

UDC 662.106.33

DOI 10.56525/YMQG6227

ENVIRONMENTAL ASSESSMENT OF SOILS AT SHIPYARD CONSTRUCTION SITES IN THE KURYK AREA

Permyakov Vladimir

Tyumen Industrial University, Tyumen, Russian Federation

e.mail:v.n.permyakov@mail.ru

Annotation. The purpose of the article – investigation of one of the most unusual coasts of the Caspian Sea in the Kazakhstan area, not only as the place chosen by JSC " KazMunayGas " for construction of a shipyard, but also as a territory on which land is suitable for the development of vegetable and melon crops growing. In this article, sites No. 1 and No. 2 are considered as the alternatives for the shipyard construction. For us, the most interesting area for investigation is site No. 2, where a large variety of edaphic types of desert communities predominates in comparison with the site No. 1, which is located near the salt valley Ashisor. The studies are made due to the poor knowledge of this part of the Mangistau region, and the wide spread of desert communities with the involvement of cereals (*Agropyron fragile*, *S. oaapia*, *S. sareptana* - the latter occurs in the middle desert).

Subject of research – assessment of the impact of the planned shipyard construction on soil condition of local vegetation. The increased content of some heavy metals (Cu, Cr, and Zn) in the soils of the chosen area is substantiated. The research was conducted in accordance with generally accepted methods, taking into account the experience of similar work carried out in 2012-2015 on the condition of some environmental components in the coastal zone of the Caspian Sea.

Cartographic materials are completed using GIS software products: Marmfo Professional v.10.2 SAS. Planet 160707.

Key words: Caspian Sea, Kashagan, Mangistau, Kuryk, Azerbaijan, transport, oil, plant, shipbuilding, ship repair, desert, soil, vegetation, wormwood, communities, monitoring, heavy metals, oil products.

Introduction

Environmental protection and safety issues of the Caspian Sea and its coastal zones are reflected in the main directions of economic and social development of the Republic of Kazakhstan for the period up to 2050 [1]. Mangistau region is one of the hydrocarbon production areas, where large offshore and onshore oil fields are concentrated. Prospects for the development of a system of crude oil transportation by sea have led to the need to forecast new shipbuilding facilities required for the construction of new vessels. The most preferable site, according to the recommendation of KazMunayGas JSC, was chosen to be the area of the Kuryk settlement, since, within the framework of the industrial development of the Republic of Kazakhstan, the coastal part of the Kuryk settlement should become the third base for maritime operations along with the ports of Bautino and Aktau [2]. In the feasibility study for the shipbuilding and ship repair yard in the settlement of Kuryk, the following were considered (Figure 1):

- plot 1, located approximately 2.5 km from the village of Kuryk, in the area of the Ersai shipyard, in particular, ERSAl Caspian LLC Contractor (ERSAl) LLC);
- plot 2, located at a distance of about 12.5 km from the village of Kuryk.

Based on the results of studies of the planned shipyard construction sites, specialists from Terra Remote Sensing and GIS Center LLC reached the following conclusions []. From an environmental perspective, preference may be given to site No. 1, whose development will cause less harm to wildlife compared to site No. 2. However, it should be noted that site No. 1 is located near the Ersai shipyard. This could undoubtedly lead to increased environmental impacts due to

cumulative impacts. At the same time, from an economic perspective, building a shipyard on site No. 1 will require significantly less investment in access roads, power lines, etc.

We are studying the soil conditions during the shipyard's construction at two sites, but Site 2 is of particular interest to us. The data obtained from this research can serve as a basis for further research and environmental monitoring in the areas of oil fields located in the coastal zone of the Caspian Sea.



Figure 1 – Diagram of the planned construction sites of the shipyard in Kuryk

The region under consideration belongs to the middle Mangyshlak desert. According to [[3,4]], middle deserts are common throughout most of the Mangystau region. They are distinguished by their more diverse information composition than that of the southern deserts. The boundary between these deserts crosses the Mangyshlak plateau just north of the Kuanda and Basgurly basins and runs just north of 43 °N (Figure 2).

