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Review Article

All India Tiger Estimation 2026 (AITE-2026): An Overview of India's Largest Wildlife Monitoring Programme

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ABSTRACT

The tiger (*Panthera tigris*) is an iconic apex predator and an important ecological indicator of forest ecosystem integrity. Its conservation has consequently become closely associated with the protection of biodiversity, ecological processes, ecosystem services and wildlife habitats. Recognizing this significance, the Government of India launched Project Tiger in April 1973 as a centrally supported conservation programme aimed at maintaining viable tiger populations and protecting biologically important ecosystems. Over the subsequent five decades, India has developed one of the world's most extensive and systematic programmes for monitoring wild tigers and their habitats. The All-India Tiger Estimation (AITE), conducted at four-year intervals, represents the principal national framework for assessing tiger abundance, distribution, prey populations and habitat conditions. The sixth cycle, AITE-2026, commenced with nationwide preparations during 2025 and field implementation during 2025–2026. The programme incorporates standardized field surveys, carnivore sign surveys, line-transect sampling, camera trapping, genetic approaches, geographic information systems (GIS), remote sensing and statistical modelling. AITE-2026 also represents an important technological advancement through the proposed integration of artificial intelligence-based tiger identification and increasingly digitalized field-data collection. Rather than focusing exclusively on the number of tigers, contemporary tiger estimation emphasizes the status of prey, co-predators, habitat quality, landscape connectivity and anthropogenic pressures. This review presents an overview of the historical development, objectives, geographical scale, methodological framework, technological innovations, conservation significance, challenges and anticipated outcomes of AITE-2026. The programme is expected to provide an updated scientific assessment of India's tiger populations and generate information essential for landscape-level conservation planning and long-term ecological security.

1. Introduction

1.1 Ecological importance of the tiger

The Bengal tiger (*Panthera tigris tigris*) is one of the most charismatic and ecologically significant large carnivores of the Indian subcontinent. As an apex predator, the tiger occupies a high trophic position and influences prey populations and broader ecological processes. The presence of a viable tiger population is therefore generally associated with the availability of adequate habitat, prey resources and ecological connectivity. Conservation of tigers consequently has implications extending beyond the species itself because protection of tiger habitats can simultaneously conserve numerous other species and ecological processes. The concept of the tiger as an umbrella species has been central to India's tiger conservation philosophy, whereby maintaining viable tiger populations contributes to the protection of associated biodiversity and ecosystem functions (Figure-1).

During the twentieth century, tiger populations declined substantially because of habitat loss and fragmentation, hunting, prey depletion and increasing human pressures. These threats highlighted the necessity for coordinated national-level conservation measures. India responded by launching Project Tiger in April 1973 with the objective of maintaining viable tiger populations and preserving areas of biological importance. The programme initially covered nine tiger reserves and has

