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Research Article

Transforming Criminal Justice in India: Forensic Intervention under the Bharatiya Nagarik Suraksha Sanhita, 2023

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Abstract
Forensic science has emerged as an indispensable component of India's criminal justice system, bridging the gap between traditional investigation methods and modern scientific precision. While earlier reliance on eyewitness accounts and confessions often led to evidentiary gaps, advancements in DNA profiling, ballistics, toxicology, and digital forensics now provide objective proof capable of strengthening prosecutions and safeguarding individual rights. The Bharatiya Nagarik Suraksha Sanhita (BNSS), 2023, marks a watershed moment by institutionalizing forensic practices through provisions such as mandatory crime scene videography, compulsory forensic examination in heinous offences, and statutory recognition of expert reports. Judicial trendshave reinforced the evidentiary value of scientific tools while balancing constitutional safeguards. However, challenges persist in implementation due to inadequate infrastructure, shortage of trained experts, and absence of standardized protocols. This paper critically analyses the role of forensic science under the BNSS, judicial endorsement of scientific methods, and systemic obstacles, while proposing reforms to establish a science-led justice delivery system in India.
Keywords: Forensic science, Bharatiya Nagarik Suraksha Sanhita 2023, BNSS, DNA profiling, chain of custody, criminal justice, judicial trends, expert evidence, transparency, fair trial

1. Introduction:

Forensic science has become a decisive element in modern criminal investigations, providing scientific precision where traditional reliance on eyewitness testimony or confessions often fails. A striking example is a case in Delhi where a charred body was discovered in a burnt car. With no eyewitnesses and the perpetrator attempting to erase all traces, the case was solved through forensic intervention: a microscopic drop of blood beneath the victim's fingernails, dental reconstruction of the skull, and hair strands on a blunt weapon. Such instances, reminiscent of the 2006 Nithari case, demonstrate how forensic science is now indispensable to criminal justice in India.

Equally instructive is the Aarushi-Hemraj double murder case of 2008, which revealed the consequences of forensic neglect. Lapses such as media access to the crime scene, failure to preserve biological samples, and improper handling of evidence undermined the investigation. Although techniques like narco-analysis were later used, their credibility was questioned in court, leading to acquittals due to insufficient scientific support. This case highlighted how weak forensic practices can compromise the pursuit of justice.

These contrasting examples illustrate the dual role of forensic science: it can either establish truth where testimonies fail, or, if mishandled, erode the foundation of justice. Recognising this, the Bharatiya Nagarik Suraksha Sanhita (BNSS), 2023, introduces reforms aimed at embedding forensic methods in criminal procedure. Provisions such as mandatory videography, compulsory forensic examination in specific cases, and integration of forensic laboratories signify a deliberate shift towards evidence-based investigation.

This paper critically analyses the BNSS, 2023 in the context of forensic science. It examines statutory provisions, judicial approaches, and systemic challenges, while arguing that effective implementation, adequate infrastructure, and forensic accountability are essential for strengthening India's criminal justice system.

2.What is forensic science?

Forensic science is the application of scientific techniques and principles to criminal and civil laws. It plays a critical role in uncovering facts based on physical and digital evidence.

It involves the use of principles from natural and physical sciences to examine and resolve legal and societal issues. In practical terms, it primarily refers to the integration of scientific techniques within law enforcement and judicial processes. By applying science to crime scene analysis and evidence evaluation, forensic science supports investigations and plays a crucial role in presenting reliable proof during court proceedings.

Therefore, it plays a critical role in the criminal justice system by acting as a link between scientific analysis and legal proceedings. It encompasses a wide range of disciplines such as DNA analysis, toxicology, forensic pathology, and ballistics, all of which are instrumental in uncovering the truth behind criminal activities. These scientific fields have seen significant advancements over time, providing law enforcement agencies and the judiciary with credible and objective tools to collect evidence, reconstruct events, and resolve complex legal questions.

