

Addressing Artificial Intelligence for Environmental Challenges in Algeria: Legislative Prospection and Constitutional Vigilance

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Abstract:

Modern societies are increasingly interested in the applications of artificial intelligence (AI), particularly in the areas of environmental protection and sustainable development. AI plays a significant role in promoting health and well-being. The principles of environmental law in Algeria include forward-looking measures to keep up with technological advancements and utilize them for environmental preservation.

The Algerian constitution also emphasizes the importance of environmental protection, supporting sustainable environmental conservation efforts. While AI offers numerous benefits, it also raises concerns, such as the depletion of non-renewable resources, which contradicts the concept of environmental sustainability and hinders the rights of future generations to a healthy environment

Keywords: Artificial intelligence, environmental protection, sustainable development, intergenerational equity, constitutional commitment.

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Introduction:

Environmental issues are classified as one of the most complex and pressing challenges for the international community, requiring creative and innovative solutions to preserve the planet and ensure sustainable development. In this context, artificial intelligence (AI) emerges as a powerful and innovative tool capable of enhancing our response to environmental challenges. Advanced AI technology offers significant opportunities for analyzing and monitoring climate change and providing effective solutions for environmental conservation and sustainable development. In this paper, we will explore how AI applications can be a crucial part of our efforts to address environmental challenges and achieve environmental sustainability.

AI applications serve as a rich source of tools and techniques that play a vital role in environmental preservation and promoting sustainable development. Through the use of remote sensing devices and geomatics systems, sources of environmental pollution can be accurately and efficiently identified and analyzed. This technology works towards achieving an optimal balance between economic growth and the social aspects of sustainable development, while safeguarding environmental integrity and the rights of present and future generations. Focusing on and supporting these aspects is fundamental to ensuring the achievement of sustainability goals.

Environmental protection and sustainable development are constitutionally enshrined rights in Algeria. The Algerian constitutional founder explicitly recognized the importance of environmental protection and sustainable development as the foundation for economic and social growth. Therefore, harnessing the potential of technology and AI applications has become essential for achieving sustainability objectives.

However, it is important to be aware that AI applications also present challenges that require serious attention. Despite the numerous benefits they offer, they may deplete non-renewable natural resources. This challenge can potentially conflict with the principles of sustainable development, necessitating careful consideration of how to utilize technology in a way that enhances environmental protection without compromising the rights of future generations.

In this context, this study raises questions about the implications of the rapid advancement of artificial intelligence applications on environmental protection and sustainable development

in Algeria. To address this issue, we propose addressing the topic through two main axes:

- Legislation regulating environmental sustainability and the use of artificial intelligence applications in Algeria :
- The impact of the evolving artificial intelligence applications on the environment and sustainable development.

Section I: Legislation Regulating Environmental Sustainability and the Use of Artificial Intelligence Applications in Algeria

Algeria is diligently working towards achieving environmental protection within the framework of sustainable development. Historically, these efforts have manifested in legislation that aligns with the global trend of environmental protection and sustainability over the past century. In 1983, Algeria issued its first dedicated environmental protection law, **Law 83-03**, enacted on February 5, 1983. This law represents a legal embodiment of Algeria's commitment to preserving the environment and ensuring its sustainability, marking an important step towards enhancing environmental protection in Algeria. Since then, several measures and legislations have been implemented to further strengthen environmental protection and sustainable development.¹

Before the concept of sustainability emerged on the international stage, legislative developments at both national and international levels regarding the environment were observed. In this context, the **Environmental Protection Law** was issued in Algeria in 2003, marking the first use of the term "sustainable development" in the law.² This step embodied the influence of the report by the **World Commission on Environment and Development**, known as *Our Common Future* (1987)³. Subsequently, legislation increasingly focused on sustainable development, leading to its explicit recognition

1 - Law 83-03, dated 22 Rabi' al-Thani, 1403, corresponding to February 5, 1983, concerning environmental protection, Official Journal No. 06 of the year 1983 (repealed).

2 - Mohammed Goujil and Nabilah Qurziz. *The Utilization of Circular Economy Technology in Islamic Banking Industry*. *Journal of Economics*, 2021, p. 250.

