ICT, Seamless Recreation and Tourism: An Anthropological Perspective

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Abstract- ***The integration of Information and Communication Technology (ICT) into wildlife and ecotourism marks a profound transformation in how humans engage with natural environments and Indigenous communities. This manuscript explores seamless tourism through an anthropological lens, examining how digital technologies mediate human-nature relationships, reshape cultural practices, and influence conservation outcomes. Seamless tourism refers to a frictionless visitor journey—from planning to post-visit—enabled by integrated ICT systems that ensure continuity through data flows, interoperable services, and context-aware interfaces. The global ecotourism market is rapidly expanding, driven by technologies such as virtual reality, augmented reality, and artificial intelligence that enhance visitor experiences while supporting conservation goals. Digital anthropology provides insight into how cultural meanings, identities, and relationships evolve through digital mediation, revealing how platforms and interfaces reconfigure host–guest dynamics and heritage expression. Findings show that while digital tools can enhance environmental education and conservation awareness, they may also commodity nature and disrupt traditional ecological relationships. Smartphones and web apps now serve as primary interfaces for travelers, combining booking, navigation, and interpretation, though their widespread use centralizes control in platform operators. Case studies highlight how virtual reality can reduce environmental impact, such as immersive orientation programs that lower wildlife disturbance. The manuscript also addresses ethical concerns, including digital colonialism, surveillance through monitoring technologies, and debates over whether virtual wildlife experiences can equitably represent non-human rights and welfare. Anthropological analysis emphasizes the need for culturally sensitive approaches that respect Indigenous knowledge systems, promote community co-production of digital content, and uphold data sovereignty. Recent innovations include virtual reef tours and digital twins that optimize visitor flows while minimizing ecological harm. This research offers guidance for professionals navigating the intersection of technology, culture, and conservation, advocating for inclusive, sustainable, and ethically grounded digital tourism practices.***

Keywords: Seamless Tourism, Wildlife Tourism, Ecotourism, Digital Anthropology, Environmental Anthropology, ICT, Conservation Technology, Virtual Reality, Sustainable Tourism

I. INTRODUCTION: THE DIGITAL TRANSFORMATION OF WILDLIFE TOURISM

The tourism industry has experienced unprecedented digital transformation, with Information and Communication Technology (ICT) becoming integral to achieving the United Nations 2030 Sustainable Development Goals (CITES, 2023). As information and communications technology became a global phenomenon, tourism was a consistent early adopter of new technologies and platforms, with digitalization expected to continue propelling the travel experience toward becoming more seamless, frictionless, and high quality in ways that contribute to sustainable development (UN Tourism, 2024). Seamless tourism emphasizes continuity through data flows, interoperable services and context-aware interfaces that anticipate and reduce visitor effort, with the goal of preserving flow without disrupting local practices or environments (Neuhofer et al., 2024).

The global ecotourism market demonstrates remarkable growth, with valuations expanding from $232.1 billion in 2023 to a projected $823.4 billion by 2033, representing a robust compound annual growth rate of 13.5% (Market Research Forecast, 2024). The nature and wildlife tourism segment leads this market expansion, driven by rising environmental awareness, government support for conservation initiatives, and technological advancements that enhance tourist experiences (Fortune Business Insights, 2025). Recording a CAGR of 15.57%, the global ecotourism market exhibits steady growth powered by millennials'

inclination toward wildlife and natural tourism, as they focus more on unique experiences rather than conventional travel (Fortune Business Insights, 2025).

Wildlife tourism has proliferated across ever more locations, increased in scope and scale, and become more organized, yet its potential to be consumptive and unsustainable has escalated as well, particularly in destinations where planning and policy provisions could be stronger (Burns & Benz-Schwarzburg, 2023). Recent studies have therefore focused on topics related to assessing sustainability, including conservation, welfare and governance, economic counterflows, and resilience, while other studies have focused on how to make wildlife tourism more sustainable through introducing digital innovations (Jones et al., 2023). The advancement in ICT Readiness is pivotal as it encourages the further digitalization of travel and tourism services, with online bookings, sharing economy platforms, digital payments and mobile access increasingly defining tourism services that empower destinations and businesses to access new markets, optimize operations, enhance visitor engagement, and gather consumer insights (World Economic Forum, 2024).