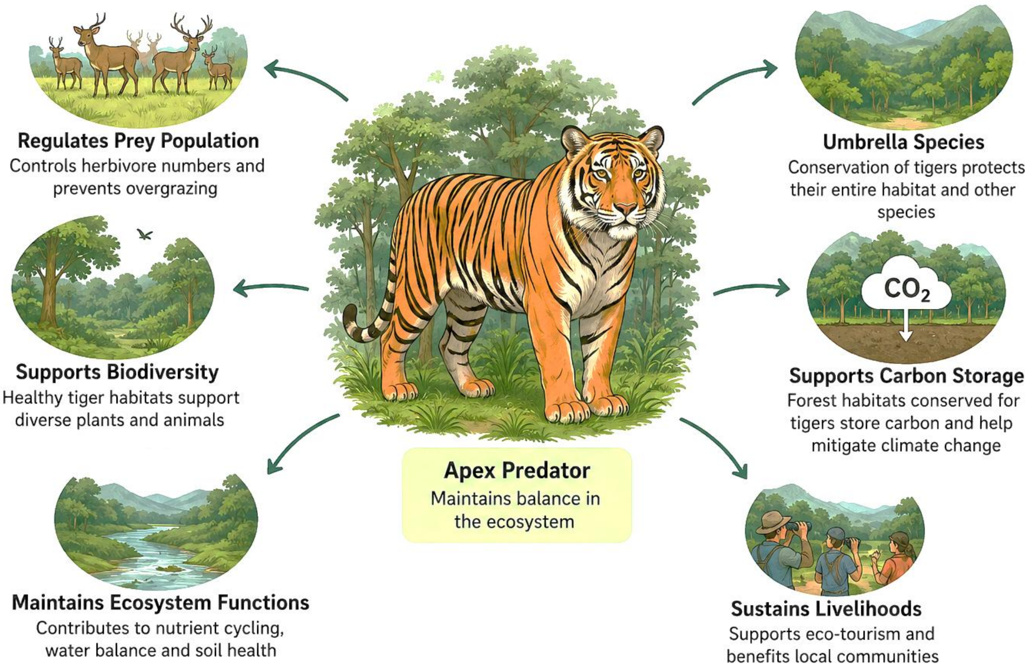

Figure 1. An illustration of the ecological importance of the tiger (*Panthera tigris*) as an apex predator and its role in maintaining ecosystem balance, biodiversity, habitat integrity, and associated ecosystem functions.

subsequently expanded considerably in geographical extent and institutional scope.

1.2 Evolution of systematic tiger monitoring in India

The development of tiger monitoring in India has progressed from relatively simple field-based approaches to sophisticated, integrated ecological assessment. Earlier estimation methods relied heavily on indirect signs such as pugmarks, whereas contemporary assessments combine multiple independent sources of information. The modern approach recognizes that reliable population estimation requires standardized sampling, individual identification, spatially explicit statistical models and assessment of habitat and prey conditions.

The All India Tiger Estimation programme has consequently become an important component of India's tiger conservation strategy. The National Tiger Conservation Authority (NTCA), in collaboration with the Wildlife Institute of India (WII) and state forest departments, coordinates the national estimation programme. The previous nationwide cycles were undertaken in 2006, 2010, 2014, 2018 and 2022, establishing a four-year monitoring framework. The official WII and NTCA records list the 2022 assessment as the most recent completed national estimation, while AITE-2026 represents the sixth cycle.

1.3 AITE-2026 in the context of contemporary conservation

AITE-2026 is not simply a conventional census intended to produce a single national tiger number. The modern estimation framework is designed to evaluate tiger populations together with their prey, co-predators, habitat characteristics and anthropogenic pressures. This ecosystem-oriented approach is important because changes in tiger abundance cannot be interpreted independently of habitat quality, prey availability, connectivity among populations and human disturbance.

The sixth cycle of AITE-2026 was formally initiated through coordination between NTCA and WII, with preparatory activities beginning in 2025 and field implementation extending into 2025–2026. WII has also recruited personnel specifically for the AITE-2026 project and initiated development of an AI-based Tiger Identification System, demonstrating the increasing integration of computational technologies into national wildlife monitoring.

2. Objectives of AITE-2026

2.1 Estimation of tiger population and distribution

The primary objective of AITE-2026 is to generate a scientifically robust estimate of India's wild tiger population and determine the geographical distribution of tiger populations across different landscapes. Population estimation provides an essential baseline for evaluating long-term conservation trends and identifying populations that are increasing, stable or declining.

An equally important objective is to document tiger occurrence beyond the boundaries of formally designated tiger reserves. Tigers frequently move through adjoining forests, corridors and multi-use landscapes. Therefore, landscape-level monitoring is essential for understanding dispersal, population connectivity and the potential for recolonization of suitable habitats.

2.2 Assessment of prey and habitat conditions

Tiger abundance is closely associated with prey availability and habitat suitability. AITE-2026 therefore incorporates systematic assessment of herbivore populations and ecological conditions. Information on species such as chital, sambar, wild pig and gaur provides an important indication of prey availability and habitat carrying capacity. Habitat assessment further helps determine whether observed changes in tiger abundance are associated with changes in forest condition, water availability, fragmentation or human disturbance.

