

A Steppe Towards a Secure Future

Aligning people's socio-economic interests with wildlife conservation to conserve the critically endangered Saiga antelope in the Central Asian Steppe



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On a seemingly never-ending expanse, green fades to gold as the fiery sun fades into the evening light. Sunsets on the Kazakh steppe are magical! The vast lands of Central Asia are now one of the few remaining homes of the strange yet fascinating Saiga Antelope (*Saiga tatarica*). The rather ungainly species once roamed widely over the steppes and semi-arid deserts from South-Eastern Europe to Mongolia and into China [1]. In fact, saigas roamed this planet well before the Woolly Mammoth (*Mammuthus primigenius*). Today, however, they are found only in five populations across four countries (Russia, Kazakhstan, Uzbekistan and Mongolia)[2].

Saiga are the true nomads of the steppe, travelling hundreds of kilometres in large aggregations on a seasonal basis to track resources in this rather harsh environment [3]. The sheer magnitude of this coordinated, tandem migration across the steppe is one of nature's greatest spectacles. To quote Pishchevich from 1884, "in the lands of the Cossacks (modern day Southern Russia and South-Eastern Ukraine), there were so many saigas that in places their herds covered the whole steppe."

Traditionally, saigas were hunted for meat by steppe communities and the male's horns were, and remain, highly priced for their medicinal value in Chinese Traditional Medicine (CTM) [4]. Throughout the Soviet Era of the 20th century, saiga numbers remained stable and were managed and harvested with an effective quota system accompanied by meticulous data collection. Through these years, the Soviet steppe was grazed by livestock in high densities under the government's collectivization scheme. Like saigas, they too would largely migrate between wintering ground (southern regions) and summer grounds (the central and northern regions of the country) [5]. Imagine this, if you can; literally, millions of saigas grazing the steppe alongside millions of livestock.



Like a flash flood that sweeps away all in its path, there came a rather sudden switch from collectivization to privatisation. With the fall of the Soviet Union in the early 1990s, livestock herders almost overnight lost the institutional support that helped them to maintain their large herds. Within four years, over 50 million livestock (mainly sheep, goat, cows and horses) were either slaughtered for meat or sold to keep the local's income and livelihood afloat (5).

Imagine yourself making a living in one of the most isolated and unforgiving environments in your country. Now imagine that almost immediately you no longer having access to the essential supplies, like medicine and medical care, you have relied on for years. On the rather lonesome steppe, people and families are several hundred kilometres away from any truly inhabited areas and the supply truck from Moscow, full of much needed supplies, does not arrive as it has consistently for years... and never again will... what do you do?

The Soviet Collapse had disastrous effects on saiga populations. Poaching for horns increased drastically, villages were abandoned, and hunting for meat

increased to unsustainable levels [6]. Within a decade of the Collapse, saiga population across their historical range crashed to near extinction. Accordingly, the species was listed as vulnerable on the 1996 IUCN Red List and critically endangered in 2002 [6].

But there was another problem. Poaching targeted males and their valuable horns disproportionately more than females, who are hunted solely for meat. This resulted in a massively declining sex ratio. In a harem breeding species like saigas, we expect males to comprise about 25% of the population. Amid their population decline, males dropped to just 2% of the population in many places. And in 2001, researchers observed 1 male for every 109 females! This culminates in drastically low pregnancy rates and populations that struggle to sustain themselves on the steppe [7].

With populations in freefall, the newly formed Saiga Conservation Alliance (SCA), led by Dr. E. J. Milner-Gulland, began organizing on-ground collaborations across all remaining saiga ranges and countries under the shared goal of securing the saiga's future through action-driven research. Largely due to these collaborative efforts through the 21st



century, saiga are on the verge of a new dawn.

In 2015, monitoring revealed that current populations in Kazakhstan were on the increase for the first time in over a decade. There were more than 300,000 individuals in existence; a considerable increase from the predicted 50,000 in 2003. The Saiga Conservation Alliance's in-country Kazakhstan collaborators, the Association for Conservation of Biodiversity of Kazakhstan (ACBK), began monitoring saiga populations and movements in 2010. By 2014, observations suggested that herds were aggregating and selecting calving sites without incident. And in 2015, aerial surveys conducted by ACBK, in collaboration with the Institute of Zoology of the Kazakhstan Academy of Sciences, observed three main major herds in Kazakhstan: Ural, Ustiurt and Betpak-Dala (see map).

But the journey to a happy conservation story ending is never so straightforward. In Betpak-Dala, over a period of two weeks in 2015, the most unfortunate event unfolded; over 200,000 saigas were found dead across various calving aggregation si-

tes. Males, females, young, all died as if a mass genocide was being orchestrated. This resulted in an 88% decrease in the Betpak-Dala population, which prior to the die-off constituted nearly 80% of the world's saiga population! Yes, conservation efforts by SCA and its collaborators were working, but it seemed like all their eggs were in one basket.

