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INFLUENCE OF AGSUCHAY AND GIRDIMANCHAY WATERS AND SPECTRAL CHEMICAL COMPONENTS OF FOREST SOILS ON TRANSFORMATION IN THE MOUNTAINOUS AREA OF THE GREATER CAUCASUS

Aim: The main basis of the research is the study of the elemental components of river waters and forestlands (in the example of Agsuchay and Girdimanchay basins) in the mountainous areas of the Greater Caucasus and their role in the restoration of forests.

The methodological basis of the article: I took the samples from the mountain waters and forest soil of the study area. I did additional laboratory and spectral analysis of the samples, and tabulated the content I obtained. Then I analyzed these results.

Results: The results of field and laboratory analyses revealed that, due to the climate change, the water resources of rivers in mountainous areas have decreased, the resulting water shortage has affected the natural flora, the species composition of trees and shrubs has decreased, and their natural regeneration has weakened. Our visual observations also show that another reason for the intensive transformation of the area is the mistreatment of the population and catering facilities in the area of the forest and water. The catering facilities created in the forests in the study areas discharge wastewater into the rivers, cut down the trees in the forests unplanned and blindly, which in turn leads to the drying of forests and the formation of steppes. The population intensively leaves their livestock in the forest areas without permission and without ownership and as a result, the trees formed from new shoots cannot grow and eventually dry up. Out of the plant species, most grass species have been transformed attracting attention in sparse forests. Chemical analysis has shown that the resulting environmental factors have increased the degree of salinization of water and soil, and the transformation of species attracts attention. Salinization is formed due to an increase in calcium, chlorine, sulfur and metal oxides, and has a definite effect on the transformation of the area.

Scientific novelty: For the first time, a spectral-chemical analysis of the water of mountain rivers (by the example of Aghsuchai and Girdimanchay) and forest soils was carried out. Moreover, for the first time, we determined the electrical conductivity by conducting chemical and spectral analysis of the soil cover of the study area. The obtained scientific innovations will prevent transformations by applying them to different areas.

Keywords: Natural regeneration of forests, water and soil components, study of radiation background.

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ВЛИЯНИЕ ВОД АГСУЧАЙСКОГО И ГИРДИМАНЧАЙСКОГО И СПЕКТРАЛЬНО-ХИМИЧЕСКОГО СОСТАВА ЛЕСНЫХ ПОЧВ НА ТРАНСФОРМАЦИЮ В ГОРНОЙ РАЙОНЕ БОЛЬШОГО КАВКАЗА

Цель: Основная основа исследования - изучение элементных компонентов речных вод и лесных массивов (на примере бассейнов Агсучая и Гирдиманчай) в горных районах Большого Кавказа и их роли в восстановлении лесов.

Методологическая основа статьи: взяты пробы из горных вод и лесной почвы исследуемой территории. Я провел дополнительный лабораторный и спектральный анализ образцов и свел полученные данные в таблицу. Затем я проанализировал эти результаты.

Результаты: Результаты полевых и лабораторных анализов показали, что из-за изменения климата водные ресурсы рек в горных районах уменьшились, возникшая нехватка воды повлияла на естественную флору, уменьшился видовой состав деревьев и кустарников, и их естественная регенерация ослабла. Наши визуальные наблюдения также показывают, что еще одной причиной интенсивного преобразования территории является плохое обращение с населением и предприятиями общественного питания в зоне леса и воды. Созданные в лесах на исследуемых территориях предприятия общественного питания сбрасывают сточные воды в реки, вырубают деревья в лесу незапланированно и вслепую, что, в свою очередь, приводит к усыханию лесов и образованию степей. Население интенсивно оставляет свой скот в лесах без разрешения и без права собственности, в результате деревья, образованные из новых побегов, не могут расти и со временем засыхают. Из видов растений большинство видов трав были преобразованы, привлекая внимание в редких лесах. Химический анализ показал, что возникшие в результате факторы окружающей среды увеличили степень засоления воды и почвы, и трансформация видов привлекает внимание. Засоление образуется за счет увеличения содержания оксидов кальция, хлора, серы и металлов и оказывает определенное влияние на преобразование территории.

Научная новизна: Впервые проведен спектрально-химический анализ воды горных рек (на примере рек Агсучай и Гирдиманчай) и лесных почв. Кроме того, впервые мы определили электропроводность путем проведения химического и спектрального анализа почвенного покрова исследуемой территории. Полученные

научные инновации предотвратят трансформации, применив их в разных сферах.

Ключевые слова: естественное возобновление лесов, компоненты воды и почвы, изучение радиационного фона.

Purpose: The main purpose of the research is to study the patterns of transformation of forest ecosystems in the Agsuchay and Girdimanchay basins of the Greater Caucasus and to determine the eco-geographical situation.

