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Development of recommendations for sustainable management of the Ural saiga antelope population to reduce the human-wildlife conflict in Kazakhstan

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Abstract

During my field expeditions from 2022-2023, I collected data on land use, pastoralism and plant diversity in Zhanibek and Kazatlov districts of West Kazakhstan Oblast. During my work I was able to define a clear boundary for my research. In the project area 991 farmlands were identified that may be affected to some extent by the presence of saigas, however, only about 132 of them have very serious impacts, this was also confirmed during interviews with local farmers. Although, this also requires further research. Furthermore, three main land use categories were identified, which according to farmers are the most vulnerable to saiga browse, namely hayfields, pastures and crops. As part of my work, I tried to define clear boundaries of these land categories. Also, I could identify typical plant species (119 species) among my observation plots (108 sites) for this steppe zone and made assessment of their distribution, which can be the driver of main saiga movements in the area.

During four months of the Eva Kleinn fellowship, I have been able to analyse the data collected during my field expeditions in Western Kazakhstan. As the main objective of my project is to develop a recommendation to improve the current saiga management plan for the Ministry of Ecology and Natural Resources of the Republic of Kazakhstan, accurate data analysis is a very important aspect.

Keywords: saiga antelope; Ural population of saiga, Kazakhstan, human-wildlife conflict; wildlife management

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INTRODUCTION

Background

In 2023, Kazakhstan's saiga antelope population was recorded at an estimated 1.9 million individuals, based on the records of the spring aerial survey (State arial survey of saiga antelope records in 2023). This figure surpasses the peak numbers reported during the Soviet period, highlighting a significant triumph in conservation efforts. Despite this success, the rising saiga population has sparked increased instances of human-wildlife conflict, particularly with agricultural activities. Farmers have reported various challenges, including saiga herds encroaching on croplands, hay grounds, and pastures, heightening fears of disease transmission to livestock. Additional issues cited by the agricultural community include saigas monopolizing water resources, livestock newborns being lost among migrating saiga herds, and the hygiene and physical disturbances presented by deceased saigas on agricultural lands. These factors have contributed to a growing anti-saiga sentiment among farmers within the Ural population's range and increasing calls for a controlled reduction in saiga numbers and their restriction to designated protected territories.

Grachev et al. (2023) have stressed the importance of implementing saiga population management strategies to effectively balance their numbers with human land-use needs. To reconcile the interests of saiga conservation with agricultural necessities in the Ural region, the establishment of protected areas was suggested and subsequently realized with the creation of the “Bokeyorda” State Nature Reserve, encompassing 343,040 hectares, and the “Ashiozek” Nature Sanctuary, spanning 314,504 hectares. However, these measures did not fully mitigate the conflicts. Continuous complaints from the agricultural sector in western Kazakhstan led the government to contemplate a regulation (culling of 80,000 saigas) program in October 2022. The proposal faced considerable public resistance, prompting the exploration of alternative solutions. Lacking other viable options to alleviate the rising tensions between human and wildlife populations, the government instituted a population number control program in 2023. This initiative aimed to harvest approximately 300,000 saiga individuals to address the ongoing human-wildlife conflict effectively in the Ural and Betpakdala populations.

Since October 2023, the Government of the Republic of Kazakhstan, through the Committee for Forestry and Wildlife (CFW), has initiated a saiga population management program amid escalating conflicts between saigas and local residents in the region. The initial number of saigas planned to be culled for the purpose population control was set at 300,000. However, from October 2023 to January 2024, a harvest of 43,000 (14%) saiga individuals was reported (CWF report during the COP14 CMS in Samarkand, Uzbekistan). The local farming community has expressed several reservations regarding this program:

1. The culling of 300,000 saigas was planned for both the Ural and Betpak-Dala populations and supposed to show an effort to regulate the

population size to more tolerable levels. However, considering the officially estimated and the even higher locally perceived population size as well as the birth rates in 2023 and 2024, the culling of this number of saigas would unlikely have yielded a substantial result in diminishing the conflict.

2. Significant funds are allocated for saiga management, yet these resources are not transferred to farmers as compensation for the damage incurred.

3. Residents do not benefit directly from saiga management; they cannot obtain meat since due to applied regulations for food safety the carcasses must first be sent to the regional centre (500 km away) for sanitary and epidemiological control and are primarily sold in urban markets and meat processing plants. The only benefit local people were able to gain is their involvement in culling actions. However, people who “suffer” from the saiga were also left because they were overloaded with their own work in the farms.

