РЕЗЮМЕТА

на научните публикации

гл. асистент д-р Стефан Генчев

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Група №	Заглавия на публикации и резюмета
B4_1	**Genchev, S., Gartsiyanova, K.** Assessment of the opportunities of mineral water resourses for regional development – a case study of South-Western planning region, Bulgaria. Geojournal of Tourism and Geosites, 53, 2, Oradea University, Romania, 2024, ISSN:2065-0817, E-2065-1198, DOI:10.30892/gtg.53217-1229, 538-546. SJR (Scopus):0.323 **Q1 (Scopus)** Линк Abstract: The mineral water resources are the basis for the development for regions of balneology and SPA activities. The main goal of the present study is to analyze and evaluate the potential of mineral water resources and the state of balneo and SPA tourism in the South-Western Planning Region of the country. Methods of scientific analysis and synthesis of the collected information database, and geographic information systems (GIS) were applied. The region has more than 1/5 of the country's river and groundwater. They are used in a complex manner (water supply, irrigation, electricity generation). The mineral waters in Sofia, Bankya, Sandanski, Kyustendil, Sapareva Banya, etc. are a great asset, which is a prerequisite for the development of spa and balneo tourism. The obtained results demonstrate that territory of the studied area has a serious potential of mineral water resources, which in case of sustainable and effective use, would contribute significantly to the development of tourism in the region. Various water resources, including mineral springs, provide many different benefits to society. With a therapeutic and prophylactic effect are the mineral waters extracted from water layers or aquifer systems, protected from anthropogenic influence, which have preserved their natural chemical composition, mineralization or content of certain biologically active components (Daukaev, 2020). Mineral waters with their specific physico-chemical characteristics (temperature, pH, total mineralization, hardness, color, smell, taste, etc.) are used for the treatment and prevention of a number of diseases, for drinking and providing recreation and rest for the population. The balneo and SPA tourism can contribute to the stable and dynamic economy of the country in addition to the restoration of human health. This type of tourism has high economic and social benefits (Zeynalova, 2022). Striving for and achieving future sustainable development of the regions and the country is directly related to the implementation of sustainable development strategies on local and national level. By updating the National Strategy for Sustainable Development of Tourism in

	the Republic of Bulgaria 2014-2030, the Ministry of Tourism accepts the European and national commitments regarding sustainable development and presents a plan for their achievement in the field of tourism (National strategy for sustainable development of tourism in the Republic of Bulgaria, 2014-2030; Varadzhakova, 2017; Varadzhakova, 2020). In the conditions of marked synergy between the main structural units of the water-energy-food Nexus, the South-West planning region has a great potential for the development of balneo and SPA tourism. The presence of a large number of natural mineral springs with different water properties, favorable geographical location, attractive climate, cultural and historical sights, natural phenomena and authentic local folklore, create opportunities this type of tourism to be combined with other types, for example: cultural, rural, wine, culinary, educational tourism, etc. Although there is lack of a consistent state policy during the decades of transition from a planned to a market economy, a negative circumstance which had a negative impact on the sustainable exploitation of mineral water resources, it should be noted that during the last 3 decades, serious investments for renovation have been made in the field of balneo and spa tourism in the region, by the construction of numerous completely new hotels and spa centers that successfully meet and satisfy the needs of their customers. The object of the present study is the spa and balneo destinations formed in the SW region. To achieve the set goal, the following tasks were completed during the research: - creation of an information base on the distribution of mineral waters in the studied area and its visualization; - description of the balneo and spa centers and their tabular and graphic presentation; - characterizing the potential of mineral waters for prevention and treatment of specific groups of diseases; - revealing the possibilities of combining balneo and spa tourism with another type, e.g. cultural, festival, wine, culinary and educational and etc.
B4_2	**Gartsiyanova, K, Genchev, S.** "Potential Applications of Water-Energy-Food Nexus Concept Through Preservation and Restoration of a Remarkable Site From Bulgarian Black Sea Coast". International Journal of Conservation Science, 15, 2, Romanian Inventors Forum, 2024, ISSN:2067-533X, DOI:10. 36868/IJCS.2024.02.19, 1033-1046. JCR-IF (Web of Science):0.27 **Q2 (Web of Science)** Линк Abstract: The Water-Energy-Food (WEF) concept is focused on the balanced management of these highly interconnected resources. It strongly emphasis on cross-sectoral and multi-level interactions, as well as resource interdependence, by highlighting the link between the extraction and use of water, energy and food. In the past decade, discussions on water, energy resources and food management have grown significantly, providing new insights into the social importance of the interaction and interplay of the components of the nexus concept water-energy-food (WEF). Nowadays, the existence of humanity is faced with significant challenges related to climate change, changes in land cover and land use. In addition, it is threatened by a water, energy and food crisis. The main goal of this article is the disclosure and argumentation of a potential local area (the northern part of the Bulgarian Black Sea coast) for applying the Nexus approach in the context of the Water-Energy-Food tripartite nexus. The chosen one is municipality of Shabla, a Black Sea municipality in Dobrich district, the easternmost border region of the Republic of Bulgaria with the Republic of Romania. The territory of the municipality of Shabla is 329.6km 2, which represents 7% of the total area of the Dobrich region and about 2% of the territory of the North-East region (NER, NUTS 2), 2.67% of the population of the

	respective district and only 0.5% of the population of NER inhabit in the municipality (Fig. 5). In the study area, there are three main components creating the conceptual framework of the Nexus approach (the lighthouse of cape Shabla, the late antique fortress of Karia and the possibilities of using the energy from the sea waves with the supporting functions of the Shabla sea flyover). The methods of field studies, scientific analysis and synthesis, as well as geographic information systems (GIS) are applied. The results obtained and the conclusions drawn indicate that the intertwining of the multiple dimensions of sustainability, short and medium-term interdisciplinary goals, interests and preferences along with the different perspectives of stakeholders lead to a nuanced understanding of the connectivities between environmental and social processes and issues of the WEF nexus. Despite the lack of surface water flow and the scarce hydrographic network in the studied territory, water, including sea water, as a resource, finds various applications and plays a key role in the formation of multidirectional and multiscale connections. The two-way interconnection between water and energy is inseparable, even more in the modern conditions of implementation of the so-called "energy transition". The model study area provides good opportunities for potential application of the WEF nexus concept. The municipality of Shabla has all the resources of the nexus and for some of them the preservation and restoration as conservation processes proved to be of crucial importance for the sustainability of the region. In the context of respecting the social, cultural, economic and environmental aspects, it is necessary for managers, scientists, politicians and stakeholders to collaborate between sectors and disciplines, to identify synergies and trade-offs and to develop and implement innovative solutions in order to optimize the distribution and use of the resources in the nexus.
B4_3	**Gartsiyanova, K**, **Genchev, S**, **Kitev, A**. ‘‘Assessment of Water Quality as a Key Component in the Water–Energy–Food Nexus’’. Hydrology, 11, 3, MDPI, Basel, Switzerland, 2024, ISSN:2306-5338, DOI:https://doi.org/10.3390/hydrology11030036, 1-14. SJR (Scopus):0.676 **Q1 (Scopus)** Линк **Abstract:** The intensive economic activity along the Bulgarian Black Sea coast is causing serious changes in the quality of the river water. In view of the topicality of the problem, the main goal of this article is to emphasize the water quality as a necessary key component in the water–energy–food nexus by determining the status of the surface waters of selected Bulgarian Black Sea tributaries from the point of view of their physicochemical characteristics. The research is based on the Water Framework Directive (WFD)—2000/60/EU and the relevant national legislation. In the present study, the Canadian Complex Water Quality Index (CCME, WQI) was applied to determine the quality of river waters. The novelty in the present study is a definite and necessary emphasis on the opinion that the analysis and assessment of water quality should become an integral part of all studies of the water–energy–food nexus. Rivers are the most important water resource for domestic, industrial, and irrigation purposes, which are fundamental to human development. However, rivers are polluted due to the discharge of sewage and industrial waste and the implementation of various human activities that affect their physicochemical quality. The protection of the natural ecological environment, including the quality of flowing surface water and the creation of favorable conditions for meeting water needs, are determined by the goals of water consumption and the requirements of water users. For determining the water quality of the selected study area, the present study was based on the analysis of the values of 10

