NCOC
NORTH CASPIAN
OPERATING COMPANY

Biodiversity of the North East Caspian region

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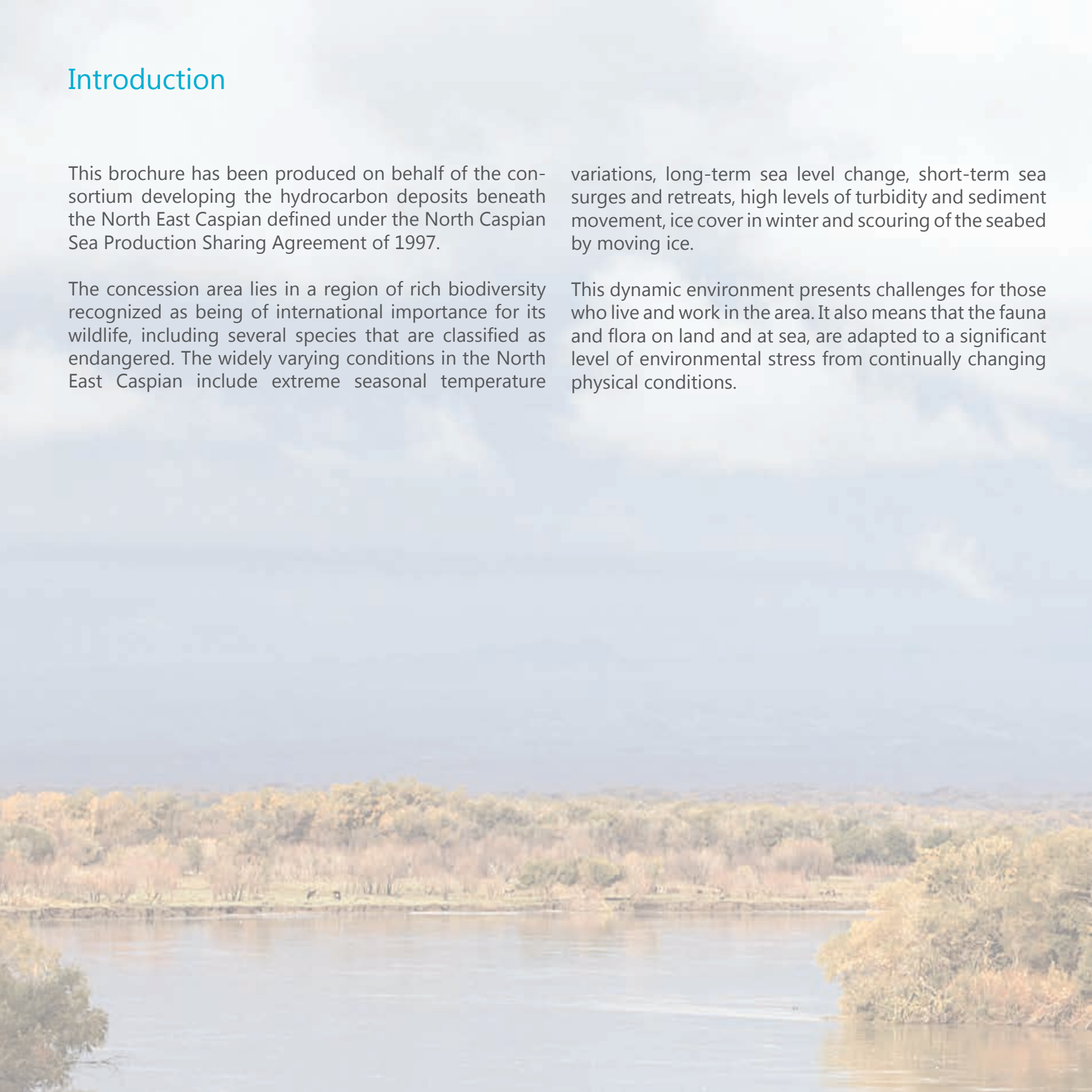
Introduction

This brochure has been produced on behalf of the consortium developing the hydrocarbon deposits beneath the North East Caspian defined under the North Caspian Sea Production Sharing Agreement of 1997.

