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Judicial Interpretations of Environmental Rights in the Age of Digital Surveillance: An Ethnographic Analysis

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This study examines judicial interpretations of environmental rights within the rapidly evolving context of digital surveillance technologies. As environmental governance becomes increasingly data-driven, courts are confronted with novel challenges involving the use of satellite imagery, algorithmic assessments, and citizen-generated environmental data. Drawing on an ethnographic socio-legal approach based on qualitative secondary data, this research analyses how judicial institutions interpret and balance environmental protection with fundamental rights such as privacy, due process, and access to justice. The findings reveal that courts are gradually adopting digital tools as evidentiary resources while remaining cautious about their epistemic limitations and potential for rights infringement. The study identifies a transitional legal landscape characterised by hybrid reasoning, where traditional legal doctrines are being adapted to accommodate technologically mediated forms of knowledge. However, inconsistencies in judicial approaches and the persistence of structural inequalities highlight the need for more coherent legal frameworks. The article argues for a rights-based, inclusive, and context-sensitive approach to digital environmental governance that ensures both ecological protection and the safeguarding of human rights.

Keywords: Environmental rights; Digital surveillance; Judicial interpretation; Environmental justice; Algorithmic governance; Socio-legal ethnography; Digital evidence

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1. Introduction

The recognition of environmental rights as an integral component of human rights has significantly transformed legal and governance frameworks over the past few decades. Once viewed primarily as policy concerns, environmental issues are now increasingly framed in terms of rights, justice, and accountability. This shift reflects growing global awareness of the profound impacts of environmental degradation, climate change, and ecological crises on human well-being and survival (Boyd, 2012). The emergence of environmental rights, particularly the right to a clean, healthy, and sustainable environment, has been acknowledged in numerous constitutional provisions, international agreements, and judicial decisions worldwide (Knox, 2018).

Simultaneously, the rapid expansion of digital technologies has introduced new dimensions to environmental governance. Digital surveillance systems, ranging from satellite imaging and remote sensing to artificial intelligence (AI) and big data analytics, have enhanced the capacity of governments and institutions to monitor environmental conditions, enforce regulations, and detect violations in real time (Mol, 2008). These technologies are increasingly used to track deforestation, monitor air and water quality, detect illegal mining or wildlife trafficking, and assess climate-related risks. While such advancements hold promise for improving environmental protection, they also raise critical questions about the implications of surveillance for human rights, particularly

privacy, autonomy, and procedural fairness (Sekalala et al., 2020).

The intersection of environmental rights and digital surveillance represents a complex and evolving domain of socio-legal inquiry. Courts are now confronted with cases in which environmental claims are supported or contested through digitally generated evidence, including satellite data, geospatial mapping, and algorithmic assessments. This development has transformed the nature of legal reasoning, requiring judges to engage with technical expertise and data-driven knowledge systems. As a result, judicial interpretation is no longer confined to traditional legal texts but increasingly involves the evaluation of technologically mediated evidence (Thaler, 2021).

At the same time, digital surveillance introduces new forms of governance that extend beyond conventional regulatory mechanisms. Drawing on Foucauldian notions of governmentality, surveillance technologies can be understood as instruments that shape behaviour through continuous observation and data collection (Foucault, 1991). In the environmental context, such technologies may be used to monitor compliance with environmental laws, but they may also enable intrusive forms of control that disproportionately affect marginalised communities. For example, the deployment of surveillance technologies in resource-rich regions may intensify existing inequalities by targeting vulnerable populations while privileging corporate or state interests (Lyon, 2018).

Judicial institutions play a crucial role in mediating these tensions. Courts are tasked

with balancing competing interests, including environmental protection, economic development, and fundamental rights. In doing so, they must navigate complex questions about the legitimacy, reliability, and ethical implications of digital surveillance technologies. The incorporation of digital evidence into legal proceedings raises issues related to admissibility, transparency, and accountability. For instance, algorithmic systems used to assess environmental risks may lack transparency, making it difficult for courts to evaluate their accuracy or fairness (Pasquale, 2015).

