AL-FARABI KAZAKH
NATIONAL UNIVERSITY

# INFORMATION
## about publication activity
## DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL SCIENCES

| № | **Наименование публикации** | **Выходные данные** *(doi статьи)* | **Аннотация статьи** | **Ссылка для цитирования** *(Ф.И.О., название статьи, название, номер и/или выпуск, том журнала, страницы, doi статьи)* |
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| 1. | Nationalization of indicators for sustainable development goals in the Republic of Kazakhstan through geoinformation technologies | DOI: 10.1553/GISCIENCE2021_01_S158 | From the first days of independence, Kazakhstan has paid attention to sustainable development and successfully achieved the Millennium Development Goals and in 2015 launched the implementation of the 2030 Agenda for Sustainable Development. The article discusses the issues of monitoring and reporting on the SDGs in Kazakhstan, the priority of nationalization of indicators, the creation of a statistical database on the SDGs, the definition of data sources, and methodology for | Nyussupova, G., Aidarkhanova, G., Kadylbekov, M., Kenespayeva, L., Kelinbayeva, R., Kozhakhmetov, B. Nationalization of indicators for sustainable development goals in the Republic of Kazakhstan through geoinformation technologies.// GI_Forum.- 2021.- 9 (1). - P. 158-168.<br><br>DOI: 10.1553/GISCIENCE2021_01_S158 |

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| | | | calculation. Geospatial data are inevitable for the integration of information about society, economy and environment. A web-portal developed by the authors is presented that allows to assess the quality of life of the population in different regions based on the SDG indicators. Copyright © 2021 Korean Society for the Study of Obesity. | |
| 2. | The research of demographical indicators of the population's quality of life for sustainable development of Almaty region.// | DOI: 10.1051/e3sconf/202015905010 | Sustainable socio-economic development of the region can be achieved only if the strategic priority of development is a socially significant goal-improving the quality of life of the population. A system of quality of life's indicators includes both objective characteristics of a person or society, their life and standards of it and subjective estimated characteristics, that show subject's attitude to his life's realities. Demographical indicators, 4that characterize regularities of human reproduction, take an important place in the system of indicators, that determine quality of life. The Concept of sustainable development itself has a direct reproductive content and implies sustainable reproduction of a person, his quality parameters and living conditions, consistent with the laws | Nyussupova, G., Kelinbayeva, R., Makhrova, A., Kairanbayeva, G. The research of demographical indicators of the population's quality of life for sustainable development of Almaty region.// E3S Web of Conferences.- 2020. – 159. - статья № 05010<br><br>DOI: 10.1051/e3sconf/202015905010 |

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| | | | of development and the principles of conservation of the natural environment. The issues of improving demographic indicators of the quality of life of the population are particularly relevant for the Almaty region - a region with a high demographic and labor potential, which plays an important role in the socio-economic and geopolitical development of the Republic, as a region with an agricultural orientation, occupying a transit position. | |
| 3. | Sustainable development, climate policy and environmental transformation of the Baltic region economies: A comparative analysis | DOI: 10.1051/e3sconf/202020803055 | The article considers the climate policy of the Baltic region countries. The reasons and factors for reducing CO2 emissions in the period 1990-2018 are analyzed, the relationship between the processes of decarbonization and the ecological transformation of farms are demonstrated. The EU influence on the climate policy of individual countries is studied. The features of evolution and the modern structure of the RES sector are explored. The assessment of measures to improve energy efficiency of national economies is given. According to the 5degree of climate policy efforts and the depth of the ecological transformation of national | Stepanov, A., Burnasov, A., Ilyushkina, M., Kovalev, Y., Nyussupova, G. Sustainable development, climate policy and environmental transformation of the Baltic region economies: A comparative analysis.// E3S Web of Conferences.- 2020. – 208. - статья № 03055<br><br>DOI: 10.1051/e3sconf/202020803055 |

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| | | | economies, a ranking scheme for the region countries is proposed. | |
| 4. | About ratio and values of the empirical coefficient of alkali metals (Na+and k+) in surface waters of Kazakhstan on the example of the ile river | DOI: 10.32014/2020.2518-170X.1 | Issues concerning to insufficient knowledge of such important aspects in the field of regional hydrochemistry, which are the patterns of formation of the regime and the dynamics of alkali metals (sodium and potassium) in surface waters are considered. It is pointed out the need for reliable analytical data on the separate concentration of sodium and potassium in natural waters to solve important practical problems in the field of assessing the suitability of the composition of the water of reservoirs for acclimatization of valuable forage organisms for fish, when choosing water sources for irrigated areas. Special attention is paid to the importance of the empirical coefficient (EC) of sodium and potassium, which is necessary in determining the total mineralization of natural waters, on which the level of their use for various household and drinking needs depends. On the state monitoring data, the nature of changes in the ratio of sodium and potassium along the Ile River was studied and the EC was established | Amirgaliev, N.A., Opp, C., Askarova, M., Kulbekova, R.A., Ismukhanova, L.T. About ratio and values of the empirical coefficient of alkali metals (Na+and k+) in surface waters of Kazakhstan on the example of the ile river (2020) 1 (439), pp. 6-13.<br><br>DOI: 10.32014/2020.2518-170X.1 |

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| | | | to calculate their absolute concentration (in $mg/dm^3$) and total water mineralization. Based on the analysis of literature data and the results of our own research on the item under consideration, conducted in different years for a number of reservoirs and watercourses in Kazakhstan, it was concluded that: previously adopted for the entire territory of the former USSR, the EC equal to 25 for freshwater reservoirs can be used for waters of some river basins of the Republic of Kazakhstan with their mineralization up to 350-400 $mg/dm^3$. A decisive role in the formation of the regime and the dynamics of the concentration of sodium and potassium in surface waters has a complex of regional physiographic conditions: climate, nature of the soil, groundwater, anthropogenic influences, etc. The necessity of establishing the EC for reservoirs and watercourses of different climatic zones of the Republic of Kazakhstan, especially for large transboundary basins, is recommended. | |
| 5. | Monitoring vegetation patterns at the syrdarya river | | The dependence of vegetation condition dynamics as expressed by Normalized Difference Vegetation | Samarkhanov, K., Abuduwaili, J., Ahmed, T., Samat, A., Aliyeva, S., Sagymbay, O. |

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| | basin from 2000 to 2015 using modis data | | Index (NDVI) from hydro-climatic factors (Multiyear precipitation, land surface temperature) in the Syrdarya River Basin (SRB) was analyzed for the period of 16 years from 2000 to 2015. The analysis demonstrated a different correlation between NDVI and hydrometric parameters. According to experimental analyses, the average NDVI values reached a maximum in April and minimum in October, while the annual average values of land surface temperature were observed maximum in June and minimum in October. Correlation between precipitation and NDVI was positive and extraordinarily strong in Spring while the correlation between Land Surface Temperature (LST) and NDVI was found negative and strong. Correlation between LST and NDVI changed from positive in spring to negative in summer due to an increase in seasonal temperature and found a decrease of vegetation cover throughout the Syrdarya river basin. Desert vegetation area in plain part of SRB decreased while NDVI of cropland area in Syrdarya and Shu river basins remained the same or increased. Hydro-climatic factors | Monitoring vegetation patterns at the syrdarya river basin from 2000 to 2015 using modis data (2021) International Journal of Geoinformatics, 17 (1), pp. 27-36 |

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| | | | negatively affected a decrease in vegetation cover, which leads to desertification processes. © Geoinformatics International. | |
| 6. | Methods For Teaching Kazakhstan's Global Competitiveness Through an Elective Course on Economic and Social Analytics For 11th Grade Secondary School Students | DOI: 10.48047/rigeo.11/5/36 | WEF "The World Economic Forum" from Davos and IMD "Institute of Management Development" make a serious analytical work in relation to comparison of competitiveness ratings. The article deals with the analysis of the rating position of Kazakhstan in terms of higher education in 2017-2020. There is also the analysis of the ways of competitiveness development and enhancement in the field of education in Kazakhstan. | Baitassov, A., Kaimuldinova, K., Berdygulova, G., Sarkytkan, K., Karbayeva, S.<br>Methods For Teaching Kazakhstan's Global Competitiveness Through an Elective Course on Economic and Social Analytics For 11th Grade Secondary School Students<br>(2021) Review of International Geographical Education Online, 11 (5), pp. 348-358.<br>DOI: 10.48047/rigeo.11/5/36 |
| 7. | Glacial debris flows in Zailiysky Alatau over the past 120 years | DOI: 10.31857/S2076673420020035 | Zailiyskiy Alatau is the most mudflow hazardous mountain region of the Republic of Kazakhstan. At the same time, this area is one of the most densely populated and economically developed one, so mudflows here cause the great damage. The paper presents results of our analysis of the glacial mudflow activity for the period from 1900 to 2019. Amount and total volume of glacial mudflows per year were used as indicators of the mudflow activity. 481 mudflows | Medeu, A.P., Blagovechshenskiy, V.P., Kasatkin, N.E., Kapitsa, V.P., Kasenov, M.K., Raymbekova, Zh.T.<br>Glacial debris flows in Zailiysky Alatau over the past 120 years [Гляциальные сели в Заилийском Алатау за последние 120 лет]<br>(2020) Led i Sneg, 60 (2), pp. 213-224.<br><br>DOI: 10.31857/S2076673420020035 |

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| | | | were recorded over 120 years of observations in the Zailiyskiy Alatau, and 24% of them were glacial mudflows. Glacial mudflows are the largest and most destructive. Of the nine mudflows with a volume of more than 1 million $m^3$, seven were glacial mudflows. The chronicle of mudflow disasters is shown. From 1950 to 2019, 87 glacial mudflows were observed in the Zailiyskiy Alatau. Of these, 16 mudflows had volumes exceeding 100 thousand $m^3$. The largest ones occurred in 1977 (6.0 million $m^3$), 1963 (5.8 million $m^3$), 1958 (4.0 million $m^3$), and 1973 (3.8 million $m^3$). The causes for formation of glacial mudflows are outbursts of moraine lakes or water from underground reservoirs, as well as collapses of moraines' slopes. The largest of them occur when a lake is bursting through an open channel. Since 1951, occurrence of glacial mudflows has been increasing and reached its maximum in the 1970s. Since 1978, the number of glacial mudflows has been decreasing, although their volumes remained large until the late 1990s. From 1997 to 2013, mudflow activity was low. During 11 of the 15 years, no | |

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| | | | mudflow was observed. Every year only one mudflow happened with a volume below 10 thousand $m^3$. Since 2014, there has been a tendency for an increase in mudflow activity. Large glacial mudflows were recorded in 2014 and 2019. To protect against mudflows in the valleys of the Zailiysky Alatau, 14 dams have been built and two more are planned. To prevent outbursts of moraine lakes, they are emptied using pumps and siphons. In 2019, the network of automated monitoring of early warning about mudflows is being organized, which will cover all the valleys of the Northern slope of the Zailiysky Alatau. | |
| 8. | Anthropogenic load on water resources of Kazakhstan | | In the article the main factor affecting water resources – irrevocable water consumption in the main river channels and administrative regions of the Republic of Kazakhstan, the degree of its impact on water resources is considered. Quantitative assessment of water resources use was carried out on the basis of data analysis of the statistical form of the departmental statistical observation 2-TP (water farm) and basin inspections. The most complete annual data are available only since | Medeu, A.R., Alimkulov, S.K., Tursunova, A.A., Myrzakhmetov, A.B., Saparova, A.A., Baspakova, G.R., Kulebayev, K.M.<br>Anthropogenic load on water resources of Kazakhstan<br>(2020) EurAsian Journal of BioSciences, 14 (1), pp. 301-307. |

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| | | | 1992. For earlier years, water consumption accounting is not systematic and data are sometimes incomplete and contradictory. In this regard, this study uses data for the period 1992-2015.<br>Anthropogenic changes in river flow at reference points in the main river channels draining the waters of a certain water collection were determined, channel water balances were compiled, transformations of water balance elements in each section were studied and compared with real water-intake facilities, and the share of irrevocable water consumption in cer tain sectors of the economy was determined. Using data on water consumption, the impact of water consumption on water resources was assessed by comparing the water resources available in the region with the volume of water used according to the so-called water load criterion. It is characterized by the capacity factor of water resources Ccap, equal to the ratio of the percentage of total water consumption to renewable water resources. This assessment was carried out for each | |

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| | | | WMB, as well as for all administrative regions of Kazakhstan. | |
| 9. | Features of the sediment runoff regime downstream the ile river | DOI: 10.12911/22998993/116332 | This paper is devoted to study on the sediment runoff of the Ile River downstream. The article analyses the Kapshagai reservoir impact on the regime and characteristics of the sediment runoff in the Ile River downstream before and after construction of the reservoir in 1970. Along with the calculation of characteristics of sediment runoff, an assessment of the amount of the suspended sediment, which is in the bowl of the reservoir, was shown. Furthermore, the impact reservoir on the granulometric composition of the suspended and bed sediment of Ile River was calculated. | Duskayev, K., Myrzakhmetov, A., Zhanabayeva, Z., Klein, I.<br>Features of the sediment runoff regime downstream the ile river<br>(2020) Journal of Ecological Engineering, 21 (2), pp. 117-125.<br><br>DOI: 10.12911/22998993/116332 |
| **10.** | Substantiation of averaging the content of mined ores with account of their readiness for mining | DOI: 10.1051/e3sconf/202020101039 | Paper demonstrates the importance of substantiating the reserves volumes ready for mining in extraction units, in accordance with the mine output capacity, averaging mode and reducing the variation in the mined product quality. Rational methods of planning mining operations based on innovative technological solutions to achieve high-quality ore mass uniformity in terms of mineralogical composition are presented. | Kalybekov, T., Rysbekov, K., Nauryzbayeva, D., Toktarov, A., Zhakypbek, Y.<br>Substantiation of averaging the content of mined ores with account of their readiness for mining<br>(2020) E3S Web of Conferences, 201, статья № 01039<br><br>DOI: 10.1051/e3sconf/202020101039 |

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| | | | Optimization of mineral extraction scheduling is possible with a comprehensive analysis of the existing situation and determining a well-founded method for mining operations. Averaging the mined ores content by two components requires a change in their volume planned for separate panels. Based on critical analysis and personal analytical research, a new method has been developed for averaging the mineral raw materials content. The method of ore content bottom-hole averaging in underground mining is substantiated, taking into account the output distribution over extraction units and obtaining a uniform quality of the extracted raw materials. The proposed method of averaging the minerals quality differs from the existing ones by the optimal ore volumes distribution in accordance with their content directly in the mined-out faces of the panels during the period of the field exploitation by underground method. | |
| **11.** | A Study of the Processes of Desertification at the Modern Delta of the Ili River with the Application of Remote Sensing Data | DOI: 10.12911/22998993/132546 | The water regime is the main factor contributing to the formation of landscapes in the river deltas of arid zones, any fluctuations in which lead to a change in the integral hydromorphic landscape. After the | Laiskhanov, S.U., Poshanov, M.N., Smanov, Z.M., Karmenova, N.N., Tleubergenova, K.A., Ashimov, T.A. A Study of the Processes of Desertification at the Modern Delta of |

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| | | | construction of the Kapshagai reservoir, the anthropogenic load on the ecosystem of the Ili River delta increased, as a result of which degradation processes, such as drying out and salinization, intensified. In the short term, this phenomenon may lead to the desertification of about 1 million ha of land in the modern river delta. In this regard, the main goal of this study is to look at the processes of desertification in the modern delta of the Ili River, using remote sensing data, which allows for quick identification of the long-term dynamics of degradation processes. For this, the authors used satellite data from Landsat 1–5 MSSS and Landsat 80LI satellites for 1979 and 2019 and soil analysis data obtained through the ground (field) surveys. Using regression analysis of space and soil data, predictors for interpreting space images were identified and maps of landscape drying and soil salinization were compiled, reflecting the changes that have occurred over the past 40 years. As a result, it was found that in 2019, compared to 1979, the area of landscapes covered with vegetation had decreased by 12% and there was | the IIi River with the Application of Remote Sensing Data<br>(2021) Journal of Ecological Engineering, 22 (3), pp. 169-178.<br><br>DOI: 10.12911/22998993/132546 |

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| | | | a transformation of hydromorphic landscapes into salt marshes and solonetzes. Over the past 40 years, the volume of non-saline soils has decreased by 41.3% and the volume of saline soils has increased to varying degrees. That is, at present, on the territory of the modern delta, a difficult land improvement situation has developed associated with the cessation of spring and summer floods due to the intensive water use at the Chinese and Kazakh sides. | |
| **12.** | Long-term variations in runoff of the Syr Darya River Basin under climate change and human activities | DOI: 10.1007/s40333-021-0050-0 | In this study, we analyzed the hydrological and meteorological data from the Syr Darya River Basin during the period of 1930–2015 to investigate variations in river runoff and the impacts of climate change and human activities on river runoff. The Syr Darya River, which is supplied by snow and glacier meltwater upstream, is an important freshwater source for Central Asia, as nearly half of the population is concentrated in this area. River runoff in this arid region is sensitive to climate change and human activities. Therefore, estimation of the climatic and hydrological changes and the quantification of the impacts of | Bissenbayeva, S., Abuduwaili, J., Saparova, A., Ahmed, T. Long-term variations in runoff of the Syr Darya River Basin under climate change and human activities (2021) Journal of Arid Land, 13 (1), pp. 56-70.<br><br>DOI: 10.1007/s40333-021-0050-0 |

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| | | | climate change and human activities on river runoff are of great concern and important for regional water resources management. The long-term trends of hydrological time series from the selected 11 hydrological stations in the Syr Darya River Basin were examined by non-parametric methods, including the Pettitt change point test and Mann-Kendall trend tests. It was found that 8 out of 11 hydrological stations showed significant downward trends in river runoff. Change of river runoff variations occurred in the year around 1960. Moreover, during the study period (1930–2015), annual mean temperature, annual precipitation, and annual potential evapotranspiration in the river basin increased substantially. We employed hydrological sensitivity method to evaluate the impacts of climate change and human activities on river runoff based on precipitation and potential evapotranspiration. It was estimated that human activities accounted for over 82.6%–98.7% of the reduction in river runoff, mainly owing to water withdrawal for irrigation purpose. The observed | |

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| | | | variations in river runoff can subsequently lead to adverse ecological consequences from an ecological and regional water resources management perspective. | |
| **13.** | Characteristics and Causes of Changes in Water Quality in the Syr Darya River, Kazakhstan | DOI: 10.1134/S009780782005019X | The water quality parameters, like major ions, have been monitored at three stations located along the Syr Darya River. The trend analysis was performed on annual timescales using the Mann–Kendall test, the Sen's slope estimator and the linear regression. The relationships of the water quality parameters to river discharge were also investigated. The statistical methods showed both positive and negative trends in annual water quality data and major ions. Significant trends were detected by the statistical methods in sulphate, sodium-potassium ion and chloride ion series. Before 1940 the mineralization of water was 0.4–0.6 g/L and the water was bicarbonate-calcium, with an increased sulfate ions volume. Atthe moment, the mineralization index has become three times higher. The mineralization varies from 0.9–1.2 g/L in the upper and 1.5–2.0 g/L in the lower reaches of the | Sanim Bissenbayeva, Abuduwaili, J., Issanova, G., Samarkhanov, K. Characteristics and Causes of Changes in Water Quality in the Syr Darya River, Kazakhstan (2020) Water Resources, 47 (5), pp. 904-912.<br><br>DOI: 10.1134/S009780782005019X |

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| | | | river. The sulfate ion and sodium-potassium ions began to predominate, dangerously exceeded volumes of the chloride ion in the lower part of the river are observed. | |
| **14.** | Assessment of the impacts of climate change and human activities on runoff using climate elasticity method and general circulation model (GCM) in the buqtyrma River Basin, Kazakhstan | DOI: 10.3390/su12124968 | The variations of climate and water resources in the Buqtyrma River Basin (BRB), which is located at the cross-section of the Altai Mountains, Eurasian Steppe and Tian Shan Mountains, have a great significance for agriculture and ecosystems in the region. Changing climatic conditions will change the hydrological cycle in the whole basin. In this study, we examined the historical trends and change points of the climate and hydrological variables, the contributions of climate change and human activities to runoff changes, and the relative changes in the runoff to the precipitation and potential evapotranspiration from 1950 to 2015 by using the Mann-Kendall trend test, Pettitt test, double cumulative curve and elasticities methods. In addition, a multi-model ensemble (MME) of the six general circulation models (GCMs) for two future periods (2036-2065 and 2071-2100) was assessed to estimate the spatio-temporal | Rakhimova, M., Liu, T., Bissenbayeva, S., Mukanov, Y., Gafforov, K.S., Bekpergenova, Z., Gulakhmadov, A. Assessment of the impacts of climate change and human activities on runoff using climate elasticity method and general circulation model (GCM) in the buqtyrma River Basin, Kazakhstan (2020) Sustainability (Switzerland), 12 (12), статья № 4968<br><br>DOI: 10.3390/su12124968 |

