Subchapter 6.3. Pollution of the coast

Fashchuk D., Lavrova O., Strochkov A., Mironov O., Alyomov S., Spiridonov V., Makarov A., Kolyuchkina G., Simakova U., Khlebopashev P.

6.3.1. Russian coast

6.3.2. Ukrainian coast

Sandy beaches, sandstone rocks and rocky shores enclose the Kerch Strait and they are typical for the region morphological coastal structures (Chapter 1). The Chushka Spit with the Caucasus harbor is part of the Tamano-Zaporozhsky ornithological protected area. No marine natural reserves are located on the Ukrainian side of the Strait with the exception of two small protected areas on the coast facing the Azov Sea. However, there are many popular beaches and aquaculture farms. As of January 2010, a natural park was planned to be set on the island of Tuzla covering the territory of 27 865 hectares of public land, while a monastery located on the island was designated as a «site of cultural heritage».

A spill over 700 tones is considered large. Besides, the polluted area was at the heart of migration route of the red-throated and black-throated Siberian diver birds while on the way from Central Siberia to the Black Sea. Coastal wetlands there, are the migratory breeding grounds for numerous seabirds and waders. As such, most birds suffered from the oil pollution of the Kerch Strait coastal area after the accident in November 2007.

6.3.1. Russian coast

The spill possible effect on the coast was not immediately clear and the mass media (Ukrainian and Russian Newspapers, Reuters, CNN, BBC News, and others) were carrying contradictory information during the first days after the Kerch accident.

On 12 November, the coasts of the Tuzla and Chushka Spits and of the nearby coastal villages of Ilyich and Priazovsky were reported hit by the oil spill. The actual extent of contamination varied significantly along the shorelines of the Kerch Strait. The Tuzla Island in particular suffered severe levels of contamination in comparison to connecting shorelines along the Kerch Strait. Selected areas to the North of the Kerch Strait along the coast facing the Azov Sea up to the Cape Kamenny were also polluted by small quantities of heavy fuel oil.

Oil products with high content of such light fractions as gasoline, acetone and kerosene pose the main threat to the aquatic environment. Fortunately, heavy fuel oil is almost free from such fractions being the next-to-last stage of oil distillation. The oil film was torn to tatters by the 11 November 2007 storm and hardly posed a serious threat to the underwater inhabitants after that. Cormorants, gulls, pochards and other water birds inhabiting the coast were affected the most. In the zone of contamination fuel oil stuck to the bird feathers depriving them from ability to move. As a result, a large number of seabirds perished during the acute phase of the oil spill. Early reports on the Ukrainian side situation mentioned 150 birds killed, while other estimations reported up to 30 000 seabirds killed by the oil spill in November-December 2007.

Individual bodies of dead dolphins were discovered at the shore line. However, their death could have resulted from collision with vessels or the storm waves. A large number of shellfish was found on the coastal strip, though their death cause was not defined. Those dead creatures, like birds, started creating a significant problem while decaying: They became heavily consumed by the necrophagouses and that threatened to spread contamination and possible diseases deep into the areas adjacent to the Kerch Strait.

Human resources (manpower) exceeding 2.5 thousand persons and more than 300 units of technical equipment were involved in the coastline clean-up operation. Specialized sub-divisions and rescue teams, military formations, fire-fighting brigades, the Maritime Academy cadets and governmental workers from Novorossiysk and other towns, and villages were engaged with eliminating the oil spill aftereffects.

Local and international organization like WWF, Greenpeace, Birds International (Russian Federation), International Fund for Animal Welfare (IFAW) and Sea Alarm jointly with volunteers and governmental officials from different cities worked to clean the coast and save the wildlife. The Wildlife Rescue Operations in the Black and Azov Seas Oil Spill Area project enjoyed support of the WWF, the Netherlands and Norway as well as of the numerous Russian WWF supporters mainly representing the Russian Caucasus regional branch. More than 1000 volunteers from the Krasnodar Region (students and teachers from five universities) contributed to the effort. Hundreds of volunteers from Russia and other CIS countries provided assistance to the animals affected by the oil spill.

