Numbers of Livestock in Western Big Pamir

(2006-2019)

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A large flock (>350) of sheep and goats in Big Pamir, October 2019 - @ WCS/Ali Madad Rajabi

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Scope of the report

This report presents the results of annual livestock counts carried out in September and October 2019 in the west of Big Pamir by WCS Afghanistan's Ecological Monitoring Team and community rangers. Analysis of livestock count results categorized according to settlements / grazing areas were not included in this report, but this finer scale measurements will have added significance when analysed with rangeland survey information carried out in 2016 and 2018. The observed demographic trends since 2006 have already been discussed in previous reports in the frame of sustainable rural livelihoods and landscape conservation (Ostrowski and Rajabi 2013 - 2018). The present report discusses results collected in 2019 and compares them with previous census results.

Background

Accurately estimating numbers and demographic trends of livestock in the fragile ecosystems of Big Pamir is central to understanding grazing pressures, the extent of competition with wild herbivores for range use, and the risk of disease transmission from livestock to wildlife. WCS has been monitoring livestock numbers in western Big Pamir since 2006 as a faster and more cost-effective alternative to carrying out thorough assessments of the state of the rangeland. The western side of Big Pamir is used by Wakhis to feed their livestock during the summer months. They remain here from mid May until early October when most withdraw to the Wakhan Valley for the winter.

In March 2014 the Government of Afghanistan declared the Wakhan District a National Park. Prior to this important development, Wakhi communities had agreed to protect a significant portion of the western Big Pamir. The Big Pamir Wildlife Reserve (BPWR) and its associated buffer zone cover 1,542 km^2 of fragile Pamir landscape. It was created to ensure the protection of key Marco Polo sheep (*Ovis ammon polii*) habitat, and promote sustainable livelihood practices. Counting livestock in the Big Pamir is therefore an important monitoring activity, generating baseline information that aims to inform the management of the Wakhan National Park and more specifically of BPWR.

Two estimates of livestock numbers in the western Big Pamir in 2006 were made based on differing methodologies (Mock et al. 2007; Ostrowski 2007). In 2007, Ostrowski et al. (2007) reconciled discrepancies of these two estimates in light of the results of an additional survey, and proposed an adjusted estimate for livestock numbers in the area in 2006 (Table 1). After this initial estimate, livestock censuses were discontinued for the following three years. In 2010, WCS's veterinary team developed a standardized protocol and measured livestock numbers from direct counts at the end of the summer grazing season, every year between 2010 and 2019 (Table 1). The present report summarizes census results made by the WCS team between September 24th, and

October 9th, 2019 and updates our knowledge on livestock trends in this part of the Wakhan National Park since 2006.

Methods

Wakhi herders using Big Pamir maintain their livestock in the same camps (ayloqs) every year at unchanging locations since first surveys in 2006-2007 (Fig. 1). In addition during the survey herders were questioned on locations of possible transitory camps in the area but none of those were reported. In each ayloq the adult and lamb/kid flocks were tended separately and were counted separately when dispersing over large grazing areas near the camp. Counting during grazing versus in corrals is recommended as easier to perform, more accurate, and perceived as less intrusive by herders. To do so a team of two rangers approached the group of livestock to count no less than 300-400 m, to have a global view of the flock and counted sheep and goats separately with hand-counters on two occasions. Counts were then averaged to final count results for each species. Only aggregated results of shoats (= sheep and goats) are provided in the present report. A similar approach was used to count yaks but this happened in mid afternoon when females and sub-adult animals were coming back to the camp (to milk calves for adult females). Groups of adult and sub-adult male yaks encountered in the area were also counted and owning ayloqs identified from questioners. Herders in each ayloq were also questioned about significant losses incurred during the season (e.g. disease, predation, accidents…) and livestock numbers, especially yak numbers, as a verification of direct count results.

Results

Table 1. Results of livestock count in the western Big Pamir between 2006 and 2019, Wakhan National Park, Badakhshan Province, Afghanistan (Ostrowski and Rajabi 2018).

