



Wildlife Crimes And Digital Technology

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ABSTRACT: Uncontrolled expansion of human interference in the forest area for urbanization, illegal mining, smuggling, and poaching activities continuously threatens the ecological balance and bio-diversity which may affect human existence in the future. Wildlife crime encompasses a range of illegal activities that harm animals and their natural habitats, often driven by profit and demand. These crimes include poaching, illegal wildlife trade, habitat destruction, and the use of illegal wildlife products in the market. Digital technology is crucial in combating these crimes by enhancing monitoring, enforcement, and awareness. There exists an urgent need for driving attention toward controlling wildlife crimes to maintain ecological balance with the help of advanced technologies. The present article focuses on the detailed outlook of various types of wildlife crimes and how digital technology can help control them.

Keywords: Digitization, Digital Technology, Digital application, Digital Solution, Wildlife Tourism, Wildlife Crime.

INTRODUCTION:

Wildlife consists of plants (flora) and animals (fauna) existing in the natural environment. Forest areas, plants, and wildlife are noteworthy parts of the bio-diversity family. To maintain the ecological and climatic balance on our planet, the importance of their existence has already been proven. However, some people for the sake of money indulge in such an activity which results in a significant threat to wildlife and natural habitats. Illegal and unauthorized entry to the forest land for activities such as encroachment, illegal logging of plants, mining, hunting, fishing, smuggling, poaching, etc. makes them tagged as wildlife criminals. Furthermore, the manufacturing of different products using wild species, storing, importing, exporting, trading, and selling to customers is also covered under the law. These activities are often driven by market demand.

Elephant ivory, rhino horns, tiger products, dolphins, and pangolin scales are in high demand particularly in Asia and Africa (Rana & Kumar, 2023) providing a threat to the extremely vulnerable species in the world. The trade related to wildlife products is expanding rapidly due to its higher demand for ornament decoration manufacturing (elephant ivory, tiger skin claw, teeth, rhino horns for passion and fashion) (Mishra & Mitra, 2019; Mozer & Prost, 2023; Nittu et al., 2022), traditional medicine (bones, blood, fats, genitalia of tiger, blood and oil of monitor lizard, nocturnal lizard, medicinal plants, and aromatic plants), black magic rituals (sorcery) (Hughes, 2021; Mishra & Mitra, 2019; Nittu et al., 2022; Rana & Kumar, 2023), commodity goods, pets, food (Chan et al., 2021), creational and luxury purposes (trophies and taxidermy products) (Tow et al., 2021). Wildlife products are often used as food in festivals and ceremonies (barking deer, wild pig, and fish) and utilized as religious sacrificial offerings (e.g., sea turtles in Indonesia) (Chawla et al., 2020). Thus, wildlife products consist of functional, social, symbolic, experiential, and spiritual value (Narreddy & Shashidhar, 2024).

Sometimes, wildlife crimes related to lesser-known species (Golden Jackal) go unnoticed by the enforcement and conservation authorities (Chawla et al., 2020). Associated corruption among government officers of forest and police, linkage with political parties, and weakness of the judicial system impede the functioning of faster decisions against crimes (Mozer & Prost, 2023). Some wildlife traders are provided licenses to trade in wildlife products where animals, birds, and plants are sold legally as food, pets, ornaments, medicines, etc. (Mozer & Prost, 2023). Corrupt authorities and employees working to safeguard poachers in lieu of money or self-safety results in low conviction rates (Chandran, 2023). For these reasons, it is often difficult to take strict legal punishment or imprisonment against all illegal wildlife trades.

INVESTIGATING QUESTIONS:

The main investigating questions of the research are as follows –

- What is wildlife crime and how is it different from wildlife trade?
- What are the different types of wildlife crimes?
- What are the different consequences of wildlife crimes?
- What are the possible strategies to control wildlife crimes?
- How does digital technology help in mitigating wildlife crimes?

RESEARCH GAP:

- It has been observed from the existing literature that there is a limited approach to describing how digital technology can help mitigate wildlife crime issues.

METHODOLOGY:

The data collection was based on the secondary sources of information. The descriptive research methodology was used to fulfill the purpose of the present study.