2.3 Assessment of conservation threats

Another major objective is to identify ecological and anthropogenic pressures that could affect tiger populations. Habitat fragmentation, linear infrastructure, encroachment, altered land use, prey depletion, human–wildlife conflict and illegal wildlife activities can influence tiger survival and movement. Integrating such information with population estimates can help conservation agencies develop more targeted management interventions.

3. Geographical Scale and Coverage

3.1 Landscape-level monitoring

The scale of AITE-2026 makes it one of the most extensive wildlife monitoring programmes undertaken anywhere in the world. The survey extends beyond individual protected areas and considers larger tiger-bearing landscapes, including tiger reserves, adjoining forest divisions, corridors and other suitable habitats. This landscape-level perspective is particularly important because tiger populations are not restricted to administrative boundaries.

The expansion of tiger conservation from isolated protected areas towards connected landscapes reflects an important change in conservation thinking. Maintaining connectivity between tiger populations is essential for dispersal, gene flow and demographic stability. Consequently, information generated through AITE-2026 can contribute to the identification and prioritization of wildlife corridors and other areas that facilitate tiger movement.

3.2 Participation and institutional coordination

A programme of this magnitude requires extensive coordination among central and state agencies, forest departments, wildlife researchers, field personnel and technical experts. Frontline forest staff play a particularly important role because they are responsible for field-level observations, transect surveys, camera deployment and maintenance, sample collection and digital data recording.

The involvement of WII, NTCA and state forest departments provides an institutional framework for standardizing field protocols and integrating data generated across different landscapes. The recruitment of dedicated technical personnel for AITE-2026 further reflects the increasingly data-intensive nature of the programme.

4. Methodological Framework of AITE-2026

4.1 Carnivore sign surveys

Carnivore sign surveys constitute an important component of field-based monitoring. Field personnel systematically search forest trails and sampling units for indirect evidence of carnivore presence, including pugmarks, scats, scrapes and other signs. Such observations help establish spatial patterns of tiger occurrence and guide subsequent intensive sampling.

Although indirect signs alone cannot provide the same degree of individual-level information as camera trapping, they remain valuable for determining occupancy and identifying areas of tiger activity. Collection of fresh scat samples also provides material for genetic analysis and can contribute to individual identification and population assessment.

4.2 Line-transect sampling

Line-transect surveys are used primarily to estimate the abundance and distribution of major herbivore species that constitute the prey base of tigers. During standardized transect walks, observers record direct sightings and relevant ecological information concerning prey species. Species such as chital, sambar, wild pig and gaur are particularly important components of tiger prey communities.

Prey abundance is a major determinant of tiger habitat suitability. Consequently, combining prey-density information with tiger occurrence data provides a more comprehensive assessment of ecological conditions than estimating tiger numbers alone. Such an integrated approach is consistent with the broader objective of evaluating the ecological status of tiger landscapes.

4.3 Camera-trap surveys

Camera trapping represents one of the most important methodological advances in modern tiger estimation. Camera traps are strategically deployed in sampling grids and locations where tiger movement is likely. Photographs obtained from both sides of an animal can be used to identify individuals based on their unique stripe patterns.

The resulting photographic database enables researchers to estimate tiger abundance using capture–recapture and spatially explicit capture–recapture approaches. These methods are substantially more robust than traditional methods based solely on indirect signs because individual animals can be repeatedly detected and their spatial distribution incorporated into statistical models.

Camera trapping also generates information on several sympatric mammalian species. Consequently, the same photographic dataset can contribute to understanding prey communities, co-predators, occupancy patterns and broader biodiversity.

