

Project Update: March 2021

1. Background:

Sloth bear is a globally vulnerable species endemic to the Indian sub-continent and listed in Appendix I of CITES. Anthropogenic and natural threats to the species and its habitat, particularly habitat fragmentation, conflicts with humans and climate change induced vulnerabilities, are increasing. The IUCN estimates that its population has declined almost by 50 % and is expects this decline to continue. Adaptation to rapidly changing environments and long-term viability requires the population size of sloth bear to be large enough along with enough genetic variation. However, currently available information on sloth bears in Nepal is either too old or inadequate to form a robust scientific view and take evidence-based management decisions, thus limiting the effectiveness of conservation. This is a first genetic study on sloth bears from Nepal. Our study aims to provide conservation status of sloth bear through integration of socioecological information.



Figure 1 A sloth bear rescued and kept at central zoo in Nepal

2. Stakeholder Consultations

A meeting was organised with Dr Maheshwar Dhakal, under-secretary at Ministry of Forests and Environment. He was very positive and expressed his support for the project. He also graduated from a university in Japan and was happy to see me conducting this PhD from Hokkaido University. A meeting was conducted with Mr. Hari Bhadra Acharya, ecologist and assistant ecologist Mr. Hemraj Acharya of Department of National Park (DNPWC) to obtain research permission for the study. Similarly, we also conducted a meeting with Dr Siddhartha Bajracharya, Executive Director of NTNC, Dr Naresh Subedi, Conservation Program Manager and Dr Chiranjivi Pokharel, Chief of the central zoo in Nepal. Dr Naresh has been coordinating activities conducted according to the MoU between Hokkaido University, NTNC and GENETUP. Similarly, meeting was organised with Dr Bhagawan Maharjhan and Dr Bhawana Shrestha of GENETUP for seeking support of lab facility. A workshop was organised at the conference hall of Biodiversity Conservation Center of NTNC in Sauraha. Chief of NTNC-BCC Mr Ram Kumara Ryal and research officer Dr Baburam Lamichhane were very instrumental during this workshop and provided full support to me and my team for the survey. They provided valuable insights on study design and supported in logistic management from their years of experience working in this area. Discussion and observation of the molecular lab at NTNC-BCC was done and it was agreed to conduct genetic analysis in this lab. Meeting was also organised with the chief warden of the Chitwan National Park and officer at the sector office of CNP. Research permission from DNPWC was shown to the park office who provided the permission letter to conduct the field activities in the Chitwan National Park.



Figure 2 A glimpse of consultation with the park warden/ officer of the CNP (From left: Park Warden, Supervisor of PI, Prof. Dr. Toshio Tsubota, bear expert of Nepal Dr. Rabin Kadariya (also a Rufford grantee) and PI)



Figure 3 Meeting at the NTNC BCC hall. Discussing and sharing about the project



Figure 4 Welcome and lab visit

3. Field Data Collection

Preliminary Field Visit (December-2019): We conducted a questionnaire survey with the victims of human-sloth bear conflict and their family members. We collected information from 100 households who suffered injuries or death due to encounters with sloth bears in and around Chitwan National Park from the park headquarters and coordinated with the sector office and local resource persons to locate these households. We also conducted a preliminary survey inside the forest in Chitwan National Park to understand the topography and to test our field design and templates for data collection. We tested the feasibility of the scat collection using the vials and ecological data collection using the templates. This field work was also useful to build rapport with the stakeholders as we also briefed them about the project activities, expected results and their implications for conservation.



Figure 5 PI with senior wildlife technician Mr. Harkaman lama in the field. Mr. Lama has been a vital member in most of the research in Chitwan, he assisted sloth bear study by Garshelis and Joshi in 1990s & have supported many PhDs and M.Sc. students in field. Figure 6 Ms. Pooja Basnet & Mr. Surendra Chaudhary collecting habitat information. Pooja is a M.Sc. student at Tribhuvan University interested in bear research and Surendra has recently joined NTNC as junior wildlife technician.

