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Features of the distribution of vegetation cover depending on the physical and geographical location of the northern part of the Kazakh Uplands

In the article the peculiarity of the distribution of vegetation cover, due to the natural landscape specifics of the lands of Kazakhstan was noted. In this regard, the object under study — the northern part of Saryarka, is characterized by physical and geographical features: landscape structure, soil cover, climatic indicators. In accordance with these data, the soil cover is characteristic, where the distribution of the plant world is characteristic. This connection is based on the regularity of the unity of the natural complex. This object is a fundamental factor in the relief of the country due to its geological specificity. Accordingly, it includes several natural zones, parts of zones that differ from its constituent parts. Because of this, the composition of the vegetation cover has a great difference in distribution from north to south. The above ground part of the region is rich in water sources and a variety of vegetation. In the south, this diversity is scantier and on the desolate steppes passes into the Tipchakovo-kovylny district. This is due to the fact that the chernozem of the North reduces fertility and in places becomes saline litter. Also, such variability is strongly influenced by climate change from west to east. The amount of precipitation decreases, and the temperature index increases. Depending on this factor, the region is divided into 3 parts: hilly steppes, dry steppes and desert steppes. The landscape structure consists mainly of: clay-loamy shale, effusions. The paper analyzes the main zonal species and edaphic orders of the steppe part of the Kazakh Uplands. It presents the main representatives of lowland communities: calcifite, petrophyte types. Although the year of publication of the maps used in the work, the relevance took place.

Keywords: Saryarka, melkosopochnik, physico-geographical, zone, relief, landscape, climate, soil, plants.

The largest physical-geographical object on the territory of Kazakhstan — Kazakh Uplands (Saryarka) occupies a huge area. Its width in the west and east makes a big difference, in the west — 950 km, in the east — 350–400 km. This region consists mainly of deformed and leveled ridges, low mountains with hummocks. Due to the peculiarities of the tectonic structure, the northern slopes of the mountain massifs are steeper than the southern ones. There are large and small hollows and holes between each mountainous region. Due to the favorable climatic conditions, the northern slope of the low-mountain region is richer in springs and plants than the southern one. Meanwhile, drier southern region is gravel. From this mountainous region, rivers such as Nura, Sherubai-Nura, Zharly, Karkaraly, Taldy, Tundik, Tokirauyn, etc., originate. They are located in the intertidal plains at an altitude of 850–1000 m above sea level and lie in the watersheds that separate them at this height. The small hummock is surrounded by plains on all sides [1].

The largest physical-geographic object on the territory of Kazakhstan — Kazakh uplands (Saryarka) occupy a huge area. Its width in the west and east makes a big difference, in the west — 950 km, in the east — 350–400 km.

In the north-west of the mountainous region, near Karaganda and to the north, i.e. towards the direction where there is more moisture, mountain massifs are well covered, deeply cut by ravines. The described unique mountain system consists of elevated hilly plains — hills flattened or divided by wider channels, rocky chains and groups of slopes. But ravines and valleys are rare in moisture-poor regions.

In the areas where small hummocks are spread, the main element of the topography is undulating plains and wide valleys that served as river channels in the past. In addition to rivers channel of which dries up in many seasons of the year, this region is also characterized by lakes with no flow or temporary flow. Most of them are located below the mentioned valleys. In the territory of Karaganda with these characteristics, these lakes are shallow (0.5–3 m), flat and muddy, most of them dry up by the end of summer. After some lakes dry up, salt accumulates in place, others form only a thin layer of salt, the third lakes are fresh water, the fourth ones are overgrown with grass, and the fifth ones are grassy lakes, which become watery only in spring and play an important role in mowing grass [2]. The history of geological development, climatic con-

ditions, landforms, landscape structure, etc. Due to its physical and geographical features, soil cover of the territory is also diverse.

Depending on its geographical location, territory passes through several natural zones: the far northwest enters the forest steppe, the main part lies in the steppe zone, and the southern part is in the desert nature zone. Since its largest area is in the steppe zone, it can be divided into several parts from a biological point of view:

1) dry steppe part — fescue-gray steppe with dark brown soil;

2) a part of the temperate dry steppe zone — meadow with various grasses — gray fescue on black soil with lowfertility (southern);

3) part of medium wet steppe zone — field with various grasses and crops on “average” and “ordinary” fertility black soil.