The saiga culling program was implemented for nearly four months, with a short break in December during the saiga rutting season. Saiga were driven into net corrals and slaughtered as well as shot at night with spotlights. The entire approach proved insufficiently effective for mitigating the conflict within the region. Local farmers were profoundly dissatisfied with this decision-making process, the actual implementation and the very limited benefits they received from the saiga harvest, making a renewal of grievances and complaints from May 2024 onwards predictable.

1. STUDY OF THE CONFLICT

The vegetation in the region is characterized by plant communities that are utilized in the pasture lands and hay grounds either on natural short grass steppe vegetation or abandoned arable fields dating from the USSR era, which are currently in the process of transitioning back into the natural steppe ecosystems. An analysis of Soviet land use maps in the region indicated that at least 20% of the land had been ploughed during the virgin land cultivation campaign during the Soviet Union times. Present-day farming activities, specifically the continuous maintenance of hay grounds in these areas, are possibly slowing down the natural succession of these lands back to natural steppe.

The vegetation in the region is characterized by the short grass steppe with *Festuca valesiaca – Stipa lessingiana* with *Stipa lessingiana* and some meadows growing in depressions dominated by *Agropyron repens* (Atlas Kazakh SSR, 1982). In this study the short grass steppe is differentiated to Dominant Vegetation Formations (DVF) because of current and past land use in the region. Two types of short grass steppe were identified, based on land use with the specific DVF i.e. the natural short grass steppe and the and short grass steppe in succession after abandoned fields and/or overgrazing.

1.1. Observation of vegetation in the study region

To comprehend the composition of the vegetation within the research territory, an analysis of 108 observational plots was conducted (Figure 1). The site descriptions were primarily focused on localities where saiga antelopes were encountered and where livestock concentrations were observed within the study area (based on personal observations and data from specialists of the ACBK). The nomenclature for the plant species is following The World Flora Online (WFO, 2024).

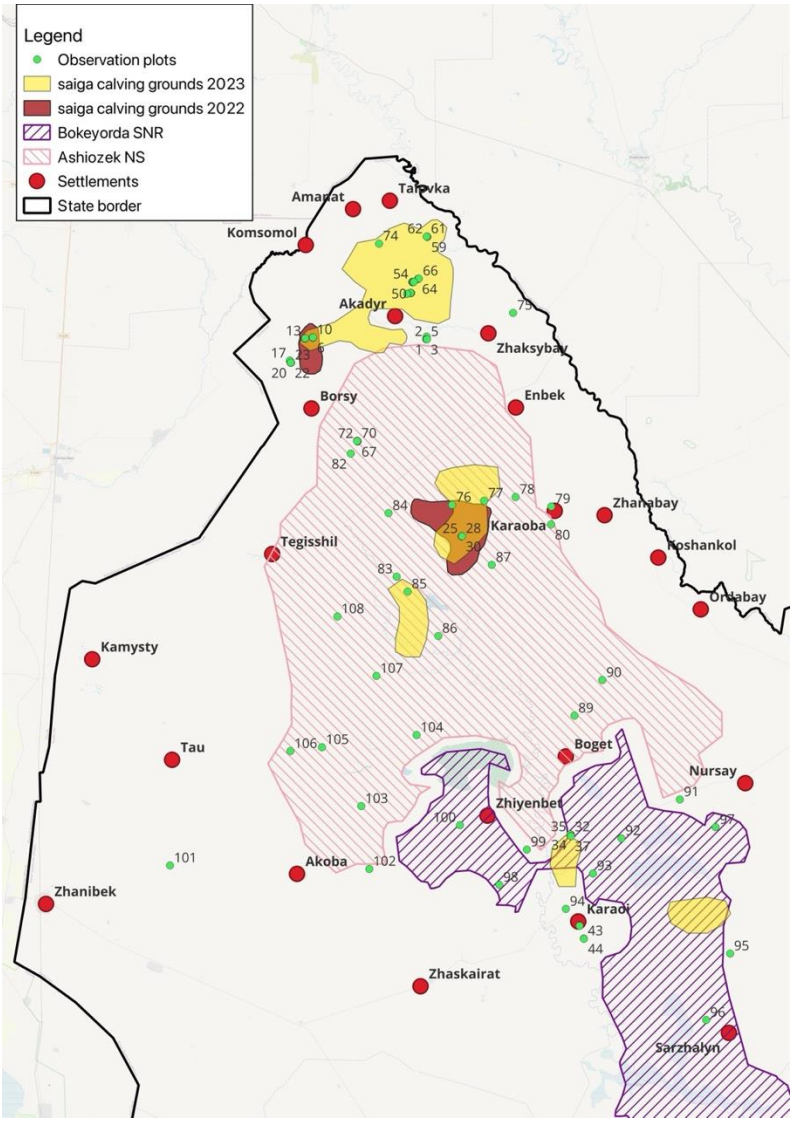

Figure 1. Map of the location of observation plots in the study area. Mainly the study was focusing on calving grounds and the saiga habitat. Additional focus was to the pastures close to villages and in remote areas. Map: Aibat Muzbay.