The concession area lies in a region of rich biodiversity recognized as being of international importance for its wildlife, including several species that are classified as endangered. The widely varying conditions in the North East Caspian include extreme seasonal temperature variations, long-term sea level change, short-term sea surges and retreats, high levels of turbidity and sediment movement, ice cover in winter and scouring of the seabed by moving ice.

This dynamic environment presents challenges for those who live and work in the area. It also means that the fauna and flora on land and at sea, are adapted to a significant level of environmental stress from continually changing physical conditions.



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The Caspian Sea

The Caspian Sea is the largest enclosed body of water in the world.

Bordered by Iran, Russia, Kazakhstan, Turkmenistan, and Azerbaijan, the Caspian Sea can be divided into three distinct physical regions, classified according to their differing water depths: a deep southern, a medium middle and a shallow northern.

The northern Caspian covers a quarter of the sea's total surface area but, due to its shallow waters of between 3-6 metres, it accounts for less than one percent of the sea's total volume.

Average water depth in the Caspian's middle sector is 190 metres, while the southern sector is the deepest, with depths of over 1,000 metres.

The Caspian Sea is in an enclosed basin with no outflows. Over 130 rivers flow into the Caspian, including the Volga River and the Ural River. The Volga River, the largest in Europe (3,700 km), drains 20% of the European land area and is the source of 80% of the Caspian's freshwater inflow.

As a result of its low salinity, shallow waters and subarctic temperatures, the northern part of the Caspian Sea freezes in the winter. There are strong winds in the area and drifting ice sheets which can build into large stamukhi.

The Caspian Sea region is climatically diverse encompassing the basins of the Volga and Ural rivers in the north, the vast semi-arid and hot arid plains of northern Kazakhstan and Turkmenistan in the east, and the humid Caucasus and Elburz mountains in the south-west.

In recent years, contrasting rainfall trends have been observed in the surrounding regions. Whereas rainfall over Russia has increased over the last century, already dry areas such as the coasts of Turkmenistan and Iran have become even drier.

Scientists have also noted variations in Caspian Sea water levels. Although reasons for these fluctuations are not fully understood, it has been suggested that recent changes may be a result of seismic activity.

Caspian Facts and figures

- Length: 1,200 km
- Average width: 280 km
- Surface area: 393,000 km^2
- Shoreline: 5,360 km
- Salinity: 1-2% (significantly lower than most oceans)

Biodiversity

The Caspian Sea and its environs are rich in biological diversity. A mosaic of unique ecosystems and habitats support many endemic species, a number of which are protected or endangered. In fact, 194 of them are listed in the Republic of Kazakhstan's Red Data Book, an inventory established for documenting rare and endangered species of animals and plants that exist within Kazakhstan.

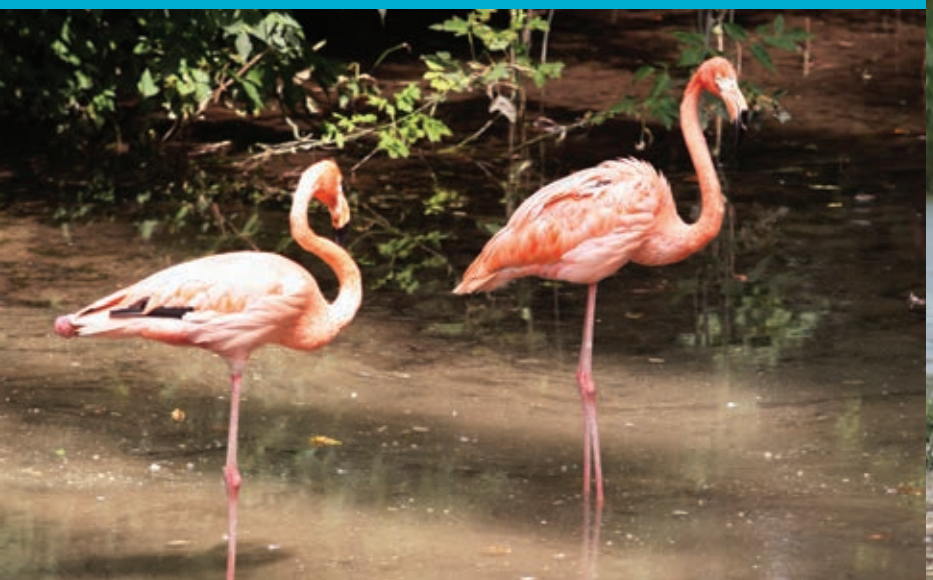
The biodiversity of the Caspian's unique aquatic environment is a product of millions of years of isolation from the world's oceans and the lower saline properties of the sea, in which both fresh water and salt water species have evolved. The northern Caspian region includes two important wetlands, the Volga and Ural deltas, which provide habitats for migrating birds and endemic fish species.

