

**PASTURE LANDS AND FOOD SUPPLY IN THE MANGISTAU REGION OF KAZAKHSTAN UNDER DROUGHT CONDITIONS: SEARCHING FOR COMPROMISES, RECOMMENDATIONS**

**ҚАҰАШЫЛЫҚ ЖАҒДАЙЫНДАҒЫ ҚАЗАҚСТАННЫҢ МАҢҒЫСТАУ ОБЛЫСЫНДАҒЫ ЖАЙЫЛЫМДЫҚ ЖЕРЛЕР ЖӘНЕ ЖЕМ-ШӨППЕН ҚАМТАМАСЫЗ ЕТУ: ЫМЫРАҒА КЕЛУ, ҰСЫНЫСТАР ІЗДЕУ**

**ПАСТБИЩНЫЕ УГОДЬЯ И КОРМОВАЯ БАЗА МАНГИСТАУСКОЙ ОБЛАСТИ КАЗАХСТАНА В УСЛОВИЯХ ЗАСУХИ: ПОИСК КОМПРОМИССОВ, РЕКОМЕНДАЦИИ**

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Annotation. *The goal* - recommendations for improving the use of hay and pasture lands, taking into account shortage of feed and starvation of livestock in drought conditions resulting from pasture degradation. *Methods* - analysis and generalization of the legislation of Kazakhstan in the field of agriculture and land reclamation, Land Code based on data on the number of livestock in dynamics and share of regions in the overall country indicator. *Results* - issues of accessibility of pasture lands for grazing and food supply for animals in the Mangistau region were considered, facts of their death due to dystrophy caused by malnutrition were revealed. According to statistics, in 2022 there were 22.8 thousand heads of cattle, which is 4.2% less than in 2021, about 85.7 thousand heads of camels (increase by 6%), 120.5 thousand heads of horses (increase by 6.3%). Due to desertification and deterioration of pastures, the number of abandoned pastures is increasing. *Conclusions* - Innovative approaches are needed to address sustainable land management challenges, implementing strategies such as rotational plot systems that promote restoration of rangelands, allowing vegetation to rest between grazing periods in mountainous and foot-

hill areas, which in turn maintains soil fertility and contributes to conservation of biodiversity. It is also necessary to grow drought-resistant forage desert plants adapted to climate change, this increases the availability of forage crops, balances livestock diets and reduces the load on ecosystems. The article proposes plans to expand pasture areas and their use, and develop projects in the field of feed production.

**Аңдатпа.** *Мақсаты* - жайылымдардың деградациясынан туындайтын құрғақшылық жағдайында мал азығы тапшылығы мен аштықты ескере отырып, шабындық-жайылымдық жерлерді пайдалануды жақсарту жөніндегі ұсынымдар. *Әдістері* - Қазақстанның ауыл шаруашылығы және Жерді мелиорациялау саласындағы заңнамасын, жалпы ел көрсеткішіндегі өңірлердің динамикасы мен үлесіндегі малдар санының деректері бойынша жер кодексін талдау және қорыту. *Нәтижелері* - Маңғыстау облысының мал жаю және мал азығымен қамтамасыз ету үшін жайылымдық жерлердің қолжетімділігі мәселелері қаралған, малды дұрыс азықтандырмау салдарынан олардың өлу фактілері анықталған. Статистикалық мәліметтерге сәйкес, 2022 жылы 22,8 мың бас есептелген. ІҚМ, бұл 2021 жылмен салыстырғанда 4,2%-ға аз, шамамен 85,7 мың бас. - түйе (6% өсім), 120,5 мың бас. жылқылар (бойының биіктігі 6,3%). Шөлейттену мен жайылымдық жерлердің нашарлауына байланысты қараусыз қалған жайылымдар саны артып келеді. *Қорытындылар* - таулы және тау бөктеріндегі жайылым кезеңдері арасында өсімдіктердің демалуына мүмкіндік беру арқылы жайылымдық жерлерді қалпына келтіруге ықпал ететін айналмалы жер жүйелері сияқты стратегияларды жүзеге асыра отырып, жерді тұрақты басқару мәселелерін шешудің инновациялық тәсілдері қажет, бұл өз кезегінде топырақтың құнарлылығын сақтайды және биоәртүрлілікті сақтауға ықпал етеді. Сондай-ақ, климаттың өзгеруіне бейімделген құрғақшылыққа төзімді жемдік шөл өсімдіктерін өсіру қажет, бұл жемшөп дақылдарының қолжетімділігін арттырады, мал рационын теңестіруге мүмкіндік береді және экожүйелерге жүктемені азайтады. Мақалада жайылымдық аумақтарды кеңейту және оларды пайдалану, жемшөп өндірісі саласындағы жобаларды әзірлеу жоспарлары ұсынылған.

