transports natural gas from Russia to Turkey and the countries of the European Union. Operating at maximum capacity, it supplies 16 bcm of gas per year. The pipeline was built with the intention of diversifying Russian gas supply routes to Turkey and avoiding third countries. There is a plan to build the second section of the pipeline that extends Russia's gas exports to the south (through the Samsun-Ceyhan gas pipeline further to Israel and Lebanon).

The Baku-Tbilisi-Ceyhan pipeline is a 1,768 km long oil pipeline from the Azeri-Chirag-Guneshli oil field in the Caspian Sea to the Mediterranean basin.

In fact, it is located far from the sea coast, but plays an important role in diversifying energy sources. The pipeline connects Baku, the capital of Azerbaijan, Tbilisi, the capital of Georgia, and Ceyhan, a port on the southeastern coast of Turkey's Mediterranean. It was put into operation on May 10, 2006 and has the capacity to carry 1 million barrels per day.

The South Caucasus gas pipeline (Baku-Tbilisi-Erzurum route) is under construction in the same corridor as the Baku-Tbilisi-Ceyhan oil pipeline. Its annual capacity is up to 16 billion m3. The 692 km long pipeline connects the Shah Deniz gas field in the Azerbaijani sector of the Caspian Sea and the Turkish port of Ceyhan. The pipeline is built with the potential to connect Turkmen and Kazakh gas fields through the planned trans-Caspian pipeline. Its operation was launched in December 2006, supplying natural gas to Georgia and Turkey. It was originally planned to use the South Caucasus pipeline to supply Europe with Caspian natural gas from the producers of Iran and Turkmenistan by connecting to other pipelines (eg Turkey-Greece and Greece-Italy pipelines). The international consortium tried to develop and implement the NABUCCO gas pipeline project with a planned length of 3,900 km and a transport capacity of up to 31 bcm per year.

It was expected to connect the Caspian region, the Middle East and North Africa (Egypt) through Turkey, Bulgaria, Romania, Hungary and Austria and other gas markets in Central and Western Europe. Project preparation began in 2002, but was not implemented and closed in 2013, giving priority to the trans-Adriatic pipeline (878 km) linking the Caspian region, the Middle East and Western Europe. The preparatory activities for the project started in 2003 and received the approval of the European Commission in March 2016.

Construction of the pipeline began in May 2016 and its operation is expected in 2019. As we can see, the Black Sea region is a crossroads for the significant transport of energy sources from the Caspian and Kazakhstan regions to Eastern and Central Europe. It promotes economic growth and contributes significantly to the employment of the BS population. The construction and operation of the pipelines has a significant social and environmental impact on the region.

**Major pressures related to human activities and impacts.**

Political transformation in post-Soviet territory led to a significant economic decline in 1990 that led to less pressure on coastal and marine ecosystems (excluding Turkey). In the late 1990s, the recovery of the economies of the Black Sea countries increased the pressure on the coastal and marine environment due to the rapid development of regional infrastructure (urbanization, expansion of tourist centers, ports, terminals and industrial complexes, power plants, pipelines, etc.).

Economic activities and other types of human activities in the coastal region in the period 2009-2014 have maintained the pressure on the marine and coastal environment. The natural features of the region have also increased the effect of this pressure. The Black Sea is virtually landlocked because it has a very narrow connection to the ocean and has limited ability to exchange seawater with the Planetary Ocean.

These circumstances make the region particularly vulnerable and sensitive to the influence of various natural and economic pressures. The state of the natural component of the Black Sea coastline indicates that both terrestrial and marine ecosystems suffer from a massive anthropogenic influence (UNDOC) caused by different sectors of economic activity. In this respect, the shelf area in the north-west of the Sea is an area with a significant impact.

Severe degradation of the marine ecosystem began in 1980 and is still ongoing, despite efforts by Black Sea countries and the international community. The basic critical factors affecting the marine environment in the region, which were typical of the late decades of the twentieth century, are still in place. These include, but are not limited to, the extensive use of land and marine resources. In particular, in the Black Sea basin area, land and water are used for intensive agriculture, forests for the paper and construction industry, rivers and the sea for navigation and commercial fishing, coastal resources for tourism, energy generation, transport infrastructure, construction and other industries.

To meet the growing demands for oil and gas, coastal and marine areas used for pipeline construction.

