Asiatic black bear *Ursus thibetanus*

Carnivore conservation initiative in north-eastern forest reserves of Bangladesh

(CLP project ID: 0394720)

FINAL REPORT

North-eastern Bangladesh / western cusp of Indo-Burma Biodiversity Hotspot

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Project Carnivore Bangladesh

At a glance

Host country | Bangladesh

Site locations | The study sites are hilly mixed ever-green forests with three protected areas and two KBAs

- Raghunandan Hill Reserve (26.31 sq. km, 24°6'–24°16'N/91°21'–91°28'E, Satchari NP);
- Tarap Hill Reserve (62 sq. km, 24°5'–24°31'N/91°35'–91°39'E, Rema-Kalenga WS);
- West Vanugach Hill Reserve (27.4 sq. km, 24°13'–24°27'N/91°44'–91°49'E, Lawachara NP);
- Rajkandi Reserve (64 sq. km, 24°08'–24°16'N/91°54'–91°55'E)

Field Survey | January–October 2021 / February–June 2022

Involved institutions | Department of Zoology, University of Dhaka and Bangladesh Forest Department

The overall aim | To draw conservation spotlight on mammalian carnivores in eastern Bangladesh—an uncharted region of the Indo-Burma Biodiversity Hotspot.

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Red Serow *Capricornis rubidus*

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Marbled cat *Pardofelis marmorata*
Data Deficient in Bangladesh
Population in eastern Bangladesh
No concerted study

Illustration | Tania Zakir

Abbreviations

IUCN SSC: International Union for Conservation of Nature Species Survival Commission
IUCN: International Union for Conservation of Nature
KBA: Key Biodiversity Area
NP: National Park
SCCS: Student Conference on Conservation Science
WCS Bangladesh: Wildlife Conservation Society Bangladesh
WS: Wildlife Sanctuary

▲ Three-striped palm civet *Arctogalidia trivirgata*
Data Deficient in Bangladesh
Population in eastern Bangladesh
No concerted study

▶ Bengal fox *Vulpes bengalensis*
Vulnerable in Bangladesh
Population in northern and eastern Bangladesh
No concerted study

Illustration | Tania Zakir and Anika Tabassum

SECTION ONE

1a. SUMMARY

The project, a stepping stone for mammalian carnivore conservation in the western cusp of the Indo-Burma Biodiversity Hotspot, carried out a systematic survey and conducted a distinctive capacity build-up and awareness campaign in Bangladesh. The fieldwork (objective 1) yielded about 5137 trap nights, the longest running camera-trap survey in eastern mixed-evergreens of Bangladesh, producing 35 mammals (18 carnivores), 45 birds, and 4 reptile species (in total, 24 threatened) and culminating in: the discovery of populations of 5 threatened mammals; participation of project member/s in 3 SCCS conferences and the IUCN global threat assessment of leopard cats; acquiring membership of 3 IUCN SSC specialist groups; and 8 peer-reviewed publication ideas (1 published, 4 in press). Regardless of the Covid-19 situation that affected the project timeline, capacity build-up and awareness campaign (objectives 2 and 3) reached 2,51,282 people through social media networking; the results were featured in 35 media pieces. Our activities trained 90 undergraduates, 45 school-goers, 5 eco-guides, and directly reached stakeholders including forest department officials. The results (objective 4) were shared with IUCN Bangladesh, WCS Bangladesh, academicians, journalists, and Forest Department officials. The project has leveraged a forthcoming collaborative project to assess bear and dhole density in eastern Bangladesh.

Clouded leopard *Neofelis nebulosa*
Critically Endangered in Bangladesh
Population in eastern Bangladesh
No concerted study

Illustration | Tania Zakir

1a. SUMMARY (in Bangla)

ইন্দো-বার্মা জীববৈচিত্র্য অঞ্চলের উত্তর-পশ্চিম সীমানা জুড়ে অবস্থিত সিলেট বিভাগের ছয়টি সংরক্ষিত বন। ইন্দো-বার্মা জীববৈচিত্র্য অঞ্চলের অংশ হওয়ার কারণে এবং সেই সাথে ভারতের ত্রিপুরা রাজ্যের বারোমুড়া-আঠারোমুড়া-লংতরাই পার্বত্য বনাঞ্চলের সাথে আন্তঃসীমান্ত সংযোগ থাকায় সিলেট-হবিগঞ্জ-মৌলভীবাজারের সংরক্ষিত বনগুলো অসম্ভব বৈচিত্র্যপূর্ণ। উত্তরপূর্ব বাংলাদেশের এই বনগুলোকে বাংলাদেশের ২৭ প্রজাতির মাংসাশী স্তন্যপায়ী প্রাণীর প্রতিটির আবাসস্থল হিসেবে বিবেচনা করা হয়। এমনকি, ২০০০ থেকে ২০১০ এর মধ্যবর্তী সময়ে তরাপ এবং পাথারিয়া সংরক্ষিত বনে বাঘের উপস্থিতির বিষয়ে স্থানীয় জনগোষ্ঠী বলে থাকেন। ভারতীয় উপমহাদেশের মোট মাংসাশী স্তন্যপায়ী প্রাণীদের প্রায় অর্ধেক সংখ্যক প্রজাতি এই সংরক্ষিত বনগুলোর প্রায় ৪০০ বর্গ কিলোমিটার এলাকায় বসবাস করলেও এদের বর্তমান অবস্থা সম্পর্কে আমাদের ধারণা খুবই সীমিত, নেই কোনো দীর্ঘমেয়াদী গবেষণা বা সংরক্ষণ কার্যক্রম।

এ বিষয়টি সামনে রেখে, ২০১৮ সাল থেকে আমরা এই সংরক্ষিত বনগুলোতে স্থানীয় জনগণ ও বনবিভাগের সহায়তায় ক্যামেরা-ট্রাপ পদ্ধতিতে গবেষণামূলক অনুসন্ধান পরিচালনা করছি। গত পাঁচ বছরে চারটি সংরক্ষিত বনে (রঘুনন্দন, তরাপ, পশ্চিম ভানুগাছ এবং রাজকান্দি) ৬৮ টি ক্যামেরা-ট্রাপ স্যাম্পলিং স্টেশনে মোট ৫১৩৭ ক্যামেরা-ট্রাপ রাত সমীক্ষা করেছি, যা পূর্ব বাংলাদেশের পাহাড়ি বনে সর্বোচ্চ। ২০২১-২০২২ সালে Conservation Leadership Programme এর অনুদানে আমাদের গবেষণা কার্যক্রম চালিয়েছি।

এ সমীক্ষা থেকে প্রাপ্ত ক্যামেরা-ট্রাপ ছবি থেকে আমরা ৮৪ প্রজাতির প্রাণী শনাক্ত করেছি, যার ৩৫ প্রজাতি স্তন্যপায়ী, ৪৫ প্রজাতি পাখি ও ৪ প্রজাতি সরীসৃপ। সমীক্ষায় পাওয়া মোট ২৪ টি প্রজাতি নানা মাত্রার বিলুপ্তির ঝুঁকির মুখে রয়েছে। স্তন্যপায়ী প্রাণীদের মাঝে মাংসাশী প্রাণী বর্গভুক্ত প্রজাতি ১৮ টি। উল্লেখযোগ্য মাংসাশী প্রাণী প্রজাতির মধ্যে রয়েছে এশীয় কালো ভালুক, এশীয় বন কুকুর, এশীয় সোনালি বিড়াল, ছোট নখযুক্ত ভোঁদড়, হগ ব্যাজা, ফেরেট ব্যাজা, হলদে-গলা মারটেন, প্রভৃতি। তৃণভোজী প্রাণীদের মাঝে লাল বনছাগল এবং রোডেন্টজাতীয় প্রাণীদের মাঝে তুলি-লেজ সজারুর উপস্থিতি উল্লেখ্যোগ্য। এদের প্রতিটির অস্তিত্ব হুমকির মুখে।

এশীয় বন কুকুর বাস্ততন্ত্রের সর্বোচ্চ পর্যায়ের প্রাণী। রঘুনন্দনে সংরক্ষিত বনে এর উপস্থিতি থেকে প্রতীয়মান হয় যে এই বনগুলো এখনো সর্বোচ্চ পর্যায়ের শিকারী প্রাণীরা ব্যবহার করছে। ক্যামেরা-ট্রাপ ছবি থেকে আমরা তিনটি সংরক্ষিত বনে (তরাপ, পশ্চিম ভানুগাছ এবং রাজকান্দি) ছোট নখযুক্ত ভোঁদড়-এর ভিন্ন ভিন্ন পপুলেশনের অস্তিত্বের প্রমাণ পেয়েছি। বিশ্বব্যাপী বিপন্ন ছোট আকৃতির এই সামাজিক শিকারী প্রাণীরা ঝিরিযুক্ত বনে আবাস করে। এদের উপস্থিতি সুস্থ বাস্ততন্ত্রের নির্দেশক। একইভাবে, ক্যামেরা-ট্রাপ ছবি থেকে রাজকান্দি সংরক্ষিত বনে এশীয় কালো ভালুকের প্রথমবারের মত একটি পপুলেশনের উপস্থিতির বিষয়টি প্রতীয়মান হয়েছে। ভালুক, ভোঁদড়, বন কুকুরসহ সোনালি বিড়াল, হগ ব্যাজা, লাল বনছাগল, তুলি-লেজ সজারু-এর ক্যামেরা-ট্রাপ ছবি উত্তরপূর্ব বাংলাদেশের প্রথমবারের মত। IUCN Bangladesh এর ২০১৫ সালের অ্যাসেসমেন্টসহ IUCN এর বৈশ্বিক অ্যাসেসমেন্টেও উত্তরপূর্ব বাংলাদেশের বনে এদের উপস্থিতির বিষয়টি নিশ্চিত ছিলো না। সমীক্ষায় প্রাপ্ত এই ফলাফলগুলো থেকে আমরা এই প্রাণীদের স্থানিক ও দৈনিক (spatio-temporal) চলাচলের গতি-প্রকৃতি বিশ্লেষণ করেছি, যা পিয়ার-রিভিউড জার্নালে প্রকাশিত হয়েছে ও বেশ কিছু প্রকাশের প্রক্রিয়া চলমান আছে।