4.4 Genetic sampling

Genetic analysis provides an additional source of information that can complement photographic and field observations. DNA obtained from non-invasive samples such as scat and hair can assist in species confirmation and, under appropriate sampling and laboratory protocols, individual identification. Genetic information may also provide insights into population structure and connectivity.

The integration of genetics with camera trapping is particularly valuable in situations where individual identification from photographs is difficult, including densely vegetated habitats, low-density populations and landscapes in which tiger detection is sporadic.

4.5 Remote sensing and GIS

Remote sensing and geographic information systems provide a spatial framework for analysing tiger habitats at multiple scales. Satellite-derived information can be used to characterize forest cover, habitat fragmentation, land-use change and landscape

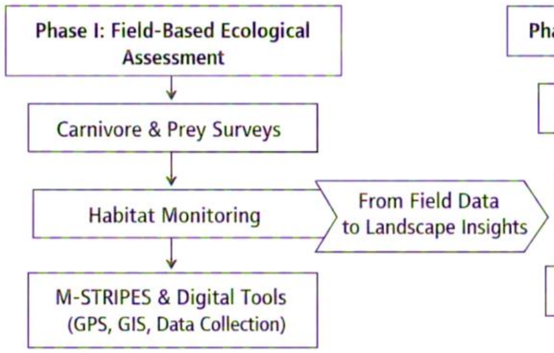

Figure-2. Flow Chart of Phases of AITE-2026: Field-Based Ecological Assessment and Spatial Analysis

connectivity. GIS-based analyses can subsequently integrate these variables with tiger occurrence, prey abundance and human disturbance.

Such spatial analyses are increasingly important because tiger conservation depends not only on maintaining protected areas but also on preserving functional connections among populations. The identification of fragmented habitats and movement bottlenecks can therefore support landscape-level conservation planning.

5. Phases of AITE-2026

5.1 Phase I: Field-based ecological assessment

The initial field component involves systematic collection of information on carnivores, prey species and habitat conditions. M-STrIPES and associated digital tools facilitate standardized recording of observations and spatial information. The programme integrates carnivore sign surveys with line-transect-based assessment of herbivores and other ecological parameters.

The use of M-STrIPES is particularly significant because the system combines GPS, field observations, remote sensing, GIS and statistical analysis. The Wildlife Institute of India describes M-STrIPES as a comprehensive monitoring platform supporting both ecological assessment and wildlife protection (Figure-2).

5.2 Phase II: Spatial and habitat analysis

The subsequent analytical component involves processing ecological and spatial datasets to characterize habitat conditions, prey availability, tiger occurrence and landscape connectivity. Remote-sensing information and GIS-based analysis can be used to identify important habitats and corridors and to examine relationships between tiger occurrence and environmental variables.

This phase is particularly important for translating field observations into landscape-level conservation information. Rather than treating each tiger reserve as an isolated unit, spatial analysis can reveal functional relationships between protected areas and surrounding forests.

5.3 Phase III: Camera trapping and population estimation

Camera trapping forms the core of individual-based tiger estimation. Cameras are deployed according to standardized sampling designs, and photographic records are subsequently processed to identify individual animals. The resulting detection histories are analysed using appropriate statistical models to derive population estimates and associated measures of uncertainty.

The exact implementation schedule may vary among landscapes because field conditions, terrain, forest type and operational requirements differ considerably. Recent implementation reports from different tiger reserves illustrate the use of systematic grid-based camera trapping during the 2025–2026 estimation cycle.

6. Technological Innovations in AITE-2026

6.1 Artificial intelligence and automated tiger identification

One of the most notable technological developments associated with AITE-2026 is the planned incorporation of artificial intelligence into tiger identification. WII issued a formal tender in May 2026 for the development and deployment of an AI-based Tiger Identification System for the AITE programme. Such systems have the potential to assist researchers in processing very large volumes of camera-trap photographs by recognizing individual tigers from their characteristic stripe patterns (Lunavath et al., 2015).

