Investigating the ecology and threats of *Euploea crameri nicevillei* (Moore, 1890) from the Sundarbans Mangrove forest in Bangladesh

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Background

The Sundarbans Crow butterfly, historically described as *Euploea crameri nicevillei*, has long been considered Bangladesh's only endemic and critically endangered butterfly. However, its taxonomic status remains contentious, with some authorities treating it as a morph of *Euploea core* and others as a subspecies of *E. crameri*. Furthermore, its true distribution range has never been thoroughly assessed, and its designation as a Critically Endangered taxon was largely based on preliminary data. Recognizing that effective conservation depends on accurate species delineation and a clear understanding of distribution, we designed this study to address these gaps. Additionally, the species' ecological characteristics have never been investigated, making this study the first comprehensive attempt to elucidate both its taxonomy and ecology.

Objectives

1. Clarify the taxonomic identity of the Sundarbans Crow butterfly using an integrative approach combining morphology and molecular data.
2. Determine whether it is truly endemic to Bangladesh.
3. Reassess its conservation status based on updated distribution and ecological information.

Methodology

Field Surveys:

1. Conducted two large and one small field expeditions in the Sundarbans (Katka, Kachikhali, Harbaria, Baiddomari) (Figure 1).
2. Transects of 500 m were surveyed for butterfly occurrence, behavior, and host plant associations.
3. Collected specimens for morphological and molecular analyses.

Morphological Analysis:

1. Compared wing morphology, sex brands, and genitalia of field specimens to type specimens in NHMUK.
2. Genitalia examined using dissection and microscopy.

Molecular Analysis:

1. Extracted DNA from leg tissue; sequenced mitochondrial COI gene (~650 bp).
2. Phylogenetic trees constructed using Maximum Likelihood and Neighbor-Joining approaches.
3. Genetic distances calculated using Kimura 2-parameter model.

Historical Review:

1. Analyzed literature from 1890 to present to assess previous records, taxonomic treatments, and distribution.

Key Results

Taxonomy: Although the target butterfly exhibits several distinctive external morphological traits, it shares key characteristics with *Euploea core*, including the structure of the underside forewing and male external genitalia. Molecular analyses further support this close relationship. Considering its unique external morphology and restricted geographic range, rather than synonymizing it with *E. core*, we herein designate the taxon as a subspecies of *E. core*, naming it *E. core nicevillei* **stat. nov.**

Distribution: The butterfly occurs widely across the Bangladeshi Sundarbans and its surrounding habitats (Figure 1). Very recently, it has also been reported from the Indian Sundarbans. Therefore, it is not strictly endemic to Bangladesh, and there is no evidence suggesting a current population decline.