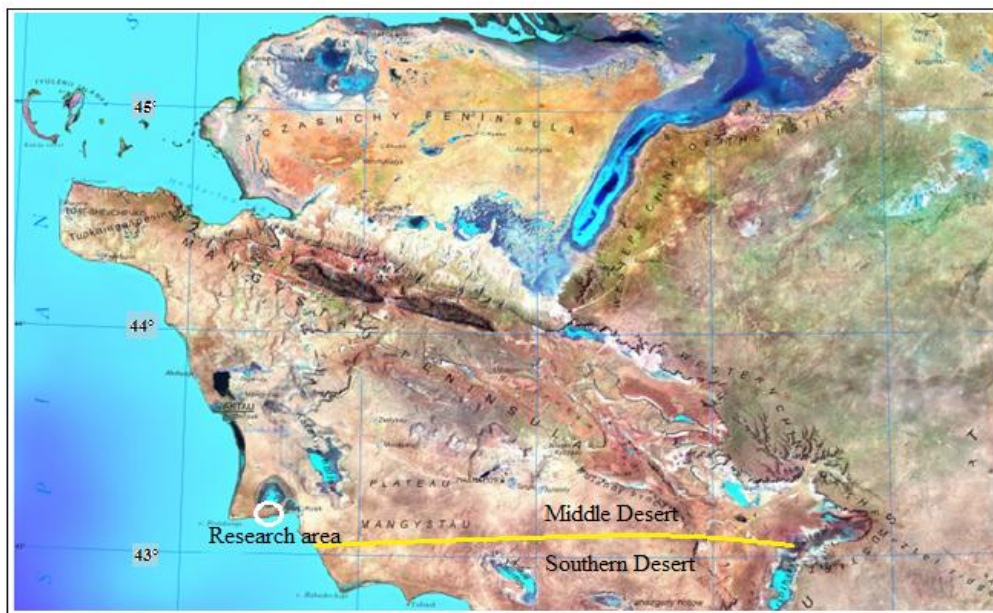


Figure 2 – Location of the study area by desert types in Mangyshlak

The vegetation cover of the study area consists of communities of 10 formations: In the southern deserts, the diversity of these 10 formations is half as great. Wormwood deserts include various edaphic variants, of which hemipsammophytic and hemipetrophytic pelitophytic species predominate over petrophytic and hemipetrophytic pelitophytic species [4,5].

On the rubble plains, they include Tasbiyurgungaceae (Nanophyton erinaceum)

communities. Such complexes belong to the hemipetrophytic type with the dominance of wormwood [3]. The vegetation of solonchaks and solonchak soils in the study area is distinguished by the presence of kokpekovy (Atriplex) communities in the ecological series. cana) azhrekovykh (A eluopus littoralis), but unfortunately, their spatial coverage has recently been poor [4]. In this regard, it is important to assess the anthropogenic impact on soils in the area of the shipyard construction in order to be able to predict changes in vegetation communities and the state of environmental components [10].

Research materials and methods. The primary source of factual information is the results of our own field research conducted on March 9 and 10, 2018, with specialists from the Department of Ecology of the regional Department of Natural Resources and Rational Nature Management (UPRIRP). Mangistau region.

Monitoring observations were carried out according to generally accepted methods, taking into account the experience of similar work in the coastal zone of the Caspian Sea. The envelope method was used for sampling. Samples were taken from depths of 5 and 20 cm. Soil samples were packed in polyethylene bags and appropriate labels were attached. The sampling methodology for monitoring general local soil pollution complies with GOST 28168-89; GOST 17.4.3.01.-83; GOST 17.4.4.02-84; GOST 17.1.5.01-80; GOST 26423-85 [6,7].

The vegetation condition was assessed using traditional methods employed in soil biological research. The route-based method was used as the basis. Photographic recording of vegetation in natural ecosystems growing on saline soils in the coastal zone of the Caspian Sea was conducted. Soil samples were analyzed in the accredited environmental laboratory of the UPRiRP, which used the following measurement methods: M03-03-2012 (kz.07.00.01668-2013) and MVI 20658-1917.

The maps of the research and sampling areas were created using GIS.

Research results and discussion. The heterogeneity of the soil cover of the study area is due to both the nature of the relief and parent rocks, and the different bioclimatic conditions of soil formation on the coast of the Caspian Sea [8,9]. According to the soil-geographic characteristics, the described area, as noted above in the text, is located in the desert zone of the Mangistau region and belongs to the middle desert (Fig. 2) with a predominance of brown soils [4,10].

Soil cover of plot No. 1. Plot No. 1 is located at a distance of 1.5 km from the village of Kuryk and its soils have varying degrees of salinity and anthropogenic disturbance.

The area is a narrow coastal strip of sandy-shell rock saline sediments, which give way to sandy-salt-marsh soils. Sandstone and shell rock sediments occupy a narrow coastal strip and the coastal slope [8,9].

The date of soil sampling at point 1 of plot No. 1 was 03/09/2018.

Point 1 is located 10 m from the seashore within the distribution of coastal marsh solonchaks with annual saltwort vegetation (Figure 1). Projective cover is 15%. The content of heavy metals (HM) and petroleum products (PP) in the soil samples is given in Table 1 and Figure 3 [10]. Morphological description of the pit :

- 0-5 cm. The soil is brownish-gray, moist, slightly compacted, sandy, lumpy-granular with small plant roots.

- 5-20 cm. The soil is grayish-brown, moist, compacted, sandy, granular-lumpy with sparse plant roots.