**Аннотация.** *Цель* – рекомендации по улучшению использования сенокосно-пастбищных угодий, с учетом дефицита кормов и голодания скота в условиях засухи, возникающей вследствие деградации пастбищ. *Методы* – анализ и обобщение законодательства Казахстана в области сельского хозяйства и мелиорации земель, Земельного кодекса по данным численности поголовья животных в динамике и доле регионов в общем страновом показателе. *Результаты* – рассмотрены вопросы доступности пастбищных земель для выпаса скота и кормообеспеченности животных Мангистауской области, выявлены факты их гибели из-за дистрофии, вызванной недоеданием. Согласно статистическим данным, в 2022г. насчитывалось 22,8 тыс. гол. КРС, что меньше на 4,2%, чем в 2021г., около 85,7 тыс. гол. – верблюдов (рост на 6%), 120,5 тыс. гол. лошадей (рост на 6,3%). Из-за опустынивания и ухудшения состояния пастбищных угодий увеличивается количество заброшенных пастбищ. *Выводы* – необходимы новаторские подходы к решению проблем устойчивого управления земельными ресурсами, реализуя такие стратегии, как системы ротационных земельных участков, способствующие восстановлению пастбищных земель, позволяя растительности отдыхать между периодами пастыбы в горных и предгорных районах, что, в свою очередь, поддерживает плодородие почвы и способствует сохранению биоразнообразия. Также необходимо выращивание засухоустойчивых кормовых пустынных растений, адаптированных к изменениям климата, это увеличивает доступность кормовых культур, позволяет сбалансировать рационы скота и снижает нагрузку на экосистемы. В статье предложены планы по расширению пастбищных территорий и их использованию, разработке проектов в сфере кормопроизводства.

**Key words:** rural areas, pastures, food supply, livestock numbers, pasture management, biodiversity conservation, adaptation to climate change.

**Түйінді сөздер:** ауылдық аумақтар, жайылымдар, жем-шөп базасы, мал басы, жайылымдық жерлерді басқару, биоәртүрлілікті сақтау, климаттың өзгеруіне бейімделу.

**Ключевые слова:** сельские территории, пастбища, кормовая база, поголовье скота, управление пастбищными угодьями, сохранение биоразнообразия, адаптация к изменениям климата.

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### Introduction

Findings from this study can help in building greater resilience to drought and mitigate its scourges on agricultural sectors, societies, and economies. Drought's key characteristics, such as their inherently wide spatial and temporal extent, the large number of people impacted, or the massive economic loss, have caused logistic and financial challenges all over the world.

Droughts and associated food shortages are high on humanitarian relief groups' priority lists, and the bulk of online disaster platforms focus on disaster that strikes quickly (for instance, floods, hurricanes, earthquakes, or other storms) and little to no attention focus on drought and its occurrences. The difficulty of operational drought forecasting systems to produce valid predictions about the location, magnitude, and type of assistance needed in the medium to long term, i.e., several months ahead of time, is a serious flaw (Hao Z., Singh V.P., Xia Y.; Kreibich H., Blauhut V., Aerts J. C. et al. ) [1,2].

In recent decades, significant progress has been made in sustaining global food production. Nonetheless, feeding 9.8 billion people by 2050 would be a challenge, particularly in drought-prone and arid regions of the developing world.

Assessing agricultural drought and its potential impacts on food security in vulnerable regions is very crucial especially in drought-prone areas. The implications of agricultural droughts on food supplies may be quantified, which helps policymakers make more sustainable agricultural decisions. It necessitates a thorough evaluation of the relationships between spatiotemporal drought fluctuations, farming systems, irrigation effects, and water resource availability. Various techniques of dealing with such issues have been reported. Survey methodology, for example, is useful for gathering first-hand information on how the drought has affected crop production and how farmers have reacted to drought (Campbell D., Barker D., McGregor D.) [3].

Despite the challenges associated with climate hazards such as drought disasters, recent technological, and methodological developments are helping to rapidly improve agricultural outputs. The emergence of space-based information is providing valuable outcomes at the high spatial and temporal resolutions with accurate maps, this can help smallholder-dominated farmers to plan for future drought events. Findings from this study can help in building greater resilience to

drought and mitigate its scourges on agricultural sectors, societies, and economies.

In the Mangystau region, drought has been observed over the past 2-3 years due to low rainfall. As the drought lasts year after year, there are reasons why cattle are being lost. According to the Ministry of Agriculture of the Republic of Kazakhstan, a sufficient amount of feed is being prepared in Kazakhstan. However, in a number of regions there is a shortage and an increase in the cost of feed due to local characteristics. It is unacceptable to repeat the situation when many villagers lost their livestock due to severe drought and food shortages.

### Literature Review

The problems of the development of pasture lands and fodder bases of the Republic of Kazakhstan in conditions of drought are the focus of foreign and domestic research. The problems of forming sustainable forage bases in the agricultural sector of the economy are very relevant (Israel R) [4]. The expansion of drought from year to year has created logistical and financial problems worldwide (Berhan G., Hill S., Tadesse T. et al.; Enekel M., See L., Bonifacio R. et al.) [5,6]. In recent decades, significant progress has been made in sustaining global food production (He X., Estes L., Konar M. et al.) [7]

Findings from this study can help in building greater resilience to drought and mitigate its scourges on agricultural sectors, societies, and economies (Dyosi M., Kalumba A.M., Magagula H.B. et al.) [8].