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| | | | variations in precipitation and temperature under two representative concentration pathways (RCPs 4.5 and 8.5) scenarios. Our study detected that the runoff change-point occurred in 1982. The impacts induced by climate change on runoff change were as follows- 70% in the upstream, 62.11% in the midstream and 15.34% in the downstream area. The impacts of human activity on runoff change were greater in the downstream area (84.66%) than in the upstream and midstream areas. A continuously increasing trend was indicated regarding average annual temperature under RCP 4.5 (from 0.37 to 0.33 ffiC/decade) and under RCP 8.5 (from 0.50 to 0.61 °C/decade) during two future periods. Additionally, an increasing trend in predicted precipitation was exhibited under RCP 4.5 (13.6% and 19.9%) and under RCP 8.5 (10.5% and 18.1%) during both future periods. The results of the relative runoff changes to the predicted precipitation and potential evapotranspiration were expected to increase during two future time periods under RCP 4.5 (18.53% and | |

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| | | | 25.40%) and under RCP 8.5 (8.91% and 13.38%) relative to the base period. The present work can provide a reference for the utilization and management of regional water resources and for ecological environment protection. | |
| **15.** | Water balance of the Small Aral Sea | DOI: 10.1007/s12665-019-8739-5 | Water balance is considered as an important tool to assess the amount of water and its availability in a region. The Small Aral Sea is a salt lake in the territory of the Kyzylorda region of Kazakhstan, the Northern part of the shrinking Aral Sea, receiving water from the Syr Darya, as a result of lowering of the water horizon of the Aral Sea and with the onset of 40–40.2 m in 1987, when the Berg Strait was formed. In this study, water balance assessment in the Small Aral Sea has been done from 1987 to 2014. The water balance of the Small Aral Sea during the observation period is mainly determined by river runoff, precipitation and evaporation. The general tendency of precipitation decreased slightly, while the general tendency for evaporation increase is high. The annual inflow of the river into the Small Aral Sea increased from 1 $km^3$ in 1987 to 5 $km^3$ in 2014 while its water balance increased | Massakbayeva, A., Abuduwaili, J., Bissenbayeva, S., Issina, B., Smanov, Z. Water balance of the Small Aral Sea (2020) Environmental Earth Sciences, 79 (3), статья № 75<br><br>DOI: 10.1007/s12665-019-8739-5 |

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| | | | from − 1.4 to 2.44 $km^3$. As the result, the water volume of the Small Aral Sea increased by 6% and the water surface area by 4% during the analyzed period. | |
| **16.** | Prospects for the development of health tourism on Lake Ray in the Almaty region of the republic of Kazakhstan | DOI: 10.30892/GTG.37320-722 | Lake Ray is a unique natural object of the Republic of Kazakhstan. It is located in the Balkhash depression of the Almaty region. The waters of the lake are characterized by a peculiar hydrochemical and mineral composition, which can be used for various types of health tourism and recreation. The study aimed to show scientifically substantiated therapeutic and health-improving attractiveness of the territory of lake basins, to attract investment in the development of tourism. This study presents the physicochemical and spectral analysis of water and therapeutic mud. Organoleptic characteristics (color, odor, consistency, structure) and sanitary and microbiological indicators of the declared sample of mud, physical and chemical indicators of the declared sample of water have been determined. The results indicated that the physicochemical composition of water and brine met the regulatory sanitary and epidemiological requirements and | Tokpanov, Y., Atasoy, E., Mendybayev, E., Abdimanapov, B., Andasbayev, Y., Mukhitdinova, R., Inkarova, Z. Prospects for the development of health tourism on Lake Ray in the Almaty region of the republic of Kazakhstan (2021) Geojournal of Tourism and Geosites, 37 (3), pp. 888-893.<br><br>DOI: 10.30892/GTG.37320-722 |

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| | | | could be used in stationary medical institutions and physiotherapy. Lake Ray in the Republic of Kazakhstan has a unique variety of hydromineral recreational resources. | |
| **17.** | Impact of Activity-Based Map Literacy Skills Teaching on Academic Achievement Levels of Secondary School Students in Kazakhstan | DOI: 10.33403/rigeo.853728 | The aim of this research is to determine the impact of activity-based teaching on students' map literacy academic achievements in teaching secondary school seventh grade map skills subjects. The research was carried out in a semiexperimental design model with a pretest-posttest control group. The academic achievement test, consisting of a total of 12 items at three different difficulty levels, was used as a data collection tool in the study. The developed measurement tools were applied to 61 people from seventh grade students studying in thirteen different secondary schools located in Talgar district in Almaty region of Kazakhstan. Directional variance analysis (repeated measures) technique was used for repeated measurements on a single factor to solve the sub-problems of the study. According to the results of the research, easy, medium difficulty, difficult questions and total test scores of the experimental group | Kaldybekova, R., Kazakstan, A., Aksoy, B., Abdymanapov, B.<br>Impact of Activity-Based Map Literacy Skills Teaching on Academic Achievement Levels of Secondary School Students in Kazakhstan<br>(2021) Review of International Geographical Education Online, 11 (1), pp. 151-167.<br><br>DOI: 10.33403/rigeo.853728 |

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| | | | students who applied the activity-based learning model and the control group students who applied the program-based learning were found to be similar according to the group variable. In contrast, easy, medium difficulty, difficult questions and total test scores related to map skill subjects of experimental group students and control group students were found to be significant in favor of experimental group according to the measurement variable and the common effect of group*measurement factors. In other words, activity-based map skills teaching applied to the experimental group is more effective in increasing the academic success of secondary school seventh graders in map skills than Program-based teaching applied to the control group. Accordingly, it is recommended that secondary school students acquire map skills while enriching these skills with activities. | |
| **18.** | Students' Views on the Use of Technology in Geography Course | DOI: 10.3991/ijet.v15i23.18781 | Use of technology in education enables students to be motivated and eager to participate in the lesson and is also a more effective tool in increasing motivation, encouraging students to the lesson and understanding the subject. The | Nurbol, U., Kairat, Z., Bakhadurkhan, A., Marat, M., Kenjekey, T., Ussenova, M.<br>Students' Views on the Use of Technology in Geography Course |

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| | | | aim of this study is to determine the views of secondary school students on the use of technology in geography lessons. Qualitative research method was used in this study. Semi-structured interviews were carried out with 32 students who took geography lessons in Kazakhstan during the 2018-2019 academic year. The semi-structured interview form developed within the scope of this research was used as a data collection tool. Results of the study showed that secondary school students found technology effective and funny to use in geography lessons. Projections, computers, tablets and smart phones were specified by the students as useful technological tools for teaching geography. Results of the study were discussed with relevant literature and important implications for further research and practices were presented. | (2020) International Journal of Emerging Technologies in Learning, 15 (23), pp. 42-51.<br><br>DOI: 10.3991/ijet.v15i23.18781 |
| **19.** | Geography of natural and recreational facilities in the development of economic integration of the border areas of northern Kazakhstan and the Russian Federation | DOI: 10.30892/gtg.35230-677 | This study presents the natural and recreational prerequisites for the formation and development of the cross-border tourism industry in the Kazakh-Russian border region in the context of modern integration processes. The purpose of the research is to identify the main | SANSYZBAYEVA, A., SAIPOV, A., DUNETS, A., MUSSAGALIYEVA, A., RAMAZAN, A.<br>Geography of natural and recreational facilities in the development of economic integration of the border areas of northern Kazakhstan and the Russian Federation |

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| | | | natural and recreational resources in the border regions of Northern Kazakhstan, among which the border regions are Kostanay, Pavlodar and North Kazakhstan regions, and the constituent entities of the Russian Federation bordering on them. The scientific significance of the article is determined by the fact that it analyzes the natural and recreational resources of 10 regions of the Kazakh-Russian borderland as a basis for the formation and development of joint tourist destinations. The main research method is a spatial analysis of the location of natural and recreational resources of border areas using modern software, as a result of which maps of natural and recreational resources in the study area were compiled. In the course of the study, it was revealed that the Pavlodar and North Kazakhstan regions of the Republic of Kazakhstan and the Altai Krai, Novosibirsk and Omsk regions of the Russian Federation have the greatest potential for the development of cross-border tourism. | (2021) Geojournal of Tourism and Geosites, 35 (2), pp. 499-506.<br><br>DOI: 10.30892/gtg.35230-677 |
| **20.** | Research of the Arctic Soils Using an Artificial Neural Network | DOI: 10.12911/22998993/141297 | Desert-Arctic soils - balasamy (W-C1), are found in the most northerly position in the Arctic. These soils are | Bazarbayeva, T.A., Urymbaeva, A.A., Kubesova, G.T., Mamyrbekova, A.K., Mylkaidarov, A.T., Umbetbekov, A.T. |

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| | | | characterized by a light granulometric composition and are formed in the areas recently released from glaciers, and develop under a crust of blue-green algae. Arctic soils (AO-AY-BC-C) are common on loamy and gravelly-loamy soils (Severnaya Zemlya, Novaya Zemlya, Franz Josef Land, North of the Taimyr Peninsula). They are characterized by wedge-shaped horizons, and are formed in the form of polygons with a diameter of 0.5–1.0 m under moss-shrub vegetation. Carbonate pelozems (WSA-SSA) are found on deluvial deposits of carbonate rocks on loamy-gravelly soils. The vegetation cover is represented by lichens and rare specimens of flowering plants. In the Arctic tundra, on the most drained areas on loamy and gravelly-loamy soils, humified weak-clay (gley) soils (AO-A-CRMg-C(D)) are common. In terms of morphology and chemistry, these soils are similar to Arctic soils, but differ from them in the large development of wedge-shaped horizons. In this work, the composition of Arctic soils was studied using a neural network. | Research of the Arctic Soils Using an Artificial Neural Network (2021) Journal of Ecological Engineering, 22 (9), pp. 1-12.<br><br>DOI: 10.12911/22998993/141297 |
| **21.** | Estimation of the changes in water surfase area based on | DOI: 10.32014/2020.2518-170X.57 | Conservation of the surface waters and their rational use is one of the | Tolepbayeva, A.K., Tanbayeva, A.A., Karagulova, R.K., Iskaliyeva, G.M., |

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| | the use of archives satellite images of landsat satellites (on the example of the ertis river) | | pressing problems throughout the world. In our country, monitoring the regulation of the flow and flooding of the floodplains is also an actual issue. This article examines the remote sensing processing technique for studying the water surface, reflecting the changes that occurred in size and in time, which allows the assessment at a new level. To determine the technique for studying the surface water researches, the analysis of published materials on modern methods of monitoring the natural water bodies based on data from the use of satellite imagery archives was carried out, and the possibilities of their application to study floodplain flooding dynamics were studied. As a result of the analysis, a technique based on the use of global surface water research data (Global Surface Water Explorer) of the European Commission research center was determined. The global surface water data set (GSWE) uses three million archival satellite images of Landsat t o quantify flooding over 32 years (from 1984 to 2015) with a spatial resolution of 30 m. The analysis of | Zhakupova, A.A., Urazbayeva, G.M., Lentschke, J. Estimation of the changes in water surfase area based on the use of archives satellite images of landsat satellites (on the example of the ertis river) (2020) News of the National Academy of Sciences of the Republic of Kazakhstan, Series of Geology and Technical Sciences, 3 (441), pp. 79-87.<br><br>DOI: 10.32014/2020.2518-170X.57 |

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| | | | the results obtained showed the presence of the problem for their use in the technique of monitoring the areas of the water surface of the river Ertis floodplain associated with a large number of raster cells with a NoData value (no data) for individual months of individual years. Despite the problems, as a result of analyzing the data of the annual level (Yearly Water Classification), the areas of the water surface were determined, which consists of the area of permanent (permanent water) and seasonal water surface (seasonal water) of the Ertis river floodplain plots. The purpose of the article is to obtain water surface data by using Landsat satellite imagery archi ves to monitor area dynamics. The presented results demonstrate a high potential for various applications requiring the information on the dynamics of the surface waters. © 2020, National Academy of Sciences of the Republic of Kazakhstan. | |
| 22. | Satellite monitoring of the Sardoba Reservoir in Syr Darya River basin (Uzbekistan) before and after a dam collapses on May 1, 2020 | DOI: 10.21046/2070-7401-2020-17-3-255-260 | The Sardoba Reservoir, operating since 2017, is located in the basin of the transboundary Syr Darya River in Uzbekistan near the Kazakhstan border (20 km). The Reservoir is located in the | Terekhov, A.G., Abayev, N.N.Lagutin, E.I. Satellite monitoring of the Sardoba Reservoir in Syr Darya River basin (Uzbekistan) before and after a dam collapses on May 1, 2020 // Sovremennye Problemy Distantsionnogo |

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| | | | center of the Golodnaya Steppe. Its bed is a flat territory with an area about 60 km2 surrounded with dams. On May 1, 2020, a side dam collapsed resulting in catastrophic flooding of the downstream lands in Uzbekistan and Kazakhstan. The 115 images of Sentinel-2A and SRTM-2000 DEM were used to restore the dynamics of water masses in the Sardoba Reservoir during the last 4 seasons (2017-2020). The Reservoir operated in irrigation mode. The water accumulated during the cold period was used in May-September. The Reservoir was never completely filled. The maximum of water deposit in the Reservoir of 515 million m3, estimated from satellite data, was registered on April 24, 2020, on the last satellite visit before the accident (6 days). As a result of the dam collapse, about 400 million m3 of water from the reservoir was lost, and its water level fell by 18 m. According to Sentinel-2A image of May 4, traces of flooding are registered on an area of approximately 600 km2. The lowland near the border between Kazakhstan and Uzbekistan was particularly affected, where a newly-formed water body with an area of about 200 km2 covered the arable land and several villages, mainly on the Kazakhstan territory. | Zondirovaniya Zemli iz Kosmosa, 2020, 17(3). - C. 255-260<br>DOI: 10.21046/2070-7401-2020-17-3-255-260 |
| 23. | Irrigation cooling effect: Opportunities in task of estimation of international | https://doi.org/10.1051/e3sconf/202022302009 | The aim of this research was the analysis of long-term and seasonal dynamics of Irrigation Cooling Effect (ICE) of | Terekhov, A., Abayev, N. Irrigation cooling effect: Opportunities in task of estimation of international irrigation water usage in |

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| | irrigation water usage in transboundary River Syrdarya basin, Central Asia | | irrigated arable lands in test sites of Kazakhstan and Uzbekistan in agriculture province "Golodnaya stepp", located in transboundary River Syrdarya basin. The Land Surface Temperature (LST) FEWS NET (Famine early Warning System Network) product was used for calculation and monitoring (2002- 2019) ICE values. The amount and efficiency of irrigation water usage significantly affects the ICE values. Therefore, long-term (2002-2019) ICE monitoring on arable land Kazakhstan and Uzbekistan in "Golodnaya stepp"is important as an objective characteristic of irrigation parameters and their changes during the observation period. Analysis of data from 2002-2019 showed that in the key period (May-June) Uzbekistan's arable land is in a better position. Review of two eras 2003-2010 and 2011-2019 it showed that changes in ICE values are directed at: an increase in May, approximately 2.5° in Uzbekistan and 1.3° in Kazakhstan; an increase in July, 1.3° in Uzbekistan and 2.5° degrees in Kazakhstan; and a decrease in September, approximately 1.5° in Kazakhstan, with stable values in Uzbekistan. Thus, ICE monitoring in arid climates is a useful tool for diagnosing water consumption on arable land in various countries, which is especially important in transboundary river basins. | transboundary River Syrdarya basin, Central Asia // E3S Web of Conferences, 2020, 223, 02009 https://doi.org/10.1051/e3sconf/202022302009 |

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| 24. | Opportunities of short-term weather forecasts data in the environmental monitoring of the Kazakhstan | https://doi.org/10.1051/e3sconf/202014903003 | This paper considers the possibilities of assimilation of FEWS NET (Famine early Warning System Network) products in natural resource monitoring of the territory of Kazakhstan in the cold period. With an area of 2.7 million km2, Kazakhstan is located in the center of Eurasia in the arid zone, and snow is one of the most important water sources in the first half of the vegetation season. The products "Snow Depth", "Temperature" and "Precipitation" developed for Central Asia are based on model meteorological data, including short-term weather forecasts. This information, presented in the form of regular matrices, has several advantages in efficiency and spatial detailing over direct ground (remote) measurements of meteorological parameters. The use of FEWS NET products for the environmental monitoring of the entire territory of Kazakhstan or its separate parts is of benefit for assessing the current situation on snow reserves, weather regimes and prospects for spring snowmelt. | Terekhov, A., Abayev, N., Bolatov, K., Egemberdyeva, Z. Opportunities of short-term weather forecasts data in the environmental monitoring of the Kazakhstan // E3S Web of Conferences, 2020, 149, 03003 https://doi.org/10.1051/e3sconf/202014903003 |
| 25. | A critical shallowing of Lake Ebinur, Xinjiang, China, in 2020 | DOI: 10.21046/2070-7401-2020-17-7-265-269 | The research considers the current state of large bitter-salt Lake Ebinur located in Xinjiang (Northwest China) near the border with Kazakhstan. Satellite-based monitoring using Landsat-8 and Sentinel-2 during 2020 has shown a significant shallowing of this reservoir. The lake mirror halved, from 720 to 360 km2, which led to drying up of its | Terekhov, A.G., Abayev, N.N. A critical shallowing of Lake Ebinur, Xinjiang, China, in 2020 // Sovremennye Problemy Distantsionnogo Zondirovaniya Zemli iz Kosmosa, 2020, 17(7), стр. 265–269 DOI: 10.21046/2070-7401-2020-17-7-265-269 |

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| | | | shallow northern part. The reason for the degradation of Lake Ebinur is the low water season coupled with the necessity to maintain a proper level of agricultural irrigation over 600 thousand hectares of arable land located in its basin. Because Lake Ebinur is located in a zone of very strong natural winds (Dzhungar Gate), there is a possibility of negative consequences associated with the appearance of intense salt storms from the drained part of the lake. | |
| 26. | Using the digital elevation model (DEM) and coastlines for satellite monitoring of small reservoir filling | https://doi.org/10.1080/23311916.2020.1853305 | Satellite remote sensing of near real-time reservoir filling has important implications for the monitoring of territorial hydrological resources. These tasks are particularly relevant for reservoirs whose ground hydrological characteristics are not accessible. The monitoring of reservoir filling demands bathymetric data or satellite altimetry. However, bathymetry and satellite altimetry data, which are essential for estimating water storage variations, are only available for a limited number of reservoirs. Another possibility is to combine satellite monitoring of the water mirror with data from the Digital Terrain Model (DEM). In this research, we suggest using global DEM to estimate the slope of a reference alluvial inflow cone entering a reservoir, such as a riverbed. Satellite monitoring of the water mirror creates a set of coastlines at different reservoir fills. The spatial location of coastlines on a reference | Terekhov, A., Makarenko, N., Pak, A., Abayev, N Using the digital elevation model (DEM) and coastlines for satellite monitoring of small reservoir filling // Cogent Engineering, 2020, 7(1), 1853305 https://doi.org/10.1080/23311916.2020.1853305 |

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| | | | alluvial cone with a known slope allows altimetric linking of water mirrors. The resulting set of altimetrically referred water mirrors gives the possibility to reconstruct the reservoir 3D bed characteristics. The 3D model of the reservoir bed is constructed as a set of layers. Each layer is a truncated pyramid. Pyramid bases are the neighboring altimetric reference water mirrors. The Kapshagay reservoir (Northwest China) on the River Tekes which is the main tributary of the cross-border (Kazakhstan-China) River Ili was considered as an example. Landsat-5,7,8 (resolution 30 m) data for the period 2007–2018 were used to monitor the water mirror area of the Kapshagay reservoir, which varies from 22 to 59 km2. Shuttle Radar Topography Mission (SRTM) was used as DEM. The nine-layer 3D model of the reservoir bed was created. The operation volume of the reservoir is estimated at 1,37 ± 0,08 km3, which is close to the official 1,4 km3. The empirical equation of the relationship between the mirror area and the water storage in the operating part of the reservoir, received as a result of 3D model calculations, is the basis for operational hydrological monitoring of objects that do not have access to ground data. | |
| 27. | Diagnostics of water availability for agricultural crops in Xinjiang (China) in 2003-2019 | DOI: 10.21046/2070-7401-2020-17-1-128-138 | This research is dedicated to the evaluation of water supply in agricultural areas of the Xinjiang | Terekhov, A.G., Abayev, N.N., Lagutin, E.I. Diagnostics of water availability for agricultural crops in Xinjiang (China) in 2003- |