3.Types and Branches of Forensic Science in Criminal Investigations d:

The Indian criminal justice system increasingly relies on a variety of forensic evidence types, each rooted in a specialized branch of forensic science. Let us understand both the types of evidence commonly used in courts and the forensic disciplines that generate them.

- **DNA Evidence**
  Known as a genetic fingerprint, DNA uniquely identifies individuals at a crime scene. It plays a crucial role in linking suspects through scientific precision.
- **Fingerprint Analysis**
  An established method of identification, fingerprints found at crime scenes are matched with known prints by forensic experts.
- **Ballistic Evidence**
  This involves analyzing firearms, bullets, and gunshot residue to determine the weapon used, bullet trajectory, and firing position.
- **Digital Evidence**
  Involves recovering data from devices like phones or computers such as deleted messages or browsing history to investigate cyber or tech-related crimes.
- **Toxicological Evidence**
  Used in suspected poisoning or overdose cases, it detects drugs, alcohol, and toxins in bodily fluids to determine cause of death.
- **Forensic Pathology**
  Involves autopsies to establish cause, manner, and time of death, especially in suspicious or unexplained deaths.
- **Forensic Odontology**
  Uses dental records and bite marks for identification, especially useful in assault cases or mass disasters.

- **Forensic Anthropology**
  Analyzes skeletal remains to determine identity, age, sex, and possible trauma in unidentified bodies.
- **Forensic Psychology**
  Studies criminal behavior, profiles suspects, assesses mental state, and evaluates competency for trial.

4.Rising Relevance of Forensic Science in India's Criminal Justice System:

India's criminal justice system faces the challenge of effectively solving crimes while upholding fairness and due process. Many serious offences remain unsolved, not because of lack of culpability, but due to outdated investigative methods, excessive reliance on oral testimony, and inadequate material evidence. This weakens public confidence and allows offenders to escape justice.

With urbanization, digitalization, and greater mobility, crimes have become more sophisticated, making traditional practices like confessions and coercive tactics increasingly inadequate. In this changing landscape, forensic science assumes central importance. It provides objective and credible forms of proof through DNA profiling, fingerprint examination, toxicology, and digital forensics, thereby strengthening investigations and prosecutions.

Acknowledging this need, the Bharatiya Nagarik Suraksha Sanhita, 2023, introduces specific provisions such as Section 176(3), mandating forensic investigation in cases punishable with seven years or more. The statute also requires crime scene videography, proper digital evidence management, and the establishment of mobile forensic units at the district level. This represents a decisive move towards evidence-based and rights-oriented policing.

Judicial pronouncements have further reinforced this trend. In Selvi v. State of Karnataka (2010), the Supreme Court rejected the use of involuntary techniques like narco-analysis, emphasizing voluntary and scientific methods. Earlier, in State of UP v. Ram Babu Misra (1980), the Court highlighted the significance of expert testimony in ensuring reliable adjudication.

Thus, the increasing reliance on forensic science is not merely a procedural reform but a constitutional imperative. It transforms scientific truth into legal proof, ensuring that justice is both effective and equitable in a modern democracy .

5.Modernising Investigation: Forensic Provisions in the Bharatiya Nagarik Suraksha Sanhita, 2023:

India's criminal justice system has long been marked by systemic challenges, including protracted trials, low conviction rates, and deficiencies in evidence collection. These weaknesses have eroded public trust in the justice delivery process and created a pressing demand for reform. The enactment of the Bharatiya Nagarik Suraksha Sanhita (BNSS), 2023, as a replacement for the colonial-era Code of Criminal Procedure, 1973, represents an important step in this direction.

One of the most transformative aspects of the BNSS is its pronounced emphasis on the integration of forensic science into criminal investigations. Forensic tools are no longer treated as optional or supplementary mechanisms; rather, they have been recognized as indispensable and are now embedded within the statutory framework of criminal procedure. The provisions of the BNSS reflect a conscious shift towards a more scientific, technology-driven, and transparent approach to investigation, signalling the transition from traditional practices to evidence-based policing.