Year	Month of census	Sheep and goats	Yaks	Total livestock[1]	Rate of growth[2]
2006[3]	Jul-Aug	8,749	740	9,489	-
2010	Jul	12,377	930	13,307	+40.2%
2011	Sept	14,559	1,171	15,730	+18.2%
2012	Sept	14,388	1,058	15,446	-1.8%
2013	Sept	19,467	1,298	20,765	+34.4%
2014	Sept	19,075	1,108	20,183	-2.6%
2015	Sept-Oct	19,135	1,188	20,323	+0.7%
2016	Sept-Oct	16,281	1,071	17,352	-14.6%
2017	Sept-Oct	16,558	1,167	17,725	+2.1%
2018	Sept-Oct	17,721[4]	880	18,601	+4.9%
2019	Sept-Oct	16,041	873	16,914	-9.1%

[1]Excluding cattle usually not present (or few) in Big Pamir after mid September.[2]Since the previous count. [3]The survey in 2006 combined two different methods; direct counts (75%) and questionnaire surveys (25%); therefore true numbers of livestock might have been underestimated by 5-10%. [4]An estimated 450 shoats had already left the area (according to discussions with owners) and were added to the total count.

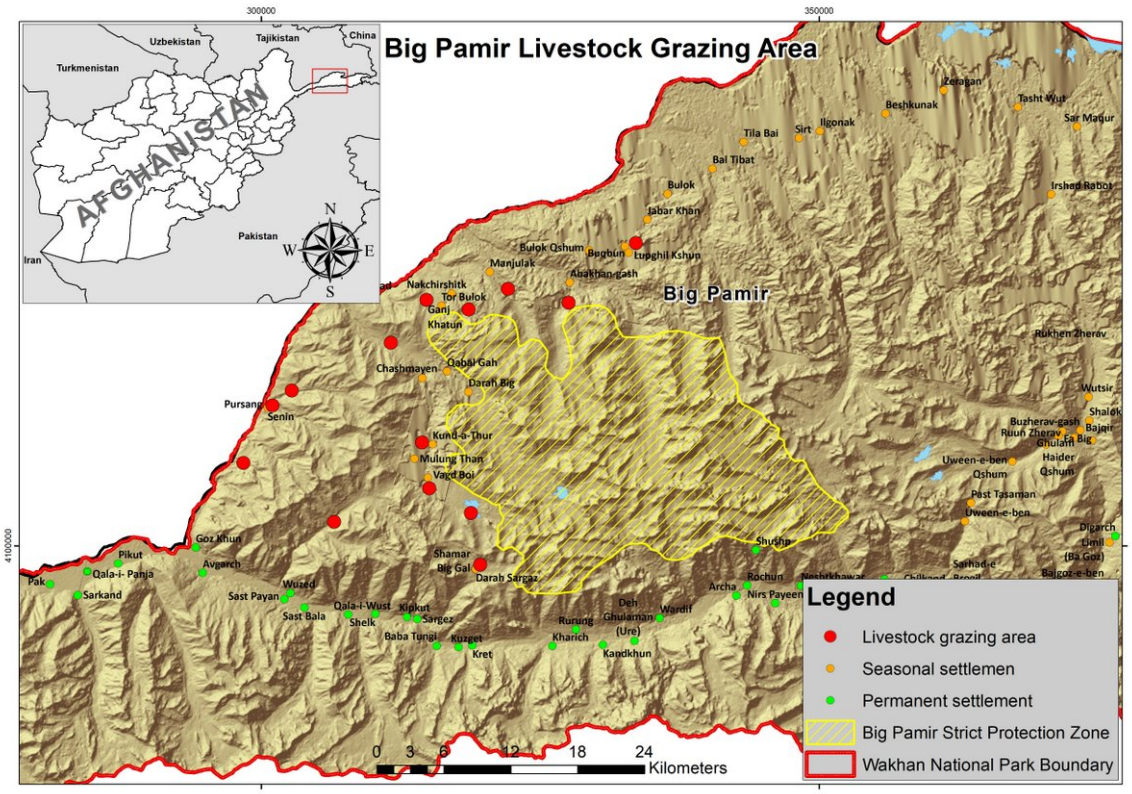

Figure 1. Livestock monitoring area in western Big Pamir showing the location of livestock grazing areas, seasonal (i.e. ayloq) and permanent (i.e. village) settlements, Wakhan National Park, 2019.

