



# Accelerating Wildlife Crime Investigations through Forensics in India

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**Opinion**

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## Introduction

Since ancient times, hunting has been intrinsic to human societies, originating from the era of hunter-gatherers. However, contemporary hunting driven by luxury, status symbols, and commercial trade, is classified as wildlife crime due to its detrimental effects on endangering species, inflicting cruelty to animals, and facilitating illicit trafficking of wildlife and its associated products, along with the destruction of wildlife habitats. Wildlife forensics is thus, application of science to support wildlife law enforcement agencies from detection of a crime through to its eventual prosecution.

To combat wildlife offenses, multiple regulations have been implemented globally to safeguard endangered species and diverse ecosystems. Despite efforts, challenges persist because perpetrators often evade legal repercussions as the victims are never able to raise their voice. In India too, significant strides have been made through enactments like the Wildlife Protection Act (1972), Forest Conservation Act (1980), and Environment Protection Act (1986), as well as establishing sanctuaries, national parks, and conservation reserves, alongside institutions like the Wildlife Crime Control Bureau, aimed at bolstering protection and conservation efforts. However, National Crime records bureau data for the year 2022 suggests there is 50% rise in wildlife crime in different states of India as compared to year 2021 [1].

The efficacy of stringent laws and policies could not deter the offenders which is visible in low conviction rate largely due to lack of evidence and huge amount of money behind. The culprits are often linked to larger organized

crime network where an enormous amount financial incentives are involved. UNODC considers wildlife crime considered the fourth most illegal trade after arms, drugs and human trafficking [2].

To understand wildlife crime and to conduct comprehensive wildlife forensic science examination, evidence plays a crucial role. Such crimes are generally hidden and discovered later or the actual form of wildlife organism is changed. The complexity of the issue is exacerbated by the challenge of gathering adequate evidence. For evidence to be admissible in court it must be appropriately handled, documented, and preserved. Evidences vary depending on type of crime and species involved encompassing the whole organism, both living or dead, animal parts like fur, feathers, bones, and organs as well as derived products like jewellerys, processed meats, clothing, ornaments, and medicines [3]. Advances in wildlife forensics have closely mirrored developments in human forensics, with some cases inspiring innovative techniques and solutions tailored to animal-related investigations are needed [4]. Samples from animals and crime scenes cover a wide array of possibilities, like snake venom, turtles, tortoises, sea horses, mynas and munias skin, bones of tiger and leopard, ivory, elephant tusks, and rhinoceros horn [5] necessitating forensic laboratories to continuously adapt, update and validate their methodologies and techniques accordingly.

## Techniques Involved

Applying forensic science to wildlife has led to significant breakthroughs in combating crime, exemplified by the 2021 international arrests linked to a poaching and wildlife trafficking ring in India [5]. A concerning trend emerging within drug addiction circles involves the consumption

of snake venom, exploiting both the animal and posing severe health risks to the abuser [6]. Evidence in such cases presents unique challenges for forensic scientist and investigators both. Scientists are continuously enhancing their methodologies to tackle complex evidence scenarios, such as identifying tanned hides or degraded materials, and distinguishing powdered venom from illicit substances.

Given the wide variety of crime samples, wildlife forensic scientists must possess comprehensive knowledge of various DNA techniques such as PCR, DNA barcoding, and mitochondrial DNA sequencing for species and individual identification. They also employ morphological analysis to discern physical characteristics and assess condition, chemical analysis like isotope analysis to ascertain geographic origin, and toxicology tests to determine exposure to contaminants, poisoning or weapon-related trauma.

Recent advancements include the application of fingerprinting in wildlife forensic case exhibits like eggshells, ivory, teeth, bone, leather, and antlers, demonstrating its growing utility and expanding scope in wildlife forensic investigations [7]. On similar line blow fly eggs from the deceased cubs was used to determine time of death and data used in the conviction in Canada where two young black bears were found disembowelled [8]. Indian wildlife forensic scientists need to gear up for the similar challenges.

### Challenges and Limitations

Challenges and Limitations : India is a large country with approximately 65% of human population sharing space with wildlife in protected areas. They often cross lines for food and in the end; the animal is eliminated on pretext of being man eater and biodiversity disrupted on pretext of need [5]. Such wild life cases cannot be dealt with forensic science and needs more education and environmental approach like to motivate people to participate in wildlife protection, provide incentives as a reward for ecosystem maintenance and associated biodiversity. Wildlife enforcement officers, Non-Governmental Organisations and Government has to rethink strategies and work on these lines to reduce wildlife crime.

Wildlife trade in markets and online are openly practiced in India for wild and rare animals, birds, ornamental plants etc surreptitiously in name of charm or good luck creating a enormous task for wildlife enforcement officers. The Wildlife (Protection) Act, 1972 has limited provisions to regulate trade of exotic species that are smuggled across borders [5]. More than Amendment of existing wildlife laws awareness and incentives with special drives for protection of endangered species or biodiversity is the need of hour and hence preventive forensics is critically important in larger public interest.

Crime scene investigation is a well-established discipline in routine crime cases where scientists ensure effective investigation and preservation of evidences whereas wildlife crime scientists may encounter unique challenges due to the diverse range of potential victims and source of evidence. Therefore, it is essential for all wildlife enforcement officers to have working awareness of the vast landscape and diverse flora and fauna to ensure appropriate evidence collection, preservation, prevents contamination and properly documents every minute detail, further for evidence to stand up to scrutiny in court correct evidence management is necessary. The local participation of forest rangers, conservationists, and veterinarians may help in handling of the wildlife scene of crime [4]. The international wildlife forensics community is helping national agencies to develop institutional standard operating procedures for evidence security and management.

Looking at the rate of crime and depletion of wildlife, there seems to be huge demand of wildlife laboratories in most of the states for better conservation of wildlife and detection of wildlife crimes. At present only one crime laboratory exists for such large diverse wildlife of India. Inadequate number wildlife laboratories in many parts of India underscores the crucial need for the government to address the deficiencies in resources and expertise required to carry out sophisticated forensic analyses. A critical aspect of this is the establishment of a comprehensive DNA database, tailored to the genetic diversity and geographic distribution of various species found in India. While existing resources like GenBank and the Barcode of Life offer avenues for identifying commonly traded species [4], the creation of databases specific to protected and endangered species presents a distinct challenge. Despite the potency of DNA analysis in species identification compared to genetic databases, issues such as degraded DNA in samples sometimes render analysis impossible. Currently, a significant portion of wildlife trade crimes may evade prosecution due to forensic scientists lacking the necessary tools or conducting tests based on law enforcement demands. There is a dire need for standardized methods and protocols across different jurisdictions in the country to ensure consistency and reliability of forensic evidence. To maximize the impact of wildlife forensic science, collaboration among scientific, enforcement, and environmental communities is indispensable.

### Conclusion

Wildlife forensics plays a vital role in combating wildlife crime and supporting conservation efforts, hence, India must strengthen and increase its laboratories as legal implications of forensic evidence in wildlife cases are profound. Despite challenges, advancements in forensic techniques and increased international cooperation hold promise for more effective wildlife protection and legal enforcement.

## Declarations

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## Authors Contribution

Dr. Sweta Sinha - Study conception and design, presentation, & critical review of draft

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