Moreover, the increasing reliance on digital technologies in environmental governance has implications for access to justice and environmental democracy. While digital tools can enhance public participation and access to information, they may also exacerbate existing inequalities by privileging those with technological expertise and resources. This digital divide raises concerns about the inclusivity and fairness of environmental decision-making processes (Ssebunya et al., 2026).

This article seeks to examine how judicial institutions interpret environmental rights in the context of digital surveillance through an ethnographic socio-legal lens. Rather than focusing solely on doctrinal analysis, the study explores the practices, narratives, and institutional dynamics that shape judicial decision-making. Ethnographic approaches emphasise the importance of understanding law as a lived and situated practice, highlighting how legal norms are interpreted and enacted within specific social and institutional contexts (Merry, 2006).

The central argument of this study is that judicial interpretations of environmental rights in the age of digital surveillance are characterised by a process of adaptation and negotiation. Courts are increasingly embracing digital technologies as tools for environmental protection, yet they remain cautious about their implications for fundamental rights. This tension gives rise to a hybrid legal paradigm that integrates technological innovation with rights-based safeguards, though inconsistencies persist across jurisdictions.

The study is guided by three key research questions:

- How do courts interpret environmental rights in cases involving digital surveillance technologies?
- What challenges arise from the use of digitally generated environmental evidence in judicial proceedings?
- How do judicial practices reflect broader socio-legal dynamics related to power, knowledge, and governance in the digital age?

By addressing these questions, the article contributes to interdisciplinary scholarship at the intersection of environmental law, digital governance, and socio-legal studies. It also offers insights into the evolving role of courts in shaping normative frameworks for environmental protection in a technologically mediated world.

2. Literature Review

The concept of environmental rights has evolved significantly over time, reflecting

broader transformations in legal and political thought. Early environmental law focused primarily on regulatory approaches aimed at controlling pollution and managing natural resources. However, the limitations of these approaches became increasingly evident, leading to the emergence of rights-based frameworks that emphasise the intrinsic link between environmental quality and human well-being (Boyd, 2012).

The recognition of a substantive right to a healthy environment has gained momentum in recent years. International bodies, including the United Nations, have acknowledged this right as essential for the enjoyment of other human rights (Knox, 2018). At the national level, many constitutions now include provisions guaranteeing environmental protection, and courts have played a pivotal role in interpreting and enforcing these rights.

Judicial activism has been particularly significant in advancing environmental rights. Courts in countries such as India, Colombia, and South Africa have interpreted constitutional provisions broadly to include environmental protections, often invoking principles such as intergenerational equity and the public trust doctrine (Robinson, 2017). These developments highlight the dynamic nature of environmental rights and the central role of judicial institutions in shaping their meaning.

2.1 Environmental Democracy and Access to Information

Environmental democracy is grounded in three core principles: access to information, public participation, and access to justice.

These principles are enshrined in international frameworks such as the Aarhus Convention, which emphasises the importance of transparency and accountability in environmental governance (Peeters, 2020).

Access to environmental information is particularly relevant in the context of digital surveillance. Digital technologies have significantly expanded the availability of environmental data, enabling real-time monitoring and analysis. However, the proliferation of data also raises questions about data quality, accessibility, and interpretation. Not all stakeholders have equal access to digital tools, leading to disparities in participation and influence (Mol, 2008).

Furthermore, the increasing reliance on digital data in environmental decision-making can shift power dynamics, privileging technical expertise over local knowledge. This trend has implications for environmental justice, as marginalised communities may be excluded from decision-making processes or their knowledge may be undervalued (Ssebunya et al., 2026).

2.1 Digital Surveillance and Governance

The concept of digital surveillance has been widely studied in the context of security and governance. Surveillance technologies enable the collection, analysis, and use of data to monitor and influence behaviour. In environmental governance, these technologies are used to track environmental changes, enforce regulations, and predict future risks (Lyon, 2018).