WILDLIFE TRADES VERSUS WILDLIFE CRIMES:

Wildlife Trades are related to the trading activities of wildlife products. It is a major business worth billions of dollars generally operated by international networks. Not all wildlife trades are illegal. However, when wildlife products and parts are traded and trafficked like prohibited drugs and arms it becomes a wildlife crime. It is driven by higher international market demand and a high profit margin is provided to the suppliers of rare species parts. Small articles of wild fauna and flora such as dried snakes, fishes, sea shells, dried herbal plant products, and other such small articles are also traded through FPO (Foreign Post Office), as a letter parcel with fake identities of the sender to avoid any kind of legal actions on suspicion (WCCB, 2024). Due to its undercover nature, obtaining accurate networks of offenders and figures on the value of the illegal wildlife trade is nearly impossible. However, it is estimated to be considered a global networked business worth billions of dollars in the global market (WWF, 2024). Thus, wildlife crime refers to illegal activities that involve the exploitation, trade, or harm of wildlife and their habitats in contravention of laws either national or international (Kurland et al., 2017; Mishra & Mitra, 2019; Moreto et al., 2018). These crimes often undermine conservation efforts and can have serious ecological and socio-economic impacts. Examples of wildlife crime include poaching, illegal wildlife trade, habitat destruction, illegal fishing, and wildlife trafficking for pet trade.

TYPES OF WILDLIFE CRIMES:**1. Poaching:**

The illegal hunting or capturing of wildlife, often for their body parts (e.g., ivory, rhino horn) or for bush meat (Moreto et al., 2018; Narreddy & Shashidhar, 2024). For instance, the poaching of rhinoceroses for their horns, which are falsely believed to have medicinal properties, is a significant issue. The illegal killing of animals is often driven by the black market demand for animal parts or traditional medicine. Using steel jaw traps and snares for poaching and smuggling per order in higher quantity has been observed in earlier research (Cress & Zommers, 2014; Mozer & Prost, 2023; Narreddy & Shashidhar, 2024). This undermines conservation efforts and threatens species with extinction. The use of bombs, shootings, and electric shocks was also reported frequently (Kumar, 2016), and wildlife poisoning using easily available toxic compounds was also noticed in major poaching activities (Radhakrishnan, 2018) which are considered significant threats to endangered wildlife species. However, to target valuable endangered species, commercial hunters use much more advanced techniques such as firearms and GPS systems (Duffy et al., 2016).

Impact: Threatens endangered species, disrupts ecosystems, and often supports organized crime.

2. Illegal Wildlife Trade:

The trade of wildlife and their parts violates national and international laws. IWT is the illicit trade of animals and animal products that largely appears to be performed by locals, but is connected to an international network of poachers (Mishra & Mitra, 2019; Moreto et al., 2018). The trafficking of endangered species like tigers and elephants for their bones, skin, and tusks. Encompasses the smuggling and selling of

wildlife and their products, often resulting in severe population declines and disruptions in ecosystems (Chandran, 2023). Traders have sometimes been given legal permits under some specific conditions to trade in wildlife products (Mozer & Prost, 2023). However, illegal WLT may become commercially legal under certain conditions, thus making it very difficult to track the legal supply chain with illegal trade practices (Duffy et al., 2016). Traders smartly use permits and misdeclaration to hide illegal wildlife sources in the legal system known as “wildlife laundering” (Mozer & Prost, 2023).

Impact: Reduces animal populations, disrupts ecosystems, and fuels black markets.

3. Habitat Destruction:

The illegal clearing or degradation of forest land for agriculture or urban development, and mining activities leads to the loss of crucial wildlife habitats (Chandran, 2023; Narreddy & Shashidhar, 2024). An example is the deforestation of the Amazon Rainforest to make way for cattle ranching, which impacts numerous species. It involves the removal or alteration of natural habitats, often leading to loss of biodiversity and disruption of ecological balance. Moreover, the decrease in the natural area with rising human interference near forest areas also increases the possibility of a greater number of human-wildlife conflicts (Chandran, 2023; Mishra & Mitra, 2019; Nittu et al., 2022).

Impact: Leads to loss of biodiversity, displacement of species, and ecological imbalances.