Introduction: It is known that there is a close connection between people and nature, and man himself is an integral part of nature. When these two factors function as a single system, rather than separately, environmental conditions will improve and human society will live a healthier life. The intensive increase in the number of people on our planet and technical progress lead to a wider use of the environment, especially natural resources, which in turn leads to the exploitation of natural resources and a significant reduction in its reserves. In our time, the factors that cause climate change are the result of human activities, increasing the number of environmental disasters and crises on our planet. As a result of climate change, permafrost is melting, and the surface of the oceans continues to rise. Due to rising temperatures, seasonal climate change, and water shortages, vegetation in many parts of the world, especially forests, is declining, and desert and desertification are attracting attention. Forest fires have started to increase in the last decade. It reached a record number in 2018-2021. Fires broke out in the forest areas of Australia, Sweden, Greece, Russia, France, Spain, Turkey, as well as in our country, and 100,000 hectares were reduced to ashes. The above-mentioned events have led to climate change and the study of modem methods in order to implement real measures to protect nature and forests has been a priority for researchers.

Research area: The study area covers the basins of the Aghsuchay and Girdimanchay rivers of the Greater Caucasus.

Research objects and methods. There are many mountain rivers in the mountainous region of the Greater Caucasus (Agsuchay and Giridmanchay basins). Along with small mountain rivers, there are Agsuchay, Girdimanchay, Akhokhchay in this area, which are distinguished by their length, water content and valley. Occasional floods in the area attract attention. My conducted research specifically focused on two main water sources known in the mountainous part of the region, and samples were taken from the river water of both rivers in the mountainous part of Ismayilli and Shamakhi regions, 1.0-1.5 m from the shore, the latest results of chemical analysis using the British - made « Palintest Photometer 7100 » automatic device made in England are recorded and presented in the table in the laboratory environment.

Table 1.

Chemical analysis of water sources close to the forest area Research material:

Number	Mineral compounds	Water accepted norms, mg / l	The result of the analysis	
			Agsuchay	Girdimanchay
1	pH	7.0-8.0	9.4	9.0
2	The roughness	0-300	395	239
3	Iron - Fe^{+2}	0-5.0	0.37	0.13
4	Potassium - K^{+}	0-12.0	2.8	7,1>
5	Magnesium - Mg^{2+}	0-100	»	»
6	Sulfate (SO_4^{2})	0-200	180	193
7	Ammonia NH_4^{+}	0-1.0	2.2	2.5
8	Ammonium NH_4^{+}	0-2.0	2.5	2.9
9	Chlorine (CL "2) ion	0-5.0	0.00	0.03
10	Chlorine compounds (NaCl)	0-50	56	67
11	Magnesium carbonate - MgCO 3	0-500	»	»
12	Calcium Carbonate - CaCO 3	0-500	480	120

Note: The analyzes were performed using the " **Palintest Photometer 7100 "** made in England, the average values were presented.

Firstly, the pH indicator of the water samples was determined [12,35].

The temperature and relative humidity of the soil taken from the forest lands in the mountainous

areas, from the dense and mixed forest area in the middle zone, from the relatively black soil type, from a depth of 30-35 cm were determined. In the laboratory, soil samples were first dried, then crushed and passed through a 0.1 mm sieve. After taking 100 g of soil samples and keeping them in 100 ml of water for 1 hour, the mass was determined and dried at 105 C to determine the water capacity and water storage capacity. It became clear that the water content of the soil brought from the area is 20-25%, water storage capacity is 65-70%. After that, the chemical components of the soil are determined and presented in the table. The chemical components of the soil were determined automatically by the British- made « Palintest Soil Kits-400 » device.

Analysis and discussions: During the research period, chemical analysis and its separate components of some river waters (in the example of Agsuchay and Girdimanchay basins) in the mountainous areas of the Greater Caucasus were carried out by the staff of the "Plant Ecology" laboratory of the Institute of Dendrology of ANAS. First of all, the pH index was determined in the imported water samples and its index in water samples was registered -9.4 in Agsuchay; in Girdimanchay water as 9.0. This indicator confirms that the samples are weakly alkaline and are harmful to plants growing in natural conditions. In this case, the factors that adversely affect the root system of plants are very close to the normative indicator, and no adverse effects have been reported. [5,6,8].