Table 1 – Indicators of the degree of soil pollution by heavy metals and petroleum products (site No. 1, point 1)

No.	Coordinates selection places	Dept h, cm	NP	Heavy metals mg/kg						
				Cu	Zn	Ni	Co	Cr	Fe	Pb
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
1	N43°11'01.8" E51°38'16.88"	0-5	<0.5	1.05	6.15	1.20	0.31	0.35	0.73	3.84
		5-20	<0.5	1.32	7.51	1.84	0.48	0.27	0.23	2.73
MAC mg/kg			1000	3.0	23.0	4.0	6.0	0.05	background	32.0

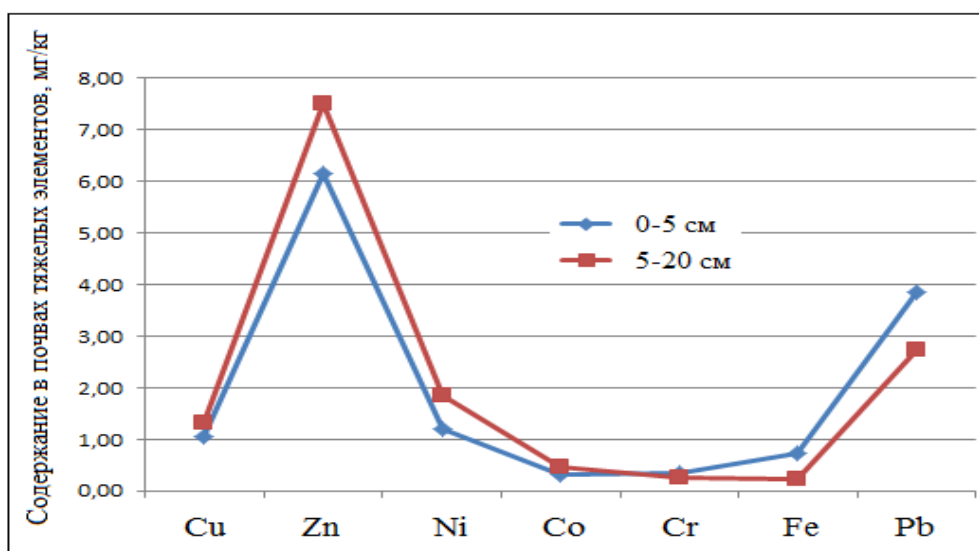


Figure 3 – Content of petroleum products and heavy metals at point 1, site No. 1.

The results of the soil sample analysis show that the content Cu, Pb, Ni, Fe, Co, Cr significantly below the MAC. Their presence in soil samples is explained by contamination by sediment from a sunken barge located 25 meters away. As for zinc, this can be explained by the fact that, depending on their particle size distribution, soil-forming rocks, particularly coastal soils, typically contain an average of 30.6 to 71.7 mg/kg. The highest average zinc values are characteristic of [solonchaks].

Point 2. Sampling date: 03/09/2018. At this point, Sandy-salt soils are rudimentary soil formations, the formation of which is associated with the initial phase of soil-forming processes. Sandy-salt soils of the coastal zone are formed by highly mineralized groundwater at a shallow depth (1-1.5 m) and are characterized by a moist, layered, saline, variegated profile with signs of gleying from a depth of 20-30 cm. The projective cover is up to 30%. These are the youngest soil formations, containing an insignificant amount of humus (0.05-0.1%) in the surface horizon.

The content of heavy metals and petroleum products in soil samples is given in Table 2 and Figure 4. Morphological description of the pit:

- 0-5 cm. The soil is gray, dry, loose, sandy, structureless with small roots of dried plants.
- 5-20 cm. The soil is the same as at a depth of 0-5 cm, but with rare plant roots.

Table 2 – Indicators of the degree of soil pollution by heavy metals and petroleum products (point 2, site No. 1)

No.	Coordinates selection places	Depth, cm	NP	Heavy metals mg/kg						
				Cu	Zn	Ni	Co	Cr	Fe	Pb
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
1	N43°11'03.40' , E51°38'16.67"	0-5	<0.5	4.88	13.28	7.92	2.51	0.62	0.81	2.93
		5-20	<0.5	4.31	14.2	8.11	3.61	0.41	0.73	2.17
MAC mg/kg			1000	3.0	23.0	4.0	6.0	0.05	background	32.0