Artificial Intelligence and Personalization in Seamless Experiences

AI tools like ChatGPT are enhancing travel planning and visitor services (SmartGuide, 2024). Usage is rising, with travelers using AI for accommodation discovery and real-time assistance (SmartGuide, 2024). AI analyzes traveler data to suggest personalized experiences and support upselling (SmartGuide, 2024). Businesses use AI for itinerary creation and multilingual communication via tools like DeepL (SmartGuide, 2024). Synthetic reality merges physical and virtual realms, reshaping tourism experiences (Miao et al., 2025). Immersion alone may not capture the depth of synthetic environments (Yang & Wang, 2025). A broader framework is needed to understand this evolving tourist experience (Buhalis et al., 2023).

Mobile Technologies as Primary Wildlife Tourism Interfaces

Smartphones and web apps integrate booking, navigation, and communication for travelers (Wang et al., 2024). Their ubiquity demands inclusive design for low-bandwidth and rural areas (Dickinson et al., 2024). Accessibility and language support are vital for older and local users (Neuhofer et al., 2024). Destination managers must invest in efficient booking tools and offline-first apps (SmartGuide, 2024; Toyama, 2024). Visual content and social media attract photography enthusiasts and boost visibility (Future Market Insights, 2024). Influencer marketing and user-generated content enhance engagement and brand loyalty (Future Market Insights, 2024). These tools expand access and deepen visitor connection to wildlife tourism.

Virtual Wildlife Tourism as Ethical Alternative

Wildlife decline and ethical concerns about captivity have increased interest in virtual ecotourism (Burns & Benz-Schwarzburg, 2023). A posthumanist approach explores how virtual experiences can respect non-human agency and welfare. Virtual tourism may fulfill ecotourism ideals if animals are portrayed with dignity (Burns & Benz-Schwarzburg, 2023). Platforms like Zoom and Google Earth offer nature experiences from home, supporting conservation (Kinseng et al., 2024). Virtual ecotourism also improves accessibility for people with disabilities (Fennell, 2023). VR and AR provide immersive, ethical wildlife interactions (Market Research Forecast, 2024). These technologies reduce environmental impact and align with conservation goals (Future Market Insights, 2025).

Case Studies of Virtual Wildlife Implementation

Galapagos Islands National Park launched a mandatory VR orientation in 2023 to educate visitors on ecosystem sensitivity (Future Market Insights, 2025). This led to a 30% drop in wildlife disturbance incidents, showing how virtual tools improve conservation outcomes (Future Market Insights, 2025). Maya Bay in Thailand offers 360° underwater virtual tours, reducing physical impact while maintaining global access (Future Market Insights, 2025). The bay's virtual reopening follows its 2018 closure due to environmental degradation. New Zealand's digital twin of Milford Sound helps optimize tours and minimize ecological effects (Future Market Insights, 2025). Uluru-Kata Tjuta National Park created virtual tours with Aboriginal elders to respect sacred sites and educate visitors (Future Market Insights, 2025). These examples show how virtual tourism balances access, education, and preservation.

Augmented Reality for On-Site Wildlife Interpretation

AR and VR enrich visitor understanding of cultural and ecological sites without physical disruption (Gretzel et al., 2024). Learning outcomes depend more on design quality and cultural collaboration than novelty (Tussyadiah et al., 2024). Content creation must respect cultural rights and undergo careful evaluation (Buhalis et al., 2024). Immersive tech can visualize past events or hidden processes but must follow cultural protocols (Smith & Waterton, 2024). Collaboration with custodians ensures respectful narration and protects sacred knowledge (Christen, 2024). Ethical frameworks should assess both cultural impact and visitor satisfaction (Timothy, 2024). Guidelines for image use, consent, and metadata help preserve dignity and prevent misuse (Brown, 2024; Nicholas, 2024).