The fact that the total hardness of water samples is 95 mg higher than the standard norm is a factor affecting water quality. Although its effect on very old tree species is not so great, it can affect shrubs, especially perennial evergreens. Only for shrubs, such roughness has a negative effect and can cause certain errors for leafshedding plants. Magnesium sulphate (MgSO), magnesium carbonate (MgCO;), calcium sulphate (CaSO.4) and calcium carbonate (CaCO) salts are the cause of high hardness in Agsuchay water. That is why the numerical value of chlorinated compounds in Agsuchay water, especially sodium chloride (NaCl), is higher than the norm, and the water is very salty. [5.7.9]. The high content of magnesium carbonate (MgCO3) in the water of Agsuchay indicates that the water looks white.

The amount of sulfur compounds in water samples (K2SO4; CaSOi; MgSCU, etc.) confirms that the water source flows from saline soils.

Nitrogen compounds in this water sample are very low (0.25 mg /1) and confirm that it is not rich in organic decay. The sample contains no free chlorine ions (CI2). Chemical analysis of the samples confirms that the water of the Agsuchay basin can be used as a means of providing drinking water to the local population only after it is treated at high temperatures. On the other hand, flowing in the lower reaches of the mountainous area of the Agsuchay, the probability of natural infiltration is low. [6,10,11].

The chemical analysis of the water brought from the Girdimanchay confirms that the alkalinity of the water is relatively low compared to the Agsuchay, and that it flows between the steep rocks (granite rocks) and is much purified and settled. The water also contains little organic decay. The total hardness of the water is 156 mg less than Agsuchay water. Here, only 0.13 mg of iron ion, 7.1 mg of potassium ion (K +) and its content is 4.3 mg more than the water of Agsuchay. The abundance of potassium ions has a positive effect on plant roots, creating favorable conditions for their metabolism. At the same time, Girdimanchay water has a positive effect on water quality due to its low hardness. Magnesium sulfate is very high in the analyzed water, and we would like to note that it is very likely that the Girdimanchay flows from deep rocky areas and is associated with a mixture of ancient animal and plant remains. That is why sulfate compounds in Girdimanchay water are higher than in Agsuchay water and are very close to normative indicators. The amount of nitrogen compounds (NH, and NH4) here is relatively higher than in the Agsuchay sample. Chlorinated compounds (NaCl) in Girdimanchay water are higher than the standard value, which increases the probability that the water is saline. The high content of magnesium carbonate (MgCO) in the sample confirms a slight salinity on the lower shores of the source, while the salts of calcium carbonate ($CaCO_3$) are 3-4 times less than the norm. Calcium ions are sharply reduced at the mouth of the Kurchay of the Girdimanchay.

Based on the above information, it can be concluded that the water of the both rivers fully provide household and vegetation in the area. The chemical elements in the water are good for the normal metabolism of the vegetation. Normal relative humidity in this area regulates the growth and development of perennial rare plants. During the study period, the number of species of some rare and endemic species (chestnut oak, hornbeam, beech, etc.) decreased only due to the relative decrease in relative humidity and water scarcity in the upper reaches of the mountain slopes, sparseness and weakening of the growing process were noted in the forest. During the study period, only a decrease in the number of species of some rare and endemic species (chestnut oak, hornbeam, beech, etc.) and thinning and reduce in growing process was observed in the forest due to the relative decrease in relative humidity and water scarcity in the upper reaches of the mountain slopes. In some of the areas mentioned, the transformation of tree species has

attracted attention, and the natural regeneration of rare species is weak. One of the main reasons for the transformation in the surveyed areas is the current climate change and water scarcity. For this reason, soil samples were taken from some areas during the study period, soil temperature, water storage and capacity, as well as chemical water components were determined with modem devices at a depth of 30-35 cm. It was found that the temperature of the mountain belts decreases with increasing temperature, the water content of the soil varies between 70-80% per 100 g, and the water storage capacity varies between 45-50%. [8,9].

Table 2.

Chemical analysis of soil samples of the forest belt in the highlands of the south-eastern region of the Greater Caucasus, in mg /1

Examples	Depth (in cm)	pH	Electrical conductivity	NO_3^{2-}	K^+	NH_3^+	Cu^{2+}	Mg^{2+}	SO_4^{2-}	$P_2O_5^{3-}$	Ca^{2+}	ci^-	Al^{3}	Fe^{2+}	Mn^{2+}
	Standard	7		0-25 mkg/1	0- 450 mkg /1	0-75 mkg/ 1	0-25 mkg /1	0-500 mkg /1	0- 300 mkg /1	0- 150 mkg/ 1	0- 250 mkg /1	0- 1000 mkg	0-50 mkg /1	0-25 mkg /1	0-25 mkg/ 1
Ismayilli, Topchu village, middle	0-35cm	6.5	1020	«	190	«	«	«	«	55	3500	1875	«	4.6	1.6
Ismayilli, Buynuz village, etc. forest	0-35cm	7.2	IIЗO	«	230	«	«	«	«	78	3750	1400	«	4.5	2.1