4. Illegal Fishing:

Fishing activities that violate regulations, such as overfishing, using banned methods, or catching protected species are another major component of global wildlife crime. It has been estimated that the over-exploited current trend of consumption of seafood will lead to a situation of no seafood by 2048 (Hughes, 2021). According to (Kurland et al., 2017) illegal wildlife trading activities are seasonal and are more associated with holidays, long weekends, or festival seasons. Furthermore, it has been observed that there are some “hot routes” for such illegal trading. The majority of the illegal fishing seizures are limited to a very small number of source countries indicates that particular country’s ports are used to redirect illegal trade to other countries. Illegal, unreported, and unregulated fishing activities are highly observed to be associated with more corrupt countries having ineffective fishery inspection (Kurland et al., 2017).

Impact: Depletes fish stocks, harms marine ecosystems, and affects food security.

5. Wildlife Trafficking for Pet Trade:

The capture and sale of wild animals as pets, often involve species that are not suitable for captivity. The earlier studies show that almost one-fourth of the total species in trade accounted for bird species in the exotic pet trade. Parrots are the most traded species (almost 90% of bird species in trade) in these categories for live companion purposes (Chan et al., 2021). Once abundant in nature, various exotic bird species, parrots, turtles, reptiles, lizards, frog species, etc. are facing extinction due to illegal pet trading. According to CITES (Hughes, 2021), the pet trade comes under regulated trade practices for a specific list of pets, but illegal trafficking occurs in the concealment of legal trades.

Impact: Endangers species, disrupts animal welfare, and often involves cruel conditions.

DIFFERENT CONSEQUENCES OF WILDLIFE CRIMES:

1. Loss of Bio-diversity and Disruption of Ecosystems

Wildlife crimes such as poaching and illegal trade can lead to significant declines in animal populations and even extinction. The loss of bio-diversity affects ecosystem stability and resilience (Chandran, 2023; Mishra & Mitra, 2019; Narreddy & Shashidhar, 2024; Nittu et al., 2022; UNODC, 2024). The extinction or decline of species due to wildlife crime diminishes bio-diversity, which is critical for maintaining healthy ecosystems (soil, water, air quality). The removal of key species due to wildlife crimes can disrupt food chains and ecological interactions, leading to imbalances and degradation of ecosystems affecting other wildlife and habitat structures.

2. Economic Losses

Illegal wildlife trade and poaching can result in substantial direct and indirect economic losses for countries (Mozer & Prost, 2023; UNODC, 2024), particularly those majorly reliant on tourism and sustainable natural resource management. Most of the countries of the world rely majorly on tourism to significantly increase GDP. Poaching activities directly impact the tourism economy, and the restoration efforts for the wildlife and natural resources made by the respective country also deepen the losses. IWT incidents also harm the stability and vision of the government hence a lesser interest of international investors also limits the possible economic growth. The illegal wildlife trade impacts economies by reducing revenue from tourism and conservation activities.

3. Threats to Human Health

Human health and safety should be kept at utmost importance during the crime scene investigation process. Wildlife crimes (animals either alive or dead) may create a dangerous risk of physical attacks or transmitting zoonotic diseases (diseases transmitted from animals to humans) or through envenomation (Chan et al., 2021; Chandran, 2023; Cooper et al., 2009; Scanlon Ao, 2021; UNODC, 2024). Illegal wildlife trade practices may increase the risk of disease outbreaks from animals to humans (e.g. H5N1 avian influenza, SARS, Ebola, COVID-19, etc.) that may threaten human health and may lead to public health crises.

4. Undermining Conservation Efforts

Illegal activities often hinder conservation programs and undermine the efforts of organizations working to protect endangered species and habitats. Illegal activities can derail conservation initiatives and waste resources impacting conservation efforts.

5. Impact on Local Communities

Although illegal environmental and wildlife crimes occur due to illiteracy, entrenched poverty (Chandran, 2023; Duffy et al., 2016), situational factors (such as remoteness, lack of police, small population area, etc.) (Aransiola & Ceccato, 2020) and limited economic opportunities (Narreddy & Shashidhar, 2024). However, wildlife crimes can negatively affect local communities in the long run by depleting natural resources that are crucial for their livelihoods, such as fish or bush meat. It also vanishes the opportunities that arise due to the sale of eco-tourism products, hospitality, and other local area development due to eco-tourism activities. Local populations may suffer from decreased availability of natural resources and ecosystem services thus impacting them.