Field sampling (March -May,2020): We conducted field work from 18 March to 15 May 2020. Covid-19 had just hit Nepal as well and we were lucky to have got permission to conduct fieldwork before the park closed to the public. Initially our work started from the eastern part of the Chitwan National Park in the core area and moved to the western part of Chitwan. Cases of Covid-19 were rising and there was fear among local communities that was reflected when we reached this area. We had to confront disturbance from locals, taking the transportation was difficult and accommodation was also tough. We had to spend a lot of time in talking with the people, local stakeholders and convince them about our work. Further, ensuring the safety of our team members was also a challenge. I have briefly shared the story through my blog here (<https://rajanpoudel093.wordpress.com/2020/06/10/research-in-times-of-corona-my-experience-from-chitwan-national-park-nepal/>)



Figure 7 Bamboo, stones and swegae pipes were kept in the road to stop outsider's movement in the village in fear of corona infection. But children's and adults gathered in mass without mask in the area.

We mostly walked along the fire line, tourist walking path, animal paths, ridge line and along the rivers looking for sloth bear signs. Whenever we encountered a fresh termite mound being fed, scrape marks or fruit trees that sloth bears preferred we intensified our search around that area to look for the scats and hair samples. During this period, we collected a total of 200+ sloth bear scats though only half of the scats that we collected were fresh enough to be used for collection of the genetic sample. For the genetic samples we rubbed the swab around the fresh sloth bear scat and kept the swab bud in the 2ml vial filled with buffer. We also kept a very little amount of outer part of scat with mucus layer into the vial. Prior to collection of samples in this way, we labelled the vial and noted the status of scat such as how many days old, habitat in which it was found, geographic coordinates and the possible food items in the scat.



Figure 8 PI collecting genetic sample from sloth bear scat. Sloth bear scats were easily noticeable along the roads and often in the wooden bridges and machans.

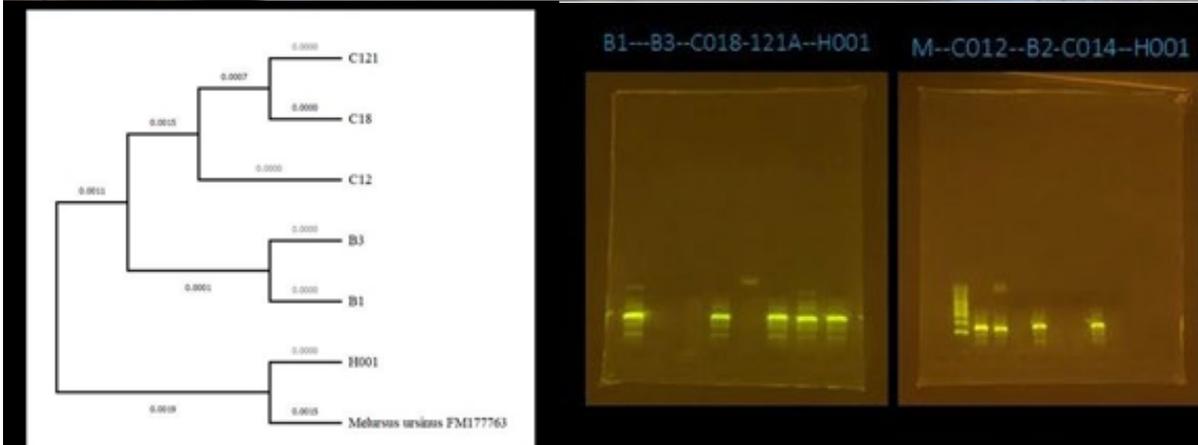
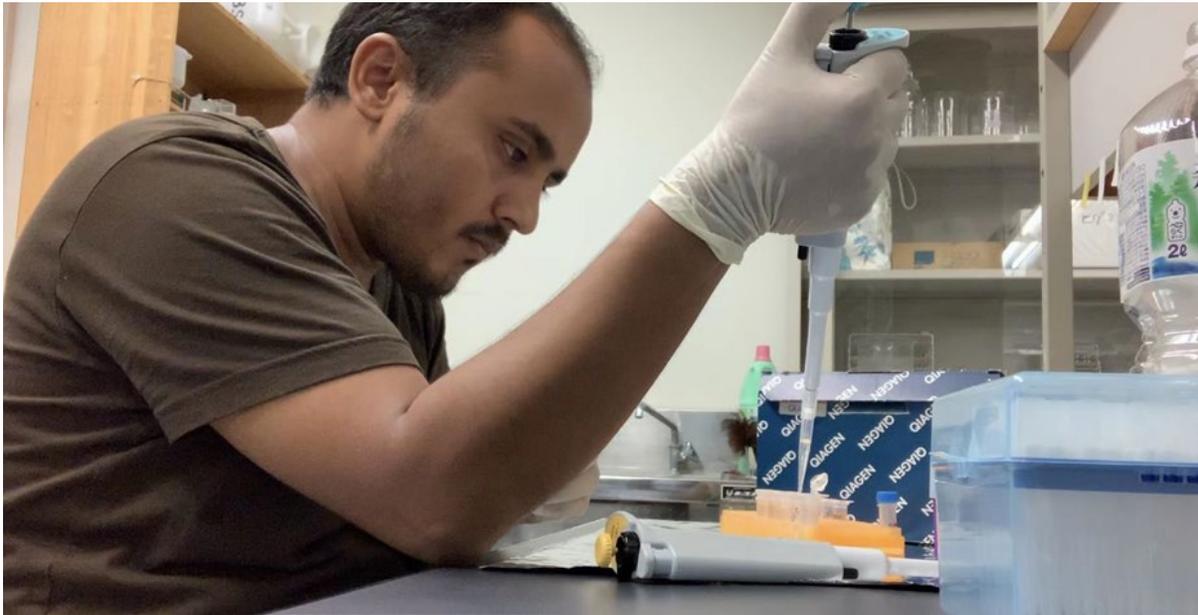