	parameters: pH, electrical conductivity (EC), dissolved oxygen (DO), ammonium nitrogen (N-NH4), nitrate nitrogen (N-NO3), nitrite nitrogen (N-NO2), total nitrogen (N-Total), total phosphorus (P-Total), orthophosphates (P-PO4), and BOD5. Based on the results obtained from the applied CCME-WQI, the following conclusions can be made: - For the Batova River, the waters in the BAD point have the most favorable quality characteristics, and the waters in the estuary section BAU have the worst; - For the Dvoinitsa River, the river waters at the point DVD are defined as the cleanest, and the most polluted are those immediately before entering the Black Sea-the point DVD; - The quality condition in the river of Aheloy is most favorable at the AHA point, and the river waters at the AHD and AHU points have markedly deteriorated physicochemical characteristics that do not meet the criteria for "fair" quality condition laid down in Ordinance No. H-4 for the characterization of surface waters; - The best-quality waters in the Dyavolska River are the waters at the point DYD, and the most polluted is the river section at the point DYU; - The surface waters of the Rezovska River in both research points-RZS and RZU—hold a satisfactory quality status according to the norms; - The quality of the river waters in the studied watersheds varies both in the individual years of the analysis period and also in the different points of the river systems, with no deterioration or improvement in their quality status; - Most often, in almost all studied points, the leading and constant exceedances are usually 10 times the norm for the indicators total phosphorus (P-Total), orthophosphates (P-PO4), nitrite nitrogen (N-NO2), and nitrogen (N-Total). The deviations from the norms for the other physicochemical indicators are not defined as so frequent. The overview of the nexus concept in the tripartite relationship water–energy–food reveals the key role played by the water sector. It highlights the need to apply a multi-sector approach in the process of achieving synergies and mitigating trade-offs involving multiple interested parties—government agencies, the private sector, academia, and civil society. As a result of the application of the CCME-WQI, the advantages of the used index were revealed, allowing us to obtain complex and differentiated assessments for different temporal and spatial summaries. The performed analysis and the obtained assessment of the quality of the river waters along the Bulgarian Black Sea coast serve as a basis for future studies in the same model area for the remaining two components in the energy and food relationship. This research provides new knowledge about this concept in the country and provides regional water quality assessments. The authors of the present study strongly express the opinion that research on the quality of water should become an integral part of research on the water–energy–food relationship.
B4_4	**Gartsiyanova, K**, **Genchev, S**, **Kitev, A**. "Transboundary river water quality as a core indicator for sustainable environmental development in Europe: A case study between republics of Bulgaria and Serbia". Caspian Journal of Environmental Sciences, Vol. 21, issue 2, University of Guilan, Iran, 2023, ISSN:1735_3033, DOI:10.22124/CJES.2023.6491, 291-300. SJR (Scopus):0.285 **Q2 (Scopus)** Линк

ABSTRACT: In recent years, the issue of the sustainable management and protection of water resources has gained increasing emphasis in environmental policies at the local, national and supranational levels. Water, energy, food and ecosystems form a special interrelationship which plays a fundamental role in providing the resources and services necessary to sustain human activity. This relationship is affected both by changes in climate, precipitation and land cover on one hand, and by economic development, agriculture and population growth on the other. A wide range of experts are working to determine how the water-energy-food nexus fosters the coherence of water, energy and food policies, supporting the transition to a circular and low-carbon economy in Europe (Internet 1). In recent years, the issue of the sustainable management and protection of water resources has gained increasing emphasis in environmental policies at the local, national and supranational levels. The European policy in the field of environment is also based on the principle of precautionary measures, preventive actions and elimination of pollution at the source, as well as on the principle "the polluter pays". Transboundary waters represent 60% of the world's freshwater flows, and 153 countries have territory within at least one of 286 transboundary river and lake basins and 592 transboundary aquifers. Only 32 countries have 90% or more of their transboundary basin area covered by operational agreements. Only 24 countries reported that all of their transboundary basins were covered by cooperative agreements (Kolcheva 2020; Internet 3). Both Republic of Bulgaria and Republic of Serbia are good examples of such cooperation. The choice of the research area in the present article is justified by the diverse natural conditions in combination with the various anthropogenic activities, which have a parallel and interconnected effect in the process of formation and change in the quality of river waters. The goal of the present study is the analysis and assessment of water quality in the Bulgarian section of the Timok, Nishava and Erma (Jerma) rivers for the period 2015-2021. The quality status of the studied river courses was assessed by the values of ten physicochemical indicators and the concentrations of eight heavy metals. The analysis and assessment of the quality of the river waters for the period 2015-2021 in selected points of the studied watersheds are based on data provided by the Environmental Executive Agency (ExEA) part of the Ministry of Environment and Water (MOEW) and also based on the Water Act (WA) in accordance with the criteria by Directive 2000/60/EC or so called Water Framework Directive. The quality status of the studied river courses was assessed by the values of the physicochemical indicators including pH, electrical conductivity, dissolved oxygen, ammonium nitrogen (N-NH4), nitrates (N-NO3) and nitrites (N-NO2), orthophosphates (P-ortho-PO4), total nitrogen and phosphorus content, BOD5 and the concentration of the following heavy metals including iron (Fe), manganese (Mn), cadmium (Cd), lead (Pb), arsenic (As), copper (Cu), nickel (Ni), zinc (Zn). The Canadian Water Quality Index (CWQI) was applied for the analysis. The waters of the Nishava River beside the village of Kalotina exhibited the most favourable quality characteristics, and the Timok River at the point beside Bregovo was the most polluted. In almost all of the studied points in the river courses, the most frequently recorded exceedances of the norms (usually up to 10 times) were for total nitrogen (N), total phosphorus (P), orthophosphates (P-PO4) and less often for dissolved oxygen, BOD5, ammonium nitrogen (N-NH4) and nitrates (N-NO3). The extremely poor quality of the river waters in Timok River at the mouth was determined by the extreme content of copper (Cu): more than 25 times the standards (over the entire 7-year study period). Values exceeding standards up to 10 times above norms were relatively constant over time, and very often between 10 and 25 times for cadmium (Cd) and zinc (Zn).

	In conclusion, it can be noted that heavy metals are very important group of pollutants that can cause significant damage to the environment, if they are above the permissible concentration. Achieving the goal formulated in the study could serve as a good basis for making informed management decisions.
B4_5	**Gartsiyanova, K.**, **Genchev, S.**, **Kitev, A.**, **Varbanov, M**. "Assessment of physico-chemical status of waters in selected sampling sites of Chepelarska River, Bulgaria". FORESTRY IDEAS, Volume 29, issue 2, University of Forestry, Sofia, 2023, ISSN:eISSN:2603-2996, 216-225. SJR (Scopus):0.166 **Q4 (Scopus)** Линк Abstract: Water is not just a commercial product, but a common good and a limited resource that should be protected and used in a sustainable manner, in both terms – of quality and quantity. However, water is under pressure due to variety of uses from different sectors, such as industry, agriculture, tourism, transport, energy, etc. which leads to deterioration in the quality of water resources. A distinctive innovation in this study is the achievement of a comprehensive assessment of water quality of Chepelarska River. The sources of water pollution (according to the way of entry into the water body) can be grouped into two types: point and diffuse. Regardless of how pollutants enter river waters, they degrade river ecosystems. The aim of the study is to assess the chemical status of Chepelarska River, right tributary of the main river in Southern Bulgaria – Maritsa, based on more than 10 physico-chemical parameters for the period 2015–2021. Chepelarska River (known also as Asenitsa or Chaya) has length of 85.9 km and a catchment area of 1010 km² (Hristova 2012). The river originates in the area of Rozhen saddle, in the Western Rhodopes. Near the town of Chepelare and the village of Hvoyna, it flows in a narrow valley with valley extensions (small hollows). It changes its direction several times from northeast to northwest. In the Upper Thracian lowland, it divides into arms and flows as a right tributary into Maritsa River in the area of Katunitsa village. The average multi-year runoff is determined by the changing weather conditions throughout the year and due to the trends in climate change. Chepelarska River has a rain-snow recharge with a maximum in the period April–May and minimum – September and August. Data were provided by the Executive Environmental Agency (ExEA) to the Ministry of Environment and Water (MOEW). The evaluation of the studied river is based on Ordinance No N-4/14.09.2012 (concerning the characterisation of surface waters) and Ordinance on environmental quality standards for priority substances and some other pollutants (Resolution of the Council … 2010), in accordance with the requirements of Directive 2000/60/EU. To achieve the set goal, the Canadian Complex Water Quality Index (CCME-WQI) was applied, through which a complex and differentiated assessment of the status of water in terms of its quality was carried out. The quality status of the sampling sites in this study was assessed by following physico-chemical parameters: pH, electrical conductivity, dissolved oxygen, ammonium nitrogen (N-NH4), nitrates (N-NO3) and nitrites (N-NO2), orthophosphates (P-ortho-PO4), content of total nitrogen and phosphorus (TN and TP), biochemical oxygen demand (BOD5) and the concentration of eight chemical elements – iron (Fe), manganese (Mn), cadmium (Cd), lead (Pb), arsenic (As), copper (Cu), nickel (Ni), zinc (Zn). The physico-chemical parameters were collected at least 4 times a year (MOEW 2012). The obtained results show constant excesses of the norms for the indicators nitrite-nitrogen (N-NO2), total nitrogen (TN), total phosphorus (TP) and orthophosphates (P-PO4). According to them, organic pollution of river waters is mainly of agricultural and