6. Legal and Enforcement Challenges

Wildlife crimes pose significant challenges for law enforcement agencies, including difficulties in monitoring and regulating illegal activities, and the need for international cooperation and collaboration (Chandran, 2023). Wildlife crime often involves complex illegal networks that are difficult to regulate and combat which become major legal and enforcement challenges.

EFFECTIVE STRATEGIES TO CONTROL WILDLIFE CRIMES:

The different consequences of wildlife crime highlight its broad impact and underscore the need for effective strategies to combat these illegal activities and protect global biodiversity. Controlling wildlife crime requires a multi-faceted approach that includes law enforcement, community engagement, international cooperation, and policy reforms.

1. Strengthening Law Enforcement

Effective enforcement of wildlife protection laws is crucial. This includes increasing the capacity of wildlife law enforcement agencies, enhancing monitoring and patrolling efforts, and implementing stricter penalties for offenders (Mishra & Mitra, 2019). Strengthening law enforcement enhances the ability of agencies to prevent and respond to wildlife crimes.

2. International Cooperation and Agreements

Wildlife crime often involves transnational networks which makes it a global challenge and responsibility to mitigate it. It has also been found in previous research about a link between global illegal wildlife crimes and other crimes such as corruption, illegal armed, and drug trading (Mishra & Mitra, 2019). International cooperation through treaties, agreements, monitoring bodies, and organizations such as CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora), Convention on Biological Diversity (CBD), Convention on the Conservation of Migratory Species of Wild Animals (CMS), International union for conservation of nature (IUCN), TRAFFIC, LEMIS (Law enforcement management information system), UNODC (United nations office on drugs and crime) are essential for combating illegal wildlife trade (Chandran, 2023; Hughes, 2021; Moreto et al., 2018; UNODC, 2024). To safeguard wildlife, especially endangered species, international cooperation and Agreements facilitate coordinated global efforts

by various government departments and non-government organizations to address cross-border wildlife crime.

3. Community Engagement and Education

Engaging local communities in conservation efforts can help reduce wildlife crime (Roe & Booker, 2019). Educational programs and community involvement can increase awareness about the importance of wildlife conservation and the consequences of illegal activities. (Chandran, 2023; Linacre, 2021; Narreddy & Shashidhar, 2024; Roe & Booker, 2019) highlights the role of local community awareness and engagement in reporting and mitigating wildlife crimes, and the respective importance of determined global efforts to protect the planet from bio-diversity destruction. Local community engagement and education (including males, females, and children) build local support for conservation and reduce participation in illegal activities.

4. Use of Technology

Advanced technologies such as satellite monitoring, CCTV surveillance cameras, digital sensor alarm system, acoustic traps, spatial monitoring and reporting tool, virtual watch rooms, electronic tagging, drones, digital radio telemetry, GPS collars, cyber tracker, and forensic analysis can enhance the detection and prevention of wildlife crimes (Alagesan, 2020; Aransiola & Ceccato, 2020; Chandran, 2023; Choudhary & Kapoor, 2024; Cooper et al., 2009; Cress & Zommers, 2014; Duffy et al., 2016; Kumar, 2016; Kurland et al., 2017; Linacre, 2021; Mishra & Mitra, 2019; Mozer & Prost, 2023; Narreddy & Shashidhar, 2024). Photos, videos, and text posted on popular social media platforms may also act as a source of evidence against any illegal wildlife activities (Bergman et al., 2022). These tools can help monitor protected areas, track illegal activities, and gather evidence. The use of technology provides modern tools for surveillance and evidence collection, improving the effectiveness of crime prevention. Thus, it may act as a valuable weapon for protecting wildlife and controlling wildlife crimes.

5. Strengthening Legislation and Policy

Updating and enforcing strong wildlife protection laws and policies can deter wildlife crimes. Governments need to ensure that legislation is comprehensive and that penalties are severe enough to act as a deterrent. Strengthening legislation and policy may ensure that legal frameworks are robust and enforceable.

6. Building Local and National Capacity

Training and equipping local law enforcement personnel and conservationists can improve their ability to combat wildlife crimes. Capacity building should include technical skills, legal knowledge, and tactical approaches. The strict enforcement of the law may reduce poaching activities, however, there also exists a requirement to understand the motivation of the local community involved in such illegal activities (Nittu et al., 2022). Building local and national capacity may empower local stakeholders with the skills and resources needed to combat wildlife crime.