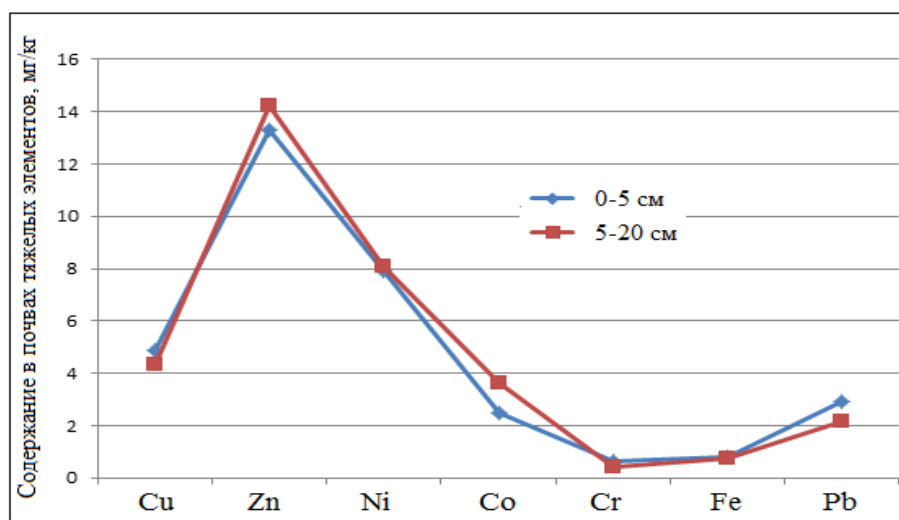


Figure 4 – Content of petroleum products and heavy metals at point 2, site No. 1.

(Zn) content in soil samples, within 0.7 MAC, at this point can be explained by the presence of metallurgical waste and heavy vehicle traffic in this area near Yersai LLC. The nickel content exceeding 2 MAC in the soil at point 2 is explained by the fact that nickel concentrations in sandy soils can reach 8-15 mg/kg, and the waste also contains numerous empty paint cans. The high copper (Cu) content (1.6 MAC in the 0-5 cm layer and 1.4 MAC in the 5-20 cm layer) and chromium (Cr) content (more than 3 MAC) are explained by the storage of industrial waste and welding slag near this point. Cobalt (Co) is a micronutrient found in fertilizers and, in small concentrations (as at point 1), is essential for plant development, particularly for improving drought resistance.

Soil cover of plot No. 2. The soil cover of plot No. 2, located approximately 15 km from the village of Kuryk, is composed of coastal saline sands occupying elevated areas and sandy-salt soils, the formation of which is associated with the initial phase of soil-forming processes. Sandy-shell sediments form near the coastal strip.

Point 1. Sampling date: 03/09/2018. The soil cover of the described location is composed of saline coastal sands. The sands have a layered profile with numerous inclusions of shell rock—up to 95-100%. The humus content in the upper layer is insignificant and decreases with depth. The projective cover is 25%. The heavy metal and petroleum product contents in the soil samples are presented in Table 3 and Figure 5. Morphological description of the soil:

- 0-5 cm. The soil is grayish-brown, slightly compacted, sandy, structureless with small plant roots.

- 5-20. The description corresponds to the description of the depth of 0-5 cm.

In this research area, in the northern part of the ferry complex under construction and at a distance of 13 km from the village of Kuryk, as expected, no excess of the maximum permissible concentrations of petroleum products and heavy metals other than Cr and chromium were recorded.

The chromium content in the sample at site 1 exceeded the maximum permissible concentration by 2.03 times. This can be explained by the slightly elevated location of site 1, which leads to the accumulation of trace elements during dust storms. Furthermore, the soil sampling site is located 25-30 meters from a parking lot for vehicles transporting chrome-plated items for construction purposes. Also located near the parking lot is a container containing paint containers, from which chromium can leach.

Table 3 – Indicators of the degree of soil pollution by heavy metals and petroleum products (point 1, site No. 2)

No.	Coordinates selection places	Depth, cm	NP	Heavy metals mg/kg						
				Cu	Zn	Ni	Co	Cr	Fe	Pb
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
1	N 43°10'0.41" E 51°26'9.97"	0-5	<0.5	0.97	3.06	0.014	1.22	0.107	0.63	3.06
		5-20	<0.5	0.31	1.83	0.005	0.931	0.072	0.33	1.79
MAC mg/kg			1000	3.0	23.0	4.0	6.0	0.05	background	32.0