An interesting document entitled the «Diary of the Center of Accident Diminishing» has been published at: http://www.wwf.ru/about/what_we_do/oil/kerch07/diary. The following sequence of coastal activities was reconstructed based on the mentioned diary, publications in the newspapers (citing statements of the Russian and Ukrainian officials) and scientific papers:

13.11.2007. As soon as the weather conditions allowed, the port services started the clean-up operations. They raked fuel oil together with contaminated soil into piles to be further on loaded onto trucks and taken away for dumping. During 12 and 13 November, more than 900 tons of contaminated soils were collected at the shore of the Kerch Strait and

the Temruk district of the Krasnodar Region to be sent for disposal to a special site in the Sennoy village of the Temruk district. The water surface contamination was eliminated through topping oil film with special sorbent powder (crushed sawdust and peat) to bind the oil particles and make them easy to collect from the surface. Oil film was collected from the sea surface by specialized vessels to be further discharged into reception facilities at the port. As a whole, about 2.5 tons of the oil-in-water emulsion was collected.

WWF was assigned to coordinate efforts to rescue birds at Taman. At the initiative of the Russian Caucasus (the WWF regional branch), a public focal point for salvation of the waterfowl affected by the fuel oil spill in the Kerch Strait was established.

16.11.2007. Operations to clean up the birds and coast line continued: Army men worked at the Chushka Spit jointly with some 100–120 people from the Novorossiysk administration and municipal enterprises, as well as with 60 persons, the gamekeepers from the Temruk District Society of Hunters and Fishermen. Fuel oil mixed with seaweed was found on the shore in the form of large heaps stretching for about 10 km in length and 3-5 m in width. As well, dead birds, mostly coots, were found lying in that fuel-oil heaps. Rangers collected the dead birds into the bags and left them by the road to be later collected and loaded onto the truck. Several birds alive were found. The problem was that polluted birds kept coming to the shore to fall into the oil. Thus, it was difficult to catch them. Further on, they went back to the sea to unattainable distance. Also, bodies of two dead dolphins were reported found.

The Novorossiysk Administration personnel and army men were cleaning the coast from oil with shovels and pitchforks, and the collected materials were picked up by trucks. Daily, about 400 m were cleaned up. It is possible that the shore near the port of Caucasus was cleaned up with technique. At the first glance, the beach looked as almost turned over and multiple inclusions of fuel oil were left on the sand. It could be assumed that manual labor for cleaning fuel oil was more effective, although much more labor intensive. Contaminated soil was transported to the landfill owned by a private company. The company management noted that polluted soil was brought for temporary storage only. How and where the soil was supposed to be cleaned up, at that time remained undecided. At least one truck of polluted soil, most probably by mistake, was unloaded at a waste landfill.

In the immediate proximity to the spill at sea three trawlers were engaged with fishing during the clean-up operations. Accessory of the vessels could not be identified. As far as we know, the Ukrainian authorities did not allow selling fish caught in the shipwreck vicinity.

17.11.2007. Help was coming by sea, land and air to the Taman Peninsula. More than two thousand people and 200 pieces of equipment were involved in the rescue operations. By that time, 26 km had been cleaned up already. As such, 2270 tons of polluted materials mostly impregnated with fuel oil algae, soil and debris were collected the day before, while 7019 tons in total were collected since the operations start. More than a thousand dead birds were taken to the designated burial area. The volunteers arrived were trying to save the birds.

21.11.2007. According to the scientists, the estimated damage was 20 billion rubles. According to the Rosprirodnadzor, it was 6.5 billion rubles.

26.11.2007. Still, no reason for optimism had arrived, since a new portion of fuel oil appeared on the Chushka Spit.

30.11.2007. By that day, 30 km of the shore line had been cleaned up, 5000 birds were buried, the damage was estimated as 30 billion rubles and five criminal cases had been initiated.

11.12.2007. The Krasnodar Region covered the cost of the shipwreck consequences elimination.

19.12.2007. In total, 180 km of the coast line were damaged by the oil spill, and 53 km out of them had been cleaned up. About 40 000 tons of oily garbage was collected at the shore, while two storage places for oily garbage were arranged. The clean-up operations at the Tuzla Spit were completed, while similar operations at the Chushka Spit continued going on. Ecologists came to the opinion that the clean-up operations negative aftermath was possible and that the main lesson to learn was the necessity to work out the rules for handling the environmentally hazard cargo in the Russian Seas water area. Sorbents were applied for utilization of oil from the collected wastes.

During the emergency and recovery activities, the sea and shore birds perished, being contaminated by oil, were collected, counted and utilized. The total amount of perished birds was 5487, while 244 birds were collected alive. In the process of rehabilitation 91 birds died, 111 birds got completely rehabilitated to be released back to the wild, and 42 specimens were transferred to the World Wildlife Fund regional branch. The practical treatments of damaged birds were in line with recommendations of Handbook on Oil Impact Assessment (Camphuysen C. J., *et al.,* 2007).