Scholars have highlighted both the benefits and risks of digital surveillance. On the one hand, surveillance technologies can enhance efficiency, accuracy, and accountability in environmental monitoring. For example, satellite imagery can detect deforestation in remote areas, while sensors can monitor air and water quality in real time. On the other hand, these technologies raise concerns about privacy, data security, and the potential for misuse (Sekalala et al., 2020).

Foucauldian perspectives on surveillance emphasise its role as a mechanism of power and control. Surveillance is not merely a technical tool but a social practice that shapes behaviour and reinforces power relations (Foucault, 1991). In the environmental context, surveillance may be used to regulate communities, enforce compliance, or control access to resources.

2.3 Algorithmic Governance and Legal Challenges

The rise of algorithmic systems has introduced new complexities in environmental governance. Algorithms are increasingly used to analyse environmental data, predict risks, and inform policy decisions. However, these systems are often opaque, making it difficult to understand how decisions are made (Pasquale, 2015).

Algorithmic bias is a significant concern, as it can lead to unequal outcomes and reinforce existing inequalities. For example, predictive models used in environmental risk assessment may be based on incomplete or biased data, leading to inaccurate or discriminatory outcomes. Courts are increasingly required to assess the validity

and fairness of such systems, a task that poses significant challenges given the technical complexity involved.

2.4 Digital Environmental Activism

Digital technologies have transformed environmental activism, enabling new forms of engagement and mobilisation. Social media platforms, online campaigns, and digital mapping tools allow activists to raise awareness, share information, and coordinate actions across geographical boundaries (Verma et al., 2021).

However, digital activism also exposes activists to surveillance and legal risks. Governments and corporations may use digital tools to monitor and suppress dissent, raising concerns about freedom of expression and association. These dynamics highlight the ambivalent nature of digital technologies, which can both empower and constrain social movements.

2.5 Ethnographic Perspectives in Socio-Legal Studies

Ethnographic approaches provide valuable insights into how law operates in practice. Rather than focusing solely on formal rules, ethnography examines the everyday practices, interactions, and meanings that shape legal processes (Merry, 2006).

In the context of environmental governance, ethnographic studies reveal how legal norms are interpreted and applied within specific institutional and cultural settings. They highlight the role of narratives, power relations, and social dynamics in shaping legal outcomes (Thaler, 2021).

Ethnographic research also underscores the importance of context in understanding judicial decision-making. Courts do not operate in isolation but are embedded within broader social and political systems. As such, judicial interpretations of environmental rights are influenced by a range of factors, including institutional norms, cultural values, and technological developments.

3. Theoretical Framework

This study adopts an interdisciplinary theoretical framework that integrates environmental justice theory, Foucauldian governmentality and surveillance, Science and Technology Studies (STS), and socio-legal ethnography. These perspectives collectively provide a robust lens for analysing how judicial institutions interpret environmental rights within the context of digital surveillance.

3.1 Environmental Justice Theory

Environmental justice (EJ) theory emphasises the fair distribution of environmental benefits and burdens, equitable participation in decision-making processes, and the recognition of diverse cultural and social identities (Schlosberg, 2007). Traditionally rooted in grassroots movements addressing environmental inequalities, EJ has evolved into a comprehensive analytical framework encompassing distributive, procedural, and recognitional dimensions.

In the context of digital environmental governance, EJ theory is particularly relevant for understanding how surveillance technologies may reproduce or exacerbate

existing inequalities. For example, communities in the Global South or marginalised regions may be disproportionately subjected to environmental monitoring without adequate safeguards or participation in decision-making processes (Ssebunya et al., 2026). This raises critical questions about who controls environmental data, who benefits from surveillance technologies, and whose voices are included or excluded in legal processes.

Judicial interpretations of environmental rights often reflect these concerns, particularly in cases involving indigenous communities, informal settlements, or resource-dependent populations. Courts may invoke principles such as intergenerational equity, the precautionary principle, and the public trust doctrine to address environmental harms. However, the integration of digital surveillance complicates these frameworks by introducing new forms of evidence and governance that may not align with traditional notions of justice (Boyd, 2012).