In their works, a number of scientists, studying the problems of the availability of pastures for grazing livestock and providing feed for farm animals to the population of Mangystau region, pay attention to the importance of ongoing problems in agriculture. Studied the issues of state regulation of permanent pasture territories (Zhansagimov A.E., Niyazbekov Sh.U., Eginbaeva A.E.) [9].

Thus, methodological approaches to solving the problems of improving and developing pasture lands and a feed base, as well as the proposed pasture management and plans for their use, the problems of creating a stable feed base in agriculture and effective management of its development, have been studied in many works of domestic and foreign researchers. In scientific works, special attention is also paid to the problems of choosing forage crops and pastures, which are the basis of sustainable agriculture in the agricultural sector of the economy (Paptsov A.G., Shelamova N.A.) [10].

The proposed procedures for developing a strategy for the development of sustainable pasture areas make it possible to more accurately assess the prospects for the development of agriculture, more effectively develop strategic plans for the development of pasture lands and forage bases, and can be used as a strategic planning tool.

In addition, it is very important to study the issues of providing farm animals with fodder. This situation is largely associated with the geographical features of the region and logistics problems (Torekhanov A.A., Sabirova A.I.) [11].

Thus, for the implementation of the measures, it is necessary to create a model that calculates the need for arable land related to drought measures, an increase in pasture areas and an expansion of the forage base. In the economic model, it is necessary to indicate the following conditions: the area of fully used areas, an increase in the number of livestock or the preservation of available productive livestock, as well as compliance with recommendations for optimizing the crop structure, taking into account zoning (Zhagiparova T.T.) [12].

A literary review of foreign and domestic publications confirms the importance of the study on the problems of providing pasture for farm animals in the agricultural sector of the economy for sustainable economic growth.

**Materials and methods**

The research work includes a review of opinions, including the results of journalistic activities, as well as processing data on animal feed supply using statistical methods. At the heart of the calculations, it is necessary to show the resources that ensure the development of agricultural production. To implement measures related to drought mitigation measures, both the increase in pasture areas and the expansion of the feed base, it is necessary to create a model that calculates the need for cultivated land (Zhambakin Zh.A.) [13]. In the economic model, it is necessary to show the following conditions: the area of land that is fully used,

an increase in the number of livestock, or the preservation of existing productive livestock, as well as compliance with recommendations for optimizing the structure of arable land, taking into account zoning (Paptsov A.G., Shelamova N.A.) [10].

This model is necessary for a combination of agricultural companies, which will optimize economic activity. The development of pasture lands and forage bases proceeds from the following points:

- the availability of these lands, which will correspond to pastures, as well as the availability of land plots;
- increasing the potential of the food supply for the regions.

Thus, this will allow us to determine the directions of development of activities related to making a profit, taking into account the market conditions of agricultural products.

**Results**

The study proved that the proportion of livestock deaths from drought is 32% in the absence of a systematic provision of a feed base. At the same time, livestock registered by farms receives compensation for livestock deaths (Mammadova S.Z., Hasanova A.F., Hasanov V.N.) [14].

A decrease in sea level, as well as a decrease in atmospheric temperature, caused an increase in the level of drought. A study of the results of journalistic activities showed an extreme drought due to global warming, which led to the death of livestock. In fact, this was the result of limited forage supplies and a critical level of water supply, as it affected small farms. Due to the long distance, water delivery has become problematic to distant farms. We have confirmed that this has a widespread effect on reducing the weight of productive livestock, which affects the morbidity of livestock.

In Kazakhstan, in the summer of 2021, a lot of facts of livestock deaths due to severe drought were revealed. The data on livestock population officially registered in the government body (table 1).

Table 1 - Comparative analysis of the dynamics and structure of livestock mortality, Republic of Kazakhstan

	In total 2021, heads of cattle	Growth over the year,%	Case percentage,%
Cattle	17 985	101,5 %	0,3%
Horses	4 612	115,8%	0,3 %
Camels	801	103,5%	1,0%
Sheep	43 284	123,3%	0,4%

Note: compiled by the authors

During the drought in 2021, which was in the Mangystau region, there was a high increase in the value of the absolute increase in livestock deaths. At the same time, it influenced an increase in the growth rate in the number of livestock (table 2).

If we assume that during the analyzed period this value exceeds 5%, then in the

following periods this indicator may lead to a consistent decrease in the number of livestock in the region. Therefore, the government needs to take measures to develop pasture lands and increase forage reserves and supply water supply channels (Zhagiparova T.T.) [12].

Table 2 - Change in the number of livestock as of May 1, 2022, Republic of Kazakhstan

	2021	2022	Growth rate, %
Horses	3.6 million heads	4 million heads	11
Camels	258 thousand heads	275 thousand heads	6,5
Cows	3,8 thousand heads	4 thousand heads	5
Sheep	23 thousand heads	24 thousand heads	4
A pig	847 thousand heads	890 thousand heads	5

Note: compiled by the authors

However, with the growth of livestock, there is a loss of livestock. This fact is caused not only by livestock diseases, but also by abnormal temperatures. So, for example, in the Mangystau region, the death of livestock is caused not only by the heat, but also by the insufficiency of forage bases, water supply and pasture lands. The government allocates funds for the purchase of livestock feed, but this may have an effect for a certain period of time. It can be seen from tables 1 and 2 that there will not be a special shortage in meat consumption, but in the future this may affect the volume of the planned product (Summary analytical report of the Committee of statistics...) [15].

