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EFFECTS OF A HARSH ENVIRONMENT ON BEHAVIORAL AND ECOLOGICAL STRATEGIES OF BLACK SNUB-NOSED MONKEYS IN THE SAMAGE FOREST, CHINA

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We analyzed how a group of black snub-nosed monkeys (*Rhinopithecus bieti*) coped behaviorally with pronounced climatic and phenological seasonality and the demands of a resource scarce and cold winter in a temperate habitat. The group was followed over 18 months in the high-altitude (3000 m+) Samage Forest, Baimaxueshan Nature Reserve, Yunnan, PRC. The forest consisted of evergreen conifers and oaks and deciduous broadleaf trees. The diet varied seasonally, with young leaves having been preferentially exploited in spring and fruits in summer. The monkeys subsisted on readily available fallback resources (mainly lichens) in winter. We predicted that this switch to a relatively low-quality diet would prompt an increase in feeding effort and decrease in moving effort. Moreover, we predicted that vertical use of space would be dictated by ambient temperature. We found that the monkeys spent significantly more time on feeding in winter than in the other seasons. The monthly time devoted to feeding was also negatively correlated with temperature and positively with the importance of lichen in the diet. Time spent on moving decreased in winter and with temperature, and day journey length was found to be longer on days with higher temperature. The degree of lichenivory explains more variation in monthly use of altitudes than climatic factors and availability of flush and fruit. All these results indicate a strong effect of seasonality on time allocation patterns and foraging behavior and the prevalence of an energy-conserving foraging strategy in winter when costs of thermoregulation were high and preferred food scarce.

Keywords: *Rhinopithecus*, China, foraging strategy, temperate forest