The Caspian is home to many unique species, including the Caspian seal and the rare beluga sturgeon.

On the semi-desert shores surrounding the Caspian, rare creatures such as the saiga, a form of antelope, migrate over ancient routes. Predatory species include the wolf.

Flora and fauna (number of species/species in the RoK Red Data Book):

- Plants: 229 (54)
- Mammals: 125 (41)
- Reptiles: 20 (9)
- Birds: 466 (63)
- Fish: 133 (27)



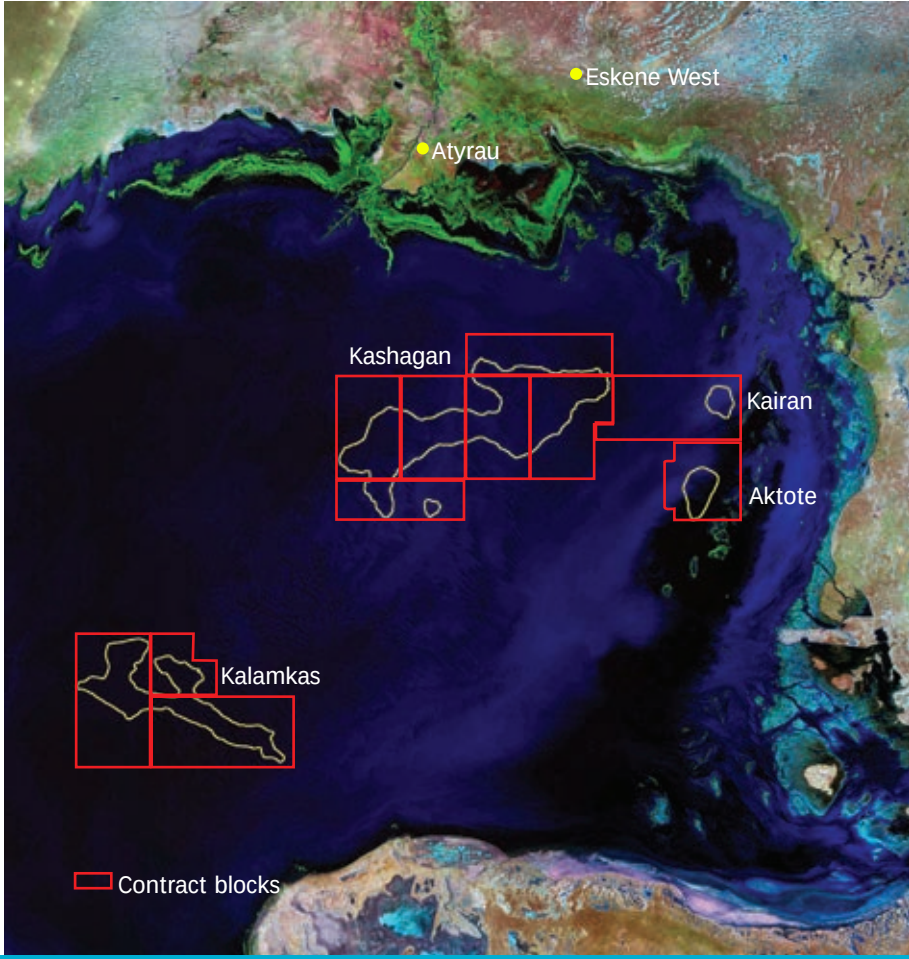
The North Caspian Sea Project

As well as being rich in biodiversity, the Caspian Sea lies above some of the largest oil and gas deposits in the world.