7. Public Awareness Campaigns

Raising public awareness about the impact of wildlife crime and the importance of conservation through media campaigns, social media platforms, and public events can help change consumer behavior and reduce demand for illegal wildlife products. There were many instances where awareness spread over social media platforms increased awareness among people to make conservation efforts (Bergman et al., 2022). Additionally, it has been observed that illegal wildlife trade does not occur if there exists no demand for wildlife products in the market (Rana & Kumar, 2023). Furthermore, there exists a favourable significance of public awareness and local community engagement in addressing wildlife crimes for prompt actions. Local community people may act as local guards to help the forest department and local police in surveillance, identification, and collecting pieces of evidence (Narreddy & Shashidhar, 2024). Public awareness campaigns thus help in altering public perceptions and behaviours, reducing demand for illegal wildlife products, and helping in quick reporting of suspects for prompt actions.

These strategies, when implemented effectively, can contribute significantly to the reduction of wildlife crimes and the protection of global biodiversity.

CONTROL MEASURES USING DIGITAL TECHNOLOGY:

1. Surveillance and Monitoring:

Camera Traps and Drones: Advanced technology-based automated thermal imaging cameras are placed in wildlife habitats that capture images of poachers or illegal activities for the prevention of crime in wildlife areas. (Aransiola & Ceccato, 2020; Choudhary & Kapoor, 2024; Cress & Zommers, 2014; Mishra & Mitra, 2019). For instance, the use of camera traps in Nagarhole Tiger Reserve has helped monitor wildlife and detect poachers. Moreover, drones, or unmanned aerial vehicles (UAVs), provide aerial surveillance and real-time monitoring of large protected areas. They are used for patrolling, detecting illegal activities such as poaching, and assessing wildlife populations (Aransiola & Ceccato, 2020; Choudhary & Kapoor, 2024; Cress & Zommers, 2014; Duffy et al., 2016; Mishra & Mitra, 2019). Drones have been employed in anti-poaching efforts in national parks having endangered species. Drones and surveillance cameras together offer detailed and real-time aerial surveillance, enhancing patrolling and monitoring efforts.

Satellite real-time Tracking: Satellite monitoring uses satellite imagery to track changes in land use, detect illegal activities, and monitor wildlife populations (Aransiola & Ceccato, 2020; Choudhary & Kapoor, 2024; Cress & Zommers, 2014; Mishra & Mitra, 2019). It helps in identifying deforestation, encroachment, and habitat destruction, which are often linked to wildlife crimes. Satellite Monitoring provides a broad overview of land changes and illegal activities, facilitating timely interventions.

2. Tracking and Data Collection:

GPS Collars and electronic tagging: GPS devices on animals can track their movements and identify patterns indicative of poaching or habitat disturbances (Aransiola & Ceccato, 2020; Cress & Zommers, 2014; Mishra & Mitra, 2019). For example, the WWF has used GPS collars on rhinos to monitor their movements and prevent poaching. Moreover, electronic tags attached to marine species can track their migration and detect illegal fishing activities. The Marine Conservation Society uses electronic tagging to monitor shark movements and illegal fishing threats.

Online Platform Tracking: It has been observed from past research that illegal wildlife trades are conducted over the Internet using websites and other social media platforms (Bergman et al., 2022; Cress & Zommers, 2014). With the increase in the use of the internet and easy access to social media platforms, the frequency of illegal wildlife activities also increases on these platforms. However, IWT activities on social media platforms can be easily tracked using automated software for species identification using different AI-based algorithms (Bergman et al., 2022; Mozer & Prost, 2023). Thus, AI-based digital advance techniques can be used to filter websites and social media platforms to identify illegal wildlife trade posts. Similarly, the scientific analysis of the call data record (CDR) matrix technology was used for wildlife crime investigation for trapping the main poachers (Kumar, 2016).

3. Forensic Analysis:

Scientific Analysis: DNA barcoding and DNA profiling of wildlife products can trace the origin of poached animals or confirm species identity (protected or unprotected) in illegal trade. Radiocarbon dating and other analytical scientific toolkits used by the forest department help in the identification of the source of the sample (Cress & Zommers, 2014; Linacre, 2021; Mishra & Mitra, 2019; Narreddy & Shashidhar, 2024; Nittu et al., 2022). Moreover, it is possible that with the use of advanced forensic technology, a small sample of evidence can provide a larger amount of information about wildlife crime (Cooper et al., 2009). For instance, elephant ivory seized in Asian countries originated from Africa leading a clue to conclude that wildlife criminals target elephants in spatially concentrated areas of Africa. Similarly, DNA results related to rhino, white-tailed deer, and parrot poaching also indicate its concentration in a small geographical area (Kurland et al., 2017).

