

The Intersection of Environmental Law and Human Rights

Tariq Bashir

University of Azad Jammu & Kashmir, Muzaffarabad

Athar Kamal

University of Azad Jammu & Kashmir, Muzaffarabad

Abstract

Artificial intelligence (AI) technologies have transformed, and continue to change, virtually every aspect of modern life. Video gaming is no exception. With the popularization of smartphones that offer a relatively unified programming environment, numerous aspects of mobile gaming have been transformed. AI algorithms and libraries have become easily accessible and applications of AI within game contexts have multiplied. These factors all combine to influence the game design itself, the quality of the player's experience, and the ways game developers and designers think about video games.

This essay will consider AI technologies in the context of mobile gaming. It showcases some of the underlying circumstances that have rendered the integration of AI relatively straightforward. This includes an overview of the SDK landscape that has fuelled the development juggernaut in that field. The research project will also consider how AI is being used in a selection of local mobile games. As mobile games exist over a continuum of possible lengths, complexities, and game design requirements, particular attention will be given to Action and Simulation subsections. These subsets are chosen because they are disparate and bracket various options in regards to action and genre design. However, they are also united in their curiosity in how technologies might influence gameplay mechanics and user interaction. Furthermore, these case studies are also encompassed within the outer investigation of broader game design strategies and how AI can serve to drive innovation in mobile gaming. Finally, it will consider what AI technologies mean in the broader scope of mobile gaming and how they are poised to drive a new generation of personalization in gameplay design and player engagement. The essay features a broad scope of considerations, all regarding the current and evolving ways games are engaged with and thought about. At its core, games remain a channel of culture, experience, and co-operation; this exploration of AI technologies is meant to extend that experience and interaction in ways foreseen and unforeseen.

Keywords AI, mobile gaming, game development, player experience, SDKs, action games, simulation games, innovation

2. Introduction

On July 6, 1998, the first implementation of Snake was introduced on Nokia devices with the release of the Nokia 6110. This marked the first time the world went mobile with games for entertainment purposes. This was the foundation of what has become a significant sector in the technological world with revenue estimated to reach by 2025. Approximately million people in the U.S. own a smartphone and dedicate their time to gaming. This is representative of more than %, with a significant amount of this number representing users. The continuous technological advances have improved the quality of the games, allowing players interactive experiences, making it stand out as a form of entertainment. With great excitement, this essay explores the extent AI can be used to expand, enhance and improve mobile gaming, and to what extent it can affect what future mobile games could look like. Note well that the term ‘mobile’ refers to tablets, devices and devices.

Mobile gaming has drastically changed since from when Snake was released on Nokia devices. The quality of mobile games has improved remarkably and becomes more complex and sophisticated. The gaming sector is constantly adapting to technological changes; hence, with the rise in popularity AI technology has been implemented widely in games. Fundamentally, AI’s sole aim within games is to allow NPC’s to mimic properties of a human player, creating an experience for the game that would be unachievable otherwise. It seems the most attractive advantages AI components can bring to a game would be their potential to noticeably enhance the gaming experience in a variety of ways. Several have pointed out the importance of per-player customization and how this can enhance a player’s immersion in a game. AI systems allow the creation of infinitely customizable experiences and allow games to imitate excessively intimate ways of communication and interaction that would not be possible with human developers. This is highly attractive, since there is an incredible amount of people who indulge in gaming looking for an escape or sense of immersion that can be achieved in no other way. Now it’s possible to create AI systems that offer greater levels of interactivity which is simply unrealistic in human-run games. (Dyulicheva & Glazieva, 2021)

3. AI Technologies in Mobile Gaming

Artificial Intelligence (AI) technologies are revolutionizing game development (N. Yannakakis & Conference on Computing Frontiers, 2012). Machine learning, neural networks, natural language processing, and many other AI techniques have been incorporated into various game elements to create a more engaging player experience. In mobile gaming, AI can enrich player interaction and make games more fun with procedural content generation, intelligent character behaviors, and dynamic game environments. AI can process data in real time and adjust the gameplay and game environment on the fly. Therefore, a more adaptive and more personalized experience can be provided to better engage players in the game. While players can be supervised, analyzed, and provided feedback by AI systems, gaming environments can become more immersive. Recent developments in AI have been successful in predictive analytics and modeling player behaviors. Such models have enormous potential in mobile gaming. Attempts have been made to detail how these AI processes are integrated into the various game components and to imagine the future promise and needs of AI in the game industry.