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| | based on eMODIS NDVI C6 data | | Uyghur Autonomous Region, People's Republic of China (XUAR PRC) for the last 17 years between 2003 and 2019. In summer there is no natural vegetation in the arid climate in XUAR PRC. Mostly, this territory's water is supplied by transboundary (Kazakhstan ? China) rivers: Ili and Black Irtysh. Cropping in XUAR PRC is based on irrigated agriculture which is the most significant consumer of river water resources. The NDVI values reflect the agricultural vegetation state that ultimately depends on the moisture regime of the root-inhabited soil layer. Thus, the seasonal NDVI maximum of the agricultural regions is directly related to the share of the cropland and soil moisture regimes. We used the long-term dynamics of the average NDVI values (first 10 days of July) for twelve agricultural zones of the XUAR located on the Dzungar and Kashgar plains and in the Ili River Valley (China's section). The product e-MODIS NDVI FEWS NET (Early Warning and Environmental Monitoring Program) with ten days renewal and resolution 250 m was used. It was obtained that during 2003-2019, for the agricultural areas of Dzungar and the Kashgar plains NDVI increased mainly because of cropping expansion. The water-abundant region of River Ili Valley and the basin of the River Khaidyk-Gol demonstrated insignificant NDVI increases because there was no | 2019 based on eMODIS NDVI C6 data //Sovremennye Problemy Distantsionnogo Zondirovaniya Zemli iz Kosmosa, 2020, 17(1). - C. 255-260<br>DOI: 10.21046/2070-7401-2020-17-1-128-138 |

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| | | | additional land suitable for cropping. The sustainability of water availability in the Dzhungar Plain agricultural region was estimated from NDVI dynamics of mouth zones of rivers Bolo-Tala, Kuitun and Manas. There were no negative NDVI trends which indicates stability in the river outflows from the agricultural zones. Therefore, we can ascertain the sustainability of water supply for the Dzungar Plain cropping and good potential for further development. | |
| 28. | Streamflow response of the Ural River to basin snow depth changes during 2001-2019 | DOI: 10.21046/2070-7401-2020-17-5-181-190 | The paper considers the transboundary runoff of the Ural River (Russia - Kazakhstan), which flows into the Caspian Sea. The Ural River is mainly snow-fed. The average annual river flow in Kazakhstan at the Kushum gauging station is about 9 km3. The relationship between the annual Ural River outflow and the average snow depth in its basin was studied. The daily product Snow Depth FEWS NET for the period 2001-2019 was used. It is shown that if several years with abnormal weather conditions are excluded from consideration, the average snow cover depth in the Ural River basin in the period from March 1 to April 15 is closely related to the annual river runoff, the coefficient of determination is 0.889. In the period from 2001 to 2019, abnormal weather conditions were in 2002, 2004, 2007, 2010 and 2011, of which 2002 and 2004 were characterized by increased volumes of annual river | Terekhov, A.G., Ivkina, N.I., Abayev, N.N., Galayeva, A.V., Yeltay, A.G. Streamflow response of the Ural River to basin snow depth changes during 2001-2019 Sovremennye Problemy Distantsionnogo //Zondirovaniya Zemli iz Kosmosa, 2020, 17(5). - PP. 255-260 DOI: 10.21046/2070-7401-2020-17-5-181-190 |

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| | | | runoff compared to the expected level, and 2007, 2010, 2011 by decreased volumes. The severe drought of 2010 was the obvious reason for the understatement of the Ural River outflow in 2010 and 2011. The forecast of the annual outflow for 2020 based on the average snow depth derived by Snow Depth FEWS NET in its basin indicates the expected low-water season. The forecast volume of annual runoff in 2020 is 3.1±1.1 km3. | |
| 29. | Validation of daily Snow Depth FEWS NET product over River Ural basin on snow depth meteorological observations | DOI: 10.21046/2070-7401-2020-17-3-31-40 | Snow depth is an important climatic characteristic of the Russian Federation. However, the Russian meteorological observational network is quite rare and instrumental measurements of snow depth over steppe and forest-steppe zones are often hampered by strong winds. This determines the interest in different estimates of snow cover parameters based on satellite data. Recently introduced for Central Asia, the product Snow Depth of the Famine Early Warning System Network (Snow Depth FEWS NET) with a resolution of 0.044×0.044° is updated daily, and the archive since 2000 covers part of the territory of Russia south of 56° N. The product documentation does not contain references to validation results for ground data in various parts of the coverage area. In the work, we tested the Snow Depth FEWS NET product for the River Ural basin. The validation used the meteorological data of 2005–2018 | Terekhov, A.G., Ivkina, N.I., Abayev, N.N., Yeltay, A.G., Yegemberdyeva, Z.M Validation of daily Snow Depth FEWS NET product over River Ural basin on snow depth meteorological observations // Sovremennye Problemy Distantsionnogo Zondirovaniya Zemli iz Kosmosa, 2020, 17(3). PP. 31-40 DOI: 10.21046/2070-7401-2020-17-3-31-40 |

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| | | | from five weather stations in the Russian part of the River Ural basin: Verkhneuralsk (WMO ID-28833), Magnitogorsk (WMO ID-28838), Kizilskoe (WMO ID-28939), Energetik (WMO ID-35038) and Orsk (WMO ID-35138). About 5,600 ground-based snow height measurements were compared with more than 2,000 daily Snow Depth FEWS NET maps. The Pearson correlation coefficient was 0.702 for separate daily values and 0.997 for multi-year average. But, the Snow Depth FEWS NET values were overestimated by about 28 % and had bias of (+4 cm) relative to meteorological observations. These discrepancies are insignificant and the Snow Depth FEWS NET product can be of interest for snow depth monitoring in the Russian part of the River Ural basin. | |
| 30. | Links between the vegetation state over Tien-Shan mountains and North Atlantic Oscillation indices of the upcoming season | DOI: 10.21046/2070-7401-2020-17-2-275-281 | The North Atlantic Oscillation (NAO) is one of the most pronounced global atmospheric centers of action that determines the weather regimes in the Northern Hemisphere. There are several natural parameters including Atlantic Ocean surface temperature and Eurasian snow cover which can be useful as predictors for the NAO indices of upcoming season. In this paper, we present a new prediction parameter which is summer NDVI vegetation indices of Tien Shan natural vegetation. The analysis of the period 2002-2018 showed that the July's NDVI values for | Terekhov, A.G., Abayev, N.N., Vitkovskaya, I.S.,<br>Pak, A.A., Yegemberdyeva, Z.M.<br>Links between the vegetation state over Tien-Shan mountains and North Atlantic Oscillation indices of the upcoming season // Sovremennye Problemy Distantsionnogo Zondirovaniya Zemli iz Kosmosa, 2020, 17(2). - PP. 255-260<br>DOI: 10.21046/2070-7401-2020-17-2-275-281 |

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| | | | the natural mountain vegetation of the Tien Shan has a high correlation coefficient of 0,598 with March - July NAO values of the next season. Natural mountain vegetation was understood as the totality of phytocoenosis of the high-altitude zone, approximately 1300-3800 m above sea level, which includes: alpine/subalpine meadows, mountain forests and steppes. The seasonal state of vegetation was characterized by decadal products of FEWS NET eMODIS NDVI C6, resolution 250 m. The accumulated maximum of NDVI values for July 11-31 (20 and 21 decades) were used. The March - July monthly values of the NAO indices were taken from the archive of the National Weather Service (Climate Prediction Center). Since the positive NAO mode is associated with raised rainfall on the mainland, we see the persistence of seasonal weather patterns in Tien-Shan mountains. Features of the weather regime of the year (wet/dry) in Eurasia have an increased probability of reoccurrence in the next season. The detected effect may have prospects for the development of predicting schemes of the NAO indices values. | |
| 31. | Climatic change in southern Kazakhstan since 1850 C.E. inferred from tree rings | DOI: 10.1007/s00484-020-01873-5 | Although global warming is an indisputable fact, there is still uncertainty about how climate change will occur at regional levels. Kazakhstan is the largest landlocked country in the world. To best manage this country’s | Zhang, R., Qin, L., Shang, H., Yu, S., Gou, X., Mambetov, B.T., Bolatov, K., Zheng, W., Ainur, U., Bolatova, A. Climatic change in southern Kazakhstan since 1850 C.E. inferred from tree rings // International Journal of Biometeorology Volume 64, Issue 5, 1 May |

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| | | | limited water resources, socio-economic development and environmental protection, a solid understanding of regional climate change impacts is needed. In this study, tree-ring width and δ13C chronologies were established based on 99 tree-ring samples of Schrenk spruce (Picea schrenkiana Fisch. et Mey.) collected in Almaty, Kazakhstan. Climate response analysis between the tree-ring chronologies and climate data indicates that summer mean temperature is the strongest climate signal recorded by tree-ring δ13C. We reconstructed temperature change in southern Kazakhstan since 1850 C.E. using the tree-ring δ13Ccorr chronology. The results show that the temperatures in southern Kazakhstan have risen at a rate of about 0.27 °C per decade over the past 166 years. However, the rate has increased by as much as 0.44 °C per decade over the past 30 years. Analyses of temperature and precipitation data show that the climate has alternated between warm-dry and cold-humid periods over the past 166 years. The extreme droughts of 1879, 1917 and 1945 were caused by the combination of continuously high temperatures and reduced precipitation. | 2020, Pages 841-851 DOI: 10.1007/s00484-020-01873-5 |
| 32. | The possibility to applying simulated series for compile scenario forecasting river runoff | DOI: 10.1007/s12665-020-09138-5 | The work shows the possibility of jointed simulation of monthly runoff, precipitation and air temperature with the method of canonical expansion. The method allows to save average runoff | Davletgaliev, S.K., Alimkulov, S.K., Talipova, E.K. The possibility to applying simulated series for compile scenario forecasting river runoff // Environmental |

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| | | | values, variability indexes and asymmetry coefficients as well as autocorrelation and intercorrelation coefficients. Simulated values of flow-forming factors can be used to compile scenario forecasts of monthly runoff hydrographs based on meteorological factors. | Earth Sciences Volume 79, Issue 16, 1 August 2020<br>DOI: 10.1007/s12665-020-09138-5 |
| 33. | Snow cover changes of the Kazakhstan dry steppes and semi-deserts: The case of River Emba basin studies | DOI: 10.21046/2070-7401-2020-17-2-101-113 | The Snow Depth FEWS NET product with daily update was used to analyze the snow regime of the upper part of the Emba River basin. The observation interval covered the period from January 01 to April 30 for 2001-2019. The Emba River basin is situated in Kazakhstan at the Eastern coast of the Caspian Sea. The area is characterized by a semi-arid to arid and extreme continental climate with dry-steppe and semi-desert landscapes. The population is small and the anthropogenic impact on the snow cover is minimal there. These conditions give an opportunity to identify the natural tendency in long-term changes of snow cover. In this paper, the trends over the last 19 years of the three snow cover characteristics, including the seasonal maximum, seasonal average and snow cover duration are presented. It was shown that the snow conditions for the seasonal maximum are triggered. There are two modes, the first is a low-snow regime (approximately 20 % of the entire sample) and the second mode covers the other years. The trends of the last 19 years show increasing snow | Terekhov, A.G., Ivkina, N.I., Yunicheva, N.R., Vitkovskaya, I.S., Yeltay, A.G Snow cover changes of the Kazakhstan dry steppes and semi-deserts: The case of River Emba basin studies //<br>Sovremennye Problemy Distantsionnogo Zondirovaniya Zemli iz Kosmosa Volume 17, Issue 2, 2020, Pages 101-113<br>DOI: 10.21046/2070-7401-2020-17-2-101-113 |

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| | | | depth. Also, there is a tendency of snow cover duration decrease. There is no trend in the seasonal average of the snow depth. The results obtained for snow cover of the dry-steppe and semi-desert zones of Kazakhstan are consistent with data from the 7th National report on climate change in Kazakhstan, which is based on meteorological observation of the air temperature and precipitation. Comparison of the Snow Depth FEWS NET product with snow depth ground data of weather station (Kazakhstan, Aktobe; WMO ID-35299) showed a good agreement of the long-term daily average values with the Pearson correlation coefficient of 0,963. | |
| 34. | Annual river runoff of the Ile-Balkash basin and prospects of its assessment due to climatic changes and water economy activities | DOI: https://doi.org/10.21660/2020.69.32068 | The water regime of the rivers of arid territories caused by not only to meteorological features, but also to a greater extent to the factors of the underlying surface of the earth. In addition, changes in river flow is determined by human economic activity. Ile-Balkhash region of Kazakhstan is the most densely populated and economically developed region. Large agro-industrial complexes, numerous settlements and cities are centered here. As a result, consideration and prospects of water consumption are the most important challenges in planning the social and economic development of the region on the basis of changing water resources in modern climatic conditions. | Rustam Abdrahimov, Ainur Amirgaliyeva, Kuanysh Tastambek, Aidar Zhumalipov, Svetlana Polyakova Annual river runoff of the Ile-Balkash basin and prospects of its assessment due to climatic changes and water economy activities // International Journal of GEOMATE, May, 2020, Vol.18, Issue 69, pp. 230- 239 ISSN: 2186-2982 (P), 2186-2990 (O), Japan, DOI: https://doi.org/10.21660/2020.69.32068 |

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| | | | The article presents the calculated features of flow for different time periods with the development of economic activity and climate change. It is established that there has been a rather intensive increase in the water content of the basin's watercourses since the seventies of the last century. The changes in the features of the annual flow of rivers for 90-100 year periods are calculated. Thus, the average annual water consumption of the Ile River in the lower reaches has increased over the past 40-50 years by an average of about 45 %, which has led, at present, to an increase in the water level in Balkhash Lake. The level of the lake decreased significantly after the building of the Kapshagai reservoir in the riverbed in 1970, primarily due to losses on its filling and increase in evaporation. Primarily, the development of the region is determined by changes in water resources in the future, its rational use and modern water-saving irrigation systems and hydraulic structures. The calculated flowoff features of the rivers of the Ile-Balkash basin make it possible to make a system of sustainable development of the region with the possibilities of water consumption, as well as regional models of flow formation. | |
| 35. | Evaluation and Dynamics of the Glacial Runoff of the Rivers of | https://www.scopus.com/inward/record.uri?eid=2-s2.0-85085067356&partnerID=40& | This article deals with the research of glacial runoff. The general characteristic of glaciation of the northern slope of the | Alexander G. Chigrinets, Lidiya P. Mazur, Kassym K. Duskayev, Larissa Y. Chigrinets, Saniya T. Akhmetova, Mussina A.K. |

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| | the Ile Alatau Northern Slope in the Context of Global Warming. | md5=a062054ee74f169b25a0ef3bca768aad | Ile Alatau is given. The glacio-hydro-meteorological data of the glaciation zone, such as glacier morphometry, air temperature, precipitation, and river runoff, are collected and analyzed. The reconstruction of the annual runoff series of the studied rivers is carried out before the estimated period. The analysis of existing methods for calculating glacial runoff is performed. The glacial runoff of the Ile Alatau rivers is calculated for specific years of a long-term period by two methods: taking into account the runoff from individual morphological parts of the glacier and without dividing it into components (according to ablation formulas). For specific years 1955-2013, glacial runoff is calculated in six options for ten basins of the major rivers and along the slope as a whole, according to the formulas of different authors. The dynamics of glacial runoff is investigated. The trends of the further evolution of glaciation in this area are revealed. New dependences and formulas are proposed for calculating the temperature coefficients of snow and ice melting, as well as for determining the height of the firn line and the ablation value. | Evaluation and Dynamics of the Glacial Runoff of the Rivers of the Ile Alatau Northern Slope in the Context of Global Warming. – International Journal of Engineering Research and Technology, Volume 12, Issue 8, 2020, P.1279-1277. |
| 36. | Features of the sediment runoff regime downstream the ile river | DOI: https://doi.org/10.12911/22998993/116332 | This paper is devoted to study on the sediment runoff of the Ile River downstream. The article analyses the Kapshagai reservoir impact on the regime and characteristics of the | Duskayev, K., Myrzakhmetov, A., Zhanabayeva, Z., Klein, I. Features of the sediment runoff regime downstream the ile river // Journal of Ecological Engineering, 2020, 21(2), стр. 117–125 |

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| | | | sediment runoff in the Ile River downstream before and after construction of the reservoir in 1970. Along with the calculation of characteristics of sediment runoff, an assessment of the amount of the suspended sediment, which is in the bowl of the reservoir, was shown. Furthermore, the impact reservoir on the granulometric composition of the suspended and bed sediment of Ile River was calculated. | DOI:https://doi.org/10.12911/22998993/116332 |
| 37. | Glacial debris flows in Zailiysky Alatau over the past 120 years. Ice and Snow. 2020; 60(2):213-224 | https://doi.org/10.31857/S207667342 | Zailiyskiy Alatau is the most mudflow hazardous mountain region of the Republic of Kazakhstan. At the same time, this area is one of the most densely populated and economically developed one, so mudflows here cause the great damage. The paper presents results of our analysis of the glacial mudflow activity for the period from 1900 to 2019. Amount and total volume of glacial mudflows per year were used as indicators of the mudflow activity. 481 mudflows were recorded over 120 years of observations in the Zailiyskiy Alatau, and 24% of them were glacial mudflows. Glacial mudflows are the largest and most destructive. Of the nine mudflows with a volume of more than 1 million m3, seven were glacial mudflows. The chronicle of mudflow disasters is shown. From 1950 to 2019, 87 glacial mudflows were observed in the Zailiyskiy Alatau. Of these, 16 mudflows had volumes exceeding 100 | Medeu A.P., Blagovechshenskiy V.P., Kasatkin N.E., Kapitsa V.P., Kasenov M.K., Raymbekova Z.T.<br>Glacial debris flows in Zailiysky Alatau over the past 120 years. Ice and Snow. 2020; 60(2):213-224. (In Russ.) https://doi.org/10.31857/S2076673420020035 |

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| | | | thousand m3. The largest ones occurred in 1977 (6.0 million m3), 1963 (5.8 million m3), 1958 (4.0 million m3), and 1973 (3.8 million m3). The causes for formation of glacial mudflows are outbursts of moraine lakes or water from underground reservoirs, as well as collapses of moraines' slopes. The largest of them occur when a lake is bursting through an open channel. Since 1951, occurrence of glacial mudflows has been increasing and reached its maximum in the 1970s. Since 1978, the number of glacial mudflows has been decreasing, although their volumes remained large until the late 1990s. From 1997 to 2013, mudflow activity was low. During 11 of the 15 years, no mudflow was observed. Every year only one mudflow happened with a volume below 10 thousand m3. Since 2014, there has been a tendency for an increase in mudflow activity. Large glacial mudflows were recorded in 2014 and 2019. To protect against mudflows in the valleys of the Zailiysky Alatau, 14 dams have been built and two more are planned. To prevent outbursts of moraine lakes, they are emptied using pumps and siphons. In 2019, the network of automated monitoring of early warning about mudflows is being organized, which will cover all the valleys of the Northern slope of the Zailiysky Alatau. | |

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| 38. | Emptying water towers? Impacts of future climate and glacier change on river discharge in the northern Tien Shan, Central Asia | DOI: 10.3390/w12030627 | Impacts of projected climate and glacier change on river discharge in five glacierized catchments in the northern Tien Shan, Kazakhstan are investigated using a conceptual hydrological modelHBV-ETH. Regional climate model PRECIS driven by four different GCM-scenario combinations (HadGEM2.6, HadGEM8.5, A1B using HadCM3Q0 and ECHAM5) is used to develop climate projections. Future changes in glaciation are assessed using the Blatter-Pattyn type higher-order 3D coupled ice flow and mass balance model. All climate scenarios show statistically significant warming in the 21st Century. Neither projects statistically significant change in annual precipitation although HadGEM and HadCM3Q0-driven scenarios show 20-37% reduction in July-August precipitation in 2076-2095 in comparison with 1980-2005. Glaciers are projected to retreat rapidly until the 2050s and stabilize afterwards except under the HadGEM8.5 scenario where retreat continues. Glaciers are projected to lose 38-50% of their volume and 34-39% of their area. Total river discharge in July-August, is projected to decline in catchments with low (2-4%) glacierization by 20-37%. In catchments with high glacierization (16% and over), no significant changes in summer discharge are expected while spring discharge is projected to increase. In | Shahgedanova, M., Afzal, M., Hagg, W., Kapitsa, V., Kasatkin, N., Mayr, E., Rybak, O., Saidaliyeva, Z., Severskiy, I., Usmanova, Z., Wade, A., Yaitskaya, N.,Zhumabayev, D. Emptying water towers? Impacts of future climate and glacier change on river discharge in the northern Tien Shan, Central Asia // Water (Switzerland) Открытый доступ Volume 12, Issue 3, 1 March 2020, DOI: 10.3390/w12030627 |