Internet of Things for Visitor Flow and Environmental Monitoring

IoT sensors like beacons and crowd counters provide real-time data to manage congestion and guide visitor flows (Femenia-Serra et al., 2024). These tools support demand-shaping strategies such as timed entry and dynamic routing. However, interoperability, governance, and maintenance challenges hinder adoption in resource-limited areas (Ivars-Baidal et al., 2024). Reviews highlight IoT's potential for overtourism mitigation but stress the need for ethical standards (Gretzel et al., 2024). Smart destinations use integrated data to enhance decision-making and resource efficiency (UN Tourism, 2024). Inclusive governance structures improve accessibility and stakeholder representation (UN Tourism, 2024). Citizen science via mobile apps enables ecological monitoring and fosters stewardship, though data quality protocols are essential (Nature, 2024; Dickinson et al., 2024; Sullivan et al., 2024).

Big Data Analytics and Conservation Technology

In the hospitality sector, studies have shown that awareness and adoption of cloud computing remain uneven, highlighting the need for targeted training and infrastructure support to fully realize its potential in tourism management systems (Titiloye et al.,2025). Big data from bookings, sensors, and social media can be analyzed with AI to personalize itineraries and forecast demand (Xiang et al., 2024). While personalization improves convenience, it may reinforce biases without transparency and explainability (Li et al., 2024). AI tools are increasingly used in tourism ecosystems for personalization and operational optimization (Buhalis & Sinarta, 2024). Global policies like the Kunming-Montréal Framework promote digital tools for conservation (CBD, 2024). These include remote sensing, biodiversity platforms, and AI classifiers for wildlife monitoring (Lamba et al., 2024; Reynolds et al., 2025). The impact of these technologies depends on their integration into local socio-political contexts (Bakker & Ritts, 2024). Responsible innovation and exnovation help phase out misaligned technologies through participatory, context-aware approaches (Luque-Ayala et al., 2024; Davidson, 2024).

Cloud Services and API Architectures for Seamless Integration

Cloud infrastructure and API-first design patterns enable modular, scalable tourism services that third-party developers and local SMEs can plug into, with open APIs reducing vendor lock-in and facilitating data sharing across mobility, accommodation and attraction services, creating the technical preconditions for seamlessness (Hwang & Kim, 2024). However, API ecosystems require governance to ensure data quality, security and equitable access, while public sector support for shared cloud platforms can level the playing field for smaller operators (Marston et al., 2024). Policy guidance increasingly recommends API standards for smart destination initiatives (UN Tourism, 2024).

Interoperability—shared formats, taxonomies and APIs—enables disparate systems including mobility, ticketing, and interpretation to work together and supports the user experience of seamlessness, while open data initiatives can stimulate third-party innovation and help smaller operators join digital ecosystems (Boes et al., 2024). However, standards require governance, maintenance and incentives to adopt them across sectors, with public authorities often playing a convening role to establish and enforce standards (EC, 2024). European and UN guidance documents highlight interoperability as a policy priority for smart destinations (UN Tourism, 2024).

Digital booking and notification systems allow destinations to spread visitor demand across time by offering timed entries, incentives for off-peak visits and predictive nudges, reducing congestion and environmental pressure at sensitive sites while

improving visitor satisfaction through reduced wait times (Ivars-Baidal et al., 2024). Successful demand shaping combines accurate forecasting with behavioral insights that respect visitor autonomy, though care must be taken to avoid excluding those unable to book online by retaining offline channels (Gössling & Hall, 2024). Literature on smart destination management highlights timed entry as an effective overtourism tool (Koens et al., 2024).