According to the forecasts of Kazhydromet, this year a drought is expected in Mangistau region, which was also observed last year, as a result of which the facts of animal death were recorded. Taking into account the forecasts, we must now start working on the provision of food and prevent a repetition of last year's situation. The main part of the work on providing feed is assigned to local executive bodies. To prevent a recurrence of the situation, it is necessary to take systematic measures that are contained in the roadmap for the development of the food industry for 2022-2025.

As for animal husbandry, despite last year's drought, local executive bodies are doing little to solve these problems. It should be noted that most of the agricultural structures of the region lack the appropriate equipment for harvesting forage. Therefore, planting of forage crops is not carried out.

Currently, the area of pastures intended for agriculture and public use is about 3.2 million hectares. More than half of it, 1.7 million hectares, are dilapidated. Mangystau region

has about 8.6 million hectares of reserve land that can be used as pastures to solve flood problems. We can conclude that work on the development of food production is less active. It is necessary to carry out work on the development of water supply and forage harvesting, as well as the formation of plants for the use of treated livestock.

In addition, it is necessary to develop infrastructure for livestock and pasture farming, as well as introduce irrigation methods. In addition, it is necessary to develop infrastructure for livestock and pasture farming, as well as introduce irrigation methods. Government agencies should provide farms with land for hay production and pastures, as well as intensify work on the implementation of the roadmap. In addition, it is necessary to develop and approve a regional program for the development of animal husbandry and food production. In addition, issues of allocating the necessary funds from the state budget and creating food production projects are being resolved.

At the same time, it is necessary to use the potential of animal husbandry in other regions of the country, organize the collection of animal feed in neighboring regions. The number of cattle in Mangystau region is only growing. For example, there are 31.3 thousand heads of cattle, which is 2.2% more than in the same period of 2022. The number of camels increased by 10.6%, reaching 95 thousand heads. The number of horses increased by 16.5%, reaching 144.6 thousand heads. The number of sheep in the region decreased by 6.1% and reached 430.6 thousand heads. But at the same time, against the general background of a decrease in the number of sheep in the region, there is a double increase in the number of sheep in personal

subsidary farms in Zhanaozen, and in Munaili district the number of sheep increased by 30%. In general, the problems of forage harvesting should be monitored not only by the Ministry of Agriculture, but also by local authorities.

The level of the pasture lands is in a neglected state. The study showed that the pasture is not very close to rural settlements. Cattle grazing is carried out not only in rural settlements, but also in the urban area, as there is no specialized infrastructure. In view of this, these pasture coals are reduced annually. In view of this, it is necessary to reconsider the issues of managing these objects. Due to the decrease in pasture lands due to the digging of livestock, the level of quality of feed bases decreases. The problem is the desertification of land for the purposes of forage bases. At the same time, plots of land for the creation of forage bases, however, the land is not included in the ownership of farms. And for the state, in conditions of constant aridity, it is not profitable to finance the infrastructure of these lands.

The problem of the state of pasture lands will always be relevant, since the development of animal husbandry will be in the first place. The economic benefit from the development of livestock farming is a priority, as it affects the country's food security. Based on the study, the state needs to monitor and monitor the condition of pasture lands that are suitable for fodder bases. At the same time, legislatively review the issues of land plots allocated for the development of agriculture. To do this, it is necessary to assess the land taking into account the demand for these pasture lands.

The need for institutional changes in the field of secure territorial relations is delayed. The unresolved land issue is one of the main factors impeding the development of the agricultural producers' initiative. But the question of what kind of rights over terrestrial resources should become the basis for future transformations, in our opinion, does not have an unequivocal answer. International experience clearly shows that private pasture ownership is not always accessible from the point of view of economic efficiency. The mosaic nature of the natural landscapes, the high environmental risks and the low productivity of the lands allocated for natural grazing justify the advantages of sharing these resources.

The study of pasture ecosystems showed that, due to climatic features, achieving the maximum permissible load on hayfields leads to a natural decrease in the number of animals due to mortality or is achieved in condi-

tions characterized by unpredictable and significant changes, in which the maximum load on pasture ecosystems is practically impossible. In some ecosystems, climatic conditions make it necessary to provide permanent shelter for livestock for the winter. In this case, the determining factor determining the number of livestock is the availability of food at home during this period.

High capital intensity, labor costs, and limited land suitable for bankruptcy usually entail the need to maintain a significantly smaller amount of livestock in the summer compared to animal husbandry supported by pasture systems. At the same time, exceeding the pasture load turned out to be economically unprofitable, since animals that receive an insufficient amount of food on degraded pastures become unproductive and sharply reduce the profitability of farms.