The most representative regional international economic organization is BSEC - Black Sea Economic Cooperation (BSEC)

The organization is a regional international organization focused on multilateral political and economic initiatives aimed at encouraging cooperation, peace, stability and prosperity in the Black Sea region and in the neighboring regions of Eastern Europe, South-Eastern Europe and Western Asia.

The headquarters are in Istanbul.

With the entry into force of its Charter on 1 May 1999, BSEC acquired international legal identity and was transformed into a full-fledged regional economic organization: Black Sea Economic Cooperation Organization. With the accession of Serbia (then Serbia and Montenegro) in April 2004, the Organization's member states increased to twelve: Albania, Armenia, Azerbaijan, Bulgaria, Georgia, Greece, Moldova, Romania, Russia, Serbia, Turkey and Ukraine. An important aspect of BSEC activities is the development of SMEs and entrepreneurship in the member countries.

The organization has member countries, observer countries, observer organizations and collaborators.

**Fig. 3. Member countries (colored orange) and observers (colored green)**

**Observatory organizations:**

- International Black Sea Club
- Energy Charter Secretariat
- European Commission
- Black Sea Commission

**Collaborating organizations:**

- Eurasian Economic Union
- International Commission of TRACECA
- The Central European Initiative

- United Nations
- United Nations Development Program
- United Nations Economic Commission for Europe
- United Nations Industrial Development Organization
- World Bank
- World Trade Organization

**Member States shall cooperate on various issues in specialized working groups:**

Agriculture and Agroindustry

Banking and Finance

Fighting crime

Culture

Customs matters

Education

Emergency assistance

Energy

Environment protection

Exchange of statistical data and economic information

Health and pharmacy

Information and communication technologies

Institutional renewal and good governance

Science and Technology

SMEs

Tourism

Trade and Economic Development

Transport

## I. 3 The impact of Black Sea policy on the environment.

Geographically, the Black Sea region connects the northeastern part of Europe with its eastern-southern part; therefore, it is a strategic intersection not only for many EU and NATO countries, but also for Russia, as clearly demonstrated by the events in Georgia in 2008 and Crimea in 2014. Consequently, as the region becomes a preeminent theater of mutual interest, the greater the chances of an open confrontation in its area or even the emergence of a type of hybrid conflict.

It analytically assesses the strategic relevance of the Black Sea region and how the balance of power in the area has evolved through an overview of Russia's past and present involvement in the basin and the neighboring eastern Mediterranean, as well as the resulting NATO operational response.

Moscow's military decisions that have followed over the years, in fact, delineate a path of active engagement and deep interest in the area and nearby territories. In this regard, it is worth noting the modernization process that Russian Black Sea forces have undergone since 2010 and which is likely to be completed before the 2020 deadline.

Apparently, Putin's strategy and ultimate goal is to achieve a solid and stable military supremacy in the basin, which would not only protect Russia's offensive strike capabilities, but also discourage any Allied attempt to engage more decisively. in the area.

Closely linked to such military and strategic planning is Moscow, which took a new and stronger form in 2014 with the annexation of Crimea. In fact, the events in Crimea have strengthened Russia's position in the Black Sea.

In such a context characterized by an obvious and consolidated presence of Russia, NATO has delineated a new strategy that fits the current and possible scenario of the future. As follows, since 2016, the Atlantic Alliance has approved a number of measures to ensure stability in the Black Sea region. In particular, the establishment of a "personalized presence beforehand" in the south-eastern part of NATO territory is also a way of helping to strengthen the Alliance's deterrent position and awareness of the situation in the region.

The existing conflict situation with a large concentration of military forces with large-scale military maneuvers is a significant anthropogenic pressure that supplements the existing pressure.

All these political decisions have a special impact on the development of the states in the Black Sea Region, on all activities, investments, on the quality of life and implicitly on the environment.

## Chapter II “Identification of sources of pollution and pollutants in the previously established area with a potential risk for pollution of the Black Sea”

This overview of pollution in the Black Sea has been compiled on the basis of the UN publications "Assessment of Black Sea Pollution", volume NY 10 of the Black Sea Environment Program series and the official BSEP bulletin. There is also a brief reference to the current regional efforts in the framework of the Strategic Partnership for the Black Sea Basin, supported by GEF / UNDP, with homologous projects for the Danube and the Black Sea.