Green Surveillance and Conservation Technologies.
Camera Traps, Drones, and Monitoring Systems
Technologies like drones, camera traps and acoustic sensors strengthen conservation monitoring and anti-poaching efforts, delivering crucial ecological data (Arts et al., 2024). Yet these tools can introduce forms of surveillance that raise privacy concerns and alter power dynamics between communities and conservation authorities, with critics warning about "green militarization" where security framings sideline participatory conservation and local rights (Duffy et al., 2023). Combining technology with community-led monitoring helps legitimize interventions and build local stewardship, while recent conservation literature calls for ethical safeguards alongside technological deployment (Lunstrum, 2024).

Digital technologies have become an integral part of achieving the 2030 Sustainable Development Goals, with better connectivity helping equip people of all ages, genders and local conditions with job-ready digital skills (CITES, 2023). Indigenous and women-led initiatives are finding ways to use technology that suits ecosystems needs, local conditions and their own livelihoods, while digital financial systems and services are expanding "financial inclusion"—connecting individuals and organizations to sustainable financial means to generate income and accomplish their conservation goals (CITES, 2023).

World Wildlife Day 2024, themed "Connecting People and Planet: Exploring Digital Innovation in Wildlife Conservation," aimed to raise awareness about the latest applications of digital technologies in wildlife conservation and trade and about the impact of digital interventions on ecosystems and communities around the world (CITES, 2023). The celebrations explored digital innovation and highlighted how digital technologies and services can drive wildlife conservation and human-wildlife coexistence, now and for future generations in an increasingly connected world, with emphasis on ensuring digital inclusion for all, including the most vulnerable (CITES, 2023).
Ethical Considerations and Community Surveillance
Surveillance technologies deployed for conservation and tourism management raise significant privacy concerns, as camera traps, drones, GPS tracking, and sensor networks monitor wildlife but also capture images and data about local people (Lyon, 2024). Facial recognition, biometric systems, and location tracking technologies increasingly employed for security and visitor management enable extensive surveillance, with these systems typically operating without adequate consent, transparency, or community control (Duffy et al., 2023).

Conservation surveillance disproportionately affects rural and Indigenous communities whose livelihoods depend on natural resource access, with monitoring technologies documenting resource use activities that may violate conservation regulations but constitute traditional practices and survival strategies (Adams, 2024). Data can be used for prosecution, restriction, or eviction, creating power imbalances where communities become surveilled subjects rather than conservation partners (Brockington, 2024). Ethical surveillance requires community consent, benefit-sharing, and protection of legitimate traditional uses (Sandbrook et al., 2024).

Recognizing the risks associated with emerging technologies has prompted a shift toward responsible innovation that accounts for ethical standards, public interest, and context-specific needs (Malakar & Lacey, 2024). In conservation, ongoing justice debates are reshaping the governance of data-driven research and practice, while also boosting procedures for supporting digital accessibility, local capabilities, and the ethical deployment of technologies (Tabor et al., 2025). Emerging guidelines and codes of conduct offer best practices for the use of conservation technologies, including the adoption of remote sensing technologies and social media data (Di Minin et al., 2024).

Exnovation: Removing Problematic Technologies
Exnovation refers to the removal or reconfiguration of technologies that undermine conservation and community goals (Davidson, 2024). It offers mechanisms to diagnose, repair, or eliminate misaligned digital tools in conservation contexts (Holbek & Knudsen, 2024). Ethical implementation

involves open-source practices, Indigenous data sovereignty, and participatory design (Hsing et al., 2024). Indigenous data sovereignty asserts control over data collection, ownership, and use by Indigenous communities (Jennings et al., 2023). Conventional governance often excludes Indigenous voices, creating power imbalances. Tourism tech collecting cultural or location data risks violating sovereignty without consent and benefit-sharing (Walter & Suina, 2024). Exnovation ensures technologies align with local priorities and ethical standards.

Bridging the Digital Divide in Wildlife Tourism

Digital inclusion affects who benefits from tourism, with rural and low-income groups often excluded (Hilbert, 2024). Offline functionality, multilingual interfaces, and community training help bridge access gaps (Hatakka & De', 2024). Inclusive planning is essential for equitable digital tourism (UN Tourism, 2024). Accessibility features like audio descriptions and offline maps improve usability for diverse visitors (Neuhofer et al., 2024). Involving disabled users and local speakers in design ensures relevance and dignity (Dickinson et al., 2024). Accessibility is now central to smart tourism frameworks (Buhalis & Sinarta, 2024). Digital literacy programs empower local hosts and artisans to participate meaningfully (EC, 2024; Timothy, 2024; Jamal & Camargo, 2024).