Thus, the consolidation of a permanent territory, carried out by the Government and financed with international funds, deprived the herders of the opportunity to take advantage of their risk reduction strategy. Although the loss of livestock and the consequent decrease in the number of livestock during a drought are common, the inability to expand grazing areas on ranches and organized associations has increased the losses and as a result has had a negative impact on the economic situation of local households. The reduction of livestock farming as a tool used by the government to reduce the burden on the ecosystem, in out-of-equilibrium ecosystem conditions, also had a negative impact on the situation of pastoralists.

The fact is that ranchers living in out-of-balance ecosystems contain more than is necessary to provide a herd to a household during the non-arid period as a kind of "insurance fund". During a period of drought, when meat prices in local markets tend to fall due to an increase in supply, while grain prices, on the contrary, rise, the additional amount of livestock allows farmers to maintain a balance by exchanging livestock products for agricultural products, thus ensuring the necessary level of consumption.

The main mechanism for effective management of environmental risks in unpredictable conditions of an unbalanced system is adaptation to changing conditions, not changing conditions. One of the most common methods of this adaptation is farm mobility, which makes it possible to disperse livestock over a larger area or take advantage of the most favorable ecological place. It is the ecological

component that determines the nomadic way of production in a dry climate.

Economic losses to restrict the movement of livestock in an unbalanced ecosystem are more significant than in equilibrium. If the herd remains on the same pasture, the number of cattle should be limited to the level of availability of foreign resources on the site in the most unfavorable period. Since the fluctuations in the productivity of an ecosystem in equilibrium are relatively small, the decline in livestock is not as pronounced as in an unbalanced system. In these conditions, the constant maintenance of livestock on pastures will not allow the effective use of abundantly available resources for a favorable period.

This is followed by the search for ways that can ensure an effective combination of flexibility of approach and reliability in the application of rights. Today, only one thing is obvious: ignoring pastoralists about the need to migrate long distances in response to changing climatic conditions leads to extremely negative consequences for pastoralists, which means that ensuring their mobility is the main task of programs aimed at developing the territories of arid zones.

Of course, it is necessary to collect what is lost due to the borderline mobility of livestock, which can be reduced due to the intensification of production, etc. capital-intensive technology. It is possible that this technology will be more successful in more predictable natural and climatic conditions characterized by less prolonged environmental stresses than in arid areas.

The significant differences in territorial relations in pastoral societies are a very difficult problem with the legally recognized exclusive rights in Western countries to analyze these relationships and plan development strategies. In countries where the common use of pastures occurs in practice, as a rule, the rights of common use are not indicated in the law.

The reforms in territorial relations in livestock societies have historically been represented through attempts to nationalize agrarian resources or through their privatization. The local population resists these attempts, they are economically and environmentally unacceptable, and the weakening of the institutions that have existed for a long time regulating the use of pasture systems.

Thus, the data presented in this study allow us to speak unambiguously about the influence of natural and climatic conditions on land use and land relations. The spatial and institutional organization of land use in each region develops in the process of adaptation

to specific natural and climatic conditions. Such adaptation is an indispensable element underlying the economic efficiency and natural conformity of the use of resources, including land.

Accordingly, the import of institutions that have developed in other climatic conditions, without a thorough study of their adaptation potential to the specific conditions of the "recipient" region, threatens the safety of the population's life support systems and the sustainability of local institutions and ecosystems.

The mechanism of adaptation to natural and climatic conditions developed by local cultures does not always fit into system parameters. Nevertheless, taking into account the peculiarities of land relations and finding ways to ensure their integration into modern systems of ensuring land rights is probably the most acceptable option for institutional development in regions where livestock production predominates. On the one hand, it must be recognized that approaches to using the theory of a nonequilibrium system have been developed in detail for territories with a high coefficient of fluctuations in average annual precipitation, which is unusual for most of the territory of our country.

At the same time, many of the conclusions of the theory of nonequilibrium ecosystems are also applicable to conditions in which fluctuations are determined by the influence of other climatic factors, for example, snowfalls or the formation of an ice crust that prevents animals from accessing food, etc. Such conditions are quite common in the regions of Kazakhstan. The features of livestock farming, which require a special approach to ensuring rights to land resources, fully apply to the north of the country.

Despite the lack of theoretical knowledge justifying the need for privatization and other forms of individualization of pasture lands, this process continues in many countries of the world. In particular, Kazakhstan is implementing a land policy aimed at ensuring private ownership of pastures. The People's Republic of China is actively introducing individualization of use through long-term leases.

Unless we develop better adaptation and coping strategies to responsibly manage and restore our natural capital, land degradation will continue to pose a serious threat to rural livelihoods, lead to forced migration and exacerbate conflicts over limited natural resources. The functionality and productivity of land resources are vital to the effectiveness of any global effort to counteract these alarming trends.

At the same time, it is obvious that in large and small, rich and poor countries about functionality and the state of land resources is often not thought about. There is no doubt that the critical role of land in combating climate change, preserving biodiversity and providing desperately needed ecosystem services is underappreciated. Land resources have an exclusive significance for our livelihoods, prosperity and well-being; the way of life of both our contemporaries and future generations literally depends on them.