এর পাশাপাশি ক্যামেরা-ট্রাপ চালানো এবং মাংসাশী স্তন্যপায়ী প্রাণীদের বিষয়ে প্রশিক্ষণ প্রদানসহ বিশ্ববিদ্যালয় ছাত্র, ইকো-গাইড, বনবিভাগের কর্মীদের আমরা সমীক্ষায় অন্তর্ভুক্ত করেছি যা মাংসাশী স্তন্যপায়ী প্রাণীদের নিয়ে গবেষণা কাজে সক্ষম একটি প্রজন্ম তৈরি করতে সহায়তা করবে। সচেতনতামূলক কার্যক্রমের প্রক্রিয়ায় আমরা কার্টুন, ছোট ভিডিও ক্লিপ, বিজ্ঞানসম্মতভাবে আঁকা ছবিসহ পোস্টার বানিয়েছি এবং জাতীয় দৈনিকে নিয়মিত লিখা প্রকাশ করেছি। মাংসাশী স্তন্যপায়ী প্রাণীদের নিয়ে শিক্ষার এই টুলস গুলো আগামীতেও ব্যবহার করা যাবে যা এদের নিয়ে সাধারণ মানুষের ভয় ও ভুল ধারণা দূর করতে অবদান রাখবে।

সিলেট-হবিগঞ্জ-মৌলভীবাজারের সংরক্ষিত বনগুলোর অভাবনীয় বৈচিত্র্যের পাশাপাশি আমাদের সমীক্ষায় বেশ কিছু ঝুঁকির বিষয়ও উঠে এসেছে। সমীক্ষায় নিয়মিত কাঠুরে ও শিকারীদের (তীর-ধনুকধারী, বন্দুকধারী ও শিকারী কুকুর সম্বলিত) ক্যামেরা-ট্রাপ ছবি পাওয়া গিয়েছে। এ গবেষণালব্ধ ফলাফলগুলো এই সংরক্ষিত বনগুলোতে গবেষণা ও সংরক্ষণ কার্যক্রম বৃদ্ধির প্রয়োজনীয়তার তুলে ধরে। সেই সাথে সংরক্ষিত বনগুলোতে, বিশেষত রাজকান্দি সংরক্ষিত বনে, IUCN প্রটেক্টেড এরিয়া ক্যাটাগরি অনুযায়ী ন্যাশনাল পার্ক/ওয়াইল্ডলাইফ স্যাংচুয়ারি আয়তন ও সংখ্যা বাড়ানোও প্রয়োজন। বর্তমানে যার পরিমাণ ১০ শতাংশেরও কম।

আমরা আতোরা ও পাথারিয়া সংরক্ষিত বনে আমাদের সমীক্ষা কার্যক্রম সম্প্রসারিত করছি। সেই সাথে, একটি সম্মিলিত প্রকল্পে, পূর্ব বাংলাদেশে ভালুক ও বনকুকুর নিয়ে একটি গবেষণা শুরু করেছি। দীর্ঘমেয়াদী কার্যক্রমের মাধ্যমে, সকলের প্রচেষ্টায় সহজেই, সিলেট বিভাগের সংরক্ষিত বনগুলোকে মাংসাশী স্তন্যপায়ী প্রাণীদের বাঁচাতে মডেল বনে পরিণত করা যেতে পারে।

1b. INTRODUCTION

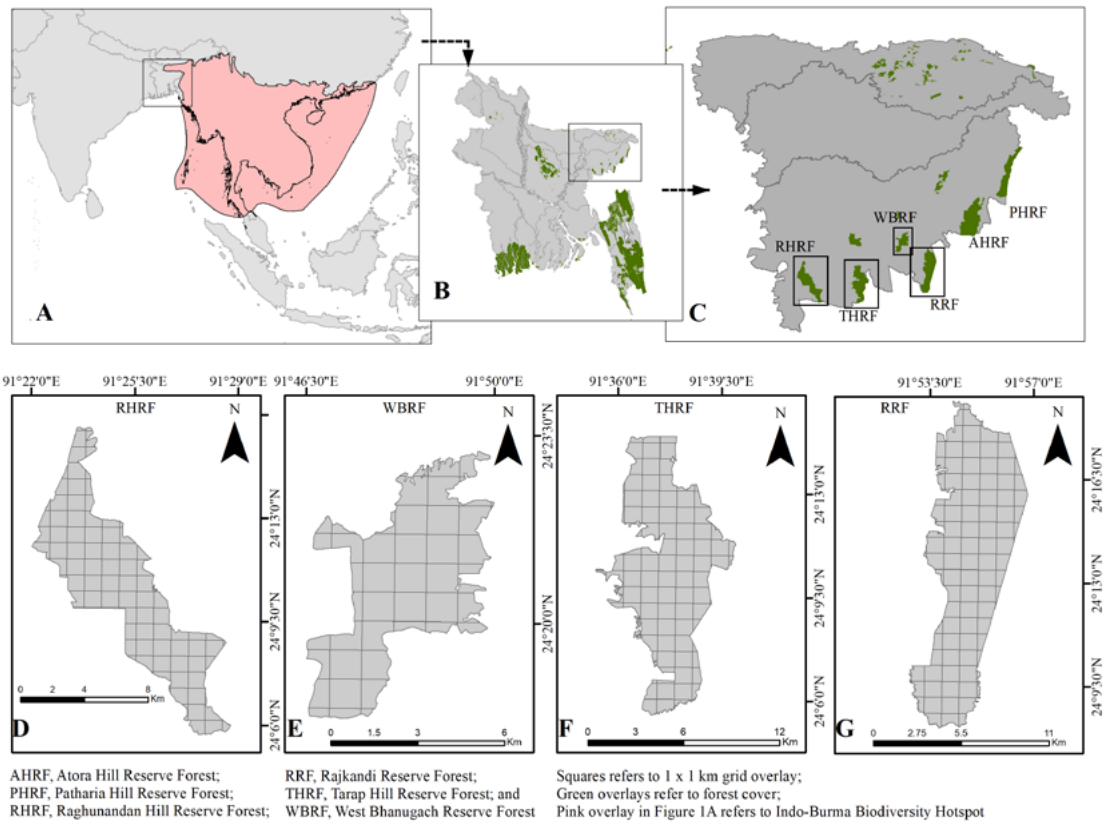
Bangladesh, one of the smallest Asian states, shelters 27 carnivore mammals—nearly half of the Indian Subcontinent Carnivora—in the mixed evergreen, trans-border forests of the north-eastern region (IUCN Bangladesh 2015, Khan 2018). The reserves, the northern fringes of the Baramura-Atharamura-Longtharai Hills, are under formal protections encompassing two national parks, one wildlife sanctuary and two Key Biodiversity Areas (KBA) to support many globally threatened carnivores such as *Cuon alpinus*, *Neofelis nebulosa*, *Pardofelis marmorata, Prionailurus viverrinus*, *Helarctos malayanus*, *Ursus thibetanus*, *Arctictis binturong*, etc. These forests also belong to the Indo-Burma biodiversity hotspot and are perishing fast. Encroachment, altercation, retaliatory killing and prey poaching are severe. Owing to research bias, systematic studies on the carnivores of north-eastern Bangladesh are nearly non-existent (Akash & Zakir 2020).

In this ecologically uncharted territory, the project was designed for a better understanding of the least-studied carnivores with adept methodologies to signify the region, long-deemed 'empty'.

The study sites were three of six hilly mixed evergreen forests. The sites are formally known as reserve forests, a country-level protection designation that is oriented toward the sustainable use of forestry resources (Chakma 2016), also including three protected areas and two KBAs: Raghunandan Hill Reserve (26.31 sq. km, 24°6'–24°16'N/91°21'–91°28'E, Satchari NP, Figure 1D); Tarap Hill Reserve (62 sq. km, 24°5'–24°31'N/91°35'–91°39'E, Rema-Kalenga WS, a KBA, Figure 1E); West Vanugach Hill Reserve (27.4 sq. km, 24°13'–24°27'N/91°44'–91°49'E, Lawachara NP, a KBA, Figure 1F). As COVID-19 situations extended the project timeline, a fourth study site was included: Rajkandi Reserve (64 sq. km, 24°08'–24°16'N/91°54'–91°55'E, Figure 1G).

We targeted to establish a structured camera-trap survey database in three reserves, perform activity pattern analysis, pair-wise co-occurrence and distribution modelling, and compare the efficacy of results of different study techniques. Our capacity build-up and awareness schemes were aimed at the Bangladesh Forest Department, indigenous guides, early-career conservationists, and citizen scientists.

Intending to create a science-backed voice for north-eastern carnivores and rally a community skilled and passionate in carnivore studies, the project–a first in the region–aims to turn the tide of mammalian carnivore conservation practices in Bangladesh.



Study sites in north-eastern Bangladesh.

Forest covers were sourced from Bangladesh Forest Department; the extent of the Indo-Burma Biodiversity Hotspot was adapted from https://databasin.org/.