26.01.2008. Still, some parts of the Chushka Spit remained covered with heavy oil.

5.02.2008. The clean-up activities went on, the birds still continued dying.

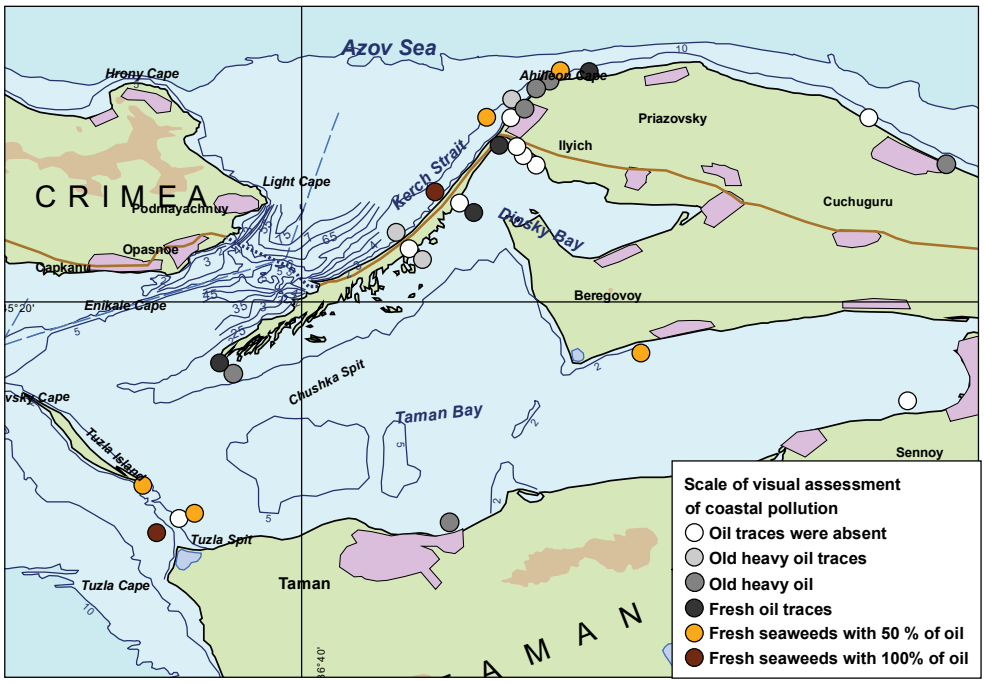

Fig. 6.3.1a. Scheme of coastal pollution visual assessment as observed during the SIO RAS-WWF expedition of 26 February — 15 March 2008.

16–17.02.2008. An information was spread around that fuel oil traces had arrived on the Ukrainian part of the Kerch Strait coast, however no such traces on the Russian part of the coast were found.

Finally, the total area of the sea surface pollution in the Black and Azov Sea basin was estimated to be 664 km^2, and the total length of the coastline contaminated with oil products was assumed to be about 183 km (Booklet, 2009).

In the period of 26 February — 15 March 2008, the P. P. Shirshov Institute of Oceanology and WWF-Russia studied the consequences of the Kerch Strait oil spill. According to the visual observations over pollutants at the shores, the most contaminated were found the sea side areas near the Ilyich village, Chushka Spit, Taman Bay, and the Tuzla Spit (Fig. 6.3.1a).

In September 2008, certain experts participated in a visual inspection conducted at the Tuzla Island, the port of Caucasus and the Taman coastal village area. Together with IKI RAS (Institute of Space Research) specialists, the third-year ecology and Earth-sciences students from the Dubna International Nature, Society and Humanity University took part in the carried out works (Photo: a). In the Taman village area, neither the coast, nor the seabed with seaweed communities bore the heavy fuel oil marks. Local residents witnessed no significant quantities of heavy fuel oil washed ashore after the Kerch catastrophe.

Photo: Photographs taken in September 2008 on the Tuzla Island during the expedition:

a) Anya Gusarova and Irina Rybakova, the third-year ecology and Earth-sciences students of the Dubna International Nature, Society and Human University with their supervisor O. Yu. Lavrova (IKI RAS); b) polymerized films of heavy fuel oil brought ashore in November 2007; c) «new» smearing heavy fuel oil washed ashore in summer 2008; d) seabirds at the Northern coast of the Tuzla Island.