Community Co-Production and Data Sovereignty

Co-producing digital content with local custodians ensures cultural accuracy and equitable benefits (Chambers, 2024). It builds trust and aligns conservation messaging with community values (EC, 2024). Co-design is recognized as best practice for ethical digital heritage (Smith, 2024). Ethical data practices require consent, ownership, and control over cultural and location data (Couldry & Mejias, 2024). Sovereignty includes the right to withdraw or correct data, with culturally appropriate consent protocols (Kukutai & Taylor, 2023). Tourism tech projects increasingly adopt governance norms to protect community rights (UN Tourism, 2024). Cross-border data laws complicate analytics, requiring legal compliance and inclusive governance boards (GDPR, 2024; Marston et al., 2024; EC, 2024).

Platform Economies and Local Enterprise Sustainability

Global OTAs and booking platforms expand market access but concentrate power, affecting small business margins (Gössling et al., 2024). Local enterprises must adapt to platform algorithms or risk displacement unless cooperative models redistribute benefits. Hybrid strategies like revenue-sharing and local curation help preserve local value (Srnicek, 2024). Smart tourism policies recommend platform governance to protect SMEs (EC, 2024). Digital marketplaces offer micro-entrepreneurs access, but visibility depends on algorithms and paid promotion (Kontogeorgopoulos et al., 2024). Support mechanisms and authenticity cues help small providers stand out (Stronza & Gordillo, 2024). A 2024 initiative in Kamala, Thailand shows how digital platforms can empower community-led tourism (Future Market Insights, 2024; Jamal & Stronza, 2024).

Digital Tools for Conservation and Sustainability

Sustainable travel gained momentum in 2024, driven by eco-awareness and global policy shifts (SmartGuide, 2024). The 2023 EU Green Deal Destination Certification promotes environmental stewardship, with first awards expected in 2024 (EC, 2024). Travelers are making conscious choices: 59% want to leave destinations better, 33% avoid peak seasons, and 25% travel closer to home to reduce carbon footprints (SmartGuide, 2024). These trends reflect growing mindfulness and policy influence on travel behavior (Gössling, 2024). In 2024, 68% of American tourists preferred eco-certified stays, and 65% of UK travelers prioritized sustainability (Future Market Insights, 2025). Island nations enforced stricter tourism regulations in 2023, including marine and reef protections (SmartGuide, 2024). These efforts signal a shift toward environmentally responsible tourism practices.

Crisis Resilience through Digital Infrastructure

Digital tools like real-time communication, flexible booking, and contactless services were vital to post-COVID tourism recovery and remain central to resilience planning (UN Tourism, 2024). These tools enable rapid health guidance and reduce economic shocks for travelers and operators. Resilience also requires social safety nets and diversified local economies, with digital preparedness integrated into contingency planning (Gössling & Hall, 2024). Reports recommend embedding digital resilience

into broader recovery strategies (UNWTO, 2024). In early 2025, 300 million tourists traveled internationally—a 5% increase—highlighting recovery and digital infrastructure's role (UNWTO, 2025). India's Amrit Dharohar scheme promotes wetland conservation and eco-tourism development (Invest India, 2023). Real-time feedback tools improve visitor experience and operational response, though privacy concerns require respectful design (Ivars-Baidal et al., 2024; Neuhofer et al., 2024).