In the overarching analysis, a total of 115 plant species belonging to 28 families were identified, with the most prevalent families being Poaceae, Brassicaceae, Asteraceae, and Amaranthaceae. Four dominant plant species were the most widespread species across the observation plots: Poa bulbosa (89 % frequency), Festuca valesiaca (81% frequency), Tanacetum achilleifolium (74% frequency), and Leymus ramosus (51 % frequency) (Figure 2). The respective dominance of each of these species is related to the predominate form of land use in the region, namely pastoral grazing, and haymaking.

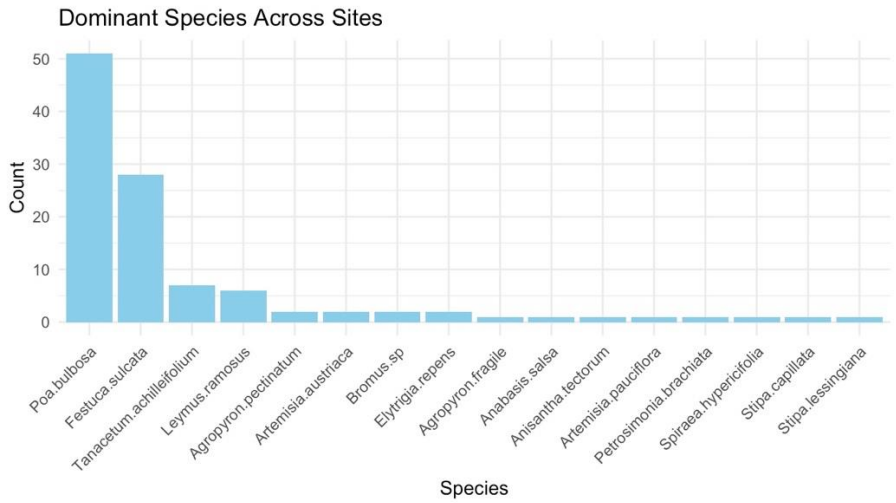

Figure 2. Number of sampling plots with highest species coverage. Festuca valesiaca is shown on the plot as Festuca sulcata (synonym for F. valesiaca).

NMDS shows as that all sampling plots are similar to each other according to their vegetation composition. It confirms that the area is represented by one ecosystem – the short grass-steppe. However, plot 85 stays out which is an observation of solonchak (salt pan) with domination of Petrosomonia brachiate and/or Halocnemum strobilaceum (32% cover) (Figure 3).

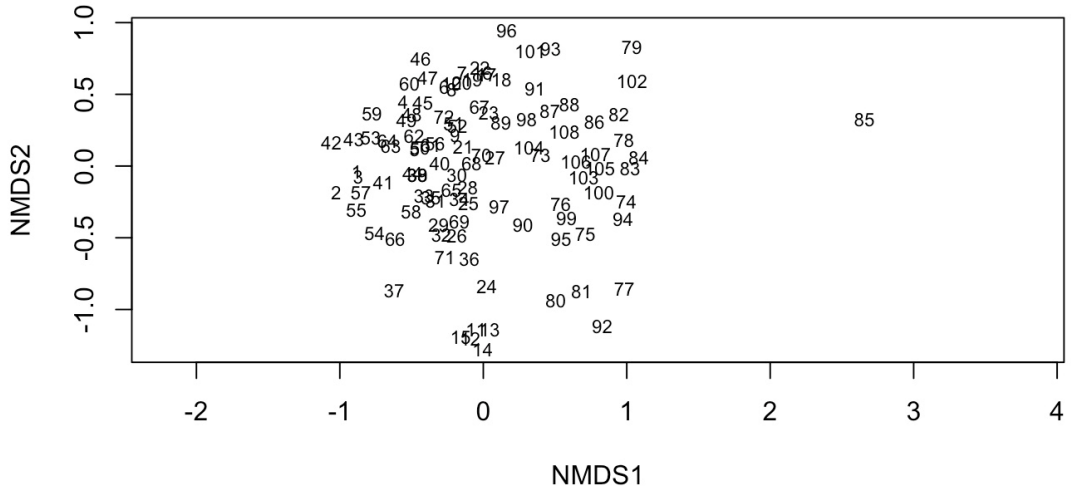

Figure 3. Scheme of a non-metric multidimensional scaling plot. Numbers in the plot represent observation sites (plots). Sites that are more similar (according to the vegetation composition inside the plots) to one another are ordinated closer together. The axes are arbitrary as is the orientation of the plot.

