

Challenges of Environmental Security and Noise Pollution in Urban Areas: Algeria as a Model

تحديات الأمن البيئي والتلوث الضوضائي في المناطق الحضرية: الجزائر أنموذجا

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ABSTRACT:

This article highlights the problem of noise pollution within urban areas in Algerian cities, as it emphasizes the importance of studying the relationship between environment and health security to enhance a comprehensive understanding of contemporary urban challenges, where it aims to provide new insights for achieving a balance between sustainable development and public health in light of growing environmental concerns, starting with the question of integrated and sustainable strategies—including urban design, technological innovation, regulatory policies, and public awareness—to reduce noise pollution.

The results conclude that noise pollution poses a serious threat to individual health and overall quality of life in cities, which requires the formulation of comprehensive strategies that focus on community education and awareness, improving urban infrastructure, implementing strict anti-pollution regulations, and enhancing cooperation between governments, civil society, and the private sector to achieve sustainable development goals.

Keywords: Noise pollution, Urban areas, Environmental security, Health security.

الملخص:

تسلط هذا المقالة الضوء على مشكلة التلوث الضوضائي ضمن المناطق الحضرية في المدن الجزائرية، حيث تُؤكد على أهمية دراسة العلاقة بين الأمن البيئي والصحي لتعزيز فهم شامل للتحديات الحضرية المعاصرة، أين تهدف إلى تقديم رؤى جديدة لتحقيق التوازن بين التنمية المستدامة والصحة العامة في ظل المخاوف البيئية المتزايدة، انطلاقا من التساؤل حول الاستراتيجيات المتكاملة والمستدامة - التي تشمل التصميم الحضري، والابتكار التكنولوجي، والسياسات التنظيمية، والتوعية العامة - للحد من التلوث الضوضائي. وخلصت النتائج إلى أنّ التلوث الضوضائي يُشكل تهديداً خطيراً لصحة الأفراد وجودة الحياة بشكل عام في المدن، ما يستوجب صياغة استراتيجيات شاملة تُركّز على التثقيف والتوعية المجتمعية وتحسين البنية التحتية الحضرية، وتطبيق لوائح صارمة لمكافحة التلوث، إضافة إلى تعزيز التعاون بين الحكومات والمجتمع المدني والقطاع الخاص لتحقيق أهداف التنمية المستدامة. كلمات مفتاحية: التلوث الضوضائي، المناطق الحضرية، الأمن البيئي، الأمن الصحي.

1- Introduction:

Modern cities are dynamic engines of economic and social development, vibrant hubs teeming with human activity and innovation; however, this very dynamism, coupled with rapid, often unplanned growth, engenders a suite of complex environmental challenges. Among these, noise pollution has emerged as a pervasive and frequently underestimated threat to urban sustainability and public welfare, where it is defined technically as the presence of unwanted or disruptive sound at

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elevated levels, as noise pollution predominantly stems from anthropogenic sources such as road, rail, and air traffic; industrial manufacturing; and relentless construction activities, while its detrimental effects on physiological health and psychological well-being are profound and well-documented, thereby positioning it as a critical issue in contemporary discourse on urban environmental quality.

The impact of noise pollution in urban settings extends far beyond mere annoyance, significantly degrading the overall quality of life for inhabitants, as chronic exposure to high noise levels triggers a cascade of physiological stress responses, which are linked to serious health conditions, and it is associated with increased irritability, anxiety, and a higher prevalence of mental health disorders; moreover, it impairs cognitive functions, reducing productivity, hindering concentration, and impeding academic performance in learning environments; in addition, noise contributes to social stress, reduces the usability of public spaces, and can even diminish property values, creating a tangible economic impact.

In Algeria, as urbanization accelerates, the imperative to implement effective and multifaceted mitigation measures becomes increasingly urgent, where urban planning and policy must prioritize acoustic comfort through integrated strategies that include the optimization of transportation systems, the promotion of sound-absorbing construction materials and technologies, and the strategic expansion of green infrastructure, which serves as a natural sound buffer; therefore, addressing the scourge of noise pollution is not merely an aesthetic or comfort issue but a fundamental prerequisite for ensuring public health, fostering sustainable development, and enhancing the livability of our cities, a goal that demands collaborative, cross-sectoral engagement from policymakers, urban planners, industry, and the public alike.

