



Dear Members of the Croatian Government,

The German Society for Dolphin Conservation (Gesellschaft zur Rettung der Delphine e.V./GRD), representing thousands of German, Austrian and Swiss citizens concerned about marine and dolphin conservation, welcomes the opportunity to comment on the Strateška studija o vjerojatno značajnom utjecaju na okoliš - Okvirnog plana i programa istraživanja i eksploatacije ugljikovodika na Jadranu (Strategic Study) pursuant to Directive 2001/42 /EC of the European Parliament and of the Council on the Assessment of the Effects of Certain Plans and Programs on the Environment (Strategic Environmental Assessment Directive) and Croatian laws.

In general, we oppose any activity to explore and exploit hydrocarbon resources in the Adriatic Sea. The Adriatic Sea is a sensitive ecosystem, given its semi-closed structure; the currents; the relatively low depths. Oil and gas exploration operations would have devastating impacts on this sensitive marine environment. In support of our objections, we would like to draw your attention to the following:

According to the Convention on Biological Diversity (CBD) Decision XII/22, the Northern Adriatic is one of the most important feeding grounds in the Mediterranean of the loggerhead turtle (*Caretta caretta*). Moreover, it is a nursery area for a number of vulnerable species and is one of the most productive areas in the Mediterranean Sea. It is ranked high for its 'special importance for life-history stages of species', 'importance for threatened, endangered or declining species and/or habitats' and for 'biological productivity':

- the Jabuka/Pomo Pit hosts the largest populations of Norway lobster (*Nephrops norvegicus*) and is important especially for juveniles in the depths over 200 m. It is ranked high for its 'uniqueness or rarity', 'special importance for life-history stages of species', and for 'biological productivity'; and
- the South Adriatic Ionian Strait contains important habitats for Cuvier's beaked whales (*Ziphius cavirostris*), an Annex II species of the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA/BD Protocol) in the framework of Barcelona Convention, and significant densities of other megafauna such as the giant devil ray (*Mobula mobular*), striped dolphin (*Stenella coeruleoalba*), Mediterranean monk seal (*Monachus monachus*), and loggerhead turtle (*Caretta caretta*), all of which are listed in Annex II of SPA/BD Protocol. It is ranked high for its 'uniqueness or rarity', 'special importance for life-history stages of species', 'importance for threatened, endangered or declining species and/or habitats', 'vulnerability, fragility, sensitivity, or slow recovery' and for 'biological diversity'.



Impacts of Offshore Oil and Gas Exploration on Cetaceans

According to the IUCN Red List, bottlenose dolphins (*Tursiops truncatus*) are classified as vulnerable, with low population densities in the Adriatic and Ionian Seas. Apart from this resident population which Croatian scientist have scientifically estimated to amount to about 220 individuals, there are occasional “visitors” in Croatian waters, like striped dolphins (*Stenella coeruleoalba*), common dolphins (*Delphinus delphis*), Risso’s dolphins (*Grampus griseus*), Cuvier’s beaked whales (*Ziphius cavirostris*), fin whales (*Balaenoptera physalus*), and sperm whales (*Physeter microcephalus*).

Pollutants and waste produced in greater densities in the areas of oil and gas exploration installations will negatively affect habitat quality because they may affect marine mammals’ health and may also be acutely toxic to benthic organisms which in turn will lead to changes in species composition.

Oil pollution due to oil and gas exploration may cause severe skin and eye damage in whales and dolphins. Apart from external damage, severe health damage may result from the toxic effects of the ingested oil. Carbohydrates from fossil oil discharged into the sea have been shown to accumulate in different organs of marine mammals. Whales and dolphins accumulate the carbohydrates in their blubber in particular. This is especially dangerous when the animals are forced to draw on their fatty reserves due to an increased need of energy (e.g., due to coldness or stress), a lack of food, or when nursing their calves.

After a screening of 29 Bottlenose dolphins in a period up to one year after the Deepwater Horizon disaster in a region in the Gulf of Mexico which was heavily affected by oil pollution the serious health damage detected included, amongst others, a destruction of the suprarenal cortex (hypoadrenocorticism) and a striking accumulation of lung diseases (alveolar interstitial syndrome, pathological pulmonary enlargement, pulmonary consolidation) compared with a control group without oil contact. About half of the animals were given a poor prognosis.