Figure 9 Research team during the survey in Chitwan National Park

4. Data Analysis and Results

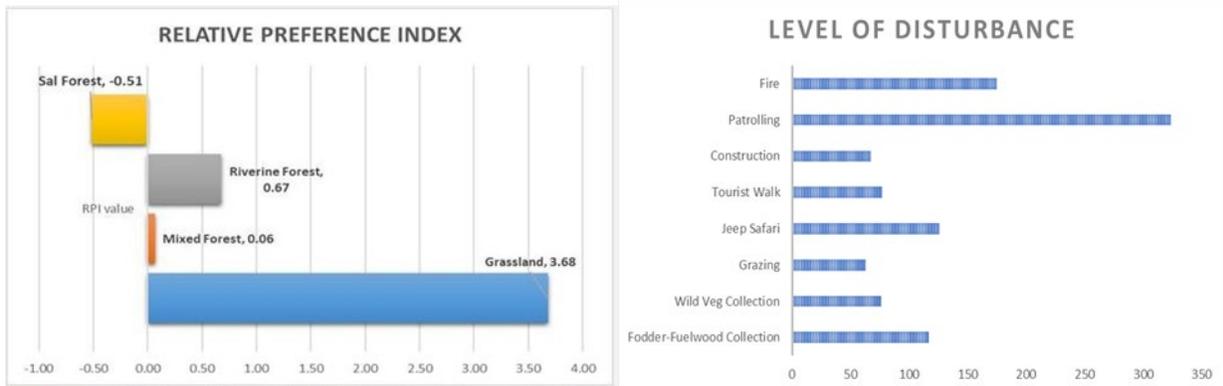
Part 1: GENETICS

Analysis of half of the genetic samples has been completed. We conducted the microsatellite analysis using the previously published 7 SNPs used for sloth bear in India. The preliminary results hint at a moderate level of genetic diversity. No distinct population cluster and structure was found as all the samples belonged to a single haplotype. Thus, we can say that the population of sloth bear in Chitwan belongs to a same meta-population and the impact on genetic level not yet visible. Phylogenetic analysis of the samples showed some branching, but the genetic distance is very low as they belong to the same ancestry, while the reference sample had greater genetic distance as it was from a different population in India.