1c. PROJECT MEMBERS

MUNTASIR AKASH

- Qualifications and experience: Please check ResearchGate profile
- Current Occupation and Employer: Faculty member at University of Dhaka, Dhaka, Bangladesh
- Main roles in the project: Project Leader

ANIMESH GHOSE

- Qualifications and experience: Please check ResearchGate profile
- Current Occupation and Employer: PhD candidate at McGill University, Montreal, Canada
- Main roles in the project: Education program coordinator; Data Analyst

FA-TU-ZO KHALEQUE MILA

- Qualifications and experience: Please check ResearchGate profile
- Current Occupation and Employer: Wildlife and Biodiversity Conservation Officer, Bangladesh Forest
- Department, Dhaka, Bangladesh
- Main roles in the project: Communication Lead

TANIA ZAKIR

- Qualifications and experience: Please check ResearchGate profile
- Current Occupation and Employer: Program assistant at IUCN Bangladesh, Dhaka, Bangladesh
- Main roles in the project: Data manager, Data analyst, Scientific Illustrator

ANIKA TABASSUM

- Qualifications and experience: Please check ResearchGate profile
- Current Occupation and Employer: Research Fellow at Bangladesh Council of Scientific and Industrial
- Research, Dhaka, Bangladesh
- Main roles in the project: Assistant data manager, Field operative

JOYANTO KUMAR BISWAS

- Qualifications and experience: Please check ResearchGate profile
- Current Occupation and Employer: currently nemployed
- Main roles in the project: Field operative, Photographer

S M SHAFI

Qualifications and experience: Please check ResearchGate profile

Current Occupation and Employer: currently unemployed

Main roles in the project: Field operative, Media story-teller

MOHAMMAD SAMIUL ALAM

Qualifications and experience: Please check ResearchGate profile

Current Occupation and Employer: Young Leader at BRAC Bank Limited, Dhaka, Bangladesh

Main roles in the project: Field operative, Media story-teller, Assistant communication lead.

THE TEAM

SECTION TWO

2a. AIM AND OBJECTIVES

Aim

Our primary purpose is to prove and signify the presence of carnivore assemblage in these enigmatic reserves. Strengthened by anecdotes of Khan (2018) and Zakir (2019), we aim to give emergence to dhole/clouded leopard/bears as a flagship species in the northeast, similar to what tiger, the national animal of the country, does for the Sundarbans, the mangrove that contains the only viable population of the species in the country.

Objectives

- Completion of survey and pertinent field activities within the dry months.
- Capacity build-up program on camera-trapping technique will be carried out targeting at least 10 forest department officials, three eco-guides, 10 citizen scientists. We will arrange two workshops on camera-trapping study techniques for aspiring conservationists.
- Awareness campaign will be conducted at 10 schools (150 students, 10 educators) within the reserves' 5 km radius, in three universities, and on social media platforms
- Our findings will be shared with the targeted stakeholders through seminars and popular news portals at the end of the project.

2b. CHANGES TO THE ORIGINAL PROJECT PLAN

The original project plans had faced rescheduling several times mainly due to the Covid-19 crisis. The project launch was delayed up to October 2020 (initially set for August 2020). We faced difficulty to mobilize our full team as four of our team members had to leave the city (they were then students; the university and the dorm was closed due to the pandemic).
We also faced difficulty to get the equipment in-time. So, we could not deploy the camera-traps before January 2021.

The similar thing happened with Objective 2 and 3. We struggled to get clearance at schools and universities to carry out in-person programmes. At the first months of the projects, we focused on online sessions. However, the project required an extended session to complete the Objective 2 and 3. Still, there were waves after waves, and we could not meet our targeted number of school students. As universities and offices were kept open, we focused on educating undergraduate students and forest officials. Interestingly, at the same time, we managed to invest some funds [mentioned in the preliminary report] to do another round of camera-trapping that discovered an edge-of-the-range population of the Asiatic black bear!

2c. METHODOLOGY

Our work started with reconnaissance survey and trail mapping for rendering updated maps of the reserves. As there had been none, pertinent land-use land cover (LULC) maps were produced following Horning et al., (2010). These maps were used to set a fixed grid (1X1km) system. For selecting potential camera trap stations, cues such as presence of carnivore signs (dens, footprints, scats, scrape marks, etc.), terrain features, seasonal drainage and intersections of the trails were tracked. Kelly and Holub (2008), O'Connell et al., (2010), TEAM Network (2011), Boitani and Powell (2012), and Meek et al., (2014) were consulted regarding standard number of stations, spacing between cameras, deployment duration, the height of the stations, their in-between distances, and during report preparation. A minimum of ~1000 trap nights were planned for each of the reserves using a total of 57 stations. The cameras stayed operational 24 hours a day. The cameras were left in the forest protected by python locks and wrought iron boxes and generally revisited at 15 days' intervals routinely. Team members were stationed at the site throughout the survey. All the selected grids for cameras covered different elevation ranges. We conducted our semi-structured interview (to check the trend of carnivore presence and incident patterns) on the local communities living for at least a generation within five km radius of the reserve. We used printed photos of the carnivores to ensure maximum response (Martínez-Martí et al., 2016). Data analyses were conducted using R software (R Development Core Team 2019) and relevant statistical packages. Niedballa et al. (2016) was followed for organizing camera trap data. Niedballa et al. (2016), and Rideout and Linkie (2017) were used for diel activity pattern analysis. Pair-wise probabilistic modelling was run according to Griffith et al., (2016).

Basic designs of the workshops and hands-on training were adapted from Rabinowitz (1997). One of our team members will do the science illustration based on the techniques of Hodges (2003) and Bredekamp et al., (2019). For hands-on training on camera-traps for forest department officials of reserve area, eco-guides and volunteers, we used Boitani and Powell (2012). The workshops for early-career conservationists were designed to demonstrate the basic considerations of camera-trapping as shown by Boitani and Powell (2012) and protocols formulated by Niedballa et al. (2016), Ridout and Linkie (2017), and Fiske and Chandler (2015). We considered awareness campaigns (for school students, their educators, and graduate student) and structured sharing of our activities as our results because such steps have never been devised for north-eastern carnivores of Bangladesh. This is because communicating with stakeholders is a key to commencing the conservation of the least-known species (Skrbinšek et al. 2018).

2d. OUTPUT AND RESULTS

Objective 1 Camera-trap survey

We successfully completed camera-trapping survey at all four Reserve Forest [Raghunandan Hill 1859 trap-nights, Tarap Hill 1472, West Bhanugach 885, Rajkandi Hill 921]. In total, we deployed 68 camera-trap stations and our survey yielded 84 different species. We found 18 carnivore mammals; of which, 3 were previously unrecorded from this region. The box below summarizes the major findings and outputs.

The findings of objective 1 have already resulted in four peer-reviewed publications i.e., quantifiable outputs/objectively verifiable indicators (OVIs) [Appendix 4b]. The findings were also featured as posters at two SCCS conferences [Appendix 4c].

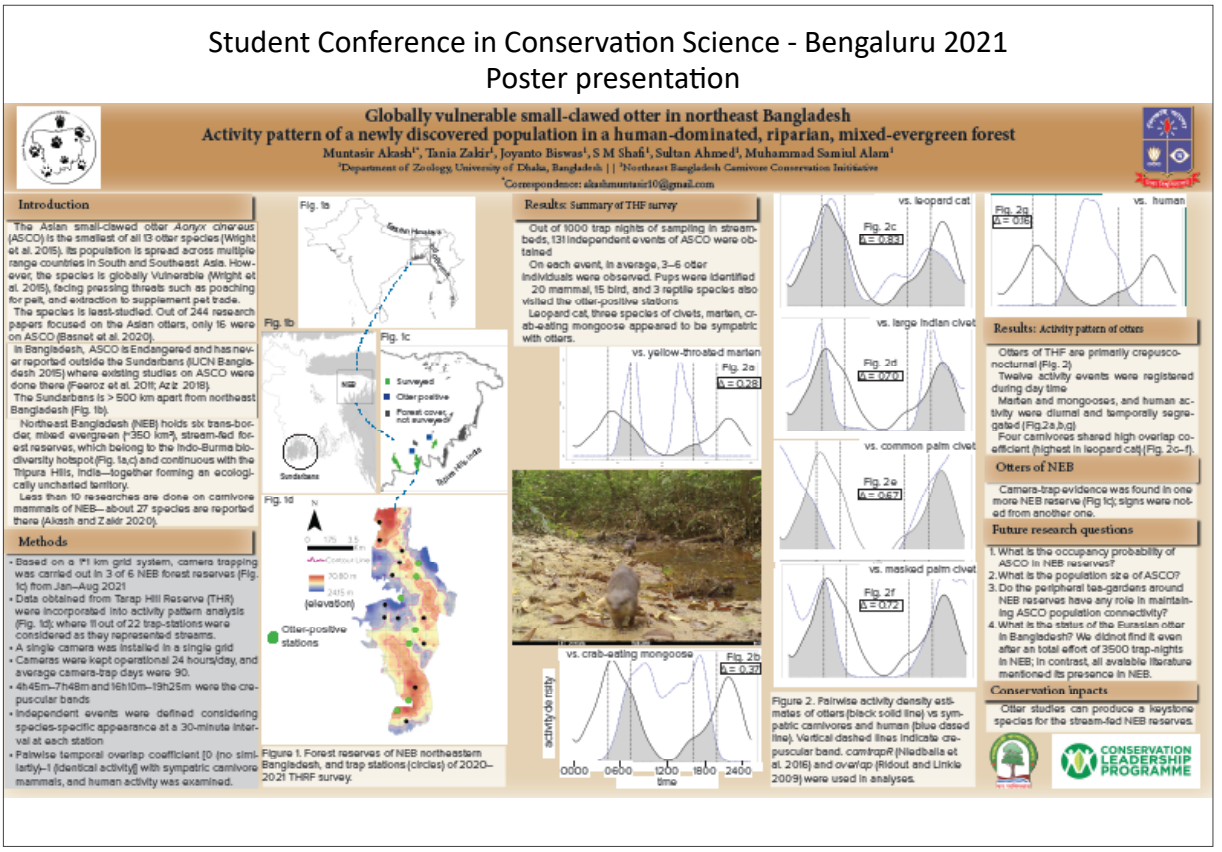
Camera-trap survey – Results and Impacts at a glance