The North Caspian Sea Production Sharing Agreement (NCSPSA) provides a framework for the exploration and production of oil and gas within a 5,600 square kilometres area in the Kazakhstan sector of the Caspian Sea.

As well as the giant Kashagan field, currently under development, other discoveries within the contract area and currently under appraisal include the Kalamkas-sea, Aktote and Kairan fields.

Developed by a consortium comprising several of the world's biggest energy companies, the combined safety, engineering, logistics and environmental challenges make this – the first offshore project in Kazakhstan - one of the largest and most complex industrial projects being undertaken anywhere in the world.



Environmental responsibility

North Caspian Operating Company (NCOC) is operator under the NCSPSA, and has delegated the execution of certain development and production activities to nominated agent companies.

NCOC and its agent companies place the utmost importance on environmental responsibility. The consortium is committed to conducting its operations in compliance with the laws of the Republic of Kazakhstan, and in line with accepted international regulations and standards.

The consortium's environmental protection activities are guided by an Environmental Protection Plan that is approved annually by the Ministry of Environmental Protection.

Since the establishment of the original consortium in 1993, a number of extensive onshore and offshore environmental monitoring programmes have been carried out. These include a programme of biodiversity research designed to provide funding for basic research projects in the Caspian region, providing automated air quality monitoring stations in the Atyrau region, annual soil surveys annual studies on birds and seal populations, and the publication of a sensitivity map covering the entire northern part of the Caspian Sea. A number of Kazakhstani companies have been employed to produce Environmental Impact Assessments of consortium operations, including the offshore and onshore facilities, the trunklines and the onshore export pipelines. These map the eco-system where activities are to be carried out, and identify the best solution to be adopted to minimise environmental impacts. Impact assessments are carried out during and after developments to monitor the effectiveness of mitigation measures.

One of the consortium's priorities is to manage air, water and land discharges in an environmentally responsible manner. All cuttings produced by the drilling process are, in line with a policy of zero discharge into the Caspian, transported onshore to a cuttings and oily water treatment facility near Bautino base, where the oil used for drilling mud is recovered and re-cycled. The company pursues a policy of no routine flaring.