1-1- Research Problem:

Within this complex urban context, a critical research problem arises: the need to elucidate the intricate, tripartite relationship between environmental security, noise pollution, and holistic quality of life, where ecological security, in this framework, transcends traditional concepts of safety to encompass an individual's right to a healthy and restorative living environment, free from physical and psychological hazards, where noise pollution directly undermines this security by acting as a persistent environmental stressor, thereby compromising both health and well-being. The central questions that this research seeks to address are, therefore, multifaceted:

First, through what specific biophysical and psychosocial mechanisms does the reduction of ambient noise levels contribute to the enhancement of environmental security within urban communities?

Second, moving from theoretical understanding to practical application, what integrated and sustainable strategies—spanning urban design, technological innovation, regulatory policy, and public awareness—can be effectively implemented to mitigate noise pollution?

Ultimately, the core of the research problem is to determine how resolving the issue of acoustic degradation can directly and measurably improve urban living conditions, thereby transforming cities into more secure, healthy, and genuinely habitable spaces for their residents.

2- Definition of Environmental Security

Environmental security refers to a set of policies, strategies, and measures designed to safeguard the environment and natural resources while ensuring their sustainability for present and future generations. It addresses challenges arising from human activities, including pollution, climate change, biodiversity loss, and resource depletion (Bouزيد, 2018, p. 22).

As a comprehensive concept, environmental security involves protecting ecosystems through coordinated efforts by governments, communities, and the private sector. Achieving it requires effective strategies to mitigate current and future environmental challenges. Fostering environmental security enhances quality of life while ensuring the planet's long-term sustainability.

2-1- Dimensions of Environmental Security:

- Health Dimension: Focuses on safeguarding human health from environmental hazards such as air and water pollution and exposure to harmful chemicals.
- Economic Dimension: Relates to the sustainable management of natural resources to ensure continued economic growth and long-term prosperity, as the environment is closely linked to economic development.
- Social Dimension: Highlights social justice by ensuring that vulnerable communities have access to essential environmental resources and encouraging public participation in environmental decision-making.(Bouزيد, 2018, p. 31)
- Political Dimension: Involves promoting environmental policies and fostering international cooperation with the aim of addressing international environmental challenges, such as climate change and biodiversity.

2-2- Importance of Environmental Security

- Safeguarding Natural Resources: Environmental security plays a significant role in conserving water resources, soil, and forests, ensuring their sustainability for future generations.
- Promoting Public Health: It seeks to reduce health risks caused by pollution, thereby enhancing quality of life and increasing productivity.
- Mitigating Climate Change: Includes strategies to decrease the effects of climate change, such as reducing carbon emissions and enhancing renewable energy sources.
- Enhancing Sustainability: Supports the fulfillment of sustainable development goals by encouraging the efficient use of resources and environmental protection.(Fadel, 2020, p. 54)

2-3- Challenges to Environmental Security

- Climate Change: One of the most serious threats to environmental security, leading to extreme weather events such as floods and droughts.
- Pollution: Includes air, water, and soil pollution, all of which negatively impact human health and ecosystems.
- Biodiversity Loss: Driven by urban expansion and the unsustainable exploitation of natural resources, posing a serious threat to ecosystems.

- Resource Conflicts: Disputes over natural resources, such as water and land, can exacerbate environmental and geopolitical tensions.

2-4- Strategies for Strengthening Environmental Security

- Developing Environmental Policies: Establishing a robust legal framework to preserve the environment and enforcing strict environmental regulations.
- International Cooperation: Fostering global partnerships to address environmental challenges through collaborative initiatives.
- Education and Awareness: Raising public awareness of environmental issues and promoting responsible environmental practices.
- Sustainable Technology: Encouraging innovation in clean technology and sustainable resource management to minimize environmental harm.