Note : The analyzes were performed using the Palintest soil kits 400 made in England

Photo 1. Analytical spectrum of soil elements

Indicators of chemical components of soil samples taken from the areas are presented in Table 2. Samples were taken from the forest area in the upper part of Topchu and Buynuz villages, and designated after the soil had dried. It is clear from the figures in the table that the electrical conductivity of the soils here is 1020 cm / ms. The high electrical conductivity should be associated with the accumulation of iron (Fe), aluminum (Al) and manganese (Mn) in the soil. The low content of copper (Cu) and magnesium (Mg) elements in the soil causes these elements to seep into the deeper layers of the soil and use the root system of tree species in the deeper layers, ensuring plant growth. As elements of iron, aluminum and manganese accumulate in the topsoil, such soils are more favorable for grasses and shrubs, some fruits and other plants, the grazing area of the area increases significantly, and some weeds are more widespread. The presence of potassium (K) in soil samples accelerates the entry of other chemical elements into the root system of plants. It is clear from the indicators in this table that the amount of calcium in the soil sample (Topchu village forest) is much higher than the standard indicator. The activeness of this element and its rapid involvement in the exchange process ensures that the wood in the trunks of tall oriental plane, hornbeam, pistachio and

linden species is strong, dense and long-lasting. That is why there are many rare and endemic species in the forests of this area. The amount of chlorine (CI) in the range of Table 2 is slightly higher than the norm. Although chlorine affects soil salinization, it is involved in photosynthesis, an important process in plant life. In such areas, the fact that the leaf body of broad-leaved species is dark green is strongly dependent on the level of illumination falling on the area. Thus, due to the low light in the dense forest area, the amount of chlorophyll increases, and the process of photosynthesis increases. In sparse forests there is a lot of light, the leaves are light green. The water storage capacity and water capacity of soil samples taken from the upper part of Buynuz village are very low. There is little organic rot in the soil, a lot of mechanical impurities, and most of them are hard rock fragments. At a depth of 30-35 cm, the temperature is between 10-12 ° C and the relative humidity is 45-50%. The soil is closer to gray-brown soils. However, the soil - pH level (PH 7.0) is very close to neutral condition (PH 7.2). The species composition of the vegetation here is weak and sparse from other areas

(Topchu village). The height of the eastern plane and hornbeam, the tallest tree species here, is estimated at 25-30 m, the diameter of the trunk is 60-80 cm, and the density of the forest is estimated at 0.5-0.7. As can be seen from Table 2, the electrical conductivity of the soil here is 1130 cm / ms. Due to the low level of organic decomposition in the area, both nitrate nitrogen (NO) and other nitrogen compounds (NH and NH_2) are low, and the vegetation is salt-resistant grass species. Free nitrogen (N_2) is abundant in the soil. This indicator confirms that due to the small number of nitrogen bacteria in the soil, their activity is weak, molecular nitrogen does not allow the formation of N_2Os, NO, and NH needed by plants, plant leaf rot is low in the soil, and due to floodwaters washing away the soil in rainy weather. The high content of calcium salts in the soil sample can ensure the hardness and longevity of the wood in the trunks of tree species. The high content of phosphorus compounds (P_2O_5) in the soil samples confirms the prevalence of fruit species in the area, where flower species were able to create favorable conditions for the presence of berry bushes. The sample contains 1,400 mcg of chlorinated compounds, with fewer coniferous species and more deciduous species in the area. The data from the table show that in mountainous areas, the spectral expression is also weak due to the very small amount of the element aluminum (Al). On the other hand, the information of Mammadov T.S. and Asadov H.H. on the assimilation and use of aluminum by plants should be considered as confirmed. Long-term research by the authors has shown that aluminum cannot be involved in metabolic processes by the root system of plants. The elements iron (Fe) and manganese (Mn) in the soil play an active role in the life processes of plants, especially in the metabolic cycle. From the above information, it is once again confirmed that water and soil are an indispensable environmental factor in the life of plants and play an important role in the transformation of plants. Just as there is no life without water, there is no natural cycle without soil. The distribution of plants depends on the type of soil and the activity of the chemical elements there. Because each soil has its own vegetation. From this point of view, the characteristic vegetation of the Agsuchay and Girdimanchay basins of the Greater Caucasus has been formed. The proliferation of long-lived, rare and endemic species here confirms the existence of forests since ancient times, the transformation of tree and shrub species and the variability of biological diversity. (Spectrum analysis) In modem times, ecological crises, climate change and water scarcity, floods, earthquakes and forest fires, intensify the process of transformation. That is why every researcher should strive to contribute to the enrichment of biodiversity while preserving the natural regeneration of forests.

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