



Assessment of impact of Juniper bushes in sub-alpine grasslands
of Jigme Singye Wangchuck National Park



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Introduction

Strategically located in the central Bhutan, covering an area of 1730 square kilometers, Jigme Singye Wangchuck National Park (JSWNP) is the third largest protected area in the country. Of many of its conservation significance, the most relevant ones here are it being a core tiger habitat, it being home to many wild ungulates (prey species of tiger) and it having nomadic communities who practice age-old yak herding for livelihood. The park has beautiful landscapes, starting from lowland sub-tropical forests in the south to temperate conifer zone in the north and north-east to sub- alpine and alpine grasslands in the central region of the park that rises to form the Black Mountain peaks. The sub-alpine and alpine grasslands are grazed by domestic yaks and wild ungulates (barking deer, sambar deer, goral, serow etc) which are main prey base for the tiger, which roam freely in these areas. The yak herding communities of Phobjikha have used these areas for rearing their yaks for time immemorial, whereby they follow a particular route to move the yaks to higher altitude (towards the Black Mountain range) during summer and back to lower altitude (Phobjikha valley and Khebethang) during the winter on yearly basis. As they move the yaks from place to place, they transition between a grassland to another, halting in each for at least a month. Wangjela is one such grassland which is used as a halt during their nomadic movement every year. At an altitude of 3300 masl., in the Wangjela region of JSWNP is a natural sub-alpine grassland, with an area of over 80 hectares. The pastureland is used during two seasons of every year; firstly during the spring (March to May) when the nomads move the yaks to higher altitudes for the hotter summer and secondly, during the autumn (September to November) on their way back to the lower altitudes bringing their yaks down for the harsh winter.

Problem statement

In the recent years, the pastureland in Wangjela is being gradually replaced by rapid growth of juniper bushes (*Juniper recurva*). The *Juniper recurva* is a species of conifer widely grown in the Himalayan region between the altitudes of 2900 to 4200 masl (Adams, 2014 as cited in Namgay, 2014), and often grows as a pioneer species in open areas (Grierson & Long, 1983). Due to its nature of being a pioneer species, it often tends to overgrow natural grasslands in favorable altitude; Wangjela is a favorable altitude and is severely affected by rapidly growing juniper bushes overtaking the valuable grassland. Given the open space, the bushes of juniper tend to grow in such a way as to occupy maximum space due to lateral branching from as low as

the ground level. On average, each growth of juniper covered a diameter of 3 meters (in Wangjela grasslands), within which no grasses could grow. This trend has largely discouraged the already decreasing number of yak herders in the region which is a direct threat to the national concern over the declining trend of yak herding practice in Bhutan.

Rationale

The Juniper bushes growing and overtaking the natural grasslands is a natural process. This trend in the region has not only left the few yak herding families who still use this grassland to graze their yaks worried, but also deteriorated the natural habitat of the wild ungulates in the region, which serves as the main prey base for the tiger population in the region. This region is an important tiger habitat. Furthermore, it is a national concern that the number of yak herding communities is decreasing at alarming rate and we need to encourage the age-old practice of yak herding. According to Ura (2002) as cited in Wangchuk, et al., (2013), pastureland the need for sufficient pastureland is a concern in the Himalayas as the pasturelands are grazed not only by yaks but also by other domestic animals such as sheep and horses and wild ungulates. Given the very fragile nature of the nomadic culture and the tradition of yak herding, owing to diminishing pasturelands and a variety of other factors, it is of vital importance that proper research is carried out before implementing any intervention in such areas. This is an effort to assess the impact of juniper bushes on sub-alpine grassland in Wangjela region of JSWNP.

Objectives

The main objectives of the activity are as follows;

1. To assess the impact of Juniper bushes on natural grassland ,
2. To carry out a pilot project of de-branching the juniper growths and comprehend the results,
3. To recommend possible intervention to resolve the issue of vanishing grassland

Methodology

Area selection: Wangjela, a sub-alpine area under JSWNP, at an altitude of 3300 masl located in the North of Phobjikha valley was selected for the assessment. Wangjela is a traditional yak herding pastureland whereby the semi nomadic herders keep their yak herds in the area during

the autumn and siring seasons. In the olden days few families dwelled permanently in Wangjila and even grew few crops besides yak herding; however, today, this area is only used as a transit for the yaks during the autumn and spring months, grazing there for around 3 months. Due to this, the pasturelands have given way for juniper bushes which has led to substantial decrease in the size of pasturelands. Therefore, the area was selected for habitat management as thinning or singling out the bushes of juniper, Rosa sp., and few other shrubs. This would open up spaces for grassland.

Sampling: In the study area, random trees were selected by counting the trees and selecting every 50th tree as a sampling point. To minimize bias the trees were counted in regular fashion; starting from the extreme corner, the individual traversed the area back and forth keeping 20m distance in between the two traverse. The trees that fell off the track was counted on the track that fell closest to the tree. A square plot of 2m X 2m was laid at each sampling point (the main stem of the tree being the center of the plot).