The Black Sea Project entitled "Control of eutrophication, hazardous substances and related measures for the rehabilitation of the Black Sea ecosystem" (better known as the Black Sea Ecosystem Recovery Project or BSERP) is the most significant current international intervention in the area aimed at improving environment.

Due to the special anthropogenic pressures in the Black Sea area, the natural landscapes are deteriorated and gradually replaced by anthropic landscapes. One of the most important vectors for the manifestation of this anthropogenic pressure is water quality.

The main sources of pollution are river runoff, oil and gas extraction activities, atmospheric deposition, intentional and accidental discharges from ships. River flows are polluted by agriculture, industry, communal wastewater, transportation and other sectors located in the sea basin. More than 300 rivers flowing into the BS lead to almost half of Europe and significant parts of Eurasia. The main rivers are the Danube, the Dnieper and the Don, which are the second, third and fourth major European rivers. The maximum estimated annual flow of rivers entering the Black Sea and the Sea of Azov is 480 km3. Drainage of polluted rivers causes sufficient damage to the marine ecosystem. Sources of pollution are located both in the coastal area and in the global catchment area. Impact management requires enhanced efforts by river basin states.

Pollution has a direct and indirect impact on the marine ecosystem. In particular, pollution from heavy metals, oil and other harmful substances directly causes toxic effects on the biota. Suspended solid particles decrease the penetration of sunlight through the water layer and thus the Report on the state of the environment in the Black Sea 2009-2014 / 5757 highlights the degradation of benthic biocenoses and pelagic algae and other organisms.

Mineral and organic fertilizers from agricultural fields stimulate the flowering of the microflora (eutrophication) and thus cause a destructive effect and damage the biocoenosis of coastal water. In general, the quality of coastal water is far from

natural due to poor management and the bays, bays and port area of large cities in particular (eg Constanta, Odessa, Sevastopol, Novorossiysk, Poti, Batumi, Trabzon, Istanbul, Varna etc.) are the most polluted areas in the Black Sea.

Other factors with effects on the marine environment related to port and coastal activities.

Dredging, coastal and offshore construction (eg construction of oil / gas installations, pipelines, coastal protection installations, wave breakers, etc.) are detrimental to benthic communities and directly and indirectly damage bottom and depressed landscapes. phytoplankton and benthic macrophytes as a result of the cushioning of a huge amount of mud. kpractices affect the biocenoses of background landscapes and have a significant impact on the ecosystem. Unsustainable fishing and the extraction of other living resources (eg Philophora algae biomass) destroy fish stocks and macrophyte fields. The decline in the population of fish species causes new negative processes in the marine ecosystem and pushes the evolution of the ecosystem in an unpredictable way. Degradation of the marine ecosystem's biota and declining productivity due to coastal water pollution, coastal and bottom landscape transformation activities and unsustainable exploitation of living resources are still one of the most problems of the BS environment.

The Black Sea ecosystem has been severely affected by pollution. There is clear evidence to correlate the decline of offshore ecosystems with eutrophication caused by increased nitrogen and phosphorus loads. A large part of these cargoes come from major rivers, especially the Danube, but also from smaller sources in all Black Sea countries. According to current estimates, about 70% of the dissolved nitrogen and phosphorus that enters the Black Sea comes from the six coastal countries, either by discharge into major rivers (especially the Danube) or from direct sources. The remaining 30% come from the 11 non-coastal countries that belong to the Black Sea basin. There is enough information to share individual responsibility for contributing to these tasks between these eleven countries. In addition, in addition to dissolved nutrients entering the sea, estimates for nitrogen compounds suggest that an amount equivalent to about 50% of the solvent may enter the system from atmospheric sources of undetermined origin. However, dissolved cargo is particularly significant because it has a direct impact on shelf area systems, which are critical to the health of the entire Black Sea ecosystem. All Black Sea countries contribute to the loading of contaminants entering the Black Sea. In the case of nutrients, the contribution is directly related to agricultural drainage, with lower contributions from domestic sources and industry. The situation was particularly bad in the 1970s and 1980s. The recent economic downturn in coastal countries has reduced inflows. This has led to a gradual improvement in the health of the NW shelf and provides some help to make recovery possible.