These parts of the steppe, change from south to north, make great deviations from the latitudinal distribution due to the difference in absolute altitude, strong salinity in some areas and the change of climate from west to east. The distribution of vegetation cover according to the above-mentioned soil types can be seen on the geobotanical zoning map in Figure 1.

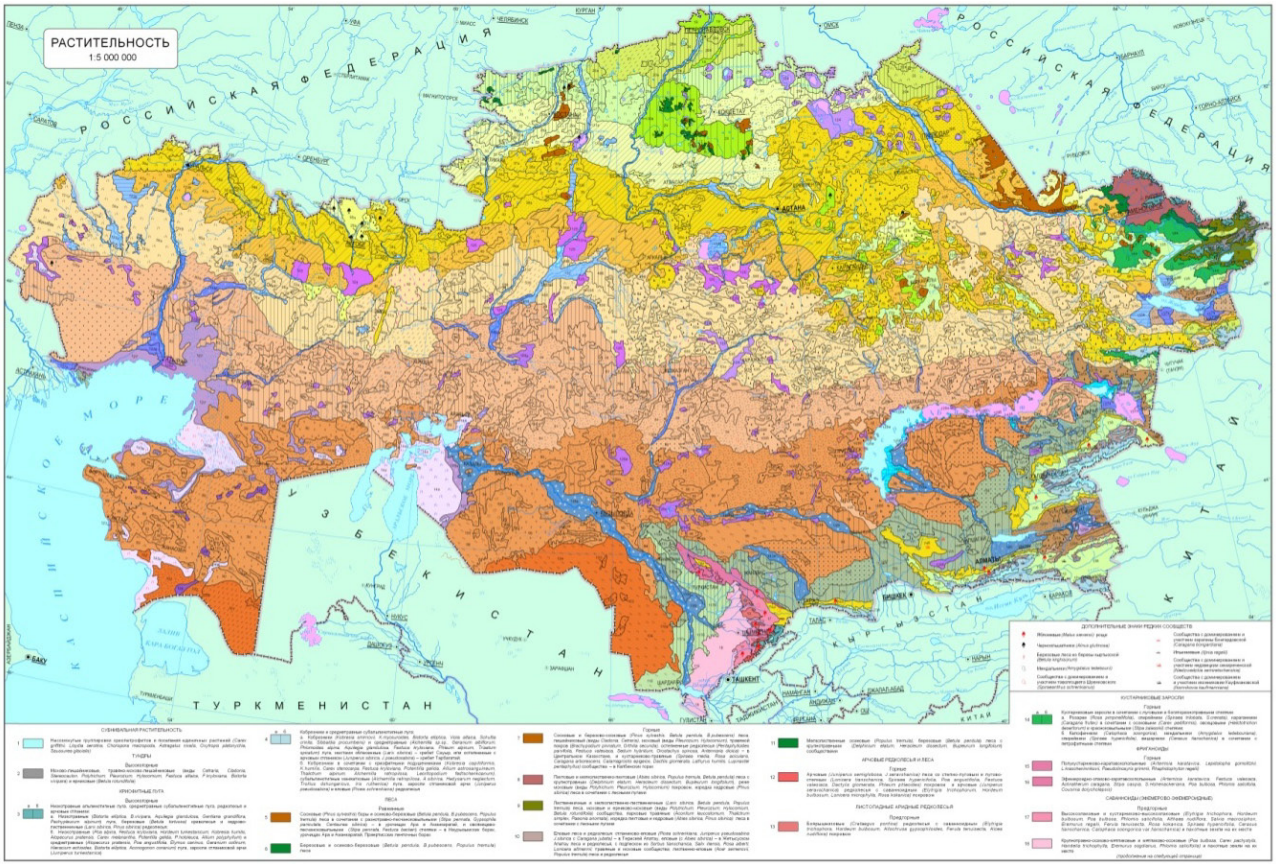

Figure 1. Geobotanical zoning of Kazakhstan

According to the given geobotanical map, the main vegetation cover distributed in the northern part of the Saryarka research object can be seen in the image of the section presented below in an enlarged version (Fig. 2).