3 - World Commission on Environment and Development. *Our Common Future*. 1987, NU, Report of the World Commission on Environment and Development : note / by the Secretary-General, Date of access: 04/27/2025, time of access: 08:00 on the following website: <https://digitallibrary.un.org/record/139811?ln=fr>

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and dedication in the constitution, highlighting the importance of environmental sustainability and the commitment to it.¹

The absence of direct laws specifically addressing artificial intelligence (AI) in Algerian legislation poses an interesting and challenging legal issue. Ongoing discussions at various levels, including jurisprudence and law, are necessary to address some of the challenges through legal solutions and the creation of legislative texts related to AI and its uses in various fields. These challenges include issues such as privacy, data protection, and civil liability.

Consequently, competent authorities at the legislative level, in collaboration with academic circles, are preparing legislation specifically for the field of artificial intelligence. It is evident that the current relevant laws may not be sufficient to address all the complex challenges associated with AI. Therefore, updating some of the existing legal systems and creating new laws that align better with rapid advancements in this field is necessary.

A) subtitle: Addressing Algerian Laws Regarding Environmental Sustainability

Sustainable development is considered a fundamental element in the Algerian constitution, emphasizing its importance and the protection of the environment in several constitutional articles, whether explicitly or implicitly. The Algerian constitution aligns with Algeria's international obligations in the field of environmental conservation and aims to achieve a balance between economic, social development, and environmental protection. The state seeks to improve the quality of life for current and future generations by promoting sustainable development and preserving natural resources and environmental heritage.

Environmental protection within the framework of sustainable development holds a prominent legal position in the Algerian legal system, fundamentally connected to a set of relevant laws. This

1 - Law 03-10, dated July 19, 2003, Official Journal number 43 issued on 20 Jumada al-Awwal, 1424, corresponding to July 19, 2003, concerning environmental protection within the framework of sustainable development.

connection demonstrates the evolution, progress, and integration of the concepts of environmental protection and sustainable development, with their highest expression found in the hierarchy of laws, which explains their inclusion in the Algerian constitution, considered the country's supreme law. Additionally,¹ the Algerian environmental law is titled *The Law on Environmental Protection within the Framework of Sustainable Development*. Furthermore, Algeria adopts international commitments in sustainable development, notably the **United Nations' 2030 Agenda for Sustainable Development**.²

The explicit inclusion of environmental protection was ensured through the constitutional amendment of 2016 in Algeria.³ This commitment was reinforced by the constitutional amendment of 2020, which is currently in effect. Article 64 of the amendment states:

"Citizens have the right to a healthy environment within the framework of sustainable development. The law determines the duties of natural and moral persons to protect the environment."

Linking and integrating the constitutional framework of environmental protection within the context of sustainable development enhances the state's commitment to preserving the environment and improving quality of life. It reflects the official stance of the state towards these issues and the importance placed on them.⁴

1 - Website: United Nations Sustainable Development Group, Accessed on: 08/03/2024, Time of Access: 15:10, Website URL: <https://unsdg.un.org/ar>

2 - United Nations. 2030 Agenda for Sustainable Development, Transforming our world: the 2030 Agenda for Sustainable Development, Date of access: 04/27/2025, time of access: 06:00 on the following website: <https://sdgs.un.org/2030agenda>

3- Law 16-01, dated March 6, 2016, including the constitutional amendment, Official Journal number 14, dated 27 Jumada al-Awwal, 1437 AH, corresponding to March 7, 2016.

4 " - The following is stated in the preamble of the Algerian Constitution of 2020: «The Algerian people express their commitment to the human rights enshrined in the Universal Declaration of Human Rights of 1948 and the international conventions ratified by Algeria.

