

3.3. SOCIO-ECONOMICS OF THE BLACK SEA COAST

Karamushka Viktor,

Department of Environmental Studies, National University of Kyiv-Mohyla Academy, Kyiv, Ukraine,

Bon Oleksandr,

Ministry of Ecology and Natural Resources of Ukraine, Kyiv, Ukraine

Introduction

This chapter focused on the reviewing of socio-economic drivers (sectors directly or indirectly related to the Black Sea) as well as on the pressure on the environment, social and economic consequences of environmental changes, and riparian countries (Bulgaria, Georgia, Romania, Russian Federation, and Ukraine) response to address challenges at national and regional levels and promote sustainable development of the Black Sea region. The chapter ends with the conclusions of socio-economic aspects.

Sources of data and information used for this chapter include but not restricted to i) ICZM national and BS Region reports for the BS Commission for 2009-2014; ii) reports and policy papers of international organizations and projects; iii) open statistic data produced by national and international agencies; and iv) scientific publications.

3.3.1. Socio-economic drivers

General overview

Conceptual framework for understanding environmental changes in the Black Sea marine and coastal ecosystem during last decades is based on the model $D \rightarrow P \rightarrow S \rightarrow I \rightarrow R$ (Drivers \rightarrow Environmental Pressures \rightarrow Environmental State Changes \rightarrow Socio-Economic Impacts \rightarrow Policy Responses) and described in the previous report “The State of the Environment of the Black Sea (2001-2006/7)” (Kleschev K.A., 2003). However, this model application for the BS Region processes has some specific implications. First, socio-economic drives represented by sectors directly or indirectly related to the Black Sea were more than ever dependent on political processes impacting on the socio-economic conditions of the riparian countries.

The social and economic conditions of the riparian states are not homogeneous: Bulgaria and Romania are the EU member states, Turkey is negotiating its accession to the EU, the Russian Federation is implementing its own social-economic policy, Georgia and Ukraine have declared an intention to the accession to the EU. However, all of the riparian states make a significant investment to the enhancement of economic growth rates improve quality of life of their population (Papava V., 2010).

The coastal zone of the Black Sea littoral states comprises terrestrial and marine parts and represents an extremely complex social-ecological system, which is developing and functioning under pressure of interdependent political, social, environmental, economic, cultural, governance, and other factors. Socio-economic development of the coastal communities based on the exploration of valuable natural resources: land, water and their mineral, biological, recreational and other their constituents. At the same time, prosperity of the coastal communities sufficiently depends on the social-economic trends at national and international scale.

GDP (per capita) data for BS countries could demonstrate the difference in the development of their economy level. The Russian Federation demonstrated the best results during the reporting period. Bulgaria, Romania and Turkey comprise group of countries with similar GDP level and tendencies. Ukraine and Georgia are instantiated by the lowest GDP in the BS region. Global economic crisis of 2008 affected the socio-economic development of the Black Sea riparian states. Their GDPs dropped down in 2009 (Table 3.3.1).

Bulgaria was quite optimistic and did not expected an immense threat of the global financial crisis to its economy in 2008. However, the crisis affected Bulgaria rather significantly: in 2009, GDP declined by 4.7% as compared to the same period of 2008. About 95% of Bulgarian companies showed a drop in their sales. The industrial sector of the country was affected significantly. According to (Mee L.D., 2010), the gross value added decreased by 8% in 2009 compare to 2008. Crisis affected income generation (five largest companies of chemical industry have demonstrated decrease in income by 46.2% in the first quarter of 2009) and caused loss of jobs in main sectors of national economy, including those dependent on marine resources.

Table 3.3.1. Dynamic of the GDP of BS countries, 2007 – 2015.

GDP per capita, PPP (current international dollars, thousand)								
Country	2007	2008	2009	2010	2011	2012	2013	2014
Bulgaria	12.898	14.396	14.133	14.963	15.676	16.208	16.647	17.406
Georgia	5.833	6.164	6.054	6.598	7.315	8.027	8.542	9.216
Romania	13.442	16.302	16.013	17.181	18.095	18.983	19.878	20.797
Russian Federation	16.649	20.164	19.387	20.498	24.074	25.317	24.165	25.095
Turkey	14.229	15.356	14.795	16.542	18.27	18.56	19.229	19.654
Ukraine	8.006	8.396	7.24	7.666	8.282	8.475	8.63	8.684

Source: Ivanciu Nicolae-Valeanu, 2013.

Situation in Georgia was more complicated. Negative impact on Georgia of the financial crisis was not expected to be high, however it was. Besides, the country had to avoid banking sector crisis, fighting with growth of the relatively high inflation rate, and protecting national currency from devaluation, and had to overcome the consequences of the military flare-up. After 2008, the summary economic indicators clearly reflected the implications of both the global financial crisis and the military flare-up (Mee L.D., 2010).

Since 2010, economies of all BS countries demonstrated tendencies to recovery. This process was ongoing without interruption through 2009 – 2014 (Ivanciu N.-V., 2013).

Sectors directly or indirectly related to the Black Sea

The sea and adjusted coastal regions are the area of various economic activities. During 2009 – 2014, similarly to the previous years, the economic activities directly connected to the Black Sea in all riparian countries comprised following key sectors:

- Shipping and ports;
- Fishery;
- Tourism;
- Oil and gas.

Most of maritime economic activities (MEAs) are typical for all of the Black Sea riparian countries in spite of possessing of different natural resources and different level of economic efficiency achieved. These MEAs have stimulated enhancing urban area development as well as some other supportive industries in coastal regions. As a result, there is quite intense expansion of urbanized areas and related infrastructures in all BS countries observed. As it follows above (see section 3.2), the built-up areas almost doubled within the 10-km strip buffer zone located along the Black Sea coastline in the period 1992 – 2014. Urban expansion towards and along the coast mainly adjusted to big cities is of 4% coastal area in Georgia and up to 12% in Turkey. This process is ongoing and is one of the main factors affecting environment. Therefore, urbanization was included in the list of key economic sectors in the coastal regions.

The Black Sea is divided into exclusive economic zones (EEZ) since years and exploration and exploitation of marine natural resources by riparian countries is restricted within the borders determined (Fig. 3.3.1) and regulated by national laws and international agreements (WB: Indicators).