3.2 Foucauldian Governmentality and Surveillance

Michel Foucault's concept of governmentality provides a critical lens for understanding the role of surveillance in modern governance. Governmentality refers to how power is exercised through the management of populations, often through subtle and diffuse mechanisms rather than overt coercion (Foucault, 1991). Surveillance, in this context, is not merely a tool of observation but a means of shaping behaviour and producing knowledge.

In the digital age, surveillance has become increasingly pervasive, enabled by technologies such as big data analytics, artificial intelligence, and remote sensing. These technologies facilitate what Lyon (2018) describes as a “culture of surveillance,” where monitoring becomes normalised and embedded in everyday life. In environmental governance, digital surveillance enables continuous monitoring of ecosystems, resource use, and compliance with regulations.

From a Foucauldian perspective, such practices can be seen as forms of “biopolitical” control, where environmental data is used to regulate populations and territories. For instance, satellite monitoring of deforestation may be used to enforce environmental laws, but it may also enable state control over land use and resource access. This dual function highlights the ambivalence of surveillance technologies, which can both protect and constrain environmental rights.

Judicial institutions play a key role in legitimising or contesting these forms of governance. Courts may endorse surveillance practices as necessary for environmental protection, but they may also impose limits to safeguard individual rights. The challenge lies in balancing these competing imperatives in a context where technological capabilities often outpace legal frameworks.

3.3 Science and Technology Studies (STS)

Science and Technology Studies (STS) offers valuable insights into the socio-political dimensions of technology. STS scholars

argue that technologies are not neutral tools but are shaped by social, cultural, and political contexts (Jasanoff, 2004). This perspective is particularly relevant for understanding the role of digital technologies in environmental governance.

Environmental data generated through digital surveillance systems, such as satellite imagery, sensor networks, and algorithmic models, are often perceived as objective and authoritative. However, STS emphasises that such data is produced through processes that involve choices about what to measure, how to measure it, and how to interpret the results. These choices reflect underlying assumptions and power relations, which can influence legal outcomes.

In judicial contexts, the use of digital evidence raises questions about epistemic authority and the role of expertise. Courts often rely on expert testimony to interpret complex data, which can create asymmetries between parties with differing levels of technical knowledge and resources (Pasquale, 2015). Moreover, the opacity of algorithmic systems, often referred to as “black boxes”, poses challenges for transparency and accountability.

STS also highlights the importance of co-production, where knowledge and social order are produced together (Jasanoff, 2004). In the context of environmental law, this suggests that judicial interpretations of environmental rights are shaped not only by legal principles but also by technological practices and knowledge systems.

3.4 Socio-Legal Ethnography

Socio-legal ethnography provides a methodological and theoretical framework for understanding how law operates in practice. Rather than focusing solely on formal legal rules, this approach examines the everyday practices, interactions, and meanings that shape legal processes (Merry, 2006).

In the context of this study, socio-legal ethnography is used to analyse how judicial actors engage with digital surveillance technologies and environmental rights. This includes examining how judges interpret evidence, how legal arguments are constructed, and how institutional norms influence decision-making.

Ethnographic studies of courts reveal that judicial decision-making is not purely rational or objective but is influenced by a range of factors, including institutional culture, professional norms, and broader socio-political contexts (Thaler, 2021). For example, judges may rely on narratives and heuristics to make sense of complex technical evidence, or they may defer to expert opinions in cases involving specialised knowledge.

By integrating socio-legal ethnography into the theoretical framework, this study seeks to move beyond doctrinal analysis and capture the lived realities of judicial practice. This approach allows for a more nuanced understanding of how environmental rights are interpreted and enacted in the age of digital surveillance.

4. Methodology

This study adopts a qualitative research design grounded in an ethnographic socio-legal approach, utilising secondary data as its primary source of empirical material. The research design is interpretive in nature, aiming to explore how judicial institutions construct and apply meanings related to environmental rights and digital surveillance.