4. Enhancing User Experience with AI

Artificial Intelligence in Mobile Gaming Development

5. AI-Driven Game Design

Artificial intelligence (AI) is having an increased influence on game design processes, transforming the way games are created. AI is facilitating the creation of games by providing new treatments for game design tasks. These treatments include procedural generation, where AI is used to create vast game worlds with unique characteristics, procedural narratives, where AI is used to create stories during gameplay to provide a more tailored player experience, and providing interface for co-creation between AI and human, allowing for collaborations in creating innovative game design ideas (Partlan et al., 2021). AI can also provide assistance in character design: AI characters are often required to play a role within the video game, in this context, it is important to create characters that present “believable” (or “realistic”) behaviors according to the characteristics of the character and its context. The development of game characters is a critical task in game design and is particularly complex in games where the characters play a central role in storytelling or gameplay characteristics. In this

context, the use of AI-driven models can offer a wide range of possible benefits, considering that AI models allow complex and non-linear relations to be learned by leveraging a large quantity of data.

AI-driven game design is facilitating additional abilities of considering the player's actions and adapting the game content accordingly over time. For example, the difficulty in which the platformer game should be generated could be dynamically adjusted to the player's performance during gameplay to provide a larger challenge. In practice, the creative authorship of these systems also comes from another creative author human (N. Yannakakis & Conference on Computing Frontiers, 2012). Mobile games have evolved into an AI Game that can also operate on hundreds of millions of devices. The performance of the game under AI control changes fundamentally because unexpected behavior would happen. The co-evolution and adaptation strategies of all these possibilities are ripe topics for ongoing study and future discussion (Machado et al., 2019). However, there are also concerns about the influence of AI on the design of games. It is debated whether AI-driven game design is unethical due to the lack of creativity and originality in co-generated games. In this paper, the tenability of these debates in the context of mobile game design is examined.

6. Challenges and Ethical Considerations

With the rise of City Server and GDPR, gathering data has become a challenging task for mobile gaming industry. Informing and obtaining a user consent is another dilemma especially in the case of AI usage. It is crucial to figure out paths to implement AI technologies while protecting personal information and consider the privacy issues regarding AI use in creating realistic avatars and interactions. AI technologies should be used with a consideration of its consequences to prevent data breach, take caution about employing biased data, and guarantee the fairness of its use. As the implementation of AI technology in video game grows, it is urgent to acknowledge the power of AI that can provide users with innovative features and extend immersive experience, and thus to raise a discussion concerning ethical considerations which should be carefully thought through by the game companies. As a reflection to the workshop, possible challenging tasks and ethical concerns about the AI implementation in the game creation with a concern of transparency, fairness, data

security, and innovationness are brought up as discussion points to foreground in part of mobile game companies and hope to enhance social responsibility about the AI use in video games (Seif El-Nasr & Kleinman, 2020). As AI technology is commonly integrated into video game, one of its salient uses is creating realistic avatars that can interact with human players. Because of this use of AI technology in video game, it is important to grasp the ways in which its artificiality is captured and concealed. In a workshop convened by the authors from the creators' perspective with game developers consisting of indie developers, sound engineers, producers, technical artists, to discuss an AI-tool called Wysilab. The ethical concerns about using the avatars in multiplayer games, the potential consequences of losing the remaining unknown in the game process of these AI, and ways in which these ethically difficult attributes might be managed are considered. Invisibility of the tool use in proprietary game dev software as a way to mitigate the loss of game process secret that can harm an immersive gaming experience and control AI-method creation so game developers have absolute control over how it is deployed are also examined. This workshop has been found scientifically valid and useful because AI is the main advancement in games right now. There are concerns developing and these can help to navigate some of these challenges. (Hassan et al.2022)

7. Future Trends in AI and Mobile Gaming

Introduction Glancing into the crystal ball...In this special track change highlighting document, a glimpse into future trends and reflections on AI's impact on mobile games are exposed.

