Vegetation survey undertaken using automatically located photographs during horse trek in the Dachigam National Park, India

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Introduction

An efficient way is needed to undertake large scale monitoring of grassland vegetation. Satellite images or aerophotographs are very useful for this purpose, but extensive ground truth data are required to make accurate analysis and interpretation. However, obtaining large-scale information from detailed vegetation surveys by manually determining species composition is difficult and costly. As an alternative to traditional land-based methods, we used a GPS digital camera that determines locations automatically and captures pictures for vegetation survey. Our testing was done in the Dachigam National Park where grassland has been heavily grazed by goat, sheep, and cattle (Hasegawa *et al*, 2012). Hence, evaluating the variations in grassland conditions in the large area of the national park is important.

Methods

Aerial photograph obtained using a GPS digital camera while riding a horse

Aerial photographs of the ground were obtained using a GPS digital camera (Casio Exilim EX-H20G) between 7 and 10 Sep 2012. These photographs were obtained by a person riding a horse. Each photograph was automatically located by the GPS satellite, and these location data were recorded on a 16 GB SD card along with the images. The aerial photographs were obtained after the horse stopped in order to avoid distorting the image through camera movement. The vegetation type was determined on the basis of the dominant species found in each photograph. The GPS data of each photograph were read using free image viewer software (IrfanView 4.35). Each vegetation type was located on a digital map (Google Map) by using the GPS data. The vertical distribution of vegetation was also determined using the altitude data from the GPS data.

Results

We obtained 110 aerial photographs of the ground during a 4-day horse trek. However, 20 photographs were unsuitable for vegetation survey because of the distorted image obtained due to camera shaking. Hence, vegetation components were determined using 90 (81.8%) photographs. These photographs were used for vegetation survey by assessing the coverage of dominant vegetation types. In many cases, we identified each species to the genus level since it was difficult to identify vegetation types up to the species level from the photographs. There were clear differences in the coverage of grassland vegetation across local areas (Fig. 1). The tall grass species and shrub species were dominant in the lower elevation sites of the National Park that were protected from grazing (Fig. 1, 2). The short grass species and short herb species were dominant in the higher elevation sites (Fig. 1, 2). *Agrostis* sp. was dominant at an altitude of 3,000 to 3,500 m whereas *Potentilla* spp.were dominant in areas exceeding 3,500 m. In some heavily grazed sites, *Poa annua* was the dominant species, followed by *Trifolium repens*, *Plantago* sp., and *Taraxacum* sp. This vegetation type was observed from various elevation zones.

Photo 1. Vegetation survey during horse trekking.

Conclusion

Conducting vegetation survey by automatically locating photographs during horse trek was very useful to obtain vegetation data from a large area of the Dachigam National Park in India. There were clear differences in grassland vegetation according to grazing pressure and elevation.