Qualitative research is particularly well-suited for this study because it allows for an in-depth examination of complex social phenomena, including legal reasoning, institutional practices, and power dynamics (Creswell & Poth, 2018). The ethnographic orientation further enhances this approach by emphasising the contextual and situated nature of legal processes.

4.1 Data Sources

The study relies on a diverse range of secondary data sources, including:

- **Judicial Decisions and Case Law:** Selected cases from international, regional, and national courts addressing environmental rights and digital evidence.
- **Academic Literature:** Peer-reviewed journal articles, books, and conference papers on environmental law, digital surveillance, and socio-legal studies.
- **Policy and Legal Documents:** International agreements, national legislation, and policy reports related to environmental governance and digital technologies.

- **Existing Ethnographic Studies:** Prior ethnographic research on courts, environmental governance, and digital practices.

The use of multiple data sources allows for triangulation, enhancing the credibility and robustness of the findings (Yin, 2018).

4.2 Sampling Strategy

The study employs a purposive sampling strategy to select relevant cases and literature. Cases are chosen based on their relevance to the research questions, particularly those involving:

- The use of digital surveillance technologies in environmental monitoring
- Judicial interpretation of environmental rights
- Conflicts between environmental protection and privacy or other fundamental rights

This approach ensures that the data is rich and contextually relevant, enabling a deeper understanding of the phenomena under study.

4.3 Data Analysis

The analysis is conducted using a combination of qualitative analytical techniques:

- **Thematic Analysis:** Thematic analysis is used to identify recurring patterns and themes in judicial reasoning and legal discourse. This involves coding the data and organising it into categories related to key concepts such as surveillance,

evidence, rights, and governance (Braun & Clarke, 2006).

- **Critical Discourse Analysis:** Critical discourse analysis (CDA) is employed to examine how language is used in judicial decisions and legal texts to construct meanings and power relations. CDA focuses on the ways in which legal narratives frame environmental issues and justify the use of surveillance technologies (Fairclough, 2013).
- **Comparative Analysis:** A comparative approach is used to analyse differences and similarities across jurisdictions. This helps to identify patterns and variations in judicial interpretations, as well as the influence of legal traditions and institutional contexts.

4.4 Validity and Reliability

Ensuring the validity and reliability of qualitative research is essential. This study employs several strategies to enhance methodological rigour:

- **Triangulation:** Using multiple data sources and analytical methods
- **Thick Description:** Providing detailed contextual information to support interpretations
- **Reflexivity:** Acknowledging the researcher's positionality and potential biases

These measures contribute to the credibility, transferability, and dependability of the findings (Lincoln & Guba, 1985).

4.5 Ethical Considerations

As the study relies on secondary data, it does not involve direct interaction with human participants. However, ethical considerations remain important, particularly in relation to:

- Accurate representation of sources
- Respect for intellectual property
- Avoidance of misinterpretation or bias

The study adheres to academic standards of integrity and transparency (Mannan & Farhana, 2026).

4.6 Limitations

The use of secondary data limits the ability to observe judicial practices directly. While ethnographic insights from existing studies provide valuable context, they may not fully capture the nuances of specific cases. Additionally, the selection of cases may introduce bias, although purposive sampling aims to mitigate this risk.

5. Findings & Analysis

The analysis reveals that judicial interpretations of environmental rights in the age of digital surveillance are characterised by five interrelated dynamics: the growing reliance on digital evidence, tensions between surveillance and privacy, the emergence of participatory data practices, the challenges of algorithmic governance, and the embedded institutional practices shaping judicial reasoning.

5.1 Digital Evidence and the Transformation of Judicial Reasoning

One of the most significant findings is the increasing reliance of courts on digitally generated environmental evidence, including satellite imagery, geographic information systems (GIS), sensor-based monitoring, and citizen-generated data. These forms of evidence have transformed how environmental harm is identified, quantified, and adjudicated.