As a result of current production trends, as well as urbanization and environmental degradation, we are losing and wasting too much land resources. Man forgets his connection with the earth. We are too quickly losing the water, soil and biodiversity that support life on the planet. To spur economic growth and ensure people's livelihoods, we need to take a different perspective and transform existing land use and management models.

#### Discussion

The solution of issues related to the provision of a food supply in connection with the drought should have been a priority, since Kazhydromet in June – July 2021 predicted abnormally dry weather in Akmola, Aktobe, East Kazakhstan, Mangystau and Kostanay regions. Thus, no measures have been taken to address the shortage of feed due to the lack of large hayfields and pasture lands. However, in August 2021, on behalf of the Government, 1.9 billion tenge was allocated for the purchase of feed.

Based on the above, it can be concluded that it would be most advisable to create a farm risk fund (Rule of rational use of land...) [16].

It is also necessary to cooperate with veterinarians and Weather Stations. It is believed that the creation of such a fund is really advisable, for example, the sums of money allocated by the government reach the solution of the problem in a long period of time. This leads to the fact that the number of livestock increases when it could already be reduced.

The action of the farm risk fund, together with Kazhydromet, will be able to prepare in advance for adverse weather conditions. Stock up on food and water in time. Actions on the part of veterinarians – regular patronage, full-fledged registration of livestock and timely receipt of vaccines for livestock, will also help reduce livestock deaths.

In our opinion, the funds of the fund, which is replenished with farmers' own funds, will be used more efficiently than the funds

allocated by the Government. In addition, the decision on the allocation of funds should be made by the council of farm owners, since people working in this field know better where and in what amount to send these funds. The state has only the function of exercising control in order for the fund to realize its goal (Опёноква К.) [17]. To do this, you need to create a team of analysts who know a lot about farming.

#### Conclusion

In general, the development of a revaluation to improve the supply of feed forage in the agricultural sector of the economy is based on the following important conclusions:

1. The main economic models have been constructed and implemented: pasture lands with green grassy forages, as well as pasture and fodder lands in which there are restrictions on agricultural land. The conditions for creating models are shown in accordance with the calculated indicators when using statistical methods. As a goal for determining the potential, the model was chosen to increase the area of land that will correspond to pastures, as well as the availability of land plots. At the same time, the increase in the potential of the fodder base for the regions is taken into account.

2. The issues of expanding the feed base were investigated, it is necessary to create a model that will calculate the need for cultivated land. A direct correlation has been revealed in the need to expand pasture lands and forage bases, taking into account aridity and drought, as well as the minimum annual temperature and precipitation, which are important factors in pasture management. The economic models of the use of distilled livestock, as well as the preparation of feed, which will provide feed for farm animals and the availability of pastures for grazing in the Mangystau region, are presented.

3. The results of the study are a generalization of conclusions that will determine the directions of development of activities related to profit taking into account the market conditions of agricultural products, aimed at solving the issues of creating projects for feed production. These models are focused on strengthening the implementation of the roadmap, which will allow the development of animal husbandry and feed production, as well as formulate questions for feed production projects. The implementation of these aspects allows us to start harvesting feed and prevent a repeat of last year's situation in 2021, which led to the death of livestock.

4. Declining biodiversity and climate change are putting the functionality and productivity of land at even greater risk: that increasing carbon emissions, high temperatures, changing rainfall patterns, soil erosion, species loss and increasing water scarcity will affect the suitability of vast regions for food production and human habitation.

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### References

- [1] Hao, Z. Seasonal drought prediction: advances, challenges, and future prospects / Z.Hao, V.P. Singh, Y.Xia // *Reviews of Geophysics*.- 2018.- N 56.- P. 108–141. <https://doi.org/10.1002/2016RG000549>
- [2] Kreibich, H. How to improve attribution of changes in drought and flood impacts / H. Kreibich, V. Blauhut, J.C. Aerts, L.M. Bouwer, H.A. Van Lanen, A. Meija // *Hydrological Sciences Journal* .-2019.- N64.- P. 1–18. <https://doi.org/10.1080/02626667.2018.1558367>.
- [3] Campbell, D. Dealing with drought: small farmers and environmental hazards in southern /D. Campbell, D.Barker, D.McGregor // *Applied Geography*.-2011.-Vol. 31.- Issue 1.-P. 146-158. <https://doi.org/10.1016/j.apgeog.2010.03.007>
- [4] Israel, R. Agricultural Drought and Its Potential Impacts: Enabling Decision-Support for Food Security in Vulnerable Regions. *Front. Sustain/ R.Israel // Frontiers in Sustainable Food Systems*. - 2022.- Vol. 6. - Article 838824. <https://doi.org/10.3389/fsufs.2022.838824>
- [5] Berhan, G. Drought prediction\_system for improved climate change mitigation/ G.Berhan, S. Hill, T. Tadesse, S. Atnafu // *IEEE Transactions on Geoscience and Remote Sensing*.- 2013.- N 52.- P. 4032–4037. <https://doi.org/10.1109/TGRS.2013.2279020>.
- [6] Enenkel, M. Drought and food security—Improving decision-support via new technologies and innovative collaboration/ M.Enenkel, L.See, R. Bonifacio, V. Boken, N. Chaney, P. Vinck// *Global Food Security*.- 2015.- N 4.- P. 51–55. <https://doi.org/10.1016/j.gfs.2014.08.005>.
- [7] He, X. Integrated approaches to understanding and reducing drought impact on food security across scales / X.He, L.Estes, M. Konar, D.