	municipal-domestic origin. The industrial activities in the area carried out for decades to this day could be considered as a source of a possible pollutant that led to an increased content of heavy metals – copper (Cu), cadmium (Cd), manganese (Mn) and especially zinc (Zn). The waters of Chepelarska River at the sampling site Ch1, both at the beginning and in the end of the study period are defined as 'highly polluted'. For 2017 and 2018, CCME-WQI values classifies the river in 'good' condition category. From 2019 to 2021, the values of WQI again place the river in this section in the category of 'poor' condition, with the lowest value WQI being recorded in 2020. As a result of the applied complex WQI, it was concluded that Chepelarska River at the sampling site Ch2 in 2015 and 2016 was in a 'critical' quality status. River waters are defined as 'polluted'. From 2017 to the end of the period, according to the calculated values of CCME-WQI, the river in this section changes its category and meets the regulatory requirements for 'good' surface water quality. The applied index has the highest value in 2020 – 73.6. Based on the results obtained from the applied CCME-WQI, the following summary can be made: - Spatially, the cleanest are the waters of Chepelarska River at the sampling site on the bridge for the village of Bachkovo, and the most polluted is the river before it flows into Maritsa River. - The quality status of the surface water varies, both in the individual years of the research period, and also in the different points, and no direction of deterioration or improvement of its quality is established. - Leading and constant are the excesses of the norms for the nitrite nitrogen (NNO2), especially for Chepelarska River after the town of Chepelare (over 25 times), total nitrogen (TN) and total phosphorus (TP) and orthophosphates (P-PO4) (up to 10 times the requirements for 'good' condition). The deviations from the regulated values for the other physico-chemical indicators are not determined to be so frequent. - The increased content (very often up to 10 times, not rarely between 10 and 25 times and in some cases over 25 times exceeding the standards) of copper (Cu), cadmium (Cd), manganese (Mn) and especially zinc (Zn) (the most often more than 25 times of excess) at the sampling site of Chepelarska River before it flows into Maritsa River, determines the extremely poor quality of the river waters in terms of heavy metal content. - Due to the nature of the identified polluting substances, a negative impact on the quality status of the surface waters of Chepelarska River in the studied sampling sites is caused by the discharge of untreated or insufficiently treated communal – household (incl. and faecal) waters. Additional peril to the quality of surface waters is the presence of numerous micro-dumps, as well as landfills that do not meet the regulated requirements. A significant problem are the settlements with a partially constructed or unconstructed sewage system and, last but not least, agricultural activities – crop farming on one hand, through excessive fertilization and use of plant protection products, and livestock farming on the other, by improper storage of significant amounts of manure. - CCME-WQI can be used for assessment of water quality for specific purposes. For example – drinking, aquatic life, recreation, irrigation and livestock. Due to the aim of this study it is possible the calculation of the index for these needs to be performed by the authors in the future. The obtained new data is a key emphasis in making management decisions to mitigate and prevent current and future pollution of river systems, as a result of various anthropogenic impacts.

B4_6	**Genchev, S**, **Gartsiyanova, K**. Water-Energy-Food NEXUS concept for sustainable future - a case study of touristic opportunities in a selected area in north-west region of Bulgaria. Proceedings of International Scientific Conference "Tourism for Sustainable Future" (online) Veliko Tarnovo/Sofia, Bulgaria, 18-19 May 2023, Авангард Прима, 2023, ISBN:978-619-239-887-3, 350-368 **Национално академично издателство** Линк Abstract: Water, energy and food are interconnected and interdependent, constituting a single and balanced system characterized by specific complexity and feedback. Putting pressure and solving problems on one of the components can create impacts on the others. Typically, the exploitation of one of the components in the system requires the acceptance of trade offs on the part of the others, as complex and multifaceted interactions take place. In the article, an analysis of the NEXUS water-energy-food approach was performed, and also an assessment for the place of the tourism sector in the system and the opportunities for its development in the regional economy was made. The development of tourist destinations is directly related to the state of the environment, cultural identity, social interaction, security and prosperity of settlements (Cole S. G. 2020). The aspiration to achieve future sustainable development of the regions and the country in particular is directly related to the implementation of sustainable development strategies at local and national level. Before all today's sustainable approach need to be integrated, and requires wide-ranging and committed participation in decision-making and their practical implementation by all stakeholders. The main goal of this article is to analyze and evaluate the water-energy-food NEXUS approach and the opportunities for development and diversification of the regional economy by revealing the tourism potential in a model research area in the North-west parts of Bulgaria. Understanding and managing the relationship, and how it is approached, is critical to ensuring efficient and sustainable use of limited resources. The North-West planning region is one of the six planning regions in Bulgaria, and is formed by the districts of Vidin, Vratsa Montana, Lovech and Pleven. Its area is 19,070 km², and the population is about 690,685 (2021) (https://infostat.nsi.bg...). The region occupies the northwestern part of the country and has a favorable geographical position with a moderate continental climate. International transport corridors pass through its territory, including the Danube River, providing good opportunities for cross-border cooperation. The study examines the tourism potential of the Belogradchik municipality as a sample from the Northwestern Planning Region, and the focus of the analysis falls on Rabishko Lake, Magura Cave and the town of Belogradchik. The possibilities for a combination of aqua tourism, ecological tourism, wine tourism, cultural tourism, festival tourism on the territory of the Belogradchik municipality and its connections along the relevant line with similar opportunities and events with neighboring municipalities and regions have been examined. The main natural sights, cultural events and museum collections located on the territory of the municipality are presented. In conclusion, an overview of the main problems and challenges facing the tourism industry, both at the local and national levels, is provided. The main interrelationships between the local potential for development of the sector and the problems that limit its development are established. In this regard, the strategy for the development of Bulgarian tourism focuses on the main goal – ensuring the necessary conditions for the sustainable development of the sector, preservation and restoration of the natural and cultural environment. Addressing the challenges requires balanced inter-institutional interaction and a high degree of stakeholder engagement. The sustainable preservation and management of natural and cultural resources in the region should be aimed

