CASE STUDY SERIES 6

Innovative Solutions for Effective Governance and Public Services

From Pugmark to Precision: Transforming Tiger Census in Bangladesh

S M Mashrur Arafin Ayon and Hasan Muhammad Baniamin

August 2024

Series Editor: Dr. Hasan Muhammad Baniamin

Policy and Innovation Lab (PLab) of South Asian Institute of Policy and Governance (SIPG), North South University, Bangladesh

From Pugmark to Precision: Transforming Tiger Census in Bangladesh

S M Mashrur Arafin Ayon and Hasan Muhammad Baniamin

The Royal Bengal Tiger and Challenges in Accurate Counting

The Royal Bengal Tiger (*Panthera tigris tigris*), the national animal of Bangladesh, resides in the Sundarbans, the world's largest mangrove forest. Native only to this region, this top-ranked predator is a critical part of the food chain, playing a crucial role in maintaining the ecological balance of the Sundarbans. Despite their vital role, accurately estimating their population within the forest has been challenging. Regular tiger censuses are essential for monitoring their population numbers and implementing effective strategies to save them. A precise tiger census provides a comprehensive picture, facilitating better management and protection efforts for this national symbol.

Historically, the Pugmark method, which involves tracking and recording tiger paw prints to estimate population numbers, was utilized for this purpose.

PROBLEM

The traditional Pugmark method used in the Tiger Census is fraught with inefficiencies and inaccuracies, leading to unreliable population estimates.

SOLUTION

Adoption of modern techniques, such as DNA fingerprinting and camera trapping, to replace the Pugmark method and improve the accuracy of

OUTCOME

Precise calculation of the tiger population, providing accurate data to inform effective conservation strategies.

The Pugmark method, despite its historical use, is plagued with inefficiencies. It heavily depends on the skill and experience of trackers, making it prone to errors in the calculations. Overlapping prints from multiple tigers and environmental factors such as rain or wind can distort or erase the prints, further complicating the accuracy of the estimates. Consequently, this technique often leads to unreliable population data.

Innovating with Non-Invasive DNA Fingerprinting and Camera Trapping

To address the challenges of inaccurate tiger population estimates, researchers and forest officers in Bangladesh, led by Dr. X, introduced groundbreaking methods such as non-invasive DNA fingerprinting and camera trapping to track these animals.

Supported by the BAGH project of USAID (United States Agency for International Development) and the Government of the People's Republic of Bangladesh, these advanced techniques have revolutionized the Tiger Census system.

Non-invasive DNA fingerprinting involves collecting environmental DNA (eDNA) from such as scat, urine, or hair in tiger habitats.   . Unlike DNA sequencing, which determines the exact sequence of nucleotides in a DNA molecule, DNA fingerprinting identifies unique patterns in an individual's DNA that differentiate it from others. This makes DNA fingerprinting particularly appropriate for the tiger census, as it allows for the precise identification of individual tigers without the need for invasive procedures. Based on these unique genetic markers, t   his eDNA is then analyzed to identify individual tigers   , providing precise data on tiger populations without disturbing the animals.

Camera trapping complements DNA fingerprinting by strategically placing cameras in areas frequented by tigers. Forest officials install these cameras in clearings approximately twelve feet in diameter, setting them at tiger height on poles. The cameras, painted in camouflage, capture still images and videos whenever motion is detected. Using black flash technology at night ensures that the tigers are not disturbed. Images and videos are stored on memory cards, collected every five days by forest officials, who also perform maintenance and battery replacements of the instruments.

Innovating with Non-Invasive DNA Fingerprinting and Camera Trapping

The integration of non-invasive DNA fingerprinting and camera trapping has significantly improved the accuracy of tiger population estimates in the Sundarbans. Dr. X's work has yielded reliable data, which is crucial for understanding the Sundarbans' carrying capacity for tigers. These methods offer several benefits: DNA fingerprinting ensures non-invasive, precise identification of individual tigers, leading to more accurate population counts, while camera trapping supplements DNA data by providing visual confirmation and behavioral insights, capturing images and videos of tigers in their natural habitat.

The advancement of these techniques has substantially increased the efficiency and accuracy of the tiger census in Bangladesh, setting a new standard for wildlife population assessment.

Declarations

These case studies have not undergone formal, rigorous review and approval. Copyright belongs to the author(s). Cases may be downloaded for personal use only.

We acknowledge the copy-editing service from the NSU-Office of Research

AbouttheAuthors

S M Mashrur Arafin Ayon is currently working as a Research Associate at SIPG, North South University. He holds both undergraduate and postgraduate degrees from the Department of Women and Gender Studies at the University of Dhaka. His research primarily focuses on gender issues, exploring the intersection of technology and gender, the gender pay gap, and gender dynamics within the digital gig economy. He is a certified R programmer and has contributed package to the Comprehensive R Archive Network (CRAN).

Dr. Hasan Muhammad Baniamin is an Assistant Professor at the South Asian Institute of Policy and Governance, North South University, Bangladesh. He obtained a Ph.D. from the Department of Administration and Organisation Theory, University of Bergen, Norway. His research interests include e-governance, health policy, refugee crisis, institutional performance, and trust, and he has published articles on these issues in journals such as Public Administration, Public Organisation Review, International Political Science Review, and International Journal of Public Administration.