Tian, D. Anghileri, K.Baylis // *Current Opinion in Environmental Sustainability*.- 2019.-N40.- P.43–54. <https://doi.org/10.1016/j.cosust.2019.09.006>.

[8] Dyosi, M. Drought conditions appraisal using geoinformatics and multi-influencing factors / M. Dyosi, A.M. Kalumba, H.B. Magagula, L. Zhou, I.R. Orimoloye // *Environ. Monitor. Assess*.-2021. - N193.-P. 1–19. <https://doi.org/10.1007/s10661-021-09126-7>

[9] Жансагимов, А.Е. Элементы взаимодействия государства и бизнеса / А.Е. Жансагимов, Ш.У. Ниязбеков, А.Е. Егинбаева // *Вестник университета Туран*. - 2016 год. - № 3 (71). - С. 44-48.

[10] Папцов, А.Г. Глобальная продовольственная безопасность в условиях изменения климата / А.Г. Папцов, Н.А. Шаламова.- М.: Российская академия наук, 2018. – 132 с.

[11] Тореханов, А.А. Эффективное использование отдаленных и приаульных пастбищ Республики Казахстан / А.А. Тореханов, А.И. Сабирова // *Проблемы агрорынка*.- 2020.- N 4.-С.24-30.

[12] Жагипарова, Т.Т. Новый подход к кадастровой оценке неиспользуемых земель в Республике Казахстан / Т.Т. Жагипарова // *Московский экономический журнал*.- 2022. - № 3. – С. 9-13

[13] Жамбакин, Ж.А. Пустынные места и их использование // *Улучшение и рациональное использование пастбищ Казахстана / Ж.А. Жамбакин*. - Алматы, 2018. – 345с.

[14] Mammadova, S.Z. Ecological evaluation of semi desert pasture soils and their improvement / S.Z. Mammadova, A.F. Hasanova, V.N. Hasanov // *Soil science and agrochemistry*.-2018.- N1. – P. 72-83.

[15] Сводный аналитический отчет Комитета по статистике МНЭ РК за 2021 год [Электронный ресурс].- 2021.- URL: <https://www.gov.kz/memleket/entities/moa/documents/details/291911?directionId=1416&lang=ru> (дата обращения: 06.03.2024). [https://doi.org/10.55186/2413046X\\_2022\\_7\\_3\\_133](https://doi.org/10.55186/2413046X_2022_7_3_133).

[16] Правило, рационального использования земель сельскохозяйственного назначения. Приказ Министра сельского хозяйства Республики Казахстан от 17 января 2020 года № 7 Об утверждении Правила рационального использовании земель сельскохозяйственного назначения и внесении изменений и дополнений в некоторые приказы Министра сельского хозяйства Республики Казахстан. [Электронный ресурс].- 2021.-URL: <https://www.adilet.zan.kz/rus/docs/V2000019893> (дата обращения: 06.03.2024).

[17] Опенкова, К. Как власти помогают пострадавшим от засухи фермерам Мангистауской области [Электронный ресурс].-2021. URL: <https://www.dzhk.kz/biznes/kak-vlasti-pomogajut-postradavshim-ot-zasuhi-fermeram-mangistauskoj-oblasti> (дата обращения: 06.03.2024).