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| | | | catchments with medium glacierization (10-12%), summer discharge is expected to decline under the less aggressive scenarios while flow is sustained under the most aggressive HadGEM8.5 scenario, which generates stronger melt. | |
| 39. | Assessment of Changes in Mass Balance of the Tuyuksu Group of Glaciers, Northern Tien Shan, Between 1958 and 2016 Using Ground-Based Observations and Pléiades Satellite Imagery | DOI: 10.3389/feart.2020.00259 | Continuous measurements of glaciological mass balance have been conducted at the Central Tuyuksu glacier, Tuyuksu group of glaciers, Ile Alatau, northern Tien Shan since 1957, showing that cumulative mass balance was negative since the 1970s. Geodetic mass balance was calculated for the 1958–1998 and 1998–2016 periods using multi-temporal digital elevation models derived from the historic photogrammetric surveys from 1958 and 1998 and the high-resolution Pléiades satellite stereo imagery from 2016. The geodetic measurements revealed a mean surface lowering of 23.2 ± 2.2 m (0.40 ± 0.04 m a–1) and a reduction in volume of (67.7 ± 6.7) × 106 m3 in 1958–2016 at the Central Tuyuksu glacier, yielding a geodetic mass balance of −21.8 ± 2.6 m w.e. Similar trends were observed at other glaciers of the Tuyuksu group, which lost in total 83.4 × 106 m3 of ice. The mass balance annual rates have not changed significantly from 1958–1998 (−0.39 ± 0.05 m w.e. a−1) to 1998–2016 (−0.35 ± 0.18 m w.e. a−1) at the Central Tuyuksu and at other glaciers of the Tuyuksu group whose maximum elevations exceed 4,000 m a.s.l. While | Kapitsa, V., Shahgedanova, M. Severskiy, I.a, Kasatkin, N., White, K., Usmanova, Z. Assessment of Changes in Mass Balance of the Tuyuksu Group of Glaciers, Northern Tien Shan, Between 1958 and 2016 Using Ground-Based Observations and Pléiades Satellite Imagery(Article) / Frontiers in Earth Science Volume 8, 28 July 2020, DOI: 10.3389/feart.2020.00259 |

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| | | | glacier thinning intensified in the ablation zone and affected a larger area in 1998–2016, extending to 3,600–3,700 m a.s.l., the accumulation increased at higher elevations in 1998–2016. Geodetic mass balance was more negative in 1998–2016 than in 1958–1998 at the smaller glaciers with lower maximum elevations. At the Central Tuyuksu, the geodetic mass balance was in close agreement with the glaciological mass balance, particularly in 1958–1998 when the difference between the geodetic and the cumulative glaciological mass balance values did not exceed 5%. During 1998–2016, this difference increased to 14%, with the glaciological method producing a more negative mass balance. This discrepancy was attributed to a systematic bias introduced by the lack of stakes in the accumulation zone of Central Tuyuksu whose contribution to uncertainty increased in 1998–2016 in line with an increase in accumulation. The negative mass balance of the Tuyuksu group of glaciers was attributed to a continuing increase in summer temperatures and a low accumulation observed in the 1970–1980s and at the turn of the century. | |
| 40. | About ratio and values of the empirical coefficient of alkali metals ($Na^+$ and $K^+$) in surface waters of Kazakhstan on the example of the Ile river | https://doi.org/10.32014/2020.2518-170X.1 | Issues concerning to insufficient knowledge of such important aspects in the field of regional hydrochemistry, which are the patterns of formation of the regime and the dynamics of alkali metals (sodium and potassium) in | Amirgaliev N., Christian Opp, Askarova M., Kulbekova R., Ismukhanova L. About ratio and values of the empirical coefficient of alkali metals ($Na^+$ and $K^+$) in surface waters of Kazakhstan on the example of the Ile river // News of the National Academy of Sciences of |

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| | | | surface waters are considered. It is pointed out the need for reliable analytical data on the separate concentration of sodium and potassium in natural waters to solve important practical problems in the field of assessing the suitability of the composition of the water of reservoirs for acclimatization of valuable forage organisms for fish, when choosing water sources for irrigated areas. Special attention is paid to the importance of the empirical coefficient (EC) of sodium and potassium, which is necessary in determining the total mineralization of natural waters, on which the level of their use for various household and drinking needs depends. On the state monitoring data, the nature of changes in the ratio of sodium and potassium along the Ile River was studied and the EC was established to calculate their absolute concentration (in mg/dm3) and total water mineralization. Based on the analysis of literature data and the results of our own research on the item under consideration, conducted in different years for a number of reservoirs and watercourses in Kazakhstan, it was concluded that: previously adopted for the entire territory of the former USSR, the EC equal to 25 for freshwater reservoirs can be used for waters of some river basins of the Republic of Kazakhstan with their mineralization up to 350-400 mg/dm3. A decisive role in | the Republic of Kazakhstan. Series of geology and technical sciences. – 2020. – V. 1, № 439. – PP. 6-13. https://doi.org/10.32014/2020.2518-170X.1 |

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| | | | the formation of the regime and the dynamics of the concentration of sodium and potassium in surface waters has a complex of regional physiographic conditions: climate, nature of the soil, groundwater, anthropogenic influences, etc. The necessity of establishing the EC for reservoirs and watercourses of different climatic zones of the Republic of Kazakhstan, especially for large transboundary basins, is recommended. | |
| 41. | Regularities of monthly variations of the ili river runoff and its forecasting | DOI: 10.31857/S2587556620030036 | Analysis of fluctuations in the time series of Ili River runoff monthly values for 1971 1994 was carried out using the method of "Periodicities" on the posts located 164 km upper and 37 km lower Kapchagayskaya Dam. The analysis revealed in fluctuations of each of them nine harmonics with the periods length larger than 1.5 years. The revealed sinusoids and repeating successions of runoff annual cycle s mean monthly values were applied in different runoff prediction schemes for months and totally for 1995. Training forecasts results were estimated by the new independent data. Runoff regulation by the reservoir causes some reduction of its mean value, smoothing and losing its annual cycle rhythm. Long term periods are revealed more distinctly in the runoff variation lower the dam. In spite Kapchagayskaya Dam influence the harmonics with the same periods of 25 and 35 months were revealed in both time series among other sinusoids. | Babkin, A.V., Babkin, V.I., Madibekov, A.S., Mussakulkyzy, A., Cherednichenko, A.V Regularities of monthly variations of the ili river runoff and its forecasting // Izvestiya Rossiiskoi Akademii Nauk. Seriya Geograficheskaya, 2020, (3), стр. 384–394<br><br>DOI: 10.31857/S2587556620030036 |

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| | | | Possibly they are more reliable, and it is more expedient to apply them for future runoff estimation comparing with sinusoids whose periods were proved only in one of time series. The Ili River runoff in 1995 upper the dam was extreme small. Lower the dam the runoff was close to the mean value of its time series. By the majority of applied predictions schemes results for the runoff upper the dam were better its estimations for future by the mean value of time series. Forecast s mistake lower the dam was smaller than its acceptable value. Therefore, the forecasts computed by these schemes for months and for the annum at total could be estimated as satisfactory and quite acceptable. | |
| 42. | Applicability assessment of natural waters in irrigation of agricultural land on the example of the vakhsh river and its tributaries | https://doi.org/10.32014/2020.2518-170X.146 | The results of chemical analyses of the Vakhsh river and its tributaries and the calculations of the main criteria for the water applicability for irrigation purposes are presented: the proportion of sodium cations capable of absorption, dissolution, ion exchange, and the proportion of magnesium. It was found that the waters of the Vakhsh river and its tributaries (Kyzylsu, Muksu, Obikhingou and Surkhob) are favorable for irrigation of agricultural land. On the values of the magnesium cations ratio to calcium cations the Vakhsh river and tributaries water correspond to the first class of «soft waters». It is shown that due to the surface and underground water exchange, underground water | Normatov, I.Sh., Amirgaliev, N.A., Madibekov, A.S. Applicability assessment of natural waters in irrigation of agricultural land on the example of the vakhsh river and its tributaries //<br>News of the National Academy of Sciences of the Republic of Kazakhstan, Series of Geology and Technical Sciences, 2020, 6(444), стр. 186–193<br>https://doi.org/10.32014/2020.2518-170X.146 |

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| | | | reservoirs are enriched by cations of alkaline and alkaline earth elements. The underground water reservoirs of the Vakhsh tributaries basin on the water quality terms are also suitable for irrigation purposes. | |
| 43. | The research results of physical and chemical parameters of snow cover in the almaty agglomeration (Southeast of Kazakhstan) | DOI: 10.5593/sgem2020/5.1/s20.084 | The chemical composition of 122 samples of snow cover (collected during 2018-2020) was measured for the representative points of the Almaty agglomeration (AA). Mean values of acidity show the absence of large-scale processes of acidification of snowfall over the study area. The analysis of the temporal variations of these parameters indicates their relative stability. The high values of suspended solids are characteristic of the mountainous territory, the Almaty city, including in the area of large highways. The concentration of organic substances (by permanganate oxidizability) varied over a wide range from 3.90 to 12.6 mgO/dm3. Their greatest values are recorded in the core of the agglomeration and the smallest were in the mountainous part. The average salinity of snow cover is 111 mg/dm3 and it has a sodium bicarbonate composition throughout the agglomeration. The low salinity of the snow cover was observed in the southwestern part of the agglomeration, as well as most of the Almaty city, while the flat territory is characterized by higher salinity values. The maps of the | Ismukhanova, R.L., Kulbekova, R., Amirgaliyev, N., Madibekov, A., Zhadi, A. The research results of physical and chemical parameters of snow cover in the almaty agglomeration (Southeast of Kazakhstan) // International Multidisciplinary Scientific GeoConference Surveying Geology and Mining Ecology Management, SGEM, 2020, 2020-August(5.1), стр. 671–680<br>DOI: 10.5593/sgem2020/5.1/s20.084 |

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| | | | determined indicators (using ARCGIS) provided an opportunity to assess the distribution of the chemical composition of the snow cover over the Almaty agglomeration and to identify foci of their high levels for the entire research period. It is important to monitor pollution of the snow cover annually, especially in urban areas, as pollutants enter the landscape with its melting. This study can be used to develop strategic planning and policies to control air pollution. | |
| 44. | Influence of climate change and anthropogenic factors on the Ile River basin streamflow, Kazakhstan | DOI 10.1007/s12517-021-08152-6 | The article considers modern change in the streamflow resources of the Ile River basin that conjugates territories of the two countries, China and Kazakhstan, with the account of climatic and anthropogenic influences. The main goal of the authors is to study long-term trends of changes in the streamflow with the account of climatic and anthropogenic load in order to develop scientifically based strategies for sustainable management and protection of the Ile-Balkhash basin water resources. The current change in streamflow with the account of climate change was estimated using the linear trend coefficient, the Mann-Kendall test, and Sen slope estimator. The results show that intense warming occurs unevenly and most of all, it became warmer at the meteorological stations located in the Ile River delta at the Kuygan, Bakanas stations for more than | Talipova, E., Shrestha, S., Alimkulov, S., Nyssanbayeva A.S., Tursunova, A., Isakan, G. // Arabian Journal of Geosciences, 2021, 14(17), 1756 Процентиль Environmental Science – 52 (Q2) https://www.scopus.com/record/display.uri?eid=2-s2.0-85112452929&origin=resultslist |

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| | | | 0.40 °C/10 years (1974–2015), and also at the Almaty MS, the maximum warming was noted at the rate of 0.04 °C/10 years (before 1973) up to 0.52 °C/10 years (1974–2015), and therefore since 1973, there has been a phase of increased water content in the region, in addition to some stations located in the flat part of the basin. | |
| 45. | Climate change and food security: The impact of some key variables on wheat yield in Kazakhstan | https://doi.org/10.3390/su13158583 | In such drought-prone regions as Kazakhstan, research on regional drought characteristics and their formation conditions is of paramount importance for actions to mitigate drought risks caused by climate change. This paper presents the results of research on the spatio-temporal pat-terns of atmospheric droughts as one of the most important factors hindering the formation of crop yields. The influence of several potential predictors characterizing teleconnection in the coupled “atmosphere–ocean” system and cosmic-geophysical factors affecting their formation is analyzed. The spatial relationships between atmospheric aridity at the individual stations of the investigated area and the wheat yield in Kazakhstan as well as its relationships with potential predictors were determined using econometric methods. High correlation was shown between wheat yield fluctua-tions and Multivariate El-Niño–Southern Oscillation (ENSO), galactic cosmic radiation, solar activ-ity, and | Stanislav E. Shmelev ,Vitaliy Salnikov ,Galina Turulina,Svetlana Polyakova ,Tamara Tazhibayeva ,Tobias Schnitzler, Irina A. Shmeleva Climate change and food security: The impact of some key variables on wheat yield in Kazakhstan // Sustainability (Switzerland), 2021, 13(15), 8583 https://doi.org/10.3390/su13158583 |

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| | | | atmospheric drought expressed through the soil moisture index, which in turn depends on precipitation levels and temperatures. The model could be modified further so that the individual components could be forecasted into the future using various time series in an ARIMA model. The resulting integration of these forecasts would allow the prediction of wheat yields in the future. The obtained results can be used in the process of creating effective mechanisms for adaptation to climate change and droughts based on their early diagnosis. | |
| 46. | Heavy metal deposition through precipitation in Kazakhstan | DOI:https://doi.org/10.1016/j.heliyon.2020.e05844 | The active development of industry, primarily mining and metallurgical, as well as energy, is accompanied by significant emissions of pollutants into the atmosphere. We collected data and analyzed the intake of heavy metals (HM) of lead (Pb), copper (Cu) and arsenic (As), cadmium (Cd) in precipitation (wet deposition) on typical natural Kazakhstan ecosystems. The average Pb, Cu, As and Cd wet deposition was 3.80 ± 1.52, 16.11 ± 1.48, 0.96 ± 0.84 and 0.88 ± 0.44 μg/L, respectively, with a large variation among the different sites of Kazakhstan. In addition, we identified the most significant industrial areas in the republic and determined the concentrations of the listed metals in the precipitation for each of them. The relationship between these | Cherednichenko, V.S., Cherednichenko, A.V., Cherednichenko, A.V., Zheksenbaeva, A.K., Madibekov, A.S. Heavy metal deposition through precipitation in Kazakhstan //<br>Heliyon, 2021, 7(1), e05844<br>DOI:https://doi.org/10.1016/j.heliyon.2020.e05844 |

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| | | | concentrations and industrial activity in the regions, and the presence of a mutual correlation between them were also investigated. We obtained that the atmospheric deposition of Pb, Cu and As were higher in the central industrial areas (Dzhezkazgan, Balkhash), as well as in the south (Chimkent) and in the east (Ust-Kamenogorsk), where large mining and metallurgical enterprises are located. In these cities, there are high concentrations of pollutants (PS) in the atmosphere, exceeding the maximum permissible concentrations (MPC) by several times. Significant sedimentation of pollutants, primarily HM, is noted, adversely affecting soils and surface runoff. The total deposition of heavy metals on snow cover was determined. We obtained that the average total deposition for Pb, Cu, As and Cd was 4.4 ± 1.28, 20.6 ± 1.43, 3.23 ± 0.81 and 1.03 ± 0.47 μg/L. Calculations performed for comparable time intervals showed that dry deposition is two to five times greater than wet deposition and the smaller the precipitation in the region, the greater the dry deposition, ceteris paribus. At the level of climate assessments, it is shown that there is a transboundary transfer of heavy metals from both the territory of Kazakhstan from the territory of Russia. Heavy metals, Wet and dry deposition, Precipitation and snow cover, Ecological regions and ecosystems. | |

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| 47. | Results of AAS-measurements of atmospheric deposition of copper and lead in the snow cover of Almaty agglomeration | https://doi.org/10.1515/pac-2021-0203 | The article presents the results of the study conducted on the territory of the Almaty agglomeration (AA) in the first half of 2019. During the expeditionary studies, sampling was carried out at 30 permanent points established taking into account the degree of anthropogenic load and sources of technogenic pollution. The content of trace elements (TE) in the snow was determined by a flame atomic absorption spectrometric method using an AA-7000 spectrophotometer with a hollow cathode lamp and with a nozzle burner operating on an acetylene-air mixture. The paper considers the amount of content of copper and lead in the snow, as well as the nature of their distribution over the study area. Calculations were carried out on the number of depositions of the TE in question per unit area over the territory of the agglomeration, with the allocation of zones experiencing the highest technogenic load. | Madibekov, A., Ismukhanova, L., Mussakulkyzy, A., Kulbekova, R., Zhadi, A Results of AAS-measurements of atmospheric deposition of copper and lead in the snow cover of Almaty agglomeration https://doi.org/10.1515/pac-2021-0203 |
| 48. | Hydrochemistry of the Pyanj transboundary river upstream, middle and downstream and the criterion its use for irrigation | DOI 10.32014/2021.2518-170X.16 | The water quality of the transboundary Pyanj River in the formation zone and along the riverbed before merging with another tributary of the transboundary Amu Darya River-the Vakhsh River was studied. The water quality on the upstream river corresponds to the very soft class (> 1.5 mmol/dm3) and in the middle and the downstream to the soft class (1.5-3.0 mmol/dm3). At the upper, middle and lower reaches of the Pyanj | Normatov, I.Sh., Goncharuk, V.V., Amirgaliev, N.A., Madibekov, A.S., Normatov, A.I. Hydrochemistry of the Pyanj transboundary river upstream, middle and downstream and the criterion its use for irrigation // News of the National Academy of Sciences of the Republic of Kazakhstan, Series of Geology and Technical Sciences, 2021, 1(445), стр. 114–120 DOI 10.32014/2021.2518-170X.16 |

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| | | | river the concentration of alkaline earth exceeds alkali metals (Ca2+ + Mg2+> Na+ + K+) at HCO3-> SO4 2-+ Cl- and according to the Handa classification they are characterized by temporary rigidity. To assess the criterion of applicability of the Pyanj river water for irrigation the coefficient of sodium adsorption (SAC) was calculated for water samples from the upstream (Khorog), middle (Darvaz) and the downstream (Lower Pyanj) of the Pyanj river that were equal to 0.88; 1.07; 1.71, respectively. The SAC values for all water samples (from the upper, middle and lower reaches) of the Pyanj river indicate their good qualities for irrigation of agricultural land. The concentration of heavy metals in the Pyanj river is significantly lower than the maximum permissible concentration (MPC). | |
| 49. | Extremal snowfall on March 13–14, 2021, in the South Kazakhstan | DOI: 10.21046/2070-7401-2021-18-4-279-284 | The product Snow Depth FEWS NET with a daily renew and spatial resolution of 1 km was used to monitor the snow cover of Kazakhstan in the 2020–2021 season. In February–March 2021, there were regular incursions of warm air into Siberia, which passed through the Kazakhstan territory and caused frequent precipitation. Within the framework of these meteorological processes, one event of heavy snowfall in the South Kazakhstan distinguished by its power. During March 13–14, 2021, in the area of the Karatau Range | Terekhov, A.G., Abayev, N.N., Tillakarim, T.A.<br>Extremal snowfall on March 13–14, 2021, in the South Kazakhstan // Sovremennye Problemy Distantsionnogo Zondirovaniya Zemli iz Kosmosa, 2021, 18(4), стр. 279–284<br>DOI: 10.21046/2070-7401-2021-18-4-279-284 |

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| | | | (2176 m), there was a heavy snowfall. The Karatau Range is a low, 500-kilometer northwestern spur of the Tien Shan mountains (7439 m), wedged into the zone of dry steppes and semi-deserts of South Kazakhstan and separating the valleys of the Syrdarya and Talas rivers. According to the product Snow Depth FEWS NET, more than 2.5 cubic km of water fell in the form of snow. Within 2 days, the average depth of the snow cover in the Karatau Range area increased from 0.8 to 48.5 cm. This snow depth updated the previous long-term seasonal maximum of 43 cm (February 4, 2005). The long-term maximum snow depth of 13 cm on March 13–14 (2003) was exceeded almost 4 times. The anomalous phenomenon in the area of the Karatau Range indicates a potentially high climatic variability of this area. Usually, atmospheric fronts run along the ridge and do not bring a significant amount of precipitation. The increase in the frequency of events of the transition of atmospheric fronts through the ridge, as a result of the interaction of atmospheric transport in the South Kazakhstan with the Siberian Anticyclone, can dramatically increase the climatic norm of snow content of the Karatau Range in future. | |
| 50. | The Development of Software to Calculate the Atmospheric | https://doi.org/10.1007/978-3-030-77448-6_52 | The article describes the development of applied software for calculating the atmospheric pollution index based on | Kauazov A., Abayev N., Turashov S., Zhambalina F. (2021) The Development of Software to Calculate the Atmospheric |