	at activities and productions with lower resource intensity, limiting pollution generated by tourists, creating and offering tourist packages for short trips. In the conditions of marked synergy between the main structural units of water-energy-food Nexus, the model research area has a great potential for the development of cultural tourism with the possibility of combining this type of tourism with festival, rural, wine, culinary, educational, etc.
B4_7	**Gartsiyanova, K**, **Genchev, S**, **Kitev, A**. "Evaluation of land cover, land use and water quality in the regions with various anthropogenic activity – a case study of Osam river basin, Bulgaria". European Journal of Materials Science and Engineering, Volume 8, issue 1, Politehnium Publishing House, Romania, 2023, ISSN:E 2537-4346, DOI:10.36868/ejmse.2023.08.01.003, 3-10 **Международно академично издателство** Линк Abstract: Nowadays the world´s demand for natural resources is more pressing than ever before. At the same time in many regions, the water resources are heavily polluted. In this connection the land use planning in a given region is very important due to the land cover and land use effect on the quality of the river water. The good quality of the water and its enough quantity, the provision of energy sources and food is a very important and difficult issue. This challenge could be done by ensuring a better management of the mentioned resources. Strengthening synergies and reducing trade-offs among the sectors is possible by applying a Nexus approach. To better understand and realize the Nexus paradigm reflecting land-water-energy-food connection, the international network of researchers works closely with policymakers and the business sector. The focus of the Nexus activities is aimed at creating conditions for improving and protecting the state of the environment in the transition to a circular and low-carbon economy in Europe. This article aims to assets the land cover, land use and water quality in the upper and middle catchment of the Osam River (municipalities of Troyan and Lovech) for the period 2012-2019. The Osam River flows through the Middle Stara Planina and the Middle Danube Plain. The coordinates of the catchment area are 42° 35 '00 "and 43°13' 00" N and 24° 30 '00 "and 25° 20' 00" E and the area of the river basin is 2824 km2. The length of the river is 314 km and it flows into the Danube, near the village of Cherkovitsa. The conducive combination of different relief, climate and soils in the Osam River basin is a precondition for the development of various economic activities that are potential sources of pollutants in the river waters. Land use and land cover is a key factor in relation to water quality characteristics. The emphasis is on acquiring new knowledge through spatio-temporal analysis of the problem. For assessment of land use and land cover in the study area, satellite and orthophoto images interpreted in GIS environment (ArcGIS 10.3) have been used to verify CORINE Land Cover (CLC) data for 2018 [14] according to the approved methodology and nomenclature [15]. The developed maps are on a scale of 1:50 000 at the regional level - for the catchment area, and on a scale of 1:10 000 at the local level for the municipalities. In addition, georeferenced topographic maps, high-resolution satellite images (Google Earth), digital elevation model, thematic maps (including hydrological, soil, administrative, etc.), statistics and field check have been used. The application of various complex indices to represent the quality of water have been constructed of a set of physicochemical parameters indicating one or another type of anthropogenic impact on water. In this study the "Water Quality Index" - WQI (Canada, recommended by UNEP) was applied. To assess the river water quality this study considers the following parameters: pH, dissolved oxygen (DO), electric conductivity (EC), ammonia (N-NH4), nitrates (N-NO3), nitrites (N-NO2), phosphates (P-ortho-PO4), biological oxygen

	demand (BOD5). In this article for assessment the river water quality only the intermediate results of the applied complex index were taken into account. They are representative of water pollution by certain indicators mentioned above. The values of the polluting indicators are divided into three groups - exceeding up to 10 times the permissible norms, between 10 and 25 times and over 25 times the regulated values. The obtained results are a good basis for popularizing the Nexus paradigm at different scales (i.e., local, regional, national, European and beyond) including planning and elaboration of the necessary policies for sustainable management of both land use and river waters in terms of their quality.
Г7_1	**Kristina Gartsiyanova**, **Marian Varbanov**, **Atanas Kitev**, **Stefan Genchev, Stela Georgieva**. Territorial features and dynamics in the water quality change in the Topolnitsa and Luda Yana rivers. Journal of the Bulgarian Geographical Society, Volume 43, Bulgarian Geographical Society, 2020, ISSN:2738-8115 (online), DOI:10.3897/jbgs.2020.43.2, 9-15 **Национално академично издателство** Линк Abstract: In this article the current changes in the water quality of rivers Topolnitsa and Luda Yana have been analyzed and evaluated. The Topolnitsa River is a left tributary of the Maritsa River and rises from the eastern foot of Mount Bunaya (1572 m) in the Sashtinska Sredna Gora Mountain. The area of the river's catchment area is 1789 km2. In the Zlatishko-Pirdopska Valley and the Upper Thracian Lowland, the river's waters are used mainly for irrigation, and the "Dushantsi", "Zhekov Vir" and "Topolnitsa" dams have been built for this purpose. The length of the Topolnitsa River is 155 km. It flows into the Maritsa River 1 km west of the town of Pazardzhik. The Luda Yana River rises from the Sashtinska Sredna Gora at an altitude of 1423 m. The length of the studied river basin is 74 km, and the area of the catchment area is 685 km2. The Luda Yana River flows into the Maritsa River west of the village of Ognyanovo.The river basins are under the significant anthropogenic impact of various origins and nature. Anthropogenic impact on the quality of surface waters in a given region can be localized - through the discharge of contaminated wastewater or diffuse - through surface washing of harmful substances from agricultural areas, regulated and unregulated landfills, and in many cases through the infiltration of domestic water from septic tanks into underground aquifers that feed river waters. The choice of the current research topic is dictated by the fact that, despite the relatively small areas, the watersheds of the Topolnitsa and Luda Yana rivers are subject to significant anthropogenic impact. The reason for this is the concentration of large industrial capacities from ore mining and non-ferrous metallurgy, the processing industry, the developed intensive agriculture, and the significant share of the communal and household sector. The main objective of this article is to study and reveal the spatio-temporal changes in the water quality of the Topolnitsa and Luda Yana rivers under the influence of anthropogenic activity for the period 1981-2018.За реализиране на поставената цел са формулирани следните задачи: • Analysis of changes in water quality in the two river basins for the period 1981-2018; • Assessment of sources and forms of impact – pollutants, method of pollution, intensity and power of impact; • Determining the degree of change in water quality by using complex indices for assessing the quality of water - (Water Quality

	Index - Canada; Water Pollution Index - Russia; Chemical Index for River Water Quality (CJ) - Germany), as well as a differentiated assessment by leading physicochemical indicators; • Identification of the main regions and sections of rivers with intense anthropogenic impact on water quality. The article examined the values of the indicators - dissolved oxygen, pH (hydrogen index), electrical conductivity, ammonium nitrogen, nitrite and nitrate ions, total nitrogen, total phosphorus, orthophosphates and BOD_5. From the specific and priority substances subject to analysis are heavy metals and metalloids: arsenic, iron, manganese, copper, cadmium, lead, zinc, nickel (Table 1). This study uses water quality data from the National Surface Water Monitoring System (NSWMS) provided by the Bulgarian Environmental Agency (BEA). The analysis was carried out for six selected points in the study area with the longest period and completeness of data. The main sources of pollution, the emitted substances and the spatio-temporal features of the change of the water quality are determined. Several indices for complex assessment of river waters have been used to assess the status of water - (Water Quality Index - Canada; Water Pollution Index - Russia; Chemical Index for River Water Quality (CJ) - Germany).
Г7_2	**Kristina Gartsiyanova**, **Marian Varbanov**, **Atanas Kitev**, **Stefan Genchev**. Analysis of heavy metal pollution in the Pirdopska and Medetska rivers, tributaries of the Topolnitsa river. International Multidisciplinary Scientific GeoConference Surveying Geology and Mining Ecology Management, SGEM, 21, 3.1, 2021, ISSN:1314-2704, DOI:10.5593/sgem2021/3.1/s12.03, 17-26. SJR (Scopus):0.217 **SJR, непопадащ в Q категория (Scopus)** Линк Abstract: Water is one of the most exposed elements to the direct and diverse impact of anthropogenic activity. Today the quality of surface waters including the river waters is a very sensitive issue. The quality of waters in the river basins significantly reflects the origin, intensity and degree of anthropogenic impact on the environment. Harmful substances like heavy metals are very important group of pollutants which can cause considerable detriment to the environment if they exceed certain concentrations. The contamination with heavy metals in the environment is more serious than those of other pollutants due to their non bio-degradable nature, accumulative properties and long biological half lives. It is difficult to restore the environment once the heavy metals enter into it. Heavy metal contamination may have devastating impacts on the ecological balance of natural water bodies including the loss of aquatic diversity. The aim of this study is to define the concentrations of copper (Cu), iron (Fe), manganese (Mn), lead (Pb), arsenic (As), zinc (Zn), cadmium (Cd) and nickel (Ni) in the waters of the Rivers Pirdopska and Medetska, tributaries of the Topolnitsa River for the period 2015-2019. In the analysis of the heavy metal content Water Quality Index (Canada), as well as statistical and graphical methods were applied. In this study the data set was analyzed and evaluated in accordance with the requirements of Directive 2000/60/EU-Water Framework Directive and its equivalent criteria transposed into Ordinance N-4 on surface water characterization from 2012 and the Ordinance on environmental quality standards for priority substances and some other pollutants from 2010. The results obtained in this study show that during the analyzed period the concentrations of Cu, Mn, Fe and Zn in the Medetska River are much higher than the reference norms, and the deteriorated quality of the river waters of the Pirdopska River is due to the high concentration mainly of Cu. Throughout