At the same time, heavy fuel oil pollution was detected along the Southern coastline of the Tuzla Island: Under the stones and in patches on the shore, while covered with sand mixed with piles of dead seaweed. Together with the «old» heavy fuel oil in the form of polymerized films and brought at the time of the 2007 catastrophe (Photo: b), the «new» heavy fuel oil was discovered washed ashore, obviously, during the 2008 summer (Photo: c). That was pollution caused by the oil left from the Kerch accident and rising from the shallow seabed to the surface due to the water temperatures increase. On the contrary, no pollution was observed at the tip of the Tuzla Island where to considerable amounts of heavy fuel oil were most probably brought at the time of the catastrophe. It is quite possible that the fuel oil was washed away shortly after the accident, as the average current velocity stands at 2-3 m/s in that narrow passage between the Tuzla Island and the Tuzla Spit. No heavy fuel oil pollution was found on the Northern coastline of the Tuzla Island either. Numerous seabird populations were found in a satisfactory state and the numbers of birds did not seem to have diminished in comparison to those observed during the previous years (Photo: d). Seabirds were seen actively diving for food proving that the seabed at the Tuzla Island Northern coastline was safe from oil pollution.

6.3.2. Ukrainian coast

The air survey conducted on 14 November 2007 found no visual evidence of significant oil pollution of the Ukrainian Kerch Strait coast during the first days after the disaster.

Starting from 15 November, Environment Committee of the Autonomous Republic of Crimea (ARC) carried out regular monitoring of soils in the coastal zones of the Kerch Strait, Leninsky district, and the Tuzla Island. Eighty-two test points were arranged to measure contamination with oil and nine test points — with sulphates. As of 9 July 2008, 1856 samples had been collected and examined for concentration of oil and 112 samples — for sulphates. The repetition factor of the background concentration excess sustained some 1500 times in the first days after the oil spill. In the result of the clean-up operations, after 9 July 2008 the maximum excess was registered as nine times on the Tuzla Island only.

The Tuzla Island, as the most polluted part of the Kerch Strait in the result of the accident, was regularly monitored in the period of 11 November — 3 December 2007 by the IBSS scientists. The first observations showed a high degree of patchiness in the distribution of oil pollution in the coastal zones. Some places were completely clean from oil while in the others coverage was complete at the shore line and at the 5–10 m wide stripe of water.

13 November. Fuel oil mixed with algae was detected in the surf zone of the Tuzla Island coast line from its South-Eastern to the North-Western part. The width of the impacted territory ranged from 1 to 10 m and the thickness — from 1 to 10 cm.

15 November. The area polluted by the fuel oil covered about 2000 square meters.

17 November. It was discovered a strip of oily dead algae stretching for 2500 m in length and 1–3 m in width along the Tuzla Island Northern coast line. No new polluted areas were detected on 18–27 November.

28 November. A strip of oily dead algae stretching from the Tuzla Island North-Western part towards its South-Eastern tip was observed. The strip was about 2,000 m long reaching from 0.5m to 10 m in the width. Also, tatters of fuel oil were found.

1 December. In the Tuzla Island North-Western part, a strip of oil spots was discovered reaching the length of 500 m and width from 0.5 to 25 m. After that, another nar-

row strip of fuel oil being about 500 m long and 5 m wide was detected at the Southern coast of the island. 14 dead bodies of birds (coot, pochard, cormorant) were detected. Level of the coast line pollution by oily algae remained unchanged. The polluted area stretched for approximately 2 km being from 1 to 5 m wide.

2 December. Characteristics of the Tuzla Island North-Western end remained unchanged. Along the coast line, the oil spots continuous band being 5 km long and 5 m wide stretched from the island North-Western tip to its South-Western part.

3 December. The last visual observation was carried out in December. No emergence of new oil pollutions was observed at the Tuzla Island. However, strips of oily algae at the North-Western edge of the island were detected as 3500 m long and 5 m wide. Dozens of dead bird bodies, mostly coots, cormorants and dives were discovered during the observations.

In November 2007, 8.5 km of shoreline were reported cleaned. Since the clean-up operations start, 3248 tons of wastes were collected. On the Ukrainian coast, volunteers, employees of the Ministry of Emergency Situations (MES) and servicemen of the Armed Forces of Ukraine took part in the clean-up operations. Collection and disposal of oil was successfully completed on the beaches of the Tuzla Island (Photo below). However, remnants of oil materials left in the open bags at the sensitive sites close to recreational areas were found abandoned a few months later. That has revealed information shortage about the storage facilities location jointly with an absence of a timely organized waste management.

Photo: Oil-polluted sand was collected, packed and transported to Kerch for utilization by the Ukrainian volunteers (*I. Kudrik* picture).