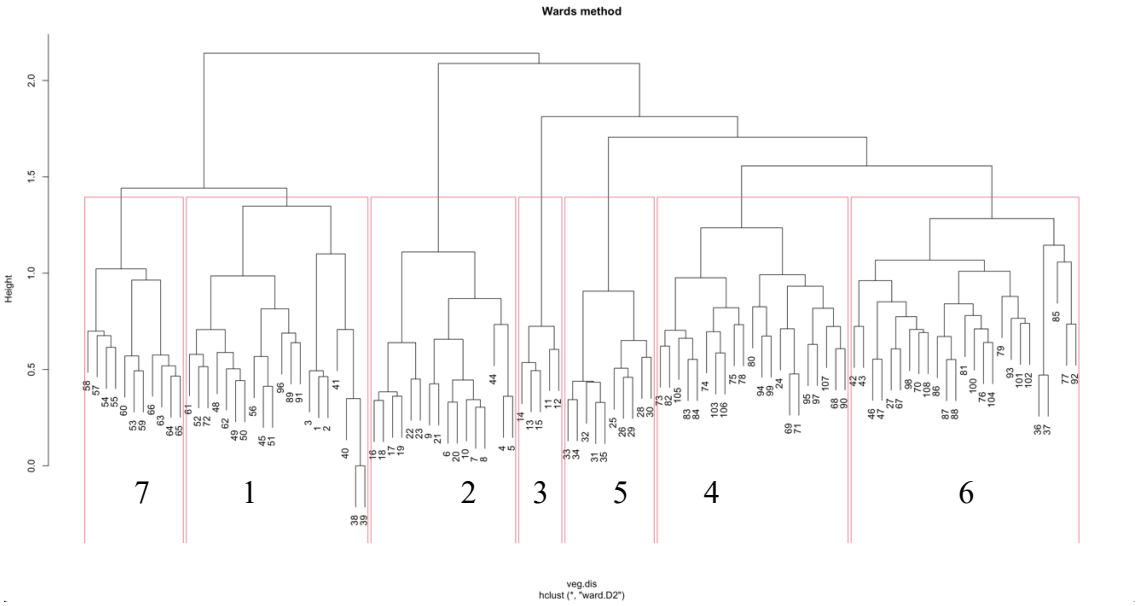

Figure 4. Hierarchical clustering dendrogram based on Ward.D2 method.

The application of hierarchical cluster analysis with the Ward.D2 method (Figure 4), along with cluster consistency analysis, enables the identification of vegetation groups, suggesting specific ecological niches or environmental conditions i.e. land-use.

1.2. Natural short grass steppe

Based on the acquired data, it has been ascertained that the primary type of vegetation in the territory is the short grass steppe with grasses not higher than 50 cm and relatively few herbal plant species. The natural short grass steppe is typified by the dominance of vegetation formations comprising species such as Festu*ca valesiaca, Stipa lessingiana, Stipa capilata, Poa bulbosa*, and *Elytrigia repen*. Only this natural type of the shortgrass steppe is described in the Soviet literature as mentioned above repens (Atlas Kazakh SSR, 1982). This biome is predominantly utilized as rangeland by local farmers. Observations indicate that 70% of all plots with the presence of *Festuca valesiaca* and/or *Poa bulbosa* DVF were grazed by ungulates, predominantly by cattle and saiga. The efficaciousness of these plants in rangeland settings has been noted by numerous scholars. According to Larin's research ("Forage plants of the meadow and pasture lands of the USSR," 1937), all DVF species possess considerable value in pastures. The DVF found in natural and in succession after abandoned fields and/or overgrazing short gras steppes are characterized like follows:

• DVF with *Poa bulbosa* predominant. The species is an ephemeroid plant with high forage qualities, which combines a high yield in severely arid regions with an unassuming nature towards soil types. Utilizing minimal moisture reserves during autumn, winter, and spring, it commences vegetation early and

by the beginning of April, provides sufficient biomass for foraging animals. This DVF is widespread on the plains and mico-depressions of the observation area.