Data collection: In each sample plot, firstly the diameter of area covered by the lateral branches of the Juniper tree was recorded. Then, the data was collected for ground vegetation. Each species of undergrowth, along with the cover percent (CV%) and maximum height were recorded. Each undergrowth species was also identified whether or not it is a palatable species (fodder for yaks). Apart from this field data, questionnaire survey was also conducted where a set of closed and open ended questions were asked to 5 person (yak herding family).

After recording the data, the juniper bush was de-branched and the main upright stem was singled out. This cleared the base of the tree and opened up the area otherwise covered by the lateral branches. We primarily focused on removing all the lateral branches and to single out the main vertical stem. All branches were removed up to height of around 2.5 meter and only the central stem was left with clean bole. Then all of the sampling points were marked and left. After six months of de-branching, the site was re-visited and same data was collected from each of the sample plots.

Data analysis: Since this is a simple assessment exercise, not much data was collected and no complicated analysis were involved. The data from the field was entered in Microsoft Excel

(2016) and basic analysis such as difference, average, percentage, mean and median were performed.

Results and Discussion

Questionnaire survey: From the questionnaire survey, it was learnt that 100% of the respondents (N=5) were worried about the rampant spread of the Juniper bushes in the grassland. All of them also agreed to increasing human wildlife conflict (HWC) in the region during recent years. On asking the possible cause of the spread of the Junipers four respondents said it could be due to lesser number of yaks grazing in the area as compared to the past, 2 respondents said it could be due to restriction by the park on cutting the trees and setting fires and only one said it could also be due to climate change. As narrated by one of the respondents, they even tried to clear the bushes that had encroached too much into the grassland; however, due to less manpower it was not possible to open larger areas. All the respondents happily responded 'Yes' when asked if they would agree to any intervention that could enrich the grassland. Regarding HWC, the respondents gave reasons such as increase in tiger numbers, decreasing number of wild prey for the tigers and the grasslands turning into forests as the reasons for HWC.

Before de-branching: The assessment showed that the juniper growth in the open grasslands occupied, in average, a circular area of 3.5 meters diameter around the main stem. Regarding the ground coverage under the bush, it was found that over 60% of the area was covered by mosses (the moss was found in 95% of the area), 25% by *Lycopodium sp.* (*Lycopodium* was found in 42% of the area), and the rest of the areas either remained barren or showed sparse growth of species such as *Cotoneaster sp.*, *Berberis sp.* (shrub), *Stapa sp.*, and *Anaciles sp.* Few fodder grasses also grew very sparsely under the bush; however, these were not accessible for grazing due to thickness of Juniper bushes.

After de-branching: The data from six months after the de-branching activity, showed that the area opened by de-branching activity showed rich growth of multiple species, both fodder and non-fodder species. Among the fodder species, *Trifolium repens* dominated the area with average of 28.5% occurrence in the study area. This was followed by *Cyperus sp.* (fodder grass) with 18% occurrence, *Digiteria sp.* with 14% occurrence, *Animone sp.*, with 12.8% occurrence, *Frageria nubicula* with 11% occurrence, *Polygonatum sp.* with 8.3% occurrence and *Galium sp.*, with 6% occurrence. And, among the non-fodder species were *Primula denticulata* with 18%

occurrence, *Pteridium aquilifolium* with 11.8% occurrence, *Berberis* sp with 9% occurrence, *Cotoneaster* sp with 8% occurrence, *Roscoe alpinus* with 5% occurrence, *Lilium* sp with 5% occurrence, *Artemesia* sp with 4% occurrence and mosses and mosses and *Lycopodium* covered 4% and 2% respectively.

Conclusion

The general conclusion of the assessment so far is that the lateral branches of juniper trees growing in open grasslands affects the overall quality of the grassland in such a way that they deteriorate the quality of sub-alpine grasslands. This is because the lateral branches covers the grassland at the ground level and prohibits growth of ground vegetation, particularly the fodder species. With removal of the lateral branches up to the height of 2.5 meters above the ground level, the open space creates room for growth of multiple fodder species that enrich the grasslands. The removal of lateral branches of Junipers growing in open grassland could therefore, be effective in improving the overall quality of such grasslands. However, a long term monitoring of the effects of the de-branching interventions on the Juniper trees and also on the grasslands is crucial for adopting such technique for larger scale habitat improvement interventions.

Recommendations

From this assessment the following recommendations are proposed;

1. Continue the assessment for next six months so that we have data for all the 4 seasons of the year and the comparison of the complete data could result in more promising findings. In the current report, the data is collected for only two seasons; therefore, the difference in ground vegetation could be due to different seasons.
2. The park could carry out de-branching intervention in larger areas in the Wangjela region for the benefit of wild ungulates and the yak herders. The intervention could extend to other grasslands such as Jari-Busa, Yakchu and Sertsho regions of JSWNP.

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