This reform not only enhances investigative efficiency but also aligns India with global standards of criminal justice, where scientific methods form the backbone of prosecution. The following provisions highlight how the BNSS seeks to modernise investigation and strengthen the evidentiary process.

- **Section 176(3): Mandatory Forensic Examination and Videography for Heinous Offences**

Section 176(3) introduces a statutory requirement for forensic involvement in serious offences. It mandates that when information regarding the commission of a cognizable offence punishable with imprisonment of seven years or more is received, the investigating officer must ensure the presence of a forensic expert at the crime scene. This provision removes the element of discretion, thereby institutionalising forensic participation as a legal obligation rather than a matter of choice.

Additionally, the section requires that evidence collection at crime scenes be videographed through mobile phones or other electronic devices. This creates a reliable record of proceedings, strengthens the authenticity of the investigation, and minimizes disputes about the credibility of evidence presented in court. By institutionalising forensic science and video documentation, the provision reduces dependence on oral testimony and custodial confessions, ensuring that convictions rest on verifiable scientific evidence.

- **Section 193(2)(i): Chain of Custody for Digital Evidence**

Section 193(2)(i) addresses the challenges associated with the reliability of electronic evidence. It requires that the final police report include a detailed chain of custody for all digital or electronic devices seized during investigation. The provision covers items such as mobile phones, computers, hard drives, CCTV recordings, and GPS devices, and ensures that such evidence remains free from tampering or manipulation.

By statutorily recognising the principle of chain of custody, the BNSS provides courts with greater assurance of authenticity, thereby enhancing the admissibility and probative value of electronic materials. This is consistent with international standards that underline the importance of documenting each stage of evidence handling.

- **Section 105: Audio-Visual Recording of Search and Seizure**

Section 105 introduces a safeguard against arbitrariness in the process of search and seizure. It mandates that such operations be videographed and conducted in the presence of at least two independent witnesses. The list of seized items, supported by video documentation, is to be forwarded promptly to the nearest magistrate.

This measure strengthens transparency, protects the rights of the accused, and prevents allegations of illegal searches or misuse of authority. Simultaneously, it enhances the evidentiary value of seized materials by ensuring that the process is objectively recorded.

- **Section 329: Admissibility of Reports by Scientific Experts**

Section 329 streamlines the admissibility of expert reports by recognising the evidentiary value of documents prepared by government scientific experts, including forensic analysts, ballistic experts, chemical examiners, and handwriting specialists. These reports are admissible in court without requiring the physical presence of the expert unless specifically directed for cross-examination. The section also allows examination through video conferencing, thereby reducing delays.

This provision eliminates procedural hurdles, facilitates quicker trials, and ensures that scientific expertise directly contributes to the adjudicatory process.

- **Sections 51 and 53: Medical Examination of the Accused and Use of DNA Profiling**

Sections 51 and 53 provide for medical examinations of accused persons by registered medical practitioners when such examinations are likely to yield relevant evidence. These provisions explicitly authorise the collection of biological samples such as blood, semen, hair, swabs, and DNA profiles. In cases involving sexual offences, such procedures are critical for corroborating testimonies and establishing the link between the accused and the crime.

The statute also incorporates gender-sensitive safeguards, requiring that examinations of women be conducted by or under the supervision of female medical practitioners. This ensures that forensic processes remain both scientifically reliable and respectful of human dignity.

- **Section 497: Disposal and Preservation of Property and Evidence**

Section 497 empowers courts to determine the method of disposal or preservation of property and material seized during investigation. This is particularly important in cases involving perishable or sensitive items such as biological samples, narcotics, and digital storage devices. By granting courts supervisory authority, the provision ensures that critical forensic evidence is preserved appropriately and does not lose its probative value during prolonged trials.