3- The Concept of Noise Pollution

3-1- Noise Pollution

Noise pollution is an increasing problem in urban areas, necessitating effective strategies to alleviate its negative impacts on public health and community well-being. It refers to the excessive or unwanted levels of sound in the environment, which negatively impact individuals' health and quality of life. This noise can originate from various sources (Samir, 2015, p. 18), including:

- Vehicles: Noise generated by cars, trucks, and buses.
- Aircraft: Sounds from takeoff and landing that affect areas surrounding airports.
- Industrial Activities: Noise from factories and heavy machinery.
- Construction Work: Sounds from drilling, painting, and building activities.
- Public Gatherings: Such as parties, festivals, and other large events.

3-2 Key Features of Noise Pollution

- Frequency: Noise varies in pitch, ranging from low-frequency sounds (e.g., truck engines) to high-frequency sounds (e.g., machinery).
- Continuity: Noise can be continuous (e.g., traffic noise) or intermittent (e.g., construction sounds).
- Impact: Noise pollution can have significant health effects, including stress, sleep disturbances, hearing impairment, and cardiovascular diseases.

3-3- Legal and Social Dimensions

Numerous countries have established laws and regulations to control noise levels, setting acceptable limits for noise pollution in residential and commercial areas. Noise pollution is also a social issue that affects individuals' quality of life and psychological well-being.

3-4- Measuring Noise Levels and Acceptable Exposure Standards

Measuring noise levels and defining acceptable exposure standards are essential for understanding the impacts of noise pollution on public health. Communities must adopt effective strategies to monitor these levels and ensure a quieter and healthier environment.

3-4-1- Measuring Noise Levels

Noise Measurement Devices: (IOS Annex A, 2016, p. 23)

- Sound Level Meters are utilized to measure noise intensity in decibels (dB), which demonstrate the strength of sound.

Types of Measurements:

- Instantaneous Sound Level Measurement: Captures the noise level at a specific moment.
- Average Sound Level Measurement: Calculates the average over a defined period, such as 1 or 15 minutes.
- Weighted Sound Level Measurement: The A-weighting (dBA) scale is commonly utilized to account for frequencies that have the greatest impact on human hearing.

Measurement Locations:

- Noise levels should be measured in specific locations, such as residential areas, near major roads, or in industrial zones. Measurements should be conducted at different times of the day to evaluate fluctuations in noise levels.

3-4-2- Acceptable Exposure Standards

Exposure Limits:

- Acceptable noise exposure standards vary by country. However, most global health organizations recommend that daily noise levels in residential areas should not exceed 55–65 decibels (dB).

Specific Standards:

- World Health Organization: Recommends that outdoor noise levels should not exceed 55 dB during the day and 40 dB at night. (Samir, 2015, p. 26)
- U.S. Environmental Protection Agency: States that prolonged exposure to noise levels above 70 dB may lead to long-term health issues.

Occupational Exposure:

- In workplaces, the maximum permissible noise exposure is typically 85 dB for an 8-hour workday. Any exposure beyond this limit requires protective measures. (Samir, 2015, p. 28)

4- Effects of Noise Pollution on Health

Noise pollution is a serious public health concern that requires attention from communities and policymakers. Implementing effective measures to reduce noise levels can significantly improve urban living conditions, ensuring a healthier and more sustainable environment.

The adverse effects of noise pollution include: (WHO, 2018, p. 47)

Psychological Effects:

- Anxiety and Depression: Continuous exposure to noise can increase stress and discomfort, leading to heightened anxiety and depression.
- Sleep Disruptions:
- Insomnia: Noise disturbances can cause sleep disorders, significantly reducing sleep quality.
 - Overall Health Impact: Sleep deprivation due to noise exposure impacts cognitive performance, concentration, and increases health risks.
- Physical Health Risks:
- Cardiovascular Diseases: Studies show that prolonged noise exposure can lead to high blood pressure, increasing the risk of heart disease.
 - Hearing Impairments: Consistent exposure to high noise levels may result in temporary or permanent hearing loss.
- Behavioral and Cognitive Effects:
- Impact on Children: Noise pollution can negatively impact children’s concentration, academic performance, and may contribute to increased stress-related behaviors.
- Weakened Immune System:
- Some studies suggest that chronic noise exposure may weaken the immune system, making individuals more susceptible to illnesses.
- Social Consequences:
- Excessive noise pollution can strain social relationships, making individuals less inclined to engage in social activities due to noise-induced discomfort.