The Algerian people are determined to reduce social disparities and eliminate regional inequalities, working towards building a productive and competitive

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Indeed, Article 21 of the Algerian constitution explicitly emphasizes the state's commitment to preserving the environment and natural resources:

"Article 21: The state ensures:

- **The protection of agricultural lands,**
- **The guarantee of a healthy environment to protect individuals and achieve their well-being,**
- **Continuous awareness of environmental risks,**
- **Rational use of water, fossil fuels, and other natural resources,**
- **The protection of the environment in its terrestrial, marine, and atmospheric dimensions, and the adoption of all appropriate measures to punish polluters."**

Furthermore, Article 64 establishes the right of citizens to a healthy environment within the framework of sustainable development, defining the duties of natural and moral persons to protect the environment.¹

The Algerian laws have accorded significant importance to sustainable development at various levels. **Law No. 01-19**, which pertains to waste management, monitoring, and treatment, exemplifies this commitment to environmental preservation and ensuring sustainable development. Additionally, there are other laws such as **Law No. 04-09**, which encourages the promotion of renewable energy, and **Law No. 04-20**, which addresses major hazard prevention and aligns with the concepts of environmental protection and sustainable development.²

economy within the framework of sustainable development. Furthermore, the people remain concerned about environmental degradation and the adverse effects of climate change, striving to ensure the protection of the natural environment and the rational use of natural resources while preserving them for future generations ».

1- "Refer to Article 64 of Presidential Decree number 20-442, op.cit

2 - Himoum, Madjid, "Sustainable Development in Light of Algerian Legislation," *Journal of Legal and Political Research*, Volume 3, Issue 01, 2021, p. 315.

The previously repealed law for environmental protection was numbered **83-03** and was titled *The Law on Environmental Protection*.

¹ Following legislative developments in environmental matters, the Algerian legislature enacted the **Environmental Law**, currently in effect under number **03-10**, named *The Law on Environmental Protection within the Framework of Sustainable Development*.

The concept of sustainable development has been incorporated into the titles of laws in many domestic legislations as an officially recognized principle. Its purpose is to clarify the balance that must be achieved between economic and social development and environmental protection. This modern concept reflects the prevailing direction of states, aiming to meet the needs of both current and future generations sustainably.²

Law No. 03/10, previously mentioned, is considered a prominent example of embodying the concept of sustainable development in environmental aspects. This law clearly focuses on providing legal protection for natural and plant resources, demonstrating how sustainable development influences local laws.

Furthermore, the impact of this concept can also be observed in **Law No. 03/01**, which relates to the sustainable development of tourism. This law directly relies on the concept of sustainable development and incorporates it into the definition of sustainable development for the tourism sector.³

By recounting the important legal concepts introduced by domestic legislations, we notice that they collectively aim at achieving intergenerational social justice in resource distribution. Algeria faces significant challenges in sustainable development, and the state aims to achieve this goal by implementing clear programs and allocating

1 - Law number 83-03 (repealed), *op.cit*

2- Refer to Article 04 of Law number 03-10, *op.cit*.

3 - Lekssasi Sidi Ahmed, Ben Abdelkadir Hassane, *The Legal Concept of Sustainable Environmental Development and Its Challenges in Algeria*, *Journal of Economic Growth and Entrepreneurship (JEGE)*, Laboratory of Spatial Development Studies and Public Entrepreneurship, Volume 5, Issue 3, Algeria, 2022, p. 220.

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the necessary budgets to support these programs and research for their practical implementation.

In addition, Algeria is working on issuing a series of laws that clarify the legal protective system for natural resources. This facilitates the implementation of necessary protection measures through strict actions to mitigate violations affecting natural resources. It also contributes to increasing awareness in society about the importance of legal systems that prevent interference with the environment and its natural resources.¹

B) subtitle: Legislative Environmental Anticipation and Its Adaptation to the Evolution of Artificial Intelligence

The Algerian legislator based **Law No. 03-10** on fundamental principles that encompass eight core principles forming the general foundation of this law. These principles embody a future vision for preserving biodiversity, conserving natural resources, adapting to modern technologies, and achieving sustainable development.

These principles are built on the concept of conserving biodiversity and preventing the degradation of natural resources, focusing on utilizing modern technology to achieve these goals. This is manifested in the principles of substitution and integration, where technology must be developed to contribute to environmental preservation and resource sustainability.

The principle of preventive action reflects the inclination to use technology to prevent pollution and potential environmental harm. Consequently, the principle of harmonization enhances the positive interaction between technology and the environment.