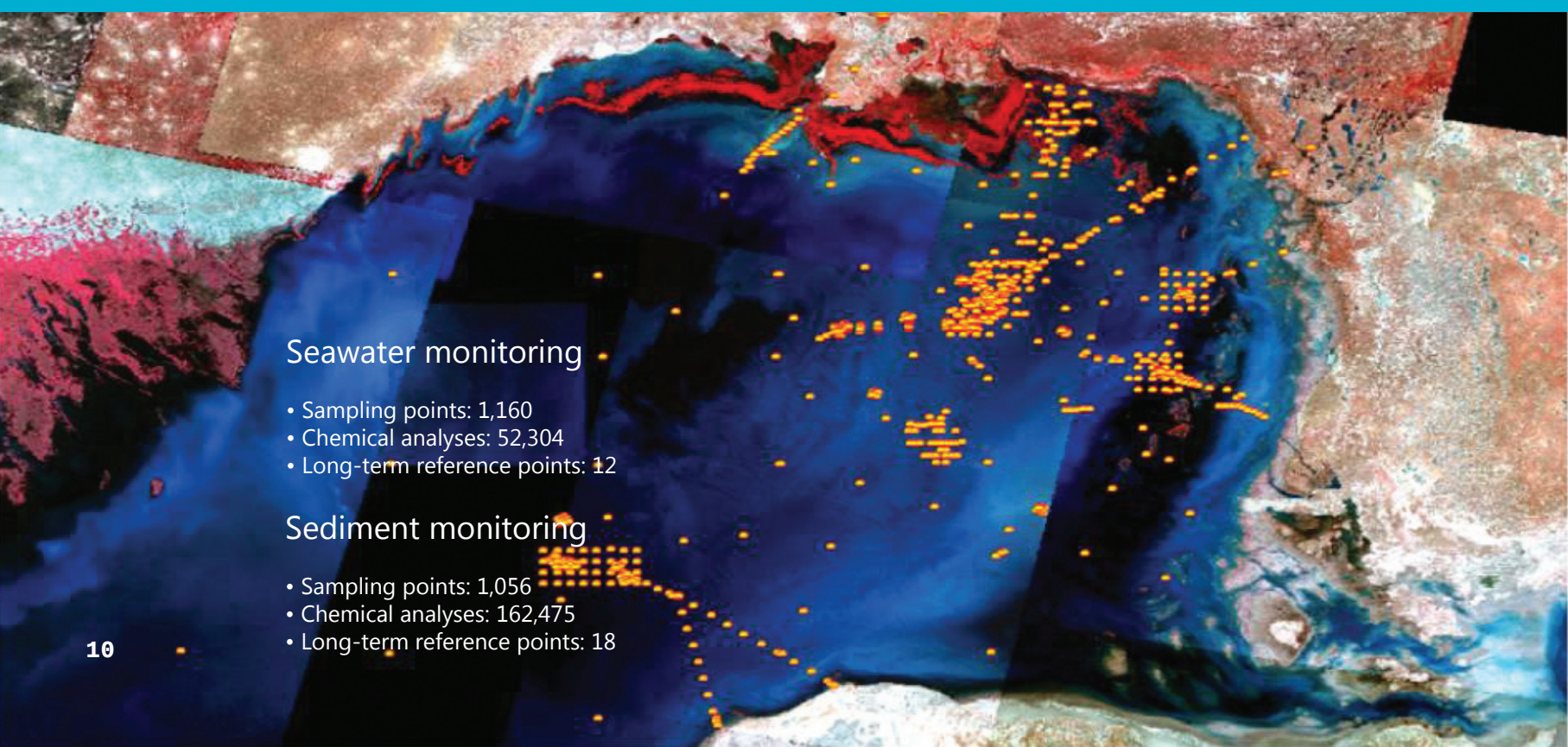
Offshore Environmental Surveys

Between 1993 and 2010 the consortium completed 36 separate offshore environmental monitoring surveys. The surveys were carried out at 900 individual offshore locations.

Data collected during surveys covers water quality (salinity, nutrients, metals), bottom sediments quality (metals, total hydrocarbons) and biological data (micro-organisms, phytoplankton, zooplankton).

Surveys performed between 2003 and 2010 showed that seawater quality at monitoring locations was relatively consistent. However, scientists did note a very low pesticide presence which was attributed to inflow from the Volga and Ural rivers, around which significant agricultural activities occur.

The surveys demonstrated that the quality of sediment in all areas in the northern part of the Caspian is positive, ranging from the designation 'fair' to 'excellent'.



Seawater monitoring

- Sampling points: 1,160
- Chemical analyses: 52,304
- Long-term reference points: 12

Sediment monitoring

- Sampling points: 1,056
- Chemical analyses: 162,475
- Long-term reference points: 18

Onshore Environmental Surveys

Between 2001 and 2010 the consortium completed 30 separate onshore environmental monitoring surveys.

The Caspian onshore area has a long history of oil production, so the scope of the onshore surveys also takes into account historic activities/data as well as current activities of nearby oil and gas developments.