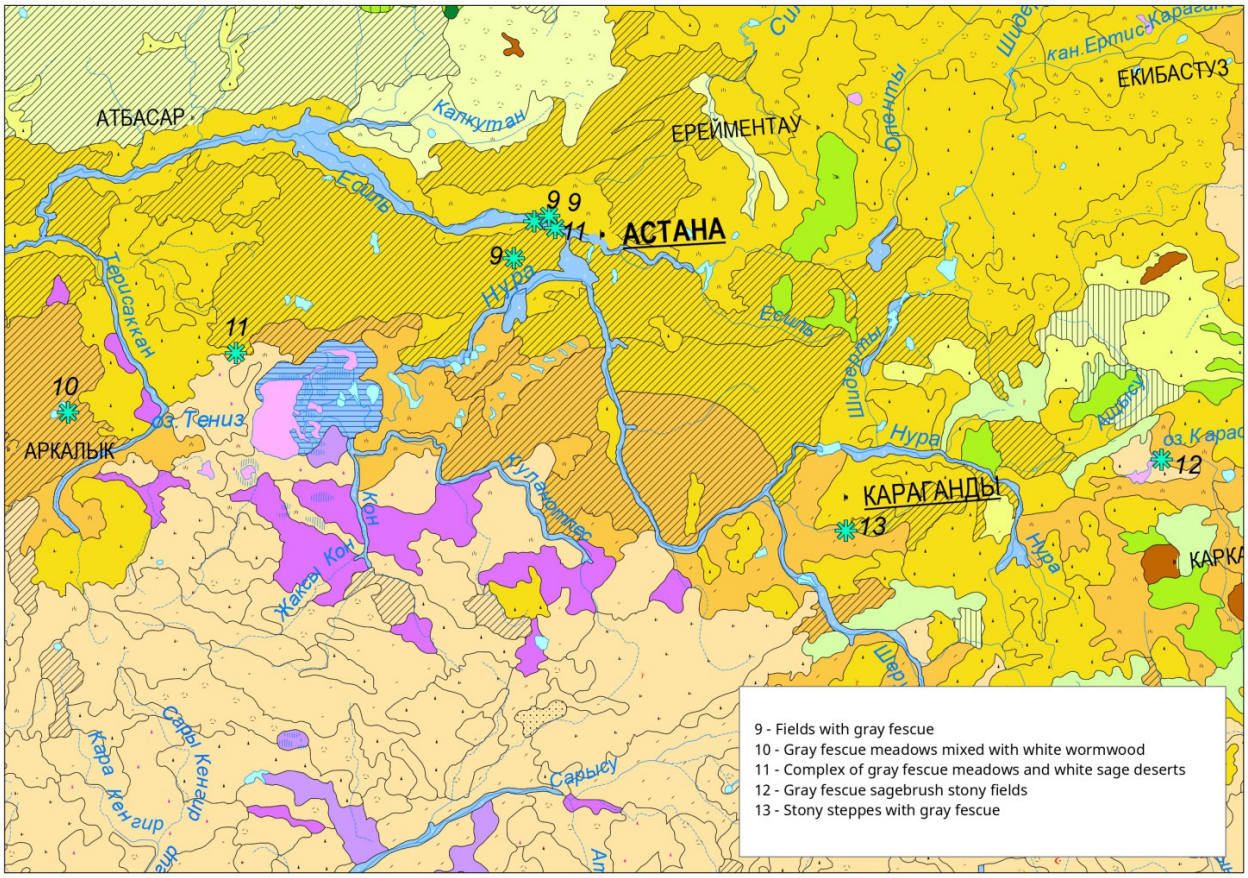

Figure 2. Vegetation cover characteristic of gray-fescue steppe zone with dark soil

9-Gray-fescue steppes; 10-Steppes of gray fescue mixed with white wormwood; 11-Complex of gray fescue steppes and white sage deserts; 12-Gray fescue-wort stony steppes; 13-Gray fescue stony steppes.

According to the geobotanical zoning map of Kazakhstan [3], the region is divided into several zone parts specific to its physical and geographical conditions. The region alternated from north to south with gray fescue steppes, white sagebrush steppes, desert and stony steppes. It is formed on the basis of structure based on the landscape of the region based on its topography (Landscape map of Kazakhstan). This feature can be seen in Table 1 below [4].