6.Impact of Forensic Mandates under BNSS on Criminal Justice

The incorporation of mandatory forensic practices in the BNSS, 2023 represents more than a procedural enhancement; it has profound implications for the investigation, processing, and delivery of justice in India. The following key impacts of these forensic-focused reforms illustrate their transformative potential within the criminal justice system.

i. Scientific Accuracy and Objectivity in Investigations

The BNSS introduces scientific accuracy at the heart of criminal investigations. Tools such as DNA profiling, ballistics, toxicology, and digital evidence now provide timestamped, verifiable data, offering greater reliability than oral testimony, which may be biased or inconsistent. This approach reduces dependence on memory, hearsay, or the credibility of witnesses frequent sources of wrongful convictions and ensures that determinations of truth are grounded in neutral, factual analysis.

ii. Transparency and Institutional Accountability

Videographic documentation of crime scenes and evidence collection, as mandated under BNSS, brings investigative procedures under a digital and verifiable record. A legally recognized chain of custody ensures that evidence is tracked and protected from collection to courtroom, minimizing the risk of tampering or fabrication. These measures enhance transparency, deter malpractice, and provide courts with independent verification of investigative processes, thereby promoting ethical policing.

iii. Improved Conviction Rates and Speedier Justice

Forensic evidence, being scientific and verifiable, strengthens the ability to establish guilt or innocence, particularly in cases where eyewitness testimony is unreliable or unavailable. By reducing dependence on confessions obtained under duress and prioritizing factual proof, the BNSS empowers prosecutors and enables courts to reach determinations more efficiently. This contributes to faster trials, higher conviction rates, and greater public confidence in the justice system.

iv. Protection of Individual Rights and Human Dignity

The forensic-centric framework of the BNSS safeguards the rights of both accused individuals and victims. Provisions include gender-sensitive requirements, such as the presence of a female officer during examinations involving female victims or accused. By mandating that forensic and medical procedures be conducted legally and respectfully, the legislation reduces the risk of custodial torture, wrongful arrests, and coerced confessions, reinforcing constitutional guarantees of due process, fair trial, and human dignity.

v. Alignment with International Legal Standards

The BNSS aligns India's criminal justice system with global practices. Its forensic mandates reflect internationally recognized norms, including UN guidelines on prosecutorial conduct, Interpol protocols, and practices in countries such as the United States and the United Kingdom, where scientific investigation forms the foundation of evidence collection. By institutionalizing

these best practices, India demonstrates a commitment to a modern, technology-driven, and rights-oriented justice system.

7.Judicial Trends Supporting the Role of Forensic Science

The Indian judiciary has consistently recognized the importance of forensic science in enhancing the accuracy, credibility, and fairness of criminal investigations. The courts have emphasized that scientific methods are indispensable in bridging evidentiary gaps and ensuring that justice is based on objective proof rather than conjecture. This judicial attitude has laid the foundation for the legislative incorporation of forensic procedures under the Bharatiya Nagarik Suraksha Sanhita (BNSS), 2023.

One of the most significant pronouncements in this regard is Selvi v. State of Karnataka (2010). The Supreme Court held that techniques such as narco-analysis, polygraph, and brain-mapping cannot be conducted without the consent of the accused, as such involuntary methods violate the constitutional guarantee against self-incrimination under Article 20(3). At the same time, the Court acknowledged that scientifically reliable techniques, such as DNA profiling and ballistic examination, are admissible when conducted with due safeguards and procedural fairness. This judgment struck a careful balance between protecting individual rights and encouraging the legitimate use of scientific tools in criminal justice.

The transformative role of DNA evidence was most prominently recognized in Mukesh v. State (NCT of Delhi) (2017), popularly known as the Nirbhaya case. The conviction of the accused was secured largely on the strength of DNA profiling, biological trace analysis, and corroborative CCTV evidence, which together provided an unassailable link between the accused and the crime. Similarly, in State of Maharashtra v. Damu (2000), the Court upheld a conviction where DNA evidence placed the accused at the crime scene, underscoring the ability of forensic science to establish guilt even in the absence of direct eyewitness testimony.