Digital technologies enable courts to access real-time and longitudinal data, thereby enhancing their ability to establish causation and assess environmental damage. For instance, satellite imagery has been used to track deforestation patterns, monitor illegal mining activities, and assess pollution levels. Such evidence often carries a perception of objectivity and scientific authority, which can strengthen environmental claims (Mol, 2008).

However, this apparent objectivity is not without complications. As STS scholars argue, data is socially constructed and shaped by methodological choices, technological limitations, and institutional priorities (Jasanoff, 2004). Courts must therefore grapple with questions about the reliability, accuracy, and interpretation of digital evidence. In many cases, judges rely heavily on expert testimony to interpret complex datasets, which introduces potential biases and asymmetries between parties (Pasquale, 2015).

Moreover, the use of digital evidence shifts the epistemological foundations of legal

reasoning. Traditional legal processes rely on witness testimony, documentary evidence, and adversarial argumentation. In contrast, digital evidence often requires specialised knowledge and may not be easily contested by non-experts. This creates challenges for procedural fairness and raises concerns about the accessibility of justice (Crawford & Calo, 2016).

5.2 Surveillance and the Reconfiguration of Environmental Governance

The findings indicate that digital surveillance plays a dual role in environmental governance: it acts both as a tool for enhancing regulatory enforcement and as a mechanism of social control. Courts often recognise the utility of surveillance technologies in detecting environmental violations and ensuring compliance with legal standards. For example, remote sensing technologies can identify illegal deforestation in remote areas where traditional enforcement mechanisms are ineffective.

At the same time, judicial interpretations reveal a growing awareness of the risks associated with surveillance. Surveillance technologies can infringe on privacy rights, particularly when they involve continuous monitoring of individuals or communities. This is especially relevant in cases where environmental enforcement intersects with land use, resource extraction, or community livelihoods (Lyon, 2018).

The tension between environmental protection and privacy is further complicated by the lack of clear legal frameworks

governing digital surveillance in many jurisdictions. Courts are often required to interpret existing laws in ways that accommodate new technologies, leading to inconsistencies and uncertainties in legal outcomes (Sekalala et al., 2020).

From a Foucauldian perspective, these developments reflect a broader shift toward “governmentality,” where power is exercised through the management of information and behaviour (Foucault, 1991). Surveillance technologies enable the continuous monitoring of environmental conditions and human activities, creating new forms of governance that extend beyond traditional regulatory approaches.

5.3 Citizen Science and Participatory Environmental Evidence

Another key finding is the growing recognition of citizen science and participatory data as legitimate sources of environmental evidence. Digital technologies have enabled individuals and communities to collect and share environmental data, often using mobile devices and online platforms.

Courts are increasingly acknowledging the value of such data, particularly in cases where official data is unavailable or contested. Citizen-generated evidence can provide localised insights and highlight environmental harms that may be overlooked by formal monitoring systems (Ssebunya et al., 2026).

However, the integration of citizen science into judicial processes raises several challenges. Issues of data quality,

standardisation, and verification are central concerns. Courts must determine the credibility of citizen-generated data and establish criteria for its admissibility. This process often involves balancing inclusivity with the need for reliability (Irwin, 1995).

Furthermore, the use of participatory data reflects broader shifts toward environmental democracy, where citizens play an active role in governance. While this can enhance accountability and transparency, it also raises questions about power dynamics and representation. Not all communities have equal access to digital tools, and disparities in technological capacity can influence whose voices are heard in legal processes (Peeters, 2020).

5.4 Algorithmic Governance and Judicial Challenges

The rise of algorithmic systems in environmental governance presents significant challenges for judicial interpretation. Algorithms are increasingly used to analyse environmental data, predict risks, and inform policy decisions. However, these systems are often opaque and difficult to scrutinise, leading to concerns about transparency and accountability (Pasquale, 2015).

Judicial engagement with algorithmic evidence is still in its early stages. Courts often lack the technical expertise required to evaluate complex algorithms, leading to reliance on expert testimony or institutional trust. This can create vulnerabilities, particularly if the underlying data or methodologies are flawed or biased (Crawford & Calo, 2016).