Shipping and ports

The Black Sea is the cross-road of the East-West and North-South of interrelations of various nature, including political, economic, societal, religious, scientific and others. The BS provides many traditional and new opportunities for cooperation in various sectors for the riparian countries. The Sea is playing the role of geo-political, economic and trade hub and considering now as an access point to the coastal countries, as well as an entry point to the European Union, the Balkans, the Caucasus, Central Asia and other regions. Therefore economic activities, related to the exploitation of marine resources and the sea as a transitional route and the way connecting nations and states, are traditional and have long history.

Traditional maritime sectors are the most important providers of employment. In Bulgaria, shipping mainly is oil transportation and its growth depends on fleet renewal and on the development of infrastructures, including inland waterway transport.

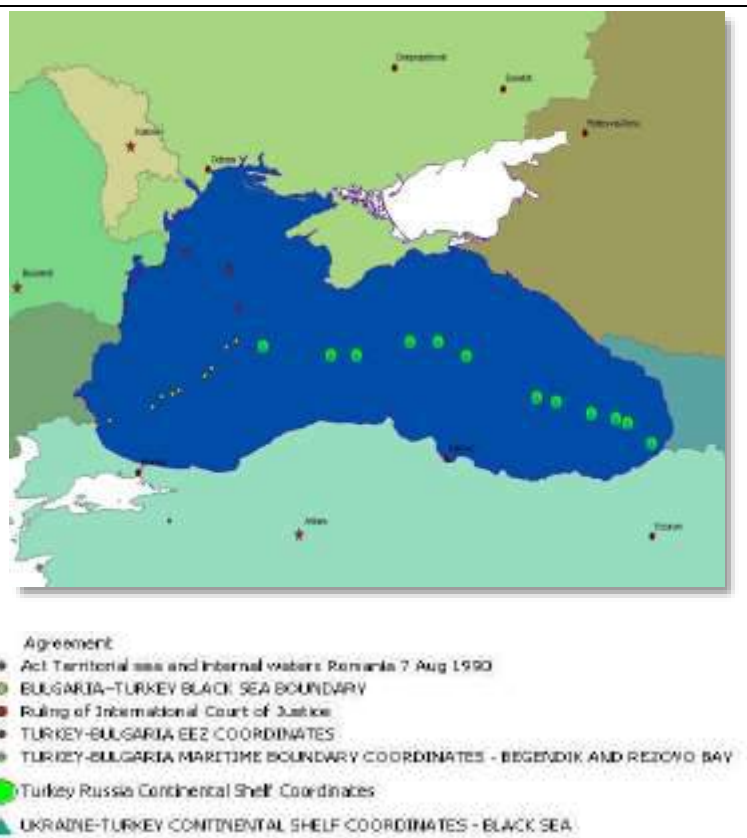


Figure 3.3.1. The map presenting delineation of the exclusive economic zones in the Black Sea (Oral N., 2018).

There are several seaports along Georgia's Black Sea coast. The largest one is the Port of Batumi. Chartered passenger ferry services the link between Georgia and Ukraine and Turkey. Shipping sector of Georgia plays an important role in the employment opportunities.

In Romania, shipbuilding industry has a long tradition and although affected by the economic crisis 2008. Recently, its competitiveness was improved by investing in green technologies and innovation capacity. Shipbuilding is mainly devoted to commercial transport vessels. Short-sea shipping is the fastest growing maritime activity in Romania and is concentrated in the Port of Constanta. Inland waterway transport sector in the Black Sea and the Danube River plays an important role in the national economy because of its size and positive contribution to the country's economy.

The Modernization Program of Novorossiysk Commercial Sea Port (Russian Federation) was focused on the development of the port's marine infrastructure. It includes dredging and construction of new cargo terminals. Inland waterways in the European part of the country form a network of channels connecting the basins of major rivers. There are plans to construct shipbuilding and ship-repair facilities at the Black Sea coast the Russian Federation.

In Turkey, maritime economic activities support of 280.000 jobs and reach a total Gross Value Added (GVA) of more than EUR 4.4 billion. The shipbuilding and ship-repair sector of Turkey (mainly concentrated at the Mediterranean Sea coast) contributes over 82% to GVA (World Bank, 2009). Turkey has the longest shoreline in the Black Sea. This provides it with the strong strategic position at the intersection of the East-West and North-South international transport corridors and provides with the potential for the development of offshore infrastructure.

Internal and international short-sea shipping is important and well developed in the country because of the unique geographic position.

The shipping sector in Ukraine makes a significant contribution to the country's economy. The country has 18 deep-sea merchant ports and 11 merchant river ports connected to the sea. The biggest sea ports, Odessa, Illichivsk, and Yuzhny. They occupy 60% share of the total cargo turnover through Ukrainian seaports (World Bank, 2009). Odessa offers regular passenger ferries to Istanbul, Varna, and Haifa. Intermodal sea-railway transport is well developed, connecting Illichivsk to Varna and to Batumi. The capacity of Ukraine's merchant fleet was significantly decreased during period of economic recession in 1990th but the country is still training qualified specialists and supplies labour forces for merchant fleets and other maritime sectors abroad.

The region has also outstanding opportunities for the development of river/sea shipping: river and channel systems provides opportunities to achieve Rotterdam on the North Sea (through Danube and Rhine) or the Caspian Sea ports (through Volga and Don) from BS ports. These opportunities are to be utilized in the years to come. Regretfully, in reporting period, the river/sea shipping capacity was not utilized and contribution of the rivers' fleet for passengers and commodities transportation was minimal in Ukraine. In this regard, the Dnipro River, the third largest river of Europe, was not exploited as a transport route.

Fisheries and aquaculture

Fisheries is the traditional economic activity in the Sea since centuries. Nova days, it is supplemented with fast developing aquaculture. The fishery sector plays an important role in the region by providing various employment opportunities for local population: several hundred thousand people have found jobs in the fisheries and aquaculture. The sector supplies as well valuable seafood products for local consumption as well as for regional and international markets.

The BS sea food processing industry comprising industrial, semi-industrial and small-scale fisheries. Variety of fishing nets and techniques are being used here. Fisherman mainly exploit a benthic and pelagic stocks of fish, as well as mollusks and crustaceans. Dominated species are varying in landings by different countries. For example, European anchovy, sprat, whiting, mullet, red mullet, turbot, sea snail, flatfish, and dogfish caught in Georgia. Russia has a long tradition in fisheries based mainly on catches of anchovy, which constitute of 65% of the country's total catches in the basin.

The BS countries have different technical capacities for fisheries. As it follows from the Table 3.3.2, Turkey has largest fleet and demonstrates largest figures in landings.