However, at the level of the entire Black Sea system, the levels of pollution with pesticides and other persistent organic pollutants (such as polychlorinated biphenyls,

PCBs or polyaromatic hydrocarbons, PAHs) they are still high. Current data on the coastal zone are limited to a few sites that have been monitored through the efforts of the Black Sea Environment Program. Most of the historical data proved to be uncertain. It will be important to complete a study of all coastal countries to detect any significant contaminated areas.

Oil pollution in the Black Sea does not seem to be widespread yet, but it affects coastal areas around rivers, sewers, industrial facilities and ports and poses a potential risk with the exponential growth of gas and oil exploitation in economic areas of riparian countries. There is no reliable evidence of significant heavy metal pollution in the Black Sea. Further studies are needed around industrial centers and ports, but widespread pollution with these substances can be reduced.

The Black Sea has a significantly higher concentration of man-made radionuclides than the neighboring Mediterranean Sea, a problem attributed to the Chernobyl accident of 1986. Current levels or radioactivity do not appear to pose a significant health hazard to humans, but it will be important to monitor the situation in the future.

Slow recovery and improper mixing of water does not provide enough oxygen for the decomposition process, and the bacteria in the lower layers consume it completely.

As a result, the Black Sea is practically dead below a depth of about 180 meters and this limit is pushed upwards. Moreover, the metabolism of some bacteria generates hydrogen sulfide, a soluble poisonous gas associated with the smell of rotten eggs. Hydrogen sulfide is present in the entire lower layer of seawater in the Black Sea.

Therefore, the Black Sea is now the largest natural anoxic water basin in the world. This means that 87% of its volume is practically devoid of marine life, except for some forms of bacteria.

However, the Sea is still relatively rich in living resources. The Black Sea shelf and river deltas are also important breeding grounds for sturgeons and other fish species, and coastal wetlands are migratory and breeding grounds for many rare and endangered European birds. The warm coastal waters and sunny beaches of the Black Sea, the beauty of its coasts, plains and mountains attract millions of tourists.

Solid waste dumped at sea from ships and coastal cities. Like a closed sea, the Black Sea is particularly vulnerable to this type of pollution, because any floating or half-submerged waste is inevitably washed ashore. Some beaches have a large accumulation of garbage, posing a risk to marine animals and humans.

Some organochlorines, often referred to as POPs (persistent organic pollutants), have been associated with a significant impact on the environment in a wide range of species and at virtually all trophic levels. They are involved in a wide range of negative effects on human health and the environment. However, as with many other

environmental pollutants, it is difficult to attribute a specific disease or disease to exposure to a specific POP.

Over 80% of the total entry into the sea is through the atmosphere, the rest through rivers. The appreciable analytical uncertainty in the measurements of organochlorines from marine samples and the extremely uneven coverage of environmental compartments (air, water, sediments and biota) and geographical locations, make environmental investigations of flows and budgets extremely problematic.

PCBs that are or have been produced for industrial use (especially as dielectrics, coolants and plasticizers) are now largely limited to closed systems. Globally, in aquatic systems, these compounds are broken down into particles and concentrated in the body's lipids. DDT, banned in most European countries in the mid-1970s, is still used to control mosquito vectors in some countries. In most Black Sea countries, the use of this pesticide has been banned and restricted. Concentrations of DDT, HCH and PCB in Black Sea fish and mammals are relatively high compared to those reported for other regional seas. As in the case of hydrocarbons, some of the locations with the highest concentrations are located in the vicinity of the Danube River. The highest concentration (24.3 ng / g) was found in a sample taken from the port of Constanța on the Romanian coast.

Among the PCB congeners, diorto and mono-ortho were predominant. The pattern of use and major sources of PCBs in other countries around the Black Sea are still unclear. The highest concentration of DDT is in the Black Sea and is associated with lipid-rich sediments in the coastal waters of Romania and Ukraine, which are under the influence of the Danube river discharges. Elevated concentrations are also reported for sediments in the vicinity of Odessa and the Port of Constanta.

HCB and cyclodiene have also been found in Black Sea sediments, although at much lower concentrations than those recorded for the other compounds. The highest values of HCB were recorded along the Romanian and Ukrainian coasts adjacent to the Danube River.

## Chapter III. Analysis of the measures and strategies adopted so far regarding the indirect pollution of BSB by the pollution factors from the established external area.