5- The Relationship Between Environmental Security, Noise Pollution, and Quality of Life

Modern urban communities face increasing environmental security challenges, with noise pollution being one of the most pressing issues. Noise pollution is an environmental and public health concern that negatively affects urban quality of life. It results from multiple human activities, including traffic, industrial operations, and construction work, leading to excessive noise levels that adversely impact both mental and physical well-being.

Environmental security is closely linked to urban quality of life, as it involves safeguarding ecosystems and natural resources. In this regard, noise pollution not only harms residents' health but also contributes to environmental degradation, further complicating public service provision, it exacerbates issues such as stress, anxiety, and reduced productivity (Fadel, 2020, p. 59).

6- Environmental Security Challenges

Addressing environmental security challenges necessitates a comprehensive approach involving collaboration among governments, civil society, and the private sector. By promoting sustainable policies, raising public awareness, and investing in clean technologies, considerable improvements in environmental security and quality of life can be fulfilled.

Environmental security faces various and complex challenges that affect both ecological stability and human well-being. Key challenges include: (Fadel, 2020, p. 74)

Climate Change:

- Rising global temperatures and climate shifts cause major disruptions to ecosystems, leading to rising sea levels, floods, and droughts that threaten food and water security.

Pollution:

- Multiple forms of pollution, including air, water, and soil contamination—pose serious health risks, degrade the environment, and contribute to biodiversity loss.

Biodiversity Loss:

- The destruction of natural habitats due to urban expansion, deforestation, and industrialized agriculture leads to species extinction and a decline in biodiversity.

Unsustainable Resource Management:

- Overexploitation of natural resources, such as freshwater and minerals, without sustainable management practices results in environmental degradation and resource scarcity.

Increasing Environmental Threats:

- Industrial and commercial activities that disregard environmental regulations contribute to growing ecological risks for communities.

Political and Social Conflicts:

- Disputes over natural resources, such as water and land, intensify social and political tensions, further threatening environmental security.

Unregulated Urban Expansion:

- Poorly planned urbanization leads to environmental deterioration, increased pollution, and inefficient resource management.

Lack of Environmental Awareness and Education:

- Insufficient public awareness of environmental issues impedes efforts to implement effective solutions for sustainability and ecological protection.

Economic Pressures:

- Economic crises often lead to reduced funding for environmental protection, exacerbating resource depletion and ecosystem degradation. (Hachemi, 2014, p. 39)

Technological Advancements and Environmental Impact:

- Rapid technological developments can introduce new forms of pollution and environmental challenges if not managed responsibly.

7- The Significance of Environmental Security in the Urban Context

Environmental security is a fundamental pillar of sustainable urban life. Prioritizing environmental protection and sustainable development significantly improves urban quality of life, contributing to the overall well-being of individuals and communities.

As a cornerstone of urban sustainability, environmental security plays a significant role in maintaining quality of life, especially in cities facing increasing pressures from population growth and urban expansion. It enhances public health by improving air and water quality and reducing pollution levels, thereby preventing various diseases, as it ensures the sustainable management of various natural resources, on the one hand, and meets current needs without compromising the ability of future generations to meet their needs, on the other hand.

Environmental security supports climate change adaptation through strategies such as developing green spaces and enhancing drainage systems. It also promotes community engagement, encouraging residents to participate in environmental initiatives and decision-making processes that foster urban sustainability. By emphasizing environmental security, sustainable urban development can be achieved, ensuring the well-being of individuals and improving the quality of life in urban communities. (Al-Cherif, 2017, p. 85)

Cities are dynamic environments where economic, social, and environmental factors constantly interact. Environmental security plays a significant role in enhancing quality of life in urban areas. Its importance is evident in the following ways: (UN-Habitat, 2022, p. 215)

Enhancing Public Health:

- Improving air and water quality reduces the risks of pollution-related diseases. A healthier environment contributes to better physical and mental well-being.