• DVF with *Festuca valesiaca* predominant. The species is a perennial small tussock grass, categorized as a valuable pasture plant. With moderate grazing intensity, it can persist on natural pastures for many decades. It grows in spring earlier than other grasses, but only with the onset of a rainy period; flowering occurs in May–June, after which it quickly becomes coarse and dry. In autumn it becomes green gain and remains green going into winter. It can be grazed two to three times during the vegetation period. Before flowering, its grass is readily consumed by sheep, goats, horses, and cattle. Hay harvested before flowering is favoured by all types of livestock. This DVF is often associated with the species *Stipa lessingiana* and *S. capillata* and the above described DVF with *Poa bulbosa*. It Is the most widespread DVF throughout the observation area covering large parts of the plains distant from settlements.

• DVF with *Elytrigia repens* predominant. It is a widespread perennial grass which can be a forage plant modest value but also a challenging weed to eradicate. It is well-grazed by all livestock types, especially at the beginning of the vegetative period. After mowing and grazing, it regrows well and is an excellent milk-enhancing plant for cows and a good fattening feed for beef cattle. In the investigated area it grows in sallow depressions and along periodically dry streams. The DVF is presently found in depressions (also along temporary streams) where water is gathering in spring.

1.3. The short grass steppe in succession after abandoned fields and/or overgrazing

The short grass steppe in succession after abandoned fields and/or overgrazing is characterized by the presence of *Leymus ramosus, Tanacetum achileifolium, Artemisia spp., Bromus spp.,* and *Agropyron repens* DVF. These are lands where vegetation has changed due to anthropogenic influence. Predominantly, this is the former use as arable lands for wheat production and areas near settlements where grazing is very intense. Consequently, DVF species that emerge indicate a certain character of land use. Specifically:

• The DVF with dominance of uniform *Leymus ramosus* signifies an advanced succession stage on abandoned fields. Within the first decade after abandonment of crop fields, annual herbs form clusters, and the fallows appear quite patchy (Dieterich, 2000). The prevalent state with *Leymus ramosus* DVF may represent a sub-climax for an extended period of time, as most are used for hay production, which appears to stabilize the DVF. *Leymus ramosus* propagates vegetative through rhizomes and seems more competitive than short grass steppe taxa under this land use conditions.

• The DVF with *Tanacetum achileifolium* predominance indicates overgrazing by livestock. Both saiga and livestock eat the species, but seemingly not as a preferred source of food. Nevertheless, our observations reveal that in absence

of other herbs saiga is selectively picking out the species neglecting dominant Poacea species.

- The DVF with *Artemisia* spp. predominance, particularly *Artemisia austriaca*, indicates a distinct degradation of pasturelands due to intensive overgrazing. Vegetation types such as *Artemisia austriaca* are less palatable to livestock during the vegetative period due to their bitterness (Baidusen et al., 2013).