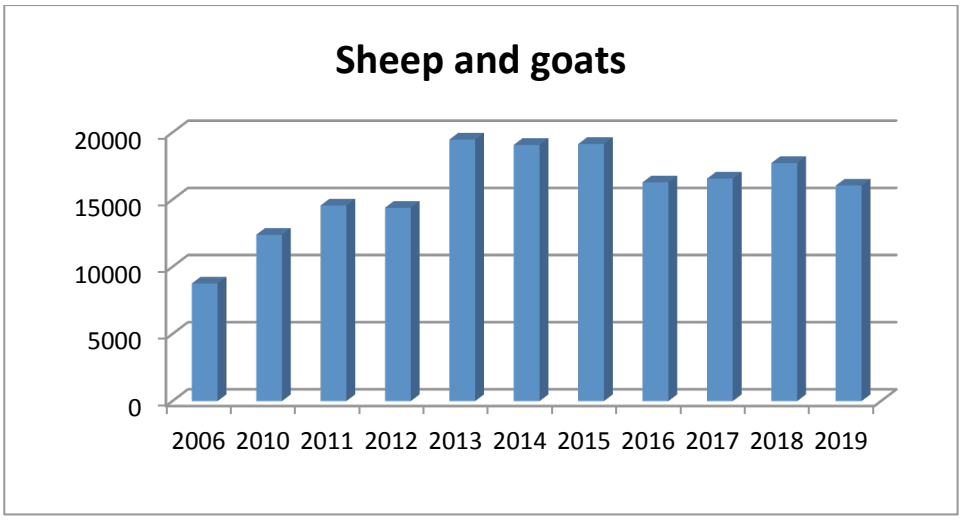

Figure 2. Annual estimates of sheep and goat numbers in the western Big Pamir between 2006 and 2019, Wakhan National Park, Badakhshan Province, Afghanistan.

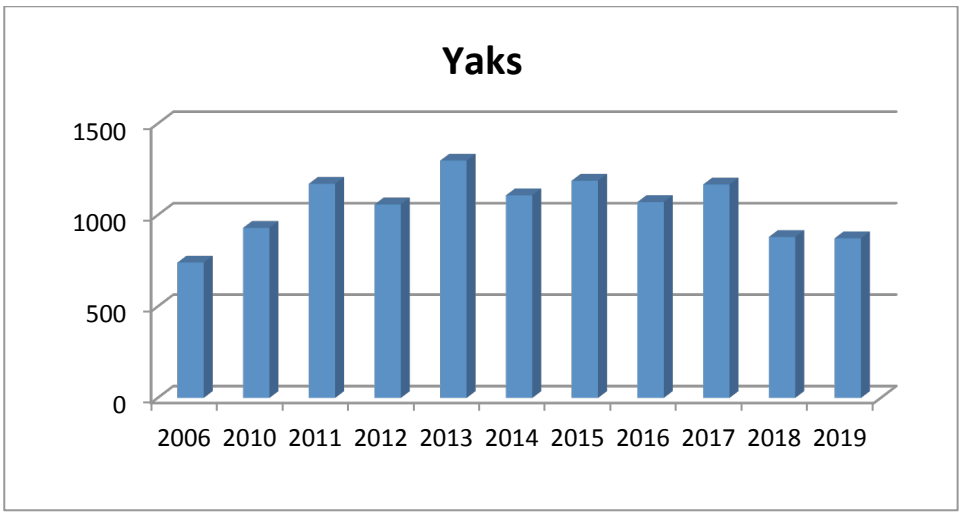

Figure 3. Annual estimates of domestic yak numbers in the western Big Pamir between 2006 and 2019, Wakhan National Park, Badakhshan Province, Afghanistan.

Discussion

The livestock population in western Big Pamir decreased by 9.1% (ca. 1,700 animals) in 2019 compared to 2018. The overall trend in livestock numbers in western Big Pamir is a significant increase of c. 80% over the last 13 years. However, this increase could be divided into two periods.

