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BIOCLIMATIC RESOURCES OF AKMOLA REGION

Abstract

Bioclimate a characteristic that determines the complex impact of climate on the human body in a given area. The bioclimate of the district is the most important natural resource, which is subordinated to the sensitivity and comfort of a person, the ability to work, and human health in general conditions. Bioclimatic resources can be assessed by the characteristics of the comfort of the climatic conditions necessary for the habitat and vital activity of organisms in a given area, as well as people. Bioclimatic indices physically characterize the thermal characteristics of the environment and are an indirect indicator of the thermal state of the human environment. The bioclimatic assessment of the Akmola region was carried out according to the bioclimatic indices. These are: effective temperature (ET), equivalent-effective temperature (PET), biologically active temperature (BAT), normal equivalent-effective temperature (PET), radiation – equivalent temperature (ret), Bodman hardness index (S), reduced temperature (tkelt.). These indices were determined separately for the warm and cold periods of the year. Many works in the world and in Russia are devoted to the topic of bioclimate. And in our country, this topic is little studied. Preservation of bioclimatic resources is very important at the present time. As a result of various environmental disasters, wars, anthropogenic impact on nature, the entire system of bioclimatic resources is changing day by day. Global warming, changes in ecosystems affect the entire system. Various conventions and protocols for the conservation of these resources are being drawn up all over the world, and our country is also a participant in these processes. Analysis of the bioclimatic system of the Akmola region, so its study is relevant.

Keywords: air temperature, relative humidity, wind speed, repeatability, land fund, resource.

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АҚМОЛА ОБЛЫСЫНЫҢ БИОКЛИМАТТЫҚ РЕСУРСТАРЫ

Аңдатпа

Биоклимат белгілі бір аумақта климаттың адам ағзасына кешенді әсерін анықтайтын сипаттама. Ауданның биоклиматы адамның сезімталдығы мен жайлылығына, еңбекке қабілеттілігіне, жалпы жағдайда адам денсаулығына бағынатын ең маңызды табиғи ресурс болып табылады. Биоклиматтық ресурстарды белгілі бір аумақтағы организмдердің, сондай-ақ адамдардың тіршілік ету ортасы мен тіршілік әрекетіне қажетті климаттық жағдайлардың жайлылық сипаттамалары бойынша бағалауға болады. Биоклиматтық көрсеткіштер қоршаған ортаның жылулық сипаттамаларын физикалық сипаттайды және адам қоршаған ортаның жылулық күйінің жанама көрсеткіші болып табылады. Ақмола облысының биоклиматтық бағасы биоклиматтық көрсеткіштер бойынша жүргізілді. Олар: тиімді температура (ET), эквивалентті-тиімді температура (ПЭТ), биологиялық белсенді температура (BAT), қалыпты эквивалентті-тиімді температура (PET), радиация – эквивалентті температура (ret), Бодман қаттылық индексі (S), төмендетілген температура (tkelt). Бұл индекстер жылдың жылы және суық кезеңдері үшін

бөлек анықталды. Әлемдегі және Ресейдегі көптеген жұмыстар биоклимат тақырыбына арналған. Ал біздің елде бұл тақырып әлі де зерттелу үстінде. Қазіргі уақытта биоклиматтық ресурстарды сақтау өте маңызды. Түрлі экологиялық апаттар, соғыстар, табиғатқа антропогендік әсер ету нәтижесінде бүкіл биоклиматтық ресурстар жүйесі күн санап өзгеруде. Жаһандық жылыну, экожүйедегі өзгерістер бүкіл жүйеге әсер етеді. Бүкіл әлемде осы ресурстарды сақтау үшін әртүрлі конвенциялар мен хаттамалар жасалуда, біздің еліміз де осы үдерістерге қатысушы. Ақмола облысының биоклиматтық жүйесін талдау, сондықтан оны зерттеу өзекті болып табылады.