Table 3.3.2. Fishing technical capacity and average landings by riparian countries in the Black Sea in 2000-2013.

Country	Number of vessels	Capacity (gross tonnage)	Reporting year	Average landings, [tonnes]
Bulgaria	704	3743	2015	7,715
Georgia	47	N/A	2015	12,600
Romania	159	790	2015	1,258
Russian Federation	33	N/A	2013	32,000
Turkey	16,447*	175,328*	2015	459,400*
Ukraine	135	N/A	2015	68,900

*Turkey: Total data for Mediterranean and Black Sea regions

Source: Tsikliras A.C.at al., 2016

For many reasons, landings in the Black Sea are showing a generally increasing trend however, during last three decades, have varied considerably from one year to the next. In 2013, the total reported landings in the Black Sea were 376 000 tonnes. The total value of these fish landings across the Black Sea is of USD 691 million (Tsikliras A.C.at al., 2016). What is important, the small-scale fisheries in the Black Sea play a significant social and economic role because of they provide jobs for at least 60 percent of the workers directly engaged in fishing activity and account for approximately 20 percent of the total landing value from capture fisheries in the region. Small-scale fisheries include recreational component, which is becoming more and more popular.

Due to semi-enclosed configuration of the Black Sea divided into exclusive economic zones between coastal states, fleets from different countries have to share the stocks. During 2008 – 2014, fisheries sector faced significant challenges due to decreasing of the fish stock. The status of the Black Sea fisheries was evaluated regularly for the period 1970-2016, using various indicators such as total landings, the number of recorded stocks, etc. (WB: Indicators, FAO, 2014, Tsikliras A.C. at al., 2016). All assessments confirmed that the fisheries resources of the Black Sea are at risk from overexploitation and impact of pollution from land based and off-shore pollution sources. The state of stocks assessments resulted in conclusion that the BS fisheries being in a worst shape as to compare to the Mediterranean and other sea regions (FAO, 2014). Therefore, sustainable management of stocks, one of the most significant issues in the region, requires urgent measures and strengthening cooperation at the Black Sea states level for these purposes.

In the reporting period, marine aquaculture has been one of the fastest growing activities in Turkey and in some other BS countries. By 2014, this sector has produced more than 88.000 tons annually in Turkey with a planned increase to 600.000 tons of sea products by 2023. Aquaculture production reached a 25% market share of the seabass and seabream trade in Europe. More than 96% of the production is located on the Aegean coast; however, being underdeveloped in Turkish Black Sea area (nine sea-cage farms operated with a production volume of just 8.500 tonnes), has potential for fast growth.

In general, marine aquaculture in the BS region has remained underdeveloped in 2008-2014. The farming of sturgeon and mussels dominated in the aquaculture industry.

Coastal and marine tourism.

Tourism plays an important role in the economies and generates significant contribution to the GDP of the BS countries. Turkey is a leader in tourism development among the BS countries followed by the Russian Federation and Ukraine (Fig. 3.3.3). In 2013, Turkey has received 37.8 million foreign visitors, Russian Federation – 28 million, Ukraine – 25 million. In 2013, Turkey is ranking 6th country in tourists' arrivals and 12th in receipts (Panayotis G., Iorga G.A., 2009).

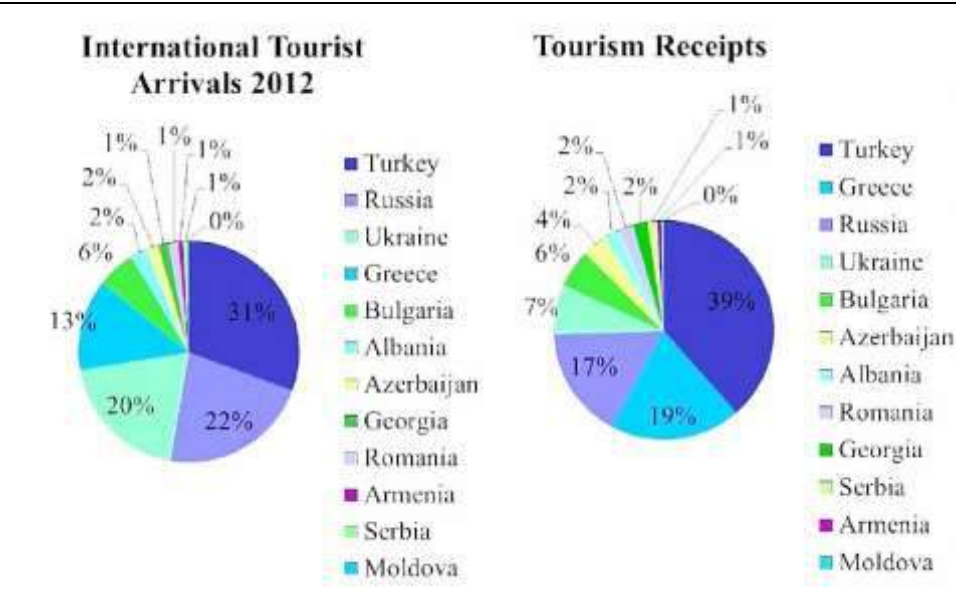


Figure 3.3.2. International tourist arrivals and receipts in 2012 in the BSEC Member states (Source: Panayotis G. and G.A. Iorga, 2009)

The Black Sea Basin favourable climate and outstanding natural features - including mineral springs and beautiful beaches – have made the region as an important destination for recreational and health tourism with the Crimea peninsula being the most important. Recreational 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 is focused mainly on the Aegean and Mediterranean). Tourism potential in the Black Sea Basin area is rich and diversified, including spa and medical tourism, culture, nature, eco and agro-tourism, adventure, cave and mountain tourism, and tourism related to cuisine, rivers, hunting and diving as well as winter tourism (skiing).

Coastal tourism constituted a significant economic sector in terms of number of visitors and income generated. In Bulgaria, Turkey, Romania the sector has significant contribution into regional GDP compare to other maritime activities. It is less developed in Georgia, Ukraine and the Russian Federation. However, it remains fast growing sector offering significant potential for future development. In Bulgaria, coastal tourism is encompassing of 80% of the total tourism sector. In Georgia, tourism is one of the fastest growing service sectors. The number of foreign visitors reached 4.430.000 in Georgia in 2012 or the 3,5-fold increase over 2008. Coastal tourism is one of the most promising economic sectors of Turkey's blue economy. Cruise tourism in the Black Sea, like coastal tourism, is noted for its potential. Coastal tourism in Ukraine has played an important role in the national economy and constitutes sufficient contribution to regional GDP. Odessa, Yalta, Sevastopol, and Kerch were among the main tourist centres on the Black Sea by 2014. Odessa area became the main coastal destination for those visiting Ukrainian from neighbouring countries.