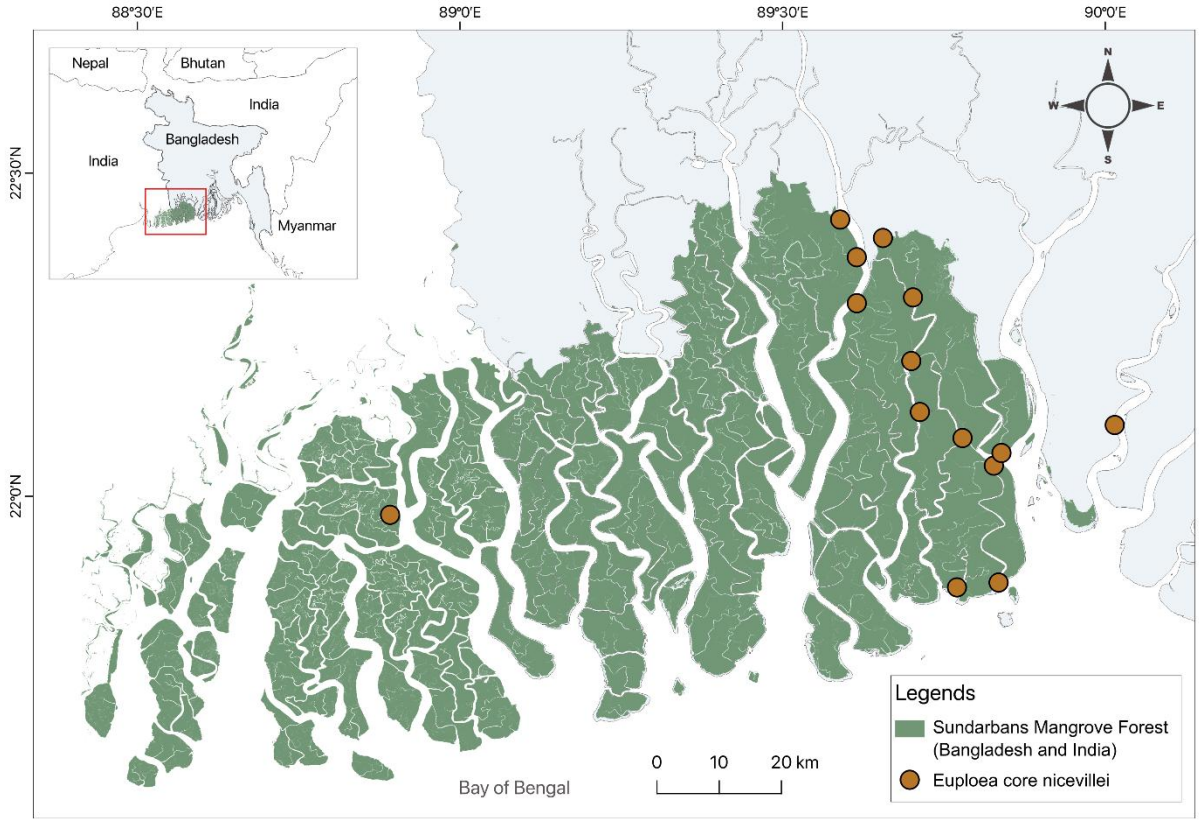

Figure 1. Updated distribution of Sundarbans Crow butterfly

Conservation Status: Previously reported Area of Occupancy (~79 km²) was likely underestimated due to limited surveys. Field observations indicate that the subspecies is locally common, with no evidence of rapid population decline. Nonetheless, conservation attention is warranted because of its mangrove habitat specificity and ongoing anthropogenic threats.

Conservation Implications: The previous designation of *E. core nicevillei* as "Critically Endangered and Endemic" was premature. It is now recognized as a valid subspecies with a wider range, highlighting the need to reassess its Red List status. Recommended conservation actions include systematic surveys across the Sundarbans to refine distribution and population estimates, protection and monitoring of mangrove habitats, and further genetic studies to better understand population structure and evolutionary history.

Outputs

- ***Publications:*** Manuscript submitted to a peer-reviewed journal (Ecology and Evolution (Wiley-Blackwell)) for consideration. The preprint can be obtained from here:

Rayhan, M. J., Jahan, S., Howlader, M. T. H., Ahmed, T., Twaha, S. M., & Chowdhury, M. F. H. (2025). *Think before you list: Integrative systematics of an 'endemic and critically endangered' butterfly in the Sundarbans*. **bioRxiv.** https://doi.org/10.1101/2025.10.07.680979

- ***Specimen Deposits:*** Voucher specimens deposited at the Invertebrate Museum of the Department of Zoology, University of Chittagong.
- ***GenBank Accession Numbers:*** PX431589, PX431590 (COI sequences).
- ***Stakeholder Engagement:*** The study involved close collaboration with the Bangladesh Forest Department and local forest officials. Research was conducted in partnership with Bangladesh Agricultural University, Mymensingh, under the supervision of Dr. M. T. H. Howlader. Additionally, outreach activities included two awareness campaigns targeting local school communities.

For any further information regarding this project, please contact the principal investigator. I hereby declare that the information provided above is accurate and true to the best of my knowledge.

Md Jahir Rayhan

Additional Photography

Figure: Sundarbans Crow (*Euploea core nicevillei*, **stat. nov.**) from Sundarbans, Bangladesh during first field visit.

Figure: Sundarbans Crow (*Euploea core nicevillei*, **stat. nov.**) from Sundarbans, Bangladesh during second field visit at disturbed forest areas associated to human habitat.

Figure: Moments from first field visit.

Figure: Mongla to Sundarbans travel with private ship.

Figure: Collecting the target species.