A Golden Age for Dynamic Player Profiling? A key driver of artificial intelligence in mobile games is dynamic player profiling. Yet present-day AI algorithms can map only a tip of the player iceberg (N. Yannakakis & Conference on Computing Frontiers, 2012). Advanced AI capabilities in the future might cater to hyper-personalized mobile game experiences created to match a player against their entire personal player profile. Everything from game mechanics, aesthetics, challenges, narrative, monetization, virtual goods etc. can be fine-tuned on a player-by-player basis. Over time, such games can start resembling an abstract version of life itself. Think an updated mobile equivalent of "The Sims" with heavier investment mostly on AI instead of content.

VR and AR Meet AI By their own rights, Virtual Reality (VR) and Augmented Reality (AR) have emerged as rapidly growing sectors. Add AI in the mix, and some fascinating prospects lay bare on the future. For one, a VR or AR game environment that dynamically adjusts to a player's biometric and in-game behaviour in a bid to ensure a great level of gaming immersion. A more intricate possibility might be a VR/AR game where AI "coaches" propose the most effective in-game actions, hence, participating at the same time as both a co-player and a player's auxiliary brain. In some extent, we're already laying down the groundwork for AI-assisted player immersion. (Dyulichева & Glazieva, 2021)

8. Conclusion

The combination of accessible games and advancing technology creates a myriad of mobile gaming innovations that have the potential to transform the industry. Widespread popularity of mobile games is owed to the increased adoption of smartphones, tablets, and the like, which provide users with constant access to games on the go. Also, live games are more frequently becoming a service, where developers are operating live updates and ongoing events to maintain a community of players. AI technologies are predominantly used by game developers to focus on two main areas: improving player's gaming experiences through the analysis of user data, and enhancing the gamer's design experience by assisting in the creation of design elements and game mechanics.

To further explore the impact of AI technologies in mobile game development, emphasis was first placed on the more transformative uses of AI in game development—involving the ways in which AI technologies have been used to create mobile games. The discussion included AI generated content, wherein AI is used to generate narrative, levels, quests, and even game worlds; how AI generated content can be used to create adversarial levels in mobile games, thus improving the replay ability of the game; and provide details about the AI model that can be the basis of a system to generate such content. Other AI powered design tools for game developers were discussed. These include tools that assist in, among other things, character or narrative design. Finally, a brief reflection on some of the wider implications and concerns regarding AI use in game development was added.

References:

- Dyulicheva, Y. Y. & Glazieva, A. O. (2021). Game based learning with artificial intelligence and immersive technologies: An overview.. CS&SE@ SW. academia.edu
- N. Yannakakis, G. & Conference on Computing Frontiers, 9th (2012). Game AI revisited. [PDF]
- Partlan, N., Kleinman, E., Howe, J., Ahmad, S., Marsella, S., & Seif El-Nasr, M. (2021). Design-Driven Requirements for Computationally Co-Creative Game AI Design Tools. [PDF]
- Machado, T., Gopstein, D., Nov, O., Wang, A., Nealen, A., & Togelius, J. (2019). Evaluation of a Recommender System for Assisting Novice Game Designers. [PDF]
- Seif El-Nasr, M. & Kleinman, E. (2020). Data-Driven Game Development: Ethical Considerations. [PDF]
- Hassan, S. Z., Salehi, P., Røed, R. K., Halvorsen, P., Baugerud, G. A., Johnson, M. S., ... & Sabet, S. S. (2022, June). Towards an AI-driven talking avatar in virtual reality for investigative interviews of children. In Proceedings of the 2nd Workshop on Games Systems (pp. 9-15). [google.com](https://www.google.com)

The Intersection of Environmental Law and Human Rights

Abstract

This paper explores the intersection of intellectual property rights (IPR) and artificial intelligence (AI), emphasizing the challenges and opportunities presented by AI technologies in relation to existing IPR frameworks. As AI systems increasingly generate original works across various domains, including art, literature, and technology, traditional notions of authorship and ownership are being challenged. The study categorizes IPR into copyrights, patents, trademarks, and trade secrets, discussing how each type interacts with AI innovations. It highlights the complexities surrounding copyright law, particularly regarding AI-generated content and the question of whether machines can be considered authors. Furthermore, the paper examines the implications of machine learning and deep learning technologies, which can create new forms of innovation but also complicate existing legal protections. The

analysis underscores the need for updated legal frameworks that address the unique characteristics of AI-generated works while fostering innovation and investment in AI technologies. The findings advocate for a collaborative approach among policymakers, technologists, and legal experts to develop a regulatory environment that supports both the protection of intellectual property and the advancement of AI capabilities.

