

# NON-TECHNICAL SUMMARY

## INTRODUCTION

The Government of Montenegro has adopted the Law on Exploration and Production (E&P) of Hydrocarbons in 2010 (OGM 41/10 and 10/11) which is fully harmonized with the EU Directive 94/22/EC (Hydrocarbon Licensing Directive). The Law regulates the conditions, manner and procedure of exploration and production of hydrocarbons, as well as other matters of significance for exploration and production of oil and gas. The Government has adopted the Decision on determining the units for exploration and production of hydrocarbons (OGM 17/11). This Decision establishes the units that are to be the subject of the first tender for award of contracts for exploration and production of hydrocarbons.

The offshore hydrocarbon E&P was also included as a key strategic commitment (Commitment No.8) of Montenegro's 2030 Energy Development Strategy which advocates exploration for oil and gas offshore and for coal in the Pljevlja and Berane basins.

Accordingly, the Government of Montenegro, represented by the Ministry of Economy, announced the first public invitation for the award of the concession contract for exploration and of the concession for production of hydrocarbons in Montenegro offshore area in August 2013. In the first bid round the Government offered 13 blocks/ parts of blocks in the offshore area for the Production Concession Contract as indicated in Figure 1.

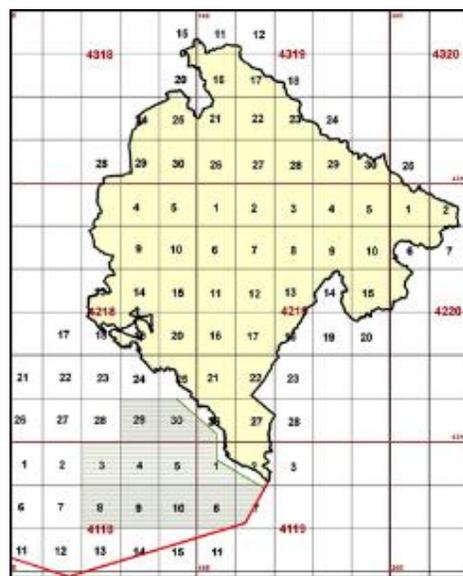


Figure 1 Montenegro Offshore Blocks

Pursuant to the above legal commitments, and based on good international practice in the industry of hydrocarbon exploration and production, the Ministry of Economy passed a decision to develop a strategic environmental assessment (SEA) for the programme of exploration and production of hydrocarbons in the offshore of Montenegro. The Law on the Strategic Environmental Assessment (OGRM 80/05, OGM 73/10, 40/11, 59/11) defines an obligation for the implementation of the procedure of the strategic environmental assessment. The SEA is to be carried out for plans and programmes when there is a possibility that their implementation would cause significant environmental effects. Development of the strategic environmental assessment is mandatory for the activities from the field of energy and industry which provide a framework for the future development of projects that are subject to the environmental impact assessment pursuant to a special act, and for the plans and programmes, which given the territory of their implementation may affect protected areas, natural habitats or preservation of wildlife.

The Environmental Consultants (Center for Architecture and Urbanism (CAU); the Institute of Researches and Development Regarding Protection at Work (ITI), and Earth Link &

Advanced Resources Development (ELARD)) were awarded the contract to prepare the Strategic Environmental Assessment of Hydrocarbon Exploration and Production (E&P) Activities in Offshore Montenegro. The overall goal of the project is to assist the Ministry of Economy, at the earliest possible stages of decision making, in sustainably managing the E&P activities in offshore Montenegro and fully integrating major environmental and social concerns in subsequent planning stages, including the upcoming licensing round and contract negotiations with oil and gas companies prior to awarding any exploration contracts.

## OVERVIEW OF HYDROCARBON EXPLORATION AND PRODUCTION ACTIVITIES

A specific Exploration and Production (E&P) programme of activities can not be defined until licenses are awarded to Oil and Gas (O&G) operators, which in turn will define detailed E&P activities. A typical program would consist of three main phases:

- Exploration Phase: including pre-drilling surveys, exploratory drilling and appraisal  
An operator would most probably need to carry additional site investigations (geological/geophysical, sub-sea investigations as well as environmental) during exploration before proposing the final drilling site and mobilizing a drilling rig. These are required for better localization of the prospects and are critical for surveying the seabed and shallow zones so that potential drilling hazards can be anticipated.  
After having identified potential drilling locations, an operator would mobilize a rig to start drilling one or more exploratory wells within the boundaries of the awarded block. This aims at proving the existence of hydrocarbons within the identified prospect.  
In the event that hydrocarbons are found within one of the wells, the well would be tested to assess the commerciality of the discovered quantities. Wells which prove to be productive will be held and plugged following industry standards in order to be completed at a later stage and used in production. Depending on findings, the reservoir might be appraised by drilling additional wells and carrying more tests.  
If the discovered reservoir is deemed non-commercial, the drilled wells would be permanently plugged with cement or mechanical plugs and abandoned.
- Production Phase: including development and production  
A Field Development Plan (FDP) is typically prepared based on exploration and appraisal results. This serves as a conceptual project specification for subsurface and surface facilities, and the operational and maintenance philosophy. Once approved, a sequence of activities will follow prior to first production from the field. These would include procurement of construction material, fabrication and installation of facilities as well as commissioning of all plant and equipment. Development planning and production are based on the expected production profile. This shall determine the facilities required and the number and phasing of wells to be drilled.  
A variety of development and production systems could be used within the licensing area. The type of facilities selected by an operator is based on several factors, including water depth, reservoir type, as well as proximity to existing oil and gas infrastructure and support operations.
- Decommissioning Phase:  
When all economical reserves are depleted, the field will be decommissioned. A preliminary decommissioning plan for offshore facilities should be developed that considers well abandonment, removal of oil from flowlines, facility removal, and sub-sea

pipeline decommissioning along with disposal options for all equipment and materials. This plan can be further developed during field operations and fully defined in advance of the end of field life. The plan should include details on the provisions for the implementation of decommissioning activities and arrangements for post decommissioning monitoring and aftercare.

## LEGAL FRAMEWORK

Montenegro is a leading country in environmental awareness. In 1991 deputies of the Parliament of Montenegro decided to do something that no other state had ever considered, which is declaring Montenegro as the world's first ecological state. This declaration was stipulated in the country's constitution in 1994, Article 1 "STATE" stipulates that: Montenegro is a democratic, social and ecological state. The latest Constitution adopted in 2007 also stipulates in Article 1 that "Montenegro is a civil, democratic, ecological and the state of social justice, based on the rule of law".

Environmental principles in Montenegrin legislation are incorporated in many laws, mainly:

- Law on Environment (Official Gazette of Montenegro, No 48/08, 40/10, 40/11). With this Law, Montenegro proclaimed itself an ecological country, and local authorities need to work on promoting quality of human environment, reduce all the factors with adverse impact on human life and prevent any harmful impacts on people.
- Law on Strategic Environmental Impact Assessment (Official Gazette of the Republic of Montenegro 80/05 and Official Gazette of MNE No. 73/10, 40/11 and 59/11).
- Law on Environmental Impact Assessment (Official Gazette of the Republic of Montenegro, No 80/05, Official Gazette of Montenegro, No 40/10, 73/10, 40/11 and 27/13). As per Annex 1 to this Law, hydrocarbon exploration and production activities are subject to EIA studies.
- Law on Nature Protection (Official Gazette of Montenegro, No 51/08, 21/09, 40/11 and 62/13).
- Water Law (Official Gazette of Montenegro, No.27/07 & Official Gazette of Montenegro, No. 32/11, 47/11).
- Law on Air Protection (Official Gazette of Montenegro, No.25/10, 40/11).
- Law on Waste Management in Montenegro (Official Gazette of Montenegro, No.64/11).
- Law on Integrated Environmental Pollution Prevention and Control (Official Gazette of the Republic of Montenegro, No 80/05).
- Law on Environmental Noise Protection (Official Gazette of the Republic of Montenegro, No 28/11).
- Law on protection of sea against pollution from vessels (Official Gazette of Montenegro, No 20/11 & 26/11).

Montenegro is signatory of over 50 international conventions and treaties related to environment protection; also several EU directives apply to environment protection in Montenegro.

**Several policies are proposed to be adopted to ensure that oil and gas activities are conducted in a sustainable and environment friendly manner. Such policies include:**

- ✓ not allowing discharges at sea from drilling activities( drilling cuttings, drilling fluids and produced water);
- ✓ obliging oil and gas operators to dispose of hazardous solid wastes resulting from their activities at existing facilities available outside Montenegro;
- ✓ not allowing unnecessary emissions to the air;
- ✓ enforcing strict procedures to be followed by oil and gas operators to avoid accidents and chemicals/hydrocarbon releases in the Adriatic Sea, including the preparation and prior approval of a spill contingency and response plan before starting any activities.