While there is only a small number of documented marine mammal deaths caused by oil, studies on population biology in the Gulf of Mexico have shown that the exclusive recording of dead marine mammals after the Deepwater Horizon disaster had led to a considerable underestimation of the number of victims.

Experience from the North Sea has shown that oil and gas exploration produces significant amounts of contaminants. Although cuttings and production water have been discharged into the North Sea and other seas and oceans for decades, the impacts of many of their substances on the marine environment have not been sufficiently examined as yet, as scientists say. In particular, polycyclic aromatic hydrocarbons and hormonal active alkylphenols impact the state of health of marine mammals. Alkylphenols are endocrine disruptors, e. g. they disrupt the endocrine system and have negative impacts on the reproduction of invertebrates and fish and also affect the immune system. In



particular marine mammals feeding on fish may be particularly vulnerable to endocrine disruptors due to their position in the marine food web.

The precise effects of alkylphenols have not yet been examined. However, according to present knowledge, it is highly probable that these substances, which are very similar to estrogen, may also affect the reproductive and immune systems of marine mammals. In mammals, estrogen-type endocrine disruptors connect to specific intracellular receptors or enter a cell through enzymatic cascades. There, they interfere with the cellular communication and affect the reproductive fitness by influencing gene expression. Diehl et al. (2012) have shown an accumulation of 4-nonylphenol (a substance within this substance class) in fish and marine mammals.

Apart from the direct toxic and endocrine effects on marine mammals, indirect effects (on the prey fish) may also be important as they may also affect the amount, quality (dietary condition, fat content), or taste of the food (flatfish in the vicinity of offshore platforms has been shown to have a phenol taste, which ultimately may affect fitness and health).

Dispersing agents are used to fight large oil spills and, in part, have highly toxic impacts on the marine environment. The active components are surfactants combined with a solvent. Moreover, they contain preservatives which increase their storage life. The dispersing agents finely disperse the oil into small droplets in the water body, thus making the oil ingestible to different organisms and getting into the marine food web.

Oil and gas drilling contaminates the environment in every step of the process of the daily operations.

Whether developmental or exploratory, oil and gas drilling is extremely harmful to the environment because pollutants are dumped into the sea with the drilling fluids (drilling muds) and the production water. While oil and gas exploration makes intensive use of toxic chemicals in drilling fluids, the consequences for the environment are far from being well studied.

It is beyond dispute, however, that these pollutants contain endocrine disruptors which have a strong potential to harm organisms at all trophic levels, from benthic invertebrates, plankton, and fish to marine mammals, and birds (and human seafood consumers!); (e.g., Fossi & Marsili 2003).

Toxic compounds in drilling fluids such as alkyl phenols are harmful to all kinds of marine habitat. Even in minute concentrations, these endocrine disruptors have serious consequences for any organism. Oil and gas drilling activities will have devastating impacts on the marine national parks, like Mljet and Kornati. We doubt that drilling in the vicinity of national parks is in accordance with the EU Habitats Directive due to the bioaccumulation of substances such as 4-nonyl phenol in biota



(Diehl et al. 2012). These substances are genotoxic and carcinogenic. They inhibit cellular communication processes and gene expression (Porte et al. 2006).

Apart from the daily marine pollution, there is a high risk of large-scale oil spills. One such incident could destroy the ecosystem of the Adriatic for a very long time and with it the economic branches of tourism and fisheries. Oil companies worldwide have shown that they are not able to prevent accidents, resulting in fatal consequences for the environment and economic disasters for coastal communities. There is no reason to assume that these companies will handle the issue better in Croatia than in the rest of the world.

In addition, Croatia has no experience and no logistic infrastructure to react adequately to oil spills.

Experience has shown that offshore exploration proposals presented to governments are often composed of generalized, unsubstantiated information and have usually been prepared without any basic consultations. Subsequent decision-maker approval or rejection of such poor Environmental Impact Assessments are being made on the basis of erroneous information and are vulnerable to criticisms of bias or tokenism.

We urge you to stop any activity to explore and/or exploit hydrocarbon resources in the Adriatic Sea to safeguard Croatia's unique marine biodiversity for our children and children's children. Future generations will certainly praise you for taking such a foresightful decision.

Yours sincerely,

Ulrich Karlowski
Biologist

References

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