Sustainable Resource Management:

- Ensuring the responsible use of resources such as water and soil, meeting present and future needs without depletion.

Climate Change Adaptation:

- Supporting strategies such as expanding green spaces and enhancing flood management, reducing environmental risks. (Derouiche, 2019, p. 91)

Economic Growth:

- Fostering job creation in sectors like renewable energy, waste management, and clean technology.

Improving Quality of Life:

- Creating safer, cleaner urban spaces, enhancing overall well-being and livability.

Community Engagement:

- Encouraging public participation in environmental decision-making, promoting awareness and responsibility.

Biodiversity Conservation:

- Preserving natural habitats and ecosystems, supporting urban sustainability.

Reducing Social Strains:

- Environmental improvements can ease social tensions, as degradation often exacerbates conflicts and inequalities.

Innovation and Technology:

- Driving advancements in clean technologies and sustainable solutions for efficient resource use.

Strategies for Reducing Noise Pollution and Strengthening Environmental Security

Mitigating noise pollution and ensuring environmental security necessitate collective efforts from governments, the private sector, and communities. Implementing effective strategies can enhance urban life quality while promoting environmental sustainability.

8- Algeria's Experience in Enhancing Environmental Security and Reducing Noise Pollution

Algeria seeks to address environmental challenges affecting public health and quality of life by fostering environmental security and reducing noise pollution. The following outlines the measures and policies adopted by the state to fulfill these objectives: (Al-Kilani, 2021, p. 61)

8-1- Legislative and Regulatory Framework

Environmental Laws:

- In this regard, Algeria adopted Law No. 03-10 on environmental protection within the framework of sustainable development, which established a legal framework for environmental safety.
- The law includes standards to reduce multiple forms of pollution, including noise pollution, and imposes penalties on entities that fail to comply with these regulations.

Technical Standards:

- Algeria has established specific noise level limits applicable to residential and industrial areas to protect public health and ensure citizens' comfort.

8-2- National Action Plans

National Strategy for Environment and Sustainable Development:

- This strategy aims to enhance quality of life by safeguarding the environment and promoting sustainability.
- The plans include projects aimed at noise reduction, such as infrastructure development and the creation of green spaces.

Specific Environmental Projects:

- Algeria has implemented projects for urban rehabilitation and climate improvement, such as establishing public parks and green corridors to reduce noise and air pollution.

8-3- Awareness and Education

Awareness Campaigns:

- The government has organized community-focused awareness campaigns highlighting the significance of environmental protection and noise reduction, emphasizing the health impacts of noise pollution.

Training Programs:

- Training programs have been conducted for local officials and citizens to promote their understanding of environmental issues and how to contribute to environmental improvement.

8-4- Technology and Innovation

Development of Clean Technologies:

- Algeria fosters the use of clean technologies across multiple sectors, including renewable energy and eco-friendly transportation, contributing to noise reduction from daily activities.

Noise Monitoring Systems:

- Noise level monitoring systems have been established in urban areas, enabling the identification of high-pollution zones and the implementation of appropriate policies for improvement.

8-5- International Cooperation

Participation in International Agreements:

- Algeria is committed to various international agreements, such as the Paris Agreement, reflecting its dedication to addressing global environmental challenges and enhancing environmental security.

Joint Projects:

- Algeria has collaborated with international organizations on projects sought at enhancing environmental conditions, including pollution reduction programs and sustainable urban development initiatives.

8-6- Urban Planning

Urban Area Design:

- Algeria incorporates urban planning strategies that include creating buffer zones between residential and industrial areas, reducing noise impact. (Youcef, 2018, p. 101)
- A strong focus is placed on developing green spaces, which serve as natural noise barriers and enhance air quality.