	the 5-year study period, the calculated average annual values for copper (Cu) usually exceed between 10 and 15 times the permissible concentrations. The highest average annual value was in 2018 (16 µg/l). The main mission of the mining industry is efficient and sustainable extraction, processing and enrichment of metal raw materials in strict compliance with regulatory requirements for healthy and safe working conditions and environmental protection. Unfortunately, in a number of mining areas, for one reason or another, the quality of surface water is dramatically impaired. Over time, the major sources of contamination by heavy metals is changed by the primary extraction and production to generate secondary pollutants. The study shows that in one of the model mining and ore processing regions in the country, the causes of heavy metal pollution, especially on the Medetska River, are environmental damage caused by discontinued mining activities and the accumulation of current damage by enterprises related to the mining industry.
Г7_3	**Kristina Gartsiyanova**, **Marian Varbanov**, **Atanas Kitev**, **Stefan Genchev**. Water quality analysis of the rivers Topolnitsa and Luda Yana, Bulgaria using different indices. Journal of Physics: Conference Series, Volume 1960, IOP Publishing Ltd, 2021, ISSN: Online 1742-6596; Pr. 1742-6588, DOI:https://doi.org/10.1088/1742-6596/1960/1/012018, 1-10. SJR (Scopus):0.21 **SJR, непопадащ в Q категория (Scopus)** Линк **Abstract.** To determine the river water quality requires the collection and analysis of large water quality datasets that can be difficult to evaluate and synthesize. A range of Water Quality Indices (WQI) have been developed to evaluate water quality data. The “index” is a useful tool to present water quality information to the large public and to legislative decision makers. Weight arithmetic water index method classified the water quality according to the degree of purity, using the most commonly measured water quality variables. These WQI allow analysis of large temporally and spatially-varying water quality datasets to produce a single value, that shows the quality of the waterbody. This study focuses on the analysis of some of the worldwide use of surface water index estimates. The catchment areas of the two model basins of bulgarian rivers (Topolnitsa and Luda Yana) are subject to active anthropogenic load. There are numerous metallurgical plants, combines for non-ferrous metals, mines and tailing ponds have been operating in the area for many years. At the end the heavy metals being the final result of their production activity. In the same time the waters of the rivers have various applications - industrial, household and agricultural. To obtain an assessment of the water quality status of the Topolnitsa and Luda Yana rivers in Bulgaria, two different indices are used - Water Pollution Index (WPI) and the Bavarian Surface Quality Index - (CJ). In the first one the conditions are regulated by the creators of the algorithm (reference values, set of physicochemical indicators, requirements for the type of data), the rest are selected by the user according to criteria determined by him. The index is calculated by a number of physicochemical parameters as obligatory include "dissolved oxygen" and "BOD5". This is due to the fact that these indicators are particularly sensitive to the anthropogenic impact. The CJ index presents a summary of water quality in a given sample according to a set of physicochemical indices and is expressed as a non-dimensional quantity from 0 to 100 (0 is the worst and 100 is the best water quality) grade of reference values are defined. In this index all conditions are set in advance by the creator, including the set of indicators, reference values, weight of individual indicators, etc. The dataset consists of analytical results from a 6-yrs survey conducted in selected points of the river systems. The main aim of this article is to test the

	sensitivity of two indices different in their construction, algorithm and content for complex assessment of river water quality in Bulgarian conditions.
Г7_4	**Varbanov, M.**, **Gartsiyanova, K.**, **Tcherkezova, E.**, **Kitev, A.**, **Genchev, S.** Analysis of the quality of river water in Sofia city district, Bulgaria. Journal of Physics: Conference Series, Volume 1960, IOP Publishing Ltd, 2021, ISSN: Online: 1742-6596 Print: 1742-6588, DOI:https://doi.org/10.1088/1742-6596/1960/1/012019, 1-10. SJR (Scopus):0.21 **SJR, непопадащ в Q категория (Scopus)** Линк **Abstract.** The article analyzes the current status of the river waters in Sofia city district, Bulgaria. The object of this study is the waters of the river Iskar and its tributaries in the selected area. The main hydrochemical indicators are analyzed in accordance with the national legislation for the period 2016-2020. Key points and areas of anthropogenic impact are determined. A complex assessment of quality of the river water has been carried out with the application of the Water Quality Index (CCME) - Canada. The main consumers of water are agriculture, energy, metallurgy, chemical industry, food production, etc. The growing needs of the population increased volumes consumed with clean water for drinking, which are then returned to the water environment with highly degraded performance. In this study 15 physicochemical indicators (pH, electrical conductivity, dissolved oxygen, BOD5, ammonium nitrogen, nitrate nitrogen, nitrite nitrogen, total nitrogen, total phosphorus, orthophosphates, iron, manganese, copper, lead, and zinc) were selected to analyze the chemical status of river waters. According to the Basin Directorate for Water Management "Danube Region" data covering the last few years, an assessment of the ecological status/potential and chemical status of more than 20 monitoring points of water bodies on the territory of the municipality or near it has been made. The summary results regarding the chemical status of water bodies show that all water bodies – type "rivers" are in "poor" condition and do not meet the requirements for achieving "good" chemical status according to the Management Plan of the river basins in the Danube Region (2016-2021). At the same time, water bodies located in the mountainous parts or near the city limits are characterized by “good” ecological and chemical status such as, Vladayska river near the village of Vladaya and Vitoshka Bistritsa river after Pancharevo.The analysis of the water qualities shows that in many cases the surface running waters on the territory of the compact city are inadmissibly polluted. The reason for this are direct discharges of domestic and industrial (insufficiently treated and untreated), and often heavily polluted rain (atmospheric) waters, which flow into the rivers in the area during heavy rainfall and increase their turbidity and content of insoluble suspended solids.
Г7_5	**Varbanov, M**, **Gartsiyanova, K**, **Genchev, S**, **Metodieva, G**. “Assessment of the Chepinska river waters quality (Bulgaria) through the combined use of different indices”. Proceedings of 23rd International Multidisciplinary Scientific GeoConference SGEM 2023, 23, 3.2, International Multidisciplinary Scientific Geoconference, 2023, ISBN:978-619-7603-64-4, ISSN:1314-2704, DOI:10.5593/sgem2023V/3.2/s12.05, 35-42. SJR (Scopus):0.17 **SJR, непопадащ в Q категория (Scopus)** Линк ABSTRACT: The article analyzes and evaluates the current status of the water quality of the Chepinska River. It is one of the main right-hand tributaries of the Maritsa River, and large settlements are located in its catchment area and active agricultural activity is carried out. They cause a strong anthropogenic impact and a significant change in water quality. The