The principle of polluter pays emphasizes the need to hold responsible parties accountable for environmental pollution and encourages them to use technology to minimize their environmental impact.

1 - Lekssasi Sidi Ahmed, Ben Abdelkabar Hassane, *op.cit*, p 221.

The principle of information and participation reflects positive engagement with the public and the use of technology to promote environmental awareness and participation in decision-making processes.

These principles combine technological advancements with a forward-looking legal perspective, striking a balance between science, technology, and the environment within the framework of sustainable development. If we delve into the concept of preserving biodiversity, we discover its strong connection to biology, exact sciences, and microscopy, indicating ongoing progress in environmental phenomena and the imperative need to monitor this progress using available technology, including artificial intelligence.

In this context, the principle of non-deterioration of natural resources aims to improve the use of renewable energy and preserve environmental resources for future generations. This includes a focus on clean energy alternatives to traditional fuels such as petroleum and natural gas, which represents the essence of sustainable development.

Regarding the principle of substitution, this concept requires replacing environmentally harmful activities and industries with those that promote sustainable development, even if the economic cost is higher. This necessitates the use of artificial intelligence techniques in technological advancement, including recycling, green economy practices, and environmentally friendly energy sources.

As for the principle of the polluter pays, this concept is linked to economic and tax aspects, often aiming to invest resources in technological research to improve the environment and develop alternatives that enhance sustainable development.

Based on our analysis of the principle of information and participation, we find that the media dissemination of environmental information heavily relies on technological advancements in media and communications. This progress encourages the full utilization of available applications and technologies for exchanging environmental information. Consequently, we can see that all the principles of this law support, to varying degrees, the use of technology and innovation

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in this context. The principle of integration also necessitates taking measures related to environmental protection and promoting sustainable development when preparing and implementing sectoral plans and programs. This contributes to limiting the rapid implementation of artificial intelligence applications in sectoral programs, reducing the depletion of non-renewable resources, and protecting the rights of future generations.¹

Based on the text of the law, it appears that the Algerian legislator has demonstrated a clear forward-thinking vision regarding modern technologies and their role in environmental protection and ensuring sustainable development. The directives of the law emphasize the importance of the principle of preventive action and remediation of environmental damage through advanced and cost-effective technologies, obliging individuals who may cause harm to the environment to consider the interests of others before taking any action.²

This approach indicates that the law provides opportunities to benefit from the latest available technologies, including artificial intelligence and other technological innovations, in the context of environmental preservation and sustainable development. Therefore, this approach can be considered an embodiment of the forward-thinking vision of the Algerian legislator, as the laws allow for the use of modern technology as a powerful tool in achieving a balance between economic development and environmental protection.

The need to apply the precautionary principle as a means of preventing significant environmental damage is also highlighted. This principle demonstrates cautious thinking in the face of environmental risks that have not been proven based on current knowledge and technology. The precautionary principle has been included in **Law No. 03-10**, indicating the necessity of utilizing modern tools and technologies to activate this principle. It includes considering all potential environmental effects that current knowledge cannot address and that have not yet been proven. This reflects a different approach

1 - Refer to Article 03 of Law number 03-10, *op.cit*

2 - Refer to Article 03 of Law number 03-10, *ipid*.

from the preventive action principle, which focuses on dealing with already confirmed environmental damage requiring the use of modern technologies. ¹

Based on **Law No. 03-10** concerning environmental protection within the framework of sustainable development, which is based on eight fundamental principles, the first principle focuses on implementing preventive measures before any potential environmental damage occurs, even in the absence of conclusive scientific evidence proving such damage. As for the second principle, referred to as the principle of preventive action and prioritizing environmental damage correction at the source, it encourages taking necessary measures to reduce known and anticipated environmental damage at the source through evaluating potential risks and taking necessary steps to mitigate them.

By utilizing technology in the field of caution and prevention, there is an urgent need to reconcile economic development with environmental preservation. Advancing in this path requires adopting innovative strategies. One strategy could be the development and use of modern technologies such as geographic information systems and remote sensing to improve environmental productivity and reduce negative impacts. For example, these technologies can accurately identify and monitor pollution locations, enabling effective measures to minimize those negative effects and preserve air and water quality.