The application of artificial intelligence could substantially reduce the time required for manual image screening and improve the consistency of photographic identification. However, automated systems should complement rather than replace expert validation, particularly when photographs are incomplete, blurred, poorly illuminated or contain partial views of animals.

6.2 Digital data collection and M-STrIPES

Digital data collection has become an integral component of contemporary tiger monitoring. M-STrIPES allows field observations and spatial tracks to be recorded using GPS-enabled mobile devices and subsequently integrated into GIS and statistical databases. The platform supports ecological monitoring as well as patrol and protection-related activities (Praveen Kumar et al., 2020).

The use of digital platforms reduces dependence on fragmented paper-based records and facilitates more rapid integration of observations from different field units. It also creates opportunities for quality control, spatial analysis and centralized data management.

6.3 Remote sensing and geospatial modelling

Satellite-based remote sensing and geospatial modelling provide an increasingly important framework for analysing habitat conditions over large geographical areas. These technologies enable researchers to examine changes in forest cover, fragmentation and landscape connectivity and to relate such changes to patterns of tiger occurrence.

The integration of remote sensing with field observations and camera-trap data can therefore generate a more comprehensive understanding of the environmental factors governing tiger distribution.

7. Conservation Significance of AITE-2026

7.1 Population-level conservation

Reliable population estimates are essential for evaluating the effectiveness of tiger conservation programmes. Comparisons among successive AITE cycles can reveal long-term trends in population size and distribution. Such information helps conservation managers identify successful landscapes as well as areas requiring additional intervention.

However, population size should not be interpreted in isolation. A stable or increasing tiger population may coexist with habitat fragmentation, increasing conflict or declining prey populations. AITE-2026 is therefore important because it seeks to place tiger abundance within a broader ecological and landscape context.

7.2 Landscape connectivity

Connectivity among tiger populations is essential for maintaining genetic exchange and demographic resilience. Habitat fragmentation can isolate populations and increase their vulnerability to stochastic events and local extinction. Monitoring movement corridors and intervening forest patches is therefore a critical component of long-term tiger conservation.

Data from AITE-2026 can contribute to identifying important movement routes and ecological linkages between protected areas. Such information may be particularly valuable for conservation planning in landscapes affected by roads, railways, mining, agriculture and other forms of infrastructure development.

7.3 Ecosystem-level conservation

The conservation significance of tigers extends beyond the species itself. Because tigers require relatively large territories and healthy prey communities, maintaining viable tiger populations generally requires conservation of substantial and ecologically functional landscapes. Consequently, tiger conservation can produce benefits for numerous other species and ecosystem services.

The umbrella-species concept underlying Project Tiger therefore provides a broader rationale for maintaining forests, prey populations, water resources and habitat connectivity.

8. Challenges in Tiger Monitoring and Conservation

8.1 Habitat fragmentation and land-use change

Habitat fragmentation remains one of the major long-term challenges to tiger conservation. Expansion of settlements, agriculture, transportation infrastructure, mining and other development activities can reduce habitat quality and disrupt movement between populations. Even when protected areas remain intact, fragmentation of the surrounding landscape can compromise their ecological functionality.

AITE-2026 can help identify areas where fragmentation is associated with changes in tiger distribution. Nevertheless, monitoring alone cannot prevent habitat loss; the resulting evidence must be incorporated into land-use planning and conservation policy.

8.2 Human–tiger interactions

As tiger populations recover and expand into landscapes shared with humans, encounters between people and tigers may increase. Human–wildlife conflict can result in livestock depredation, economic losses, injury and, in severe cases, human or tiger mortality. Effective conservation therefore requires not only ecological monitoring but also conflict prevention, rapid response systems, community participation and appropriate compensation mechanisms.

8.3 Illegal wildlife activities

Poaching and illegal wildlife trade continue to represent potential threats to tiger populations. Effective protection requires strong field surveillance, intelligence-based enforcement, technological monitoring and coordination among wildlife agencies. Digital monitoring platforms such as M-STrIPES can contribute to documenting patrol effort and wildlife-related threats, although technological tools must be supported by adequate personnel and institutional capacity.