Table 1

Landform structure of the northern region of Kazakh Uplands

Parts of the landform depending on the topography	Landform structure	Vegetation cover	Soil type
Uplands	Small hilly plains composed of granular clayey shale	Shrub-gray-fescue plants	Normal, poorly developed black soil of the south
	Small hilly plains near the river composed of quartzite, shale, and effusives.	Various herbaceous plants with red fescue and in some places Korzhin fescue	Black soil of the south is not properly matured
	Small hills composed by granite	Petrophyte-various grass-oat-fescue plants	Less mature black soil of the south
	Quartzite, shale, and effusives are small hills with slopes.	Rich variety of herbaceous red fescue plants	Normal black soil, sometimes less mature

The immediate continental climate of Kazakhstan is typical of the studied area. According to B.P. Alisov, the small hill of Central Kazakhstan belongs to the territory of continental West Siberia (steppe). Extending over a large area from north to south, it leads to zonal differences in the climate in terms of heat and moisture. The feature of the latter is defined by the radiation index of dryness. The climate of the Kokshetau plateau and the plains surrounding it (various grass-fescue steppes and forest steppe belt) belong to the area with the lowest dryness. The radiation index of aridity in this region is 1, and in dry steppes this index is close to 2, that is, temperate-insufficient moisture here. Climatic indicators of the entire region by zone parts are presented in Table 2 [5].

Table 2

Climatic indicators of the northern regions of Saryarka

№	Region (part of zone)	Amount of precipitation, mm	Average temperature of January, t^0C	The average temperature of July, t^0C
1	The steppes near Kokshetau, various grass-fescue fields	300–350, in some places 390	-17-19	+18+20
2	Dry steppes	200–250, in some places 300	-18-21 (minimum — 39,5)	+19+22 (maximum + 38+39)
3	Deserte fields	200, in many places 175	-15-16 (minimum — 40)	+22+25 (maximum +40+45)

During the vegetation period, the total average temperature of the steppe zone from 3211^0 to 2108^0 (in the desert-steppe from 3574^0 to 2566^0).

The primary distinction between the steppe zone and the desert zone lies in the varied distribution of precipitation throughout the year. Despite an annual rainfall total of 260 mm, each area exhibits a different pattern. Precipitation in spring and early summer surpasses that in winter. In the southern part of this zone, snow cover recedes in the latter half of March, while in the north, it persists until the second decade of April.

The air's relative dryness gradually increases, and the development of overall vegetation is contingent on the weather during this period. The physical and geographical conditions of the research object serve as the primary factors influencing the distribution of soil and plant cover characteristic of the region.

Fertilization is primarily concentrated in saline clay rocks. Due to the wetter climate and lower soil salinity, the role of xerophytic wormwood in the natural landscape is diminishing. Sorghum, on the other hand, is found predominantly in highly saline habitats. Grassland crops constitute the primary source of ground fuel in the steppe.

Some species from other plant families are also categorized as temperate xerophytes. Alongside them, there are plants of Class V moisture, which are highly sensitive to insufficient moisture in the soil and air— these include soft, broad-leaved mesophytes. In the southern part of the zone, sorrel is less abundant in open ground fuel. As one moves northward, it replaces xerophytes, occupying more space due to increased moisture. Their maximum growth occurs in the III-IV class of moisture, in the summer they stop for a short time and partially. Some species of other families also belong to temperate xerophytes, along with them there are plants of class V moisture, which are very sensitive to insufficient moisture in the soil and air — soft, broad-leaved mesophytes. In the southern part of the zone, sorrel is less abundant in open ground fuel, but to the north it replaces xerophytes, taking up more space due to increased moisture. Due to soil erosion, the share of ephemerals in wildfire is small.

In the second half of summer, especially in dry year, there are wildfires. During this period, the vegetation cycle of steppe plants is interrupted because, despite the summer rainfall, as a result of strong transpiration of the thick upper layer of the soil, sufficient moisture reserves for the plant in the soil are exhausted. In September, when the temperature decreases and the air becomes dry, the second growing season begins and lasts until the stabilization of the snow cover in October [6].