Evaluating Digital Impact Beyond Downloads

Effective KPIs for tourism digitization go beyond downloads, focusing on inclusion, sustainability, and local economic impact (UN Tourism, 2024). Evaluations should include environmental, social, and governance metrics like emissions, job creation, and data sovereignty (Gretzel et al., 2024). Mixed methods capture nuanced impacts, and funders now prioritize outcome-based KPIs (Buhalis & Sinarta, 2024). "Smartwashing" occurs when tech projects lack real benefits, risking wasted funds and community alienation (Ivars-Baidal et al., 2024). Strong appraisal, stakeholder oversight, and pilot-to-scale pathways help identify genuine innovation (Femenia-Serra et al., 2024). Independent evaluations are key to avoiding performative tech adoption. Reviews call for accountability frameworks in smart tourism investments (EC, 2024).

Extended Reality and Immersive Conservation Education

Extended reality (XR) includes VR, AR, and MR, offering immersive experiences that transform tourism (Buhalis et al., 2023). VR enables virtual travel through 360° videos, while AR overlays digital content on real-world views (Tussyadiah et al., 2024). MR blends digital and physical elements for pre-trip previews, on-site engagement, and post-trip sharing (Yang & Wang, 2025). Synthetic reality dissolves boundaries between physical and virtual, requiring new experiential frameworks (Miao et al., 2025; Neuhofer et al., 2024). VR opens access to fragile or remote sites, democratizing tourism (Burns & Benz-Schwarzburg, 2023). It raises questions about replacing vs. complementing physical travel (Guttentag, 2024). Experience quality varies by destination, user traits, and tech design (Tussyadiah et al., 2024).

Blockchain and Decentralized Tourism Ecosystems

Blockchain offers solutions for trust, transparency, and decentralization in tourism (Önder & Treiblmaier, 2024). Smart contracts, digital identities, and tokenization enable secure, automated transactions (Hawlitschek et al., 2024). Applications include document verification, loyalty tokens, fractional ownership, and decentralized reviews (Treiblmaier & Önder, 2023). Some destinations use blockchain currencies and track product provenance (Seyitoğlu & Ivanov, 2024). Challenges include scalability, energy use, legal uncertainty, and lack of interoperability (Treiblmaier, 2024; Truby et al., 2024). Legal frameworks for smart contracts and digital assets remain unclear (Huckle & White, 2024). Realizing blockchain's potential requires solving technical, legal, and coordination issues (Seyitoğlu et al., 2024).

Digital Twins and Predictive Tourism Management

Digital twins replicate destinations virtually, allowing simulation and optimization without real-world disruption (Buhalis et al., 2024). New Zealand's Milford Sound twin helps plan tours and reduce environmental impact (Future Market Insights, 2025). Predictive management anticipates issues and tests solutions in virtual environments (Gretzel et al., 2024). Twins integrate IoT, bookings, weather, and monitoring data for real-time modeling (Ivars-Baidal et al., 2024). Managers can visualize flows, predict needs, and assess impacts (Femenia-Serra et al., 2024; Timothy, 2024). High costs and expertise needs limit adoption to well-funded destinations (Buhalis & Sinarta, 2024). Cloud computing and open-source tools may expand access, but community alignment remains key (Marston et al., 2024; Gössling, 2024).

Biometric Technologies and Frictionless Access

Biometric systems offer frictionless access via fingerprints, facial recognition, and iris scans, but raise privacy concerns (Buhalis et al., 2023). Airports use facial recognition for boarding, while resorts link biometrics to payments (Neuhofer et al., 2024; Ivars-Baidal et al., 2024). In wildlife tourism, biometrics can streamline entry and personalize experiences (Dickinson et al., 2024). However, surveillance risks and data misuse in remote areas are major concerns (Duffy et al., 2023). Indigenous communities oppose biometric data collection on their lands, citing colonial control (Kukutai & Taylor, 2023). Ethical use requires consent, governance, opt-out options, and secure data handling (Lyon, 2024; GDPR, 2024).

Cultural sensitivity demands alternatives for those unwilling to provide biometric data (Christen, 2024; UN Tourism, 2024).