Black Sea Ecosystem Recovery Project, the currently implemented GEF-UNDP Black Sea Ecosystem Recovery Project addresses to the control of eutrophication and hazardous substances by reforming agricultural policies to reduce non-point sources of fertilizer and manure (buffer zones) , erosion control, organic farming, manure storage facilities, etc.), rehabilitation of key ecosystems in the basin to improve their nutrient sink capacities (wetland restoration) and strengthening the legislative and

enforcement framework, raising public awareness, promoting change in consumer practices (including phosphate-free detergents).

In addition to control and reduction, BSERP aims to improve the management of critical marine and coastal areas. In addition, the project serves as a funding mechanism for research aimed at improving knowledge on nutrient flow and budget, such as: river inputs in terms of the role of dissolved and unknown organic nutrients; the role of sediment / water flows on the NW shelf is unclear; the contribution of atmospheric deposition has not been assessed; mixing along the thermocline and horizontal mixing was poorly evaluated; the flow of items in the system is poorly understood; there is uncertainty about the functioning of the water column regarding the nutrients that limit the growth of algae; there is speculation about which nutrient (nitrogen, phosphorus or silica) limits the growth of algae between the northwest shelf and the Bosphorus gyrus; the status of the marine ecosystem is also unclear, which are signs of benthic recovery.

According to the Black Sea Commission, environmental efforts to reduce discharges from 49 high-priority sources of pollution - such as under-treated wastewater and air emissions - have begun to bear fruit. This is evidenced by the flowering of less and less intense algae, an increase in comparable fish catches and the return of distinct life forms in the waters of the Black Sea.

The continuous improvement of Black Sea waters can be attributed to a variety of factors:

• Continuous changes in the economies of the lower Danube countries

• Direct actions taken to improve infrastructure and reduce nutrient discharges across the Danube

• A ban successfully implemented on polyphosphate detergents in several countries

The most important measure of prevention and intervention in case of pollution is the permanent monitoring of the main sources of pollution.

The study “Monitoring the state of surface waters in the Lower Danube basin” highlights:

The purpose of the Water Framework Directive, as a long-term policy of the European Union in the field of water, is to ensure good surface water quality. Each state in Europe must identify all river basins in its national territory and assign them to individual river basin districts. In this regard, an efficient integrated system and monitoring technology, which analyzes the interpretation of data and the use of results have been developed to make decisions related to the protection of water resources.

The main objectives are focused on expanding monitoring activities and obtaining more detailed information on the status of surface waters. The main priority was the development of an integrated river basin management strategy and the construction of an online continuous monitoring system. Some of the technical objectives for continuous water monitoring have been achieved in Hungary and Romania.

The European Union (EU) Water Policy has long been established in the Water Framework Directive (WFD 2000/60 / EC) [1]. The purpose of the WFD is that the quality of surface waters reaches a good ecological and chemical state by 2015 (2021, 2027).

All countries on the banks of the Danube should have an inventory of all river basins located on their national territory in each river basin district.

The most international river basin in the world is the Danube river basin, which covers more than 800,000 km2 and covers 10% of European territory, including 19 countries.

Given the huge size of the Danube river basin and the number of countries with different specific conditions, the management of the transboundary river basin requires special attention.

In 1994, the Convention on the Protection of the Danube River was signed by the main stakeholders in the region, with the aim of strengthening cross-border cooperation to protect the river and its basin. The EU and 14 countries in the Danube basin are contracting parties to the International Danube Commission (ICPDR).

The preparation of the Danube River Basin District Management Plan (DRBMP) was the most important task in the implementation of the Water Framework Directive.

To achieve the set objectives, the first DRBMP was prepared in 2009 and is reviewed every 6 years. The first review was carried out in 2015, when activities were investigated that had negative effects on the water quality of the Danube basin, and the Commission also assessed the current state of water bodies and the effects of interventions.

Based on the results, the Danube countries have jointly prepared action plans to be implemented in the next period. Examining the important pressures in the Danube River Basin (DRB) are crucial elements of the plan. In this sense, the development of an efficient integrated system consisting of monitoring technology, data analysis, interpretation and system of use of results is essential for making decisions to protect water resources.

Nowadays, due to the advanced progress of science and technology, new measurement and communication techniques have been developed, leading to real-time decision-making tools.

The main objectives are focused on expanding monitoring activities and obtaining more detailed information on the status of surface waters.

The main dangers to water quality in the Danube basin are the following:

-nutrient pollution,

-dangerous substances,

-hydro-morphological alterations and

-organic pollution.