Figure: Observing the caterpillar/ ecology during the third field visit.

Figure: Ditto.

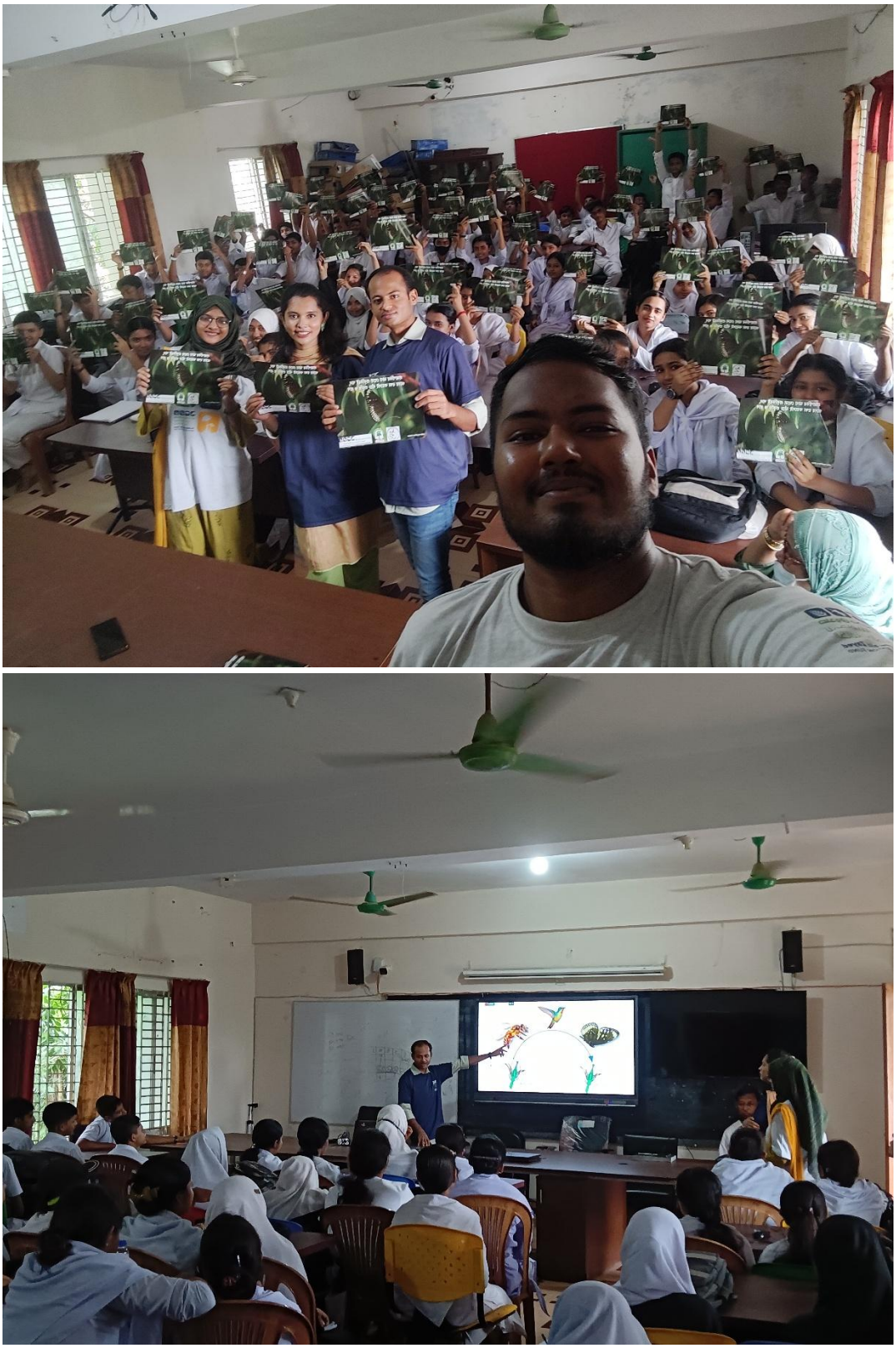

Figure: First school campaign.

Figure: Plantation of native butterfly host-plants during first school campaign.

Figure: Second school campaign.

Figure: Glimpse from Second school campaign.