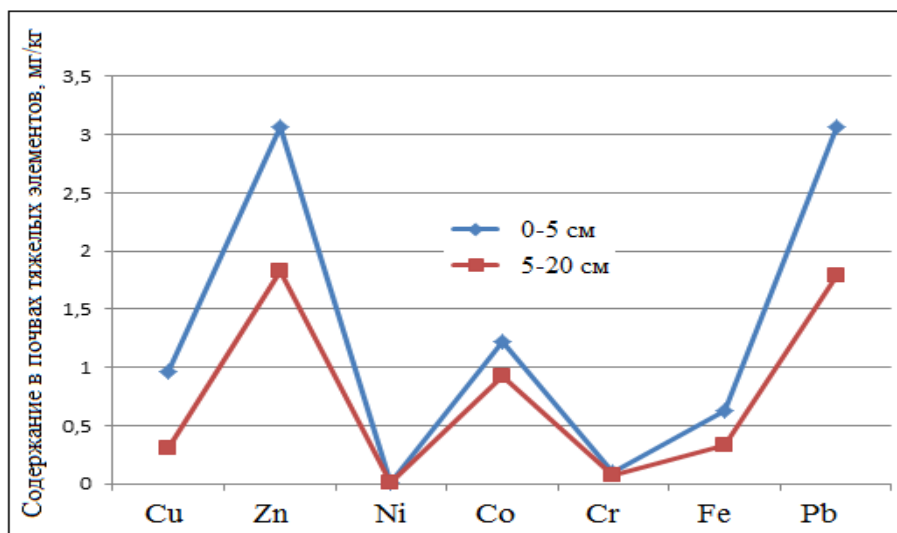


Figure 5 – Content of petroleum products and heavy metals at point 1, site No. 2.

Point 2. Sampling date: March 10, 2018. The soil cover at point 2 is similar to point 1 and consists of saline coastal sand. The heavy metal and petroleum product contents in the soil samples are shown in Table 4 and Figure 6.

Morphological description of the soil:

- 0-5 cm. The soil is brownish-gray, loose, sandy, with small plant roots.
- 5-20 cm. The soil is similar but slightly compacted.

Table 4 – Indicators of the degree of soil pollution by heavy metals and petroleum products (point 2, site No. 2)

No.	Coordinates selection places	Depth, cm	NP	Heavy metals mg/kg						
				Cu	Zn	Ni	Co	Cr	Fe	Pb
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
1	N 43°10'3.20' E 51°25'50.36"	0-5	<0.5	1.2	2.14	3.16	0.51	0.431	1.97	3.17
		5-20	<0.5	0.73	1.84	2.97	0.07	0.226	0.38	2,331
MAC mg/kg			1000	3.0	23.0	4.0	6.0	0.05	background	32.0

Cr chromium content in the samples at point 2 of the site above the MAC by 4.07 times is explained by emissions from the concrete unit, which is located above point 2. The concrete unit supplies hydraulic concrete for the construction of the breakwater.

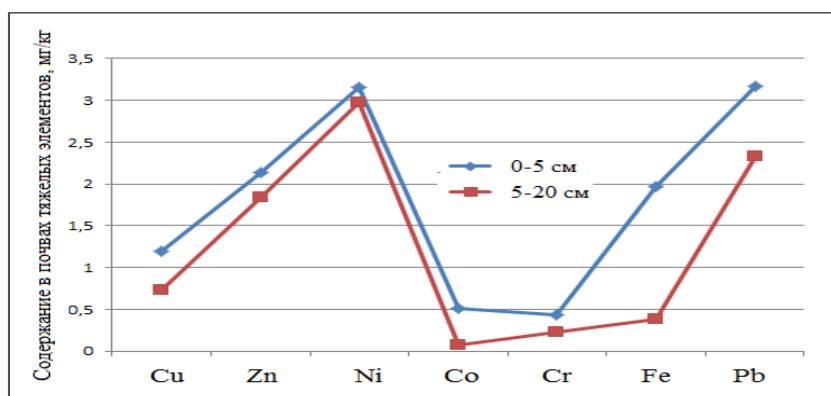


Figure 6 – Content of petroleum products and heavy metals at point 2, site No. 2.

Point 3. Sampling date: 10.03.2018. The soil cover of point 3 is characterized by sandy-salt soils. Sandy The olanchak soils of the coastal zone are formed by highly mineralized groundwater at a depth of 1-1.5 m and are characterized by a moist, layered, saline, variegated profile with signs of gleying from a depth of 20-30 cm. The projective cover is up to 40%. These are the youngest soil formations, containing a negligible amount of humus (0.05-0.1%) in the surface horizon. The contents of heavy metals and petroleum products in soil samples are presented in Table 5 and Figure 7.

Morphological description of the soil:

- 0-5 cm. The soil is gray, dry, loose, sandy, structureless with small roots.

- 5-20 cm. The soil is brownish-gray, dry, slightly compacted, sandy, structureless with a small number of plant roots.

Table 5 – Indicators of the degree of soil pollution by heavy metals and petroleum products (site No. 2, point 3)

N o.	Coordinates selection places	Depth, cm	NP	Heavy metals mg/kg						
				Cu	Zn	Ni	Co	Cr	Fe	Pb
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
1	N 43°10'24.25" E 51°25'58.02"	0-5	<0.5	2.4	4.01	0.431	0.114	1,058	4.17	3.86
		5-20	<0.5	0.73	2.97	0.272	0.039	0.618	2.51	2.13
MAC mg/kg			1000	3.0	23.0	4.0	6.0	0.05	backgr ound	32.0