Furthermore, and following the Norwegian model, the majority of the revenues from oil and gas activities shall be deposited in a special fund (sovereign wealth fund) to be used for the needs of future generations. Other revenues will support the current development of the country and will be used to support priority sectors in Montenegro such as tourism and environmental protection.

One of the requirements of the SEA Law ("Official Gazette of MNE", No. 80/05, Official Gazette of MNE, No. 73/10, 40/11) and the EU SEA Directive (2001/42) is consultation with the public, environmental authorities and other bodies, together with such neighboring states as may be potentially affected. Stakeholder input has been fed into the SEA process from an early stage through scoping and is sought prior to finalizing the SEA report.

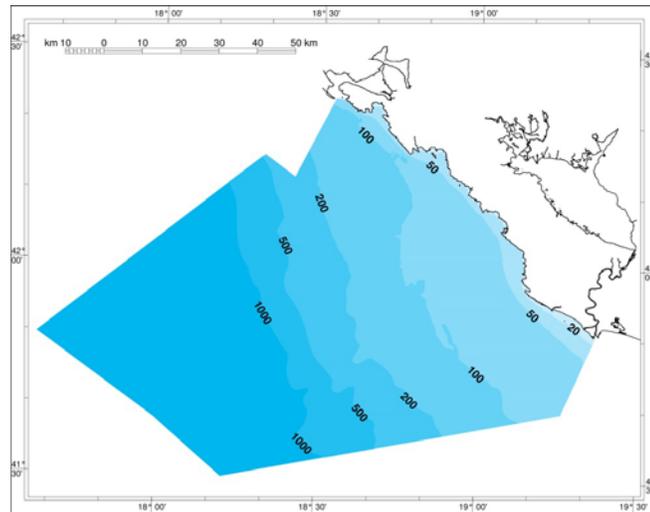
## **OVERVIEW OF BASELINE ENVIRONMENT**

Information about the environment in the offshore Montenegro has been collected in order to characterize and assess the sensitivities of those features that might be affected by the proposed hydrocarbon E&P Programme or that could affect the programme. The following section provides a brief summary of the baseline environment.

## PHYSICAL ENVIRONMENT

### *Bathymetry*

Bathymetry of the Offshore Montenegro is shown in Figure 2. The area of the continental shelf (area limited by depth of 200 m) covers 43,5% of the total offshore area; the bathymetric belt of 500-1000 meter depth covers 10,4%; the bathymetric belt over 1000 meters depth covers 33,7%; and depths up to 20 m are located within a very narrow belt along the shore and they account for 0,9% of the offshore area (outside Boka Kotorska bay).



**Figure 2 Bathymetry of Offshore Montenegro**

It shall be noted that borders of offshore Montenegro has not been precisely defined, because delineation with adjoining countries is not fully executed; thus the calculated percentages above are considered approximate.

### *Waves*

Most frequent waves in southern Adriatic are generated by Bora winds (north-east), Sirocco (south-east) and Maestral (north-west). Dominant waves in the southern Adriatic in winter are from south-east and north-west directions; from south-east direction in spring; from north-west in summer; and from north-east in autumn.

### *Currents*

The basic characteristic of currents in the southern Adriatic is the entrance of currents in winter period. Direction of currents in the entire profile, from the surface to the bottom, is quite parallel along the shore, and water masses transport occurs from South East to North West. Intensity of currents varies according to time (months), climate and depth.

In summer months, movement of sea mass has diverse direction and stronger intensity, especially in the surface layer. Speed of the currents reduces substantially with the increase in depth, and general currents flow direction is East and South East. Unlike in winter, impact of sea tides is visible in summer. In spring and autumn, presence of transversal currents with greater frequency of flow from the shore to the open sea is notable. Flow per layers differs in speed and direction.

## ENVIRONMENTAL QUALITY

### *Air Quality*

Air quality is monitored in Montenegro through eight (8) stations. Air quality is affected the most by industrial activities and emissions resulting from the combustion of fuels in large and small furnaces, and internal combustion engines. This is mostly reflected on the concentration of particles (particulate matter), which is the biggest problem for air quality in Montenegro. High concentrations were most pronounced during the hot season, mainly due to the use of solid fuels (coal and wood). Air quality assessed in terms of the concentration of SO<sub>2</sub>, NO<sub>2</sub> and O<sub>3</sub> is within the prescribed threshold limit values, with no major concentration variations on an annual basis.

### *Greenhouse Gas Emissions*

Montenegro is among the Non-Annex 1 Parties of the United Nations Framework Convention on Climate Change, thus has no obligation of quantified reduction of emissions of greenhouse gases (GHG). The country is however required to periodically prepare GHG inventories as a part of its National Report/ Communication to the UNFCCC and must report on the steps it is taking or envisage undertaking to implement the Convention.

GHG emissions in 2010 were equivalent to 0.01% of global emissions. Based on the initial national communication report of Montenegro (2010) the energy sector had the highest share in total emissions in 2003 equals to 49.9%, the share of industrial processes was 35.5%, agriculture accounted for 12.3% and waste accounted for 2.3%. The sub-sector of transport contributes to the anthropogenic emissions primarily through fuel consumption in road transport (90% of energy consumption in the transport sector,), while the total contribution of this sub-sector to the total emissions from energy sector amounts to 15.3%.

### *Sea Water Quality*

Temperatures of sea water of the Adriatic Sea fall behind relevant values of air temperatures for about a month. Lowest temperatures are recorded in February, and highest in August.

In the area of southern Adriatic, seasonal sweetening of surface water happens quite frequently. The highest is spring sweetening and the smallest is autumn. Fresh water comes from Bojana River and northern Albanian rivers. Average values of temperature, salinity and water density offshore of Montenegro are presented in Table 1.

**Table 1** Average Values of Temperature, Salinity and Water Density Offshore of Montenegro

Season	Mean Temp (°C)	Mean Salinity (‰)	Mean Density ( $\sigma_t$ )
Winter	14.28	38.52	28.86
Spring	15.12	38.58	28.72
Summer	15.81	38.72	28.65
Autumn	16.17	38.67	28.52

The highest transparency in the southern Adriatic is in summer with an average of 32.6 meters. Lowest mean transparency is recorded in autumn (21.5 meters). Mean transparency in winter of 24.4 m is slightly lower than spring which amounts to 25.2 m.

Blue color of sea is dominant in summer at the entire area of the southern Adriatic, including offshore Montenegro. In autumn, the impact of rainfall and inflow of fresh water is evident as the color of the sea corresponds to V degree of Forel scale (blue-green color). At certain points, the sea is dark-green which corresponds to VII degree per Forel. Sea color changes in different seasons in Montenegro are presented in the Table 2.

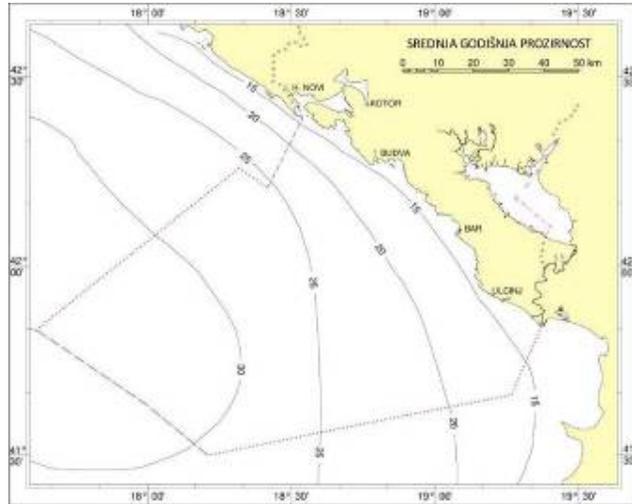


Figure 3 Mean Annual Transparency in Meters

Table 2 Range of Sea Color (Degree per Forel-Ule) in the Southern Adriatic

Winter		Spring		Summer		Autumn	
Degree per F-U scale	Color range	Degree per F-U scale	Color range	Degree per F-U scale	Color range	Degree per F-U scale	Color range
II to V	Blue to blue-green	III to VII	Light blue to dark green	II to IV	Blue to dark blue-green	II to V	Blue to blue-green

*Sediments*

Based on the study on “Physical-oceanographic and Hydro-acoustic Properties of Adriatic Offshore”; HIJRM Split 1990 and the Atlas of recent sediments in Adriatic Sea, scale 1: 750 000, HIJRM, Split, 1985, and as shown in Figure 4, main types of sediment are: Mud, muddy sand, sandy mud, fine sand, and coarse sand and scratched rocks.