	heterogeneous impact requires the assessment to be carried out by using a complex of indices that includes the Canadian Water Quality Index (CCME WQI), the Bavarian Pollution Index (CJ) and the water oxygen balance index used in the BENILUX countries. The assessment was made according to more than 10 chemical indicators, such as dissolved oxygen, ammonium nitrogen, electrical conductivity, BOD5 and others. The data were obtained from the National Water Monitoring System, at 4 points along the main river and its tributaries, for the period 2015-2022. The reference values for the maximum permissible concentration of polluting substances are in accordance with Regulation N-4 of 2012. Significant water pollution is observed after the settlements, as a result of waste water from urban sewage and agricultural activity. Poor water quality is mainly observed in local sections of the river course. In the lower reaches of the river, the water quality improves significantly.
Г7_6	**Gartsiyanova, K M, Kitev, A, Varbanov, M, Georgieva, S, Genchev, S.** Water Quality Assessment and Conservation of the River Water in Regions with Various Anthropogenic Activities in Bulgaria: A Case Study of the Catchments of Topolnitsa and Luda Yana Rivers. International Journal of Conservation Science, 13, 2, 2022, ISSN:2067-533X, 733-742. JCR-IF (Web of Science):0.8 **Q1, не оглавява ранглистата (Web of Science)** Линк Abstract: Water is a very important natural resource which is being exploited indiscriminately by humans. The water resources are getting depleted and polluted by anthropogenic sources. One of the key activities to conserve the water including the river water is to achieve a good water quality. Water quality describes the physical, chemical and biological status of water. In this study to define a water quality in a model region with various anthropogenic activitieis (catchments of Topolnitsa and Luda Yana Rivers) were used fiveteen physicochemical parameters: pH, electrical conductivity (EC), dissolved oxygen (DO), ammonium (N-NH4), nitrate (N-NO3), nitrite (N-NO2) and phosphate (P-ortho-PO4) and such heavy metals as Cu, Fe, Mn, Pb, As, Zn, Cd and Ni. The samples were collected for the period 2019-2021 in six monitoring points of the study area, characterized with intensive and various human impact. The results based on this index and obtained from this research would be useful to the large public and even to land-use planners and environmental management agencies for monitoring and reducing the water pollution, especially for such regions defined as an ecological “hot spot” for many years and their future conservation.
Г7_7	**Gartsiyanova, K., Varbanov, M., Kitev, A., Genchev, S., Tcherkezova, E.** Water Conservation and River Water Quality of the Bulgarian Black Sea Tributaries. International Journal of Conservation Science, 13, 3, Romanian Inventors Forum, 2022, ISSN: ISSN:2067-533X, E-ISSN:2067-8223, 981-990. JCR-IF (Web of Science):0.8 **Q1, не оглавява ранглистата (Web of Science)** Линк Abstract: Various policies, strategies and activities related to sustainable management of water resources in order to meet the current and future human demand are defined as "water conservation". Nowadays many countries including members of EU have already implemented such water policies. Water conservation could be also implemented on the institutional and social level. One of the key activities to preserve the water resources is to avoid any decline in the water quality. This paper analyzes the current state of quality of the main Bulgarian tributaries of the Black Sea. Component analysis of the main physicochemical indicators according to Ordinance N-4/2012, as well as the content of some of the most common heavy metals in Bulgarian rivers was performed. The results show that river water is mainly polluted by wastewater from utilities and agriculture. The participation of heavy metals in the pollution of river waters in this region of the country is not very high

	and is reported only in some of the monitoring points. The waters of the Veleka river near the village of Sinemorets have the most favorable hydrochemical characteristics, while the waters of the Dvoinitsa river at the point before flowing into the Black Sea have the worst.
Г7_8	**Мариан Върбанов, Атанас Китев, Стефан Генчев, Кристина Гърциянова.** Оценка на кислородния баланс на водите в басейните на реките Тополница и Луда Яна. Проблеми на географията, 4, Издателство на БАН "Проф. Марин Дринов" - София, 2020, ISSN:0204-7209, DOI:https://doi.org/10.35101/PRG-2020.4.2, 41-57 **Национално академично издателство** Линк **Abstract:** The article analyzes and assesses contemporary changes in water quality in the basins of the Topolnitsa and Luda Yana rivers, which are experiencing significant anthropogenic impact of diverse origin and nature. A water quality index, applied in many countries around the world, was used to assess the impact and condition of the waters. The reference values of the indicators in the index are comparable with the same ones in the relevant Bulgarian regulatory documents, which makes it possible to obtain representative results. The critical condition of the river sections of the Topolnitsa, Mutivir and Luda Yana rivers near large settlements has been noted. Local pollution is caused by frequent burst discharges of wastewater from livestock farms. In the lower reaches of the main rivers, a gradual improvement in water quality is observed in terms of the used physico-chemical indicators.
Г7_9	**Върбанов, М.**, **Гърциянова, К.**, **Китев, Ат.**, **Генчев, Ст.** ОЦЕНКА НА КАЧЕСТВОТО НА РЕЧНИТЕ ВОДИ ЧРЕЗ КОМБИНИРАНО ИЗПОЛЗВАНЕ НА РАЗЛИЧНИ ИНДЕКСИ (на примера на реките Тополница и Луда Яна). Проблеми на географията, 1-2, Акад. издателство "Проф. Марин Дринов", 2023, ISSN:0204-7209, DOI:10.35101/prg-2023.1-2.3, 31-43 **Национално академично издателство** Линк **Abstract:** The article presents the possibilities for combined application of diverse indices for assessing the quality/pollution of river waters. For the purposes of the study, the so-called "open", "partially open" and "closed" indices were used, which differ in their construction, algorithm and content, and include at least 10 physico-chemical indicators for assessment. Their sensitivity to various anthropogenic impacts is being tested - industrial, domestic and agricultural. The results obtained indicate that the assessment indices applied in the article respond differently to individual types of anthropogenic pressure and in specific cases, choosing only one index could give incorrect results. The most sensitive is the Canadian Water Quality Index (WQI), and to a significant extent the Water Pollution Index (WPI). The Bavarian Pollution Index is more suitable for checking primarily “domestic” pollution, which limits its independent use. Next, the results of the study make it possible to reveal specifically the spatio-temporal characteristics, forms and scales of pressure on surface waters in the Topolnitsa and Luda Yana river basins, in which various economic activities have been carried out for many years.
Г7_10	**Vatseva, R., Kopecka, M., Otahel, J., Rosina, K., Kitev, A.**, **Genchev, S.** Mapping urban green spaces based on remote sensing data: Case studies in Bulgaria and Slovakia. Proceedings of the 6th International Conference on Cartography and GIS, Bandrova, T., Konechny, M. (Eds.), 1, Bulgarian Cartographic Association, 2016, ISSN:ISSN:1314 - 0604, DOI:DOI:10.13140/RG.2.2.33019.92964, 569-578 **Без JCR или SJR – индексиран в WoS или Scopus https://cartography-gis.com/docsbca/iccgis2016/ICCGIS2016-58.pdf** Abstract: Urban Green Spaces (UGS) contribute to the sustainable development of the urban ecosystem. Recently, UGS have been considered to be of substantial importance for the

	quality of life, since they have a significant impact on ecosystem functions, local microclimate, air quality, recreation and aesthetic perceptions. Remote sensing and geographic information system (GIS) provide powerful tools for mapping and analysis of UGS at various spatial and temporal scales. With the availability of high resolution remote sensing images and multi-source geospatial data, there is a great need to transform Earth observation data into useful information necessary for urban planning and decision making. Therefore, the current research is focused on mapping of UGS, based on remote sensing data. The present study aims to investigate and map the spatial distribution of urban green spaces in Sofia, Bulgaria and Bratislava, Slovakia using remote sensing data by implementing various spatial analysis techniques. The spatial detail of the mapping exceeds previously available land cover datasets such as CORINE Land Cover and Urban Atlas. Based on their function or morphology, fifteen different classes of UGS were mapped and quantified.
Г7_11	**Stoyanova, Velimira**, **Genchev, Stefan**, **Poleganova, Dessislava**. DYNAMICS OF THE URBAN TERRITORY OF ISTANBUL PROVINCE (REPUBLIC OF TÜRKIYE) FOR THE 1985-2018 PERIOD. Proceedings, 9th International Conference on Cartography and GIS, Bulgarian Cartographic Association, 2024, ISSN:1314-0604, 636-645 **Национално неакадемично издателство** Линк Abstract: Turkey's rapid urbanization over the past four decades has significantly altered the country's rural and urban landscape, creating new temporal and spatial patterns of urban fabric. Though the geographical evolution of urban territory and the trends toward urbanization are somewhat diverse in the various Turkish cities, these processes are most noticeable in Istanbul. The complex and multi-layered nature of the urbanization processes in Istanbul, as well as their rapid development in recent years, determine the need to investigate trends in the spatial expansion of the urban territory in Istanbul province. The current study uses GIS and remote sensing data for the years 1985–2018 to evaluate changes in urban expansion and land cover types in the Istanbul province. At the beginning of the considered period, the urbanized territory of the province's total area was 13.29%, and in 2018 it was 23.03%. We identified the following classes of urban territory in the study area: Continuous urban fabric (CLC 111), Discontinuous urban fabric (CLC 112), Industrial or commercial units (CLC 121), Road and rail networks and associated land (CLC 122), Port areas (CLC 123), Airports (CLC 124), Mineral extraction sites (CLC 131), Construction sites (CLC 133), Green urban areas (CLC 141), and Sport and leisure facilities (CLC 142).
Г7_12	**Nadezhda Ilieva**, **Boris Kazakov**, **Stefan Genchev**, **Aleksandra Ravnachka**, **Velimira Stoyanova**. APPLICATION OF GIS IN SPATIAL SEGREGATION MEASUREMENT (A CASE STUDY OF PLOVDIV, BULGARIA). Proceedings Vol. 1, 8th International Conference on Cartography and GIS, 2020, Nessebar, Bulgaria, Eds: Bandrova T., Konečný M., Marinova S., 1, Bulgarian Cartographic Association, 2020, ISSN:1314-0604, 94-109 **Без JCR или SJR – индексиран в WoS или Scopus (Web of Science)** Линк Abstract: In Bulgaria, spatial segregation is mostly related to the Roma quarters, which occupy a significant part of the urban space and thus represent a functional barrier to urban development. The paper presents the results of measuring spatial segregation in its five dimensions proposed by Massey and Denton’s conceptual scheme: evenness, exposure, concentration, centralization and clustering. Specific indicators providing information on the above-mentioned dimensions of the Roma segregation in the urban area of Plovdiv have been calculated, based on official national statistical data, satellite and orthophoto images, and

