

**ARCHITECTURE AND CONSTRUCTION: THEIR IMPACT ON AIR AND ECOLOGY**

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**Annotation:** This article examines urban planning issues related to how architecture and construction affect air quality and the ecological state of a city. It discusses airflow dynamics, the environmental impact of construction materials, pollution during the building process, and the reduction of green areas. The article demonstrates that green and energy-efficient architecture can mitigate environmental damage and improve urban living conditions.

**Introduction**

Architecture and construction play a crucial role in shaping the environment in which people live. Every new district, bridge, industrial facility, or private home becomes not only a functional element but also an active participant in ecological processes. The influence of architecture extends to the microclimate, air quality, biodiversity, and the sustainability of the urban ecosystem.

Modern cities face population growth, industrial expansion, and increasing anthropogenic pressure. These processes require new approaches based on ecological standards, energy efficiency, and the reduction of carbon footprints. Architecture is no longer viewed as an isolated art; it has become a tool for environmental management within urban territories.

**Architecture as a Regulator of Airflows**

The urban air environment does not form randomly. High-rise buildings, residential complexes, building density, and engineering structures influence wind direction, air purification capacity, and temperature distribution.

Skyscrapers may create intensified wind corridors, while dense development may form stagnant zones with elevated pollution levels.

Effective planning includes:

- Orientation of buildings relative to prevailing winds.
- Proper spacing between structures.
- Aerodynamic facade characteristics.
- Green landscaping as natural air filters.
- Open spaces enabling healthy air circulation.

**Building Materials and Ecological Footprint**

The production of cement, concrete, steel, and bricks contributes significantly to environmental impact.



[photo-1]



[photo-2]

Cement production alone accounts for nearly eight percent of global CO<sub>2</sub> emissions.



[photo-3]



[photo-4]

Innovations that reduce environmental damage include:

- Material recycling.
- Low-carbon composite materials.
- CLT (cross-laminated timber) panels.
- Smart coatings capable of reducing nitrogen oxides.

Construction as a Source of Environmental Disturbance

Construction activities temporarily worsen ecological conditions due to dust, emissions, noise, vibrations, and waste.

Major pollutants:

- PM10 and PM2.5 particles.
- CO, NO<sub>x</sub>, SO<sub>x</sub> emissions.
- Noise pollution.
- Soil and water contamination due to debris.

Mitigation strategies:

- Dust-capture systems.
- Machinery fuel standards.
- Area fencing.
- Regular watering to suppress dust.
- Waste recycling.
- Green buffer zones.

Impact on Green Areas and Biodiversity

Construction disrupts ecosystems in which every organism has an ecological function. Loss of green spaces reduces natural air filtration and overall biodiversity.

Modern solutions include:

- Green roofs.
- Vertical gardens.
- Ecological corridors.
- Nature-oriented neighborhood planning.

Green infrastructure improves microclimate, lowers temperature, absorbs CO<sub>2</sub>, and reduces airborne particles.

Eco-Architecture and Sustainable Development

Eco-friendly architecture is not a trend but a necessity.

Key principles:

- Energy efficiency (solar panels, insulation).
- Water-saving and recycling systems.
- Use of natural daylight.
- Autonomous ventilation.
- Renewable energy integration.



[photo-6]



[photo-7]

Sustainable buildings aim to coexist with nature rather than compete with it.

#### Conclusion

Architecture and construction significantly influence air quality, climate, and the ecological health of urban environments. Competent design enhances environmental well-being and creates sustainable living conditions.

Modern architecture prioritizes energy efficiency, emission reduction, preservation of natural elements, and integration of green spaces. The future lies in uniting design, functionality, and ecological responsibility.

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