

Wildlife camera trapping in the Himalayan kingdom of Bhutan with recommendations for the future

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Abstract

Despite its small size, Bhutan has ~160 mammal species, including the critically endangered tiger (*Panthera tigris*), snow leopard (*Panthera uncia*) and many other IUCN Red-Listed species. This rich mammal diversity is being documented through exhaustive surveys that are hampered by insufficient funds, inadequate human resources and difficult access to mountainous terrain. Camera trapping is relatively new in Bhutan, but is addressing these challenges. Initially, camera trapping focused on tigers, but has since broadened to include other mammals. Notable camera trap findings include the highest recorded elevation for tigers, unusual colour morphs of the Asiatic golden cat (*Pardofelis temminckii*), occurrence of the Pallas's cat (*Octolobus manul*) in the eastern Himalayas and the presence of the takin (*Budorcas taxicolor*), Bhutan's national animal, in Thrumshingla National Park. There is, however, scope to expand camera trapping to include Bhutan's poorly known small and medium-sized mammals. Current camera trapping in Bhutan is noticeably ad hoc and we recommend integrating camera trapping into tradi-

tional surveys as a standardised, robust survey protocol for rugged terrain. This will enable the landscape modelling of species distribution in Bhutan for effective wildlife conservation and management, given potential impacts from climate change, economic development and increased pressure from people on protected area resources.

Introduction

Covering an area of 38 394 km² (MoAF 2011), Bhutan is a small country located between India and China in the Eastern Himalayas (Plate 15). The country is mountainous with nearly 95% of its land area located more than 600 m above sea level (asl) (MoA 2009; MoAF 2011). Altitudes range from 80 m asl (Tempa *et al.* 2011) to 7500 m asl (Sherub 2004), while annual precipitation ranges from 5500 mm in the southern region (MoA 2002) to a relatively low 500 mm in some of the drier alpine areas (Sangay and Wangchuk 2005). Bhutan is located at the juncture of two biogeographical realms: the Oriental and the Sino-Japanese (Holt *et al.* 2013), resulting in rich biodiversity at the ecosystem, species and