Survey effort	5137 camera-trap nights [the longest running camera-trap survey in eastern mixed-evergreens of Bangladesh] 68 camera-trap stations 179 sq. km forested habitats covered
Major Findings	35 mammals (18 carnivores) 45 birds 4 reptiles 24 threatened species (in total) 5 species with previously undocumented population Asian short-clawed otter Asiatic black bear Greater hog badger Red serow Asiatic brush-tailed porcupine
Publications	4 peer-reviewed articles; 3 being prepared 2 Student Conference on Conservation Science (Bengaluru 2021 and Cambridge 2022)
IUCN global assessment	1 (leopard cat)
New research leveraged	Bear and dhole survey in eastern Bangladesh

Asiatic brush-tailed porcupine *Atherurus macrurous*
Data Deficient in Bangladesh
Previously unknown from north-eastern Bangladesh
No concerted study

Greater hog badger *Arctonyx collaris*
Vulnerable in Bangladesh
Previously unknown from north-eastern Bangladesh
No concerted study

Student Conference in Conservation Science - Bengaluru 2021
Poster presentation



Globally vulnerable small-clawed otter in northeast Bangladesh
Activity pattern of a newly discovered population in a human-dominated, riparian, mixed-evergreen forest

Muntasir Akash[1*], Tania Zakir[1], Joyanto Biswas[1], S M Shafi[1], Sultan Ahmed[1], Muhammad Samiul Alam[1]
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Introduction

The Asian small-clawed otter *Aonyx cinereus* (ASCO) is the smallest of all 13 otter species (Wright et al. 2015). Its population is spread across multiple range countries in South and Southeast Asia. However, the species is globally Vulnerable (Wright et al. 2015), facing pressing threats such as poaching for pelt, and extraction to supplement pet trade.

The species is least-studied. Out of 244 research papers focused on the Asian otters, only 16 were on ASCO (Basnet et al. 2020).

In Bangladesh, ASCO is Endangered and has never reported outside the Sundarbans (IUCN Bangladesh 2015) where existing studies on ASCO were done there (Feeroz et al. 2011; Aziz 2018).

The Sundarbans is > 500 km apart from northeast Bangladesh (Fig. 1b).

Northeast Bangladesh (NEB) holds six trans-border, mixed evergreen (~350 km²), stream-fed forest reserves, which belong to the Indo-Burma biodiversity hotspot (Fig. 1a,c) and continuous with the Tripura Hills, India—together forming an ecologically uncharted territory.

Less than 10 researches are done on carnivore mammals of NEB— about 27 species are reported there (Akash and Zakir 2020).

Methods

- Based on a 1*1 km grid system, camera trapping was carried out in 3 of 6 NEB forest reserves (Fig. 1c) from Jan–Aug 2021
- Data obtained from Tarap Hill Reserve (THR) were incorporated into activity pattern analysis (Fig. 1d); where 11 out of 22 trap-stations were considered as they represented streams.
- A single camera was installed in a single grid
- Cameras were kept operational 24 hours/day, and average camera-trap days were 90.
- 4h45m–7h48m and 16h10m–19h25m were the crepuscular bands
- Independent events were defined considering species-specific appearance at a 30-minute interval at each station
- Pairwise temporal overlap coefficient [0 (no similarity)–1 (identical activity)] with sympatric carnivore mammals, and human activity was examined.

Fig. 1a
Fig. 1b
Fig. 1c
Surveyed
Otter positive
Forest cover, not surveyed
NEB
Sundarbans
Tripura Hills, India
Fig. 1d
(elevation)
Otter-positive stations

Figure 1. Forest reserves of NEB northeastern Bangladesh, and trap stations (circles) of 2020–2021 THRF survey.

Results: Summary of THF survey

Out of 1000 trap nights of sampling in stream-beds, 131 independent events of ASCO were obtained

On each event, in average, 3–6 otter individuals were observed. Pups were identified

20 mammal, 15 bird, and 3 reptile species also visited the otter-positive stations

Leopard cat, three species of civets, marten, crab-eating mongoose appeared to be sympatric with otters.

vs. yellow-throated marten
Fig. 2a
Δ = 0.28
vs. crab-eating mongoose
Fig. 2b
Δ = 0.37
activity density
0000 0600 1200 1800 2400
time
vs. leopard cat
Fig. 2c
Δ = 0.83
vs. large Indian civet
Fig. 2d
Δ = 0.70
vs. common palm civet
Fig. 2e
Δ = 0.67
vs. masked palm civet
Fig. 2f
Δ = 0.72

Figure 2. Pairwise activity density estimates of otters (black solid line) vs sympatric carnivores and human (blue dashed line). Vertical dashed lines indicate crepuscular band. *camtrapR* (Niedballa et al. 2016) and *overlap* (Ridout and Linkie 2009) were used in analyses.

vs. human
Fig. 2g
Δ = 0.76

Results: Activity pattern of otters

Otters of THF are primarily crepuscolo-nocturnal (Fig. 2)

Twelve activity events were registered during day time

Marten and mongooses, and human activity were diurnal and temporally segregated (Fig.2a,b,g)

Four carnivores shared high overlap coefficient (highest in leopard cat) (Fig. 2c–f).

Otters of NEB

Camera-trap evidence was found in one more NEB reserve (Fig 1c); signs were noted from another one.

Future research questions

1. What is the occupancy probability of ASCO in NEB reserves?
2. What is the population size of ASCO?
3. Do the peripheral tea-gardens around NEB reserves have any role in maintaining ASCO population connectivity?
4. What is the status of the Eurasian otter in Bangladesh? We didnot find it even after an total effort of 3500 trap-nights in NEB; in contrast, all available literature mentioned its presence in NEB.

Conservation impacts

Otter studies can produce a keystone species for the stream-fed NEB reserves.

CONSERVATION LEADERSHIP PROGRAMME

Student Conference in Conservation Science - Cambridge 2022
Poster presentation

Finding fantastic beasts

A camera-trapping story on threatened carnivore mammals inhabiting forgotten forests of northeast Bangladesh

Tania Zakir[1]*, Joyanto Biswas[1], Mohammad Samiul Alam[1], S M Shafi[1]
Sultan Ahmed[1], Azizul Islam Barkat[1], Muntasir Akash[1]
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Abstract
Riparian, trans-border forest reserves of northeast Bangladesh are reportedly home to 27 carnivore mammals. Concerning carnivore research and conservation, these reserves, despite being part of the Indo-Burma Biodiversity Hotspot and the Tiger Survey Priority Landscape, are largely overlooked. Henceforth, a systematic camera-trapping effort of 4216 nights—a first time initiative in the region—revealed 16 carnivores including breeding populations of the small-clawed otter and greater hog badger; also discovered evidence of the dhole, Asiatic black bear and golden cat. These remarkable findings emphasize immediate conservation investments in the carnivores living in northeast Bangladesh.

Introduction
Northeast Bangladesh holds the northernmost fringes of the Tripura Hills, India, which belong to the Indo-Burma Biodiversity Hotspot and the Tiger Survey Landscape (Sanderson et al. 2010; Khan 2018). Covering 450 sq km—from where only 10 pertinent publications came out—these mixed evergreens harbour about half of the Indian Subcontinent Carnivora; of which, 13 species are never studied in Bangladesh (IUCN Bangladesh 2015).

Methodology
- From Oct 2018 to Jan 2019, and Jan 2021 to Oct 2021, camera-traps were deployed for terrestrial mammals in a 1×1 km grid system within three reserves (114 sq km) (Figure 1)
- Following R statistical packages were used: camtrapR (data management), biodiversityR (assessing diversity), astroFns, circular, overlap (temporal overlap pattern), co-occur (spatial co-occurrence pattern)

Result
- 4216 trap nights revealed 16 carnivores (33 mammals in total) (Table 1, Figure 2)
- Species' temporal overlap and spatial co-occurrence in terms of anthropogenic pressure (Figure 3)
- discovery of breeding populations of the small-clawed otter population and greater hog badger
- discovery of the globally threatened dhole, Asiatic black bear, Asiatic golden cat, and a rare rodent, brush-tailed porcupine.

Discussion
The study stands as a stepping-stone for carnivore conservation in northeast Bangladesh and the adjoining Indian State of Tripura. Together, the region forms an ecologically uncharted territory as carnivore research is non-existent there. It provides a scientific perspective of a least-studied carnivore guild. The region needs to be brought under a broader, internationally recognized conservation scheme (currently < 10 % is protected) (Akash et al. 2021).

Reference
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Figure 1. Northeast Bangladesh

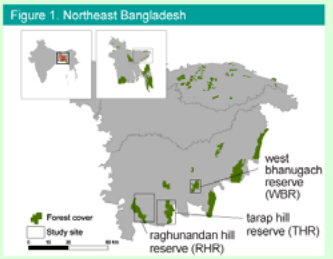


Figure 2. Species (mammal) accumulation curve for camera trap data

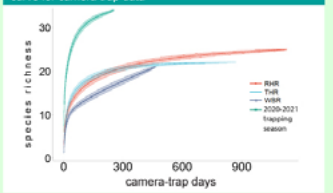
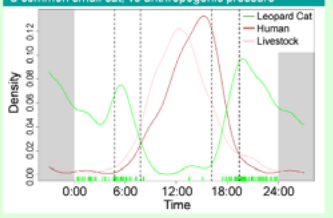


Table 1. Summary of the no. of species (and regionally threatened ones) that appeared in camera-traps

	CR	EN	VU	NT
16 carnivores: 4 felids, 2 canids, 3 mustelids, 4 civets, 2 mongooses, 1 bear	1	3	4	5
6 primates, 5 rodents, 2 ungulates, 1 lagomorph, 1 treeshrew, 1 pangolin, 1 chiropteran	3	6	1	1
Birds (41) and reptiles (4)	-	1	2	1

Figure 3. Diel activtiy comparison between leopard cat, a common small cat, vs anthropogenic pressure



Asiatic golden cat | Asian small-clawed otter | Dhole | Asiatic black bear, identified using Steinmetz and Garshelis (2008)

Student Conference in Conservation Science - Cambridge 2022
Poster presentation (won the best poster award)

A CAT OUT OF WATER

Assessing spatiotemporal patterns and drivers of human-fishing cat conflict in Bangladesh from media reports

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*akashmuntasir10@gmail.com

Abstract

The wetland-dependent fishing cats (*Prionailurus viverrinus*) are least-studied, and endangered in Bangladesh. Between 2005–2021, 564 conflict cats (395 adults, 170 juveniles) had appeared in 361 incidents reported in media; 160 cats were dead. Retaliation on sight was the cause behind 46 % of incidents; 48 % of incidents happened in winter. Since 2016, for every fortnight, a fresh conflict incident was noted. The results highlight a worsening yet overlooked conflict scenario. The risk map, derived from plotting incidents for 490 sub-districts of Bangladesh, shows that globally accredited fishing cat distribution requires revision, and all three wetland-rich regions—recognized as fishing cat strongholds—are severely conflict-prone.