Between 2006 and 2013 the livestock population growth in western Big Pamir has been dramatic, at +119%, or an annual average growth rate of 16.9% (Table 1). This demographic increase was reported in all livestock species; sheep, goats (Fig. 2), yaks (Fig. 3) and probably cattle as well, but those have not been included in the surveys because the vast majority of them remains in the Pamirs for only a short period of time (early July-mid September). We think that concomitant to this increase in numbers, Big Pamir also supported locally increased densities (Ostrowski et al. 2013). Livestock range-use surveys carried out between 2006 and 2008 suggested that Wakhi people maximized the use of available pastures for their livestock (Ostrowski 2009). In such circumstances an increase in livestock numbers should inevitably translate into an increase in livestock densities. Using GPS data collected by herders Ostrowski (2009) found that the average home range and density of eight of these herds, totalling nearly 5,000 sheep and goats, were 30.2 ± 5.3 km^2 and 20.8 ± 5.2 animals/km^2, respectively.

After 2013 livestock numbers have levelled off and even significantly declined in 2016 and 2019. This levelling off or possibly negative trend is as important to understand as the preceding period of growth. The significant population increase between 2012 and 2013 (+34%) raised concerns over the sustainability of current grazing practices by

Wakhi herders in Big Pamir (Ostrowski et al. 2013). We predicted that livestock populations might have reached maximum numbers in the area, which were likely to decrease in the future because of degraded pastures. Aligned with our predictions, livestock numbers after 2013 seemed to have levelled off with a modest (and probably genuine) decrease of -2.6% in 2014 compared to 2013 followed by an increase of +0.7% in 2015 compared to 2014 and then a clear decrease of -14.6% in 2016 compared to 2015 as well as of -9.1% in 2019 as compared to 2018. Overall the shoat and yak populations have decreased by 17.6% and 32.7%, respectively between 2013 and 2019.

Although the main reasons of this decline have already been discussed (Ostrowski and Rajabi 2018) we elaborate further on the causes of decline observed in 2019 based on information retrieved during the survey. First a number of livestock owners, amongst the most educated, have sold larger numbers of livestock in autumn 2018 in anticipation of a high mortality during winter-spring 2019, as fattening was considered sub-optimal after summer 2018 (Amruddin Sanjer, per comm.). Also, because of severe snowfalls and cold weather conditions a large number of shoats (especially lambs and kids) have died in early spring 2019. During the survey the team recorded from questionnaires that at least 450-500 shoats had died of coldness, food shortage and diseases and 62 (presumably weakened) of predation by wolves during spring 2009. Overall and as measured by WCS surveys, the rangelands of western Big Pamir appear nowadays overgrazed and are probably not able to sustain for long duration populations of livestock in excess of 15,000-16,000 animals (pre-2011 numbers).

As during the previous three surveys a continuing concern is the presence of cattle in Big Pamir in summer; a large-size grazer that was not reported in this area at this time of the year between 2010 and 2013. In Wakhan cattle are usually moved by early September to the main valley, where farmers use them as draft animals for agriculture. Without an observed increase of agriculture mechanization in the area, the presence of 239 and 111 cattle in Big Pamir in late September 2014 and 2015, respectively, suggested that cattle were left in Big Pamir for increasingly longer periods of time. In 2016 only 24 cattle were counted in western Big Pamir and none in 2017, but counts took place slightly later than during the previous two years. However, in 2018 and 2019, 7 and 41 cattle, respectively, were still present in Big Pamir despite the late count. In 2017 30 domestic Bactrian camels were counted for the first time in the last decade, then 17 in 2018, and 31 in 2019. Free-ranging cattle (and camels) constitute an additional grazing burden on already heavily utilized rangelands and particularly in the Big Pamir Wildlife Reserve where cattle are released intentionally.