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| | Pollution Parameters and Air Pollution Levels Forecast | | normalizing the observed impurities concentrations in the atmosphere and forecasting the level of pollution in Kazakhstan. Application software was developed for entering, calculating and automation fore-casting the level of pollution (P parameter) in 20 cities of the Republic of Kazakhstan. The automation of the P parameter calculations has significantly (several times) reduced the time spent on calculating the P parameter and the search for optimal pollution indicators in the city. The software is written in Borland Delphi 10 lite, the database is organized on the basis of MS Access. Database queries are executed in SQL using ADO technology. When the software runs, arithmetic calculations perform at the local level and output/input results are transported to MS Excel files | Pollution Parameters and Air Pollution Levels Forecast. In: Silhavy R. (eds) Informatics and Cybernetics in Intelligent Systems. CSOC 2021. Lecture Notes in Networks and Systems, vol 228. Springer, Cham. https://doi.org/10.1007/978-3-030-77448-6_52 |
| 51. | Satellite monitoring of hydrometallurgical processing on Lake Manas, Xinjiang, Northwest China | DOI: 10.21046/2070-7401-2021-18-1-243-247 | A set of Landsat images from 1990 to 2020 was used to study the dynamics of land cover — land use changes in the bottom of the dried-up lake Manas, Xinjiang, Northwest China. After the construction of the main water channel Black Irtysh–Karamay in 1999, the lake bottom was periodically filled with water. The regime of long-term changes in the water area and the development of anthropogenic structures in its bottom indicate the creation of a hydrometallurgical complex for solar evaporation of salt brines. Location of | Terekhov, A.G., Abayev, N.N., Lagutin, E.I. Satellite monitoring of hydrometallurgical processing on Lake Manas, Xinjiang, Northwest China // Sovremennye Problemy Distantsionnogo Zondirovaniya Zemli iz Kosmosa, 2021, 18(1), DOI: 10.21046/2070-7401-2021-18-1-243-247 |

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| | | | the Manas Lake in the Dzungarian plain on the territory of the Karamay Oil fields suggests that hydrometallurgical processing is a concomitant of petroleum production. Apparently, this place is used for subsalt oil production, which is combined with the Lithium extraction from the salt-lake brines. This is facilitated by favorable climatic conditions. Very dry and hot summer weather provides extreme water evaporation. The significant potential of solar water evaporation in the Dzungarian plain and the possibility of using the technical resources of subsalt oil production create a good basis for large-scale Lithium extraction. Similar conditions exist in the oil fields of the Northern Caspian region (Kazakhstan, Russia) and Tarim basin (China). | |
| 52. | Determination of the runoff characteristics of the yesil river basin based on gis technologies | https://doi.org/10.32014/2021.2518-170X.37 | The article examines the effectiveness of GIS-technologies in Kazakhstan for determining and clarifying hydrographic characteristics (e.g. catchment area, river length, location, lakes and reservoirs), the analysis of hydrological processes and phenomena, as well as the creation of a cartographic and attributive database of water bodies. Yesil River, the main waterway of the central and northern part of Kazakhstan, is one of the least hydro-logically studied catchments in the region. To address this research and information gap data was obtained from remote sensing and runoff depth based on the Kazhydromet | Duskayev, K.K., Mussina, A.K., Ospanova, M.S., Bazarbek, A.T., Macklin, M.G Determination of the runoff characteristics of the yesil river basin based on gis technologies//News of the National Academy of Sciences of the Republic of Kazakhstan, Series of Geology and Technical Sciences, 2021, 2(446), стр. 74–81 https://doi.org/10.32014/2021.2518-170X.37 |

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| | | | network for the period 1945 to 2016. A topographic and river network map (1:1,000,000) of the Yesil River basin, including locations of gauging stations as well as depth and runoff coefficient maps were created using ArcGIS software. These maps provide a very useful tool for water resource management and economic policy decision making. | |
| 53. | Perennial fluctuations of river runoff of the Yesil river basin | DOI: 10.21533/pen.v9i4.2306 | The features of perennial fluctuations in the river runoff of the Yesil Basin Rivers are considered. The purpose of study is to analyze the spatial and temporal variability of various characteristics of river runoff in the F river basin. In the presented work, the series of annual and maximum water discharges were analyzed, as well as the series for the minimum runoff, based on analysis of runoff long-term fluctuations of the Yesil river basin and the authors' own researches. Hydrological calculations and statistical analysis were carried out using standard Excel and Statistica packages. Based on the processing of surface-based observations (1933-2016 years), as well as the analysis of literature data, conclusions were conducted about the presence of intra-century cycles in the series of the annual river runoff of the Yesil river basin. It was revealed that the Yesil Basin Rivers are characterized by a cyclic runoff with a period of 15-25 years. As a result of the analysis of the long-term variation of | Makhmudova, L., Moldakhmetov, M., Mussina, A., Kanatuly, A. Perennial fluctuations of river runoff of the Yesil river basin // Periodicals of Engineering and Natural Sciences, 2021, 9(4), стр. 149–165 DOI: 10.21533/pen.v9i4.2306 |

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| | | | the values of the maximum water discharge, noticeable differences in the long-term variation of both the direct values of the maximum discharge and their absolute variability were revealed; it was revealed that the series of the minimum winter and summer-autumn runoff at a significant part of the gauging stations of the Yesil river basin are heterogeneous. The heterogeneity of the runoff series characteristics in the Yesil basin is due to both factors: climatic changes and anthropogenic pressure. | |
| 54. | Mine technical system with repeated geotechnology within new frames of sustainable development of underground mining of caved deposits of the Zhezkazgan field | doi.org/10.3846/gac.2020.10571.<br>General Earth and Planetary Sciences- 41, Q3 | The article outlines the principles of design of repeated geotechnology at the development of reserves in the conditions of collapsed deposits of the Zhezkazgan field for the purpose of rational management of underground mining processes. This is an integral design principle of the mine technical system with repeated geotechnology, and the foundation for the practice of designing and operation of the subsoil at the development of mineral deposits. At the designing of a mine technical system with repeated geotechnology aimed at the development of collapsed subsoil reserves, the risks and natural and man-made emergencies related to the production are taken into account. Under modern | Bekbergenov, D., Jangulova, G., Kassymkanova, K.-K., Bektur, B. Mine technical system with repeated geotechnology within new frames of sustainable development of underground mining of caved deposits of the Zhezkazgan field. Geodesy and Cartography (Vilnius), 2020, 46(4), pp. 182–187.<br>doi.org/10.3846/gac.2020.10571 |

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| | | | conditions, mining design cannot be employed in isolation from the principles of sustainable development, which implies not only orthodox meaning but also the development that ensures society existence without threatening the needs of future generations. In this connection, the ongoing research incorporates designing of mine technical systems with due account for the principles of sustainable development, which correspond to the current priority direction related to the development of repeated geotechnology within new frames of sustainable development of repeated underground mining of reserves in the conditions of collapsed deposits of the Zhezkazgan field. This contributes to the efficient use of resource-replenishing repeated geotechnology and the possibility of the most complete development of the georesource subsoil potential due to the enhancement of the ore potential at the operation of underground mines of Kazakhmys Corporation Ltd., which is one of the largest copper mining companies in the world. | |
| 55. | Landscape of the Mangystau region in Kazakhstan as a geomorphotourism | DOI 10.30892/gtg.29201-476. Geography, Planning and Development -64, Q2 | One of the ideas of using landscape, that a section of terrain can be appreciated as an object with visual, | Koshim, A.G., Sergeyeva, A.M., Bexeitova, R.T., Aktymbayeva, A.S. Landscape of the Mangystau region in |

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| | destination: A geographical review. | | aesthetic, historical-cultural, scientific and socio-economic values, is the development of geomorphotourism. This type of tourism is well demanded especially in developed industrialized countries. However, it is largely underestimated and undeveloped in Kazakhstan due to<br>insufficient information, while there are many forms and types of landscape that potentially have natural, cultural and historical values. This paper based on sitevisits of geomorphic landforms of the Mangystau region in Kazakhstan have been reviewed and discussed the geomorphotourism potential of some of the geo- morphosites of studied area. The geographical review shows that the landscape of the Mangystau region has the higher capability to develop ecotourism and geomorphotourism. Therefore, development of tourism in the study area is depending on the level of management and investment and further work under UNESCO Geoparks development programme on preserving the natural environment and sustainability of the tourism resources of the region. | Kazakhstan as a geomorpho-tourism destination: A geograp-hical review. Geojournal of Tourism and Geosites, 2020, 29(2), pp. 385–397. DOI 10.30892/gtg.29201-476 |

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| 56. | Impact of small and medium-sized tourism firms on employment in Kazakhstan | DOI 10.30892/gtg.32407-563. Geography, Planning and Development -64, Q2 | Nowadays, small and medium-sized tourism firms play a key role in the development of the national economy of Kazakhstan. In 2019, there were over 7000 small and medium-sized tourism firms in Kazakhstan. The tourism firms have many contributions to make labor-intensive and more often self-proprietary, comparatively improved levels of efficiency and better income distribution, has a strong socio - economic imperative for the country, and disseminates broadly the benefits of economic growth. However, there is a little information available on the impact of tourism firms on employment in Kazakhstan. The objective of this manuscript is to fill this information gap by inve stigating the impact of tourism firms on employment by applying regression analysis. The results of the regression analysis revealed that there is a positive relationship between tourism firms and unemployment reduction. This manuscript may be beneficial for practitioners and academicians. Examining the impact of tourism firms on employment tends to raise or provide some useful insights into some theoretical issues on one hand. | Aktymbayeva, A., Assipova, Z., Moldagaliyeva, A., Nuruly, Y., Koshim, A. Impact of small and medium-sized tourism firms on employment in Kazakhstan. Geojournal of Tourism and Geosites, 2020, 32(4), pp. 1238–1243. DOI 10.30892/gtg.32407-563 |

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| | | | On the other hand, it raises some practical implications for policy makers in the government. | |
| 57. | Underground mosques of mangystau as the objects of religious tourism | DOI 10.30892/gtg.34105-616. Geography, Planning and Development -64, Q2 | A distinctive feature of Mangystau is a significant number of underground mosques that have existed within the region since the X-XIII centuries. The purpose of the study is to analyze and assess the current state of underground mosques and the prospects for their use as objects for the development of tourism. The study was carried out as a result of the use of complex methods: dialectical, retrospective, systemic and logical analysis, as well as general scientific methods of comparison, analysis and synthesis. Underground mosques in Mangistau region play an important role in the development of tourism in Kazakhstan. The analysis shows that the objects carved into the rock are unique underground structures that differ in the peculiarity and history of their formation. The research results can be used in theoretical and methodological research on this topic. The research materials show that in the Mangistau region it is necessary to study the religious heritage using a rich resource base and develop new tour programs that will increase the region's tourism opportunities and the | Koshim, A.G., Sergeyeva, A.M., Saparov, K.T., Berdibayeva, S.K., Assylbekova, A.A. Undergro-und mosques of mangystau as the objects of religious tourism<br>Geojournal of Tourism and Geosites, 2021, 34(1), pp. 33–41. DOI 10.30892/gtg.34105-616. |

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| | | | development of all types of religious tourism. | |
| 58. | Monitoring of displacements of objects of terrestrial surfaces by interferometry method | doi.org/10.32014/2020.2518-170X.110. Geotechnical Engineering and Engineering Geology – 37, Q3 | Geomechanical monitoring is a system of observations of the state of the geological environment, the processes of displacement of rocks and the earth's surface, geomechanical and hydrodynamic processes in a rock mass, interpretation of the results of observati-ons, the formation of judgments about the state of the rock mass as a whole and the forecast of parameters of stable slopes.<br>To determine the displacement of the earth's crust of the Akbakay field, the technology of terrestrial radar interferometry was used. Which is used by only a few research institutes and organizations in the world.<br>In satellite radar interferometry, the promptness to obtain an actual spatial information about the Earth's surface is an important requirement for modern Earth remote sensing data, along with high spatial resolution, as well as geometric accuracy. The operational efficiency is one of the main advantages of radar systems for remote sensing of the Earth or a system of instruments synthesized by radar. | Madumarova, G., Suleimenova, D., Pentayev, T., ...Miletenco, N., Tumazhanova, S. Monitoring of displacements of objects of terrestrial surfaces by interferometry method. News of the National Academy of Sciences of the Republic of Kazakhstan, Series of Geology and Technical Sciencesthis link is disabled, 2020, 5(443), pp. 105–115. doi.org/10.32014/2020.2518-170X.110 |

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| | | | Geomechanical monitoring and research on geodynamic polygons reveal wide opportunities for studying vertical movements of the earth's crust. | |
| 59. | Analysis of key SWOT-Characteristics of Agri-business, management and land use in Kazakhstan: The case of Turkestan region | Economics and Econometrics – 34, Q3 | | Anarbayev, Y., Pentayev, T., Molzhigitova, D., Omarbeko-va, A., Omarova, S. Analysis of key SWOT-Characteristics of Agri-business, management and land use in Kazakhstan: The case of Turkestan region. Academy of Entrepreneurship Journal, 2021, 27(5), pp. 1–9. |
| 60. | Study of conditions of gully formation in mountain regions of south-east kazakhstan with use of gis-technologies | doi.org/10.3846/gac.2021.12140. General Earth and Planetary Sciences -41, Q3 | In the article the results of field and laboratory researches of gully erosion in the mountains of Zhetysu Alatau of south-east Kazakhstan are considered. Mountain ridge Malaisary was chosen for study of gully erosion. Malaisary ridge is the western ridge of Zhetysu Alatau mountains in the south-east Kazakhstan. Foothills and plain territories of southeast Kazakhstan are characterized by favorable conditions for the development of erosion processes. There was conducted stationary monitoring (yearly in October from 2013 to 2018) of gully erosion development on the Malaisary ridge from 2013 to 2018. Most of gullies of studied ridge show | Khalykov, Y., Lyy, Y., Sarybaev, E., ...Uksukbayeva, S., Sharapkhanova, Z. Study of conditions of gully formation in mountain regions of south-east kazakhstan with use of gis-technologies. Geodesy and Cartography (Vilnius), 2021, 47(2), pp. 54–65. doi.org/10.3846/gac.2021.12140 |

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| | | | development in the top part and extend in the width mainly due to fluvial processes. There were studied the natural-anthropogenic factors influencing development of gully erosion; the morphometric characteristic received using the modern devices and satellite images are provided. The determined factors of development of gullies on Malaisary ridge are mechanical substratum composition, atmospheric precipitation (spring runoff, summer rainfalls), steepness and length of the slopes. | |
| 61. | Monitoring of oil pollutions in the Caspian Sea using sentinel-1 and sentinel-2 images | https://doi.org/10.5593/sgem2020/2.2/s10.030 Geotechnical Engineering and Engineering Geology – 17, Q4 | Currently, the issue of pollution of the Caspian Sea, which is saturated with oil industry facilities, is highly relevant. Monitoring of such objects and phenomena that pose a potential and real threat of natural and man-made emergencies, such as emergency oil spills that entail significant environmental damage, is important for Kazakhstan. The main purpose of this paper is to evaluate the capabilities of SAR and optical images in the task of detecting oil spills, having tested them in the task of mapping zones with a high frequency of occurrence of oil spills for three years. Due to its many advantages, SAR imagery is currently | Zhantayev, Z., Kaldybayev, A., Nurakynov, S., Sydyk, N. Monitoring of oil pollutions in the Caspian Sea using sentinel-1 and sentinel-2 images. Inter national Multidisciplinary Scientific GeoConference Surveying Geology and Mining Ecology Management, SGEM, 2020, 2020-August(2.2), pp. 251–257. https://doi.org/10.5593/sgem2020/2.2/s10.030 |

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| | | | the most common remote sensing tool for oil spills. However, using SAR images, it is sometimes difficult to identify man-made oil spills and false objects similar to them, which are commonly called" look-alikes" and include windless areas, organic slicks of natural origin, algal blooms, etc. | |
| 62. | The role of web-based gis system in the control and prevention of natural and manmade hazards in Kazakhstan | doi.org/10.5593/sgem2020/2.2/s11.053. Geotechnical Engineering and Engineering Geology – 17, Q4 | With the development of space and information technology, emergency monitoring using satellite data is gaining tremendous relevance. If we take into account the area of the Republic of Kazakhstan (2.7 million km2), there is an urgent need to create a unified space monitoring system for the most priority natural and man-made disasters. This article discusses the space monitoring system, its composition and functional diagram of the basic elements of the system and remote access services to the resources and results of the space monitoring system. The composition of the information support of the system, its formats and sources, the frequency of updates are described. The basic structure of the geoportal, namely the subsystem for collecting satellite and ground data, a database, processing and expert interpretation, integration and dissemination of monitoring data, is briefly explained. | Z Zhantayev, S Nurakynov, A Kaldybayev, N Sydyk. The role of web-based gis system in the control and prevention of natural and manmade hazards in Kazakhstan.<br>International Multidisciplinary Scientific GeoConference: SGEM 20 (2.2), pp. 445-452.<br>https://doi.org/10.5593/sgem2020/2.2/s11.053 |

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| 63. | Terrestrial laser scanning method for monitoring erosion of the southwestern shore of Alakol lake | DOI 10.5593/sgem2020/2.2/s09.015. Geotechnical Engineering and Engineering Geology – 17, Q4 | The purpose of this study is to follow the dynamics of erosion on the Alakol lake coasts using terrestrial laser scanner (TLS), which are leading to major changes of embossed medium, endanger the existing infrastructure and hinder the development of recreational coastal zone. The main steps in applying the ground-based laser scanning method are as follows: preparatory work for field-based radar systems; TLS data collection with laser scanner RIEGL VZ-4000; processing the received data in the RiscanPro program; analysis of multi-temporal digital elevation models (DEM). Four monitoring sites were selected on the southwestern coast of the Alakol lake, where abrasion is actively developing. The results of DTM processing made it possible to determine the numerical values of the coastline dynamics for 4 monitoring sites of the Alakol lake for 2018-2019. In section No. 1, the dynamics of coastal retreat ranged from 5.5 to 6 m, with a height of the coastal ledge of 3.5-4.5 m. With coverage of 200 m along the coastal section, erosion amounted to 3394 m3. In section No. 2, the dynamics of coastal retreat ranged from 1.3 to 2 m, with a height of the coastal ledge of 2.2-3.7 m. With | Khalykov Y., Lyy Y. Abitbayeva A., Togys M., Valeyev A. Terrestrial laser scanning method for monitoring erosion of the southwestern shore of Alakol lake. International Multidisciplinary Scientific GeoConference Surveying Geology and Mining Ecology Management, SGEMТом 2020-August, Выпуск 2.2, Страницы 117 - 1292020 20th International Multidisciplinary Scientific Geoconference: Informatics, Geoinformatics and Remote Sensing, SGEM 2020. |

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| | | | coverage of 150 m along the coastal section, erosion amounted to 2794 m3. In section No. 3, the dynamics of coastal retreat ranged from 7.2 to 7.4 m, with a height of the coastal ledge of 1.2-1.5 m. With coverage of 100 m along the coastal section, erosion volume amounted to 2199 m3. In section No. 4, the dynamics of coastal retreat ranged from 1.3 to 4 m, with a height of the coastal ledge of 7.2-9 m., erosion of the coastal area with a coverage of 200 m amounted to a maximum volume of 5536 m3. The results revealed patterns of changes in the configuration of the coastline depending on the height of the coast and lithological composition. | |
| 64. | Classification of alakol lake coasts by prevailing exogeodynamic processes and recreational conditions | DOI 10.5593/sgem2020/2.2/s11.039. Geotechnical Engineering and Engineering Geology – 17, Q4 | The aim of this paper is to study and classify the types of shores of the Alakol lake according to the prevailing exogeodynamic processes and recreational conditions for planning various types of recreational activities. Coastal classification was carried out using the methods of decoding satellite images, field monitoring studies, analysis of archival stock materials, including geomorphological, geological and topographic 1: 200 000 scale maps. Criteria as genesis, age, lithology of soils, the predominant type of | Abitbayeva, A., Lyy, Y., Valeyev, A., Kalita, R., Mitrofanova, A. Classification of alakol lake coasts by prevailing exogeodynamic processes and recreational conditions. International Multidisciplinary Scientific GeoConference Surveying Geology and Mining Ecology Management, SGEM, 2020, 2020-August(2.2), pp. 329–342. Doi 10.5593/sgem2020/2.2/s11.039 |