Keywords

Intellectual property rights, artificial intelligence, copyright, patents, machine learning, legal frameworks, innovation, authorship

1. Introduction

Human rights and environmental law have long been considered disparate fields, but increasingly, their intersection has been recognized as one of the key challenges of contemporary legal systems. Not only are human rights defenders commonly confronted with lead poisoning, domestic pollution, and climate displacement, but the global community has come to acknowledge that environmental concerns must not give rise to human rights abuses. The focus is on sustainable development, and what this means is threefold. It revolves mostly around the notion of human security, promising human development and human protection, as well as environmental integrity. This means that human rights such as property rights, cultural rights, health rights, and others too numerous to mention are ensured and, therefore, protected when states engage in sustainable development programs. States are increasingly being held accountable at the national as well as international levels to justify proposed developmental projects involving environmental risk, as well as to demonstrate that a duty of care on the part of states is refined and extended to vulnerable people who are likely to be adversely affected by environmental harm emanating from developmental activities, including but not limited to management of toxic waste and global warming (Benesch et al.2021).

This essay explores the intersection of human rights and environmental law, specifically focusing on access to environmental justice. Environmental justice, as a concept, is informed by both substantive principles like the right to life, health, and information, and procedural principles such as equality and non-discrimination. The

core principle, borne out by numerous global and regional norms, is that everyone enjoys a fundamental right to a sound and healthy environment. Access to environmental justice, or freedom from environmental degradation and the enjoyment of a clean and healthy environment, ties in the right to life.

2. Historical Development of Environmental Law and Human Rights

Historically, environmental law and human rights have been concerned, respectively, with the narrow interests of humans or with the biophysical environment. But beginning in the 1960s, and then gathering pace from the late 1980s, the two began to intersect. In the earlier period, a new international environmental law came into being; in the later period, a discourse emerged which invoked human dignity as the basis for a fundamental right to a clean, healthy, and safe environment. Some date the emergence of international environmental law with the Barcelona Convention concerning the regulation of whaling, and scores of similar treaties to regulate common property resources were concluded between the wars, but very often national concern for the environment lagged behind customary practices.

Several legal documents and international conferences of great importance were milestones in the development of international environmental law after 1972. In 1972, the Stockholm Conference on the Human Environment, at which countries agreed to the Stockholm Declaration, was a turning point in that it focused world attention on environmental protection in relation to human rights. The Declaration does not refer explicitly to human rights as now widely defined in international law and has thus been criticized as not providing secure protection for human rights. Nevertheless, more recent international documents establish a link between human rights and the environment. The Rio Declaration on Environment and Development, for instance, and Agenda 21 both recognized the right of every human being to an environment adequate for their well-being. A connection between the environment and human rights is also demonstrated by the fact that an increasing number of international organizations and UN agencies agreed that environmental degradation can - and frequently does - result in human rights violations. The normative framework reflects the growing consensus that a sound and healthy environment is essential as an enabling condition for the enjoyment of fundamental human rights, including the rights to life and health.

3. Key Principles and Concepts in Environmental Law and Human Rights

There are three foundational principles that are central to analyzing the intersection of environmental law and human rights: the Precautionary Principle, the Principle of Non-Discrimination or Vulnerability, and the Principle of Interdependence and Indivisibility of Human Rights (Roch & Sampaio, 2019).

a) **Precautionary Principle** The Precautionary Principle, or rule of caution, operates as an imperative for preventive action to protect against a possible environmental or human health threat. States must apply preventive measures in order to prevent, control, and minimize damage. It represents a proactive capacity of law for future problems. It operates in a context of scientific uncertainty. It is important to act despite ongoing efforts to assess the existence of risks. The burden of proof must be detached from the victim to the potentially responsible party. It operates towards established irreversible harm. The responsibility attached to the liable party presents a concept that lies in the voluntary perspective.