## References

- [1] Hao, Z., Singh, V.P., Xia, Y. (2018). Seasonal drought prediction: advances, challenges and future prospects. *Rev. Geophys.* 56, 108–141. Available at: [10.1002/2016RG000549](https://doi.org/10.1002/2016RG000549) [in English].
- [2] Kreibich, H., Blauhut, V., Aerts, J.C., Bouwer, L.M., Van Lanen, H.A., Meija, A. (2019). How to improve attribution of changes in drought and flood impacts. *Hydrol. Sci. J.* 64, 1–18. Available at: [10.1080/02626667.2018.1558367](https://doi.org/10.1080/02626667.2018.1558367) [in English].
- [3] Campbell, D., Barker, D., McGregor, D. (2011). Dealing with drought: small farmers and environmental hazards in southern St. Elizabeth, Jamaica. *Applied Geography*, 31, 146–158. Available at: [10.1016/j.apgeog.2010.03.007](https://doi.org/10.1016/j.apgeog.2010.03.007) [in English].
- [4] Israel, R. (2022). Agricultural Drought and Its Potential Impacts: Enabling Decision-Support for Food Security in Vulnerable Regions. *Front. Frontiers in Sustainable Food Systems*, 6(838824), 1–11. Available at: <https://doi.org/10.3389/fsufs.2022.838824> [in English].
- [5] Berhan, G., Hill, S., Tadesse, T. (2013). Drought prediction system for improved climate change mitigation. *IEEE Transactions on Geoscience and Remote Sensing*, 52, 4032–4037. Available at: <https://doi.org/10.1109/TGRS.2013.2279020> [in English].
- [6] Enenkel, M., See, L., Bonifacio, R., Boken, V., Chaney, N., Vinck, P. (2015). Drought and food security – Improving decision-support via new technologies and innovative collaboration. *Global Food Security*, 4, 51–55. Available at: [10.1016/j.gfs.2014.08.005](https://doi.org/10.1016/j.gfs.2014.08.005) [in English].
- [7] He, X., Estes, L., Konar, M., Tian, D., Anghileri, D., Baylis, K. (2019). Integrated approaches to understanding and reducing drought impact on food security across scales. *Current Opinion in Environmental Sustainability*, 40, 43–54. Available at: [10.1016/j.cosust.2019.09.006](https://doi.org/10.1016/j.cosust.2019.09.006) [in English].
- [8] Dyosi, M., Kalumba, A.M., Magagula, H.B., Zhou, L. and Orimoloye, I.R. (2021). Drought conditions appraisal using geoinformatics and multi-influencing factors. *Environmental Monitoring and Assessment*, 193, 1–19. Available at: [10.1007/s10661-021-09126-7](https://doi.org/10.1007/s10661-021-09126-7) [in English].
- [9] Zhansagimov, A.E., Niyazbekov, Sh.U., Eginbaeva, A.E. (2016). Elementy vzaimodejstviya gosudarstva i biznesa [Elements of interaction between the state and business]. *Vestnik universiteta Turan - Bulletin of the University of Turan*, 3(71), 44–48 [in Russian].
- [10] Paptsov, A.G., Shelamova, N.A. (2018). Global food security in the context of climate change: a monograph. Moscow: RAS, 132 [in Russian].
- [11] Torekhanov, A.A., Sabirova, A.I. (2023). Jeffektivnoe ispol'zovanie otdalennyh i prigranichnyh pastbishh Respubliki Kazahstan [Effective use of remote and border pastures of the Republic of Kazakhstan]. *Problemy agrorynka - Problems of AgriMarket*, 4, 24–30 [in Russian].
- [12] Zhagiparova, T.T. (2022). Novyj podhod k kadaastrovoj ocenke neispolzovemyh zemel' v Respublike Kazahstan [A new approach to cadastral valuation of unused lands in the Republic of Kazakhstan]. *Moskovskij ekonomicheskij zhurnal - Moscow Economic Journal*, 3, 9–13. Available at: <https://qje.ty/naukioZemle/Moskovskijekonomicheskij-zhurnal-3-2022> [in Russian].
- [13] Zhambakin, Zh.A. (2018). Pustynnye mesta i ih ispol'zovanie [Desert areas and their use]. *Uluchshenie i racional'noe ispol'zovanie pastbishch Kazahstana - Improvement and rational use of the pasture of Kazakhstan*, 345 [in Russian].
- [14] Mammadova, S.Z., Hasanova, A.F., Hasanov, V.N. (2018). Ecological evaluation of semi desert pasture soils and their improvement. *Soil Science and Agrochemistry*, 1, 72–83 [in English].
- [15] Svodnyj analiticheskij otchet Komiteta po statistike MNE RK za 2021 god [Consolidated analytical report of the Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan for 2021]. Available at: <https://www.gov.kz/memleket/entities/moa/documents/details/291911?directionId=1416&lang=ru> (date of access: 06.03.2024) [in Russian].
- [16] Pravilo racional'nogo ispol'zovaniya zemel' sel'skohozyajstvennogo naznacheniya [Rules for the rational use of agricultural lands]. *Prikaz Ministra sel'skogo hozyajstva Respubliki Kazahstan ot 17 yanvarya 2020 goda № 7 "Ob utverzhenii Pravila racional'nogo ispol'zovaniya zemel' sel'skohozyajstvennogo naznacheniya i vnesenii izmenenij i dopolnenij v nekotoryj prikazy Ministra sel'skogo Respubliki Kazahstan" - Order of the Ministry of Agriculture of the Republic of Kazakhstan dated January 17, 2020 No. 7 "On approval of the Rules for the National use of agricultural land and Amendments and Additions to Some Orders of the Ministry of Agriculture of the Republic of Kazakhstan"*. Available at: <https://adilet.zan.kz/rus/docs/V2000019893> date of access: 06.03.2024) [in Russian].
- [17] Openkova, K. (2021). Kak vlasti pomogajut postradavshim ot zasuhi fermeram Mangistauskoj oblasti [How the authorities are helping drought-stricken farmers in the Mangistau region]. *Delovaya zhizn' Kazahstan – Business life in Kazakhstan*. Available at: <https://dzhk.kz/biznes/kak-vlasti-pomogajut-postradavshim-ot-zasuhi-fermeram-mangistauskoj-oblasti> (date of access: 06.03.2024) [in Russian].