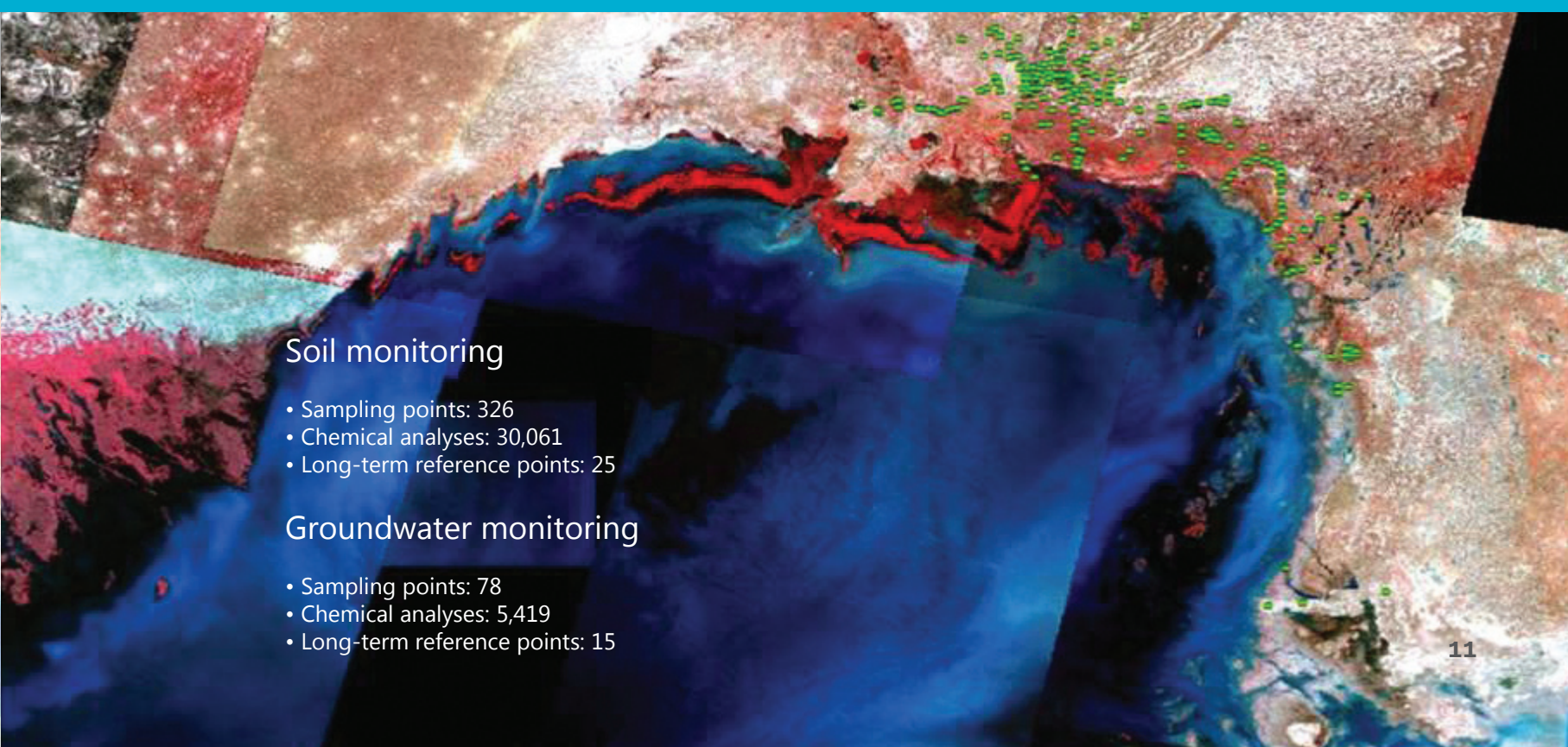
The main parameters for soil analysis were heavy metals and organics. The results show a general improvement in soil quality since 2005.

For groundwater surveys, in addition to heavy metals and organics, scientists monitor chemical-physical characteristics as well as the concentration of nutrients. The groundwater quality in the area from 2005 to 2010 was considered to be poor, mostly due to the salinity of the water.

Environmental Sensitivity Maps 1999 – 2010

Environmental data collected since 1993 is stored by the consortium in a central database linked to a geographical information system. This system allows for mapping exercises and various types of scientific analysis. The collected information has been incorporated into an Environmental Sensitivity Map covering all of the North East Caspian.

The map is used to promote effective coastal zone management for consortium operations and can also be incorporated into local and regional development policy where appropriate.



Soil monitoring

- Sampling points: 326
- Chemical analyses: 30,061
- Long-term reference points: 25

Groundwater monitoring

- Sampling points: 78
- Chemical analyses: 5,419
- Long-term reference points: 15

Biodiversity Management

The consortium seeks to improve its knowledge of the environment in which it operates and thus limit its impact on the Caspian Sea bi-resources.

Its annual Environmental Protection Plan identifies a variety of projects.