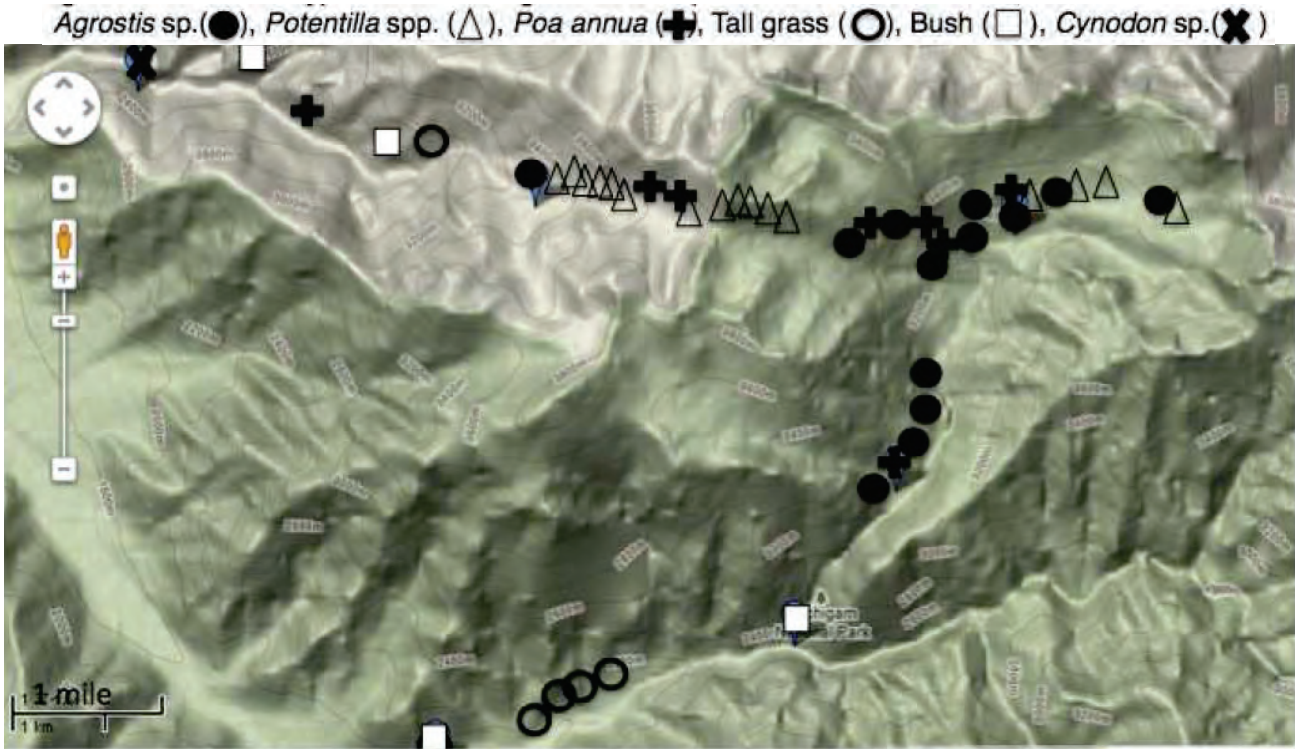

Figure 1. Grassland types in the Dachigam National Park, Jammu and Kashmir, India.

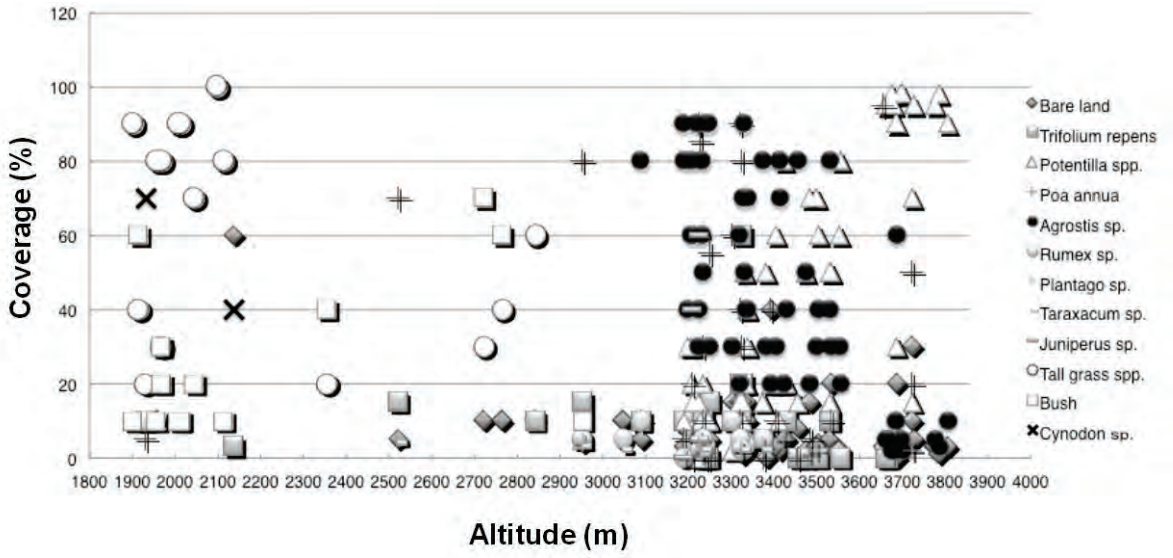

Figure 2. Vertical distribution of grassland species

Reference

Hasegawa N and Kimura R (2012) Influence of livestock grazing by nomads on vegetation of alpine rangeland in Dachigam National Park in India. Proceedings of the 4th Japan-China-Korea Grassland Conference in Aichi, Japan