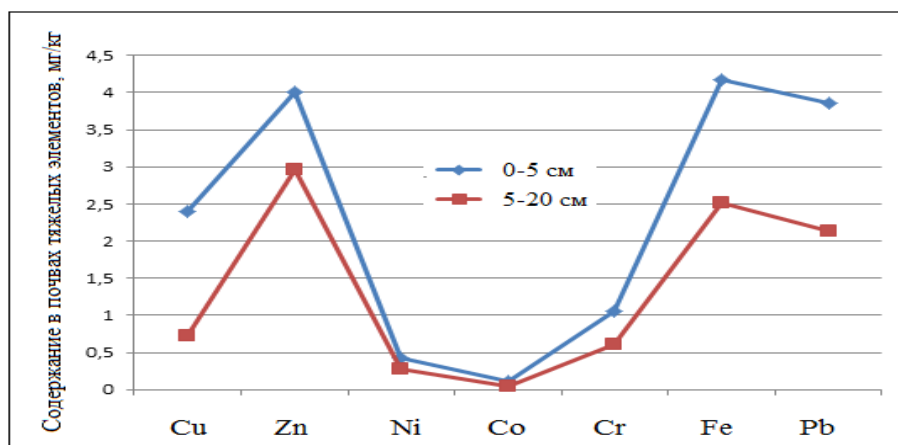


Figure 7 – Content of petroleum products and heavy metals at point 3, site No. 2.

The increased content of chromium in samples from point 3 of the MAC area by 19 times is explained again by emissions from the concrete plant.

Point 4. Sampling date: 10.03.2018. Point 4 is represented by sand and shell sediments with sparse forb vegetation. The projective surface cover is 15%.

The content of heavy metals and petroleum products in soil samples is given in Table 6 and Figure 8. Morphological description of the soil:

- 0-5 cm. The soil is gray, dry, loose, sandy, structureless with small roots.

- 5-20 cm. The soil is gray, dry, loose, sandy, structureless.

Table 6 – Indicators of the degree of soil pollution by heavy metals and petroleum products (site No. 2, point 4)

N o.	Coordinates selection places	Depth, cm	NP	Heavy metals mg/kg						
				Cu	Zn	Ni	Co	Cr	Fe	Pb
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
1	N 43°10'23.00" E 51°26'11.72"	0-5	<0.5	2.1	3.44	0.104	0.17	0.566	3.49	3.18
		5-20	<0.5	1.97	3.15	0.095	0.087	0.471	3.17	3.67
MAC mg/kg			1000	3.0	23.0	4.0	6.0	0.05	background	32.0

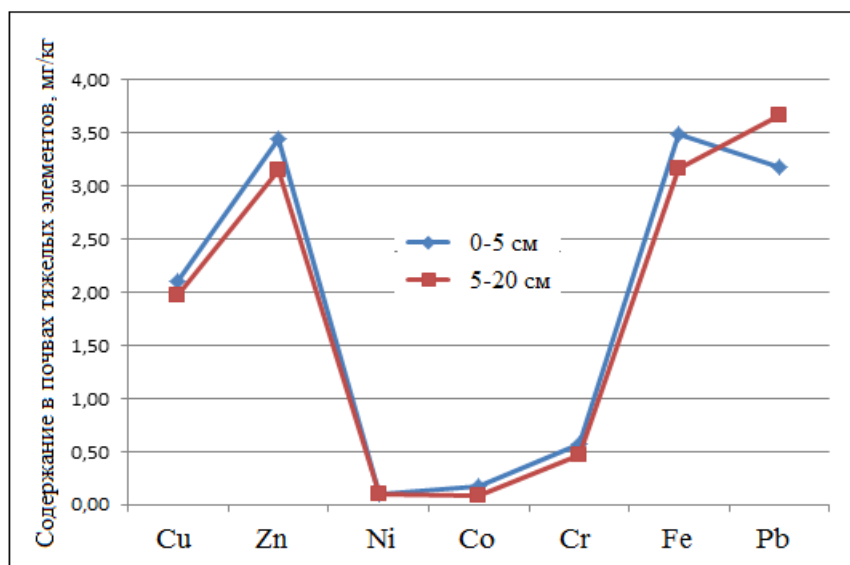


Figure 8 – Content of petroleum products and heavy metals at point 4, site No. 2.

The 11.2-fold excess of Cr and chromium in samples from point 4 is explained by point 4's location near a cement warehouse and the presence of stored concrete blocks for the breakwater. The concentrations of Zn, zinc, Co, cobalt, and nickel (Ni) at all soil sampling points in plot 2 are below the MAC values. The soils are considered uncontaminated.

Using Mapinfo programs Professional v.10.2, SAS. Planet 160707, maps were created showing the locations of sampling points at site No. 1 (Figure 9) and at site No. 2 (Figure 10) with images of soils and vegetation.