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| | | | exogeodynamic processes and recreational use were applied to assess the geomorphological conditions and the favorable areas for recreation. It was revealed that for the Alakol lake most typical were the accumulative-phytogenic type of shore 261.84 km (50.6%), the accumulative - 144.54 km (27.9%), and to a lesser extent - the abrasive 50.94 km (9.8 %), abrasive-accumulative 38.24 (7.4%) and delta type of the coast 21.94 km (4.3%). The type of recreation and the degree of auspiciousness (slightly unfavorable, relatively favorable and favorable) of the studied area were determined. | |
| 65. | Distribution characteristics and assessment of heavy metals in the surface water of the Syr Darya River, Kazakhstan | doi.org/10.15244/pjoes/104357. General Environmental Science – 55, Q2 | The distribution characteristics and pollution assessment of aquatic environment and human health of eight heavy metals (Zn, Cu, Pb, Cd, Ni, Co, Mn and Fe)were measured in surface water of the Syr Darya River within Kazakhstan. The distribution characteristics results showed that the high content of Zn, Cu and Pb samples concentrated in southern Kazakhstan, and another high content of Cu samples concentrated at the entrance to the Aral Sea, the high contents of Fe and Cd samples mainly concentrated in the downstream area | Zhang, W., Ma, L., Abuduwaili, J., ...Issanova, G., Saparov, G. Distribution characteristics and assessment of heavy metals in the surface water of the Syr Darya River, Kazakhstan. Polish Journal of Environmental Studies, 2020, 29(1), pp. 979–988. doi.org/10.15244/pjoes/104357 |

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| | | | of Kyzylorda, the high contents of Co and Ni samples distributed throughout the study area, and the high contents of Mn mainly concentrated upstream in the Kyzylora. A comparison with strict maximum permissible concentration standards for fisheries showed that the impact of current heavy-metal concentrations on fisheries is worrying. The heavy metal pollution index showed that the heavy metal pollution in the research area is high. The health risk assessment of heavy metals in the surface water indicated that Cd can cause a significant carcinogenic risk to human health and it should be a priority target of heavy-metal pollutant control in the region. The results have reference significance for regional water environment and repair of the Aral Sea. | |
| 66. | Human-induced enrichment of potentially toxic elements in a sediment core of Lake Balkhash, the Largest Lake in Central Asia | doi.org/10.3390/su12114717. Environmental Science (miscellaneous) – 83, Q1 | Over the past century, the impacts of human activities on the natural environment have continued to increase. Historic evolution of the environment under anthropogenic influences is an important reference for sustainable social development. Based on the geochemical analyses of a short sediment core of 49 cm from Lake Balkhash, the largest lake in | Huang, K., Ma, L., Abuduwaili, J., ...Saparov, G., Lin, L. Human-induced enrichment of potentially toxic elements in a sediment core of Lake Balkhash, the Largest Lake in Central Asia. Sustainability (Switzerland), 2020, 12(11), 4717. doi.org/10.3390/su12114717. |

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| | | | Central Asia, potential factors historically influencing geochemical variation were revealed, and influences of human activity on regional environmental change were reconstructed over the past 150 years. The results showed that the dominant factor inducing changes in potentially toxic elements (V, Cr, Co, Ni, Zn, Cu, Cd, and Pb) is the physical weathering of the terrestrial materials. The variation in Ca content was influenced by the formation of authigenic carbonate. Since 1930, potentially toxic elements (Cr, Co, Ni, Zn, Cu, Cd, and Pb) in the lake sediments have obviously been affected by human activities, but the impact of human activities has not exceeded that of natural terrestrial weathering. In particular, the enrichment factors (EFs) for Cd and Pb reached 1.5. The average ecological risks of Cd were higher than the criterion of 30, suggesting a moderate risk to the local ecosystem in recent years. Total risk indices indicated moderate potential ecological risk for the lake ecology. The results will provide support for the environmental protection and better management practices of the Lake Balkhash watershed. | |

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| 67. | Characteristics and Causes of Changes in Water Quality in the Syr Darya River, Kazakhstan | https://doi.org/10.1134/S0097807820050 19X | The water quality parameters, like major ions, have been monitored at three stations located along the Syr Darya River. The trend analysis was performed on annual timescales using the Mann–Kendall test, the Sen's slope estimator and the linear regression. The relationships of the water quality parameters to river discharge were also investigated. The statistical methods showed both positive and negative trends in annual water quality data and major ions. Significant trends were detected by the statistical methods in sulphate, sodium-potassium ion and chloride ion series. Before 1940 the mineralization of water was 0.4–0.6 g/L and the water was bicarbonate-calcium, with an increased sulfate ions volume. Atthe moment, the mineralization index has become three times higher. The mineralization varies from 0.9–1.2 g/L in the upper and 1.5–2.0 g/L in the lower reaches of the river. The sulfate ion and sodium-potassium ions began to predominate, dangerously exceeded volumes of the chloride ion in the lower part of the river are observed. | Sanim Bissenbayeva,, Abuduwaili, J., Issanova, G., Samarkhanov, K. Characte-ristics and Causes of Changes in Water Quality in the Syr Darya River, Kazakhstan.<br>Water Resources, 2020, 47(5), pp. 904–912.<br>https://doi.org/10.1134/S0097807820050 19X |
| 68. | Changes in intra-annual runoff and its response to | doi.org/10.1016/j.catena.2020 .104974. | An attribute study of the runoff changes due to climate change and | Alifujiang, Y., Abuduwaili, J., Groll, M., Issanova, G., Maihemuti, B. Changes in |

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| | climate variability and anthropogenic activity in the Lake Issyk-Kul Basin, Kyrgyzstan | Earth-Surface Processes - 97% - Q1 | anthropogenic activities is of great value to determining the best response to runoff changes. This study investigates the evolution of the intra-annual runoff and evaluates the effects of changes in climate and anthropogenic activities on runoff variations in the Lake Issyk-Kul Basin (LIKB). The monotonic trend test and wavelet transform analysis were used to characterize the trends and periods of the hydro-meteorological variables in the LIKB. In addition, the periodicity-trend superposition model and double-mass curves were used to assess the contributions of climate change and anthropogenic activities to runoff variations. The analyses were conducted using regional climate data combined with runoff data derived from 13 different river stations in the LIKB for the period between 1943 and 2012. The results indicate the following. (1) The monthly runoff trends in the three groups of tributaries (northern, southeastern, and southern tributaries) exhibit distinct differences, and the percentage of the data sets with no pattern gradually increased (from 26% to 38%) from north to south. There is a positive trend, with a | intra-annual runoff and its response to climate variability and anthropogenic activity in the Lake Issyk-Kul Basin, Kyrgyzstan. Catena, 2021, 198, 104974. doi.org/10.1016/j.catena.2020.104974. |

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| | | | similar decrease (from 50% to 24%) from north to south. (2) The air temperature, precipitation, and runoff in the LIKB increased throughout the low and high flow periods. | |
| 69. | Organic carbon burial in the aral sea of central asia | doi.org/10.3390/app11157135. General Engineering -71%, Q1 | The burial of organic carbon in lake sediments plays an important role in the terrestrial carbon cycle. Clarifying the current status of carbon burial in the lakes of Central Asia is of great significance for the application of carbon balance assessments. With the analysis of the total organic carbon and nitrogen and the carbon isotope and organic carbon burial rate in the core sediment of the North Aral Sea, the status and influencing factors of organic carbon burial over the past 70 years can be revealed. The results showed that the main source of organic carbon was predominantly from lacustrine aquatic plants. However, the contribution of terrigenous organic carbon increased from the 1950s to the 1960s. The burial rate of organic carbon in North Aral Sea sediments was consistent with the overall change in the regional temperature. The burial rate of organic carbon showed an upward trend as a whole with an average of 28.78 g·m−2·a−1. Since 2010, the burial rate of organic carbon has stood | Feng, S., Ma, L., Abuduwaili, J., ...Saparov, G., Issanova, G.<br>Organic carbon burial in the aral sea of central asia. Applied Sciences (Switzerland), 2021, 11(15), 7135. doi.org/10.3390/app11157135 |

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| | | | at the highest level in nearly 70 years, with an average of 55.66 g·m−2·a−1. | |
| 70. | Sediment organic carbon sequestration of balkhash lake in central asia | doi.org/10.3390/su13179958. Geography, Planning and Development- 84%, Q1 | As an important part of the global carbon pool, lake carbon is of great significance in the global carbon cycle. Based on a study of the sedimentary proxies of Balkhash Lake, Central Asia's largest lake, changes in the organic carbon sequestration in the lake sediments and their possible influence over the past 150 years were studied. The results suggested that the organic carbon in the sediments of Lake Balkhash comes mainly from aquatic plants. The organic carbon burial rate fluctuated from 8.16 to 30.04 g·m−2·a−1 and the minimum appeared at the top of the core. The organic carbon burial rate continues to decline as it has over the past 150 years. Global warming, higher hydrodynamic force, and low terrestrial input have not been conducive to the improvement of organic carbon sequestration in Balkhash Lake; the construction of a large reservoir had a greater impact on the sedimentary proxy of total organic carbon content, which could lead to a large deviation for environmental reconstruction. | Liu, W., Ma, L., Abuduwaili, J., Issanova, G., Saparov, G. Sediment organic carbon sequestration of balkhash lake in central asia. Sustainability (Switzerland), 2021, 13(17), 9958. doi.org/10.3390/su13179958 |

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| 71. | Assessing the potential of soil erosion in Kyrgyzstan based on RUSLE, integrated with remote sensing | Earth-Surface Processes – 78%, Q1 | Recent Ph.D. graduate in Cartography & Geography Information Systems with experimental research experience. Specialized in climate change, land use/cover change, hydrology, soil erosion, water resources studies. Currently, I'm working at the Geography Department, Institute of Geology, National Academy of Sciences of the Kyrgyz Republic as a research associate. My responsibilities included data processing, compiling quarterly and annual reports on the state of the environment and land | Duulatov, E., Pham, Q.B., Alamanov, S., ...Issanova, G., Asankulov, T. Assessing the potential of soil erosion in Kyrgyzstan based on RUSLE, integrated with remote sensing.<br>Environmental Earth Sciences, 2021, 80(18), 658 |
| 72. | Catalytic Decomposition of Methane to Hydrogen over Al2O3 Supported Mono– and Bimetallic Catalysts | DOI:10.9767/bcrec.17.1.12174.1-12 | This article discusses the decomposition of methane in the temperature range 550–800 °C on low-percentage monometallic (Ni/□-Al2O3, Co/□-Al2O3) and bimetallic (Ni-Co/□-Al2O3) catalysts. It is shown that the bimetallic catalyst is more active in the decomposition of methane to hydrogen than monometallic ones. At a reaction temperature of 600 °C, the highest methane conversion is 81%, and the highest hydrogen yield of 51% is formed on NiCo/□-Al2O3. A complex of physicochemical methods (Scanning Electron Microscope (SEM), X-ray Diffraction (XRD), Temperature Programmed Reduction (TPR-H2), etc.) | Yergaziyeva G., Makayeva N., Shaimerden Zh., Soloviev S., Telbayeva M., Akkazin E., Ahmetova F. Catalytic Decomposition of Methane to Hydrogen over Al2O3 Supported Mono– and Bimetallic Catalysts // Bulletin of Chemical Reaction Engineering & Catalysis, 17 (1) 2021, 1-12<br>10.9767/bcrec.17.1.12174.1-12 |

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| | | | established that the addition of cobalt oxide to the composition of Ni/□-Al2O3 leads to the formation of surface bimetallic Ni-Co alloys, while the dispersion of particles increases and the reducibility of the catalyst is facilitated, which provides an increase in the concentration of metal particles - active centers, which can be the reason for an increase in the catalytic properties of a bimetallic catalyst in comparison with monometallic ones. | |
| 73. | Study of the Effect of Rocket Fuel on Plant Communities Growing at Sites of Launch Vehicles Separating Parts Fall | DOI:10.12911/22998993/140283 | The article presents the results of a study of synthesis and accumulation of heptyl in the plants growing on the soil contaminated with rocket fuel. The study was carried out under laboratory conditions of al-Farabi Kazakh National University. The results of the experiments confirmed that certain concentrations of a rocket fuel-heptyl (unsymmetrical dimethylhydrazine, UDMH) are not toxic for the crested wheatgrass, Agropyronpectiniforme Roem.et Schult., Kentucky bluegrass, Poapratensis L., and tarragon, Artemisia terrae-albaeKrasch., although they can cause anatomical and morphological changes in the roots and leaves of the plants grown on the soil contaminated with UDMH. The changes in the morphological structure of plants under | Atygayev A.B., Mukanova G.A., Bazarbayeva T.A., Kurbatova N.V., Zubova O.A., Yerekeyeva S. Study of the Effect of Rocket Fuel on Plant Communities Growing at Sites of Launch Vehicles Separating Parts Fall // Journal of Ecological Engineering 2021, 22(8), 173–182 |

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| | | | the influence of UDMH (in particular, in the outer tissue that protects the plant organs from drying out, temperature effects, mechanical damage and other adverse factors) can lead to an imbalance in water metabolism and gas exchange, a deterioration in the absorption and release of water, and the cessation of intake from the soil of both beneficial and harmful substances. | |
| 74. | The Level of Soil Pollution in the Aksu River Basin as a Result of Anthropogenic Impact | DOI: 10.12911/22998993/142449 | As the main purpose of this article, the authors consider the level of soil pollution in the Aksu River basin as a result of anthropogenic impact, in which factors of anthropogenic transformation of soils in different zones play an important role, as well as processes occurring in soils as a result of their impact. This article highlights the research of the main analyses carried out, which showed that the anthropogenic transformation of soils within the surveyed territory is multifactorial and complex. As an assumed result, the validity of which is analyzed in this article, it can be considered that the degree and forms of manifestation of anthropogenic transformation of foothill soils depend on their use, as one criterion of which is considered the use of such soil for arable land, including irrigated arable land, in which the degradation of | A.A.Urymbaeva, T.A.Bazarbayeva, G.A. Mukanova, A.T.Umbetbekov, A.K. Mamyrbekova , G.T.Kubesova. The Level of Soil Pollution in the Aksu River Basin as a Result of Anthropogenic Impact Journal of Ecological Engineering 2021, 22(10), 225–234 |

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| | | | mountain soils is mainly associated with pasture loads during a certain period. As a research question, it remains to be considered whether this is really the case or whether the present territory is subject to a different anthropological impact. | |
| 75. | Modern sediment model of traffic flow | DOI:10.2478/ttj-2021-0023 | The work deals with the mathematical modeling of traffic phenomena. The submitted model is based on a prospective analogy of some described phenomena with particle sedimentation. Both the qualitative analysis of the model and the numerical experiment is carried out. Qualitative results of the research have been compared with the known data of supervision of the traffic on city highways. As a result, the main control parameters which can use for optimal traffic management are highlighted and justified. | B.Yedilbayev, A.Brener, Akmaral Shokanova, A.Boltayeva. Modern sediment model of traffic flow Transport and Telecommunication, 2021, volume 22, no. 3, 301–311 |
| 76. | Modifying and Micro-Alloying Effect on Carbon Steels Microstructure | | Small additives of elements exhibiting high chemical activity with respect to iron and impurities, included in its composition, have a complex effect on the structure and properties of steel.Moreover, as a result of the modifying and refining effect of micro-additives, the amount, dispersion and morphology of nonmetallic inclusions change, and when alloying the matrix, hardenability, uniformity of structure | A.Toleuova, G.Musina, S.Kaldybayeva; Modifying and Micro-Alloying Effect on Carbon Steels Microstructure Solid State Phenomena ISSN: 1662-9779, Vol. 316, pp 359-363 , 2021 |

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| | | | and resistance to brittle fracture of steels change, too. The article presents a metallographic analysis of carbon steel deoxidized by a complex Ca – Ba alloy. Deoxidation of steel using the complex Ca – Ba alloy allows significant reducing the content of nonmetallic inclusions, modifying residual nonmetallic inclusions into favorable complexes with their uniform distribution in the volume of steel, and significant increasing the mechanical properties of steel. The high surface activity of barium makes it possible to consider barium as a rather effective modifier. The use of barium in alloys leads to grinding of non-metallic inclusions, homogenization of liquid metal, lowering the liquidus temperature, grinding of primary grains of cast steel, and increasing technological ductility. | |
| 77. | The green space and social impact in almaty city: a cross-sectional data analysis | DOI:10.30892/gtg.34134-645 | The theory of urban ecology tries to enhance the positive aspects of green space for humans, while at the same time decreasing the negative aspects of cities for the environment. These benefits are reflected in economic terms as they have a positive effect on real estate values, investment, tourism and the quality of life. In this study urban green space is defined as all urban land covered by vegetation of any kind. This covers | Minzhanova, G., Pavlichenko, L., Karbayeva, Sh., Bimagambetova, L., & Razdobudko, O. (2021). The green space and social impact in almaty city: a cross-sectional data analysis. Geojournal of tourism and geosites, 34(1), 251–255. |

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| | | | vegetation on private and public grounds, irrespective of size and function, and can also include small water bodies such as ponds, lakes or streams. This study aims to find the relationship between green space abundance and social impact in particular on academic progress in Almaty city, South Kazakhstan. Data on green space, academic average point score, and nine possible confounding variables were collated. Multiple linear regression analysis was performed. Multivariate data analysis was performed to produce scatter plots that include regression lines. There was a positive relationship between the proportion of green space and better academic average scores per student after accounting for the possible confounding variables. This study provides some support for the idea that access to green space has a positive impact on academic progress, but by no means is it conclusive. | |
| 78. | A novel method and device for plastic mulch retriever | DOI: 10.24425/jwld.2021.137101 | Plastic mulch provides a range of benefits including helping modulate soil temperature, reduce soil erosion, evapora-tion, fertilizer leaching and weed problems and increasing the quality and yields of the product. But when the crops are harvested, plastic | Khazimov K.M., Niyazbayev A.K., Shekerbekova Zh.S., Urymbayeva A.A., Mukanova G.A., Bazarbayeva T.A., Nekrashevich V.F., Khazimov M.Zh. 2021. A novel method and device for plastic mulch retriever. |

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| | | | mulch needs to be removed from the ground for disposal. Otherwise, these wastes are mixed with the soil and have a negative impact on yields by reducing the access of nutrients and moisture in the soil. The purpose of the cur-rent study is, therefore, to propose a roller for plastic mulch retriever which is applicable when the crops are harvested, and the plastic mulch needs to be removed from the ground for disposal. The winding mechanism of the plastic mulch retriever performs the main function and must have the high-quality performance of the winding operation in the removal technolo-gy. Research based on requirements of tensile strength test method and changes of strength characteristics of plastic mulch from various factors under natural conditions. The coefficient of compaction of the used plastic mulch (Krel), was the ratio of the diameter of the standard plastic mulch which was wound in the factory to the diameter of the used plastic mulch dur-ing the winding. | Journal of Water and Land Development, 2021, 49, стр. 85–94 |
| 79. | Preparation of coal briquettes based<br>on non-standard Kazakhstan coal<br>with various additives and<br>determination of their quality | | **ABSTRACT**<br>Briquetting of coal fines is one of the best solutions for the disposal of substandard coal and coal fines. The coals of the Central region of Kazakhstan were selected as the object of this study. When stored for a long | M.I. Tulepov, L.R. Sassykova. A. Kerimkulova, G.O. Tureshova, A.O. Zhapekova, Z.Sultanova, S. Tursynbek, Sh. Gabdrashova, D.A. Baiseitov.<br>Preparation of coal briquettes based on non-standard Kazakhstan coal |

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| | | | time, the coals of this region dry out and turn into coal fines that are not suitable for consumption. It is established that mechanical properties of composite briquettes depend on the charge composition and some technological parameters of briquetting, including: the material composition of the briquetted mixture, moisture mixture, compacting pressure, mode of heat treatment of the briquettes, the type and flow rate of the binder component. To optimize the combustion of the coal mass, the pyrotechnic component or polymer additives were added to mixture with the initial coal. The pyrotechnic component produces an incendiary layer, which contains as a combustible component (coal sludge, cardboard), a magnesium igniter and oxidizing agents in the form of ammonium nitrate and barium chromate. The greatest influence on the duration of burning of brown coal is exerted by oxygen-containing compounds (90 %). It was found in the laboratory research to obtain high-quality fuel briquettes, the following characteristics are necessary: coal size 0 - 2.5 mm; coal humidity 10 - 11 %; pressing pressure 150.0 MPa; processing temperature 230° C; heat treatment time of 180 min. The introduction of incendiary composition in the briquette | with various additives and determination of their quality // Journal of Chemical Technology and Metallurgy, 56, 1, 2021, 123-132 |