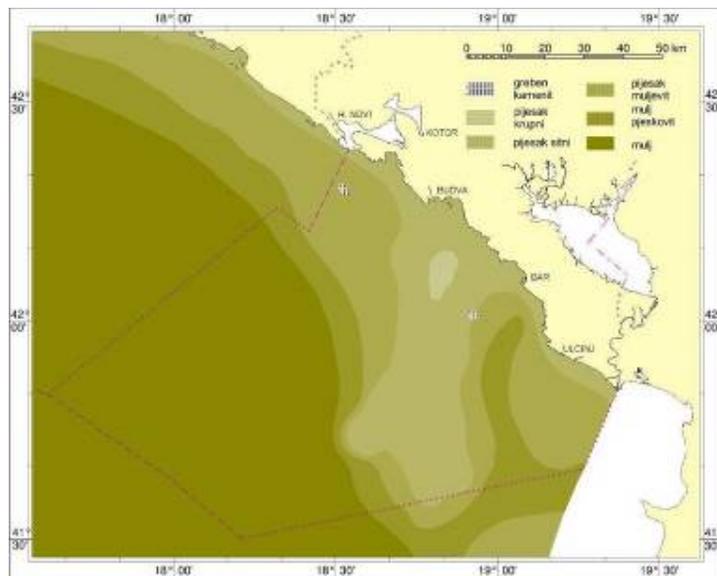


Figure 4 Recent Sediments in the Adriatic Sea

## ECOSYSTEMS AND BIODIVERSITY

Neither flora nor fauna of Adriatic Sea or Mediterranean Sea are sufficiently explored. This particularly refers to benthic endobionts, in particular interstitial or mesofauna, followed by parasites and benthic bathyal and meso and bathypelagic fauna of the South-Adriatic Valley.

### *Phytoplanktons and Zooplanktons*

The area of Montenegrin coastal zone hosts four key groups of phytoplankton that are: *Bacillariophyceae* (Diatom); *Dinophyceae* (dinoflagellate ); *Prymnesiophyceae* (Coccolithophores); and *Chrysophyceae* (Silicoflagellates).

Phytoplankton biomass is expressed with the concentration of chlorophylls *a*. the highest average concentration of chlorophylls *a* was recorded at Ada Bojana and amounted to 1.065 mg/m<sup>3</sup>. Minimum concentration of chlorophylls *a* was recorded at Jaz (0.546 mg/m<sup>3</sup>), and it was also low at the location where microplankton was the lowest.

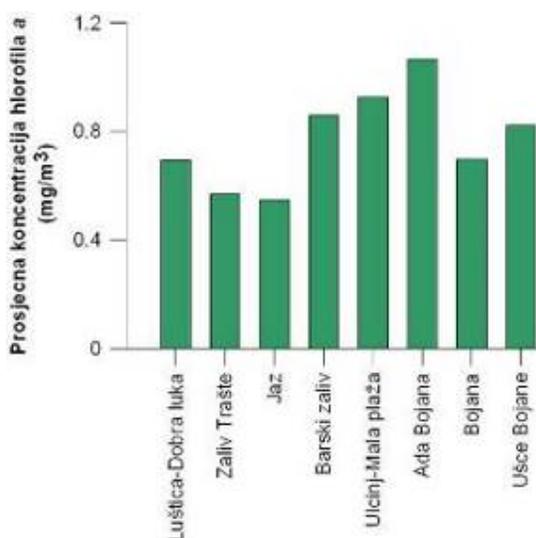


Figure 5 Average Concentration of Chlorophylls in the Surveyed Area

### *Zooplankton*

Zooplankton is a chief source of food for fish larvae, therefore it has substantial impact on their survival. Zooplankton material was collected at 8 sites in the offshore of Montenegro during 2009 within MEDPOL project. The overall amount of zooplankton per site is shown in Figure 6.

Substantially higher values were recorded at Bojana River mouth. These results were expected given that Bojana River is a basic source of fresh water.

The most numerous groups during the surveying period were copepods, followed by cladocera that were also numerous but solely over summer period. A total of 92 zooplankton species was registered during the survey period.

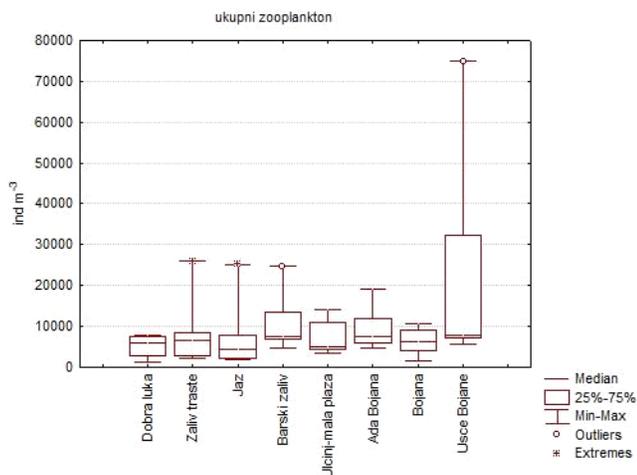


Figure 6 Total Number of Zooplanktons at Surveying Period

### *Phytobenthos and Zoobenthos*

In the study area, there are 25 species registered according to local / international legislation as rare, protected, endangered or species.

Exploration of the narrow coastal belt conducted by RAC SPA (2013) showed that 119 types of benthos (invertebrates, algae and marine flowering plants) inhabit this zone, however other studies refer to a bigger number.

Along the rocky shore, the upper part of infralittoral is often covered in well preserved meadows of *Posidonia oceanica*.

At 100 m depth, there are numerous representatives of Cnidarians, Echinodermata, tunicate, molluscs, bryozoa and spongia.

In the layer from 100 to 200 m depth, in terms of invertebrates, there are cnidarians, echinodermata, tunicate and molluscs. With regards to phytobenthos, marine flowering plants are not present at this depth. In respect to algae, there are data on the presence of *Cystoseira foeniculacea* and *C. spinosa* at depths of around 30 m (Mačić, 2010). In the zone of circalittoral, there are algae that participate in construction of coral biotic community.

In the bathyal zone of Montenegrin offshore, there are biotic communities of bathyal mud on mobile base, developed in the form of two facies. In the upper layer of biotic community at 200 to 350 meter depth, there are facies of soft muds with fluid surface skin characterized by *Nephros norvegicus*, *Thenia muricata*, *Funiculina quadrangularis*, *Parapenaeus longirostris*, etc. In the deeper part of biotic community of bathyal muds at depths between 400 and 500 m there are facies of sandy mud and fine gravel. There are well developed settlements of *Terebratula vitrea*, depth acidias *Hormathia coronata*, starfish *Brisingella coronata* and often there can be sea urchins *Cidaris cidaris* and *Echinus acutus* (Gamulin-Brida, 1974). In the area of solid substrate, there is biotic community of large branchy depth corals.

Recent explorations of the continental slope conducted during 2013 included 7 locations with depths ranging from 426 to 543 m depth showed that clay-muddy base is most dominantly populated with representatives of spongia, molluscs, anelida, crustacean, Echinodermata and fish (Angeletti *et al.*, 2014).

### *Sea Mammals*

Mammal species that can often be found in the Adriatic are common dolphin, striped dolphin, while common dolphin – once the most common species amongst dolphins in the Mediterranean – is regarded as regionally extinct species. Whales are not often found and do not reside constantly in the Adriatic Sea, but occasionally enter the Adriatic from the Mediterranean Sea. Mediterranean monk once populated caverns and caves in the Montenegrin offshore, but today this species is regarded extinct in this area.

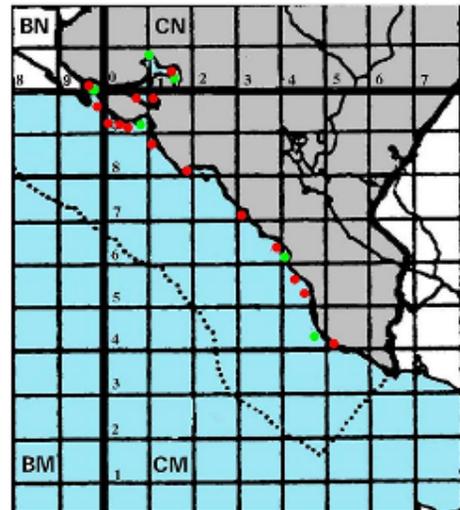


Figure 7 *Posidonia oceanica* Distribution

Common dolphin (*Delphinus delphis*), short-beaked common dolphin (*Tursiops truncatus*), striped dolphin (*Stenella coeruleoalba*), Atlantic spotted dolphin (*Stenella frontalis*) and Riso's dolphin (*Grampus griseus*), as well as the Mediterranean monk seal are species protected by Decision on placing certain flora and fauna species under protection (Official Gazette of MNE, 76/2006). Montenegro is signatory of various international conventions (ACCOBAMS Agreement, Barcelona Convention and Bern Convention) which include protection of species of sea mammals.