	GIS. The proposed methodology can be used for other cities as well, making comparison and spatial analysis possible.
Г7_13	**Stoyanova, Velimira**, **Ravnachka, Aleksandra**, **Genchev, Stefan**. APPLYING CLUSTER ANALYSIS IN BULGARIAN CHEMICAL INDUSTRY FOR THE PERIOD 2010–2020. Journal of the Geographical Institute "Jovan Cvijić" SASA, 75, 2, 2024, ISSN:03507599, DOI:10.2298/IJGI240312011S, 165-180. SJR (Scopus):0.41 **Q3 (Scopus)** Линк Abstract: This paper discusses the territorial organization of the chemical industry in Bulgaria. Using the ESRI ArcGIS software and applying cluster analysis, the study aims to group (cluster) the 28 Bulgarian districts (NUTS 3 level classification) based on produced output, persons employed, and Bulgarian lev (BGN) equivalent of foreign exchange earnings from exports for the period 2010–2020. Three reference years, 2010, 2015, and 2020, have been selected for the observed period. The general conclusion is that the chemical industry in Bulgaria is characterized by high territorial concentration. Varna was the leading district in developing the chemical industry in the observed period from 2010 to 2020, followed by Plovdiv, Ruse, and Sofia (the capital). At the other pole were the districts of Vidin, Montana, Vratsa, Pleven, Lovech, Razgrad, Silistra, Targoviste, Dobrich, Pernik, Kyustendil, Blagoevgrad, Sliven, Yambol, and Kardzhali. The findings of the research show that territorial polarization is linked with several factors that can be grouped according to their impact into four groups: 1) raw material and energy, 2) transport infrastructure and proximity to the end user, 3) state and environmental regulations, and 4) provision of skilled labor.
Г7_14	**Tcherkezova, E.**, **Markov, K.**, **Varbanov, M.**, **Genchev, S.** ASSESSMENT OF INLAND WATER BODY EXTENT USING SENTINEL 2 IMAGERY: AN EXAMPLE FROM THE BATAK RESERVOIR (WESTERN RHODOPES, BULGARIA). PROCEEDINGS of the XXXIV INTERNATIONAL SYMPOSIUM MODERN TECHNOLOGIES, EDUCATION AND PROFESSIONAL PRACTICE IN GEODESY AND RELATED FIELDS – 2024, Съюз на геодезистите и земеустроителите в България, 2025, ISSN:2367-6051, 268-276 **Национално неакадемично издателство** Линк Abstract: Climate change and human activities significantly impact inland surface water bodies. Effective water use and resource management depend on accurate delineation of water body boundaries. The rapid development of geoinformation technologies over the past decades provides an opportunity to apply Geographic Information Systems (GIS) and remote sensing methods and techniques for water body delineation and for analysis their spatial and temporal dynamics. This study utilizes Sentinel-2 optical satellite images to analyse the surface water area changes of the Batak Reservoir (Western Rhodopes, Bulgaria). The analysis covers two years in two seasons: November (2022) and July (2024). It includes the calculation of several water indices, e.g. Normalized Difference Water Index (NDWI), Sentinel Water Mask (SWM), Water Ratio Index (WRI), threshold methods, and Object-Based Image Analysis (OBIA). The results were compared with in-situ investigation and open source data from the Bulgarian Ministry of Agriculture and Food. They provide valuable spatial information on changes in the Batak Reservoir area, which cannot be identified only by measuring its water levels. This highlights the usefulness and effectiveness of processing satellite imagery data, which can be applied to enhance the quality of existing data sets available from the East Aegean River Basin Directorate (Plovdiv). Also, the methodological approach used in this study can be applied for long-term monitoring of the spatial and temporal changes in the boundaries of the Batak Reservoir.

Г7_15	**Stoyanova, Velimira, Tcherkezova, Emilia, Genchev, Stefan, Zareva, Elitsa, Metodieva, Gergana.** LAND USE AND LAND COVER CHANGE IN THE CHEPINSKA VALLEY FOR 30 YEARS PERIOD. Bandrova T., Konečný M., Marinova S. (Eds.). Proceedings, 9th International Conference on Cartography and GIS, 16-21 June 2024, Nessebar, Bulgaria, Bulgarian Cartographic Associaion, 2024, ISSN:1314-0604, 365-372, Bulgarian Cartographic Association, 2024, ISSN:1314-0604, 321-330 Национално неакадемично издателство Линк Abstract: The study aimed to identify land cover and land use transformations in the Chepinska River valley over the last 30 years. The total area of the considered territory is 976.86 km2. For the main aim of the article, applied methodology is based on Geographic Information Systems (GIS) analysis and assessment. The area is characterized by Artificial surfaces (26.17 km2), Agricultural areas (159.73 km2), Forest and semi-natural areas (770.21 km2), and Water bodies (20.75 km2). Forest and semi-natural areas predominated over the other three classes and occupied over 79% of the study area. This class is represented by the following classes at level 3: Broad-leaved Forest (CLC 311), Coniferous forest (CLC 312), Mixed forest (CLC 313), Natural grasslands (CLC 321), Transitional woodland-shrub (CLC 324), and Sparsely vegetated areas (CLC 333). At the beginning of the considered period, the Forest and semi-natural areas of the total area was 80.74% (788.71 km2), and today it is 78.84% (770.20 km2).
Г7_16	**Velimira Stoyanova, Stefan Genchev, Emilia Tcherkezova, Gergana Metodieva.** Land Cover Classification through GIS-Based Clustering of Morphometric Terrain Features: The Chepelarska River Basin (Western Rhodopes, Bulgaria). Journal of Geoscience and Environment Protection, 13, 8, 2025, ISSN:2327-4344, DOI:10.4236/gep.2025.138007, 121-128 Линк Abstract: This paper proposes a GIS-based approach to classifying land cover using key morphometric indicators—slope, aspect, and elevation. The study focuses on the Chepelarska River basin in the Western Rhodopes, Bulgaria, combining CORINE land cover data with digital terrain models. K-means clustering, implemented via the ArcGIS Mapping Clusters tool, was employed to identify natural groupings based on the morphometric variables. The analysis yielded four distinct land cover clusters, each defined by a unique morphometric profile. Among the examined indicators, slope and aspect proved most significant in shaping land cover distribution. The study demonstrates the potential of morphometric clustering as a practical tool for land management in mountainous terrains and highlights its innovative use within GIS-based land cover analysis.
Г7_17	**Петров П., Г. Железов, Ст. Генчев.,** Крайдунавска рекреационно-туристическа зона – проблеми и перспективи. Сборник доклади, Международна научна конференция „География и регионално развитие", гр. София, 2010г. 299-304., Национален институт по геофизика, геодезия и география при БАН, 2010 г., ISBN: 978 954 9649 07 9 Abstract: On the basis of an integrated approach, the Bulgarian Danube coast and islands are considered as a combination of key components of current and potential tourism products: sites of natural and cultural heritage, road infrastructure (public sector) and tourism infrastructure (private sector).
Г7_18	Staddon, C., **Genchev, S.**. Geographical and Temporal Dimensions of Bulgarian Attitudes towards the Rural Environment. Czech Sociological Review 2013, 49(3), 2013, SJR (Scopus):0.408, JCR-IF (Web of Science):0.563, 375 – 402, **Q2 (Web of Science)** Линк