The territories around Odessa, Sochi and Batumi are also well-established tourist destinations. However, the Black Sea tourism potential is not yet fully developed primarily due to the limited investments, insufficient transport infrastructure, inadequate tourist facilities, and relatively poor quality of services. In 2014, the conflict between Ukraine and the Russian Federation has affected the tourism sector in both countries. Coastal tourism activities has failed significantly in Crimea however attractiveness of other Black Sea destinations - Odesa and Sochi regions,

Georgia coast etc. seems increased. Anapa, Gelendjik, and Sochi on the Caucasian coast of the Black Sea are the famous destinations for coastal tourism.

The common tendency in the sector is the increasing number of visits (see, for example, data for Bulgarian coast, Fig. 3.3.3). Economic crisis of 2008 has affected the sector but it is recovering.

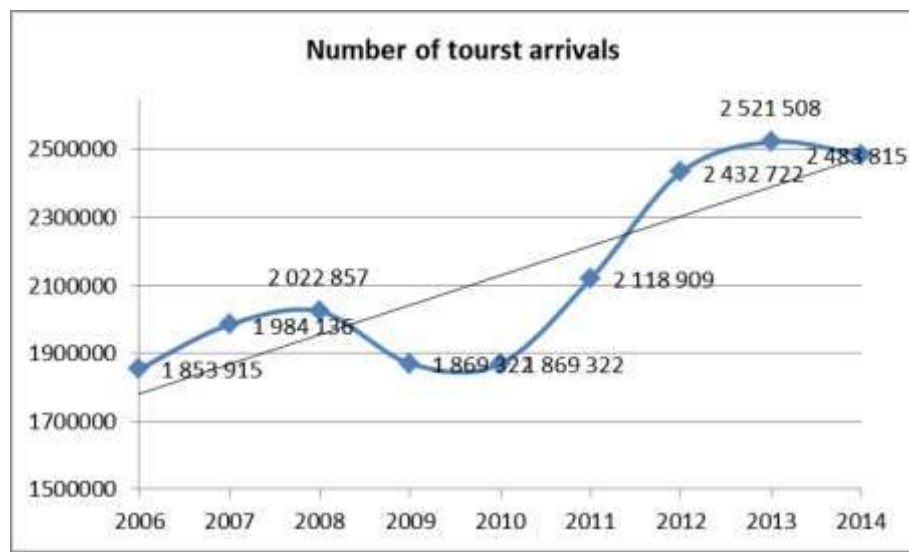


Figure 3.3.3. The number of tourist arrivals to the coastal zone of Bulgaria (Bulgarian Annual Reporting on Integrated Coastal Zone Management (ICZM, 2014).

Continued expansion and diversification of tourism over the past decades in the BS countries makes it as one of the largest and fastest-growing economic sectors. Regrettably, in spite of very positive impact on employment and income, growth of the tourism industry creates environmental challenges notably in the coastal areas and requires sustainable management approach.

Exploration and exploitation of oil and gas

This includes offshore hydrocarbon industries and pipelines, located both on the adjusted terrestrial areas as well as on the Black Sea aquatic area. Estimations of deposits are different. The West Black Sea Basin is considered as an area with most promised gas-oil deposits. It presents shelf with depth approximately 100 m for main part. The area is located mainly within the Ukraine water, covers about 50 thousand km², and comprises Odessa Bay with the adjacent gas province. Area comprises one exploited deposit and six deposits in the stage of preparation for the exploitation or development. The total surveyed resources of gas in this area is of 1.5 trillion m³ (Panayotis G., Iorga G.A., 2009).

According to (UNDOC), deposits of the North-Western part of the BS are estimated at 495.7 billion m³ of natural gas and 50.4 million tonnes oil, Prikerchenskay zone - 321,2 billion m³ of natural gas and 126,8 million tonnes oil, continental slope - 766,6 billion m³ of natural gas and 232,6 million tonnes oil. It creates opportunities to meet the demand for energy.

Offshore oil and mainly gas exploration and production in the Black Sea is located in production fields (Ayazli off the Turkish coast, Galata and Kaliakra near the Bulgarian coast, the Ana, Doina, Delta, Pescarus and other fields off Romania, Odesa Bay off Ukraine fields; Russian Federation is running exploration and planning 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 this sector's role. Offshore oil and gas exploitation is already the third-largest employer in the coastal economy of Romania.

The Black Sea area is not only comprises hydrocarbon deposits, the Sea is an important transit route for gas-oil supply from Russia and the Caspian Region countries to the EU and a significant energy market in its own right. However, this situation creates not only opportunities for the region. The crossing interests and maritime power of the EU and non-EU countries in the region poses specific problems that require extra efforts for coordination achieving common vision.

Russian Federation is the world's leading natural gas exporter and one of the largest gas producers, as well as the largest oil exporter and producer. Russian Federation produces gas and oil mainly outside of the BS. In 2014, The Russian Federation companies has started gas exploitation in the Black Sea shelf after annexing Crimea and withdrawal Ukrainian offshore gas platforms. Meanwhile, The Russian Federation succeeded in oil transportation, and Russian container cargos, using well-developed cargo terminals, are the major transport segment in the short-sea shipping sector.

Natural gas and crude oil mainly transported by pipelines. Key pipelines in the BS region presented on the Fig. 3.3.5 and described below.

The Odessa–Brody pipeline is a crude oil pipeline connecting Ukrainian cities Odessa at the Black Sea, and Brody near the Ukrainian-Polish border (674 km). The pipeline was constructed to supply oil delivered to Odessa oil terminal from oil-exporting countries. Pipeline was used in reverse regime for oil transportation in both directions. There are plans to expand the pipeline to Płock, and furthermore to Gdańsk in Poland.

Famous Blue Stream is a major trans-Black Sea gas pipeline that carries natural gas from Russia to Turkey and to European Union countries. Operating at full capacity, it delivers 16 bcm gas per year. The pipeline was built with the intent of diversifying Russian gas delivery routes to Turkey and avoiding third countries. There is a plan to build the second section of the pipeline expanding Russia's gas export to the south (via Samsun-Ceyhan gas pipeline further to Israel and Lebanon).