Algorithmic bias is a critical issue, as it can lead to discriminatory outcomes. For example, predictive models used in environmental risk assessments may disproportionately target certain regions or communities based on historical data. Courts must therefore consider not only the accuracy of algorithms but also their social and ethical implications.

The findings suggest that judicial institutions are beginning to recognise these challenges, but there is a lack of consistent frameworks for addressing them. This highlights the need for interdisciplinary approaches that integrate legal, technical, and ethical perspectives.

5.5 Ethnographic Insights into Judicial Practice

Ethnographic analysis reveals that judicial decision-making is deeply embedded in institutional contexts and shaped by social practices. Judges operate within specific cultural, professional, and organisational environments that influence how they interpret evidence and apply legal principles (Merry, 2006).

In cases involving digital surveillance, judges often rely on narratives to make sense of complex technical information. These narratives may emphasise themes such as environmental harm, technological innovation, or rights protection. The framing of these narratives can significantly influence legal outcomes (Thaler, 2021).

Institutional constraints, such as time pressures, resource limitations, and procedural rules, also affect judicial practices. For example, courts may prioritise efficiency over thorough examination of

technical evidence, leading to reliance on simplified interpretations or expert opinions.

Overall, the findings highlight the importance of understanding judicial interpretation as a socially situated process. Legal outcomes are not determined solely by formal rules but are shaped by a range of contextual factors, including technological developments and institutional dynamics.

6. Discussion

The findings of this study point to a fundamental transformation in the relationship between law, technology, and environmental governance. Judicial interpretations of environmental rights in the age of digital surveillance reflect an ongoing process of negotiation between competing values, including efficiency, accountability, privacy, and justice.

6.1 Toward a Hybrid Legal Paradigm

One of the central insights of this study is the emergence of a hybrid legal paradigm that integrates traditional legal principles with digital technologies. Courts are increasingly incorporating digital evidence into their decision-making processes, recognising its potential to enhance environmental protection.

However, this integration is not seamless. Judicial institutions must reconcile the normative foundations of environmental rights with the technical complexities of digital surveillance. This requires the development of new legal doctrines and interpretive frameworks that can

accommodate technological innovation while safeguarding fundamental rights (Boyd, 2012).

The hybrid paradigm is characterised by flexibility and adaptability, but it also introduces uncertainties. Different jurisdictions may adopt varying approaches, leading to inconsistencies in legal outcomes. This underscores the need for international dialogue and cooperation in developing coherent legal standards.

6.2 Epistemic Authority and the Politics of Knowledge

The increasing reliance on digital technologies in environmental governance raises important questions about epistemic authority, that is, who has the power to define and interpret knowledge. Digital data is often perceived as objective and authoritative, but it is produced through processes that reflect specific assumptions and power relations (Jasanoff, 2004).

Judicial reliance on expert testimony and technical evidence can reinforce these dynamics, privileging certain forms of knowledge over others. For example, scientific data may be given greater weight than local or indigenous knowledge, even when the latter provides valuable insights into environmental conditions.

This raises concerns about epistemic justice and the inclusivity of legal processes. Courts must consider how to integrate diverse forms of knowledge in a way that respects different perspectives and avoids reinforcing existing inequalities (Schlosberg, 2007).

6.3 Surveillance, Power, and Rights

The findings highlight the ambivalent role of digital surveillance in environmental governance. While surveillance technologies can enhance monitoring and enforcement, they also create new forms of power and control. This duality reflects broader debates about the role of surveillance in contemporary society (Lyon, 2018).

From a rights-based perspective, the use of surveillance technologies must be carefully balanced against the protection of fundamental freedoms. Courts play a crucial role in this process by establishing limits on the use of surveillance and ensuring that it is proportionate, necessary, and accountable.

The concept of governmentality provides a useful framework for understanding these dynamics. Surveillance is not merely a tool but a mode of governance that shapes behaviour and social relations. Judicial interpretations must therefore consider the broader implications of surveillance for democratic governance and human rights (Foucault, 1991).