The judiciary has also acknowledged the role of expert opinion in other branches of forensic science. In S. Gopal Reddy v. State of Andhra Pradesh (1996), the Supreme Court highlighted the relevance of expert evidence in cases involving ballistic reports, observing that scientific opinion often provides crucial insights for reconstructing the sequence of events at a crime scene.

Real-life cases further demonstrate the indispensable role of forensic science in advancing justice. In the Bhanwari Devi case (2011), where the body of the victim could not be recovered in entirety, DNA profiling of skeletal remains provided conclusive identification, thereby allowing the prosecution to move forward. This instance illustrates how forensic methods can prevent investigations from collapsing due to lack of conventional evidence.

Collectively, these judgments reflect the judiciary's progressive orientation toward integrating forensic science into the evidentiary framework. By repeatedly endorsing the credibility of scientific techniques, the courts have created an enabling environment that is now mirrored in statutory reform. The BNSS, 2023, institutionalizes this judicial approach by mandating forensic involvement in serious crimes, emphasizing the maintenance of the chain of custody, and strengthening the admissibility of scientific evidence. The convergence of judicial foresight and legislative reform thus signals a transformative shift toward a more reliable and technologically advanced criminal justice system in India.

8. Addressing Implementation Challenges: The Way Forward for Forensic Science Under BNSS, 2023:

While Section 176 of the Bharatiya Nagarik Suraksha Sanhita, 2023, has made forensic investigation mandatory in serious offences, its implementation continues to face multiple systemic hurdles. One of the foremost challenges is the shortage of adequately equipped forensic laboratories across the country. Both central and state-level labs are often overburdened and under-resourced, which results in significant delays and raises concerns

about the reliability and consistency of forensic analysis. This situation is further compounded by the shortage of trained experts in specialized fields such as toxicology, digital forensics, and forensic pathology, especially in rural and semi-urban regions where forensic infrastructure remains weak or altogether absent.

Another pressing concern is the lack of standardized procedures and accreditation of forensic laboratories. Many labs still function without certification from recognized bodies such as the National Accreditation Board for Testing and Calibration Laboratories (NABL), which undermines uniformity in quality and exposes forensic evidence to challenges regarding admissibility in courts. In addition, gaps in training among law enforcement personnel in crime scene management and evidence preservation often lead to mishandling or contamination, thereby weakening the probative value of critical forensic material.

To address these gaps, a comprehensive and multi-pronged approach is required. Establishing regional forensic laboratories with modern equipment can decentralize services, reduce dependence on central facilities, and ensure faster, localized investigations. At the same time, structured recruitment of qualified forensic professionals, coupled with regular training programs for police officers, investigators, and members of the judiciary, can significantly improve investigative competence. Institutional mechanisms, such as the creation of Forensic Oversight Boards at both the state and national levels, may also be established to enforce quality standards, monitor practices, and ensure accountability.

The adoption of emerging technologies offers further potential for strengthening the system. Artificial intelligence may be used to assist in complex data analysis, blockchain technology can secure and authenticate digital chains of custody, and automation in laboratory workflows can improve accuracy and reduce human error. Alongside these measures, raising awareness among institutions and the public about the reliability and importance of forensic science is essential. This would not only foster greater confidence in the justice system but also promote a shift towards evidence-based and science-led investigation and prosecution.

9.Conclusion: Towards a Science-Led Criminal Justice System

The integration of forensic science under the BNSS, 2023, particularly through Section 176 marks a significant shift toward transparent, objective, and science-based criminal investigations in India. To truly realize its potential, India must address existing gaps in infrastructure, expertise, and procedural consistency through strategic investment, standardization, and institutional reforms. With robust training, technological innovation, and accountability, forensic science can evolve from a supportive tool to a core pillar of justice. This transformation promises faster trials, stronger public trust, and a legal system where evidence guides the path to justice.

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