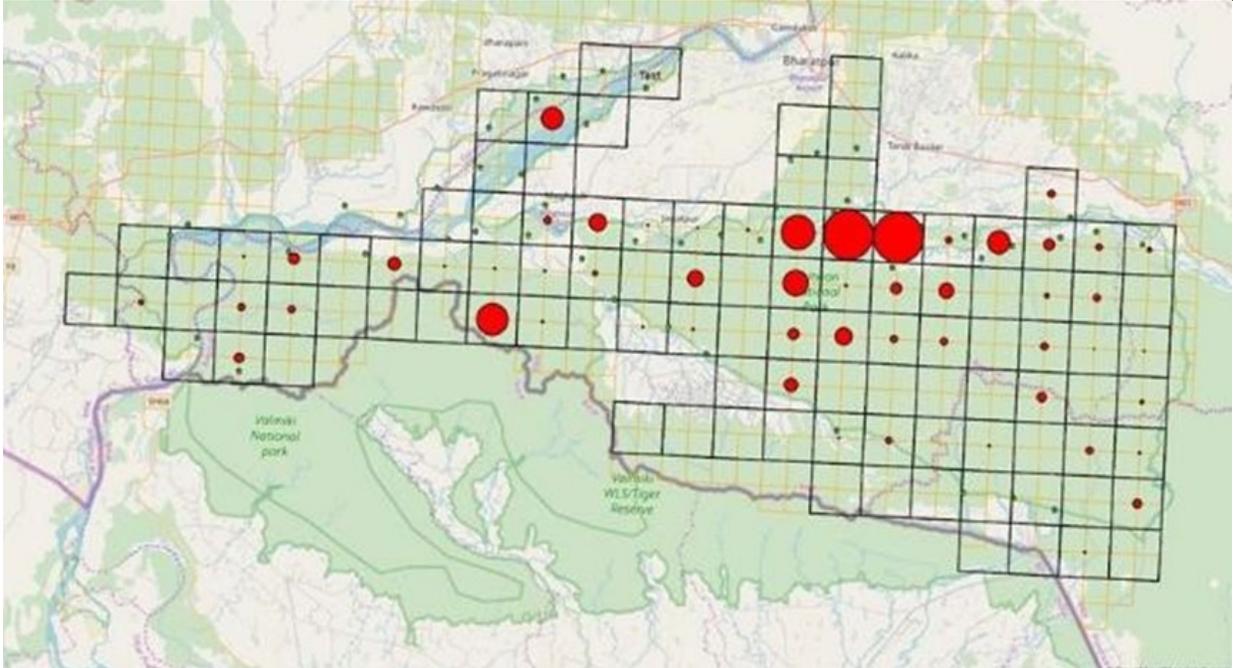


Part 2: HABITAT USE

The analysis of the bear signs showed that bears have a wide range of habitat requirements. The habitat preference index showed that they preferred grassland habitat in comparison to forest habitat. Disturbance was widespread with fire being the most common form of disturbance followed by fodder and fuelwood collection and tourist activities. However, we found that park patrolling was also high because of which direct disturbance/removal of wildlife through activities like poaching was not detected.



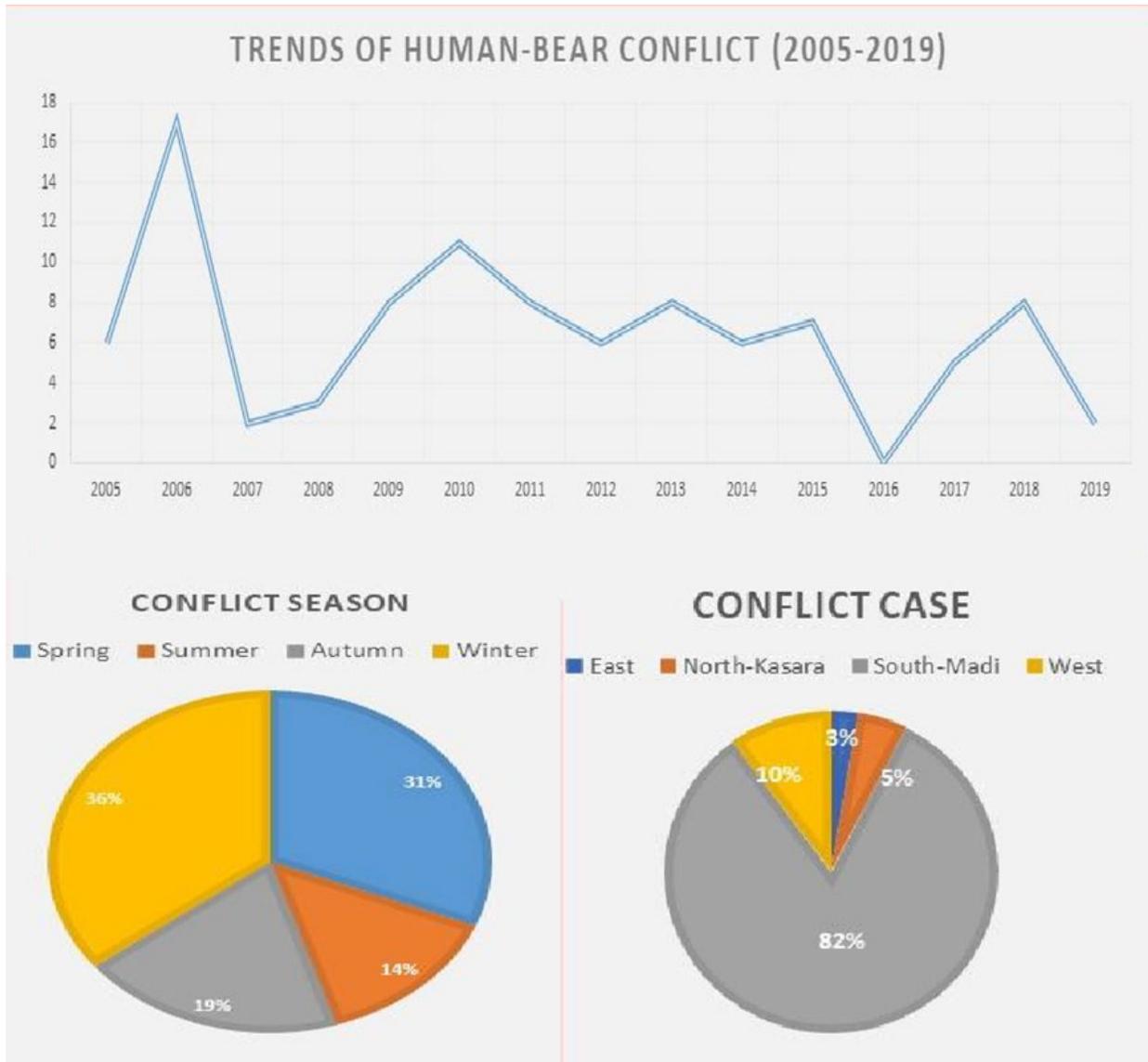
Chitwan National Park had good level of sloth bear sign presence. They were almost uniformly distributed throughout the protected area. In Chitwan national park more bears were found in the peripheral area. It might be because most of the alluvial grassland habitat required for sloth bear is in the periphery.