The Baku–Tbilisi–Ceyhan pipeline is a 1,768 km long crude oil pipeline from the Azeri-Chirag-Guneshli oil field in the Caspian Sea to the Mediterranean Sea basin. In fact, it is located far away from the sea coast however it plays an important role for diversification of the energy sources supply. The pipeline connects Baku, the capital of Azerbaijan, Tbilisi, the capital of Georgia, and Ceyhan, a port on the south-eastern Mediterranean coast of Turkey. It was entered into operational on 10 May 2006 and has a capacity to transport 1 million barrels per day.

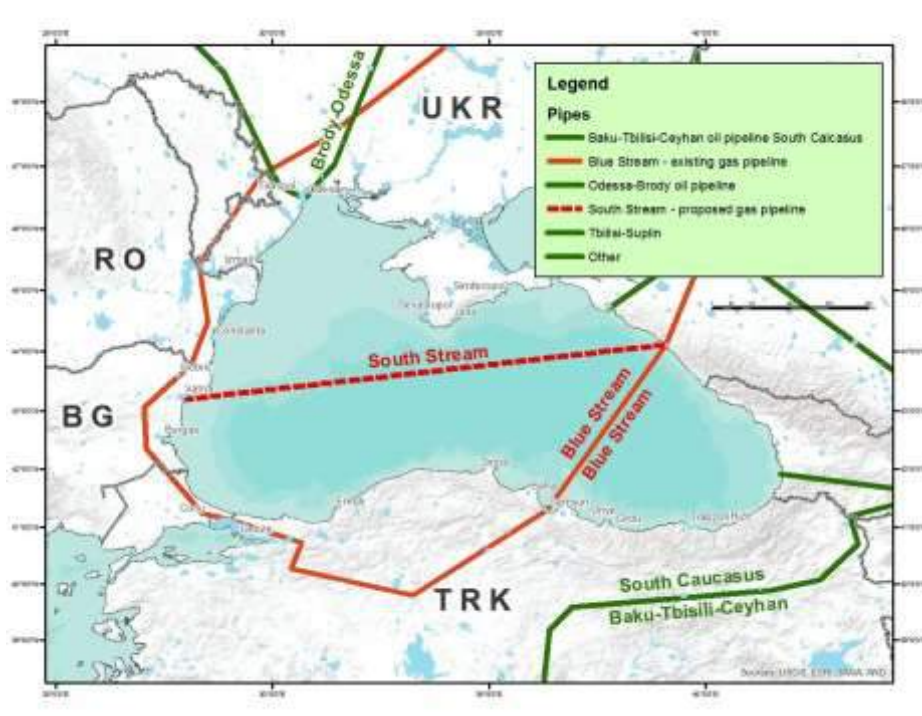


Figure 3.3.4. Oil-gas pipelines in the Black Sea Region (UNDOC).

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 is connecting the Shah Deniz gas field in the Azerbaijan sector of the Caspian Sea and Turkey port Ceyhan. The pipeline is constructed with the potential to connect Turkmen and Kazakh gas fields through the planned Trans-Caspian Pipeline. Its operation has been started in December 2006, supplying natural gas to Georgia and Turkey. Initially it was planned to use South Caucasus pipeline to supply Europe with Caspian natural gas from Iran and Turkmenistan producers through connection to other pipelines (e.g., Turkey-Greece and Greece-Italy pipelines). International consortium has attempted to develop and implement NABUCCO gas pipeline project with planned length 3,900 km and the transport capacity up to 31 bcm per year. It was expected to connect the Caspian region, Middle East and North Africa (Egypt) via Turkey, Bulgaria, Romania, Hungary and Austria and further Central and Western European gas markets. Project preparation has been started in 2002 however it was not implemented and closed in 2013 giving priority to the Trans Adriatic Pipeline (878 km) connecting Caspian region, Middle East, and Western Europe. Project preparatory activities started in 2003 and got approval of the European Commission in March 2016. The pipeline construction started in May 2016 and its operation is expected in 2019.

As we may see, the Black Sea region represents cross-road for significant transportation of energy sources from Caspian Region and Kazakhstan to Eastern and Central Europe. It promotes economic growth and makes significant contribution to the employment of the BS population. Pipeline construction and operation has significant social and environmental impact on the region.

Water projects

Water projects are vital to waterway maintenance, especially on the Danube River, and for improved access to maritime ports in the Black Sea. Such projects increased capacity of the

commercial harbours in Ukraine (marine Odesa, Illichivsk, Yuzhny harbours as well as Danube and Dnipro rivers harbours), Georgia, and other countries.

Key marine economy sectors described above have promoted development the urban development sector to accommodate prevailed migration of population to the coast. In particularly, urban agglomeration of Odesa, Sebastopol, Novorossiisk-Sochi, Istanbul, Constanta, Varna provides more jobs, particularly during the summer season (UNDOC).

3.3.2 Major pressures related to human activities and impacts

Political transformation on the post-Soviet territory caused in 1990th significant economic decline resulted in the decreasing pressure on coastal and marine ecosystems (except Turkey). In late 1990th, recovery of the economies of the Black Sea countries increased pressure on the coastal and marine environment due to the fast development of regional infrastructure (urbanisation, enlargement of touristic centres, harbours, terminals and industrial complexes, energy generating installations, pipelines, etc.).

Economic and other kind of human activities in coastal region during 2009-2014 kept pressure on the marine and coastal environment ongoing. Natural features of the region has increased and effect of this pressure. The Black Sea is practically landlocked because has very narrow connection with the ocean and restricted opportunity to exchange marine waters with World Ocean. These circumstances make the region especially vulnerable and sensitive to influence different natural and economic pressures. The state of the natural component of the coastal zone of the Black Sea indicates that both terrestrial and marine ecosystems are suffering from massive anthropogenic influence (UNDOC) caused by different sectors of economic activities. In this regard, shelf area of the North-Western part of the Sea is an area of significant impact.

Severe degradation of the marine ecosystem has started in the 1980th and still ongoing in spite of undertaken efforts of the Black Sea countries and international community. Basic critical factors affecting the marine environment in the region, which were typical for late decades of the 20th century are still in place. They comprise but not restricted to extensive use of terrestrial and marine resources. In particular, in catchment Black Sea area land and water are used for intensive agriculture, forests for paper industry, and construction, rivers and the sea for navigation and commercial fishing, coastal resources for tourism, energy generation, transport infrastructure, constructing and other industries. To meet increasing demands for oil and gas, coastal and marine areas used for pipelines construction. As a result, natural landscapes are deteriorated and gradually replacing by anthropogenic landscapes.