In summer 2013, aerial surveying of the Adriatic was organized and three types of dolphin were identified in Montenegrin waters: common bottle nose dolphin, striped dolphin and goose beaked whale (Figure 8).

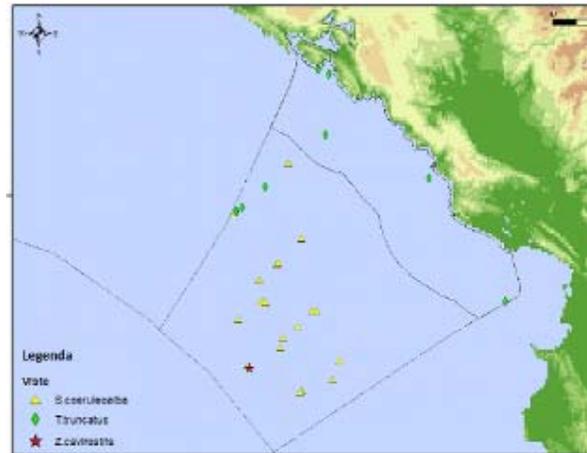


Figure 8 Whales and Dolphins Spotted in Montenegro in Aerial Surveying of the Adriatic, 2013

### Sea Turtles

The Mediterranean Sea is a home to three species of sea turtles: green sea turtle (*Chelonia mydas*), leatherback sea turtle (*Dermochyls coriacea*) and loggerhead sea turtle (*Caretta caretta*). The Decision on placing certain wildlife species under protection (O.G. MNE, 76/2006) includes loggerhead and green sea turtle, but does not include the leatherback turtle. The IUCN identified loggerhead and green sea turtle as endangered species, while leatherback is categorized as vulnerable. The loggerhead is the most frequently found turtle in the Adriatic. It breeds mainly in the Ionian Sea and the Mediterranean in general, however, there are a few nests in the Adriatic shore south of Italy.

Green sea turtle lays eggs only on few beaches in Cyprus and Turkey. It is very rare in the Adriatic. Institute for Marine Biology has a registry of young green turtle for spring 2013 at Bigovo near Kotor. The leatherback sea turtles do not breed in the Mediterranean but individuals entre the Mediterranean and Adriatic Sea in search of food. During aerial surveying of the Adriatic in 2013, individuals of loggerhead were spotted in Montenegrin waters (Figure 9).



Figure 9 Sea Turtles and Eagle Rays Spotted in Aerial Surveying of the Adriatic in 2013

Sea turtles surveying in Montenegro is at a starting point and there isn't sufficient information to estimate state of population in territorial waters and epicontinental belt on scientific basis. Such explorations require a lot of effort and funding and further researches are certainly recommended to ensure better management of resources.

*Birds*

Montenegro's location along a major migratory route (the Adriatic flyway, apart from Gibraltar and Aegean corridors, is the third most important in Europe) and diversity of natural habitats result in high avian diversity. According to Bird Life International (BLI), there are 311 species of birds in Montenegro, 12 of them are globally threatened. Among 21 species of seabirds, one is categorized as vulnerable (*Clangula hyemalis*) and one as endangered (*Melanitta fusca*), in addition to 262 migratory birds. As per BLI, Montenegro has 5 Important Birds Areas (IBAs), which are: Biogradska Woods; Durmitor; Sasko Lake; Skadar Lake; and Ulcinj Salt pans.



**Figure 10 Important Bird Areas according to the Center for the Protection and Research of Birds of Montenegro.**

According to the Center for the Protection and Research of Birds of Montenegro, there are 13 Important Bird Areas, namely: Bojane Delta, Rumija, Buljarica, Skadar Lake, Tivatska solila, Ćemovsko polje, Prokletije, Plav Lake, Niksic accumulation, Hajla, Biogradska Mountain/Bjelasica, Durmitor and Cijevne Canyon; and 7 potential sites, namely: River Zete Valley, Kucke planine, Visitor, Komovi, Golija, Pivska visoravan and Ljubisnja (Figure 10).

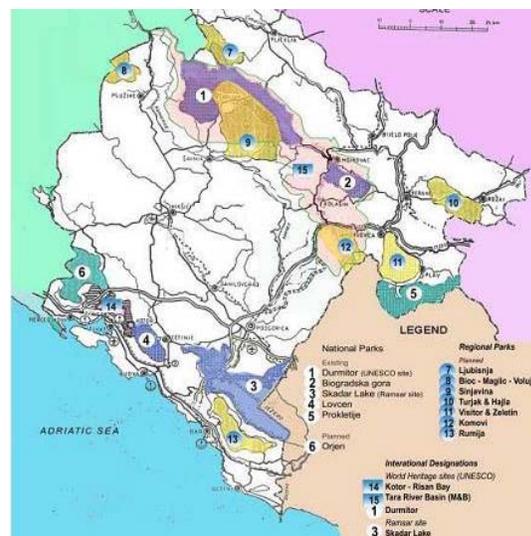
Marine birds nest either in the coastal area and small number of its islands, peninsulas and capes, but mainly in Croatian part of the Adriatic shore, i.e. islands.

*Protected Areas and Areas of Special Significance*

Based on the national legislation, a great number of natural assets in Montenegro is placed under protection, many of which protect the most important components of biodiversity in the places where it occurs (in situ protection) (Figure 11).

Internationally protected natural assets in Montenegro include: Skadar Lake National Park; Durmitor National Park; the basin of the River Tara; the Bay of Kotor and Risan.

No marine protected areas are declared in Montenegro yet. However, some areas are under consideration. Figure 12 shows the marine areas of special significance and the



**Figure 11 Protected Areas in Montenegro<sup>1</sup>**

<sup>1</sup> Fourth National Report of Montenegro to the Convention on Biological Diversity, <https://www.cbd.int/doc/world/me/me-nr-04-en.pdf>.

proposed sites for the protection, and these are as follows:

- Three areas of special significance according to the Law on Nature Protection, these are: Velika plaža, Buljarica and Tivatska solila.
- Proposed sites for the protection: Boka Kotorska gulf, Mamula up to the ness of Mačka, ness of Trašte up to Platamun (where protected area extends from ness of Žukovac to ness of Kostovica), ZPM Katič, ness of Volujica up to Dobre vode settlement, ness of Komina up to ness of Old Ulcinj (Stari Ulcinj), gulf of Valdanos up to Long Beach (Velika plaža), Seka Đeran and southern area of Long Beach up to delta of Bojana River<sup>1</sup>.

There are also three areas that are considered as centers of diversity for marine species and marine habitats. Figure 12 shows the intersection of the areas of special significance, biodiversity centers, protected areas and important bird areas in the coastal region with the proposed blocks for exploration and production.

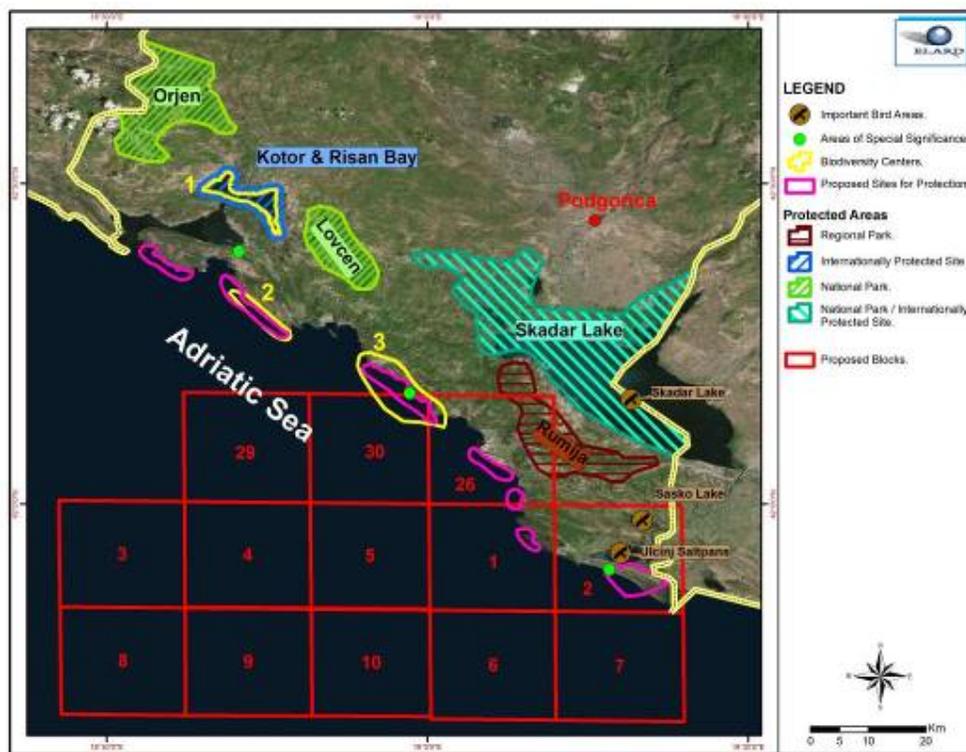


Figure 12 Intersection of Important Biodiversity Areas in the Coastal Region with the Proposed Blocks.