Government Policy and Digital Regulation

Government policy shapes digital tourism through procurement rules, data protection laws, accessibility standards, and innovation incentives (UN Tourism, 2024). Effective policy aligns digital investments with sustainability and community goals, not just economic growth. Open standards and benefit clauses in procurement prevent extractive vendor models, while regulatory foresight balances innovation and rights (EC, 2024). International bodies guide governments in crafting balanced digital tourism policies (UNWTO, 2024). The EU's Digital Services and Markets Acts require transparency in algorithms, moderation, and data use (EC, 2024). These laws reduce platform dominance and influence global practices (Gössling et al., 2024; Srnicek, 2024). Privacy-by-design and ethical data practices build trust and ensure compliance from project inception (Couldry & Mejias, 2024; Marston et al., 2024; UNWTO, 2024).

Public-Private Partnerships and Multi-Stakeholder Governance

PPPs mobilize resources for digital tourism while maintaining public oversight of equity and standards (EC, 2024). Transparent contracts with local benefit clauses and inclusive procurement pipelines support fair outcomes (Timothy, 2024). Governance boards with diverse stakeholders ensure accountability in constrained public budgets (UN Tourism, 2024). Smart destinations integrate mobility services with attractions for seamless travel (Ivars-Baidal et al., 2024). Real-time transport info and coordination lower carbon footprints and improve visitor flow (Gössling & Hall, 2024; Boes et al., 2024). Data literacy empowers managers and communities to interpret analytics and challenge vendor claims (Jamal & Camargo, 2024; EC, 2024). Co-learning programs foster collaboration between technologists and local stakeholders (Femenia-Serra et al., 2024).

International Cooperation and Standards Development

UNWTO guidelines promote sustainability, inclusivity, and ethical tech use in smart destinations (UN Tourism, 2024). CITES supports digital innovation for wildlife conservation while protecting ecosystems and communities (CITES, 2023). Interoperability standards enable seamless cross-border tourism experiences, developed by ISO, W3C, and industry groups (Buhalis & Amaranggana, 2024). Public authorities play key roles in maintaining and promoting standards (EC, 2024). EU initiatives show how standardization accelerates innovation and ensures quality (EC, 2024). Climate change and biodiversity loss require global cooperation in tourism tech for carbon tracking and conservation (Gössling, 2024; Hall, 2024). Policymakers must ensure digital tools support true sustainability, not unchecked tourism growth (Fletcher et al., 2024).

II. CONCLUSION AND RECOMMENDATIONS

Synthesis of Key Findings

This study explored ICT in seamless tourism through an anthropological lens, revealing complex ties between technology, nature, and power. Seamless tourism reflects cultural visions of human-nature relationships, not just technical integration (Buhalis et al., 2023). Digital tools enhance conservation and visitor management but risk surveillance and marginalization (Duffy et al., 2023). Virtual tourism reduces impact but may trivialize wildlife and weaken conservation motivation (Burns & Benz-Schwarzburg, 2023). IoT and AI improve management but concentrate power and exclude some groups (Ivars-Baidal et al., 2024). Outcomes depend on governance, values, and context (UN Tourism, 2024). Indigenous communities use digital tools to assert sovereignty and preserve cultural protocols (Horst & Miller, 2024; Kukutai & Taylor, 2023; Christen, 2024).

Recommendations for Practice

Destination managers should pair tech with stakeholder engagement and inclusive design (Buhalis & Law, 2024; Neuhofer et al., 2024). KPIs must measure sustainability, equity, and cultural integrity (UN Tourism, 2024). Data governance should respect privacy and community sovereignty (EC, 2024). Conservation groups must integrate local knowledge and adopt exnovation to remove harmful tech (Sandbrook et al., 2024; Davidson, 2024). Surveillance must not criminalize traditional practices, and open-source tools should build capacity (Duffy et al., 2023; Arts et al., 2024). Tech providers must co-design with communities and ensure transparency (Smith, 2024; Toyama, 2024;

Couldry & Mejias, 2024). Policymakers should regulate platforms, invest in literacy, and promote cooperation (Timothy, 2024; Jamal & Camargo, 2024; UNWTO, 2024).

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