Study area map showing the hotspots of sloth bear use of the habitat. Big red bubbles mean more sloth bear and small red bubbles meaning less sloth bear in the habitat.

Part 3: HUMAN-SLOTH BEAR CONFLICT

We found that the trend of human sloth bear conflict was decreasing. The conflict records from 2005-2019 shows that there were many conflict cases in 2006 after which there is a decrease with almost zero conflict in year 2016. Conflict was higher in winter season followed by spring season. More than 80% of the conflicts with sloth bears occurred in Madi sector of the park. Interviews with the victims revealed that most of these casualties resulted because of sudden encounter rather than preemptive attack as prey. Most of the attacks occurred in the farm and forest interface when people were engaged in the agriculture and forestry related activities.





Some disturbing pictures of human-sloth bear attack. Most people get multiple injuries on head or body because of the attack. As sloth bear attacks the people face and head, people have to live their life with the stigma of attack and face challenge in adjusting to the new normal after the attack in the society.

5. Diet

We washed the sloth bear scats using the wire mesh. We counted the frequency of occurrence of the food items present in the scat. Analysis of the scat samples showed that the major diet of sloth bear was composed by termites, ants and fruits. Most of our sampling was conducted during the dry season, during this period there is lack of fruits and the only diet that sloth bear can rely upon are the termites and ants. Thus, termite and ants were higher in the scat. In the monsoon and post monsoon season the percentage of the fruit contributing to the diet of the sloth bear become higher. This finding is like most of the other studies, though some variations might occur due to the type and abundance of fruits available for the sloth bear.



Figure 10. In month of May when the fruits of *Casia fistula* are ripe, Sloth bear eats the fruit, and the scat is very dark and full of the fruit remains. Figure 11. We washed the scats using 3 different mesh size to retain the 3 different types of food items, bigger fruit items, termites and ants and other more digested materials.

6. Results Dissemination

We have shared the current findings with the related local stakeholders particularly the Department of National Parks and Wildlife Conservation and National Trust for Nature Conservation. The results were also shared through a speed talk at the international conference. Valuable feedback and praise were received during this Student Conference on Conservation Science-New York, 2020.

