



ISSN: 2230-9926

Available online at <http://www.journalijdr.com>

# IJDR

International Journal of Development Research

Vol. 15, Issue, 08, pp. 68924-68927, August, 2025

<https://doi.org/10.37118/ijdr.29875.08.2025>



RESEARCH ARTICLE

OPEN ACCESS

## ENVIRONMENTAL CONSIDERATIONS FOR URBAN PLANNING STANDARDS

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### ARTICLE INFO

#### Article History:

Received 18<sup>th</sup> May, 2025  
Received in revised form  
26<sup>th</sup> June, 2025  
Accepted 11<sup>th</sup> July, 2025  
Published online 29<sup>th</sup> August, 2025

#### Key Words:

Environment - Considerations Standards-  
Planning- Urbanenvironment.

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### ABSTRACT

The second half of the last century witnessed numerous pollution and ecological crises in many cities around the world. Some of these phenomena even encompassed large geographical areas and several countries. This led to a significant increase in environmental awareness among different categories of society. Fear and panic sometimes prevailed due to the deterioration of environmental conditions both locally and globally, and the impact this would have on the future of civilization and the lives of future generations. The accelerated scientific progress in the field of ecological studies and the innovation of various ecological technologies to stop pollution at the source have effectively limited the spread of pollutants and enabled their control, but at a high cost. International agreements and local environmental legislation have played a major role in establishing a legal framework for environmental protection and setting specific standards for air, water and soil pollution levels to ensure a safe and healthy environment for people. Among the methods and measures that can be used to avoid pollution problems in cities and reduce the amount of pollutants to levels below permissible levels is the introduction of environmental standards within the framework of urban planning standards so that they can be taken into account in the future when developing existing cities or when preparing new urban plans. This paper presents the most important environmental problems in cities and urban areas, as well as environmental considerations that must be included in urban and urban planning standards in order to avoid environmental problems as much as possible, using appropriate equipment and technical means to reduce pollutants at their sources

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Citation: Saleh Hamed. 2025. "Environmental Considerations for Urban Planning Standards". *International Journal of Development Research*, 15, (08), 68924-68927.

## INTRODUCTION

Cities and urban agglomerations have existed since ancient times in the vicinity of places that was rich in basic life resources such as water, plant and animal food. The intensity of human conflicts and disputes in the past influenced this choice, as the demands of defending the site remained a priority. This was reflected in the selection of high locations and the construction of walls and fortifications with the availability of life resources such as water and food sources. As the establishment of cities spread and their size increased, urban legislation emerged, derived from the realities of accumulated experience over time. Initially, those who governed the city were responsible for implementation in the form of customs and planning concepts. The local environment had a significant influence on giving recognizable characteristics to urban planning. Cities founded in the desert differ from those on the seashore and those in mountainous areas. With the flourishing of civilizations and scientific advances in the field of engineering and planning, cities became more similar in terms of the basics and standards of urban planning and the city's requirements for public service facilities such as water supply, sewage, transportation and waste disposal. However, the ecological imbalances and problems that emerged after the industrial renaissance had a significant negative impact on the urban environment in cities,

as industrial activity became one of the important economic activities due to the jobs and financial investments it provided to city dwellers. The entry of industrial activity into cities has led to numerous environmental problems, from air pollution in cities with black smoke and various gases, to discharge of liquid waste into rivers and contamination of drinking water sources. This situation continued to exist until the forties of the last century. After the Second World War, serious consideration began to be given to how to protect the urban environment from pollution. The spread of environmental awareness and the results of environmental research and studies have emphasized the dangers posed by all types of environmental pollution, and the importance of adopting environmental standards that guarantee the quality and safety of air, drinking water and food, in addition to the aesthetic aspects of the environment, including the tranquility and visual beauty of natural landscapes. The year 1971 witnessed a major change in the field of environment and development, with the holding of the Conference on Environment and Human Development under the auspices of the United Nations. This conference resulted in the World Environmental Charter and the establishment of the United Nations Environment Program to address environmental issues on a global scale. Many new departments, faculties and research institutes dealing with the protection of the environment from pollution were founded. Also, environmental protection regulations were adopted in all countries of the world, and regional and international agreements and contracts were concluded.

Today, the word "environment" is of great importance in our daily life and has become an essential part of our programs and ideas. Environmental protection priorities are considered special since everyone has the right to enjoy a clean environment.