Overview of water status, economic analysis of water use, monitoring, planning and designation of the system and joint measures of the program were planned so that the objectives of the Water Framework Directive could be achieved.

Monitoring programs provide adequate information on the state of the Danube basin; the subprograms are in line with the WFD implementation program. The purpose of the Transnational Network Monitoring System (TNMN) is to provide a comprehensive picture of pollution events, long-term changes in water quality and the main pollution tasks in the Danube basin. It offers data comparability, ie uniformity of data acquisition and exchange.

Each year, the TNMN prepares an annual report from the measurement data of the national laboratories, which includes the sampling location, the list of measurement parameters and the processing of the measurement results.

The WFD requirements must be met both by the Convention on the Protection of the Danube River and by the (revised) TNMN surface water monitoring monitoring programs.Meanwhile, the Joint Danube Survey (JDS) contains the results of monitoring investigations.

Investigative monitoring is mainly a national task, but in order to meet the objectives of the basin level, JDS has been set up, which is repeated every 6 years.

Surveys conducted by JDS in 2001, 2007 and 2013 provided a snapshot of the entire length of the Danube and significant tributaries. The purpose of the JDS is to fill in the missing information in the monitoring networks in the Danube river basin, to harmonize the monitoring methods already used, to evaluate the effects of new compounds or chemical elements in different matrices and to test new devices and methods. JDS programs increase the reliability of data and information provided by the TNMN system.

The Transnational Monitoring Network TNMN - ICPDR's Transnational Monitoring Network TNMN regularly monitors the water quality in the Danube river basin.

The TNMN can act as a basis for an integrated water quality measurement network throughout the basin and not only provides data on water quality and pollution

trends, but also helps to harmonize methods for assessing and assessing water quality in the affected area.

Network laboratories are allowed to use analytical methods of their choice for as long as they meet certain pre-agreed criteria and allow the analysis of the physico-chemical quality of priority elements and substances. A system-wide quality control program (conducted annually) has been established to ensure that data is of high quality throughout the basin. The data is stored in a database established by the ICPDR. National laboratories provide data to managers, who collect, verify and convert the data into a data exchange file format (DEFF file), which is then sent to the data center for final verification and processing. Measuring points for water quality assessment within the TNMN is shown in Figure. There are 114 monitoring monitoring stations, where water quality components are analyzed and 12 measurements per year are reported in the TNMN yearbook.


**Fig.10 Monitoring points in the Danube Basin**

Join Danube Survey

The annual water quality assessment was supplemented by JDSs to provide a picture of the ecological status of the Danube. They obtain biological and microbiological, chemical, hydromorphological and toxicological data. These are the largest river research expeditions in the world, in order to provide comprehensive and reliable data and information along the entire length of the Danube and some of its tributaries, both on water quality and on the causes of pollution.

The first common survey of the Danube was in 2001. A total of 140 different parameters (chemical, biological, microbiological) were measured along the entire length of the river, thus providing a considerable amount of data.

The survey should be repeated every 6 years, so in 2007 and 2013 another snapshot was taken about the status of the Danube and its tributaries. Surveys have shown that the water quality in the Danube river basin is showing an improvement, but it has also shown that special issues need to be addressed at several tributaries and near large cities in the lower section. JDS improves the available databases and thus helps to assess water quality.

Danube emergency system for pollution accidents

Within the International Commission for the Protection of the Danube River (ICPDR), some measures to prevent accidents for the Danube and the Tisza have been considered. The Danube Accident Emergency System (DAEWS), which is able to alert stakeholder countries during cross-border pollution accidents.