The EMERALD Network consists of 32 sites (Figure 13) - areas of special interest for the protection (ASCI) which should be established by the member countries present of the Bern Convention.

<sup>1</sup> Source: CAMP, RAC-SPA.

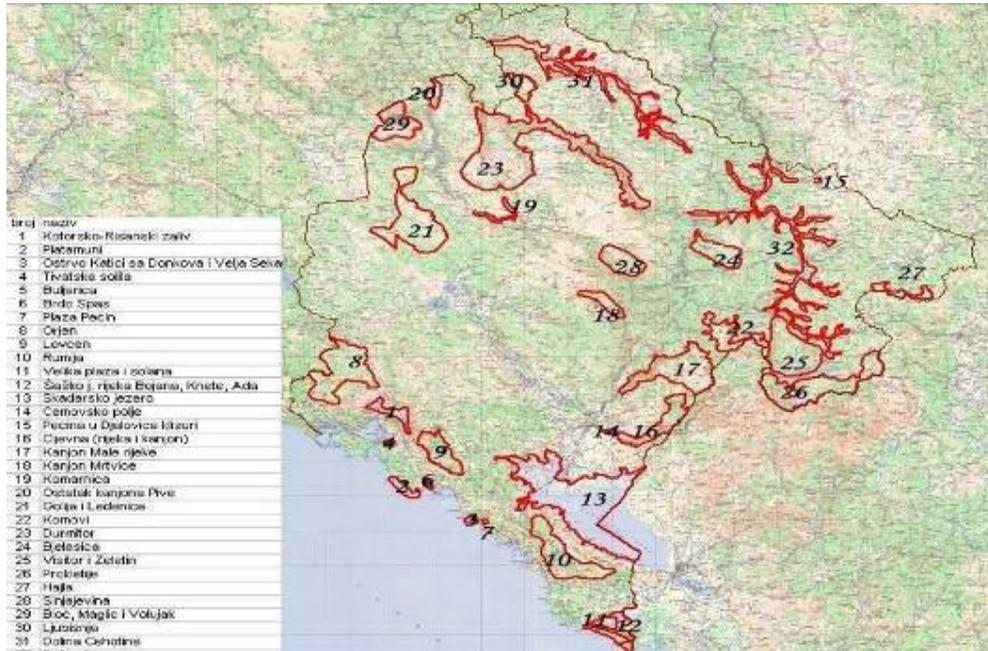


Figure 13 EMERALD Sites Network

**ARCHEOLOGICAL AND CULTURAL HERITAGE**

Montenegro has many underwater archaeological sites that are still in situ and protected by the law, and there are many more that have not yet been explored or discovered. Montenegro has two underwater archaeological sites that are protected by the law, the Bay of Bigovica in Bar and the under-ocean area between cape Strpački and cape Murove in Risan. However, there is a list of registered underwater archaeological sites which are not protected by the law, but whose cultural importance is recognized through a new group of Laws protecting cultural heritage. Their legal protection will be therefore re-evaluated.



Figure 14 Excavation at Maljevik and Bigovica © Dusan varda

- Njivice, Hercegnovski zaliv
- Malo rose
- Žanjice
- Uvala Žanjic
- Ostrvo Lastavica
- Karatoč
- Kumbor
- Zaliv Trašte
- Uvala Bigova
- Slovenska Plaža
- Katič
- Petrovac
- Luka Bar
- Rt Volujica
- Obala Velja Zabija
- Barski zaliv
- Uvala Malčjevik
- Stari ulcinj
- Uvala Pržno
- Tivatski zaliv
- Otok Gospe od otoka
- Uvala Dobra luka
- Marina Budva
- Uvala Valdanos
- Velika Plaža
- Ulcinj
- Hrid Đeran

Montenegro is also a State Party to the Convention on the Protection of the Underwater Cultural Heritage, having ratified the Convention on 17<sup>th</sup> July 2008.

## **SOCIO-ECONOMICS**

### *Employment*

The labor market in Montenegro suffers from a gap between available labor force and labor market needs which results in high degree of long-term unemployment. The unemployment problem is particularly articulated in the northern region of Montenegro. The number of employees in 2013 was 3% higher than the average number of employees in 2012.

The unemployment rate in the Coastal Region at the end of 2013 was 11.7% or 19.5% of the total number of the unemployed in Montenegro.

### *Poverty*

Absolute poverty line for Montenegro in 2012 was €182.43 per equivalent adult, which is approximately €7 more than in 2011. In 2012, 11.3% of the population had equivalent consumption below the absolute poverty line. Portion of persons in the poverty was increased from 9.3% in 2011 to 11.3% in 2012.

There are significant differences in the extent of poverty in the region between the North and other parts of the country. Poverty rate in North region is almost twice as high as poverty rate in the Central region and the Southern region. Poverty rate in the North region was 18.3% in 2012. In that region there is 30.9% of the total population of Montenegro, but there is also 50.2% of all the poor. Poverty rate in Central region is 7.9%, and in South 9.0%.

### *Economy*

From 2006 – 2008, the GDP of Montenegro recorded very high growth rates compared with EU member states and candidate states, but in 2009, due to the economic crisis, Montenegro entered in a recession period when real GDP had negative growth rate of 5.7%. Economic recovery has become notable since 2010. Negative economic growth was recorded in 2012 while 2013 recorded a real increase in GDP of 3.5%. GDP in 2013 was 3,327 million euros and the GDP per citizen was €5,063. In 2013, volume of exports was five times lower than volume of import. At the end of 2013, public debt reached 1,933 million euros or 57.95% of GDP. Budgetary deficit in 2012 was 6.8% of GDP, while in 2013 it was estimated to be 3.9% of GDP.

### *Tourism*

The natural shore in Montenegro is the most attractive area for various market segments, so preservation of its properties and its landscape is a precondition for preservation of natural balance and development of tourism for a longer period of time.

Measures to control and mitigate the pressure on the environment and integrate patterns of green economy in sectorial policies are prerequisite for sustainable tourism in the coastal area. Although regulations request the preparation of environmental impact assessment studies during projects' planning stages, this has not been sufficiently applied, which lead to

intensive, and in certain cases, unplanned and uncontrolled development of tourist accommodation buildings along nearly the entire Montenegrin shore<sup>1</sup>. This particularly refers to Budva, Ulcinj, along Bojana River, Port Milena and Velika plaza (the Grand Beach), Buljarica, Tivat and Luštica Peninsula.

The length of coastline of Montenegro is 293.5 km. It has 117 beaches with a total length of 73 km. There are possibilities for the expansion of existing beaches in addition to possibilities for investing in new beaches providing a total maximum capacity of 270,000 guests at the same time<sup>2</sup>.

According to MONSTAT data, there were 1,492,006 tourist arrivals in Montenegro in 2013 which is 3.6% higher than in 2012, while the number of overnight stays is 2.8% higher than in 2012, 89.4% of which were foreign tourists, and 10.6% were domestic tourists. In 2013, most overnight stays were by tourists from Russia (28.1%), Serbia (25.1%), Bosnia and Herzegovina (7.5%), Ukraine (5.6%), Kosovo (3.3%), Poland (2.7%), Germany (2.3%), and France (2.2%). Tourists from other countries had 23.2% overnight stays. 97% of overnight stays in 2013 were realized at coast towns which reflects the major role of coastal tourism compared with overall tourist potentials in Montenegro. Seasonal distribution of tourist turnover at the coastal zone is very unfavorable with dominant concentration of tourist turnover in summer months which indicates that capacities are not being used rationally and sufficiently.

### *Marine traffic*

Currently, there are several international maritime ports in Montenegro: the port of Bar, the port of Kotor, the port of Zelenika and the port of Risan, and ports for domestic maritime transport, marinas and docks.

At the port of Bar, the scope of activities performed includes: loading and discharging cargo, passenger terminal, cargo warehousing, additional cargo handling, piloting, berthing and unberthing, ship supplying, maintenance of technical systems, trade, hotel business and tourism, and food production. The Port of Bar covers about 95% of all port activities.



**Figure 15**      **The Port of Bar**

The port of Kotor is used exclusively as a passenger terminal for liners and cruisers. It accounts for 100% of cruising vessels turnover and 84% of nautical tourism turnover in Montenegro.