Additionally, these techniques can analyze the environmental impact of development projects and direct investments towards more environmentally sustainable solutions. Harnessing this modern technology can significantly contribute to achieving sustainable economic development while simultaneously preserving the environment and natural resources for future generations..²

As a result of the above, the principles of caution and preventive action intersect in the necessity of harnessing advancements in modern technologies in the field of environmental

1 - Refer to Article 03 of Law number 03-10, *op.cit.*

2 - Geiser K, *What next?: Technology, cleaner production technologies*. UNEP'S International High level Seminar on Cleaner Production, 2000, p 19.

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protection and sustainable development, as stated in Article 3 of **Law 03-10**.

Preventive legal systems are concerned with safeguarding the environment and public health from the harmful effects of technology. They regulate and monitor potential technological activities to provide preventive measures that reduce environmental and health impacts. These legal systems aim to promote sustainable technology use and ensure that institutions and companies adhere to strict environmental standards.

Among the key points emphasized within the framework of preventive legal systems related to environmental protection in the context of sustainable development is that the impacts of technical specifications on environmental protection from industrial risks have been thoroughly studied and assessed by experts in environmental legal studies. Additionally, it is evident that the concept of risk assessment differs from impact assessment, which can be clarified by addressing the idea of diversity and integration in this context.¹

Risk assessment cannot be considered a fully completed technical process during the environmental impact study phase. It is not merely an exercise conducted by judicial authorities to determine whether licenses should be granted to industrial facilities. Rather, it is realized when the actual exploitation of the industrial facility begins, involving the preparation of infrastructure and necessary preparations before commencing industrial activities. It also includes studying the potential impacts of industrial activities prior to their implementation and examining potential effects that could lead to accidents or disasters.

Based on this, risk assessment involves providing a comprehensive evaluation of potential impacts on the environment when granting licenses to industrial facilities for initiation, modification, or expansion of operations. In other words, risk analysis represents the authority granted to the specialized administrative body

1- El-Helou, Majid Ragheb. "Environmental Protection Law." First edition, Dar Al-Matbu'at Al-Jami'iyya, Alexandria, Egypt, p 140.

in the field of the environment to conduct necessary investigations enabling them to assess the magnitude and type of environmental risks and potential harmful effects arising from licensing industrial facilities for their activities. This is achieved through actions in accordance with legally defined timelines.

Consequently, it can be inferred that the objective of risk analysis is to strive to reduce potential harmful effects that may occur when industrial facilities engage in activities without complying with environmental regulations and safeguards, preserving the environment and public health.¹

Regardless of the differences in description, two contradictory definitions of risk assessment can be provided:

- **Risk Assessment and Analysis:** Risk assessment can be described as a thorough and precise analytical process conducted by the industrial establishment or operator involved in the activity, based on various studies and reports, to identify and analyze all internal and external factors that enable estimating hazards and risks associated with those activities. This also includes studying the impact of the activity on the environment and public health.
- **Risk Assessment and Documentation:** Risk assessment can also be described as a documentary process aimed at identifying and recording the risks that neighboring communities may be exposed to due to the industrial establishment's activities. This process should be part of the file submitted to management before obtaining the license to operate the facility, including documenting internal and external risks and the impact of the activity on the environment and public health.

1 - Wanas, Yahya, *Legal Mechanisms for Environmental Protection in Algeria*, Doctoral dissertation, Faculty of Law and Political Science, Abu Bakr Belkaid University, Tlemcen, Algeria, p. 177.

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These formulations represent two completely different concepts of risk assessment, which can be adopted depending on the specific context and needs of the institution or relevant authority.¹

Determining the purpose of a reporting system requires considering the nature of the imposed legal obligations, directed towards protecting and preserving the environment or reducing pollution impacts. Additionally, obligations may include issuing orders to monitor environmental activities and compelling individuals to take necessary measures to protect the environment. Sometimes, the law requires industrial facilities to provide detailed reports demonstrating their implementation of required environmental procedures.