**Urban environment:** A natural ecosystem is defined as an area of land with geographical boundaries that contains a distinct natural formation, including natural resources and plant and animal living organisms. An ecosystem has a stable balance that allows the continuity of life for all living organisms in it, unless this balance is disturbed, such as the depletion of living resources due to a natural disaster or external intervention that disrupts the ecological balance. The urban environment is the work of man and is therefore always the primary cause of the destruction and disappearance of the natural ecosystem, which will be replaced by the urban environment. The urban environment is a unique ecosystem that can be treated separately and within clear, separate boundaries. It is characterized by dynamism, intense activities and enormous consumption of natural resources in a small area. This distinguishes it from other natural ecosystems. The urban environment is considered one of the most complex ecosystems due to multiple sources of environmental pollution and the release of unnatural pollutants, which significantly negatively affect the ecological balance. The renewal intervals in nature are slow and cannot absorb the huge amount of gaseous, liquid and solid pollutants that arise from everyday activities in the city, which requires us to use the necessary technical and planning means to reduce the level of pollutant emissions and their impact on the population and the natural environment within and around the city.

**The importance of environmental planning:** Environmental planning falls within the framework of integrative planning of development programs, including programs for the development and rehabilitation of existing city plans and the planning of modern urban communities. The goal of environmental planning is to determine the elements and activities that positively or negatively affect the environment and find proactive solutions for them. It also aims to achieve the principles of sustainable development of the urban environment by making it suitable for human life, providing comfort, clean air, drinking water and physical health to its inhabitants, along with a stable social and economic life. Preservation of the social and cultural environment of local residents is among the goals of environmental protection planning in the city. From this comes the complexity of the process of integrated management of the urban environment, because it does not deal exclusively with the physical elements of the environment (air, soil, etc.), but deals with other soci

**Environmental considerations for urban planning:** It is possible, through scientific research and the collection and analysis of relevant data, to arrive at a set of environmental standards as part of urban planning standards. These standards will contribute to avoiding many potential problems that may arise in the future. In this part of the paper, we will present a series of environmental factors and influences that significantly affect the quality of the natural environment and social life to which the city is exposed, or that limit the deterioration of environmental conditions within it.

#### **Ecological aspects of the location of the city**

Cases of reverse temperature inversion, in which the air temperature above the city is higher than the air temperature in the vicinity. The geographical location of the city determines its climatic characteristics that distinguish it from other geographical locations. Therefore, cities have some advantages due to their presence within a certain geographical area, but there are some characteristics that can have a major impact that contribute to increasing or decreasing environmental pollution. This requires us to analyze local climate data for the location and know its impact on the local environment. For example, we can highlight some of them, such as:

- 1) The direction and intensity of the prevailing winds have a significant impact on determining the locations and types of activities that result in the emission of various gaseous

pollutants, and on determining the height of the chimneys of factories and power plants. The wind rose for the region and the data available from the Meteorological Department are used as the primary reference in determining the locations of these activities.

- 2) Cases of atmospheric stability, since the city is located in an area where atmospheric stability occurs at a local level for a long period, which contributes to the increase in the concentration of pollutants by accumulating within the components of the atmosphere (the phenomenon of photochemical smog, known in Los Angeles and other cities around the world), and this can affect the implementation of some industrial activities that pollute the atmosphere and traffic control in the city, and determine the size of green and tree-lined areas in the city.
- 3) Proximity to the Earth's surface, various gaseous pollutants remain close to the Earth's surface where the smell of smoke intensifies. This stuffy atmosphere leads to health problems for city dwellers who suffer from respiratory allergies (the London disaster of 1791 killed an estimated 444 people in a week). If such an event is likely to occur in an urban location several times a year, the necessary precautions must be taken to keep air pollution levels low.

**Ecological aspects for types of human activities:** Human activities in the city are considered the main source of air pollution in general, and these activities can be divided into two types:

Usual life activities, which are related to the movement of motor vehicles, other service activities and some types of light industry.

Large industrial activities, including the cement, iron and steel industries, electricity generation, chemical industries and laboratories for biological and nuclear research, because these activities produce high levels of pollution. Despite the availability of technologies to reduce the levels of pollution produced by these industries, they remain a constant source of concern for the local population, who fear an ecological disaster and, ecological aspects impose an obligation on us to avoid such activities near cities and to choose suitable locations for them that do not affect the vital resources of the city, such as sources of drinking water and agricultural land. Tourism is one of the economic activities with a significant impact on the environment. This activity is seasonal and can have a direct impact on the environment. The presence of a large number of tourists during a given season puts pressure on various vital resources of the city, such as high consumption of drinking water, increased amount of wastewater, heavy traffic and high food consumption, in addition to the production of large amounts of solid waste. This impact increases as the number of tourists increases in relation to the population, as this activity requires taking the necessary measures to provide sufficient space and prepare to meet the needs for water supply and treatment of liquid and solid waste.