	Abstract: This paper explores certain dimensions of the transformation since 1989 in attitudes towards the environment in one largely rural locality of southwest Bulgaria. There is something of a paradox apparent in rural attitudes and behaviours to the environment: nakedly expropriative on the one hand whilst simultaneously deeply concerned and celebratory on the other. Exploration of this apparent paradox is the primary objective of this paper. The authors present fi ndings from a decennial survey initiative focusing on environmental attitudes and behaviours in a mountainous Bulgarian locality. Results from 1999 and 2011 are presented side by side with a view to identifying temporal and (local) geographical trends in environmental views, attitudes, opinions and behaviours. An analytical perspective, drawing on political ecology and post-structural social theory, is developed and applied.
Г8_1	Kotsev, Ts., ***Stoyanova, V.***, Aidarova, Z., Genchev, St. КОНЦЕПЦИЯ ЗА МОНИТОРИНГ НА АРСЕНА В СИСТЕМАТА ПОЧВИ-ГРУНТОВИ ВОДИ-РЕЧНИ ВОДИ В ЗАСЕГНАТАТА ОТ РУДОДОБИВ ДОЛИНА НА РЕКА ОГОСТА. Concept of arsenic monitoring in the soil-groundwater-river water system in the mining affected Ogosta river valley. Проблеми на географията, 1-2, Акад. изд. "Марин Дринов", 2020, ISSN:0204-7209 ISSN 2367-6671 (Online), 101 – 125, http://geoproblems.eu/wp-content/uploads/2020/07/2020_12/7_kotsev.pdf Abstract: The article presents the concept, structure and technical characteristics of the exploratory monitoring system in the Ogosta River valley. The construction of the system aims to study the spatial distribution of arsenic in groundwater on the floodplain terrace, contaminated during river spills with waste from the flotation of sulfide ores. Subsequently, the monitoring program focused on the processes of mobilization and movement of arsenic in the river-alluvial terrace system. The concept of the monitoring network is based on the relationship between the degree of groundwater pollution and the landforms in the floodplain terrace. This relationship is due to the specific conditions in the different morphological parts of the floodplains for the accumulation of river sediments and the movement of arsenic from the soil to the groundwater. 25 piezometers are located in sections of the active floodplain terrace with different heights above the river, in the stream zone of an old river bed filled with sediment, as well as in the high floodplain terrace. The stations cover a wide range of arsenic concentrations in soil (15–40,300 mg/kg) and groundwater (1–700 mg/l). The spatial organization of the monitoring network allows studying the factors and patterns in the spatial distribution of contamination of the alluvial aquifer within the floodplain. The system provides an opportunity to monitor the impact of river flows on the mobilization of arsenic in contaminated soils and its movement to groundwater and river waters. Such studies can be carried out in a test site in the valley, which includes two piezometers, a hydrometric point on the river, a soil monitoring system and a meteorological station. All of them are equipped with telemetry systems. Online access to real-time information allows for decision-making on sampling of river, groundwater and soil-pore waters in characteristic states of the river-floodplain system. The established monitoring system is the basis for transforming the Ogosta River Valley into a test area for studying arsenic migration in contaminated river terraces and for modeling the processes of its mobilization and transport. It can be used to assess these processes in light of the modern concept of using the self-cleaning of natural systems as a strategy for their restoration. When developing the relevant regression models, the monitoring network can be used to predict arsenic concentrations in groundwater and river waters. When developing the relevant

	regression models, the monitoring network can be used to predict arsenic concentrations in groundwater and river waters.
Г8_2	**Стоянова В., Методиева Г., Черкезова Е., Генчев С.** Оценка на земното покритие във водосбора на река Чепеларска (Западни Родопи, България) за периода 1990–2018 г., Проблеми на географията, 1-2, Акад. издателство "Проф. Марин Дринов", 2025, ISSN:0204-7209, DOI:DOI: 10.7546/PG.1-2.2025.08, 131 – 165 **Национално академично издателство** Линк Abstract: Land cover changes are among the key indicators of human impact on the natural environment. Urbanization, industrialization, land use changes and deforestation lead to significant transformations associated with biodiversity loss and disruptions in the carbon and hydrological balance. This study assesses land cover changes in the Chepelarska River catchment area (Western Rhodopes) for the period 1990–2018, using data from CORINE Land Cover (level 3) and GIS. 20 classes were identified, dominated by forests and semi-natural areas (83% in 2018), followed by agricultural lands (14%) and anthropogenic sites (3%). The most significant changes are observed in classes 311, 243 and 324. Strong anthropogenic impact is reported in the areas around the Lucky-2 tailings pond, the industrial zone in Asenovgrad and the Pamporovo resort. A spatial dependence has been established between land cover and the socio-economic characteristics of municipalities.
Г8_3	**Nadezhda Ilieva,** Tamás Hardi**, Stefan Genchev, Aleksandra Ravnachka, Dessislava Poleganova,** Szilárd Rácz**, Boris Kazakov.** Suburbanization processes in second tier cities in Bulgaria – demographic, socio-economic, and spatial transformation of the agglomeration areas (a case study of Plovdiv and Burgas). Проблеми на географията, Книга 1-2, Акад. издателство "Проф. Марин Дринов", 2023, ISSN:0204-7209, DOI:DOI: 10.35101/prg-2023.1-2.5, 63 – 91 **Национално академично издателство** Линк Abstract: The main goal of this study is to explore the suburbanization process by analyzing the population dynamics, socio-economic and spatial transformation in the agglomeration areas of the second tier cities (according to ESPON's classification) of Plovdiv and Burgas in Bulgaria. For the scope of the present study, three essential tiers of analysis have been defined: demographic transformation, socio-economic transformation, and changes in land cover. Depending on the population change trends (positive and negative) and the impact of the two main components (natural and migratory growth), a settlement typology has been done using the methodology of Webb (1963) for the 2001–2011 and the 2011–2021 periods. Subsequently, an analysis of particular social and economic indicators has been carried out in order to track the changes and highlight the differences between the urban transformation of Burgas and Plovdiv respectively. The most valuable sources for spatial transformation analysis are the geospatial databases obtained by decoding satellite images enabling the study of land cover types and their change. Currently, various information sources are available, but as far as European countries are concerned, the database created and coordinated by the European Commission under the Copernicus programme is considered the most applicable (the layers containing information on the land imperviousness), as well as the JICA data. The agglomerations of Burgas and Plovdiv differ in terms of the type and intensity of changes in land cover in the 2006–2018 period. During the entire period, the agglomeration of Plovdiv exhibits a definite prevalence of the new land cover in its periphery, at the expense of the agglomeration core, in contrast to the agglomeration of Burgas. In the case of Plovdiv, the changes in its agglomeration periphery occur at least twice as fast as those in the agglomeration core. In the agglomeration of

	Burgas, on the other hand, the relative share of new types of land cover prevails in the periphery during certain time periods (2006–2009 and 2012–2015), at the expense of the size of that same class of land cover in the agglomeration core.
Г8_4	**Varadzhakova, D**, **Genchev, St**. Main Characteristics of the Accommodation Facilities in Rural Areas: The Case Study of Bulgarian North-West Region. Tourism and Rural Space (TARS), 48, 2, Performantica Publishing House, 2022, ISSN:2971-9151, DOI:10.5281/zenodo.7547390, 223-247 **Индексирано в ERIH+ (ERIH Plus)** Линк Abstract: Tourism sector is very important for the Bulgarian economy. Before the pandemic of COVID-19 it generates between 10% and 12% of the country's GDP. The present paper discusses the specifics of the tourism business in the rural areas. For the purpose of the study the research object are the accommodation facilities in these areas. The North-West Region of Bulgaria is chosen as a researched area because it is the least economically developed area in the country. There are 46 rural areas, evenly distributed in the five provinces of the region. The main types of accommodation, their characteristics, their territorial location compared to major urban centers and their relationship with the number of tourist attractions in the researched areas are identified. The main goal of the paper is to explore the potential for development of tourism in rural areas, based on a study of the accommodation facilities in the rural areas in the North-West Region of Bulgaria. The research includes an analysis of the disparities between the different rural areas, the possible reasons for them, as well as the opportunities for tourism development. The conclusions that have been made can become the basis for the development of tourism products and regional strategies for the development of specialized and alternative types of tourism.

гр. София Подпис: ……

Дата: гл.ас. д-р Стефан Генчев