In 2019 yak numbers have remained stable in western Big Pamir as compared to 2018 count results. In 2018 the counting team hypothesized that the lower count that year (-24%) compared to 2017 could have been the result, at least in part, of an earlier transhumance to the valley, that requires the use of adult male yak as pack animals,

rather than a genuine decline of the yak population. Although a plausible hypothesis the team observed that the number of yak calves (not anticipated to move with adult males) counted in 2018 was also lower (-16%) than in 2017 at the same time of the year, thereby weakening the hypothesis of an earlier transhumance. In 2019 we confirmed that the decrease in yak population in western Big Pamir was genuine. Although the number of adults slightly increased (+2.6%) compared to 2018 the number of calves has continued to drop compared to 2018 (-12%) and 2017 (-26%). Herders questioned about their yak mentioned three factors that individually and in combination may explain the observed decline. Because of the lack of good pastures in Big Pamir for at least two consecutive years the productivity of females and calves' survival have decreased. Also as a result of 'bad pastures' many herders have sold yak recently. Finally there is for the past two years (since 2017-2018) resurgence in foot-and-mouth disease, a disease known to affect yak clinically in the Pamirs (Ostrowski *et al*., 2010) which was put under control by subsidized cattle and yak vaccination campaigns carried out by WCS between 2009 and 2013 (e.g. Rajabi *et al.*, 2014). These causes may support the existence of a possible negative trend in yak populations that needs to be further monitored and understood during next year count.

We seem to observe that during the last decade livestock owners have maximized the use of Big Pamir pastures and adjusted well to a significant spring die-off in 2016 without much external support. It was anticipated that without an episode of cold wave in winter-spring 2019, or another unpredicted disease outbreak, livestock number might reach in September-October 2019 the high levels measured in 2013-2015 (Ostrowski and Rajabi, 2018). This did not happen as a result of significant die-off resulting from food shortage and coldness in spring 2019 but possibly also to behavioural changes pervasively influencing livestock herding in the Wakhi society (see above).

In 2006 and 2007, a rangeland study of Big Pamir showed that the sedge meadow / wet meadow, Alpine grass, and Artemisia steppe vegetation covers, which are the most significant to wild and domestic grazers, suffered from the effects of heavy, long-term grazing, which significantly reduced the standing crop (Bedunah 2009). With the doubling of the livestock population grazing this landscape seven years later, and sustained high stocking rates in 2013-2015, an even higher level of degradation of this fragile vegetation cover, which is essential to wildlife, has occurred. A pessimistic scenario would even suggest that the increased livestock numbers could in time threaten the entire ecosystem, exposing populations of wild and domestic herbivores to dramatic food shortages.

This alarming scenario was however tempered by the results of sheep body condition and rangeland monitoring conducted in 2016. The body condition measurements suggested that the fattening levels of sheep grazing the western Big Pamir in summer 2016 and 2017 were optimal. On average, 30-kg body mass animals at the beginning of

the grazing season left the area 20-kg heavier and all fattening indices showed very highly significant increases after summer grazing (Ostrowski and Rajabi, 2017a,b). Of course it should be noted that in 2016 these results were retrieved in the context of a ca. 15% decrease in livestock numbers in the area and a year with very good precipitation, but in 2017 similarly good fattening levels were observed while livestock numbers remained stable in comparison to the preceding year. Zandler (2016) carried out a rangeland survey in Big Pamir Wildlife Reserve in August-September 2016. He found that, averaged over all plant community types, total foliar vegetation cover in the western Big Pamir increased by 18.2% between 2007 and 2016 with more change in the grass- and forb-dominated communities. These results suggested an improvement in vegetation condition over 10 years. However, rainfall amounts were average in 2006-2007 and well above average in 2016 suggesting that plant productivity could have been atypically high in 2016. Indeed a new rangeland survey carried out in summer 2018 showed on the contrary an overall decline in rangeland conditions in Big Pamir compared to 2016 mainly as a result of low precipitations in 2018 (Zandler 2018).