The ports of Zelenika and Risan have much smaller scope of services provided using own resources, compared to the port of Bar. The only difference between them is that the port of Zelenika offers warehouse facilities. The level of utilization of port facilities has been rather low

<sup>1</sup> Ministry of Spatial Development and Environmental Protection: National Biodiversity Strategy with Action Plan for period between 2010 – 2015, (proposal) July 2010, p. 35

<sup>2</sup> Ministry of Tourism and Environmental Protection: Strategy for Tourism Development in Montenegro by 2020, Podgorica, 2008.

recently. The Marina of Budva has acquired the status of an international port, primarily for nautical vessels.

There are also various existing and planned marinas along the coast of Montenegro.

### *Waste Management*

Currently, most of the municipal solid waste collected in Montenegro is landfilled. There are two sanitary landfills under operation, one in the Bar Municipality, Mozura Sanitary Landfill, and one in the Municipality of Podgorica, Livade Sanitary Landfill. In addition to these two sanitary landfills there are 19 non-compliant landfills currently under operation. Four sanitary landfills are planned to be built and are at different stages of design and funding: Niksic – Budos; Herceg Novi – Duboki Do; Bijelo Polje – Celinska Kosa; and Berane – Vasov do. There is currently no infrastructure for hazardous waste treatment in Montenegro. For this reason, in accordance with the Law on Waste Management ("Official. Gazette of Montenegro", no. 64/11) and the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, and based on licenses issued by the Agency for the Environment, hazardous waste is exported from Montenegro.

## **POTENTIAL IMPACTS AND PROPOSED MITIGATION MEASURES**

Exploration and production activities offshore Montenegro are likely to negatively affect several environmental and social components. Positive impacts are also expected depending on how the sector is managed. The main impacts are described in this section along with the proposed mitigation measures.

### **NOISE GENERATION**

During seismic surveys: It is generally accepted that the sound caused during seismic surveys has the potential to adversely affect marine organisms but the significance of these effects is the subject of a large number of research studies, notably on marine mammal behavioral responses. While many studies have reported changes in behavior, no universal conclusions have been drawn as to whether they are biologically important [OSPAR Commission, 2009]. Similarly, no conclusive evidence of a link between sounds of seismic surveys and the mortality of any marine mammals has been established. Studies investigating sound-induced effects on other species are relatively scarce. Fish can be particularly vulnerable especially in their early, larval, stages but it appears that seismic-induced effects do not hinder recruitment to fish populations [OSPAR Commission, 2009].

The animals most likely to be affected by sound produced from the seismic survey are baleen whales, beaked whales and seals, as it is believed that most toothed whale species are less affected by the sound frequencies used in seismic operations.

In order to minimize any possible impacts on marine mammals, it is recommended that seismic operations should use the lowest practicable power levels throughout the survey and only discharge pressure waves into the marine environment when necessary and after a suitable 'soft' start to allow time for marine mammals, turtles and fish to move away before the array reaches full power. The process should begin with the smallest source in an array and build up slowly over 20 to 40 minutes. Beginning at least 30 minutes before startup during

daylight hours, visual observers should monitor a safety (exclusion) zone of 500 meters radius around the survey vessel. Startup of the array cannot begin until the safety zone is clear of marine mammals and turtles for at least 20 minutes. Visual monitoring of the sea surface should continue while the seismic array is operating during daylight hours, and the array should be shut down if a whale, monk seal, or sea turtle enters the safety zone during visual monitoring. Monitoring is required during the daytime and nighttime, or surveys should be limited to daylight hours only. It is very important that the timing and location of cetacean calving and migrations should be considered when planning a seismic survey, and if possible avoided. As for fish eggs and larvae which are most at risk from the impacts of seismic activities, sensitive fish spawning areas should be avoided at known breeding times.

An Environmental Impact Assessment (EIA) study should be conducted for seismic survey activities whereby exact timing, locations and possible impacts shall be determined and additional mitigation measures identified if required.

During drilling and production, low frequency noises from drilling wells and all associated vessels will add to the ambient noise in the exploration area. As most toothed whales have hearing ranges at medium to high frequencies, they are considered to be relatively unharmed by industrial noise, with the possible exception of beaked whales. Although seals are capable of hearing the low frequency sounds generated by a drilling rig over large distances, they are generally believed not to be adversely affected by drilling rig sounds as their hearing is more sensitive to higher frequency ranges. Baleen whales are considered to be potentially at risk at close range, since the frequencies used in their communication noises and assumed levels of hearing overlap with the sound spectra of industrial noises.

The impact of the noise generated is difficult to be assessed due to uncertainties in how noise affects specific marine mammals, and how far the noise will be transmitted in the sea. However, it is estimated that the underwater noise produced could elicit response from some individual marine mammals if they pass within 1 km of a drilling rig or a platform. It is not likely that such effects would have any significant impacts at the population level. It is important to note that the Adriatic Sea already supports significant vessels movement and incremental impact from vessel movement associated with oil and gas activities is not considered to be significant.

The selection of drilling facility or a production platform can be used to reduce the amount of sound entering the marine environment. However, it is understood that the choice of drilling rig is generally dictated by other factors.

## **DISCHARGE OF CUTTINGS AND DISTURBANCE TO SEA BED**

The discharges of drill cuttings, muds and cement from the top sections of the wells, which are deposited close to the sea bed at the wellheads, are expected to cause impacts at each well site. To avoid such impacts, a policy of not allowing discharges at sea from drilling activities will be adopted; operators will be obliged to discharge cuttings and drilling fluids outside Montenegro. It is important that similar policies be adopted in other countries of the Adriatic to be able to control cumulative impacts.

Disturbance to sea bed is expected during different project phases. Ocean bottom cable surveys (if any), vertical cable surveys, and vertical seismic profile (VSP) surveys may disturb

small areas of the sea floor during seismic surveys. During drilling, production and hydrocarbon usage, installing rigs, platforms and pipelines is expected to disturb sea bed. Sea bed-disturbing activities may have impacts on benthic communities including deep-water corals, subsea infrastructure, shipwrecks, or other submerged archaeological resources.

In order to avoid or at least minimize these impacts, operators are required to conduct detailed surveys of the seabed prior to selection of well locations and start of operations. Results of these surveys are presented in the EIA study to support selection of wells and other facilities and to demonstrate that disturbance to seabed has been minimized to the extent possible.

### **ATMOSPHERIC EMISSIONS**

Atmospheric emissions will arise from seismic survey vessels, drilling and production activities and from gas treatment onshore.

The resultant emissions offshore will not have any significant localized impacts due to the dispersive nature of the offshore environment. Gas treatment onshore may have impacts on sensitive receptors in the vicinity of the treatment plant; thus site selection is essential to avoid significant adverse impacts on surrounding communities. Air dispersion modelling studies are proposed to be conducted as part of the detailed EIA studies for drilling, production activities and for gas treatment plants.

The overall air emissions from the different Programme phases will contribute regionally and globally to issues such as global warming, acid rain and air pollution. The acceptability overall needs to be considered in the context of the national energy policy, and national policy for the management of greenhouse gases and commitments to the EU and the Kyoto Protocol. Being a Non-Annex 1 Party of The United Nations Framework Convention on Climate Change, Montenegro is required to periodically prepare GHG inventories as a part of its National Report/ Communication to the UNFCCC and must report on the steps it is taking or envisage undertaking to implement the Convention.

### **PHYSICAL PRESENCE**

The number of 2D and 3D seismic surveys that may be undertaken and the duration of surveys will determine the significance of impacts from the physical presence during that phase. Usually surveys are of limited duration and thus the impacts are not expected to be significant. However, to further reduce these impacts, it is recommended that oil and gas industry operators are required to check in advance with the Ministry of Transport and Maritime Affairs, the Maritime Safety Department and Fisheries Associations that proposed surveys will not be carried out in an area and at a time that would conflict with legitimate shipping and fishing operations, including both floating and stationary gear, with consequential disruption of both such activities, and the required licenses from the relevant authorities shall be obtained.

In addition, in the case of a survey planned in an area of intensive fishing, discussions with Fisheries Associations shall be initiated as early as possible, and, in any case, at least 45 days before the planned date in order that the implications can be fully considered. A clear

communication plan shall be developed and a fair compensation scheme in case of loss of equipment shall be proposed.

The duration of drilling is limited and therefore the impact of the physical presence of the drilling rig and possible suspended wells on fishing and shipping activities is not considered to be significant.

The physical presence of platforms will attract pelagic fishes. Birds may use offshore platforms as stopping places. However migrating birds can become disoriented when encountering a steady artificial light source at night which cause birds to circle the light source for hours, increasing the risk of collision with the lighted structure, decreasing fat reserves, and potentially interrupting migration. Noise and lights may cause minor behavioral changes in marine mammals and sea turtles (e.g., attraction or avoidance). Benthic communities may be affected by sloughing of organic debris from platforms, and by the physical presence of pipelines on the sea floor. Generally, these impacts are not expected to be significant. To avoid the impacts on birds especially migratory birds, It is recommended to use fewer lights as much as practical; use low intensity lights; avoidance of the use of white lights (white lights are the least favorable choice for lighting structures) and use strobing lights instead of steady lights.