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| | | | does not lead to a significant reduction in the size and destruction of aggregates, while a significant part of the pyrotechnic composition is located on the surface of the coal in the form of particles with sizes from 145.8 to 368.6 nm, mainly in the form of “coagulants”. | |
| 80. | Испытания образцов эмульсионного взрывчатого вещества Senatel Magnum до и после введения маркирующей композиции на взрывчатые свойства и критерии безопасности | DOI: 10.24000/0409-2961-2021-6-75-81 | Статья посвящена испытанию образцов эмульсионного взрывчатого вещества Senatel Magnum до и после введения маркирующей композиции на взрывчатые свойства и критерии безопасности. Установлено, что смесь маркирующих веществ, которая была введена в состав эмульсионного взрывчатого вещества Senatel Magnum, не влияет на его взрывчатые свойства, а также на его безопасность при эксплуатации и ведении взрывных работ. | Амир Ж.А., Байсейтов Д.А., Гизатова С.Е., Кудьярова Ж.Б., Тулепов М.И. Испытания образцов эмульсионного взрывчатого вещества Senatel Magnum до и после введения маркирующей композиции на взрывчатые свойства и критерии безопасности// Безопасность труда в промышленности. — 2021. — No 6. — С. 75–81. DOI: 10.24000/0409-2961-<br><br>2021-6-75-81 |
| 81. | Purification of Oil-Containing Waste Using Solar Energy | https://doi.org/10.2478/rtuect-2021-0011 | Significant oil losses in oil-containing wastes and their adverse impact on the region environmental setting bring about the need to develop an oil-containing wastes treatment technology. To tackle this issue, the authors have set an aim of designing a helio | M. Abdibattayeva, K. Bissenov, Zh. Zhubandykova, R. Orynbassar, L. Tastanova, B. Almatova<br>Purification of Oil-Containing Waste Using Solar Energy<br>Environmental and Climate Technologies<br>2021, vol. 25, no. 1, pp. 161–175 |

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| | | | device and creating an oil-containing wastes treatment method based on it to extract oil products. Considering a widespread in the composition and properties of potential oil sludge raw materials and their tendency for either formation of stable emulsions or phase separation, we have conducted in-depth modern physical and chemical studies and defined the need to develop a commercial oil-containing wastes purification method. We have designed the device, in which oil product hydrocarbons undergo thermal treatment using solar energy. Following oil-containing wastes purification using solar energy, the particulate load in soil does not exceed 6.65–6.79 % and the absolute molecular weight of hydrocarbons approaches that of bitumen. The developed oil-containing wastes purification method solves an important environmental issue of oil-containing wastes recycling, promotes recovery, and prevents degradation of natural complexes, and reduces soil and water pollution. | |
| 82. | Research of the Arctic Soils Using an Artificial Neural Network | **DOI** 10.12911/22998993/141297 | Desert-Arctic soils - balasamy (W-C1), are found in the most northerly position in the Arctic. These soils are characterized by a light granulometric | Bazarbayeva T.A., Urymbaeva A.A., Kubesova G.T., Mamyrbekova A.K., Mylkaidarov A.T., Umbetbekov A.T.; Research of the Arctic Soils Using an Artificial Neural Network; |

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| | | | composition and are formed in the areas recently released from glaciers, and develop under a crust of blue-green algae. Arctic soils (AO-AY-BC-C) are common on loamy and gravelly-loamy soils (Severnaya Zemlya, Novaya Zemlya, Franz Josef Land, North of the Taimyr Peninsula). They are characterized by wedge-shaped horizons, and are formed in the form of polygons with a diameter of 0.5–1.0 m under moss-shrub vegetation. Carbonate pelozems (WSA-SSA) are found on deluvial deposits of carbonate rocks on loamy-gravelly soils. The vegetation cover is represented by lichens and rare specimens of flowering plants. In the Arctic tundra, on the most drained areas on loamy and gravelly-loamy soils, humified weak-clay (gley) soils (AO-A-CRMg-C(D)) are common. In terms of morphology and chemistry, these soils are similar to Arctic soils, but differ from them in the large development of wedge-shaped horizons. In this work, the composition of Arctic soils was studied using a neural network.  | *Journal of Ecological Engineering**Открытый доступ*Том 22, Выпуск 9, Страницы 1 – 12,2021 |

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| 83. | Experimental Determination of Electrochemical Sorption/Desorption Properties of Gold(III) Ions | **DOI** 10.3103/S1067821221030111 | For the Republic of Kazakhstan, like for any country with a developed mining and processing sector, it is important to develop knowledge to improve methods and technologies for the complex processing of raw materials, including those for the more complete extraction of precious metals. This is needed due to the high loss of precious metals during their processing and separation and the need to improve the process of their concentration. Advances in the field of carbon nanomaterials offer great prospects for improving existing technologies for the extraction of precious metals from waste solutions and pulps. The goal of the work is to conduct comprehensive studies on the influence of the flow rate of solutions, pH, and the presence of ions of other metals on the extraction of gold on a carbon nanostructured material from rice husk (with its further regeneration and reuse). The effect of the pH of the solution on the degree of extraction of gold(III) ions is studied, it is found that the highest recovery for gold ions is observed at pH ~ 2. The selectivity of gold extraction is established in the combined presence of copper, nickel, and silver. The dependence of the electrochemical reduction sorption of gold on the flow | Mansurov, Z.A., Supiyeva, Z.A., Yeleuov, M.A., Pavlenko, V.V., Smagulova, G.T. Experimental Determination of Electrochemical Sorption/Desorption Properties of Gold(III) Ions Russian Journal of Non-Ferrous Metals, 2021, 62(3), стр. 257–264 |

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| | | | rate of solutions is investigated. It is found that the optimal flow rate of solutions is 10 mL/min. The sorption capacity of the sorbent based on carbonized rice husk is calculated. The investigation into the electrochemical sorption/desorption of gold(III) ions showed that the desorption process proceeds better in an acetone/water/NaOH mixture; the degree of desorption is 96%, which demonstrates the possibility of regeneration of the carbon material of the electrode for reuse. The results can be applied to optimize the processes of extraction of precious metals from their solutions. | |
| 84. | Tuning the Nanoporous Structure of Carbons Derived from the Composite of Cross-Linked Polymers for Charge Storage Applications | **DOI** 10.1021/acsaem.0c02908 | Controlling the porosity of carbon-based electrodes is key toward performance improvement of charge storage devices, e.g., supercapacitors, which deliver high power via fast charge/discharge of ions at the electrical double layer (EDL). Here, eco-friendly preparation of carbons with adaptable nanopores from polymers obtained via microwave-assisted cross-linking of poly(vinyl alcohol) (PVA) and poly(vinyl pyrrolidone) (PVP) is reported. The polymeric hydrogels possess porous and foam-like structures, giving excellent control of porosity at the precursor level, | Barzegar F. Pavlenko V., Zahid M., Bello A., Xia X., Manyala N., Ozoemena K.I., Abbas Q.<br>Tuning the Nanoporous Structure of Carbons Derived from the Composite of Cross-Linked Polymers for Charge Storage Applications<br>ACS Applied Energy Materials, 2021, 4(2), стр. 1763–1773 |

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| | | | which are then subjected to activation at high temperatures of 700-900 °C to prepare carbons with a surface area of 1846 m2 g-1 and uniform distribution of micro-, meso-, and macropores. Then, graphene as an additive to hydrogel precursor improves the surface characteristics and elaborates porous texture, giving composite materials with a surface area of 3107 m2 g-1. These carbons show an interconnected porous structure and bimodal pore size distribution suitable for facile ionic transport. When implemented in symmetric supercapacitor configuration with aqueous 5 mol L-1 NaNO3 electrolyte, a capacitance of 163 F g-1 (per average mass of one electrode) and stable evolution of capacitance, coulombic, and energy efficiency during 10 »000 galvanostatic charge/discharge up to 1.6 V at 1.0 A g-1 have been achieved. | |
| 85. | Revisiting the carbon mesopore contribution towards improved performance of ionic liquid–based EDLCs at sub-zero temperatures | **DOI** 10.1007/s11581-021-04354-w | The important role of mesopores has been investigated in electric double-layer capacitors (EDLCs) operating from 24 °C down to − 40 °C by using two in-house synthesized carbons with hierarchical porosity. These carbons were prepared from colloidal nanoparticles of SiO2 as the template and d-glucose as the carbon source. A | Pavlenko V., Kalybekkyzy S., Knez D., Abbas Q. Mansurov Z., Bakenov Z., Ng A.;<br>Revisiting the carbon mesopore contribution towards improved performance of ionic liquid–based EDLCs at sub-zero temperatures;<br>Ionics, 2021; |

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| | | | decrease in the average diameter of the nanoparticles from 12 to 8 nm results in increased surface area and offers a perfect match between ions of binary mixture of imidazolium-based fluorinated ionic liquids and the pores of carbon. Short-range graphene layers produced with 8-nm silica nanoparticles lead to the creation of transport channels which better accommodate ions. We explain these findings per coulombic interactions among the ions and between the pore wall and the ionic species under confinement and electrochemical polarization conditions. Further, it is shown that a microporous carbon (another in-house produced rice-husk carbon SBET = 1800 m2·g−1) performs better than hierarchical carbons at room temperature; however, thanks to the large fraction of mesopores, the latter exhibit far higher capacitance down to −40 °C. While the ordering of ions in confinement is more critical at room temperature and dictated by the micropores, low temperature performance of supercapacitors is determined by the mesopores that provide channels for facile ion movement and keep the bulk ionic liquid–like properties. Graphical [Figure not available: see fulltext.]. | |

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| 86. | Research and Development of Essentials for Silage Preparation, Transport and Storage in Flexible Containers of Optimal Volume | **DOI**<br>10.2478/ata-2021-0012 | The research purpose was to develop the basics for silage preparation by vacuuming with the use of flexible polymer containers and estimating silage quality. The analysis of modern systems used for silage preparation and storage showed that the main disadvantages include the high storage and preparation costs, and losses of silage weight and nutrients by 3-25% after opening of storage facilities. To eliminate these disadvantages, the basics for preparing the silage by vacuuming in flexible polymer containers that can be transported and stored with optimum volume have been studied and developed. The study pursuits its goals by observing the changes in density and degree of silage compaction caused by the vacuum pressure and deadweight. A comparative estimation of silage quality indices was conducted by means of chemical analysis of silage specimens. The results show graphical dependencies of changes in silage volume and density at vacuum pressure up to 60 kPa. Moreover, a comparative assessment of quality indices of silage specimens prepared by vacuuming in soft containers, and traditional method using trenches was conducted. The reliability of results for silage storing quality in a | Sagyndykova Z., Nekrashevich V., Khazimov K. Kassymbayev B., Khazimov M.;<br>Research and Development of Essentials for Silage Preparation, Transport and Storage in Flexible Containers of Optimal Volume;<br>Acta Technologica Agriculturae, 2021, 24(2), стр. 72–78. |

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| | | | vacuum container was achieved by fivefold test repetition within 2 years. Comparison of silage quality indices obtained using vacuum technology and traditional method showed improvement in favour of the proposed method: dry matter by 2.05%; protein by a factor of 1.47; nitrogenous substances by 1.37; starch by 1.56; calcium by 1.83; phosphorus by 2; digestible protein by 1.24; feed unit by 1.31; exchange energy by 1.16, which was achieved thanks to the elimination of succus leakage. © 2021 Zhadyra Sagyndykova et al., published by Sciendo 2021. | |
| 87. | Drying of Vegetable Products in Mobile Solar Dryer with Movable Shelving | **DOI** 10.1134/S1810232821010112 | The article outlines the relevance of production of dried products using a mobile solar dryer plant with mobile shelving. For intensification of the drying process, the convection of the drying agent flow in the proposed design of drying chamber was studied via numerical solution of the Navier–Stokes equations. As a result, a graphical interpretation of isolines of moving stream of drying agent in a chamber was obtained. Varying dimensionless parameters of the drying agent enabled complete coverage of all zones of the dryer chamber. The motion of shelves due to gravitational forces allowed uniform drying of materials. Through | Urmashev B.A., Khazimov K.M., Temirbekov A.N., Tursynbay A.T., Torzhenova T.V., Khazimov M.Z.; Drying of Vegetable Products in Mobile Solar Dryer with Movable Shelving; Journal of Engineering Thermophysics, 2021, 30(1), стр. 145–162. |

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| | | | multivariate experiments, the influence of the temperature-time regimes of the dryer chamber on the particle size was investigated. The optimal drying conditions for cut fruit are presented. © 2021, Pleiades Publishing, Ltd. | |
| 88. | Acid Modification of Diatomite-Based Sorbents | | In this work, the effect of acid pre-treatment (hydrochloric acid, HCl) and calcinations of diatomite, a silicon dioxide-material from natural sources, was studied with the aim to obtain diatomite-based sorbents with specific physicochemical properties.<br>For this, acid pre-treatments with HCl at different calcination conditions, namely HCl concentration (0.5, 1 M) and calcination temperatures (from 600 to 900 °C) were studied. Morphological features different from those of natural diatomite were obtained. It has been found that treatment of diatomite with 0.5 M HCl at 800 °C showed a specific pore volume of 0.008 cm3/g, and a specific surface area of 19.26 m2/g, while the treatment of diatomite with 1.0 M HCl showed a specific pore volume of 0.011cm3/g, and a specific surface area of 25.57 m2/g. The performance of the acid pretreatment of diatomite for adsorption of Pb ions from water was also studied. | A. Nurgain, M. Nazhipkyzy, A.A. Zhaparova, A.T.Issanbekova, M.Alfe, A.S. Musina;<br>Acid Modification of Diatomite-Based Sorbents;<br>Eurasian Chem.-Technol. J. 22 (2020) 157–164 |

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| 89. | Ether oil types of flora semi-desert of the Turkestan region, their distribution and prospects for resource use | | The article presents materials on the species diversity of essential oil species of Turkestan semideserts flora. The ecological and coenotic patterns of their distribution are analyzed, the resources of promising essential oil plants are identified. Reserves of 10 essential oil-bearing species of Turkestan semi-deserts flora of the Republic of Kazakhstan are determined. | Ibragimov T.S, Kuatbaev A.T, Satybaldieva G.K, Orazbaev A.E, Boribay E.S (2020) Ether oil types of flora semi-desert of the Turkestan region, their distribution and prospects for resource use. Eurasia J Biosci 14: 1021-1025. |
| 90. | In Vivo Comparison of Chlorine-Based Antiseptics versus Alcohol Antiseptic for Surgical Hand Antisepsis | DOI:10.1155/2020/3123084 | Despite being commonly used as effective preparation for surgical hand antisepsis, alcohol solutions have major drawbacks, such as drying effect, emergence of hand eczema, and other diseases. (is study aimed to demonstrate the effectiveness of sodium hypochlorite (NaOCl) and hydrogen peroxide (H2O2) as antiseptic in comparison to single sodium hypochlorite and 70% ethanol. In 5-day tests, the effects of 3 antiseptics were established according to standard test methods. (e antiseptics were applied to the hands of 82 volunteers, and samples of bacteria were collected on days 1 and 5, immediately after drying and 6 hours later after antiseptic application. Student's t test and ANOVA were applied in a statistical study. (e NaOCl with $H_2O_2$ composition demonstrated noninferiority to both | Zh.Myltykbayeva,G.Kovaleva, A.Mukhitdinov,S.Omarova and R.Nadirov; In Vivo Comparison of Chlorine-Based Antiseptics versus Alcohol Antiseptic for Surgical Hand Antisepsis; Hindawi Scientifica Volume 2020, Article ID 3123084, 6 pages |

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| | | | sodium hypochlorite only and alcohol products and superiority to these antiseptics on day 5 ($P < 0.05$ at a significance level of 5% for each comparative<br>trial in this day) at equivalence margin of 20%. (e effectiveness of the NaOCl plus H2O2 composition as an antiseptic was explained by the formation of singlet oxygen in the system. Together, these data suggest that NaOCl and H2O2 may be an effective hand antisepsis that avoids the drawbacks seen with alcohol solutions. | |
| 91. | Quality of Drinking Water in the Balkhash District of Kazakhstan's Almaty Region | DOI:10.3390/w12020392 | The thinly populated Balkhash District of Kazakhstan's Almaty Region lies in the lower reaches of the Ili-Balkhash basin, which is shared by China and Kazakhstan. The district is arid and heavily dependent on inflows of surface water, which are threatened by the e ects of upstream population growth, economic development, and climate change. The quality of drinking water from centralized water systems and tube wells in nine villages of the district was analyzed, and the organoleptic properties of water from these sources was also assessed by an expert and via surveys of local residents. Although most samples met governmental standards for the absence of chemical impurities, high | S.Nurtazin,S.Pueppke,T.Ospan , A.Mukhitdinov and T. Elebessov;<br>Quality of Drinking Water in the Balkhash District of Kazakhstan's Almaty Region;<br>Water 2020,12,392; |

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| | | | concentrations of mineralization, chlorides, boron, iron, and/or uranium were present in some well water samples. Levels of these pollutants were as much as 4-fold higher than governmental maxima and as much as 16-fold higher than concentrations reported previously in surface water. All centralized water samples met standards for absence of microbial contamination, but total microbial counts in some well water samples exceeded standards. Organoleptic standards were met by all the water from five villages, but centralized water from one village and well water from four villages failed to meet standards based on expert judgment. Residents were, for the most part, more satisfied with centralized rather than well water, but there was no obvious relationship between the failure of water to meet standards and the locations or populations of the settlements.<br>This is the first comprehensive assessment of groundwater used for drinking in the lower Ili-Balkhash basin, and although it relies on a limited number of samples, it nevertheless provides evidence of potentially serious groundwater contamination in the Balkhash District. It is thus imperative | |

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| | | | that additional and more detailed studies be undertaken. | |
| 92. | The transformation of ecosystems of the Ili river Delta (Kazakhstan) under the flow regulation and climate change | DOI :10.15666/aeer/1802_24832498 | This paper presents the results of a study on the main reasons for the transformation of wetland ecosystems in the Delta of the Ili River in the period of 1979-2014. The study results are shown based on the analysis of multi-temporal satellite data Landsat, dynamics of hydrological regime of the river Ili, climate conditions and features of economic activities of the local community, as well as fieldwork in the study region. Analysis of area changes of main types of hydromorphic and semi-hydromorphic ecosystems of Delta river Ili in high and medium on water discharge in the following (1979, 1993, 2000, 2010, and 2015) years. Increasing water consumption in China and in Kazakhstan part of the Ili-Balkhash basin due to the development of the agrarian and municipal sectors of economy especially in China, significantly exceed increasing flow of Ili River, caused by regional warming in the catchment part of Ili River Basin. The global warming has intensified the degradation of glaciers in mountain catchment areas of Ili River, this in the near future threatens with a decline in river flow and as a consequence lead to | Mukhitdinov, A. Nurtazin, S. Alimova, S. Ablaikhanova, N. Yessimsiitova,Z. Salmurzauly,R. Margulan, I. –Mirasbek, Y. The transformation of ecosystems of the Ili river Delta (Kazakhstan) under the flow regulation and climate change; Applied ecology and environmental research (18(2):2483-2498) , 2020. 10.15666/aeer/1802_24832498 |

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| | | | the deterioration of delta ecosystems and the desiccation of lake Balkhash similarly to the ecological disaster of the Aral Sea. Analysis of long-term (from 1970 to 2013) climatic data from three meteorological stations demonstrated a trend of the regional increase of average annual air temperature by 1.4 °C and decreasing of average annual precipitation by 10 mm. These factors also contribute to the transformation process of hydromorphic ecosystems. | |
| 93. | Estimation of Efficiency of Use of Dairy Products Enriched with<br>Enter Sorbent Dietary Fibers on Immunophysiological Indicators of<br>the Rat Organism | | At all times, the problem of healthy and wholesome food has been one of the most important problems facing human society. This problem cannot be solved by simply increasing the amount of food consumed. Plant-based antioxidants are widely used for the prevention and treatment of diseases with the aim of eliminating free radicals from the body and restoring the body's antioxidant defense system. The article shows biochemical indicators that reflect the nature of changes in the early stages of the formation of response of the animal organism during toxic poisoning and the use of sour-milk products using enter sorbent dietary fiber from rice husk. With an increase in the dosage and frequency of CCl4 administration, the | N.Ablaikhanova, Z.Yessimsiitova, U.Amzeyeva,A.Mukhitdinov, S.Mankibaeva,A.Zorbekova, S.N.Abdreshov, A.Kozhamzharova, A. Konysbayeva and S. Tuleukhanov. Estimation of Efficiency of Use of Dairy Products Enriched with Enter Sorbent Dietary Fibers on Immunophysiological Indicators of the Rat Organism ;<br>92 Journal of Pharmacy and Nutrition Sciences, 2020, 10, 92-100 |

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| | | | effect of deep poisoning and impaired lymph dynamics was obtained. Along with a decrease<br>in the content of total protein and urea in lymph and blood plasma, an increase in ALT and AST levels in blood plasma by 2.5–3 times, as well as an increase in thymol test, were noted. Antioxidant defense mechanisms are universal in order to increase the body's vitality. | |
| 94. | Environmental assessment of the impact of technogenic factors on the soil mesofauna of the south-east of Kazakhstan and development bioindicative and Indicative factors | | **ABSTRACT**<br>A lot of research is devoted to soil fauna, which is especially harmful on cultivated lands, and its changes with different methods of cultivating cultivated plants. The patterns of changes in the mesofauna on the dry and irrigated lands were studied. The experiment, in contrast to the available works in the scientific literature, will be based on the study of the impact of technogenic factors on the mesofauna of soils in southeast Kazakhstan. Studying the soil mesofauna will make it possible to solve many cardinal problems of systematics, phylogeny, evolutionary patterns, and other issues of soil zoology. The abundance and distribution of individual groups of the soil population is significantly affected by such indicators of the soil environment as the thickness of the litter | Z.Tukenova, T.Akylbekova, M. Alimzhanova, K.Ashimuly and A. Saparov. Environmental assessment of the impact of technogenic factors on the soil mesofauna of the south-east of Kazakhstan and development bioindicative and indicative factors; ARPN Journal of Engineering and Applied Sciences, VOL. 15, NO. 22, NOVEMBER 2020; |