Conclusions. It was established that in plot #2, which belongs to the central desert of the region, the vegetation cover is formed by a community of formations consisting primarily of wormwood (5 formations), Anabasis sabdariffa, Sakchaulchik, Black Boyalich, Haloxylon saxaul, and succulent perennial Salsola, which is twice as diverse as in the southern deserts.

It has been established that the lands of this area are primarily occupied by farms, producing open-field vegetables and fruit trees. Irrigation is provided by groundwater from wells

approximately 50 meters deep, with a salinity of 3-4 g/dm³. These wells are characterized by high nitrate and nitrite content (up to 144 mg/dm³). At Cape Peschaniy (Fig. 2), there were previously nine production wells, drilled to a depth of 15 meters in the sands of the Khvalynsk terrace and Pontic limestone. Therefore, to develop vegetable growing in this area, it is necessary to develop measures to construct desalination plants for irrigation of existing and future agricultural lands.

Recently, their projective cover has been decreasing to 12-15%. This is due to natural factors, but there is also an anthropogenic impact on vegetation due to land disturbance by earthworks and traffic. Pollution can clog the stomata of plants and disrupt their physiological and biochemical functioning. Chemical pollution of vegetation is associated with toxic emissions from exhaust gases and fuel leaks.



Figure 9 – Map of monitoring points at site No. 1.



Figure 10 – Map of monitoring points at site No. 2.

Based on soil sample analysis at point 2 of site No. 1, located within the Ersai LLC work zone, we determined that moderate soil contamination is caused by two elements: Ni (nickel) and Cr (chromium). Mobile zinc (Zn) concentrations exceeded the maximum permissible concentration (MPC) at all six sampling points. Based on the seven heavy metals analyzed, we determined that the low level of contamination at site No. 1 is likely caused by five elements: Zn (zinc), Cu (copper), Co (cobalt), Ni (nickel), and Fe (iron). The most hazardous heavy metals, Hg (mercury) and As (arsenic), were not detected in samples from the two sites studied. Solid municipal waste and unauthorized dumps directly on the Caspian Sea coast have been found to have a significant impact

on the vegetation cover of the area.

It has been established that research is needed to assess the impact on soils in the shipyard construction area and to compile a vegetation biodiversity database to predict changes in vegetation communities and the state of environmental components [11]. Only compliance with existing requirements for post-construction site cleanup and reclamation measures for disturbed lands will preserve the natural soil and vegetation cover [10,11].

REFERENCES

1. Law of the Republic of Kazakhstan dated July 15, 1997 No. 160-I " On Environmental Protection".
2. On the state of the environmental situation in the Mangistau region and sources of its pollution. Department of Natural Resources and Environmental Management of the Mangistau Region (DNRIM). – Aktau, 2017. – 62 p.
3. Rachkovskaya E.I. et al. On the issue of zonality of the vegetation cover of the deserts of Kazakhstan and Central Asia // Botan. j. 1990. Vol. 75, No. 1. P. 17-26.
4. Safronova I.N. Deserts of Mangyshlak (vegetation essay). St. Petersburg, 1996. 211 p.
5. Kisykov U.K. Steppes of Mangyshlak and their economic use // Collection of abstracts of scientific works of Kaz. ped. in-ta. Alma-Ata, 1961. Issue 16. Pp.
6. GOST 17.4.3.01-83. Environmental protection. Soils. General requirements for sampling.
7. GOST 17.4.4.02-84. Environmental protection. Soils. Methods of sampling and sample preparation for chemical, bacteriological, and helminthological analysis.
8. Sydykov Zh.S., Golubtsov V.V., Kuandykov B.M. Caspian Sea and its coastal zone. Monograph. Publishing house " Olke ", Almaty, 1995.
9. Samal Syrlybekkyzy., Gusman Z. Kenzhetaev., Aliya R. Togasheva. Lyaylim S. Tayzhanova . 17-Year Periods of Rising and Falling Water Levels in the Kazakhstan Section of the Caspian Sea // European Researcher, 2014, Vol. (69), No. 2-2, p. 401-412.
10. Syrlybekkyzy S., Kenzhetaev G. Zh., Suleimenova N.Sh., Permyakov VN, Nurbayeva FK Investigation into the Physico-Chemical Properties of Soils of Caspian Sea Coastal Area in Mangystau Province // ORIENTAL JOURNAL OF CHEMISTRY, December 2014. ISSN: 0970-020 X CODEN: OJCHEG 2014, Vol. 30, No. (4): Pg. 1631-1638.
11. Syrlybekkyzy S., Kenzhetaev G. Zh., Akbasova A., Nurbayeva FK Koibakova SE, Zhidebaeva AE // Creation of database of the coastal zone of the Caspian Sea soil condition using GIS technologies Modern Applied Science (ISSN19131844-Canada-Scopus). Volume 12. Issue 3. December 2015, No. 10. Pages 2495 - 2503.