Visual impacts from the presence of the platform and rigs on the quality of landscapes are expected and can be mitigated through adequate siting at significant distances from the shore. The government of Montenegro has set a minimum separation distance from the shore of 3 km; this distance shall be confirmed during EIA studies where impact on landscape and visual amenity shall be further confirmed and considered as part of the siting of facilities, where possible.

There will also be a need for on-shore support facilities. The Port of Bar is a good candidate to provide logistics support to the oil and gas operations. The total area of on-shore support facilities including fabrication yards and logistics bases could range from 5 ha (50,000 m<sup>2</sup>) in early stages of exploration up to 100 ha (1,000,000 m<sup>2</sup>) in the case of multiple platforms operating in the sea. The location of such facilities shall be in line with the spatial land use plans and the facilities shall be subject to EIA studies prior to their deployment.

## **ACCIDENTAL EVENTS**

Possible accidental events include:

- During seismic surveys: collision with vessels, causing the loss of the streamer oil reservoir and/or diesel fuel from the vessel.
- During exploratory drilling: crude oil spill, chemical spill or gas blowout.
- During Operation: crude oil spill and chemical spill.
- During Hydrocarbon usage: oil spill from tankers (collision with vessels), loss of containment in pipelines and fires/explosions in gas treatment plants.

The probability of such impacts is very small. The actual impacts depend on many factors, including the volume and type of oil spilled / gas fired, and sea and weather conditions, the biological and physical characteristics of the area, the relative sensitivity of species and communities and the type of clean-up response.

The crew of the drilling rig, production platform or gas treatment facility should undergo environmental awareness and safety training. All equipment used should have safety measures built in to minimize the risks of any oil spillage. The installations should have built-in safety measures to minimize the risk of an oil spillage, notably blow-out preventers, and fuel-transfer hoses. Platforms and rigs design and selection shall consider the possible seismic activity in the area they operate at.

An approved Oil Spill Contingency Plan (OSCP) is required in advance of approval for drilling. This is designed to assist the decision-making process during an oil spill, indicate what resources are required to combat the spill, minimize any further discharges and mitigate its effects. The operator shall consider in the OSCP the possible spill scenarios, the methods to prevent such scenarios, as well as the material and equipment needed to effectively respond to each scenario. Prior to start, the operator shall demonstrate its readiness to implement the OSCP.

In the event of environmental damage, environmental liability shall be determined according to Law No. 27/2014 on environmental liability and the Environmental Liability Directive – Directive 2004/35/EC based on the polluter pays principle.

## **SOCIO-ECONOMIC IMPACTS**

The Oil and Gas exploration and production activities in Montenegro are expected to entail social and economic impacts both positive and negative. These include:

- Change in income and income per capita: During production phase, hydrocarbon exploitation is anticipated to lead to a reduction in import bills for gas and a rise in exports, thereby leading to an overall net increase in domestic production. It will also have a positive impact at the national level by reducing shortages of petroleum products and securing power resources in the country.
- Impacts on existing economic activities including fishing, shipping and marine transport from the physical presence and movement of vessels. As discussed earlier these impacts are not expected to be significant with proper mitigation and communication.
- The Programme may have both positive and negative impacts on tourism.
  - Negative impacts may arise in the event of accidental spills or from the degradation of ecosystems. Oil and gas operators are generally very cautious about their reputation and follow very strict procedures to avoid impacts and to benefit the environment and society where they operate; strict implementation of OSCP procedures in a transparent manner will also help minimize such impacts; the oil and gas industry has proven to be able to coexist with highly touristic and pristine areas as long as strict procedures are followed.
  - Positive impacts are expected from investments that oil and gas companies will make as part of their corporate social responsibility in order to further conserve the environment in Montenegro and hence support tourism development; it is also expected that the industry will increase the influx of foreigners who will be interested in exploring the beauty of Montenegro and

its tourist offers, and they may share their experiences with other people; last but not least, and as discussed above, part of the O&G revenues will support the current development of the country including priority sectors such as tourism and environmental protection.

- Job creation: The implementation of the programme requires both skilled and unskilled labor. It is an opportunity for unemployed people to be hired and for people to receive training. This would contribute to reducing the unemployment rate while improving the quality of life of the local population. Indirect employment might also be generated through the supply of goods and services from local and national businesses and manufacturing industries of raw material and intermediate inputs. A key policy of the government of Montenegro is to require that oil and gas companies train Montenegrins so that they can gradually join the work force and support the sector, hence reducing the currently high unemployment rate.
- Conflicts related to inflow of foreign workers: The lack of specialization in oil and gas industry among the local workforce necessitates the hiring of foreign workers. Conflicts caused by the higher ratio of foreigner to local workforce might emerge, especially that the locals would consider the outsider workforce as intruders and their presence as the reason for their loss of livelihood. This situation could potentially create local frustration resulting in emergence of conflicts that would, in the worst case scenario, end up with acts of vandalism or violence. Operators shall develop a clear 'Recruitment Strategy' which is based on an assessment of the availability and qualification of local labor. This strategy should seek to maximize the recruitment of skilled and unskilled locals. The Strategy should also seek to minimize the potential for conflicts over the local vs. foreigner share in the employment, and the intent to hire locals shall be highlighted in media outlets, and universities so as to manage expectations.
- Change in demand and supply of public services and infrastructure: Expenditures and demand from the Programme and large workforce will put pressure on the public services and other services, such as hospitals, transport, housing, etc. Also, the transportation of personnel, goods and materials to the work areas will lead to a rise in the demand for transportation and will increase the pressure of ports that will be used by service vessels. Operators shall prepare and implement a 'Procurement and Supply Strategy' with the aim to maximize benefits to the local, provincial and national economies.
- Inflation: The increase in demand for goods and services to supply the Programme is expected to create a rise in the overall level of prices. The presence of foreign workforce could lead to a new host of services and a larger range of goods being offered in the local markets to satisfy the demand. It is expected that local businesses would want to offer their goods and services at higher prices for the foreign workforce.

As part of their Corporate Social Responsibility Scheme, oil and gas Operators are recommended to investigate opportunities for funding social and health infrastructure projects, and promote tourism, education and scientific research.

## HEALTH AND SAFETY IMPACTS

### Public Health

Oil and gas exploration and production may entail public health issues especially in the event of accidents. Oil causes a variety of public health problems either through direct exposure to oil during a spill or through indirect exposure. Slow leaks of oil and other contaminants from oil drilling and shipping can lead to contamination of fish caught recreationally or commercially. Consumers eating contaminated fish are exposed to these chemicals as well. Public health and safety problems are common in the event of an oil spill. Acute health effects from the evaporation of volatile oil components can include headaches, nausea, vomiting, eye irritation, worsened asthma symptoms, upper respiratory tract irritation, vertigo, leg and back pains and psychological ailments such as anxiety disorder and post-traumatic stress disorder.

In the event of blowouts at a rig, various types of air pollutants will be emitted to the air and may cause adverse health effects. However, since operations are not permitted within 3 Km from the shore, the possibility of these pollutants reaching the shore is dependent on the amount of gases released, weather conditions and wind direction.

Impacts of offshore oil and gas activities on public health are however generally expected to be low under normal operation conditions as discharges to air and sea need to follow strict national and international standard limits and policies and given the limited exposure of the general population.

### Workers Health

Workers in the offshore oil and gas industry might be subject to several health and safety issues including:

**Environmental health issues** can mainly arise from exposure to high levels of noise and vibration, air pollutants and radioactive materials. To mitigate these impacts Operator HSE plan and Emergency Response Plan shall be prepared according to best practice and HSE Officer must be present onboard to ensure HSE plan is well applied, and workers abiding to it, and personal exposure limits to radiation shall be periodically measured, and proper PPE shall be worn. Noise levels shall be maintained below IFC occupational noise levels.

**Personal health issues** include water quality, food hygiene, legionnaire's disease and other outbreaks of infection. Whilst generally well controlled by the industry, these issues continue to have the potential for widespread illness and loss of life. A qualified paramedic shall be present onboard all the time to address health issues and concerns of staff. Industrial hygiene measures includes general housekeeping and maintenance of all areas on the vessel.

**Psychological health issues** due to the potentially stressful offshore environment as the workforce live and work in one restricted location for a significant period of time without a break. The offshore employees may suffer adverse impacts in many ways that could lead to psychological ill-health, alcohol problems, drug abuse, cumulative stress trauma litigation and other. The living environment must provide suitable conditions in which workers can relax and recuperate from the demands of the job, and which includes:

- the ability to get adequate sleep; that is, undisturbed sleep of a quality and quantity necessary to restore physical and mental equilibrium;

- a balanced and adequate diet;
- leisure and recreational activities; and
- feeling safe and secure.