Түйін сөздер: ауа температурасы, салыстырмалы ылғалдылық, жел жылдамдығы, қайталану қабілеті, жер қоры, ресурс.

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БИОКЛИМАТИЧЕСКИЕ РЕСУРСЫ АКМОЛИНСКОЙ ОБЛАСТИ

Аннотация

Биоклимат, характеристика определяющая комплексное воздействие климата на организм человека в данной местности. Биоклимат района является важнейшим природным ресурсом, который подчинен чуткости и комфортности человека, трудоспособности и здоровья человека в общих условиях. Биоклиматические ресурсы можно оценить по характеристикам комфортности климатических условий, необходимых для обитания и жизнедеятельности организмов на данной территории, а также человека. Биоклиматические показатели физически характеризуют тепловые характеристики окружающей среды и являются косвенным показателем теплового состояния среды обитания человека. Биоклиматическую оценку Акмолинской области проводили по биоклиматическим показателям. Это: эффективная температура (ЕТ), эквивалентно-эффективная температура (РЕТ), биологически активная температура (ВАТ), нормальная эквивалентно-эффективная температура (РЕТ), радиационно-эквивалентная температура (ret), индекс твердости Бодмана (S), приведенная температура (ткелт.). Эти показатели определялись отдельно для теплого и холодного периодов года. Теме биоклимата посвящено множество работ в мире и в России. А в нашей стране эта тема мало изучена. Сохранение биоклиматических ресурсов очень актуально в настоящее время. В результате различных экологических катастроф, войн, антропогенного воздействия на природу изо дня в день меняется вся система биоклиматических ресурсов. Глобальное потепление, изменения в экосистемах влияют на всю систему. Во всем мире составляются различные конвенции и протоколы по сохранению этих ресурсов, и наша страна также является участником этих процессов. Анализ биоклиматической системы Акмолинской области, поэтому ее изучение актуально.

Ключевые слова: температура воздуха, относительная влажность, скорость ветра, повторяемость, земельный фонд, ресурс.

Introduction. The biological existence and economic activity of a person is highly dependent on the climate and its dynamics. The results of studies of climate change over the past hundred years and the causes of these changes showed that the observed trends are largely not related to the natural variability of the climate. Scientists also do not exclude the possibility of such serious climate changes, this problem not only attracted the attention of the scientific community, but also became the concern of the governments of many countries and international organizations. In many countries, special climate control bulletins began to be issued, and climatologist scientists from the University of East Anglia were among the first.

Bioclimate-forming processes are observed in different geographical conditions. Therefore, the specific features of these processes, and with them the types of climate, are determined by such geographical factors as the latitude of the climate, the distribution of land and sea, the structure of the Earth's surface, soil, vegetation and snow cover, sea ice, ocean currents, etc. The distribution of climatic conditions on the planet depends on the distribution of these geographical factors.

Special conditions, called bioclimatic, occur in the lowest surface layer of air in which crops live. Here, the features of the atmospheric regime are influenced by the structure and state of the Earth's surface.

Characteristics of the comfort of climatic conditions:

"Very discomfort" – climatic conditions of the natural environment, characterized by strong irritability. In this case, additional protection measures will be required to ensure a comfortable life.

"Discomfort" is a climatic condition of the natural environment, characterized by significant irritability. In this case, the adaptive mechanism of the human body does not provide a comfortable psychophysiological situation.

"Subcomfort" is a weak irritating condition of the natural environment. That is, a situation in which the mechanism of adaptation of the human body is close to the main comfortable psychophysiological situation that ensures a comfortable life.

"Comfort" is the main comfortable psychophysiological state of a person, which ensures a comfortable life in a permanent and temporary living environment.