Another problem is the water quality. Rivers run-offs, oil and gas extraction activities, atmospheric deposition, intentional and accidental discharged from vessels are the main sources of pollution. Rivers flows are polluted by agriculture, industries, communal wastewaters, transport and others sectors located in the Sea basin. Over 300 rivers running into the BS drain almost half of Europe and significant parts of Eurasia. The main rivers are the Danube, Dnieper and Don, which are the second, the third and the fourth major European rivers.

The estimated maximum annual river discharge entering the Black Sea and Azov Sea is of 480 km³ (ESPON, 2013). Polluted rivers' run-off cause sufficient deterioration of the marine ecosystem. Sources of pollution locate both at the coastal zone and the overall catchment area. Management of the impact requires consolidated efforts of the catchment area states.

Pollutions cause direct and indirect impact on marine ecosystem. In particularly, pollutions represented by heavy metals, oil and others harmful substances are causing toxic effect on biota directly. Suspended solid particles decrease sun rays penetration through water layer and thus

depress development of benthic biocenoses and pelagic algae and other organisms. Mineral and organic fertilizers originated from agricultural fields stimulate microflora bloom (eutrophication) and in such a way cause destructive effect and damage coastal water biocoenosis.

In general, quality of coastal water is far away from the natural level due to the bad management and bays, golfs and harbour area of large cities in particular (e.g., Constanta, Odesa, Sebastopol, Novorossiysk, Poti, Batumi, Trabzon, Istanbul, Varna, etc.) are the most polluted areas in the Black Sea (UNDOC).

Other factors of effects on the marine environment related to harbour and coastal activities. Dredging, coastal and off-shore construction (e.g., construction of oil/gas facilities, pipelines, coastal protection installations, wave breakers, etc.) are harmful for benthic communities, and directly and indirectly deteriorate bottom landscapes and depress phytoplankton and benthic macrophytes as a result of dumping huge amount of silty mud. Dredges and some fishing practices damage bottom landscapes biocenoses and have a significant impact on the ecosystem. Unsustainable fisheries and extraction of other living resources (e.g., biomass of *Philophora* algae) are destroying the fish stock and macrophytes fields. Decreasing of the population of fish species is provoking further negative processes in marine ecosystem and push ecosystem evolution in unpredictable way.

Depressing biota of the marine ecosystem and decreasing its productivity due to pollution of the coastal water, coastal and bottom landscapes transformation activities, and unsustainable exploitation of living resources still constitute one of the most problems of the BS environment.

Key economic activities and their impact on the marine and coastal environment summarized in Table 3.3.4.

Table 3.3.4. Anthropogenic activities affecting directly the marine environment.

Pressure	Economic activity	Sub-activity / Marine water use
Biological disturbances Deterioration of marine ecosystem	Fisheries	Living resources catches Fish / Mollusks
Deterioration of coastal and marine ecosystem: Damages to the physical environment (in terms of geological and geomorphological integrity, as well as constructed shoreline / infrastructure)	Anthropogenic origin structures (including the construction stage)	Coastal protection & protection against flooding
		Harbor operation
		Emplacing and operating offshore structures (other than those producing energy)
		Oil/gas extraction
Nutrient and organic substance enrichment	Human settlements, Industry, Agriculture	Waste water discharges from industry/emissions;

Pressure	Economic activity	Sub-activity / Marine water use
		Waste water discharges from municipalities; Nutrients discharged by the rivers
Hazardous substances contamination	Industry	Hazardous substances discharge by the rivers

Source: UNDOC

Climate change

Apart of the described factors of pressure on the environment in the BS region, there is a strong scientific evidences that the global warming in recent decades is becoming one more significant factor of influence on many physical, societal and biological systems. Key indicator of the global warming is rising surface air temperatures, and main consequences of this uncontrolled phenomena are retreating and melting glaciers, increasing average global sea levels and changing functioning ecosystems.

Climate change (CC) is natural process however there is a strong scientific consensus that human activity significantly contribute to this process accelerating temperature increase. Human-induced climate change is caused mainly by greenhouse gas emissions from industry, transport, agriculture and other vital economic sectors. Carbon dioxide makes one of the largest contribution to enhanced climate change. BS coastal activities promotes climate change by utilizing fossil fuels (coal, oil and gas), which are the greatest source of humanity's carbon dioxide and carbon oxide emission. Industry, agriculture, deforestation and other land-use changes also release large amounts of carbon dioxide and other green-house gases. Domesticated animals, rice paddies and waste management (in particular, the disposal and treatment of garbage and human waste) comprise other sufficient sources of methane emission. All these activities and processes are taking place in coastal zone.

The BS region is under impact of global climate change tendencies. Global temperatures continue to increase. The global average temperature is estimated to have risen by 0.6°C over the course of the 20th century, and there are few scenarios of following development (Stakeholders Conference, 2014). Although the rate of warming varies from year to year due to natural variability, the human-induced warming trend has continued. 2001-2010 was the warmest decade on record since modern temperature monitoring began around 160 years ago. The global combined land-air surface and sea-surface mean temperature for the decade is estimated at 0.47°C above the 1961-1990 average of 14.0°C. Globally, 2010 is estimated to be the warmest year ever recorded since modern measurement began, closely followed by 2005. No single year since 1985 has recorded a below-average mean. The 2001-2010 decade was also the warmest ever recorded for each continent. Europe and Asia recorded the largest average temperature anomaly for the decade (+0.97°C) (Stakeholders Conference, 2014). Climate processes have some specifics in the BS region. Short-term periods of increased temperature in summer, increased number of extra-ordinary meteorological phenomena, warmer in general winter seasons are typical features of the climate change consequences in the BS region.

Addressing climate change is focusing first of all at mitigation of this phenomenon, however CC creates as well some new opportunities. In particular, some areas of human activity may benefit taking advantage of CC. The prolongation of the warm season near the Black Sea coast

(a season relatively short compared with the Mediterranean similar locations) caused by warming is beneficial for tourism sector. Tourist demand in mountain and coastal resorts, following the need of urban inhabitants to escape the city heat waves, is resulted as well from CC consequences.