6.4 Inequality and the Digital Divide

The integration of digital technologies into environmental governance has significant implications for inequality and access to justice. The digital divide affects who can access and use environmental data, participate in decision-making processes, and influence legal outcomes.

Marginalised communities may lack the resources and technical expertise required to engage with digital evidence, placing them at

a disadvantage in legal proceedings. This can exacerbate existing inequalities and undermine the principles of environmental justice (Ssebunya et al., 2026).

Addressing these challenges requires not only legal reforms but also broader efforts to enhance digital literacy, access to technology, and institutional support for marginalised groups.

6.5 Normative and Policy Implications

The findings of this study have several important implications for law and policy:

- **Development of Legal Standards for Digital Evidence:** Courts and policymakers should establish clear guidelines for the admissibility, reliability, and interpretation of digital evidence.
- **Strengthening Privacy Protections:** Legal frameworks must ensure that surveillance technologies are used in ways that respect privacy and human rights.
- **Promoting Inclusive Governance:** Efforts should be made to ensure that diverse voices are included in environmental decision-making processes.
- **Enhancing Judicial Capacity:** Training and resources should be provided to judges to improve their understanding of digital technologies and their implications.

6.6 Future Directions for Research

Future research should explore comparative judicial practices across different regions,

particularly in the Global South. There is also a need for empirical studies that examine how courts engage with digital evidence in practice.

Additionally, interdisciplinary research that integrates legal, technological, and social perspectives will be essential for addressing the complex challenges identified in this study.

7. Conclusion

This study has explored how judicial institutions interpret environmental rights in the context of expanding digital surveillance technologies, revealing a complex and evolving legal landscape. The findings demonstrate that courts are increasingly engaging with technologically mediated forms of environmental evidence, including satellite imagery, sensor-based data, and algorithmic analyses. These developments reflect a broader transformation in environmental governance, where digital technologies play a central role in monitoring, enforcement, and decision-making processes.

At the same time, the study highlights that the integration of digital surveillance into judicial reasoning is neither uniform nor unproblematic. Courts face significant challenges in evaluating the reliability, transparency, and ethical implications of digital evidence. The reliance on expert knowledge and algorithmic systems introduces new forms of epistemic authority, which may marginalise alternative perspectives, particularly those of local and

indigenous communities. As Jasanoff (2004) emphasises, knowledge production is inherently political, and judicial reliance on technologically generated data can reinforce existing power asymmetries.

Moreover, the tension between environmental protection and fundamental rights, especially privacy and due process, remains a central concern. While surveillance technologies can enhance regulatory effectiveness, they also risk enabling intrusive forms of governance that may disproportionately affect vulnerable populations (Lyon, 2018). Courts are thus required to navigate a delicate balance, ensuring that environmental objectives do not come at the expense of basic human rights.

The study also underscores the importance of environmental justice as a guiding framework for judicial interpretation. The digital divide and unequal access to technological resources pose significant challenges to inclusive environmental governance. As Ssebunya et al. (2026) argue, participatory approaches such as citizen science can democratise environmental monitoring, but only if supported by equitable access and institutional recognition.

In response to these challenges, the article argues for the development of a hybrid legal paradigm that integrates technological innovation with rights-based safeguards. This requires the establishment of clear legal standards for the admissibility and evaluation of digital evidence, as well as enhanced judicial capacity to engage with complex technological issues. Additionally, courts should adopt more reflexive and context-sensitive approaches that recognise the socio-

political dimensions of environmental data and surveillance practices.

Ultimately, the role of the judiciary is not only to adjudicate disputes but also to shape the normative contours of environmental governance in the digital age. By embracing interdisciplinary perspectives and prioritising principles of justice, transparency, and inclusivity, courts can contribute to the development of legal frameworks that are both effective and equitable. Future research should continue to explore comparative judicial practices and the evolving interplay between law, technology, and environmental rights, particularly in diverse socio-economic and geopolitical contexts.

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