In a non-salinized steppe, the dark brown soil typical of the dry steppe may be completely free of salinization. This condition, as well as the presence of large amount of humus (0–10 cm deep, 3–5 %) determines its specificity. As a rule, the surface layer of the soil does not exist, humus layer has a grayish-brown (dark) color. Layering is observed only in its surface layer, and below it is loose, less granular, and the roots have penetrated into the soil. As it goes deeper, it becomes whiter and denser. The lower layer of humus boils with acid, and a lot of carbonate and gypsum deposits accumulate there. The chemical analysis

of such soil shows that humus is completely absent in the leaching layer due to leaching, it is rich in calcium and magnesium, and there is a small amount of soda. Such, in well-drained conditions, looks like a loose yellow soil, matured in rocks, a normal dark-brown steppe soil.

In the normal dark-brown soil and covering 45–55 % of the dry steppe, the vegetation cover is usually dominated by sedge-fescue, and in the lower layer there is a mixed desert oat. In more arid areas, the importance of the trailing gray increases.

Temperate dry steppes develop in southern black soil with little humus, typical of Kazakhstan. The dark-brown grayish surface layer, with a humus content of 4–6 %, is characterized by fragmented or fine granularity, although the grain is irregular rather than layered. The alternating layer begins at 20–35 cm and becomes lighter as it descends. Along the cracks, there are humus flows and pale, carbonate-enriched rocks in the lower part of the crust. Further descent reveals the parent rock, which is compacted and concentrated with limestone and sometimes gypsum [7].

Temperate dry steppes on low-humus (southern) black soil are characterized by the increasing importance of red fescue, and in some cases, oat dominates the vegetation in this region.

Table 3

The main zonal types and edaphic variations in the steppe part of the Central-Kazakhstan hummocks

1nd stripes	2nd stripes	Association of Plakorly residents	Calcifite type	Petrophyte type
Dry gray-fescue steppes	Dry gray fescue steppes on dark brown soil	Gray fescue (Stipa Lessingiana, Festuca sulcata, Plomis agrarian, Dianthus leptopetalus) steppes	Stipa Korshinskyi bed-gray-fescue (Stipa Lessingiana, Festuca sulcata, Galatella divaricala) steppes	Petrophytic gray-brush sedge with Spiraea hypericifolia (Stipa Capillataa, Festuca sulcata, Onosma simplcissimum, Berteroa spathulata, Allium globosum) steppes
	Dry xerophyte-various herbaceous gray-fescue steppes on brown soil	-	Dry xerophyte-various herbaceous gray-fescue (Stipa Lessingiana, Festuca sulcata, Galatella tatarica, Tanacetum achilleifolium) speppes	
Deserted sage brush and fescue steppes	Deserted sagebrush-fescue steppes on light-brown soil (northern strip).	Thinning sagebrush-thinning sagebrush-gray (Stipa Lessingiana, Festuca sulcata, Artemisia gracilescens) communities in the complex of thin sagebrush-fescue steppes	Calcephytic variegated grass-sage-fescue (Stipa lessingiana, Artemisia terrae-albae ssp.semiarida, Agropyron pectiniforme, Serratula cardunculus, S.dissecta, Galatella divaricata) steppes	Sublessingian sagebrush steppes with (Stipa capillata, Festuca sulcata, Artemisia sublessingiana) Stipa hypericifolia
	Deserted sagebrush steppes on light-brown soil (southern strip)	Complex steppes with thinning sage-brush sedges; (Stipa sereptana, Artemisia gracilescens); thinning sagebrush steppes containing Ferula ferulaeoides; (Artemisia gracilescens, Artemisia terraealbae ssp.semiarida); contains Eurotia ceratoides steppes with thickets	Gray sagebrush steppes (Stipa lessingiana, Artemisia terraealbae ssp.semiarida)	Steppes containing (Festuca sulcata, Artemisia sublessingiana, Artemisia gracilescens) Caragana balchaschensis

The physical-geographic features of the territory have served as the foundation for scientific-theoretical research and continue to be a subject worthy of in-depth investigation within the framework of various specialized sciences, such as soil science, cartography, hydrology, and others. This ongoing research enables the comparison of different time periods, facilitating the identification of current changes in vegetation cover and other relevant environmental aspects.