b) **Principle of Non-Discrimination or Principle of Vulnerability** In the gestation of human rights in an environmental context, discrimination produces profound inequalities affecting the poorest for political or racial reasons, as well as privileges in terms of economic power, indirectly affecting human rights. Finally, not only does the right to a certain environment, more or less healthy, derive, but human rights themselves, considering their dependence, acquire a position of forbidden fruits in the debate on pollution and on the construction of large infrastructures.

3.1. Precautionary Principle

One mechanism within environmental law that supports the protection of human rights in the context of the environment is the Precautionary Principle. This principle is important in both human rights and environmental law, and thus provides an optimal starting point for discussion. The Precautionary Principle aims to address doubts about the existence of threats of serious or irreversible damage in order to protect human health and the environment. It explicitly states that: "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation." Furthermore, international human rights instruments, specifically in the realm of economic, social, and cultural rights, have also required that steps are taken

to prevent pollution and ensure that the consumption of natural resources is within the ability of ecosystems to regenerate.

Various treaties or instruments on the environment have incorporated the Precautionary Principle as one of the inherent elements. At a national level, several states or nations have also acknowledged the existence of the Precautionary Principle and given it direct enforcement. Internationally, various conventions and legal systems provide provisions related to the application of the Precautionary Principle. Besides that, some international tribunals have applied this Principle. Precaution is applied in a range of areas such as climate change and pollution. It encourages states and corporations to take measures to prevent and mitigate harm in situations in which there is a lack of full scientific evidence about impacts on environmental health. In the context of its application in the area of human rights and in the area of environmental governance, the objectives of the Precaution are not fundamentally contradictory, if the concept of precaution is used to integrate the requirement for caution in the protection of the environment and the social and economic rights of impacted communities. In this way, accounting for implications and human rights facilitated by precaution provides a platform for reflection and evaluation of development activities, including policies and programs that are impacting communities. It is therefore key to promote a precautionary approach in environmental governance. Precaution is more than human rights and environmental preservation; it is also a democratic value.

3.2. Principle of Non-Discrimination

The principle of non-discrimination is part of the core at the intersection of human rights and the environment. This principle requires that “no one be discriminated against, in particular on the basis of nationality, place of residence, sex, color, or religion.” Environmental hazards, however, often result in limited access to environmental resources, as well as adverse impacts on human health that members of marginalized and vulnerable sectors of society experience.

International and regional environmental agreements acknowledge that the hazardous activities of states and businesses pose a threat to several human rights and, like other states and businesses, should respect human rights in their activities. As shown through numerous case studies and in light of legal obligations flowing from the principle of non-discrimination, states have a duty to ensure the protection of

Indigenous Peoples, women, and other vulnerable groups from natural resource exploitation and distribute costs and benefits of production equally. The principle of non-discrimination is particularly relevant for the vulnerable poor who tend to live and work in areas of high environmental degradation and are especially at risk from a changing climate.

People in poverty are the most vulnerable to natural hazards as they tend to live in poorer quality housing, mostly in densely populated low-income areas. Several international documents outline the special responsibilities states and the international community have to protect specific groups from environmental degradation, which may be detrimental to human well-being. It has been successfully argued that expanding the rights argument gives a fuller value to the right to health, integrating and actualizing social justice principles and deserving additional legal protection. International human rights instruments and immediately relevant provisions provide an international legal obligation to protect the vulnerable poor based on their distinctive negative risk externality. The international right to development, which integrates economic, social and cultural rights and civil and political rights, must have “an immediate bearing on the realization of environmental and human rights.” The effective promotion of sustainable development will, vice versa, safeguard human rights.