Introduction

The lion's share of the global range of the globally vulnerable fishing cat (*Prionailurus viverrinus*) falls in Bangladesh. This wetland-dependent small cat is endangered, subject to only two peer-reviewed studies (Akash and Zakir 2020), and facing intense anthropogenic pressure in the country. Herein, spatiotemporal patterns and drivers behind these conflicts are examined.

Methodology

- A search protocol was developed similar to Akash et al. (2021)
- A media report was considered as a verified incident given an image and/or expert opinion was provided
- Verified incidents were categorized using nine major parameters

HUMAN-FISHING CAT CONFLICT NEWS

Spatial characteristics	Temporal characteristics	Drivers of conflict
• Place of incident (administrative unit) i.e., district, sub-district • Trait of the place of incident i.e., farm, agroforest mosaic, roadkill, etc. • Place of release i.e., within home range/relocated; protected area/homestead forest	• Time of incident i.e., dawn, day, dusk, night • Season i.e., Winter (Nov-Feb); Summer (Mar-Jun); Monsoon (Jul-Oct) • Year	• Reason i.e., cat attacked/was sighted/road-kill/trafficked • Nature of retaliation i.e., chased down/trapped • Outcome i.e., No. of 'problem cats'/death/releases, etc.

Results

- Between 2005–2021, 564 conflict cats (395 adults, 170 juveniles, 160 dead cats) had appeared in 361 incidents reported in media (83 % wrongly labelled the cat)
- Since 2016, for every fortnight, a fresh conflict incident was noted (Figure 1)
- Wetlands of Bangladesh appeared as conflict hotspots (Figure 2)
- Retaliation on sight was the cause behind 46 % of incidents (Figure 3)

Figure 1a. Season-wise pattern of conflict

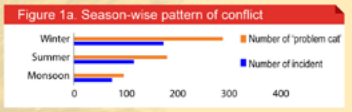


Figure 1b. Year-wise pattern of conflict

Figure 3. Drivers of conflict observed in reported human-fishing cat conflict incidents (2005-2021)

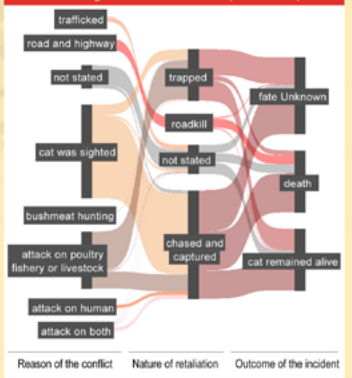


Figure 2a

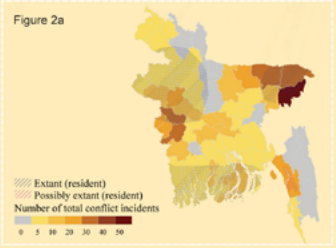
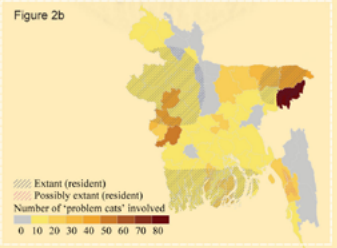


Figure 2b



Discussion

The conflict heat map shows that (i) every wetland-rich region of Bangladesh—reported as fishing cat strongholds (Mukherjee et al. 2016)—are severely conflict-prone; (ii) the cat is still widespread in the country; and (iii) > 90 % of its habitats there are under no conservation scheme. The cat can act as a conservation ambassador of the fast-disappearing, non-protected wetlands.

References

Akash M, Trageser S, Zakir T, Rahman SC, Mila FTZ and Ghose A. 2021. Detecting the spots: A review on leopard occurrences in Bangladesh. Cat News 73: 20–27.

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80 °F 27 °C
Camera ID: SNP012
06-09-2021 13:35:28

Objective 2 Capacity build-up program on camera-trapping technique

Two training workshops were carried out which were attended by 70 stakeholders living/stationed at the reserve periphery.

Five eco-guides, 2 forest officials, 3 citizen scientists, and 7 undergraduate students were directly accompanied in the fieldwork.

Two online talks and six in-person invited lectures on camera-trapping and carnivore mammal conservation were carried out. Online talks had ~4000 views and the invited lectures were attended by six batches of 180 forest department officials.

Ninety undergraduates were provided with ex-situ camera-trapping training.

We found Asiatic golden cats in multiple forests of north-eastern Bangladesh. Here, you see a cinnamon morph.

Asitatic golden cat *Catopuma temminckii*
Vulnerable in Bangladesh
as many as 10 color morphs
Previously unknown from north-eastern Bangladesh
No concerted study

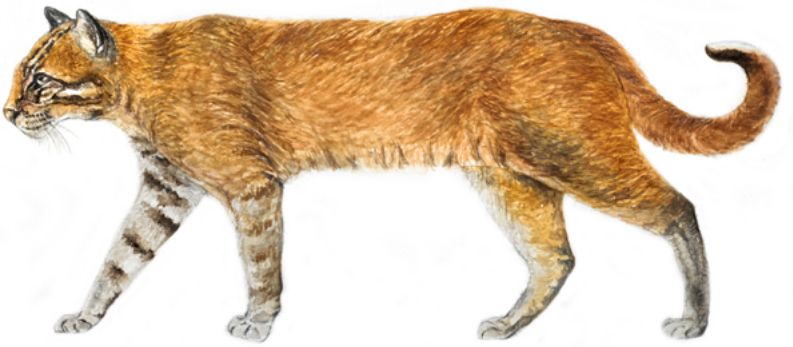


Illustration | Tania Zakir

ex-stiu moments for carnviores

in-situ moments for carnviores

moments for carnviores

moments for carnviores

Objective 3 Awareness campaign

Two consecutive World Otter Day were celebrated engaging 30 fishermen, 45 school students, and students of the Dhaka University Nature Conservation Club.

2000 posters were produced.

Distribution of 20 printed and framed photos of camera-trapped animals among the local forest department stations.

Five educational short clips on carnivores were produced: three on otters, one on leopard cats and one on Asiatic golden cats [Appendix 4e].

An awareness programme was carried out with the members of the Dhaka University Tourist Society.

The activities were featured in 35 media pieces [Appendix 4f].

Our social media activities reached about 250, 000 reach.

Illustrations of 18 carnivore mammals were produced that can be used in future awareness/ educational sessions.

stakeholders with camera-trap photos at Raghunandan national park

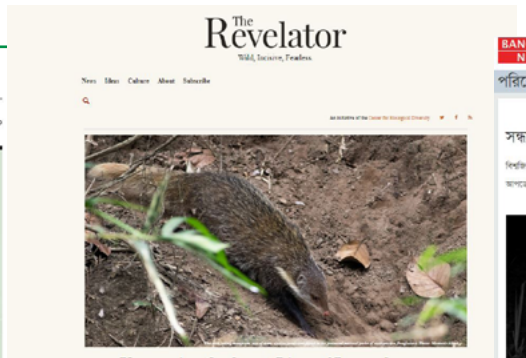

16 WEDNESDAY 16.12.2020 EARTH THE BUSINESS STANDARD

Wildlife illustration

A decisive tool to empower conservation

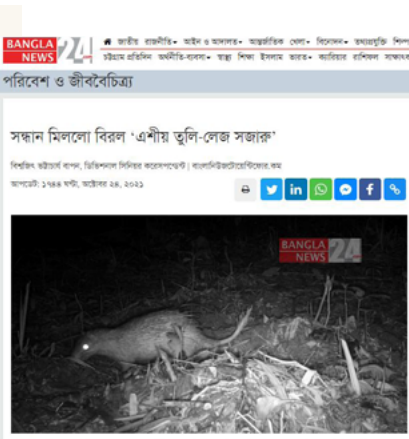
Muntasir Akash
Nature Editor

Six aspiring young zoologists of Bangladesh are paving the path for scientific illustration and exploring endless conservation possibilities


The Revelator

Uncovering the Secret Lives of Lesser-known Carnivores in Bangladesh

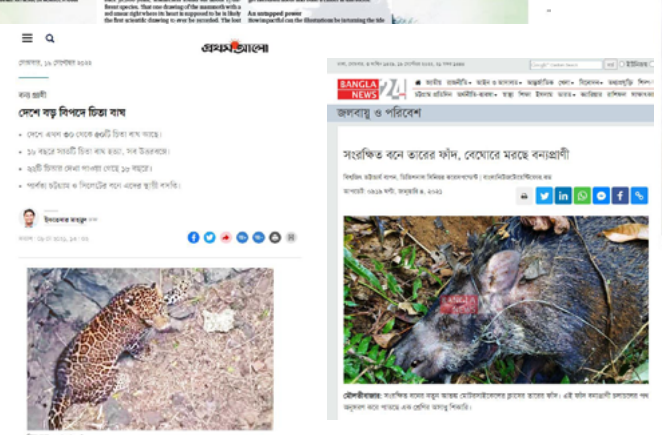
Pursuing unorthodox queries about smaller, "uncharismatic" species often comes with difficult hurdles, as one researcher found out.