Ecology and Genetic diversity of Sloth bear (*Melursus ursinus*) in Nepal

Rajan Prasad Paudel¹, Michito Shimozuru¹, Rabin Kadariya², Naresh Subedi², Mariko Sashika¹, Toshio Tsubota¹



Sloth bears are **UNIQUE !**

- Carries their cubs on their back
- Do not hibernate
- Does not kill wild preys
- Sucks Termites & Ants
- Only found in Indian Sub-continent

Photo Credit : [www.naturalists.com](#)
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National University, Japan
National Trust for Nature Conservation, Nepal

Zoom Meeting
Recording

Participants (54)

Find a participant

- RAJAN (Me)
- Joe Martens (AMNH IT) (host)
- harshini jhala
- Ana Forzacardi (Co-host)
- Felicy Arengo (Co-host)
- nadar gact (harhey) (Co-host)
- Allan Esno

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Zoom Group Chat

Wonderful work. Thank you all for sharing

From Martha Goon to Everyone: All of the presentations were AMAZING. I'm so honored to have been able to hear them!

From Suzanne Macey to Everyone: Congrats winners and all!

From Even Heikkala to Everyone: Terrific work everyone of you!!!!

From Georgia Cullen to Everyone: Congratulations to all the participants and presenters!!!!

From Kristin Douglas to Everyone: Congratulations - such wonderful presentations!

From Weckly-De Leo DiCicco to Everyone: Thank you everyone! This was a great event!!!

To Everyone ▼
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7. Conclusion and Way Forward

Our research findings indicate a wide distribution of sloth bears within the Chitwan National Park. However, this use of habitat does not necessarily reflect the higher abundance or higher density of sloth bear. We have found that grasslands and riverine forest are important habitat if we want to conserve sloth bears. Further, we also show that termites, ants and fruit trees are required for sloth bears to survive. Thus, we expect the park managers to incorporate these findings in their park management plan and species action plans for conservation of sloth bears. During the project we had good collaboration with park authority, biodiversity conservation center and local groups like nature guide association and community based anti-poaching units that will be vital for future conservation activities in the area. While the project has been successful to raise voice to prioritise sloth bear conservation. The projects long-term impact is that it has successfully transferred knowledge and skills on sloth bear monitoring as well as generated the basic information on the distribution and diet of sloth bears. It will help to take forward the sloth bear conservation agenda.

We suspect that the species might be rapidly declining outside the Chitwan National Park. Thus, we suggest long term monitoring of the sloth bears using camera traps, genetics and indigenous traditional knowledge to estimate the actual population throughout its distribution range in Nepal including the 'Churia range'. Human-sloth bear conflict has been causing number of deaths and injuries because of which there is negative attitude towards its conservation. Further, poaching of sloth bears for its gall bladder and penile bone and meat has also been reported in Nepal. Victims have not received compensation because of unawareness about the process and complex nature of documentation involved. We recommend following interventions:

- Explore more on ecology and behavior of sloth bears.
- Understand human-bear interactions.
- Conduct school and community level awareness programmes.
- Policy advocacy and sensitisation programmes to prioritise sloth bear conservation.
- Formulate national level and sub-national level sloth bear conservation action plan.
- Explore the zoonotic diseases in wild and captive sloth bear in Nepal.
- Address the poverty induced threats from humans in the sloth bear habitat focusing on alternative livelihood programmes.

Photographs from the study



Typical sloth bear habitat showing river, grassland and forest. A greater one horned rhino is seen wallowing in the river. Sloth bears prefer grassland habitat but shows seasonal migration to the upland Sal forest during the monsoon season when the rivers flood and the grasslands are inundated. Sloth bears share grassland with mega herbivores like One horned Rhino and Asian elephant while in the forest it has to live along with Royal Bengal Tiger and Common leopards. It might be because of this competition that Sloth bears have unique dietary niche. It is interesting how sloth bears co-exist with such mega herbivores and fearsome predators in these parks.



PI and research team member getting ready for the survey during the first camp in eastern Chitwan National Park



Researcher posing in the study area. Working in lowland forest is challenging as the temperature can cross 45 degree Celsius and the chances of encounter with wild animals like Tiger, Rhino, Elephant and venomous king Cobra are always present. © Munna Chaudhary.



Mr. Harkaman Lama, senior wildlife technician who has years of experience working in wildlife surveys in Nepal inspects the termite mound. Sloth bears have evolved to be a voracious insect sucker. They break the termite mound and dig the grounds to eat mound termites as well as ground dwelling termites. It is interesting how such a big animal can live almost solely by feeding on such tiny little insects. The species of termites, ants that they eat, and their status has not been explored yet in Nepal.