Algeria's efforts to foster environmental security and mitigate noise pollution indicate its commitment to safeguarding the environment and protecting public health. By implementing a robust legislative framework, executing national plans, conducting public awareness campaigns, and fostering international cooperation, Algeria seeks to balance economic development with environmental preservation. Despite existing challenges, these initiatives highlight the significant role of environmental security in achieving sustainable development and enhancing overall quality of life. (Moussa, 2016, pp. 74-86)

9- Conclusion

Environmental security and noise pollution are among the most pressing challenges facing urban communities in Algeria and the world in general today, as these interconnected issues have a profound impact on public health and quality of life, where noise pollution-resulting from urban activities such as traffic, industrial operations, and construction-causes serious physical and psychological impacts, undermining environmental security and increasing social pressures.

In light of global challenges such as climate change and economic instability, addressing these issues has become more urgent than ever, as failure to take proactive measures could lead to deteriorating health conditions, loss of biodiversity, and a decline in overall well-being; therefore, a comprehensive and integrated response is critical to mitigate these risks.

An effective approach includes developing holistic strategies that emphasize education, community awareness, urban infrastructure improvements, and the enforcement of strict pollution control regulations. Furthermore, promoting collaboration between governments, civil society, and the private sector is crucial for fulfilling sustainable development goals, where innovation in clean technology and the development of sustainable solutions play a crucial role in reducing environmental impact.

Ultimately, addressing environmental security and noise pollution is not just about protecting the environment, as it is also essential to improving individual and societal well-being through collective action and shared commitment from all stakeholders, to create healthier and more sustainable urban environments that benefit current and future generations, where environmental security challenges require an integrated response that includes cooperation between governments, local communities, and the private sector.

10- Recommendations

Based on the findings of this research, the following five recommendations are proposed to mitigate noise pollution and enhance environmental security in Algerian urban centers:

- Enact and enforce a stringent noise pollution law with zonal limits and mandatory noise impact assessments for new developments.
- Integrate green acoustic barriers and sound-absorbing materials into urban planning to mitigate noise and enhance biodiversity.
- Launch a public awareness campaign to educate citizens on the health impacts of noise and promote individual behavioral change.
- Establish a multi-sectoral task force to coordinate noise mitigation policies across government, industry, and civil society.
- Fund targeted research and innovation, including noise mapping and clean technology adoption, to develop localized, evidence-based solutions.

- References:

- Al-Cherif, M. (2017). Urban Planning and Its Impact on Noise Pollution Reduction. *Journal of Environmental Studies*.
- Al-Kilani, M. (2021). The Legal Framework for Environmental Protection in Algeria. Publications of the Ministry of Environment.
- Bouزيد, A. (2018). Environmental Security: Concept and Applications in Algeria. Dar Al-Farabi.
- Derouiche, L. (2019). Strategies for Reducing Noise Pollution in Arab Cities. Research and Studies Center.
- International Organization for Standardization. (2016). Acoustics—Description, measurement and assessment of environmental noise—Part 1: Basic quantities and assessment procedures (ISO Standard No. 1996-1:2016). <https://www.iso.org/standard/59765.html>
- Fadel, R. (2020). Environmental Awareness and Its Role in Enhancing Environmental Security. *Journal of Environmental Education*.
- Hachemi, B. (2014). The Health Effects of Noise Pollution and Ways to Mitigate Them. *The Environmental Health Journal*.
- Moussa, K. (2016). Environmental Challenges in Algeria: Environmental Security and Noise Pollution (PhD Dissertation). University of Algiers.

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- Samir, A. (2015). The Impact of Noise Pollution on Public Health in Major Cities. *Journal of Environmental Sciences*.
- United Nations Human Settlements Programme (UN-Habitat). (2022). *World Cities Report 2022: Envisaging the future of cities*. UN-Habitat. <https://unhabitat.org/world-cities-report-2022>
- Youcef, A. (2018). *The Role of Civil Society in Enhancing Environmental Security - Environmental Studies*.
- World Health Organization. (2018). *Environmental noise guidelines for the European region*. World Health Organization Regional Office for Europe. <https://www.who.int/europe/publications/i/item/9789289053563>