At the same time the warming has explicit health implications. A lot of people are sensitive to sharp temperature and pressure drops and increases, and these obstacles are have to be controlled in order to prevent health disorders. Warming is to changing boundaries of habitats of animals and insects, including the peddlers of dangerous infectious diseases (e.g., tick-borne Lyme disease, tick-borne encephalitis, hemorrhagic fever, West Nile fever). Warming is a factor of fast induction of new and transformed viruses threatening health and life of human and other living organisms. Therefore, medical institutions of the BS region are considering approaches to prevention, diagnosis and treatment of atypical for the area of diseases.

3.3.3. Consequences of environmental change

Over the last decades an increase human (economic activities) and natural (climate change) drivers and pressures, described in the previous section, caused substantial degradation of Black Sea. The time were the Black Sea had a remarkably stable ecosystem past away in the second half of the 20th century. Economic depression in the 1990th in post-Soviet countries and consolidated measures undertaken by littoral countries and international communities promoted positive changes in the marine ecosystem. Environmental restoration created opportunities for economic activities.

- Acceleration of an economic activities at the end of 1990th and in the first decade of the 2000s on the BS coast area (in particular, constructing new hydrocarbon pipelines, developing energy, transport, military and industrial infrastructure) increased pressure on the marine and coastal environment after decade. During 2008-2014, monitoring activities and research programs showed similar consequences and tendencies, which were described for the Black Sea ecosystem in the second half of 1990th.
- • Decline in the Black Sea fisheries was irreversible. According to the modern estimation, about 85 percent of the Black Sea stocks are fished at biologically unsustainable levels (Tsikliras A.C. at al., 2016). In spite of the difference in sustainability of the demersal and pelagic fish stocks (demersal stocks experience higher fishing mortality rates than small pelagic stocks), the majority (85 percent) of stocks for which a validated assessment available are fished outside biologically sustainable limits (Tsikliras A.C. at al., 2016). Fish stocks are slowly decreasing. It has negative consequences for fishery sector and put it in face of losing sources of its existence and development.
- • Natural habitats, notably wetlands and shelf areas, supporting important biotic resources are still under anthropogenic impact (amount of polluted water discharged into the Sea has been decreased but not prevented and depends on economic activities on the coast; littering of coastal and marine environment represents increased threat for biota and human health). It means that developing tourism, recreation and health sectors have worse quality of ecosystem services.
- • Some progress was achieved in the field of the protection of coastal biodiversity, ecosystems and landscapes. In particular, in 2008-2014 several new national parks and natural reserves were established in the Ukrainian part of the BS coastal zone – in Odesa, Mykolaiv, Kherson oblasts and in AR Crimea. Ukraine has designated 2

exclusively marine protected areas – State Botanic Reserve Filophora Field (2008, Odesa Bay) and State Botanic Reserve Small Filophora Field (2012, aquatory between AR Crimea and Kherson region). At the same time these optimistic steps were not supported by strong management and appropriate resources for implementation of the effective protective programs and activities. The cumulative positive impact of these measures is in hindering ongoing degradation of natural landscapes and biodiversity, creating some job opportunities and preconditions for new touristic activities.

- • Dynamic quality of coastal water impacted by pollution from multiple coastal sources and off-shore installations and activities is an issue for rapidly developing touristic sector in all BS countries.
- Consequences of economic activities and environmental changes have not depressed value of the Black Sea goods and services, which remain key factors of socio-economic development of coastal communities.

Hydrocarbon Resources. In spite of political and military tensions between some BS countries (Russian Federation- Ukraine, Georgia –Russian Federation) and arisen from these processes economic difficulties and uncertainties, exploitation of hydrocarbon deposits in the North-West shelf and in other part of the BS is inevitable and will be accelerated. It will create new jobs and generate energy resources for littoral countries. Meanwhile, it creates significant threat to the marine environment and require responsible management and coordinated actions among BS countries.

Fish stock. The status of the Black Sea fisheries was evaluated for the period 1970-2010 (FAO, 201, Tsikliras A.C. at al., 2016). All indicators used for assessment (e.g., temporal variability of total landings, the number of recorded stocks, the mean trophic level of the catch, the fishing-in-balance index, the catch-based method of stock classification) confirmed that the fisheries resources of the Black Sea are exhausting and at risk from overexploitation. The pattern of exploitation demonstrates that the BS fisheries is in a worst shape. In the BS, total landings, mean trophic level of the catch and fishing-in-balance index were declining.

To make possible stocks recovering, the country need to introduce regular, more detailed and extensive stock assessments of all commercial and supportive species, which create background for reasonable conservation and management measures. Meanwhile, sensitivity of the fishery to human impact stimulates development more sustainable and less dependent aquaculture sector

To make possible stocks recovering, the country need to introduce regular, more detailed and extensive stock assessments of all commercial and supportive species, which create background for reasonable conservation and management measures. Meanwhile, sensitivity of the fishery to human impact stimulates development more sustainable and less dependent aquaculture sector.

Ecosystem services. Tourism is based on ecosystem services of the BS environment (recreational resources, beaches, sands, friendly water and sun, natural beauties and attractions, etc.) and developing very fast. Tourism is one of the most promising sectors in terms of sustainable use of coastal and marine goods and services. The coast and marine area still have huge but restricted potential to provide necessary goods (food and accommodation facilities) and services for local and foreign tourists. Developing tourism infrastructure in Georgia, northern part of Turkey, Odesa region in Ukraine, Krasnodar Krai in the Russian Federation, as well as improvement of coastal infrastructure of Bulgaria and Romania is expected to be the key trend in nearest decade.

Tackling issues like deterioration of natural habitats, pollution prevention, supporting fish and other living resources stock, irresponsible exploitation of hydrocarbon and mineral resources of the BS bed, and others will improve the quality of an environment and facilitate the development of those maritime activities that are dependent on a healthy environment, such as fisheries, aquaculture and tourism.

3.3.4. Responses: countries activities to address problems

In 2009-2014, the BS countries demonstrated economic growth accompanied with intensive expansion on the natural coastal areas and negative impact on the marine ecosystem. Response to changes in the BS environment affecting socio-economic landscapes of the littoral countries required coordinated and consolidated efforts at the national and regional level. Basis for regional cooperation was created by the Convention on the Protection of the Black Sea against pollution (Bucharest Convention, 1992) supplemented with its Protocols and follow-up non-legally binding acts (e.g., Black Sea Strategic Action Plan, 1996, 2009). The Convention remained as a key framework for cooperation in 2009-2014. Regional cooperation was supplemented with international cooperation among Black Sea riparian countries, European Union, UN agencies and international financial organizations.