**Environmental considerations related to public health:** A clean environment is a fundamental pillar for ensuring the health of community members and the basis of primary health care. Pollution of the urban environment includes not only chemical pollution, but also natural and aesthetic pollution, both of which have the same impact on the psychological state and physical health of humans. In this context, city planning standards and urban planning standards play a major role in contributing to the improvement of the urban environment and making it more orderly and pleasant for residents. These considerations include the following:

**Planting trees and green areas:** The distribution of green areas in the city and its suburbs, which provides each resident with the equivalent of 14 square meters of green space, is considered a good ecological standard. In order to demonstrate the importance of trees within urban boundaries, a medium-sized tree can consume the amount of carbon dioxide produced by one person in a year and can provide them with the necessary amount of oxygen throughout the year.

The availability of green spaces and open spaces for sports recreation, daily walks and children's playgrounds provides psychological comfort to city residents and helps to alleviate the pressures of daily life. Surrounding major roads with trees and green belts as a buffer zone between the road and pedestrian paths also helps to reduce the spread of pollutants emitted by motor vehicles.

**Noise:** Noise within cities is caused by the movement of various motor vehicles on city streets, accompanied by the sounds of their sirens. In some locations in the city, noise is present for hours during the day. Furthermore, the use of some mechanical equipment for digging, demolition and construction work, as well as low-flying aircraft (if the airport is located near the city), create constant inconvenience to residents inside their homes and workplaces. It also has a negative impact on boardrooms and classrooms, as it interferes with speakers' voice and requires them to raise their voices when speaking. Intermittent, high-frequency noise also has a psychological and health impact on people, as it disturbs them during sleep and causes hearing loss with age. One statistic shows that the number of noise complaints from residents in Britain doubled between 1791 and 1793, and that 19% of the population of France (1791) was exposed to 19 decibels of noise daily. Noise is measured in decibels, and the following table shows noise levels and their respective effects on the human ear. In this sense, environmental considerations require the provision of sound insulation areas for highways within the city. The sound insulation area can be in the form of green, tree-lined spaces 94 meters deep from the center of the road or by using sound barriers to deflect and reduce noise levels, or by installing windows with good sound insulation on the facades of buildings facing the road. When choosing airport locations, the directions of take-off and landing of aircraft in relation to the city or neighboring urban areas should be taken into account. Some standards have set the sound level in residential areas at 4 decibels, and not more than 94 decibels during the day, and at 39 decibels, and not more than 14 decibels at night.

**Solid waste collection and disposal:** The process of collecting and disposing of solid waste and cleaning cities is of great importance, especially in raising the level of health of the population and the aesthetics of the city, in addition to its effective contribution to reducing the spread of insects and rodents that transmit diseases. The high population density that characterizes cities results in large quantities of garbage, which requires good organization of the process of collection, transport, recycling of some of its components and disposal of the remaining waste, since this process is a daily routine procedure and requires large financial costs for its implementation. However, city planning plays a major role in the success of the city's public cleaning program and finding solutions to many problems of daily work. It is necessary to draw up a comprehensive plan for solid waste management as part of comprehensive plans for integrated city facilities. In this context, the following should be taken into account:

- The width of roads and passages must be compatible with the type of machinery used in the solid waste collection and transport phase.
- Determine fixed areas for garbage containers on the streets and in the settlements, so that they are equipped for this purpose and where the initial sorting can be done.
- Identification of temporary collection sites, if necessary, depending on the size of the city and final disposal site.
- Determine the final solid waste disposal site and the final sorting sites for some solid waste components.
- It is necessary to have at least one incinerator to eliminate medical waste generated in hospitals and medical sanatoriums in the city.
- At the regional and national level, hazardous waste storage and treatment sites must be designated to serve several neighboring cities. A site for a sanitary landfill that will serve the city or group of cities for a period of 14 years must also be determined, with two more sites reserved for future use.