Algerian environmental legislation tends to impose reporting as a means to assess compliance of industrial facilities with environmental procedures. This commitment can be either a negative obligation, where the legislator obliges facilities not to violate environmental laws, or a positive obligation, where facilities are required to take specific actions.

Algerian environmental legislation and regulations contain numerous practical examples of this commitment. For example, **Law No. 27-72** stipulates the necessity for industrial facilities to reduce pollutant emissions into the air and direct efforts towards preserving the environment and natural resources. Additionally, users are required to submit periodic reports containing detailed information about potential environmental risks.²

1 - Rashidi, Saber, *A Study on the Impact on the Environment: Research on the Concept and Legal Basis*, Ma'arif Journal, University of Bouira, Volume 11, Issue 01, Algeria, 2021, p. 111.

2 - Bouanak Samir, *Mechanisms of Environmental Administrative Control in Algeria - How Effective in Environmental Protection?*, Journal of Scientific Research in Environmental Legislation, Volume 05, Issue 02, University of Tiaret, 2018, p. 107.

Section II: The Impact of Evolving Artificial Intelligence Applications on the Environment and Sustainable Development

The rapid evolution of artificial intelligence applications is reshaping various sectors, raising significant interest in their impact on the environment and sustainable development. These technologies offer substantial potential for enhancing the management of natural resources, yet they also pose risks related to resource overconsumption and pollution. In this context, it is crucial to explore the effects of these evolving applications on the environment and how to achieve a balance between technological innovation and environmental sustainability.

A) subtitle: A Forward-Looking Vision of the Positive Impacts of Artificial Intelligence Applications on Environmental Sustainability

Using artificial intelligence (AI),¹ environmental data can be analyzed, and pollution and environmental changes can be monitored with high accuracy and efficiency. By collecting data from diverse sources such as satellites, drones, and smart sensor networks, AI enables the rapid and effective detection of air and water pollution and changes in ecosystems. When these issues can be identified quickly, it becomes possible to take effective actions to preserve the environment through proactive strategic planning and leveraging available data within specialized algorithms, providing decision-makers with anticipated outcomes over time based on specific options.

AI can also play a crucial role in improving the management of natural resources such as water, energy, and forests. By analyzing data and employing intelligent models, the efficiency of resource utilization can be enhanced, guiding better strategies for their conservation. This contributes to providing a more objective forward-looking perspective aimed at maintaining environmental balance and ensuring a healthy and sustainable future.

Therefore, strategic foresight, relying on AI technologies associated with environmental sciences, seeks to understand the shape

1 - Mohammed Goujil and Nabilah Quriziz, *op.cit*

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of the future and the expected challenges that the environment may face. Considering the complexity of factors influencing the environment, collecting data in a scientifically and statistically accurate manner is essential for taking appropriate actions and making informed strategic decisions to preserve the environment and ensure its sustainability.¹

The environmental challenges we currently face extend beyond a diverse range of issues, such as climate change, air and water pollution, biodiversity loss, and depletion of natural resources. Thus, we must develop a sustainable vision for the future that relies on obtaining accurate and reliable information to understand the causes and potential impacts of these challenges.

To achieve this goal, scientists and experts in the fields of environment and sustainability must collaborate to standardize criteria and develop unified methods for data collection and analysis. We can leverage modern technology, such as geographic information systems and remote sensing, to identify sources of pollution and estimate their impact on the environment. These techniques can also be used to monitor air and water quality, assess changes in landscapes, and manage waste accumulation.²

By leveraging available scientific data and analyzing it accurately, unique insights can be provided regarding anticipated environmental challenges and their potential impacts on the environment and human life in the future. This approach allows the scientific community, policymakers, and the general public to refine innovative and effective environmental strategies and policies to address forthcoming challenges and preserve the health and sustainability of the environment for future generations.³

AI embodies a quantum leap in supporting sustainable environmental decision-making and opens doors to achieving greater

1 - World Meteorological Organization (WMO), "Accessed date: 11/04/2024, Access time: 20:20, on the following website:" <https://public.wmo.int/en>.

2 - World Meteorological Organization, Ibid.