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Сарыарқа ұсақ шоқысы солтүстік аймағының физикалық-географиялық жағдайына байланысты өсімдіктер жамылғысының таралу ерекшеліктері

Мақалада Қазақстан жерлерінің табиғи-ландшафтық ерекшелігіне байланысты өсімдік жамылғысының таралу ерекшелігі атап өтілді. Осыған байланысты зерттелетін нысан — Сарыарқаның солтүстік бөлігі, яғни ұсақ шоқының зерттелу аймағының физикалық-географиялық жағдайы: ландшафттық құрылымы, топырақ жамылғысы, климаттық көрсеткіштері, соған байланысты топырақ жамылғысының ерекшелігі мен сәйкесінше таралған өсімдіктер дүниесі қарастырылған. Бұл байланыс табиғи кешеннің біртұтастық заңдылығына негізделген. Аталған нысан өзінің геологиялық ерекшелігіне байланысты еліміздің жер бедерінің негізін құраушы фактор. Тиісінше, ол бірнеше табиғи аймақтарды, оның құрамдас бөліктерінен ерекшеленетін аймақтардың бөліктерін қамтиды. Осыған орай өсімдіктер жамылғысының құрамы солтүстіктен оңтүстікке қарай таралуында үлкен айырмашылыққа ие. Аймақтың солтүстігі су көздері мен өсімдіктердің алуан түрлілігіне бай келеді. Оңтүстікке қарай бұл алуантүрлілік сиреп, шөл дала боз-бетегелі ауданға ұласады. Себебі солтүстіктің қара топырағы құнарлылығын азайтып, кей жерлерінде тұзданған сорға айналады. Сондай-ақ, мұндай ауыспалыққа климаттың да батыстан шығысқа қарай өзгерісі қатты әсер етеді. Жауын-шашын көлемі азайып, температура көрсеткіші артады. Бұл факторға байланысты аймақ 3 бөлікке бөлінеді: қыратты, құрғақ және шөлденген далалар. Ландшафттық құрылымы негізінен: саз-балшықты тақтатастан, эффузивтерден құралған. Жұмыста ұсақ шоқының дала бөлігіндегі негізгі зоналық түрлері мен эдафикалық нұсқаларына талдау жасалған. Онда жазықты мекендеуші қауымдастықтың негізгізгі өкілдері: кальцефитті, петрофитті типтерге сипаттама берілген. Сондай-ақ пайдаланылған карталардың шығу жылы ескі болғанмен, өзектілігі жойылмаған.

Кілт сөздер: Сарыарқа, ұсақ шоқы, физикалық-географиялық, зона, жер бедері, ландшафты, климаты, топырағы, өсімдіктері.

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Особенности распространения растительного покрова в зависимости от физико-географического положения северной части мелкосопочника Сарыарка

В статье отмечена особенность распространения растительного покрова, обусловленная природно-ландшафтной спецификой земель Казахстана. В связи с этим исследуемый объект — северная часть

Сарыарки — характеризуется физико-географическим особенностями: ландшафтным строением, почвенным покровом, климатическими показателями. В соответствии с этими данными характерен почвенный покров, где свойственно распространение растительного мира. Эта связь основана на закономерности единства природного комплекса. Данный объект является основополагающим фактором рельефа страны благодаря своей геологической специфике. Соответственно, он включает в себя несколько природных зон, частей зон, которые отличаются от его составных частей. Из-за этого состав растительного покрова имеет большое различие в распространении с севера на юг. Надземная часть региона богата источниками воды и разнообразием растительности. На юге это разнообразие скуднее и на опустыненных степях переходит в типчаково-ковыльный район. Это связано с тем, что чернозем Севера снижает плодородие и местами становится засоленным сором. Также на такую переменчивость сильно влияет изменение климата с запада на восток. Количество осадков уменьшается, а температурный показатель увеличивается. В зависимости от этого фактора регион разделен на 3 части: холмистые степи, сухие степи и пустынные степи. Ландшафтная структура состоит в основном из глинисто-суглинистого сланца, эффузиев. Авторами проведен анализ основных зональных видов и эдафических порядков степной части мелкосопочника. В нем представлены основные представители равнинных сообществ: кальцефитные, петрофитные типы. Несмотря на год издания использованных в работе карт, они не потеряли свою актуальность.

Ключевые слова: Сарыарка, мелкосопочник, физико-географический, зона, рельеф, ландшафт, климат, почва, растения.

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