ҚҰРЫҚ АУДАНЫНДАҒЫ КЕМЕ ЖАСАУ ЗАУЫТЫНЫҢ ҚҰРЫЛЫС АЛАҒДАРЫНДАҒЫ ТОПЫРАҚТЫ ЭКОЛОГИЯЛЫҚ БАҒАЛАУ

Пермяков В. Н.

Тюмень индустриалды университеті, Тюмень қ. Ресей Федерациясы
e.mail:v.n.permyakov@mail.ru

Аңдатпа. Мақаланың мақсаты-Каспий Теңізінің Қазақстан аумағындағы ең ерекше жағалауларының бірін "Қазмұнайгаз" АҚ кеме жасау зауытын салу үшін таңдаған жер ретінде ғана емес, сонымен қатар жер учаскесі ретінде де зерттеу.көкөніс және бақша дақылдарын өсіруге жарамды. Бұл мақалада кеме жасау зауытының құрылысына балама ретінде No1 және No2 учаскелер қарастырылған. Біз үшін тергеу үшін Ең қызықты аймақ - № сайт. 2, мұнда ашисор тұзды алқабының жанында орналасқан No1 учаскемен салыстырғанда шөлді қауымдастықтардың эдафикалық түрлерінің алуан түрлілігі басым. Зерттеулер Маңғыстау облысының осы бөлігін нашар білуіне және дәнді дақылдардың қатысуымен

шөлді қауымдастықтардың кең таралуына байланысты жүргізілді (*agropyron fragile*, *S. oaripa*, *S. sareptana* - соңғысы орта шөлде кездеседі).

Зерттеу пәні-жоспарланған кеме жасау зауытының құрылысының жергілікті өсімдіктердің топырақ жағдайына әсерін бағалау. Таңдалған аумақтың топырақтарындағы кейбір ауыр металдардың (Cu, Cr, Zn) мөлшерінің жоғарылауы негізделген. Зерттеу Каспий теңізінің жағалау аймағындағы қоршаған ортаның кейбір компоненттерінің жай-күйі бойынша 2012-2015 жылдары жүргізілген ұқсас жұмыстардың тәжірибесін ескере отырып, жалпы қабылданған әдістерге сәйкес жүргізілді.

Картографиялық материалдар ГАЗ бағдарламалық өнімдерінің көмегімен толтырылады: Marmfo Professional v. 10.2 SAS. Планета 160707.

Түйін сөздер: Каспий Теңізі, Қашаған, Маңғыстау, Құрық, Әзірбайжан, көлік, мұнай, зауыт, кеме жасау, кеме жөндеу, шөл, топырақ, өсімдіктер, жусан, қауымдастықтар, мониторинг, ауыр металдар, мұнай өнімдері.

ЭКОЛОГИЧЕСКАЯ ОЦЕНКА ГРУНТОВ НА СТРОИТЕЛЬНЫХ ПЛОЩАДКАХ СУДОСТРОИТЕЛЬНОГО ЗАВОДА В РАЙОНЕ КУРЫКА

Пермяков В. Н.

Тюменский индустриальный университет, г. Тюмень Российская Федерация
e.mail:v.n.permyakov@mail.ru

Аннотация. Цель статьи – исследование одного из самых необычных побережий Каспийского моря на территории Казахстана не только как места, выбранного АО "КазМунайГаз" для строительства судовой верфи, но и как территории, на которой земля пригодна для развития выращивания овощных и бахчевых культур. В этой статье площадки № 1 и № 2 рассматриваются в качестве альтернативных вариантов строительства верфи. Для нас наиболее интересной областью для исследования является площадка № 2, где преобладает большое разнообразие эдафических типов пустынных сообществ по сравнению с участком № 1, который расположен недалеко от соляной долины Ашисор. Исследования проводятся в связи со слабой изученностью этой части Мангистауской области и широким распространением пустынных сообществ с участием злаковых (*Agropyron fragile*, *S. oaripa*, *S. sareptana* - последний встречается в средней полосе пустыни).

Предмет исследования – оценка влияния планируемого строительства судовой верфи на почвенное состояние местной растительности. Обосновано повышенное содержание некоторых тяжелых металлов (Cu, Cr и Zn) в почвах выбранной территории. Исследования проводились в соответствии с общепринятыми методиками с учетом опыта аналогичных работ, проведенных в 2012-2015 годах по изучению состояния некоторых компонентов окружающей среды в прибрежной зоне Каспийского моря.

Картографические материалы подготовлены с использованием программных продуктов ГИС: Marmfo Professional v.10.2 SAS. Planet 160707.

Ключевые слова: Каспийское море, Кашаган, Мангистау, Курык, Азербайджан, транспорт, нефть, заводы, судостроение, судоремонт, пустыня, почва, растительность, полынь, сообщества, мониторинг, тяжелые металлы, нефтепродукты.