3- Ahmed Hani, Environmental Data Analysis, "Accessed date: 10/04/2024, Access time: 08:10, on the following website:<https://greenfue.com>.

positive changes and sustainability in various aspects of environmental life. The exceptional capabilities of AI enable us to benefit from non-traditional expertise by conducting precise modeling and simulation processes, analyzing vast amounts of data efficiently, and building advanced simulation models.¹

AI can provide accurate signals and strong evidence that pave the way for sustainable and innovative environmental decisions. This power can be used to improve environmental policies and develop effective procedures, including waste management strategies and sustainable urban planning. Additionally, AI can play a pivotal role in assessing the impact of environmental projects and predicting climate changes, enabling informed strategic decisions based on evidence and data.²

Furthermore, it is worth mentioning that AI can significantly contribute to the development of new technologies for environmental preservation and achieving sustainable development. These technologies can be leveraged to develop clean and sustainable energy systems, including improving energy efficiency and enhancing renewable energy technologies. Additionally, AI can be relied upon to improve recycling processes and waste management by intelligently classifying and sorting materials, thus contributing to tangible progress in environmental sustainability.³

B) subtitle: The Negative Effects of Artificial Intelligence Applications on Environmental Sustainability

Focusing on the use of traditional technology and reducing our reliance on AI applications is a better approach to addressing environmental challenges and ensuring sustainable development. Excessive reliance on technology can be harmful to the environment and society, as it increases the consumption of natural resources and contributes to escalating environmental problems. Instead, we should consider simple and innovative solutions that rely on traditional practices and environmental sustainability, maintaining a balance between the economy, environment, and society. Therefore, excessive

1 - Mohammed Goujil and Nabilah Quriziz, *op.cit.*

2 - Ahmed Hani, *op.cit.*

3 - Ahmed Hani, *Ipid*

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reliance on AI applications should be avoided, and efforts should be made to find solutions that reduce resource consumption, promote environmental awareness, and achieve sustainable development without advanced and costly technologies.

The rapid advancements in AI raise growing concerns about its environmental impact. This rapid progress is observed to increase productivity in agricultural sectors, enhancing competitiveness. However, its ability to learn, analyze, and make decisions quickly may encourage increased energy consumption and the depletion of non-renewable resources, especially fossil resources.

The uses of AI pose significant environmental challenges, as they can negatively impact the environment in various ways. Training AI models consumes massive amounts of natural resources and contributes to environmental pollution due to the collection of large amounts of required data. Additionally, personal data can be stored without explicit consent, violating privacy and exposing individuals to the risks of data exploitation.

While AI offers numerous positive impacts on the environment, this progress can also have unexpected negative effects when the environment fully relies on advanced technological systems. For example, using robots or internet-connected devices to improve energy efficiency in buildings can lead to increased energy consumption or resource waste due to programming errors or power outages, resulting in increased carbon emissions and environmental degradation. Furthermore, issues such as electronic waste accumulation and resource depletion can arise from advanced technology.

Thus, we must be cautious and take appropriate measures to maintain a balance between technological development and environmental protection, ensuring that reliance on technology does not harm the environment or deplete its resources.

The transformative nature of AI presents entirely new challenges, as implementing intelligent technology across various industries can lead to significant changes in the economic and social

structure. While AI can improve production efficiency and services, it may also lead to increased social rigidity and unemployment.

In labor-intensive industries, robots and smart systems may increasingly replace workers, resulting in job losses and exacerbating social inequalities. Economically, the use of AI can alter job structures and substitute required skills in the labor market, necessitating that individuals retrain and learn new skills to adapt to rapid technological advancements.

