OCCUPANCY ESTIMATION OF SLOTH BEAR (*Melursus ursinus*) IN CHITWAN NATIONAL PARK, NEPAL.

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A thesis submitted in partial fulfillment of the requirements for the award of the Degree of Master of Science in Zoology with special paper Ecology and Environment

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RECOMMENDATION

This is to recommend that the thesis entitled "**Occupancy Estimation of Sloth Bear (*Melursus ursinus*) in Chitwan National Park, Nepal"** has been carried out by Mr. Dinesh Ghimire for the partial fulfillment of Master's Degree of science in Zoology with special paper 'Ecology and Environment'. This is his original work and has been carried out under my supervision. To the best of my knowledge, this thesis work has not been submitted for any other degree in any institutions.

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CERTIFICATE OF ACCEPTANCE

This thesis work submitted by Mr. Dinesh Ghimire entitled "**Occupancy Estimation of Sloth Bear (*Melursus ursinus*) in Chitwan National Park, Nepal"** has been approved as a partial fulfillment for the requirements of Master Degree of Science in Zoology specializing in Ecology and Environment.

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LETTER OF APPROVAL

On the recommendation of the supervisor Tej B. Thapa, Ph. D., Associate Professor, this thesis submitted by Mr. Dinesh Ghimire entitled "**Occupancy Estimation of Sloth Bear (*Melursus ursinus*) in Chitwan National Park, Nepal"**, is approved for the examination and submitted to the Tribhuvan University in partial fulfillment of the requirements for Master's Degree of Science in Zoology (Ecology and Environment).

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DECLARATION

I hereby declare that the work presented in this thesis entitled "**Occupancy Estimation of Sloth Bear (*Melursus ursinus*) in Chitwan National Park, Nepal"** has been done by myself, and has not been submitted elsewhere for the award of any degree. All the sources of the information have been specifically acknowledged by reference to the author(s) or institution(s).

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Date:----------

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ABSTRACT

Effective conservation plan for Sloth Bear requires detailed information regarding their distribution and habitat use. There is limited information available on the species ecology in response to different site covariates in Nepal. The aim of the study was to assess occupancy, distribution pattern and habitat preference of Sloth Bear in Chitwan National Park. The study was carried out during April - May 2012 using single season model of occupancy estimation based on sign survey. The study area was divided into 74 grids each measuring 16 Km^2. Of the total grids, 35 were randomly selected for sampling. A total of 288 spatial replicates were sampled in 35 different grids recording 87 evidences of Sloth Bear presence. An occupancy-based approach was used in which separate models were developed to determine the influence of habitat covariates on occupancy and detection probability. A total of 12 models for detection probability and 18 models for occupancy estimation were created. Models were ranked on the basis of AIC values and model average was undertaken from the models having $\Delta AIC < 2$. The estimated occupancy of Sloth Bear in the study area was 0.90 (with SE of 0.08, 95% CI 0.34-0.97), 25% higher than naïve estimate. The major predictors for the occupancy of Sloth Bear were habitat types (0.45), distance to water (0.22), distance to road (0.15) and altitude (0.16). 37% of the surveyed grids had occupancy rates lower than the averaged rate (0.90). There was no relationship found between distance to settlement and occupancy (0.0015). Model averaged detection probability was $0.44 \pm 0.09_{SE,}$ ranged between 0.05 and 0.77. The detection of animal was negatively correlated with disturbances. The general distribution pattern of Sloth Bear was clumped. Mixed forest (RPI =0.42) was found to be most preferred by the animal followed by grassland (0.21). Sal forest (-0.11) and riverine forest (-0.25) was less preferred. The status of Sloth Bear in Chitwan National Park was found satisfactory in term of habitat use though anthropogenic disturbances could be potential threat for long term conservation of the species. This study provides the present status of Sloth Bear in term of habitat use and distribution. Detailed multi-season occupancy analysis is essential to evaluate the effect of ground covariates throughout the year.

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Abbreviated form	Details of abbreviations
AIC	Akaike's Information Criteria
CDZ	Central Department of Zoology
CITIES	Convention on International Trade in Endangered Species of Wild Fauna and Flora.
CNP	Chitwan National Park
DHM	Department of Hydrology and Meteorology
DNPWC	Department of National Parks and Wildlife Conservation
GIS	Geographic Information System
GPS	Global Positioning System
IUCN	International Union for Conservation of Nature and Natural Resources
NG	Nepal Government
PPP	Park People Programme
UNESCO	United Nations Educational Scientific and Cultural Organization