**Urban water supply:** Most Arab countries lack water resources to meet urban water needs, including basic household needs, recreational needs, landscaping, and industrial and fire protection

needs. Applying water supply standards from European cities or other countries with large water resources can lead to a major error that causes rapid depletion, deterioration of water resources and their quality and suitability for drinking, especially groundwater resources. The first thing to consider is to ensure high-quality water that meets the water quality guidelines issued by the World Health Organization or the drinking water specifications issued locally in each country. In terms of water quantities, this requires a balanced water policy that works to ensure water for all needs, with the establishment of multiple controls aimed at achieving the following:

- 1) Exclude industrial activities that consume large amounts of water or force them to use less water-consuming technologies.
- 2) Review considerations for designing urban water networks to achieve lower water consumption.
- 3) Take advantage of the reuse of treated wastewater for irrigation of green areas and the establishment of public parks.
- 4) Protect various water sources from direct and indirect pollution.
- 5) Provide additional water sources to compensate for deficits in groundwater supplies, such as desalination of seawater.
- 6) Use precipitation falling on the roofs of residential and public buildings by collecting it in underground reservoirs, for drinking or watering gardens in areas with an annual rainfall of more than 144 millimeters.

**Liquid waste disposal:** Human activities in the city result in the use of large quantities of water for domestic and industrial purposes, which is converted into polluted water that must be collected and transported outside the city for treatment. Wastewater also causes direct and significant environmental pollution if it is not collected and treated at the required level to ensure its reuse for agricultural irrigation or other appropriate purposes. Untreated wastewater can pollute groundwater if discharged into open land or surface water if discharged into lakes or rivers. It can also cause significant damage to the marine environment if disposed of along the beach, polluting the water and marine life and making the beach unsuitable for swimming and water sports. In this context, we must emphasize that urban planning standards should include certain considerations that protect the soil, water resources and the sea from pollution, including:

- The importance of establishing sewerage networks in cities. The type of system (combined or separate) is determined by the annual rainfall in the city.
- The choice of a wastewater treatment system that is compatible with the amount of wastewater collected and the available financial capabilities. It is preferable to apply simple technologies that are suitable for the local environment (stabilization basins).
- Establishing engineering controls for the use of cesspools or septic tanks in areas where sewerage networks are not available.
- Require industrial plants to treat the resulting industrial wastewater before discharging it into the sewerage network or to establish a separate sewerage network for the industrial area and treat it separately.
- Considering treated wastewater as a water resource that must be used in accordance with its quality.

**Impact of cities on the environment:** Environmental considerations in city planning standards include the negative impact of urban activities on the surrounding area, which sometimes extends for tens of kilometers. If the necessary protection and regulation measures are not taken at the regional level, the areas surrounding cities will be exposed to continuous and rapid environmental deterioration due to the lack of strict environmental protection legislation. There are many examples of this, such as:

The increasing pressure on fertile agricultural land on the outskirts of cities to be converted into residential or industrial areas as a result of the housing crisis and rising land prices in the city. Removal of the natural vegetation cover that consists of various local trees and plants from natural lands and their conversion into agricultural land leads to the disruption of the natural balance of the local environment and harms biodiversity as a result of the extinction of many local animal

and plant species. Intensive use of pesticides with great depletion of water resources in order to provide city dwellers with agricultural products. The splitting of agricultural land into small, dwarf plots due to the desire of city dwellers to enjoy the rural space for those who have financial means. This leads to a decrease in agricultural production on these areas. Some natural lands adjacent to cities have been converted into open dumps for construction waste, automotive waste and various solid waste. Deterioration of the state of nature reserves that exist near cities, due to various human activities.

## COMMENT AND RECOMMENDATIONS

This paper presents a set of environmental considerations, some of which are addressed by urban planning standards from an engineering planning perspective, in order to outline the design indicators and requirements for these facilities within the city. However, the environmental dimension already has a significant impact on our daily lifestyle and our future vision, making environmental considerations a fundamental element in planning processes and development programs. This paper is an attempt to identify some environmental considerations related to urban planning standards. These considerations require further research and studies in order to transform them into engineering standards that can be applied when developing existing urban plans or when establishing new urban communities. To achieve this, the following can be recommended:

1. Conducting annual environmental assessments in cities suffering from environmental degradation.
2. Monitoring the results of scientific research in the field of urban environmental pollution.
3. Integrating environmental protection studies into the national natural plan and regional plan.
4. Participation of environmental experts in committees responsible for the preparation and review of city and urban development plans.
5. Implementation of the concept of healthy cities proposed by the World Health Organization, which has been implemented in some regions of the world, because it has managed to improve environmental conditions.

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