It is crucial to realize that failure to adapt quickly to these transformations can increase economic disparities among individuals and countries. Therefore, significant investments in education and training are necessary to ensure that workers are prepared to face these challenges and seize new opportunities offered by AI.¹

Additionally, AI can be employed harmfully to enhance environmentally destructive activities. For instance, in oil and gas extraction operations, these technologies can contribute to increased carbon dioxide emissions and the leakage of harmful substances into the surrounding environment. This is due to the massive consumption of electricity and energy resources by AI systems, leading to significant increases in carbon emissions and air pollution. In general, operating AI systems requires large amounts of electrical energy, and some large-scale applications, such as neural network training, can be particularly costly and energy-intensive.²

The depth that distinguishes AI consumes vast amounts of energy, resulting in increased electricity consumption and greater carbon emissions in electricity generation processes. Consequently, this has a negative impact on the climate, potentially affecting biodiversity and endangered species in various sectors such as agriculture, fishing, and resource extraction. Additionally, the rapid advancements in AI can lead to the accumulation of outdated devices

1- Paula Astih, *Artificial Intelligence Systems Raise Legal Concerns: Warnings of Copyright Infringement and Fabrication of Information*, Al-Sharq Al-Awsat Newspaper, Accessed date: 05/04/2024, Access time: 05:30, on the following website: <https://aawsat.com/>

2 - Paula Astih, *Ipid*.

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and electronics, resulting in increased electronic waste and its harmful impact on the environment.

Technologies associated with AI represent a tremendous advancement in the world of technology, offering significant opportunities to enhance productivity and improve quality across a wide range of industries. These technologies can reduce human errors and increase efficiency and effectiveness in operations. Moreover, they enable unleashing creativity and innovation in fields such as medicine, science, and the environment.

Despite concerns about job displacement, this transformation can create new employment opportunities in developing and maintaining smart technologies. Furthermore, education and training can be improved to enhance individuals' skills in areas related to AI.

Smart technology also brings many social benefits, including improved prediction of pandemics and accidents, energy and resource conservation, and enhanced healthcare and quality of life. It can contribute to creating more sustainable and advanced societies.

Of course, regulation and ethical use of smart technologies are necessary to ensure the protection of privacy and personal rights. Strong security measures should be implemented to maintain system stability and prevent breaches.

If developments in AI are approached with caution and good regulation, they can significantly contribute to improving life and promoting economic and social progress. The current uses of AI raise concerns about their impact on the environment and sustainable development. However, we should also acknowledge the positive aspects, as AI can contribute to addressing many environmental and social challenges.¹

1 - Edward Brenya, Edwin W. Warden, *Sustainable Development: Can New Technology and Economic Growth Be the Answer?*, *Journal of Economics and Sustainable Development*, IISTE Knowledge Sharing Partners, Vol.5, No.7, 2014, p 185.

In general, AI can play a crucial role in enhancing productivity and increasing industrial efficiency. It can significantly contribute to achieving economic growth by providing innovative and actionable solutions. However, we must be cautious about its impact on resource depletion and natural wealth, as this contradicts the concept of sustainable development, which aims to preserve and sustainably use Earth's resources for current and future generations.

Simply put, our society should harness the immense capabilities of AI to improve our quality of life and economic well-being, but we must also use it responsibly to ensure that we reap its benefits without sacrificing the environment and sustainable development.¹

Conclusion

This study summarizes the importance of the rapid development in this technological field in enhancing environmental protection and achieving sustainable development. However, we should not overlook the challenges associated with this technology, which require sustainable design and implementation to ensure its compatibility with the concept of sustainable development and the rights of future generations.

The study indicates that contemporary technology, including artificial intelligence, plays a crucial role in supporting environmental protection and achieving sustainable development. Accordingly, smart technology can be used in analyzing and monitoring sources of pollution, improving environmental quality, and achieving sustainable development. Additionally, constitutional commitment to sustainable development can enhance environmental protection and sustainability through the establishment of appropriate legal and regulatory systems.

Technological progress should be pursued in sustainable ways that preserve non-renewable natural resources and ensure the rights of future generations. Therefore, the recommendations that can be proposed may include promoting research in the field of artificial intelligence technology to develop sustainable solutions that contribute to enhancing sustainable development and environmental protection. Additionally, support can be provided to legislations and legal systems that secure environmental dimensions and sustainability,

1 - Edward Brenya, Edwin W. Warden, *Ipid*.

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activate constitutional commitments, and raise awareness of the importance of sustainable development and the use of technology in sustainable ways. It is essential to ensure a proper balance between development and environmental protection through sustainable decision-making that takes into account the rights of current and future generations.

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