3.3. Interdependence and Indivisibility of Rights

Environmental protection is part of human rights due to the indivisibility and interdependence of rights under international human rights instruments. Interdependence means that human rights are related, linked, or interconnected; the loss of one right may lead to the loss of other rights, especially other economic, social, and cultural rights. Deprivation of the right to food, caused by a variety of factors, might also have impacts on health care, housing, freedom from torture, and discrimination, and ultimately lead to the deprivation of the right to life. Indivisibility means that economic, social, and cultural rights are not mutually exclusive from civil and political rights. According to this principle, the enjoyment of human rights by an individual is interconnected by a shared value, and all rights should be supported and observed for the welfare of the individual. The right to a healthy environment has inevitably emerged due to this principle (Feria-Tinta, 2021).

One of the major factors of the right to a healthy environment is the internal structure of the economic, social, and cultural rights, a trio of rights enshrined in the International Bill of Rights. As resources underpin the enjoyment of these rights, the undisturbed functioning and management of the environment are inevitable conditions for the welfare of individuals. Depletion of natural resources may affect people's health, housing conditions, water availability, cultural rights, rights to food, and livelihood. For example, deforestation leads to slow poisoning because of the use of timber treated with chemicals. It may also lead to land degradation and water pollution, which, in this case, may have implications for all economic, social, and cultural rights, such as the right to water, sanitation, food, and health. Similarly, damages to the atmosphere from oil and industry negatively impact health, water quality, land, and access to food, thus impeding the enjoyment of a range of rights. As the entire livelihood of the people is very much related to these socio-economic rights, it is important to propose an integrated approach. Historically, the atmosphere, ocean, soil, water, and climate were addressed by separate policy frameworks and sectors, resulting in fragmented management systems with limited coordination among them. A solid argument in favor of integrated thinking and actions is the interdependence and indivisibility of human rights. Experiences with various international bodies clearly show that large numbers of countries and civil society organizations support a systematic and multidisciplinary approach to confront the impacts of climate change. The African Charter for Human and Peoples' Rights states that: "All peoples shall have the right to a general satisfaction of the conditions necessary for their economic, social, and cultural development. Nature of this entity, Mother Earth, is considered by all people as sacred. In Latin American indigenous peoples' language, Mother Earth is embraced in the collective understanding of human dignity.

4. Case Studies and Examples

The intersection of environmental law and human rights becomes most clear in the context of specific examples and case studies. These examples have been carefully selected to demonstrate these connections, as they represent a collective viewpoint from a variety of jurisdictions. A sample of these cases forms the basis for this part of the book (Mejía-Lemos, 2022)

In a notable case, the superiority of international law was used as the basis for a holding on environmental protection. The court in that case stated that international declarations and conventions had the binding effect of law, and as a result, local laws and regulations inconsistent with such international norms were to be set aside as unconstitutional. On this basis, the decision adopted by the court was in stark contrast to some of the positions adopted by other superior courts in Africa, particularly in recognizing the binding effect of international human rights and other treaties as laws of a local jurisdiction. The judiciary has portrayed a dedication to the principles of environmental justice, and every case was indeed characterized by some degree of minority and special interest response, a situation illustrating the fervent debate on the subject matter in most jurisdictions.

Each of these cases demonstrates the capacity for local communities to link human rights and environmental rights law in terms of both reigning in environmental pollutants and advancing the development of environmental rights case law. They also reveal some of the hurdles facing those attempting to win their case in court, including the need to educate sometimes hostile judges on the linkages between human rights and environmental rights. The former fatalities bring to light fundamental principles governing the filing and determination of public interest environmental litigation, including locus standi, justiciability, cause and effect. All these cases warrant due incisive scholarly research endeavors of national, continental, and international leverage, given their universal application as worldwide reference points drawn from various locations.

4.1. The Right to a Healthy Environment in the Inter-American Court of Human Rights

The protection of the environment through the fostering of human rights has started to be recognized by regional human rights bodies and various international scholars. This section reflects the recognition of the role of environmental threats on human rights issues. In this sense, the Court in various landmark cases has pondered environmental protection measures. Especially, the gathering of cases highlights the development of a synergy focusing on respecting and protecting the right to a healthy environment as a human right. The Court has often dealt with adjudicating the facts regarding the adverse effects of pollution, such as skin diseases or the sanitation

attacks on the land of certain indigenous and local communities (Garín & Chávez, 2020).