The Caspian Seal

The Caspian seal is the only marine mammal in the Caspian Sea and is endemic to the Caspian. In 2008 the International Union for Conservation of Nature (IUCN) changed its status from 'vulnerable' to 'endangered' and put it on the Red List of Threatened Species.

Caspian seals feed on a variety of small fish. During winter they migrate to the North Caspian to breed, with the pups being born on the winter ice field.

At the beginning of the 20th century the total number of seals was estimated at more than a million. By the late 1980s the figure had halved, and in 2005 surveys showed that there were approximately 111,000 seals.

Since 2005, the consortium has supported yearly scientific programmes that are intended to increase understanding of the Caspian seal.

In 2010 this work included the sixth annual seal survey to determine the number of pups born and the distribution of the breeding population. Satellite tracking was also used to record the movement of adult and juvenile seals.

As well as providing valuable information on the population size and distribution (information which can be used to minimize potential impacts on the seal population) when viewed over time, it gives an indication of the overall population trend.

In 2009, the consortium organized an international scientific symposium in Atyrau dedicated to the Caspian seal. Its objective was to provide a comprehensive scientific overview of the hazards faced by the Caspian seal and how these might be mitigated.

The symposium was first of its kind and brought together expert scientists from Kazakhstan and all over the world. Conservation experts have attributed the decline in seal numbers to a combination of factors. The most important of these are commercial hunting over the past century, degradation and loss of habitat, incidental killing by fishermen and drowning in nets, and declining fish stocks. Other factors include recurrent disease epidemics and pollution from agriculture and heavy industry.

Ice breaker traffic through winter breeding grounds can disrupt mother-pup interactions. Mitigation measures being pursued by the consortium include: trained seal watchers on board every vessel,

the use of thermal imaging binoculars for night-time travel, satellite identification of breeding areas so that they can be avoided.

Seal pups are also taken by naturally occurring predators – principally wolves and sea eagles.

Bird Monitoring

The Caspian Sea is situated on major migratory routes for many birds, the majority of which are from the Siberian-Asian region.

In autumn the birds concentrate on the north-east and northern coasts of the Caspian. Gradually, they move along the western coast towards the south. The Ural and Emba rivers are also important migratory paths. During spring, the migration routes move back in the opposite direction.

When migrating birds rest and look for food in the coastal reed beds. Swans, geese, ducks, sandpipers and other water and marsh birds also nest and brood in these areas. This coastal area is considered to be the most sensitive.

In Kazakhstan, 31 species of birds living along the coast or coastal areas of the Caspian Sea are included into the Red Data Book. Most of them live in aquatic and coastal ecosystems, such as the pink pelican, the Dalmatian pelican and white-tail eagle.

Starting in the year 2000, the consortium has made annual observations of bird species in the Mangistau and Atyrau regions in order to better understand wintering activities, seasonal migration and nesting habitats.

Between 2000 and 2009 Agip KCO conducted 31 separate surveys associated with well testing activities.

Sturgeon

There are 25 different types of sturgeon in the world mainly in the Black Sea, Sea of Azov, Lake Baikal, the Mississippi River and the Caspian Sea.

The Caspian Sea is home to five of them: beluga, Russian sturgeon, Persian sturgeon, starry sturgeon and fringebarbel sturgeon. They are all classified as 'endangered' by the International Union for Conservation of Nature.

Just like salmon, all sturgeons reproduce in freshwater. The construction of large dams on the Kura (1950s) and Volga (1960s) blocked up to 90% of the natural spawning grounds. This soon led to depletion in fish numbers.

The Ural River is now the only river with no dams and therefore suitable for sturgeon reproduction. The beluga sturgeon normally reproduces 500 to 800 kilometres from the river mouth. Once fertilised, eggs transform into very small sturgeons and in a few months, as they grow, drift and swim towards the river mouth where they eat and grow even larger. After some time they move offshore into coastal waters. It takes between 7 and 20 years for an adult sturgeon to reach its reproductive age. During this time, sturgeon live in the northern part of the Caspian Sea during the warmer summer months and in the southern part during the colder winter months.