BANGLA NEWS 24

পরিবেশ ও জীববৈচিত্র্য

সন্ধান মিললো বিরল 'এশীয় তুলি-লেজ সজারু'


16 WEDNESDAY 07.07.2021 EARTH


প্রথম আলো

দেশে বড় বিপদে চিতা বাঘ

BANGLA NEWS 24

জলবায়ু ও পরিবেশ

সংরক্ষিত বনে তারের ফাঁদ, বেমোরে মরছে বন্যপ্রাণী


SAFARI PARK IN LATHITILA FOREST: ARE WE COMMITTING ECOCIDE?

Mustasir Akash
Nature Editor

The proposed safari park in Lathitila could result in the destruction of one of Bangladesh's most biodiverse forests

CAN WE GIVE UP LATHITILA?

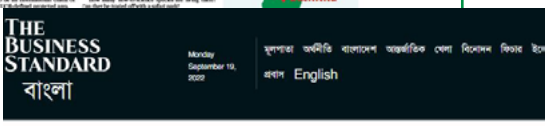
Lathitila


16 EARTH

There is still time for THE BEARS OF BANGLADESH


16 EARTH

SNARES A LOOMING DISASTER FOR BANGLADESH WILDLIFE

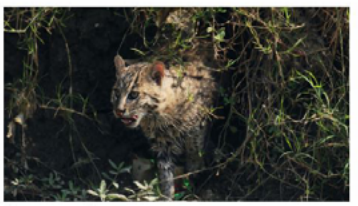

THE BUSINESS STANDARD বাংলা

Monday September 19, 2022

বাংলাদেশ

প্রতি ১৫ দিনে মেছোবিড়াল-মানুষের সংঘাতের ঘটনা ঘটছে: সমীক্ষা

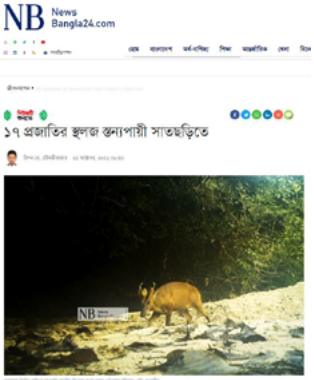
২০১৬ সাল থেকে প্রতি ১৫ দিনে একটি করে নতুন মেছোবিড়াল-মানুষের সংঘাতের খবর সংবাদ মাধ্যমে এসেছে। প্রায় ৫০ শতাংশ ক্ষেত্রে মানুষ দেখা মাত্রই মেছো বিড়ালের প্রতি প্রতিশোধমূলক আচরণ দেখিয়েছে।



RELATED NEWS

শ্রীমঙ্গলে গাড়ি চাপায় মেছো বিড়ালের মৃত্যু

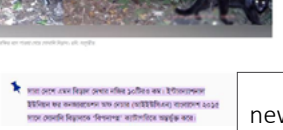



NB News Bangla24.com

১৭ প্রজাতির স্থলজ স্তন্যপায়ী সাতছড়িতে

Saving Bangladesh's otters: A mission not too late to launch


বিলুপ্তপ্রায় সোনালি বিড়াল মৌলভীবাজারের বনে



news featuring our activities

Objective 4 Result sharing with targeted stakeholders

The results of camera-trapping survey have been shared with IUCN Bangladesh, WCS Bangladesh, 10 professors of zoology, and 10 high-ranked Forest Department officials.

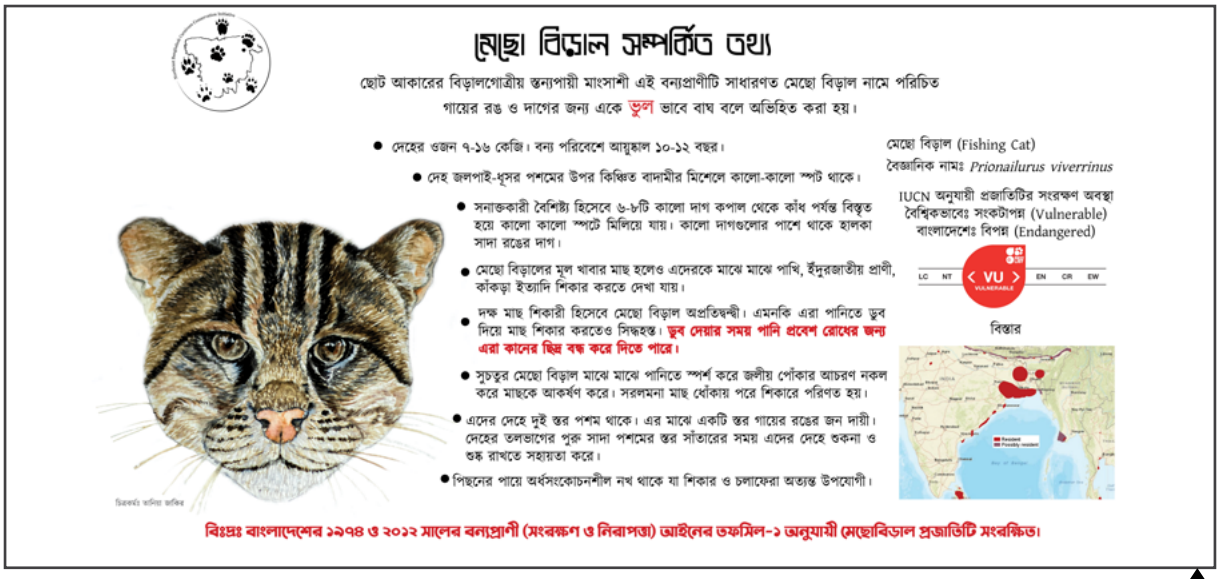
our programme with school students and university club members

our programme with fishermen who share the landscape with otters

2e. COMMUNICATION AND APPLICATION OF RESULTS

The overall goal of the project is to establish new protected areas by putting carnivores as flag-ship species. The findings of the project are, thus, continuously being shared with the policy makers: Bangladesh Forest Department officials, and academicians. The project also empha-sised publishing popular articles in rows. It also attempted to draw the attention of the global authorities to the species found during the survey: otter, bear, golden cat, and fishing cat.

The approach already secured membership of three IUCN SSC specialist groups: IUCN Canid Specialist Group, IUCN Otter Specialist Group and IUCN Small Carnivore Specialist Group. The project findings have leveraged a coming survey on the density of bears and dholes in eastern Bangladesh.



poster we released to in response to human-fishing cat conflicts

our posters for the World Otter Day

2f. MONITORING AND EVALUATION

For objective 01, we were focused on two criteria as Monitoring and Evaluation activities: getting the findings published in peer-reviewed journals and writing popular press articles.

For objectives 2 and 3, we always took a short quiz/opinion survey about the experience/ learning perceived by the attendants. These surveys of ours, on average, yielded 68-73 percent positive responses.

Overall, we also aimed to draw national and global attention to the carnivore mammals of eastern Bangladesh. The outputs of the communication activity also aligned with this criteria.

Barking deer *Muntiacus muntjak*
Endangered in Bangladesh
common ungulate in eastern Bangladesh
no concerted study

Yellow-throated marten *Martes flavigula*
Vulnerable in Bangladesh
largest marten in the Old World
first recorded in Bangladesh in 2010
lives in eastern Bangladesh
no concerted study

2g. ACHIEVEMENTS AND IMPACTS

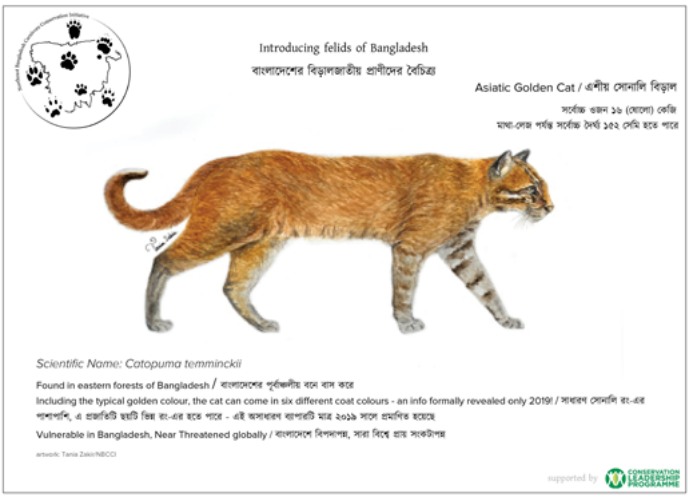
- Survey of ~4550 trap nights in a single season. This adds a tremendous amount of data on the carnivore communities;
- The discovery of the Asiatic black bear (*Ursus thibetanus*, vulnerable), small-clawed otter (*Aonynx cinereas*, vulnerable), golden cat (*Catopuma temminckii*, near threatened), greater hog badger (*Arctonyx collaris*, vulnerable), ferret badger (*Melogale* sp. Data deficient in Bangladesh) along 35 mammals (18 carnivores), 45 birds, and 4 reptile species (in total, 24 threatened)
- Unearthing previously unknown behavior of gibbon (*Hoolock hoolock*, endangered), Phayre's leaf monkey (*Trachypithecus phayrei*, endangered), capped langur (*Trachypithecus pileatus*, vulnerable), and Assam macaque (*Macaca assamensis*).