Materials and methodology. Akmola region is the largest agro-industrial territory of the country and occupies one of the leading positions in the country in the production of agricultural products. The soil and climatic conditions of the region make it possible to grow wheat grain that is competitive to the potential market with high technological and bread - making properties, rich in protein and gluten. The agro-industrial complex of the region provides 25% of the grain produced in the country and is its main exporter. General characteristics of climatic and recreational resources of Akmola region . Historically, since the opening of the first resort, the resort business in Kazakhstan has been, first of all, a form of Social Policy and is aimed entirely at rehabilitative treatment of citizens using therapeutic natural factors. The assessment of recreational resources is carried out on the basis of the assessment of the following individual components, which are considered from the point of view of its use in a specific form of Tourism: relief, water bodies and soil-vegetation cover, bioclimat, hydromineral and unique natural therapeutic resources, historical and cultural potential, etc. As can be seen from the definition, this type of resource is distinguished not by the peculiarities of origin, but by the nature of use. Practically all natural resources have recreational and tourist potential, but the level of its use varies and depends on the recreational demand and specialization of the region. The climate of Akmola region is sharply continental, dry, with hot summers and cold winters. Belongs to the West Siberian climatic temperate zone. The daily and annual temperature amplitudes are very large. Spring and autumn look weak. There are many sunny days, and the amount of solar heat that the Earth receives in summer is as great as in the tropics. Cloudiness is only insignificant. The annual rainfall decreases from North to South, with a maximum of them falling in June and a minimum in February. The snow cover stabilizes on average for 150 days. In Akmola region, the wind is quite strong. On the territory of the region, the lowest air temperature values for the whole of Kazakhstan were observed (Atbasar - 57°C, Astana - 52°C). Akmola region is poor in water. Rivers are shallow, non-navigable, fed by meltwater and, to a lesser extent, underground sources. In summer, rivers often dry up, the water in them becomes salty.

Results and analysis. Methods of statistical assessment by calculating bioclimatic indices were used. According to the data obtained in Akmola region for the period from 1971 to 2019, average monthly air temperature indicators, humidity, wind parameters were considered.

The conducted studies on the spatial and temporal distribution of the degree of analysis of the influence of bioclimatic and meteorological factors on the features of the natural conditions of some region and specific materials revealed the distribution of the calculated bioclimatic in the territory.

In Akmola region, extremely unfavorable climatic conditions have not been controlled, which negatively affect the life and health of people, work and residence. And the comfort-free situation, that is, a somewhat unfavorable one, most often falls on the winter and summer months, especially in January, February, July. The region is mainly dominated by subcomfort conditions, that is, climatic conditions in which the negative impact of the environment is not great. The most favorable months in the region are September and June.

In this work, the last decades (1971 - 2019.) On the example of seven stations of the Akmola region, an analysis of the volatility of bioclimatic features was carried out.

1) Bioclimatic (effective temperature, equivalent – effective temperature,) indices for warm and cold periods are provided for Akkol, Astana, Atbasar, Balkashino, Ereymentau, ESIL, Kokshetau, Korgalzhyn, Stepnogorsk, Shchuchinsk stations. On the basis of the compiled integral bioclimatic indicator, zoning was carried out. In Akmola region, extremely unfavorable bioclimatic conditions have not been recorded that affect the health, survival and working capacity of the local population. However, the uncomfortable climate conditions are suitable for January, February and July. September and June are the most comfortable months. Akkol, Astana, atbasar, Balkashino, Ereymentau, ESIL, Kokshetau, Korgalzhyn, Stepnogorsk, Shchuchinsk stations were taken as objects of control. In the course of the study, data for the period from 1971 to 2019 were analyzed.

2) The main statistical characteristics are calculated (effective temperature, average monthly temperature). The greatest variability of air temperature, which is characterized in the territory under consideration, is observed in July. In all summer months, the effective temperature at most stations has a positive mark, which indicates that there is little significant temperature variability during the summer period.