An interdisciplinary team of researchers and policy makers collaborated to investigate this mystery. They concluded the cause of death to be pasteurellosis, a bacterial infection, that caused haemorrhagic septicaemia. This was caused when the normally commensal bacteria, *Pasteurella multocida*, found in the oesophagus of saigas, found its way into the saigas' bloodstream. The viral outbreak was driven by unusually high temperature and humidity ten days prior to the onset of calving [8].

With that event, climate change became a clear and present factor in saiga conservation efforts, in addition to the challenges of growing and sustaining declining populations and breeding.



Top, left: Sunset group of saiga at watering hole (credit: Eugeny Polonsky, SCA). Top: Aggregating Saigas with face of farm in the background (credit: author) and a group of dead saiga female from one of the many aggregation in Betpak-Dala, 2015. (credit: Steffen Zuther, ACBK). Top: In today's world saigas are found solely in five population: (left to right) Pre-Caspian, Russia; Ural, Kazakhstan; Ustiurt, Kazakhstan-Uzbekistan; Betpak-Dala, Kazakhstan; Western Mongolian, Mongolian sub-species (credit: SCA). Next page: New born saigas employ the hiding tactic to avoid predators once they are born. Their body camouflages well with the dirt and dust of the steppe. Saiga new born are ready to walk within a day of being born (credit: SCA).



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The Betpak-Dala mass mortality event (MME) was unfortunate in its timing and unusual with respect to its scale but MMEs caused by pasteurellosis and other diseases (foot and mouth, FMD) are not unrepresented. But the Betpak-Dala MME highlights a critical point for conservation. With changes in seasonal climate increasing average temperatures, MMEs are likely to occur more readily in the future. Hence, conservation needs to invest in preventive measures to build saiga population to large enough sizes to survive with these events.

We need to establish collaborative and sustainable landscape-level conservation approach to facilitate coexistence between saigas, livestock, climate, and people so its migratory lifestyle may continue. This is especially key as post-Collapse livestock activities on Kazakh rangelands are increase with governmental support in the form of subsidies and policies

[9]. This produces both a renewed threat of disease spill-over to saigas and opportunities to understand shared drivers of disease.

Though the Soviet Era reflects a rather peaceful co-existence, saiga did contract parasites and diseases from livestock, i.e. FMD. Some disease events required blanket vaccination for livestock herds to eradicate outbreaks in both domestic and wild ungulates [10]. For example, in winter 2016, nearly two-thirds of the Mongolian subspecies, *Saiga tatarica mongolica* died from the Petit Peste des Ruminants (PPR) virus. Saiga contracted PPR from livestock and the outbreak was exacerbated by reduced forage availability due to overstocked and overgrazed rangelands. Considering all of this, the Kazakh rangelands have seen few studies on parasites, diseases, and vectors, all of which can affect the critically endangered saiga. Disease surveillance and management needs to become proactive to conserve saiga.

My research aims to change that by building evidence and work with stakeholders to manage disease transmission between domestic and wild ungulates in the Kazakh rangelands. My research partners and I want to understand the effects of environmental and climatic change on the transmission of gastrointestinal nematodes – think of very small worms in the animals’ stomachs – between migratory and domestic ungulates (between saiga and cows, sheep, goats, etc.). Knowing how diseases and parasites move between species, and how changes in climate and on the steppe landscape exacerbate this, we can more readily predict where disease transmission hotspots will occur (like shared watering holes) and begin identifying patterns and actions to control or mitigate disease and future MMEs. By knowing more about a disease and its effect on wild and domestic species, the better we can design targeted disease management systems to address economic security,



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The hope is our research and collaborations can be used to engage with herders and develop appropriate interventions to improve livestock health. This serves the dual purpose of improving economic security to the largely resource-poor herders of the Kazakh steppe and wildlife conservation due to reduced spill-over to Saigas.

At this point, when I take a step back and ponder about the next steps and the potentially precarious future of a prehistoric creature, I am left ponderous. What a shame would it be to lose them in my own lifetime! As I overcome the fear of that thought, my mind wonders to the image of nearly 60,000 saiga females that I witnessed aggregating to calve in May 2018 on the steppes of Ural. I distinctly remember seeing the massifs of old farms dotting my horizon. People and their livestock were housed there going about

their daily routine. Growing up we are nearly indoctrinated to believe that people and wildlife need to be two separate entities to thrive. But I remember thinking that this situation offers an opportunity to work alongside local people to understand them, and via this, work towards the conservation needs of the saigas whilst upholding local livelihoods and well-being.

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