In December 2007, the Kerch Strait got frozen and all clean-up activities were suspended. Up until that point, 5,440 tones of oil sand mixture had been collected from the contaminated coastal areas. Following the ice melt, additional 1700 tones of waste were collected. Wastes were initially put into bags and then transported and stored at the Kerch Port bonded area to ensure that no further leakage occurred. Ukrainian Ministry of Environment Protection (MEP) was designated responsible for waste management. As such, it requested the oil sand mixture treatment and processing to be carried out in the Kerch port instead of burring it in the clay mines. A special governmental commission, established by decision of the Ukrainian Cabinet of Ministers of 19 March 2008, by its decision No 496 approved application of technology proposed by Ecocenter Ltd. from Kirovograd (http://www.ecocenter.com.ua/index_e. htm). The waste was stabilized and transformed into inert substance through mixing with other materials, and the newly-produced mixture was reused in road construction after that. At the time of the Kerch port inspection by UNEP **on 14 July 2008,** approximately 1500 tones of waste still remained to be processed. In total, the oily wastes collected along the Ukrainian coast were estimated to be 7140 tones. Meanwhile, oil content of

Photo: Polluted by oil sandy coast and collection of polluted materials mostly macroalgae, soil and debris by military forces and volunteers (from http://www.flickr.com/photos/)

the sampled oil-contaminated sand collected ranged from 4% to 30%. However, these numbers could be well over-estimated, as they imply that 285–2000 tons of oil arrived at the Ukrainian coast. In practice, most of the spilled oil arrived at the Chushka and Tuzla Spits and contaminated the Russian coast mostly.

Many surveys were conducted by the local residents, fishermen, employees of the MEP and MES of Ukraine, and authorities of the Kerch commercial port, since all of them were participants in and witnesses of the November 2007 event. According to the local residents, in the Kerch Bay and the Kerch Strait Northern part (tiny villages of Capkanu, Sipyagino, Opasnoe, the Crimea port, Zhukovka) no mass arrivals of heavy fuel oil to the coast were observed, except for a small portion of up to three barrels of oil to create patches in the area of the Turkish Eni-Kale fortress that were promptly collected by the MES staff. The coast to the North from the Crimea port till the Hrony Cape in the Azov Sea was not affected by oil pollution either. Moreover, a flock of swans would occasionally dove along those coasts (near the Crimea port) searching for food, which indicated that no oil was on the bottom. However, according to the information provided by the fishermen, their bottom fishing gear got often stained in black oil in the vicinity of the Zhukovka coastal village (to the North from the Crimea port). It was possible that at the Northern entrance of the Kerch Strait a seabed oil pollution of mosaic nature had occurred.

In March 2008, significant coastal waters contamination with oil film was observed in the course of survey conducted at the Ukrainian coast of the Kerch Strait in the areas to the South from the Crimea port (the Opasnoe village, beam anchorage No 454). A strong smell of oil present in the air was indicating a «freshness» of spillages. That pollution of the Kerch Strait waters with volatile fractions of petroleum products was obviously not related to the *Volgoneft-139* tanker accident. Probably, the reason was an oil release to occur during petroleum products pumping from a small boat to a larger one (transshipment) for further transportation by sea. For those — officially not allowed — operations an anchor place to the South from the Tuzla Island was often used.[1]

According to the officers of the post-disaster service of the MES of Ukraine, the Ukrainian coast strongest pollution occurred in the area of the Ak-Burun Cape and Arshintsevskaya Spit not during the storm and right after the *Volgoneft-139* tanker accident, but a week later on 17–19 November. In order to eliminate contamination of the bays at the Ak-Burun Cape, up to 500 bags of contaminated sand were removed from the area daily. Beaches of the Arshintsevskaya Spit and bays of the Ak-Burun (White) Cape are the territory presently belonging to the Kerch historical and archaeological museum. By March 2008, those beaches had been cleaned. Visual inspections later resulted in discovery of just a few spots of oil preserved under the stones and on the rocks in the Ak-Burun Bay. The head of the State Ecological Expertise and Environmental Control in the city of Kerch reported about a diving survey carried out in the vicinity of the Arshintsevskaya Spit by the MES of Ukraine in March 2008. In its result no oil was found on the bottom of the Kerch Strait.

[1] There is a practice in Russia and Ukraine: oil and oil products are being transported down the rivers by the river-sea class vessels to the sea ports and then re-loaded to the sea-type tankers. Vessels do not enter the shallow river ports or do not do this due to economical reasons. The river-sea class vessels can not withstand powerful storms as was demonstrated by the tragedy in the Kerch Strait.