Digital Databases: The forest department, with the help of local police and crime intelligence agencies, uses technology to develop a robust wildlife crime database. WCCB (Wildlife Crime Control Bureau) has already created a wildlife crime database management system (WCDBMS), and the CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) database helps authorities track international trade in protected species (Alagesan, 2020; Cress & Zommers, 2014). These databases help in getting almost real-time wildlife crime data from the police as well as the forest department as soon as it occurs. The timely reportage of wildlife crime helps investigating agencies to track, identify, analyze the trend, and develop effective measures to capture the wildlife parts and criminals, thus detecting, preventing, and controlling wildlife crimes.

4. Public Awareness and Education:

Social Media Monitoring: Platforms like Facebook, Instagram, and Twitter are monitored for illegal wildlife trade activities (Bergman et al., 2022). Organizations like TRAFFIC use social media analytics to track and report illegal wildlife sales.

Mobile Apps: The mobile application-based reporting of wildlife crime helps management officials take prompt actions (Choudhary & Kapoor, 2024). It increases public participation and efforts toward the conservation of wildlife and natural resources. Apps like “Wildlife Crime Watch” allow users to report sightings of illegal activities and provide real-time data to enforcement agencies. The cooperation and reporting by the community helps, frequent patrolling, and active response by the police force effectively mitigate the chances of wildlife crimes (Aransiola & Ceccato, 2020).

5. Enforcement and Collaboration:

Integrated Systems: Digital platforms facilitate collaboration between international enforcement agencies, NGOs, and local authorities. The “SMART” (Spatial Monitoring and Reporting Tool) system helps coordinate anti-poaching efforts and track wildlife crime (Cress & Zommers, 2014). Moreover, Blockchain can ensure transparency and traceability in wildlife trade. The “Wildlife Blockchain Initiative” aims to use blockchain to verify the legality of wildlife products and prevent illegal trade.

RECOMMENDATIONS:

- **Invest in Digital Infrastructure:** Allocate resources to develop and maintain digital infrastructure that supports real-time data collection, analysis, and dissemination to combat wildlife crimes effectively.
- **Capacity Building:** Train law enforcement personnel and local communities in the use of digital technologies to enhance their ability to detect, prevent, and respond to wildlife crimes.
- **Policy and Legislation Review:** Regularly review and update policies and legislation to keep pace with the evolving nature of wildlife crimes and the use of digital technologies.
- **Public-Private Partnerships:** Foster partnerships between government agencies, private sector entities, and civil society organizations to leverage their respective strengths in combating wildlife crimes.
- **International Cooperation:** Encourage international cooperation and information sharing to tackle transnational wildlife crimes effectively.
- **Sustainable Livelihoods:** Support initiatives that provide sustainable livelihood alternatives to local communities to reduce their dependence on illegal wildlife activities.
- **Ethical Considerations:** Ensure that the use of digital technologies in combating wildlife crimes respects privacy, ethics, and human rights.

CONCLUSION:

Wildlife crime is a critical issue with wide-ranging consequences, necessitating international cooperation and stringent law enforcement to protect global biodiversity. The present article highlights the significance of technology that contributes to the fight against wildlife crime. Advanced technologies such as satellite monitoring, drones, and forensic analysis play a critical role in enhancing the detection and prevention of wildlife crimes. These technologies provide tools for real-time surveillance, evidence collection, and data analysis, which are essential for effective wildlife conservation. By leveraging these digital tools and technologies, conservationists and law enforcement can more effectively combat wildlife crimes and protect vulnerable species. Technology may help in taking precautionary measures before crime occurs and may help in alerting early to take prompt actions against poachers. It may also help in tracing sources, paths, and involved people, through systematic data analysis and patterns using wildlife crime databases. These technologies collectively improve the effectiveness of wildlife crime prevention by offering advanced tools for surveillance, data collection, and evidence analysis. Their implementation in National Parks and protected areas has shown significant benefits in protecting endangered species and preserving biodiversity.

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