8.4 Methodological and analytical limitations

Large-scale wildlife estimation also presents methodological challenges. Detection probability varies among habitats, seasons and individual animals. Camera-trap performance can be affected by equipment failure, environmental conditions, animal movement and sampling design. Genetic sampling likewise depends on sample quality and laboratory reliability. Statistical models must therefore account appropriately for imperfect detection and sampling uncertainty.

The credibility of AITE-2026 will ultimately depend not only on the volume of data collected but also on the standardization of field protocols, quality assurance, transparent analytical procedures and appropriate estimation of uncertainty.

9. Expected Outcomes of AITE-2026

9.1 National tiger population estimate

The principal expected outcome of AITE-2026 is an updated national estimate of India's wild tiger population, accompanied by information on spatial distribution and population structure. The final national assessment is expected to be released after completion of data processing, validation and statistical analysis. As of August 2026, the national results of the sixth cycle have not yet been officially released.

9.2 State- and landscape-level information

In addition to the national estimate, AITE-2026 is expected to generate information at state, landscape and tiger-reserve levels. Such information can reveal areas of population increase or decline and identify landscapes that require targeted management interventions (Porika et al., 2014).

9.3 Information on prey, habitat and ecological condition

The integrated nature of the estimation programme is expected to generate a substantial dataset on prey abundance, carnivore occurrence, habitat characteristics and anthropogenic pressures. These data can provide a broader ecological assessment of tiger landscapes and assist in prioritizing habitat restoration, prey management and corridor protection.

9.4 Conservation priorities and future planning

The results can also support future conservation priorities, including protection of wildlife corridors, restoration of degraded habitats, management of human–wildlife conflict and strengthening of protection measures. In this respect, AITE-2026 should be regarded not merely as a population census but as a national ecological monitoring framework capable of informing adaptive conservation management.

10. Future Perspectives

The future of tiger monitoring in India is likely to involve increasing integration of field ecology, molecular biology, remote sensing, artificial intelligence and advanced statistical modelling. Large-scale camera-trap datasets will require automated image processing and reliable data-management systems. Similarly, genetic information may become increasingly valuable for understanding population connectivity, dispersal and genetic health.

Future assessments should also place greater emphasis on long-term ecological indicators. Monitoring tiger numbers at four-year intervals provides valuable population-level information, but complementary annual or seasonal monitoring of prey, habitat connectivity, human disturbance and conflict can provide early warnings of emerging conservation problems. Integration of these datasets into a common analytical framework would strengthen evidence-based and adaptive wildlife management.

11. Conclusion

The All India Tiger Estimation 2026 represents an important milestone in India's continuing effort to conserve the Bengal tiger and the ecosystems on which it depends. The sixth cycle builds upon more than two decades of increasingly sophisticated national tiger monitoring and reflects a transition from conventional population counting towards integrated ecological assessment. The combination of carnivore sign surveys, line-transect sampling, camera trapping, genetic analysis, remote sensing, GIS, digital field-data collection and emerging artificial intelligence technologies provides a powerful framework for understanding tiger populations at both local and landscape scales. The significance of AITE-2026 extends beyond determining the number of tigers present in India. The programme provides an opportunity to assess prey availability, habitat quality, connectivity, anthropogenic pressures and the broader ecological condition of tiger landscapes. Its findings can therefore contribute substantially to conservation planning, corridor protection, habitat management and conflict mitigation. The ultimate success of AITE-2026, however, will depend on how effectively the information generated through the programme is translated into conservation action. Continued collaboration among NTCA, WII, state forest departments, researchers, local communities and other stakeholders will be essential. Long-term commitment to scientific monitoring, habitat protection, landscape connectivity and community-based conservation will remain fundamental to ensuring that India's tiger populations remain viable and ecologically functional for future generations.

Competing interests:

The authors declare that they have no competing interests

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