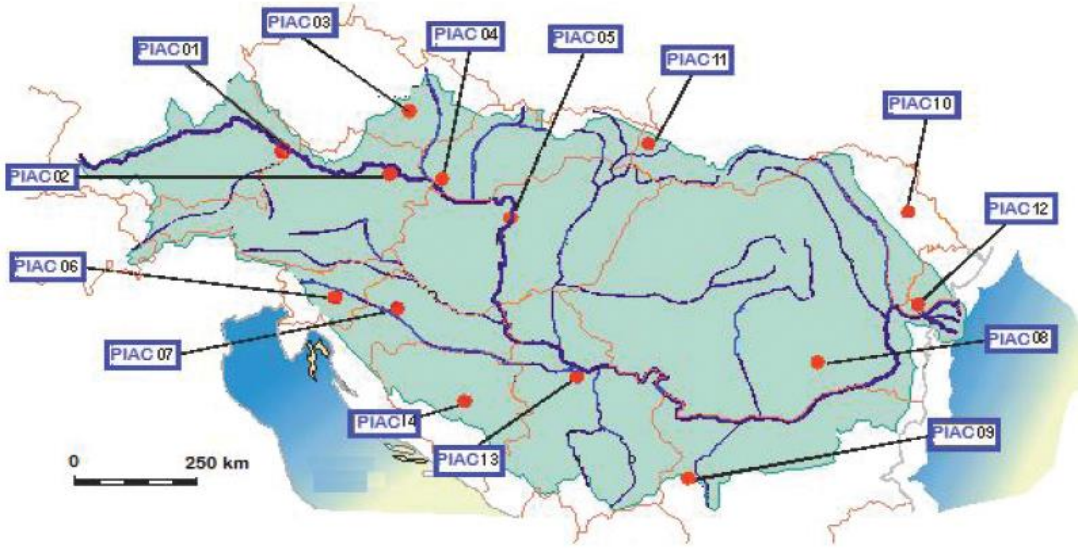


**Fig.11 Danube emergency system for pollution accidents (PIAC) - Main International Alert Center - national alert center**

The BS-SAP Black Sea Strategic Action Plan recommends preventive measures to control pollution. Anticipatory action is a fundamental principle of the plan, although it also uses the "polluter pays" principle. The plan calls on the signatories to agree on common water quality targets and to develop a strategy to gradually reduce burdens until the targets are met. Places where pollution levels are unreasonably high are called "hotspots" and are considered immediate priorities for action.
The action plan not only addresses pollution entering the sea from rivers and discharge pipelines, but also includes detailed provisions to prevent pollution by ships, to minimize pollution caused by maritime accidents and to control illegal dumping of waste at sea. Another important pollution provision refers to the future monitoring of the state of the Black Sea in all sectors.
The action plan also refers to objectives such as:

- The promise of a better future for the 16 million people in six countries who live on its shores.
- Commitments of regional governments on serious actions to make a difference real in the rehabilitation and recovery of the sea.
- The dedicated work of many people who dedicate their time and energy to helping protect the environment.

However, if urgent measures are not taken to keep nutrients on land, recovery can be reversed as economic conditions improve and the use of chemical fertilizers is resumed. The coastal waters of the Black Sea remain severely affected by sewage a situation exacerbated by the weak economies of the coastal states. In most countries there is a serious lack of transparency in sewerage indicators. Where data exist, it results from studies using methodologies that are not intercomparable. Independent investigations and epidemiological data suggest that this situation is serious and requires urgent action.
Another form of action is the co-operation of NGOs in a wide-ranging action to raise awareness of the problems of the Black Sea and the measures that must be taken to restore existing water quality and ecosystems.
The Black Sea NGO Network (BSNN) is a regional association of 62 environmental and sustainability NGOs from the six Black Sea coastal countries: Bulgaria, Georgia, Romania, Russia, Turkey and Ukraine. Its mission is to contribute to the protection and rehabilitation of the Black Sea by uniting public efforts and involving all key stakeholders. The association was registered in Varna, Bulgaria in 1999.

## CIV Conclusions.

Council conclusions on the EU's commitment to regional cooperation on the Black Sea:
1. Reaffirms its long-term commitment to prosperity, stability and resilience in the Black Sea area. Recalling that the Black Sea Synergy Initiative remains the basis of the EU's commitment to the region, the Council welcomes its March 2019 review by the