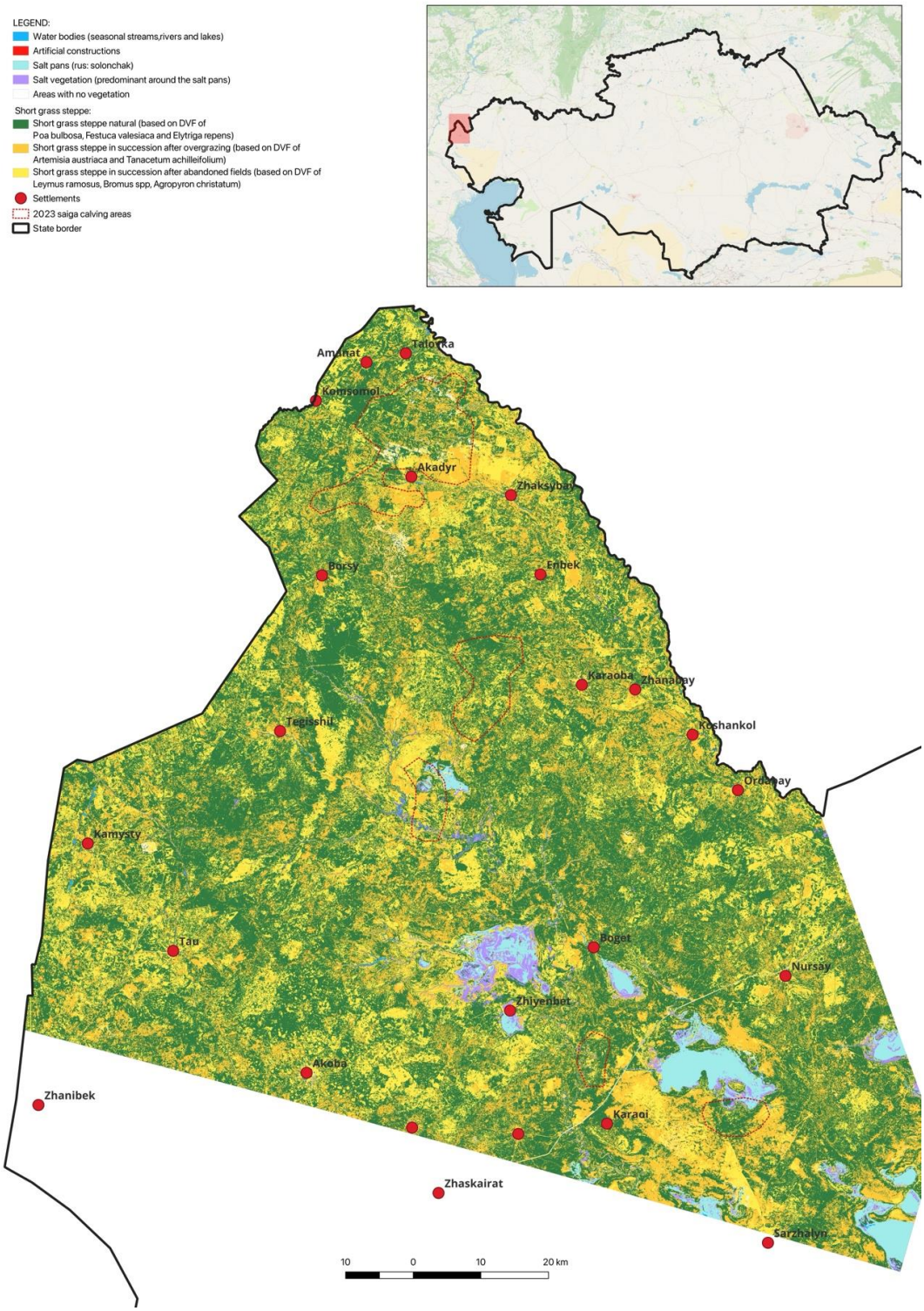

Figure 5. Map of natural short grass steppe and short grass steppe in succession after abandoned fields and/or overgrazing. Obviously, areas around the villages are overgrazed whereas the more distant areas from settlements are covered with the natural short grass steppe. The Landsat image covers only the central and northern part of the study area, however all calving grounds were fully covered with the image and analysed.

2. SAIGA IMPACT

Here presented research reveals that from the perspective of livestock keeping farmers saiga has a certain negative impact on the pasture lands and hay fields within the study area. However, this impact is temporally and spatially limited, and the nature of said impact does not exceed that of climatic effects. In 2022, during the initial vegetation assessments in the region, I noted the active growth of *Poa bulbosa* was caused by significant precipitation in both 2021 and 2022. A reduction in precipitation correlated with a decrease in vegetative activity. In 2023, it was quite challenging to identify *Poa bulbosa* at observation plots due to the absence of moisture, thus resulting in much less productive pastures.

In addition, saiga is a selective feeder with a strong preference for herbal plants, rather than grass (*Poaceae)* (Abadurov et al., 2005), including species which are not much used by livestock and may even become weeds such as *Tanacetum achilleifolium*, *Ornithogalum fischerianum*, *Tulipa spp.* (Fadeev et al., 1982.). Also, such annual *Brassicacae* as *Euclidium syriacum, Lepidium ruderale* and *L. perfoliatum* are well eaten by saiga (Dieterich et al., 2012) while being mostly avoided by livestock. Only in spring during the calving time, saiga is also eating a lot of *Poacea* (Dieterich et al., 2012). Throughout the year livestock forages on the grasses of the short grass steppe, which predominate in the investigated area. Thus, there is also a certain degree of segregation of saiga and livestock regarding fodder plants, thus leading to a more effective and less competitive use of the vegetation.

Certainly, impact of saigas from the end of April to the beginning of June in calving territories is not neglible. The considerable aggregation of saigas in one area, along with an increased density of saigas per hectare, undoubtedly exerts a distinct influence. An example of pasture trampling is well illustrated in the drone photo, where saigas alongside with domestic livestock forge trails through the pastures. Nevertheless, it is difficult to understand, what the density of such trails would be without saiga, as both livestock and saiga are using them. Furthermore, I could not establish if the trails affect the overall biomass productivity or if the water (surface and infiltration) collected on the trails benefits adjacent vegetation, an improved growth of which may thus partly or fully compensate for productivity losses on the trails.