**Risks of hazards** such as fires and explosion, Loss of stability /Loss of station, Structural failure and Risks associated chemicals handling and diving and diving-related operations.

Effective management and control remains central to the continued safety of every offshore installation. It is also essential that where control measures fail, measures to mitigate risks are in place, for example, gas detection systems and fire deluge arrangements. Escape, Evacuation and Rescue measures (EER) should also be in place for occasions when other combined measures have failed. Systems should not just be in place but tested to ensure plant and equipment works when required. It is crucial that personnel are competent and understand how to interpret warnings and take necessary action.

Hazards identification and risk assessment studies must be prepared for each facility to ensure operators have identified all risks and put appropriate control measures in place before offshore installations come into operation.

### **TRANSBOUNDARY IMPACTS**

Neighboring countries that are most likely to be affected from the Programme are mainly Croatia and Albania. Although most of the impacts from the Programme are localized within the immediate vicinity of facilities and unlikely to affect neighboring countries, the following activities have the potential to cause transboundary impacts:

- Noise from seismic activities will be limited in scale and of very short duration; however, in view of the possibility that seismic survey vessels may enter waters of neighboring countries (i.e. Albania), noise may have impacts on marine mammals in the neighboring country within a range of a several hundred meters of a typical airgun array, particularly if they swim beneath the array.
- Seismic vessel activity may have the potential to interact with shipping travelling through the seismic activity area from ports of other countries, thus a notification shall be given to maritime affairs in foreign countries that have ships planning to travel through the activity area during the time of the activity.
- Accidental oil spills are the main concern of transboundary impacts. Any oil spill likely to have impacts in waters of a neighboring country shall be reported to the relevant authorities in that country. Factors important in determining oil spill impacts and recovery rates include the type of oil, the thickness of shore deposits, climate and season, the biological and physical characteristics of the area, the relative sensitivity of species and communities and the type of clean-up response.
- The possibility of transboundary impacts from a shallow gas blowout would be reservoir specific. Atmospheric emissions could potentially have transboundary effects, although they would be dependent on the type and volume of gas released into the atmosphere in addition to the accident location.
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Since significant transboundary impacts might occur in the events mentioned above, transboundary consultations with neighboring countries shall be conducted as per the SEA Law of Montenegro (No. 80/05), EU Directive 2001/42/EC (SEA Directive) and the Law on Ratification of Convention on Environmental Impact Assessment in a Transboundary Context (ESPOO Convention) (OG MNE, No. 08/08-27).

## MONITORING

Monitoring of environmental parameters is critical to assess the status of the environment during Programme implementation and for identifying effectiveness of mitigation measures that were formulated to address the potential environmental and socio-economic effects identified in this SEA Study. With the knowledge of baseline conditions, the monitoring programme will serve as an indicator for any deterioration in environmental conditions due to implementation of the Programme.

Monitoring and reporting of the state of the environment in Montenegro is the responsibility of the Environmental Protection Agency (EPA). EPA is an independent body and the operative implementation authority of the Law on Environmental Protection, it was established in 2008. The EPA outsources the monitoring to several organizations such as the Center for Ecotoxicological Research (CETI), Nature Protection Institute, Public Institute for Development and Research into Occupational Health and Safety (PIDROHS) that monitors environmental noise and the Institute of Marine Biology. The environmental and socioeconomic indicators proposed in the development of the SEA Framework are the basis of monitoring the changes in the environmental and socio-economic parameters.

Also, the licensing authority should ensure that an appropriate activity level monitoring programme be devised for evaluating the environmental impacts and efficacy of mitigation measures relating to the key potential environmental issues that were identified as significant. This should be carried out in consultation with the environmental authorities and specialists. Operators will be required to monitor their activities as per the a monitoring programme approved by the licensing authority. Monitoring records shall be submitted to the competent authorities.

## OVERALL RECOMMENDATIONS

The following recommendations to be followed prior to any Oil and Gas activity:

- 1- It is recommended to establish an "Environmental Management Unit/ Committee" responsible for Oil and Gas Exploration and Production under the jurisdiction of the EPA; this unit shall have representatives from all concerned stakeholders. The Unit shall be responsible for preparations of ToRs for EIA studies; review and approval of EIA studies; monitor compliance of Operators with the environmental management plans; shall receive and review periodic reports from the Operator on discharges to air, water, in addition to waste generation, management and disposal reports; shall be responsible for monitoring of impacts from O&G activities on the environment through the monitoring of the proposed indicators in this SEA; and shall advise on any required corrective actions or further monitoring. It is recommended that members of

civic society be represented in this committee to ensure transparency and full representation.

- 2- It is recommended to ratify the Offshore Protocol of Barcelona Convention, which will form a legal obligation for licenses to abide with.
- 3- It is recommended that the National Contingency Plan (NCP) be reviewed and updated in light of the Oil and Gas Exploration and Production. The plan shall support individual OSCP to be developed by future operators for their individual blocks.
- 4- Marine areas that are currently being considered for protection shall be declared as protected, and Licensees shall not be permitted to conduct activities in/ approximate to these areas. An exclusion zone shall be specified around these areas (not less than 500 m).
- 5- Underwater shipwrecks and archeological sites shall be surveyed, mapped and an exclusion zone around these sites shall be specified based on their importance prior to start of any activity by an operator.
- 6- Environmental impact assessment studies shall be prepared for each proposed E&P activity according to the Law on Environmental Impact Assessment (Official Gazette of the Republic of Montenegro, No 80/05, Official Gazette of Montenegro, No 40/10, 73/10, 40/11 and 27/13). The current SEA provides a substantial amount of information that will provide a base for the subsequent EIA studies, however, the assessment is conducted at a high level and shall be subject to detailed assessment during EIA studies as more information becomes available on the techniques to be used (i.e. type of seismic surveys, type of drilling rigs, type of production platforms and the usage of extracted hydrocarbons). During the course of the EIAs, the following shall be conducted for the proposed activity:
  - Surveys of benthic species including coral communities. Exclusion zones shall be defined around areas of sensitive/ protected species.
  - Survey of mammal species, turtles and seals which could be present in the study area during the time of the proposed activity.
  - Defining and mapping birds' migration routes and time of migration, and habitats of marine birds.
  - Survey of underwater shipwrecks and archeological sites (if not conducted at earlier stage).
  - Survey of water quality and bottom sea sediments quality.
  - Defining important fishing areas within the area of the proposed activity.
  - Defining and mapping water ways crossing the area of the proposed activity.
  - Survey of underwater noise levels; and conducting an underwater noise modelling study (for seismic activities) to define the zones around noise sources in which sea mammals, turtles and seals would be at risk.
  - Conducting air dispersion modelling studies for drilling, production activities and for gas treatment plants.

- Specifying land based infrastructure that will be used to support the proposed activity (such as ports and airports). The adequacy of existing infrastructure to cater for the requirement of proposed activity shall be assessed.
  - Preparation of a waste management plan that considers the recommendations presented in the report.
  - The site selection of proposed land based activities (especially for gas treatment plants and pipelines during hydrocarbon usage phase) shall be based on an analysis of alternatives, and shall avoid and keep a distance from:
    - o Protected areas, important bird areas and habitats of protected and important species;
    - o Water courses, such as rivers and lakes;
    - o Areas of archeological importance and tourist areas;
    - o Areas of significant landscape features; and
    - o Populated areas.
- 7- It is recommended to adopt and enforce the policies proposed by the authorities to ensure that oil and gas activities are conducted in a sustainable and environment friendly manner, which include:
- not allowing discharges at sea from drilling activities ( drilling cuttings, drilling fluids and produced water);
  - obliging oil and gas operators to dispose of hazardous solid wastes resulting from their activities at existing facilities available outside Montenegro;
  - not allowing unnecessary emissions to the air;
  - enforcing strict procedures to be followed by oil and gas operators to avoid accidents and chemicals/hydrocarbon releases in the Adriatic Sea, including the preparation and prior approval of a spill contingency and response plan before starting any activities.
- 8- Since significant transboundary impacts might occur during accidental events, transboundary consultations with neighboring countries shall be conducted as per the SEA Law of Montenegro (No. 80/05), EU Directive 2001/42/EC (SEA Directive) and the Law on Ratification of Convention on Environmental Impact Assessment in a Transboundary Context (ESPOO Convention) (OG MNE, No. 08/08-27).
- 9- Potential Areas for Environmental Regional Cooperation include:
- Environmental Policies of Joint Interest (discharge of muds and cuttings, produced water, protection of cetaceans and marine habitats);
  - Shared infrastructure (waste management, on-shore support facilities);
  - Transboundary environmental impacts and emergency response; and
  - Environmental training and sharing of know-how and expertise.