Protection and vegetation recovery remains a main conservation priority in the western Big Pamir. Zandler (2018) have shown that biomass productivity in exclosure plots in BPWR was 2.5 higher compared to outside the exclosure plots after two years of no-grazing, supporting that the area has retained a good restoration capacity should the level of livestock grazing is reduced. Unfortunately solutions to tackle the summer high stocking situation in Big Pamir are few. They all require a community-driven effort to introduce more sustainable grazing practices and limit livestock numbers and the extent of them grazing 'most valuable areas'. In theory specified grazing periods, durations, and rotations among livestock owners could be proposed and an increased destocking effort in the autumn, primarily via sales could be developed. Restrictions imposed on usage of Pamir pastures by non-Wakhi herders will also have to be taken into consideration. However, such management practices are likely to be difficult to implement considering the role livestock production plays in the subsistence of the Wakhi, and the local economy in general. It is currently the only large-scale profitable activity in the district[1].

Also, the effects of climate change on livestock grazing, pastoralism and rangeland ecosystems of Wakhan are difficult to measure but could be significant. Climate change seems to result in decreased winter precipitations and increased ambient temperatures, both favourable conditions for an earlier plant growth combined to a lower productivity of grasslands, especially at lower elevations. Herders would adjust to this situation by resuming the grazing season earlier than in the past and reducing the number of their livestock. The latter starts being practiced as evidenced in the present report. The recurrent claims from herders that in autumn the grass is now "gone a month

[1] Althought very dependent on the security situation in the country and particularly in Badakhshan, tourism is potentially a key economic resource for Wakhan in the future.

and half earlier than before" starts having effects on livestock economy in the area. As a result of this decline in pasture productivity particularly at lower elevations, herders tend to bring their herds at increasingly higher altitudes by the end of the grazing season and many of them decide to leave their livestock in Pamirs for winter. These new practices increase the risk of irreversible damages to a rangeland also exposed to the stress of declining precipitations and increasing temperatures. Of even greater concern is the impact of such practice on the valuable wildlife of Wakhan National Park and particularly the Marco Polo sheep in western Big Pamir. This species is excessively susceptible to disturbance by livestock herding and will see opportunities to survive the heavy competition on pastures, especially on sedge meadows, rarefying. This shift of livestock range use may also have a negative effect on wild ungulates by the associated disturbances (e.g. opportunistic poaching, herding dogs…) it may elicit particularly during lambing and rutting times.

In anticipation of a quantitative update on rangeland conditions across Wakhan, livestock monitoring provides a good proxy of the annual level of grazing pressure on Pamir rangelands in Afghanistan. Although the WCS monitoring effort focuses only on livestock in western Big Pamir, this area receives in summer at least one third of the livestock population owned by the ca. 1,500 Wakhi households, who composed in 2014 nearly 90% of the human population of the district (Ostrowski, pers. obs.). In 2020 WCS aims to resume the measure of fattening indices of livestock brought to Big Pamir during summer, along with monitoring of numbers.

Conclusion

In recent years Wakhi people have increased livestock numbers in Big Pamir. Although this increase could be sustainable it is unknown whether it is a recent phenomenon resulting from new economic incentives, societal modifications, or part of a long-term and possibly cyclical increase in livestock numbers, likely followed by a decrease as a result of harsh, successive winters. After 13 years of livestock number monitoring in western Big Pamir we have no evidence of the existence of such a cyclical pattern. However, following this increase we observe since 2013 a levelling off or possibly a steady decline of livestock in western Big Pamir. This is particularly true for yak population, which has returned to numbers counted a decade ago. Further monitoring in the years to come shall confirm the nature of the trend.

Interestingly and in the absence of adopted new pasture management practices (e.g. rotational grazing of winter fodder support) the rangeland condition seems to "dictate the sustainable use of pastures" by controlling numbers or even driving indirectly livestock population to a steady decline through high winter/spring mortality of weak individuals, and increased destocking at the end of the pasture season.

Climate change is also expected to be a driver of considerable changes in livestock range use in Big Pamir with an anticipated risk of serious degradation of the rangeland and negative impact on wild herbivores and the altitude ecosystems in general. It is therefore important to better understand demographic variations of livestock in Pamirs and their range use. It justifies continuing efforts at monitoring livestock numbers and additional researches on their spatial and temporal movements. Livestock number measurements carried out by WCS in western Big Pamir since 2006 are accessible in a database available with the WCS Afghanistan's Monitoring and Evaluation Department in Kabul.

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