High Representative and the European Commission, which confirms its practical value and positive contribution to regional cooperation in the Black Sea area.
2. Stresses the growing strategic importance of the Black Sea area for the EU and calls for increased commitment to regional cooperation there, in line with the principles of the EU's overall strategy and the revised European Neighborhood Policy. In particular, it highlights the importance of capitalizing on new opportunities for economic development, resilience and connectivity in the region.
3. Remains concerned about security challenges in the Black Sea area. In this context, the Council reiterates that respect for international law, including the principles of independence, sovereignty and territorial integrity, the United Nations Convention on the Law of the Sea, including Freedom of Navigation, and EU policy decisions and its policy of non-recognition of illegal annexation of Crimea are fundamental to the EU's approach to regional cooperation in the Black Sea area.
4. Welcomes the pragmatic and sector-oriented cooperation in the framework of the Black Sea Synergy Initiative, which aims to build trust, encourage regional dialogue and achieve tangible results for the benefit of both the region and the EU. The Council recognizes the added value of the bottom-up approach to project development and the inclusive and voluntary nature of the Black Sea Synergy and its implementation. A strengthened EU commitment to regional cooperation in the Black Sea area should build on the lessons learned during the implementation of the Black Sea Synergy.
5. Commends in particular the commitment made with the support of the EU, the six coastal states and the Republic of Moldova to work together for a more sustainable blue economy. The Council welcomes the Common Maritime Agenda for the Black Sea of 21 May 2019, a cooperation agenda in the maritime basin agreed at a ministerial meeting in Bucharest and based on the Burgas Ministerial Declaration of 31 May 2018; and the Strategic Research and Innovation Agenda for the Black Sea, launched in Bucharest on 8 May 2019, continuing the Burgas vision document of 31 May 2018. These two agendas represent a significant step towards enhanced regional cooperation in the Black Sea in the field of maritime affairs and fishing, with a focus on the blue economy. These include environmental sustainability, smart ports, tourism, research and innovation, support for small and medium-sized enterprises, and blue skills and careers. The Council invites the High Representative and the European Commission to continue to actively guide and support the implementation of these two agendas in the coming years. The Council encourages the states concerned to take into account the priorities of these agendas for their transnational, cross-border and national programs.

The Danube Declaration concludes, among other things:
(1) reaffirms the "Convention on Cooperation for the Protection and Sustainable Use of the Danube" (Convention on the Protection of the Danube River), signed in Sofia in 1994, as a solid basis for our common work for sustainable and equitable water

management and flood risk management, the Danube basin, which we coordinate within the International Commission for the Protection of the Danube River (ICPDR).
(2) Appreciates the work of the ICPDR as the main coordinating body in the Danube Basin for all water management issues and is committed to further strengthening the ICPDR as a platform for further exchange and cooperation between our countries, characterized by a broad sense of solidarity on the Danube and in line with the recently adopted "ICPDR Vision and Mission" statement.
(3) appreciates the significant support provided by the European Union (EU) for its enlargement process and ongoing cooperation between EU Member States and EU Member States under the ICPDR.
(5) welcomes the EU Strategy for the Danube Region (EUSDR) as a new partner strategy for the ICPDR. Given the EUSR's multisectoral approach and the emphasis on facilitating project preparation and implementation, we recognize the great potential for synergies between the ICPDR and the EUSDR and
(6) express our appreciation and support for the ICPDR's continued cooperation with all relevant partners in the Danube river basin and beyond, especially with regard to
• area coordination of relevant activities in the Sava, Tisza, Prut and Danube Delta sub-basins, which are complementary to the ICPDR activity;
• cooperation with the Black Sea Commission on the basis of the Memorandum of Understanding signed in 2001 and which is currently receiving additional impetus from the implementation of the EU Marine Strategy Framework Directive;
• UNECE Convention on Transboundary Protection and Use of International Watercourses and Lakes
• Framework Convention on the protection and sustainable development of the Carpathians;

Conclusions on socio-economic issues and recommendations:
1. Recently, the Black Sea countries have shown steady economic growth. The socio-economic processes in the Black Sea coastal area depend to a large extent on local economic and societal activities, as well as on national and global trends.
2. The global economic crisis of 2008 has not been crucial for coastal economies, and the coastal states in the BS have shown strong potential for further rehabilitation and development.
3. Tourism is an accelerator for many other sectors of the economy of the BS coastal states.
4. Despite the importance of fisheries, this sector has historically lacked an integrated management strategy and sustainable development.
5. Natural habitats in the coastal and marine environment remain under pressure from human activities mainly on land. Despite the creation of new protected areas (national parks and nature reserves) on the coast and offshore, ecosystem degradation is not prevented and biodiversity is declining.
6. Continuous urbanization, infrastructure development, offshore exploitation of hydrocarbon deposits are the key factors of economic development in the near future.

It is therefore necessary to strengthen cooperation, strengthen political ties between riparian states, as well as relevant technical assistance from the international community, in order to ensure the implementation of the principles of sustainable development of the Black Sea region.

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