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| | | | and the content of humus in the soil. There is a tendency to positively correlate the characteristics of soil zoocenosis with soil moisture. pH and soil temperature, but their influence is significant only for certain groups of mesofauna, such as earthworms of the genus Lumbricus, larvae of dessert beetles, weevils and clickers. The significance of all factors considered is different for different representatives of soil invertebrates. The results showed accumulation of heavy metals (Zn, Pb, Cd, Cu) in the soil of southeastern Kazakhstan (Saimasai village) that cadmium representatives of the soil mesofauna accumulate in these quantities in the smallest amounts. The revealed features of the accumulation of HM in soil in the territory of the village of Saimasai indicate that the lead-zinc association is characteristic of the residential area, and the lead-cadmium association is characteristic of Sadovaya and Rysbekov streets, Pb (residential and Rysbekov) and Cd (Sadovaya) occupy a leading position. The geochemical series (Kc) of the accumulation of toxic elements of hazard classes 1 and 2 in the soil of the Saimasai village was established: Pb30> Cd20> Zn15.8> Cu1.7. Thus, the conclusion is | |

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| | | | made that the absence of the overall Saimasai soil<br>pollution coefficient (64.5) reflects a high level of pollution in accordance with the generally accepted gradation of urban pollution, that is, dangerous levels of pollutants, in particular heavy metals. | |
| 95. | Research of the combustion of gas-generating compositions with<br>additives of carbon powders | DOI:<br>10.1016/j.matpr.2020.08.268 | Carbon materials obtained from secondary plant raw materials are widely used in various industries,where they are applied as catalysts, adsorbents and in pyrotechnics for creating gas-forming systems.In this work, activated carbon of two types– obtained from the walnut shell and as a product of utilization of gas adsorbents was used. The combustion of a three-component mixture of sodium nitrate, magnesium, and carbon obtained by carbonization of a walnut shell or by grinding gas mask elements was studied. It was found that at a low carbon content, the combustion of the mixture occurs at a high rate in a convective mode. As the working composition, a mixture with a component ratio of 60% – NaNO3, 20% – Mg, 20% – C was chosen, which is characterized by rather high values of gas productivity. The burning rate of a composition based on carbon from walnut is about two times higher than in the case of carbonfrom a gas mask, and the flame temperature is higher by about | D.A.Baiseitov , S.Tursynbek , L.R. Sassykova , Zh. Amir , A. Orazbayev ,M.I. Tulepov, Zh. Kudyarova,<br>S. Sendilvelan, M. Prabhahar, S. Prakash;<br>Research of the combustion of gas-generating compositions with additives of carbon powders;<br>Materials Today: Proceedings 33 (2020) 1216–1220;<br>10.1016/j.matpr.2020.08.268 |

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| | | | 500 K. X-ray phase analysis of solid combustion products showed that the main products are magnesium oxide and sodium carbonate. The presence of a partially unreacted initial oxidant of sodium nitrate has also been found, and its content in combustion products of a carbon-based incendiary composition from a gas mask is higher than in the case of combustion of a mixture based on carbon obtained from a walnut shell. This can probably be explained by the fact that gaseous products are released during combustion, and this leads to partial dispersion of the initial components in the combustion wave, which is more pronounced when using carbon obtained from a gas mask. As a result of the research the prospect of using such a mixture in gas generator cartridges is shown. | |
| 96. | Complex Oil-containing Waste Treatment by Applying Solar Energy | https://doi.org/10.2478/rtuect-2020-0045 | The article describes in detail the complex oil-containing waste treatment by applying solar energy. The developed Helio devices are equipped with concentrating elements to extract oil in the purification of dump oil. The questions of practical application of pretreated oil-contaminated soils and oil sludge to strengthen road surfaces are considered. The results of the | M. Abdibattayeva, K. Bissenov, Zh.Zhubandykova, R. Orynbassar, L.Tastanova; Complex Oil-containing Waste Treatment by Applying Solar Energy; Environmental and Climate Technologies 2020, vol. 24, no. 1, pp. 718–739; https://doi.org/10.2478/rtuect-2020-0045 |

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| | | | experimental study on the production of soil concrete is based on oily dump. The structures of the soil concrete made on the basis of oil-contaminated soils and oil sludge<br>are investigated and relevant proposals are made. | |
| 97. | DEVELOPMENT OF TECHNOLOGY FOR APPLYING SLUDGE FROM THERMAL POWER PLANTS IN THE PRODUCTION OF DRY PLASTER MIXTURES | | ABSTRACT<br>The article presents the results of experimental studies of authors on the development of compositions and technology for<br>the production of dry plaster mixtures on the basis of fly ash of thermal power plants. This technology includes the<br>production of slag binder by mechanochemical activation of blast-furnace granular slag with hardening activators and<br>preparation of dry mixtures with the introduction of mineral, polymeric, reinforcing and air-entraining additives into<br>their composition. The problem of accumulation in Kazakhstan of a significant amount of ash-and-slag waste from<br>thermal power plants and their negative impact on all natural environments is highlighted. The grain composition of | O. Zubova, G. Minzhanova, B. Tussupova & L. Kurbanova<br>DEVELOPMENT OF TECHNOLOGY FOR APPLYING SLUDGE FROM THERMAL POWER PLANTS IN THE PRODUCTION OF DRY PLASTER MIXTURES<br>International Journal of Mechanical and Production<br>Engineering Research and Development (IJMPERD)<br>Vol. 10, Issue 2, Apr 2020, 179–190 |

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| | | | TPP wastes is briefly described, as well as the process of their formation. The results of studies on the effect of the addition of mechanically activated ash on the properties of plaster solutions are presented. Standard methods of research were used in the work, including technological methods, X-ray diffraction and chemical analysis of substances. For particle size distribution, the laser granulometry method was used. The test was carried out on the device "Microsizer 201A". Described are the compositions of dry plaster mixtures of M35 and M50 grades developed by the authors, the mineral part of which consists entirely of production waste and local raw components. The economic efficiency of the developed compositions of dry plaster mixtures, which is caused by the replacement of Portland cement with cheaper slag binder, is revealed. As a base of comparison, mixtures were chosen for Portland cement, used in plants of dry construction mixtures. Also, the environmental benefits of using the | |

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| | | | proposed method for processing ash and slag wastes,<br>which consist in a significant improvement of the environmental situation in and around the TPP. | |
| 98. | Ecological and genetic assessment of the consequences of radiation influence on contaminated areas \| [Эколого-генетическая оценка последствий влияния радиации на загрязненных территориях] | | The objects of study are the territory of the districts of the West Kazakhstan region of the Republic of Kazakhstan adjacent to the Kapustin Yar test site: Bokeyordinsky, Zhangalinsky, Zhanibeksky, Kaztalovsky, Akzhayiksky and Syrymsky. The purpose of the work is to conduct a radioecological survey of contaminated areas and to study the content of pollutants in environmental objects, biota (rodents, fish and biosubstrates of domestic animals) by physicochemical methods to assess the risk of the landfill's impact on biota and humans. This paper presents the results of expeditionary and laboratory research on the pollution of environmental objects in the areas adjacent to the landfill. Indicators of the gamma-survey of the levels of radiation background of the surveyed territories as well as data on pollution of soil, surface and ground waters, dominant forms of plants, biosubstrates (hair of domestic animals: camel, horse, cow) are given. The generally accepted research methods | Bigaliev, A.B., Shalabaeva, K.Z., Shimshikov, B.E., (...), Sharakhmetov, S., Burkhanova, M.N.<br>Ecological and genetic assessment of the consequences of radiation influence on contaminated areas \| [Эколого-генетическая оценка последствий влияния радиации на загрязненных территориях]<br>Vavilovskii Zhurnal Genetiki i Selektsii<br>24(7), c. 794-801, 2020 |

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| | | | were used: standard sampling methods, radiological, atomic adsorption spectrophotometry, cytogenetic (micronucleus) method. A reconnaissance and radioecological examination of environmental objects was carried out using analytical methods, which made it possible to determine the quantitative content of toxic components, the content of priority pollutants and radioactive isotopes. It has been established that the values of the volumetric activity of natural and man-made radionuclides in soil samples, drinking water and biosubstrates (pet hair, human peripheral blood samples) from settlements correspond to the value of the control level for this region. The measurements of radiation activity by gamma radiation showed that along the perimeter of the surveyed territory of the test site and in nearby settlements the radiation level is in the range of 0.06–0.014 μSv/h. A slight excess of the level of radioactivity persists in the area near the fall of missiles in the Bokeyordin region. The investigated regions are characterized by an insignificant level of background radiation, the average DER value for the regions as a whole is 0.14 μSv/h. The absolute maximum, 0.73 μSv/h, was recorded at the points of missile impact in the Kaztal region. | |

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| 99. | Perspectives of the silicon dioxide production from rice husk in Kazakhstan: an overview | DOI 10.18321/ectj993 | Rice husks (RHs) are the hard-protecting coverings of grains of rice. Considering the fact that this agricultural waste accumulates over the years, the need for prompt resolve for RH waste is readily apparent. As claimed by the Food and Agriculture Organization of the United Nations (FAO), the production of the global paddy rice in 2016 is considered to be 748.0 million tons. Based on this, the amount of RHs makes up about ~20% of paddy rice production by weight. Much of this production is treated as waste and either thrown into rivers or tossed on landfills, often causing pollution problems when it decays or simply returned to the fields where it can become airborne. This work presents synthesis routes for the production of SiO2 from RH sourced in Kazakhstan. RH, chosen from Almaty, Kyzylorda and Turkystan regions, was utilized as the major silica source. The results shown verified that the highest purity (98.2–99.7%) amorphous silica with a certain surface area between 120–980 m2 g-1 could be extracted during acid treatment and controlled calcination. The structure is amorphous, porosity diameter reduced from 26.4 nm to 0.9 nm, certain pore volume raised from 0.5 to 1.2 cm3 g-1.. | Kapizov O ,Azat S.,Askaruly K. ,Zhantikeyev U.,Tauanov Z.,Bergeneva N.S.,Satayeva A.R. Perspectives of the silicon dioxide production from rice husk in Kazakhstan: an overview; Eurasian Chemico-Technological JournalТом 22, Выпуск 4, Страницы 285 – 293,2020; |

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| 100. | Phytomanagement: Perspectives of using of phytoremediation technology in Kazakhstan | DOI 10.1051/e3sconf/202015901003 | The content of heavy metals around the metallurgical plants of East Kazakhstan in the soil and plants growing around these plants was studied. It was determined the concentration of heavy metals in soils, plant organs, it was calculated bioconcentration factor and the level of extraction of heavy metals by sunflower and lawn grasses. The study of sunflower plants and lawn grasses showed that the studied species accumulated a significant amount of heavy metals mainly in the roots. Sunflower plants and lawn grasses had high accumulation activity and accumulated a significant amount of heavy metals in their organs. Determination of the content of heavy metals in the soil showed a significant removal of heavy metals from the soil, which indicates a high degree of phytoextraction of heavy metals by the studied plant species. | Atabayeva S.,Kenzhebayeva S.,Alybayeva R.,Asrandina S.,Shoinbekova S. Phytomanagement: Perspectives of using of phytoremediation technology in Kazakhstan; EDP Sciences, 2020. |
| 101. | Melting point depression of ionic liquids by their confinement in carbons of controlled mesoporosity | **DOI** 10.1016/j.carbon.2020.07.071 | The effect of ionic liquids (ILs) confinement in the nanoporosity of carbons on their low temperature transitions has been studied by differential scanning calorimetry. The ILs consisted of the [$EMIm^+$] cation and [$FSI^-$], [$TFSI^-$] or [$BF_4^-$] anions. The carbons were strictly microporous | Béguin F. Pavlenko V., Przygocki P.,Pawlyta M., Ratajczak P.; Melting point depression of ionic liquids by their confinement in carbons of controlled mesoporosity; Carbon, 2020, 169, стр. 501–511. |

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| | | | (Maxsorb) and mesoporous with a small amount of micropores, i.e. a MgO templated carbon TC-1 ($L_{meso}$ = 3.4 nm), a silica templated carbon TC-2 ($L_{meso}$ = 8.7 nm), and a high surface area carbon black SC2A ($L_{meso}$ = 9.6 nm). All ILs encapsulated in the microporous Maxsorb demonstrated "flat" low temperature thermograms typical of an adsorbed state. In the narrow mesopores of TC-1, the interactions between the ions and the pore walls constrained the molecular motions, leading to a glass transition upon heating. The three confined ILs in SC2A displayed a melting peak at lower temperature ($\Delta T_m \sim$ -30 °C) than their neat counterpart. The $\Delta T_m$ shift was comparable for TC-2 soaked with [$EMIm^+$] [$FSI^-$], whereas only a glass transition was given by [$EMIm^+$] [$TFSI^-$] and [$EMIm^+$] [$BF_4^-$] confined in this carbon. Overall, the work shows that the liquid state of ILs can be extended to lower temperatures by their confinement in carbons possessing relatively wide mesopores.  | |

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| 102. | Fitting the porous texture of carbon electrodes to a binary ionic liquid electrolyte for the realization of low temperature EDLCs | **DOI**<br>10.1016/j.electacta.2020.136416 | We report on electrical double-layer capacitors (EDLCs) operating effectively at low temperature (down to −40 °C) while implementing nanoporous carbon electrodes and an ionic liquid (IL) electrolyte. For this purpose, the binary mixture of [EMIm][FSI] and [EMIm][$BF_4$] in 1:1 mol ratio has been selected, since it has been previously shown that it remains liquid down to its vitrification at −97 °C, unlike the parent ILs with melting points of −13 °C and 14 °C, respectively. To enhance the mass transport of the IL ions, especially at a low temperature, where the IL electrolyte exhibits a high viscosity, carbon electrode materials with a substantial share of mesopores serving as passageways for bulky ions were selected. These were a carbon black (SC2A) with a broad range of interparticle mesopores in addition to a reasonable amount of micropores, as well as a home-made templated carbon (MP98B) with hierarchical porous texture made of interconnected micropores and well-defined mesopores. From 20 to −40 °C, the capacitor with MP98B electrodes displayed greater specific capacitance, energy and power as well as better | Pameté Yambou E., Gorska B., Pavlenko V., Beguin F. ;<br>Fitting the porous texture of carbon electrodes to a binary ionic liquid electrolyte for the realization of low temperature EDLCs;<br>Electrochimica Acta, 2020, 350, 136416; |

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| | | | charge propagation than the cell with SC2A, whereas on volumetric basis its performance was inferior due to lower electrode density. Advanced SCMP composite electrodes of intermediate density were formulated by mixing these two carbons in the 1:1 mass ratio and harnessed to realize EDLCs with enhanced both specific and volumetric energy. Owing to the adjusted electrode properties, the performance of SCMP-based EDLCs surpassed literature data obtained with analogous constructions based on IL electrolytes and lightweight mesoporous materials, which suffered from poor volumetric metrics. © 2020 Elsevier Ltd | |
| 103. | Towards an optimized hybrid electrochemical capacitor in iodide based aqueous redox-electrolyte: Shift of equilibrium potential by electrodes mass-balancing | **DOI** 10.1016/j.electacta.2020.135785 | Considering the cost-effectiveness, safety, and environmental friendliness for energy storage and delivery at high rates, hybrid electrochemical capacitors in aqueous electrolytes containing redox-active species are attractive alternatives to expensive organic electrolyte based electric double-layer capacitors (EDLCs). Here, the influence of electrode mass-balancing on the equilibrium potential of hybrid cells in aqueous sodium nitrate + sodium iodide (5 mol $L^{-1}$ $NaNO_3$ + 0.5 mol $L^{-1}$ NaI) has been investigated. The shift of equilibrium potential determines, | Abbas Q. Fitzek H., Pavlenko V., Gollas B.;<br>Electrochimica Acta, 2020, 337, 135785;<br>Towards an optimized hybrid electrochemical capacitor in iodide based aqueous redox-electrolyte: Shift of equilibrium potential by electrodes mass-balancing. |

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| | | | whether the positive electrode behaves fully battery-like (charge/discharge strictly in the iodide redox potential range) or shows a mixed battery-like and EDL capacitive behavior. With an appropriate mass-balancing of the positive and negative electrodes (mass ratio = 1:2), the equilibrium potential shows a negligible shift during galvanostatic charge/discharge cycles at 0.5 A $g^{-1}$, which results in full battery-like behavior of the positive electrode. Consequently, the hybrid cell exhibits stable electrochemical performance. By contrast, an equal or higher mass of the positive compared to the negative electrode, leads to a shift of the equilibrium potential resulting in two different charge storage mechanisms at the positive electrode. As a result, the overall performance of the hybrid cell deteriorates. We show by thermogravimetric analysis and Raman spectroscopy that the formation of polyiodides ($I_3^-$ and $I_5^-$) is controlled by the oxidation of iodide ($I^-$) anions to molecular iodine in nanoporous carbon based positive electrode, and that more polyiodides are produced, if the positive electrode operates strictly within the iodide/iodine redox potential range.  | |

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| 104. | Application of carbons produced from rice husk in the process of capacitive deionization | **DOI**<br>10.18321/ectj996 | Nanoporous carbon materials are well recognized as the main components of electrodes in capacitive deionization. Herein, the activated carbons were produced based on rice husk which is an abundant waste material in southern regions of Kazakhstan. The resulting carbons were characterized electrochemically by comparing their performance with well-known brands of commercial porous carbons (i.e. Norit DLC Super 30, Kuraray YP 50F). The features of carbon/ carbon electrochemical cells were analyzed using the means of galvanostatic cycling with potential limitation and cyclic voltammetry. Whilst the surface morphology and elemental composition of carbons were observed using scanning electron microscopy combined with energy dispersive X-ray spectroscopy. Using the method of low-temperature nitrogen adsorption it has been established that the specific surface of home-made carbon produced based on rice husk is equal to 2290 $m^2g^{-1}$. The salt adsorption analysis has been performed using different concentrations of inlet solutions of sodium chloride. Our study has shown that the manufacturing and application of activated carbons based on rice husk | Pavlenko V. Supiyeva Z;<br>Application of carbons produced from rice husk in the process of capacitive deionization;<br>Eurasian Chemico-Technological Journal, 2020, 22(4), стр. 277–284. |

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| | | | can be highly efficient because the resulting electrode materials exhibit a high electrosorption capacity of 20.02 mg $g^{-1}$, which exceeds similar values obtained in the case of application of commercial porous carbons. © 2020 Eurasian Chemico-Technological Journal. | |
| 105. | Comparative analysis of the flora of the ketpen-temerlik in kazakhstan and China (northern Tian Shan) | **DOI** 10.12911/22998993/119803 | The article provides a comparative analysis of the flora and endemism of the western and eastern part of the Ketpen-Temerlik range in Kazakhstan and China, which is the eastern tip of the Northern Tian Shan. The flora of the entire Ketpen-Temerlik range includes 1890 species of vascular plants belonging to 593 genera and 120 families. In the western part of the ridge (in Kazakhstan), 1747 species were identified, belonging to 585 genera and 111 families and in the eastern part (in China), 1673 species belonging to 577 genera and 117 families. Angiosperms make up 98.4% of the ridge flora, 80.0% of which are dicotyledonous and 18.5% are monocotyledonous. The analysis of the largest flora families of the entire Ketpen-Temerlik range allowed us to identify 28 of the largest families by the largest number of species. The families with the largest number of species are Asteraceae (308 species), Poaceae (166), | Sadyrova G. Sadyrov G., Zhamilova S., Jusupbekova N., Baizhygitov D., Dauletbaeva M., Urymbayeva A.; Comparative analysis of the flora of the ketpen-temerlik in kazakhstan and China (northern Tian Shan); Journal of Ecological Engineering, 2020, 21(4), стр. 70–81. |

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| | | | Fabaceae (133), Brassicaceae (105), Caryophyllaceae (93), Rosaceae (90), Lamiaceae (81), Chenopodiaceae (75), Ranunculaceae (74) and Scrophulariaceae (57). The major genera are Astragalus (43 species), Artemisia (38), Taraxacum (34), Carex (33), Allium (33), Potentilla (31), Ranunculus (22), Oxytropis (21), Veronica (20), Poa (18), and Saussurea (18).  | |