Overfishing and illegal fishing throughout the Caspian have had a dramatic impact on sturgeon population. Since the 19th century sturgeon stocks have been overfished for their eggs which are processed into caviar. In response to this threat, the Convention on International Trade in Endangered Species (CITES) and the United States Fish and Wildlife Services have banned the import of caviar which originates from the Caspian Sea.

In 2011 the consortium initiated a project with the United Nations Development Programme and CaspEco, the RoK and Russian Federation Spawning Grounds Working Groups and local and international experts to assess the status and wellbeing of fish (particularly sturgeon) spawning grounds along the Volga and Ural rivers. The project aims to identify priority actions for rehabilitation, along with their technical feasibility and economic viability.

Integrated Coastal Zone Management Masterplan

In collaboration with both national and international scientific experts and organisations, Phase I agent company Agip KCO has developed a management masterplan for Kazakhstan's North Caspian coastal zone.

The masterplan, which adopts the guidelines set by the European Union and United Nations agencies for coastal management worldwide, seeks to integrate economic needs with social and eco-environmental sustainable development and is seen as a prerequisite for the systematic understanding of the long-term strategic needs of the area.

The masterplan is based on extensive environmental monitoring carried out in the North Caspian. Its main objectives are:

- to create the baseline ('zero' scenario) of the environmental and socio-economic context
- to develop coastal zone future scenarios at short-term and long-term scale
- to assess environmental criticalities
- to develop guidelines towards biodiversity protection

The plan promotes awareness of the principles of sustainable development and the significance of environmental protection.

Letter received from the United Nations Environment Programme

"We would like to express our appreciation for the extensive work undertaken in the preparation of the Masterplan. The amount of data and information collected over time as well as the way, in which this information has been analysed, organised and presented in the plan, is impressive.

By supporting the development of the Masterplan, Agip KCO sends a clear message of understanding that its role in the region carries expectations which go beyond addressing oil and gas operations ... and that the company seeks to make a significant contribution to environmental protection of the region."

Frits Schlingemann, Interim Secretary of the Tehran Convention
Parvin Farshchi, CaspEco Project

Caspian International Seal Survey

"...the major causes of population decline of the Caspian seal have not been related to oil exploration activities, except winter shipping, which may have a small influence on the Caspian seal during the breeding period."

Caspian International Seal Survey

Seismicity

Earthquakes in the Caspian area are directly related to the sub-duction of the South Caspian plate which belongs to the Arabic plate and "plunges" below the North Caspian plate.

Historically, seismic activity in the Caspian is largely concentrated in its southern and middle parts and in the area of the Apsheron peninsula, where the two plates meet.

The northern part of the Caspian Sea is considered a tectonically stable region, and one of the Earth's least active earthquake areas.

Nevertheless, the consortium is aware of the risk of earthquakes, and facilities are designed to minimize associated risks to 'as low as reasonably practicable', the internationally recognized framework for deciding on the level of investment needed for safety programmes.

Issues from the past: abandoned wells

The history of oil exploration in the Caspian Sea dates back to the late 19th century and it is inevitable that there are certain issues from the past.

While estimates vary, it is acknowledged that there may be as many as 1,500 abandoned wells in the coastal area of the Caspian Sea. A significant number of old wells have been submerged due to the rising water levels of the Caspian. The current condition of these wells is unclear, and it suspected that some are leaking.

The consortium appreciates ongoing government efforts to manage this legacy issue.

From North East Caspian Marine Study 1994-2006

Birds - Positive

"AKCO operations have neutral and even positive influence on avifauna of NE Caspian."

Institute of Zoology of the RoK Ministry of Education and Science, Almaty

Fish - Neutral

"The current status of fish within the range of Agip KCO activities should be considered satisfactory."

Kazecoproject, Almaty

Bottom sediments - Neutral

"Under the routine, accident-free mode of operation there are no anticipated significant changes."

Institute of Microbiology and Virology, MES RoK, Almaty

Phytoplankton - Neutral

"No adverse changes in composition, structure and productivity of phytoplankton were discovered at the various stages of geophysical surveys, exploration, appraisal drilling, and construction of infrastructure facilities."

LLP Research and Production Centre of the Fish Industry, JSC KazAgroInnovation, Almaty

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