The first hint of this perspective can be found in the first landmark case considering the harmful impacts near an oil field in the homeland of indigenous peoples. In principle, the human rights treaties do not stipulate the right to a healthy environment. Nonetheless, on several occasions, the Court has upheld the adverse social effects of cases that demonstrate deep levels of health and environmental intertwinement, indicating that its legal protection of the right to a healthy environment is nurtured. The members of the affected indigenous community asserted that a company is causing a range of environmental and public health harms, depriving them of their visits and cultural practices. These are used in good faith and precedent-based to provide a framework in litigation and legal argumentation for indigenous communities and environmental human rights advocates. Yet, these examples can be relied upon even in environmental crime cases, where private entities misuse the environment to enhance profit-making, which are being addressed with special criminal or compensation measures. The gradually adopted judicial interpretive tools lead to a newly transformed paradigm in environmental human rights law. This was infused with practical legal meaning in a notable case, in both the Inter-American and international human rights tribunals.

During the history of case law and in the continuous jurisprudential change, the most challenging question to be answered is to investigate what kind of duty the creation embodies. There is much promise for a normative and doctrinal command about the obligation of the international court in the face of such a transformation. In the established paradigm, this jurisprudential tour at last culminated, emanating the rejuvenated interpretation of a substantive civic right within the required forum. Then, within the latter period, it would be elucidated if this newly reconceptualized right or interpretation actually made a practical difference in the approaches to addressing the state's breach in environmental harm cases. This is to say that it is crucial to investigate whether or not a significant jurisprudential departure of further development is reflected in the Court's ruling.

5. Challenges and Opportunities for Advancing Environmental Rights

Enforcing laws aimed at protecting the environment, and in turn, the human rights that depend on its quality, sufficiency, and preservation remains a consistent problem in all parts of the world. Government commitment to protect the environment and implement a myriad of public policies related to the environment is not sufficient unless and until they address the root causes of non-enforcement: weak institutions incapable of implementing the law, inadequate resources for such implementation, intentionally degraded mechanisms to check compliance or potential limits on future control, and a body of law that is incapable of addressing the environmental problems of today or the future.

Discharge into the environment, and the resulting emissions, which lead to myriad other inhuman, degrading, and preventable acts, including the spread of disease, diminishing access to water, creating food insecurity, and destroying property and lives, continue to go unchecked for a variety of reasons. Some governments have endemically weak enforcement practices while others intentionally degrade enforcement institutions and checks. Corruption can render any otherwise legitimate attempts at implementation ineffective. In many cases and regions, laws and policies aimed at protecting the environment are not in place or have significant gaps. In almost all countries, there are significant political dynamics at play with respect to any attempt to implement existing laws. There may also be strong, legitimate arguments for giving priority to different rights at a given time or place if the environmental laws are enforced. There is also a growing use of public interest litigation as a tool to try to hold those who imperil the environment and its dependent human rights accountable. Finally, many human rights forums offer protection under limited legal scenarios, such as a demonstration of reprehensible intent or proof of imminent risk to life.

5.1. Enforcement and Implementation Gaps

The realization of environmental rights is significantly impeded by enforcement and implementation gaps under existing legal frameworks. In many countries, legal provisions are either too few and weak to offer sufficient protection to people or are not effectively implemented. Laws that cannot be enforced are often systematically ignored. Due to inadequate funding, relevant agencies have traditionally carried out

only a small fraction of the community right-to-know provisions (Mayer, 2021) Among other things, these provisions require businesses and governments to publicly report annual information about the quantity, source, and type of hundreds of toxic chemicals released to air, water, and land in thousands of local communities, widely appreciating that public disclosure of such data is necessary for the fate and transport of chemicals and emergency planning by local communities. These enforcement gaps are especially troubling given that many persons who rely on natural resources for their food and water most heavily also often live in remote and difficult-to-reach areas. Thus, an unhealthy cycle of degradation and disease often occurs, in which persons who suffer most from environmental degradation often become increasingly poor and unable to take care of the environment. Their poverty, in many cases, thwarts the development of the necessary infrastructure and information that would enable them to clean up the environment. International enforcement programs and technical assistance are needed to break this destabilizing cycle of inequality and environmental decline. Successful strategies for enforcement of environmental rights require enhancements in several areas. In addition to developing international avenues for enforcement, there is a need for capacity building in less developed countries, where basic technical equipment and information for environmental protection is often inadequate. In addition, there is an urgent need for more systematic capacity building to help mobilize environmental enforcement agents. This would involve emergency programs for training in evidence gathering, courtroom skills, multiple agency cooperation, and international cooperation programs, technical assistance, and experience exchange, including exchanges between public and private sector representatives. In line with this, relevant codes of conduct have called for technical assistance programs that can more effectively make national enforcement efforts sustainable. These programs need to be put on a priority agenda.