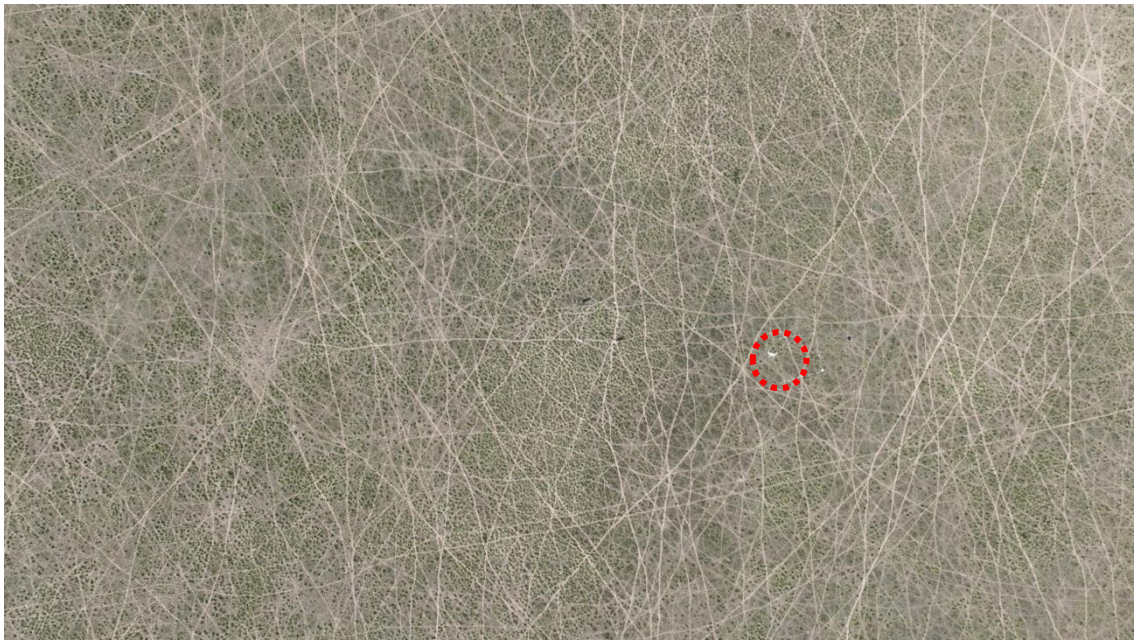

Figure 6. Trails of ungulates in the [2] saiga calving ground. Red circle – dead saiga calf. Elevation 75 m above the ground. Photo: Aibat Muzbay.

For the last three years the precipitation amount has fallen from 416.7 mm (2021) to 371.1 mm (2023). Biomass available in the steppes is a function of the amount of precipitation. 47 mm less precipitation (12%) under the arid conditions of the short grass steppe has significantly negative impact on the productivity of vegetation on the pastures and hay grounds. Thus, the overarching effect on the availability of fodder for livestock is the level of precipitation and not the number of saiga. Certainly, farmers perceive this fact differently and use the saiga as a scape goat for all problems coming in their way (illness, scarcity of fodder and hay, dried up watering places etc.).

In parallel with the growth of saiga population, there has also been an increase in livestock numbers in the region, apart from sheep and goats. In addition to this, the area of available land is constantly shrinking due to the leasing of vast tracts of land by private farmers. Consequently, the farmers want to use all available land only for their own benefit and do not want to share their resources with anyone, especially saigas, which the farmers do not have the benefit of. As a result, in their eyes, saigas become guilty of all anthropogenic, natural and climatic pressures on the forage resources in their pastures.

3. RECOMMENDATIONS

Saiga is the only large ungulate species of the vast drylands in Kazakhstan, which is still present in functional numbers i.e. able to graze the steppe and desert ecosystems in significant intensity. This is important, as dryland plant species and large ungulates have been together on an evolutionary path for millennia. Without their presence the vegetation cover will change, while wild fires become more frequent and soil erosion is more likely. All other large ungulate species of the Kazakh drylands are either locally extinct (wild horse *Equus ferus* and Bactrian camel *Camelus ferus*) or rare (Goitered gazella *Gazella subgutterosa* and kulan *Equus hemionus kulan*, both endangered EN under IUCN Red List) thus present in numbers only locally significant for the dryland ecosystems. Thus, the objective should be that saiga is present throughout the steppe and desert ecosystem in Kazakhstan and not only in several restricted areas with local sub-populations. In order to achieve this, the current policy to simply reduce the saiga numbers is counterproductive and the government's solution must be to ensure that local people are prepared to accept saigas in their neighborhoods. The main focus of the government should be on local acceptance of saigas, namely by the farmers themselves. This is now considered to be the only proper solution to this conflict.