These findings, in turn, created stirs, as our findings

- are featured in 35 media reports
- showed the absence of the fishing cat (*Prionailurus viverrinus*, vulnerable) from our survey led to a rethinking about the conservation regarding the deliberate release (of rescued cats) at forests. The cat is a wetland species that led to five collaborations including an already published paper on the striped hyena (*Hyaena hyaena*, extinct in Bangladesh), and participation in an IUCN global assessment of the leopard cat (*Prionailurus bengalensis*)
- Using the experience of participating in two SCCS conferences to attend the SCCS Cambridge 2021 and won the first prize of the Best Poster Award.
- Furthermore, our illustrations of the carnivore mammals are highly praised. The works of one of our team members get into an IUCN publication and inspired a community of science illustrators
- At least four undergraduate students who volunteered in our fieldwork are thinking to pursue a career in the carnivores
- The online talks, physical lectures, and the day we celebrated brought around 160,000 people (including Forest Department officials) in contact with the carnivore animals through Facebook (https://www.facebook.com/CarnivoreGuardiansBangladesh/), Twitter (@projectcarnivo1) and Instagram (https://www.instagram.com/carnivoreguardians-bangladesh/)

These directly feed our overall objective i.e., to highlight, prove and signify the presence of carnivore assemblage and to streamline carnivore research in the country

Glimpse of our ongoing work on carnivore ID flash cards



2g. CAPACITY DEVELOPMENT AND LEADERSHIP CAPABILITIES

The CLP experience was tremendous; the journey for the forgotten carnivores has theretofore been rewarding. The knowledge and the skills attained have helped the team members to secure PhD offers, jobs in top conservation organizations (IUCN Bangladesh), and jobs that calls for leadership roles. The project introduced members to the global community for carnivores, honed project management skill, improved writing abilities and provided with lessons of research communication techniques.

Most importantly, it has taught us how to strategize conservation movement. Recently, a zoo-themed safari park has been proposed for one of the study sites. Against the plan, a commentary was published (Khan et al. 2022). Dissuading government decisions is a tough job, but how the scientific community was steered to write this commentary, a first-ever thing in the conservation sector in Bangladesh (the project gave rise to many firsts!), was pivotally assisted by the lessons learned through the project journey.

Masked palm civet *Paguma larvata*
Vulnerable in Bangladesh
A forest-dwelling species
lives in eastern Bangladesh

Ferret badger *Melogale sp.*
Data Deficient in Bangladesh
less than five camera-trap records
prefers riparian forests
lives in eastern Bangladesh

No concerted study on viverrids and mustelids of Bangladesh

SECTION THREE

3a. CONCLUSION

The project has a database yielded from the camera-trapping survey, the largest in eastern Bangladesh and Tripura, India. The project has drawn attention to the carnivores of eastern Bangladesh and called for movements to create more protected areas (< 10 percent is protected according to IUCN category of protected areas). The project relayed the message on camera-trapping techniques and their importance to university students, eco-guides, and forest-department officials. There are conservation-worthy populations of the Asiatic black bear (*Ursus thibetanus*) and the Asian small-clawed otter (*Aonyx cinereus*)—revealed by the project. The terrestrial mammal community in eastern Bangladesh is diverse and they are facing a myriad of threats including poaching.

3b. PROBLEMS ENCOUNTERED AND LESSONS LEARNT

- **Which project activities and outcomes went well and why?**
  The fieldwork under Objective 1, despite the Covid-19 situation and our first-time attemptto conduct a large-scale camera-trapping, went exceptionally well. This largely owes to the determination, patience, enthusiasm, and perseverance of the whole team. Each round of fieldwork came with some unforgettable experiences.

- **Which project activities and outcomes have been problematic and in what way, and how has this been overcome?**
  Conducting fieldwork was problematic. We had to check constantly for the slots in-between lockdown periods to get into the field and reschedule the activities. Several of my team members and volunteers joined the field from the remote corners of the country. We arranged additional transport for them.

  As schools were closed, we could not conduct the school-based awareness campaigns, whereas capacity build-up programs were partially completed. To check this, we had to shift our focus to university students, eco guides, and forest department officials.

- **Briefly assess the specific project methodologies and conservation tools used.**
  We believe that the project methodology was sound, adept, and effective. We devised the project to decipher the terrestrial carnivore mammal diversity. The discoveries as well as the amount of data spoke for the methodology. However, whether the team was bigger, the work would have been swifter and easier to manage.

  The rescheduling issue to address lockdown impacted the rest of the objectives the project aimed at. We used social media, went collaboration with the local conservation team, and sources easier to access to tackle this drawback. We strictly followed Rabinowitz (1993) in whatever chances we managed to scrape in-between lockdown periods.

  The findings asserted the necessity of two different projects: (i) continuous monitoring of the ecology of the targeted species; and (ii) assessing and tackling threats it faces.

poaching is a serious threat to the animal diversity of north-eastern Bangladesh.
these gun-weidling poachers and hunting dogs are from Rajkandi and Tarap Hill Reserve.

- **Please state important lessons which have been learnt through the course of the project and provide recommendations for future enhancement or modification to the project activities and outcomes.**
  Local peoples are the key. For our warm relations with the local people, we were able to retrieve two traps that got vandalized. And, as a result, we did not lose a single camera trap—also the first-ever scenario in Bangladesh!

  Young freshman undergrads are the ones we should give our most investments to create a community of carnivore researchers—one of the long-term goals

  Networking with the policymakers and media people is another driving factor. We sensed that as we updated these stakeholders continuously about our findings

  The otters are in abundance in the region and can be alleviated as a keystone species. A similar thing can be asserted for the bears, a conservation-worthy population lives there. We are planning to continue trapping and launch the species-based program (on the bear, otter, and small cats). The region is worth investing in the research and conservation efforts—a lesson well learnt!

3c. IN THE FUTURE

We will soon commence a collaborative project on the ecology of bears and dholes in eastern Bangladesh. This coming project has been directly leveraged by the findings of the current project. We are also trying to seek funding for the small cats and otters, and consulting with the IUCN otter specialist group, International Otter Survival Fund and Clouded Leopard Working Group. The project leader is also looking for a PhD window to work on the carnivores of eastern Bangladesh.

Clouded leopard
Neofelis nebulosa

Dhole
Cuone alpnius

Marbled cat
Pardofelis marmorata

Illustration | Tania Zakir

Final Report

Carnivore conservation initiative in north-eastern forest reserves of Bangladesh

FUTURE OF MAMMALS OF EASTERN BANGLADESH IS IN OUR HANDS

Dhole *Cuon alpnius*
Endangered in Bangladesh
no conservation investment

Phayre's leaf monkey *Trachypithecus phayrei*
Critically Endangered in Bangladesh
no conservation investment

Leopard cat *Prionairulus bengalensis*
Near Threatened in Bangladesh
no conservation investment

CONSERVATION LEADERSHIP PROGRAMME

Project Carnivore Bangladesh

FINANCIAL REPORT

Itemized expenses	Total CLP Requested (USD)*	Total CLP Spent (USD)	% Difference	Details & Justification (Justification must be provided if figure in column D is +/- 25%)
PHASE I- PROJECT PREPARATION				
Communications (telephone/internet/ postage)	150.00		-100%	We did not include our expenditure under this category as it was insignificant. The section was spent for the below sections.
Field guide books, maps, journal articles and other printed materials	236.00	214.38	-9%	
Insurance	91.00	106.31	17%	
Visas and permits				
Team training	113.00	107.75	-5%	
Reconnaissance	1,101.00	846.53	-23%	We started our trapping programme asap our first reconnaissance visits had been completed. We had to do this because we were pressed under tight COVID-19-related lockdown periods. We spent a large sum of this budget line on another round of camera-trapping on a fourth site (24º12´-24º17´N and 91º51´-91º55´E).
EQUIPMENT				
Scientific/field equipment and supplies	5,935.00	7245.38	22%	
Photographic equipment				
Camping equipment				
Boat/engine/truck (including car hire)				
Other (Equipment)	236.00	278.40	18%	
PHASE II- IMPLEMENTATION				
Accommodation for team members and local guides	1,132.00	665.45	-41%	We didn't need to spend much on accommodation because we had got support from the Forest Forest Department and the locals as they allowed our team to stay at the field dormitories and earthen houses at a minimal cost for most of the trips.
Food for team members and local guides	2,413.00	2038.47	-16%	

Itemized expenses	Total CLP Requested (USD)*	Total CLP Spent (USD)	% Difference	Details & Justification (Justification must be provided if figure in column D is +/- 25%)
Travel and local transportation (including fuel)	673.00	1328.66	97%	We planned to move by bus. But all the intercity buses were shutdown during our fieldwork days. We had to hire cars/ microbuses. Hence, the increased cost. This was adjusted as we had amounts from the budget under accommodation and food. In total, considering the three budget lines, we have 866.26 USD which was adjusted for a fourth trapping round and the remaining tasks.
Customs and/or port duties				
Workshops	1409	1077.76	-24%	
Outreach/Education activities and materials (brochures, posters, video, t-shirts, etc.)	259.00	413.24	60%	The printing cost of t-shirts was increased. However, the purchases made in this case were utilized in workshop programme and post-project activities.
Other (Phase 2)				
PHASE III - POST-PROJECT EXPENSES				
Administration				
Report production and results dissemination	413.00	412.60	0%	
Other (Phase 3)	566.00		-100%	This budget line was spent in the above sections, particularly adjusted for the increased cost for the travel, equipment and outreach material purchases.
Total	14,727.00	14,734.94		