One of the areas of such cooperation is climate change prevention and adaptation. All the Black Sea littoral states have signed and ratified the UN Framework Convention on Climate Change and the Kyoto Protocol to the Convention. Meanwhile, actual implementation of the provisions of these legal acts has been sporadic in 2008-2014, with little regional coordination. It makes sense to consider the possibility of a Black Sea countries to strengthen regional coordination of possible actions in terms of prevention and adaptation to CC including regional emissions trading scheme.

In spite of the limits of the coastal zone have not been formally defined in all riparian countries (actually, only Romania and Bulgaria has legal ground for coastal zone limitation), the ICZM concept and principles were introduced in BS countries. At the same time, common legal document or guidelines on methodology of the ICZM for the BS states is not developed and improved. Romania has legislation in force directly related to ICZM. Others countries apply certain ICZM principles through spatial planning legislation (Bulgaria), Shore Law (Turkey), Urban Planning Code (the Russian Federation). Georgia and Ukraine have developed draft legislation for ICZM but adoption and enforcement is suspended due to lack of political will. Therefore, adequate planning of coastal development and inter-sectoral coordination at national and regional levels are still required countries activities to address problems. In this regard, the Black Sea Commission and its bodies (Permanent Secretariat and the Advisory Group on the Development of Common Methodologies for Integrated Coastal Zone Management), provides the international framework for the coordination and advancement of ICZM in the Black Sea Region. The Commission considers ICZM methodology as key instrument for sustainable development of the coastal communities. Details of the context and activities of ICZM and its role in governance of the coastal development described in details in the following chapter.

Cooperation of the BS countries with EU promoted multi-dimensional development and made sufficient contribution to economic growth in the BS region. Such cooperation takes place largely on a bilateral basis, and is supplemented with multilateral cooperation, aimed at supporting and promoting mutually beneficial sectoral initiatives. In 2008 – 2014, such initiatives included but not restricted the Interstate Oil and Gas Transport to Europe (INOGATE), the Transport Corridor Europe-Caucasus-Asia (TRACECA), the Black Sea Pan-European Transport Area (PETrA), the Danube-Black Sea Task Force (DABLAS). These

initiatives promoted deeper regional integration for the Black Sea region as a whole and strengthened capacities to prevent and overcome regional and global challenges.

Countries are planning framework for the “blue growth” in the BS region (Tsiaras K., 2010). “Blue Growth” is a new concept and an important element of the Integrated Maritime Policy (IMP), which is a cross-sectorial policy that seeks to provide a more coherent approach to maritime issues, with increased coordination between different ministries, with the public authorities and the private sector, with regions and with other countries. The EU has laid down objectives for the Black Sea basin as well as for other regional seas. Marine and maritime growth will be reflected in all EU funding instruments for 2014-2020 as well as in other maritime investment and research priorities. Blue Growth is a key component of this policy by addressing difficulties that hinder sustainable growth in a number of maritime sectors. In this regard, EU provides support to the projects clarifying maritime policies and developing instruments for implementation of such policies.

In particular, for Bulgaria, Romania and Turkey, most promised and relevant sectoral activities were identified (Tsiaras K., 2010). Exercises were based on the analysis of maritime economic activities (MEAs) and the Countries’ Fiches. Identified four groups of activities, important for “blue growth”, are presented in the table below and can be applicable for planning development of coastal zones by other Black Sea countries.

SECTORAL THEMES (ACTIVITIES)	Increasing regional attractiveness - Coastal tourism - Yachting and marinas - Cruise tourism	Ensuring regional energy security - Offshore oil and gas - Offshore renewable energy
	Connecting the region - Port and coastal / river infrastructure - Inland waterway transport - Ship-building and repair - Short-sea shipping	Sustainable utilization of living aquatic resources - Marine aquaculture - Fishing for human consumption

In addition to these sector-driven thematic ‘pillars’, the proposed Black Sea sea-basin approach has been supplemented with important cross-cutting horizontal actions that are necessary to underpin the sustainable and balanced long-term growth of maritime economic activities. Identified four key groups of cross-cutting ‘Horizontal Actions’ are presented in the table below.

HORIZONTAL ACTIONS	Planning a blue economy <input type="checkbox"/> Maritime Spatial Planning and ICZM <input type="checkbox"/> Integrated local development	Developing knowledge <input type="checkbox"/> Joint data collection, monitoring and sharing
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	<input type="checkbox"/> Development of smart infrastructure	<input type="checkbox"/> Capacity-building across individuals, institutions and society <input type="checkbox"/> Sharing maritime culture and heritage
	Supporting business growth <input type="checkbox"/> Facilitating access to finance <input type="checkbox"/> Promoting innovation through applied Research and Development <input type="checkbox"/> Development of maritime clusters	Enhancing the Environment <input type="checkbox"/> Preserving, protecting and improving the quality of the coastal and marine environment and heritage <input type="checkbox"/> Ecosystem monitoring <input type="checkbox"/> Building resilience to the impacts of climate change

Through coordinated efforts applied in the reporting period, the BS countries demonstrated some progress in socio-economic development, which was not accompanied with expected improvement of the state of environment in the region.

Conclusion and Recommendations:

1. During reporting period the Black Sea countries have demonstrated steady economic growth. Socio-economic processes in Black Sea coastal area strongly depend on the local economic and societal activities as well as trends of national and global levels.
2. Global economic crisis of 2008 was not crucial for coastal economies and the BS littoral states demonstrated strong potential for rehabilitation and further growth.
3. Tourism is an accelerator for many other sectors of the BS littoral states economy.
4. Despite importance of the fisheries, this sector has historically lacked an integrated management strategy and sustainable development.
5. Natural habitats of coastal and marine environment remain under pressure of mainly land-based human activities. In spite of establishing new protected areas (national parks and natural reserves) on the coast and in open sea, degradation of ecosystems is not prevented and biodiversity decline is ongoing.
6. On-going urbanization, infrastructure development, offshore exploitation of hydrocarbon deposits are the key factors of economic development in the nearest future. Strengthening of cooperation, enhancement of political links, between the riparian states as well as the relevant technical assistance for them from international community are therefore needed in order to ensure implementation of the principles of sustainable development of the Black Sea region.

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