The vision for the future of the saiga should be the following:

- Suitable Saiga habitat are all steppes and semi-deserts in Kazakhstan and parts of Russia, Uzbekistan and Turkmenistan
- The division into sub-population (Ural, Betpakdala, Ustyurt and Kalmykia) are a result of low numbers of saiga in the 1920ies.
- A conservative estimate is that there is room for more than 10 million saiga in its historical habitat today
- The sustainable use strategy leads to a situation, that local people welcome the species returning to their region, as they are benefiting directly and/or indirectly from their presence.

To achieve this vision, a program for the sustainable use of saigas should be introduced in Kazakhstan. Sustainable use is not just about guaranteeing minimum population growth with concurrent use, it is a whole program that includes four main elements:

1. Firstly, it is Benefit Sharing as an dimension of sustainable use. These benefits include:

1.1. Intangible benefits. This is the sense of spiritual fulfilment and enjoyment from observing and coexisting with wildlife.

1.2. Ecosystem services. Local farmers have already noticed that the number of steppe fires has been greatly reduced with the dramatic increase in the numbers of saigas. There used to be other ungulates in the Ural steppe, which were removed by humans, with the consequence that the entire produced biomass burned every year. Now this function of fire safety of the steppe depends solely

on saigas (and livestock). Also, the abundance of saigas in the steppe means the safety of livestock from predators like the wolf.
1.3. Access to meat. Local people could partially replace their livestock with saigas. That is, it could be economically and physically advantageous for them to consume saiga for food. Saigas do not need to be herded and protected from wolves or horsethieves. There is no need to prepare hay for saigas in winter; they can easily overwinter in the southern regions and return.
1.4. Financial income for land users. Farmers could receive rewards for having saigas on their pastures. And these rewards could be paid from the profits that are possible from exporting saiga horns. This measure needs especially to be considered for the calving grounds of the saiga, as the animals stay on one place for several weeks during that time.
1.5. Revenues from the use of saigas for the development of local people's welfare. Saiga is a very valuable resource. There is a huge potential for its sustainable use. These funds could go back to the villages for improvement of communal infrastructure, services and overall wellbeing.

2. Secondly, it is the sense of ownership as a dimension of sustainable use. Benefit sharing alone is not sufficient. Local people need to realize that saiga conservation is the responsibility of each and every one of them. To do this, they must be empowered to prevent illegal and illegitimate use, and to manage and utilize saigas. Also, local people should be empowered to participate in decision-making on management, conservation and benefit sharing.

3. Third, appropriate institutions are a dimension of sustainable use. It is necessary to develop different institutional arrangements for different forms of sustainable use, ownership, and benefit sharing:

3.1. Tourist use without take of saigas – local business in cooperation with land users, hunting area holders = income for local people
3.2. Hunting tourism – hunting area holders = income for hunting area holders and their staff
3.3. Domestic sport hunting – hunting area holders provide opportunities to domestic hunters (sale of meat and horns not permitted) = income for hunting area holders and their staff
3.4. Commercial hunting for production of meat and horns (population control as side effect) – central national entity (e.g. Okhotzooprom) together with hunting ground owners (handling, storage, processing and sale of horns through monopoly organization) = generation of revenues for payments to land users and hunting area holders
3.5. Collection of horns from natural mortality – local land users, hunting area managers in collaboration with monopoly organization = financial reward for collectors but majority of revenues for community development and welfare
3.6. Associations of users of saiga in local range areas = participation in decision making about management and benefit sharing
3.7. National level fund = management of funds from commercial saiga use and spending for land user rewards and local development

4. Suitable techniques are a dimension of sustainable use. Sustainable use of saigas should be in such a way that the approach used can ensure:
4.1. Securing animal welfare
4.2. Avoidance of adverse impact on animal behavior, population and ecosystem
4.3. Best products and optimum revenues
4.4. Prevention of illegal take and illegal trade.

The population control program, implemented from October 2023 to February 2024, was a good experience for Kazakhstan, as the last legal hunt before that was 20 years ago. Decision makers and local specialists will now be able to adequately assess their capacities and limitations. The next program should focus on the sustainable use of saigas, taking into account its above explained four important dimensions. Also, to ensure legal international trade in saiga derivatives as the major source of cash revenues from saiga, a justified removal of the annotation on international commercial trade at the next CoP CITES needs to be achieved.

4. ACKNOWLEDGEMENTS

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