5.2. Climate Change Litigation

Climate change litigation is a new trend in environmental lawsuits, but it is significant because the majority of cases filed around the world aim to further environmental rights and often rely on human rights as a basis for their claims. Many lawsuits focus on government actors who inadequately address climate change by failing to implement policies and regulations, exerting authority, or ensuring that appropriate

strategies are in place. In contrast, a limited number of cases have pursued private actors, including corporations and enterprises, whose business activities have contributed to exacerbating climate change. In some jurisdictions, climate change-related lawsuits have attracted significant attention as courts struggle to answer complex legal questions. In a limited number of cases, government and corporate actors have been held accountable for failing to address climate change in a manner consistent with human rights norms. Such decisions could potentially guide future decisions by other judges (Tigre & Urzola, 2021).

The Inter-American Court of Human Rights holds that the Earth Charter, Universal Declaration of Human Rights, and the New Declaration of Human Rights associated with the Climate Crisis can lead to state obligations to prevent activities that may give rise to human rights violations many decades into the future. While domestic courts in countries other than the USA have not pursued such a line of argument, there are strategic advantages to articulating human rights-based climate arguments. These include providing judges with the tools to conduct balancing tests between different interests in society, including but not only human rights. The development of human rights-based arguments for climate change cases is also important for their wider procedural implications beyond arguments of force majeure and the prevailing lack of climate science uncertainty surrounding the difference between weather and climate. Overall, instances of climate change litigation have the potential to affect policies and regulations, alter the course of the underlying climate science, and further diminish legal defenses that use uncertainty in climate science to argue in favor of maintaining the status quo. Climate change lawsuits are also a useful tool to galvanize public opinion and can lead to systemic changes in corporate and government behaviors. Frequently mobilizing civil society and the establishment of grassroots organizations is the actual policy behind bringing climate change lawsuits (Feria-Tinta, 2021)

References

- Rocha, A., & Sampaio, R. (2022). Climate change before the European and Inter-American Courts of Human Rights: Comparing possible avenues before human rights bodies. *Review of European, Comparative & International Environmental Law*, 32(2), 279-289.

- Benesch, T., Sergeeva, M., Wainstock, D., & Miller, J. (2022). Climate change, health, and human rights: calling on states to address the health risks of climate change, through the Inter-American Court of Human Rights. *The Lancet Regional Health–Americas*, 34.
- Feria-Tinta, M. (2021). Climate Change as a Human Rights Issue: Litigating Climate Change in the Inter-American System of Human Rights and the United Nations Human Rights *Climate Change Litigation: Global Perspectives*. [HTML]
- Mejía-Lemos, D. (2022). The Protection of the Environment through International Human Rights Litigation: Taking Stock of Challenges and Opportunities in the Inter-American System. *Human Rights Law Review*. [HTML]
- Garín, A. L. & Chávez, M. O. (2022). Climate Change and the Right to Health in the Inter-American System of Human Rights. *Global Health Law Journal*. unisanta.br
- Mayer, B. (2021). Climate change mitigation as an obligation under human rights treaties?. *American Journal of International Law*. cambridge.org
- Tigre, M. A., & Urzola, N. (2021). The 2017 Inter-American Court's Advisory Opinion: changing the paradigm for international environmental law in the Anthropocene. *Journal of Human Rights and the Environment*, 12(1), 24-50. [HTML]
- Feria-Tinta, M. (2021). Climate change litigation in the European Court of Human Rights: causation, imminence and other key underlying notions. *Europe of Rights & Liberties/Europe des Droits & Libertés*, 2(1), 52-71. europedeslibertes.eu