3) The time distribution of the average monthly air temperature at Akkol station, located in Akmola region. From this graph, it is clear that July is the warmest month. But the actual coldest month we can not mark, the seeding winter months are approximately at the same level. When considering the average air temperature, the coldest month is January 1984, when the average air temperature was -25.2°C . The time distribution of the average monthly air temperature at Akkol station is shown. From this graph, it is clear that July is the warmest month. But the actual coldest month we can not mark, the seeding winter months are approximately at the same level. When considering the average air temperature, the coldest month is January 1984, when the average air temperature was -25.2°C . The warmest month is July 2008, when the average air temperature was 23.2°C . The time distribution of the average monthly air temperature at Astana station is shown. As the warmest months, we can mention June and July. Based on the graph, we can calculate February as the coldest month. When considering the average air temperature, the coldest month is February 1984, when the average air temperature was -22.4°C . The warmest month is July 2008, when the average air temperature was 23.2°C . The time distribution of the average monthly air temperature at the atbasar station is shown. As the warmest months, we can mention June and July. Based on the graph, we can calculate January as the coldest month. When considering the average monthly air temperature value, the coldest month is January 2008, when the average air temperature was -25.4°C . The warmest month is July 1998, when the average air temperature was 24.8°C . The time distribution of the average monthly air temperature at the balkashino station is shown. As the warmest months, we can mention June and July. Based on the graph, we can calculate February as the coldest month. When considering the average monthly air temperature value, the coldest month is February 1984, when the average air temperature was -27.2°C . The warmest month is July 1998, when the average air temperature was 22.5°C . The time distribution of the average monthly air temperature at yegindykol station is shown. As the warmest months, we can mention June and July. Based on the graph, we can calculate January as the coldest month. When considering the average monthly air temperature value, the coldest month is January 2008, when the average air temperature was -24.8°C . The warmest month is July 2018, when the average air temperature was 23.5°C .

In the warm period, there were no very discomfort cases on ET in the provided region, and in the cold period, very discomfort cases were registered in January at the stations Akkol, Astana, Atbasar,

Balkashino, Ereymentau, ESIL, Kokshetau, Korgalzhyn, Stepnogorsk, Shchuchinsk. The diskomfort situation on all stations in the warm period falls on April, June. At the same time, at the Ereymentau station, only in July, there were unpleasant cases. In the cold season, uncomfortable cases of the human body in terms of the level of cold sensation were recorded in January at the stations Akkol, atbasar, Ereymentau. In December, discomfort climatic conditions are detected at all stations. The subcomfort situation was observed at all stations in April. In the warm season, the subcomfort situation is observed at all stations in March. In November, all stations were subcompact. At all stations, the climate conditions in May are found to be comfortable. It is determined that the summer months are comfortable.

4) Analysis of the temporary course of air temperature, humidity, wind speed at Akkol, Astana, Atbasar, Balkashino, Ereymentau, ESIL, Kokshetau, Korgalzhyn, Stepnogorsk, Shchuchinsk stations was carried out.

5) A monthly catalog of effective temperatures has been compiled, which made it possible to determine whether the temperature in Akmola region has been moderate over the past decade.

6) From 1971 to 2019, July and August are the warmest months at the Stations of Akkol, Astana, atbasar, Balkashino, Ereymentau, ESIL, Kokshetau, Korgalzhyn, Stepnogorsk, Shchuchinsk in Akmola region. And we can calculate February as the coldest month, but we cannot designate the actual coldest month, because the winter months are approximately at the same level.

Conclusion. Several factors influence the variability of comfort conditions. They are temperature, wind, relative humidity. The heterogeneity of comfort conditions across the territory depends on temperature changes. That is, here, a lot of control over the diskomfort situation is associated with a high temperature in the same area. And in the region where the temperature value was slightly lower, a subcomfort situation was observed. In Akmola region, extremely unfavorable climatic conditions have not been observed for a month, which negatively affect the life and health of people, work and residence. And the comfort-free situation, that is, a somewhat unfavorable one, most often falls on the winter and summer months, especially in January, February, July. The region is mainly dominated by subcomfort conditions, that is, climatic conditions in which the negative impact of the environment is not great. The most favorable months in the region are September and June.

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