Black-naped hare *Lepus nigricollis*
Endangered in Bangladesh

SECTION FOUR

APPENDICES

4a. CLP M&E measures

Output	Number	Additional Information
Number of CLP Partner Staff involved in mentoring the Project	NA	NA
Number of species assessments contributed to (E.g. IUCN assessments)	1	https://dx.doi.org/10.2305/IUCN.UK.2022-1.RLTS.T18146A212958253.en
Number of site assessments contributed to (E.g. IBA assessments)	NA	NA
Number of NGOs established	NA	NA
Amount of extra funding leveraged ($)	1	The bear and dhole survey will be funded under this programme https://documents.worldbank.org/en/publication/documents-reports/documentdetail/395741538969430897/bangladesh-sustainable-forests-and-livelihoods-sufal-project
Number of species discovered/rediscovered	5	The Asiatic black bear, the Asiatic golden cat, the Asian small-clawed otter, the greater hog badger, and the ferret badger. And, at least one new species of stream-dwelling freshwater fish species.
Number of sites designated as important for biodiversity (e.g. IBA/Ramsar designation)	NA	The project significantly steered the next activity i.e., bear and dhole survey, which, will surely work to make safe space for these species in eastern Bangladesh.
Number of species/sites legally protected for biodiversity	NA	NA
Number of stakeholders actively engaged in species/site conservation management	~15	University students, eco-guides, and forest department field personnel were actively engaged in the field survey.
Number of species/site management plans/ strategies developed	NA	The project represented a first step for a big region that constitutes the western cusp of the Indo-Burma Biodiversity Hotspot and an ecologically territory in terms of carnivore research. The project significantly steered the next activity i.e., bear and dhole survey, which, will surely work to make safe space for these species in eastern Bangladesh.
Number of stakeholders reached	~250	The project, through awareness and outreach programme, reached them. Through social media activity, it reached another ~250000 view for the carnivores. In invited lecture sessions also drew the attention of ~200 forest department officials.
Examples of stakeholder behaviour change brought about by the project.	NA	NA

Output	Number	Additional Information
Examples of policy change brought about by the project	NA	NA
Number of jobs created	NA	NA
Number of academic papers published	8	3 in press, 1 published, 4 being written (Appendix 4b)
Number of conferences where project results have been presented	3	One in SCCS Bengaluru 2021, two in SCCS Cambridge 2022

4b. List of publications (published, in press, being written)

Akash M. Chakma, S., Biswas, J., Sultan, A., Zakir, T., Rahman, H., Ansary, Z., Kabir, J. 2022. How far westward? Revisiting the distribution of Arctonyx badger in the westernmost global range. Mammalia: accepted.

Akash, M., Debbarma, H., Zakir, T., Ahmed, S., Nanziba, R. 2022. A spiny intrigue: Understanding the distribution and temporal ecology of porcupines in eastern Bangladesh. Hystrix: being prepared.

Akash, M., Ahmed, S., Biswas, J., Alam, M.S., Zakir, T., Shafi, M.S., Barkat, A.I., Islam, M.T., Alom, K., Guala, C. 2022. What does a discovery tell us? A camera-trapping insight into the small-clawed otters in north-eastern Bangladesh. Otter Bulletin 39(3): in press.

Akash, M., Chowdhury, A.G., Ahmed, S., Debbarma, H., Sharma, S. 2022. Not yet a goner: recent evidence still beacon a future for the bears in eastern Bangladesh. Ursus: being prepared.

Akash, M., Dheer, A., Dloniak, S.M. and Jacobson, A.P., 2021. The faded stripes of Bengal: a historical perspective on the easternmost distribution of the striped hyena. European Journal of Wildlife Research 67(6): 1–12.

Akash, M., Iqbal, F., Mondal, S. 2022. Only south of the Ganges? On recent occurrences and distribution of smooth-coated otters in Bangladesh. Otter 2022: in press.

Akash, M., Zakir, T., Ahmed, S., Biswas, J., Debbarma, H.m, Alam, M.S., Guala, C., and Islam, T. 2022. Camera trapping insights into leopard cat movement in eastern Bangladesh. Cat News 75: in press.

Ghimirey, Y., Petersen, W., Jahed, N., Akash, M., Lynam, A.J., Kun, S., Din, J., Nawaz, M.A., Singh, P., Dhendup, T., Marcus, C., Gray, T.N.E. & Phyoe Kyaw, P. 2022. Prionailurus bengalensis. The IUCN Red List of Threatened Species 2022: e.T18146A212958253. https://dx-.doi.org/10.2305/IUCN.UK.2022-1.RLTS.T18146A212958253.en. Accessed on 01 August 2022.

4c. SCCS Posters

SCCS Bengaluru 2021

https://www.researchgate.net/publication/354956540_Globally_vulnerable_small-clawed_otter_in_northeast_Bangladesh_Activity_pattern_of_a_newly_discovered_population_in_a_human-dominated_riparian_mixed-evergreen_forest?_sg%5B0%5D=h69K4vERKN7lpEW9h1Icn_CvDRKyRBSBR6EChhHHqnxFWTuo7PNXgH2Zda2TCQv58xMLXGIwooYxVaUtCU4CGOyWv5l1Uz0K96lPXeg2.wXw6bhrDbSWTnqTvL_X0nCokDmHHMMFNK-PvkAsPS3jsKAEYjPebUo5INp-2WggLruRsILBkg_T7s82s-18rBiA

SCCS Cambridge 2022 (Poster 01)

https://www.researchgate.net/publication/359634682_Finding_fantastic_beasts_A_camera-trapping_story_on_threatened_carnivore_mammals_inhabiting_forgotten_forests_of_northeast_Bangladesh

SCCS Cambridge 2022 (Poster 02)

https://www.researchgate.net/publication/359634814_A_cat_out_of_water_Assessing_spatiotemporal_patterns_and_drivers_of_human-fishing_cat_conflict_in_Bangladesh_from_media_reports

4d. Link to online-talks

1. Talk on camera-trapping with the Brahmanbaria Science Club
2. World Otter Day 2021 Bangladesh

4e. Links to skits

1. World Otter Day 2021 Bangladesh
   The International Otter Survival Fund featured this event in their monthly newsletter
2. Talk on camera-trapping with the Brahmanbaria Science Club
3. World Otter Day Cartoon
4. Eurasian and smoon-coated otter in Bangladesh
5. গোল্ডেন ক্যাট বাংলাদেশে - Elusive Asian golden cat in Bangladesh
6. 2020 CLP Team Awards -- conservation of small carnivores in the north-eastern forests of Bangladesh

All skits can be accessed here: https://drive.google.com/drive/folders/1YFQZ3KlHnHppOSB93hrFZ-T3ZgF8rtWcE?usp=sharing

4f. Links and photos of media activity

The Revelator

- Species Spotlight: The Greater Hog Badger, Cornered by a Hunting-Driven Extinction Crisis
- Species Spotlight: The Asian Small-Clawed Otter — A Victim of the Pet Trade
- Uncovering the Secret Lives of Lesser-known Carnivores in Bangladesh

The Business Standard

- Asiatic wild dog: Bangladesh's forgotten wildlife

- There is still time for the bears of Bangladesh
- Camera-trap study reveals rare wild cat in northeastern Bangladesh
- Safari Park in Lathitila forest: Are we committing ecocide
- Saving Bangladesh's otters: A mission not too late to launch
- Carnivore mammals of the homesteads: Forgotten and forsaken?
- Snares: A looming disaster for Bangladesh wildlife
- Wildlife illustration: A decisive tool to empower conservation
- Vanishing in silence: Our marvellous small cats
- My journey with camera-trapping
- Civets: Nocturnal carnivores facing extinction
- Finding fantastic beasts: A camera-trapping story from our forgotten forests
- The greater hog badger, cornered by a hunting-driven extinction crisis
- প্রতি ১৫ দিনে মেছোবিড়াল-মানুষের সংঘাতের ঘটনা ঘটছে: সমীক্ষা (in English: in every 15 days, a new human-fishing cat conflict occurs in Bangladesh)
- Saving a black bear cub in the Hill Tracts

DeshRupantor.com

- ৬ রং ধারণ করতে পারে দেশের বিলুপ্তপ্রায় এই 'সোনালি বিড়াল' (in English: Golden cat can takes six different colors)
- দেশে মাত্র একটি মর্মর বিড়াল বেঁচে আছে! (in English: Only one captive marbled cat specimen in Bangladesh)
- সংরক্ষিত বন উজাড় করে কৃত্রিম বনায়ন! (in English: Plantation forest in natural reserves!)

NewsBangla24.com

- বিলুপ্তপ্রায় সোনালি বিড়াল মৌলভীবাজারের বনে (in English: Rare golden cat in the forests of Moulvibazar)
- ১৭ প্রজাতির স্থলজ স্তন্যপায়ী সাতছড়িতে (in English: 17 terrestrial mammals camera-trapped in Satchari)
- 'বিলুপ্ত' মনে করা বানর মিলল র‍্যাবের অভিযানে (in English: 'extinct' primate rescued in a drive)

Banglanews24.com

- সন্ধান মিললো বিরল 'এশীয় তুলি-লেজ সজারু' (in English: Rare Asiatic brush-tailed porcupine camera-trapped)
- পৃথিবীর মধ্যে দেশেই বেশি আছে বিপদাপন্ন 'মেছোবিড়াল' (in English: Largest fishing cat population is in Bangladesh)
- সংরক্ষিত বনে তারের ফাঁদ, বেঘোরে মরছে (in English: Snaring wreaks havoc in the forests of Bangladesh)
- দেশে হুমকির মুখে বিপন্ন 'কালোঘাড় খরগোশ' (in English: Black-naped hare is endangered in Bangladesh)
- অভয়ারণ্যে প্রাণি বিনাশের তৎপরতা (in English: Hunting is rampant in the forests)

The Daily Prothom Alo

- দেশে বড় বিপদে চিতা বাঘ (in English: The plight of leopards in Bangladesh)
- আমাদের বনের ঢোল (in English: Wild dogs of Bangladesh)

The Daily Kaler Kantho

- আমাদের ঢোলও আছে (in English: We have dhole!)

The Daily Jugantor

- সাতছড়ি বনে মিলল বিপন্ন বন্য কুকুর (in English: Dhole camera-trapped in Satchari)

Page reach: Northeast Bangladesh Carnivore Conservation Initiative

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