

THE IMPACT OF THE STATE OF THE BUILDINGS ON THE ENVIRONMENT QUALITY IN NORTH-WEST IAȘI

Ana-Maria Oiște¹, Iuliana-Gabriela Breabăn²

Key words: buildings, impact, questionnaires, residential quarters.

Abstract. This paper has the purpose of illustrating the state of the buildings and its impact on the environmental quality in North-West Iași. The data were processed on the field with the help of questionnaires in 2008-2009 and focused on the roof type, number of levels, polystyrene isolation and other space usages. A classification of the buildings built before 1955 and after this year was done, too. This area was chosen as it contains residential quarters (Copou University, Super Copou, Sararie partially) in which a high standard of the environment quality is essential for its inhabitants.

Introduction

The city's population continues to expand and implementation of resource-efficient measures in all areas of human activity is imperative. The built environment is one clear example of the impact of human activity on natural environment and on the quality of life. Buildings have tremendous impact on environment in all life cycle stages. It results in different problems and most significant influence on resource dissipation, biodiversity degradation and human health.

With a history of over 600 years, the city of Iași has a territorial expansion which nowadays is ignoring the restrictions imposed by natural environment, being realized either through the excessive growth of constructions density, or through the expansion of the districts on unfavourable building land (slopes with active geomorphologic processes, high groundwater level, leached soils that suffer compaction processes), this tendency leading to significant changes by accelerating some of these phenomena or producing some new ones that affect environmental quality and implicitly the quality of the lives of those who live in the area or in its proximity. The analyzed area located in a residential zone, with multiple functionality, containing along with the residential zones an education and health

¹ „Al. I. Cuza” University of Iasi, PhD, anamaria.oiste@yahoo.com

² „Al. I. Cuza” University of Iasi, Faculty of Geography and Geology.

area located around “Alexandru Ioan Cuza” University, zones occupied by green spaces and recreational zones. Initially, in this area the constructions were made on favourable terrains specific for the areas of the upper terraces of Bahlui (the 5th and the 6th terrace) where have been localized constructions that benefited of urban technical utilities from the beginning. Then, the constructions began to rose on unfavourable lands – Aurora and Botanical Garden slopes area, because of the decrease of the free space in favourable lands area.

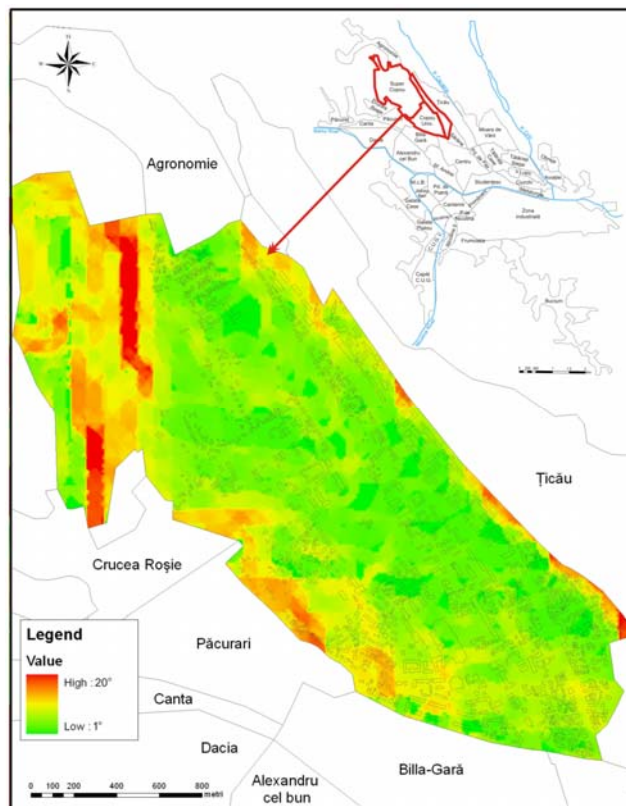


Fig 1 - Localization of studied area and slopes map

The study aims were the inventory of the buildings, the evaluation of their state in the light of the main characteristics: age, roof type, number of levels, type of building facades, followed by the determining of the impact of their state on the environmental quality and mapping the obtained results.

1. Materials and methods

The main utilized materials have been the topographic plans 1:2000 1955 edition and 1:5000 1964 edition as well the aerial photos from 2006. The working methods have implied the delimitation of the study area, direct observations made in the field, realization and application of questionnaires between 2007-2009 applied on 1490 buildings, which contained six questions referring to their features: age, roof type, number of levels, facades type – if they have or not polystyrene isolation, followed by the processing of the data thus obtained with Microsoft Excel and Arc-GIS software and the determination of the impact of their state on environmental quality.

2. Results and discussions

The studied area has a 316.35 ha surface, having various usages specific for the urban space as built space, green spaces, streets and spaces with other usages. The largest surface is occupied by the green spaces, representing 51% of the total, favoured by their functionality and attractiveness, especially the Botanical Garden and Copou park, serving the area population as well as the whole city population, followed by the buildings covered area – 25%, numerical important and with various functions. The streets cover a significant surface of 22% due to the great width of some intensely circulated streets and also to the dense side streets network, but with a reduced width, necessary for the residents' service. Finally, the spaces with other destinations – parking lots, children's playground, have a smaller surface, the insufficiency of the parking lots leading to illegal parking and traffic disruption, affecting the population along the densely populated streets.

1490 buildings have been inventoried and analyzed, whose characteristics have been assessed and classified, giving each an attribute directly proportional to the environmental impact. Concerning the number of levels, the following classification resulted: 50% for the buildings with one level, 33% with two levels, 7% with three levels, so that 90% of the buildings have a diminished number of levels and a diminished impact on the environment. The other 10% is owned by the high buildings, out of which 3% have over four levels, these being the buildings with a significant impact on the environment, being situated either on the slopes affected by geomorphologic processes or on the cornice of some stabilized slips, or on the terraces bridge, which doesn't affect the slopes, but modifies the landscape of an area in which houses with maximum three levels and an alike aspect are prevailing. It's well-known that as the size of the buildings is higher so the impact is greater, because they are heavy and involved in different natural process: overloading with buildings the areas affected by geomorphologic

processes slopes and generating the compaction processes on the slightly inclined terrains, because the soil is affected by leaching process.

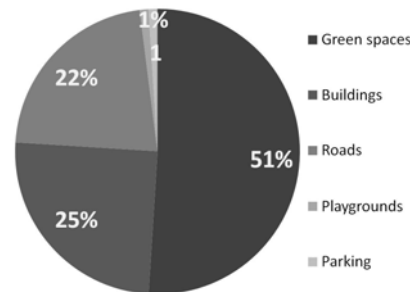


Fig 2 - Land use in the study area

The classification of the buildings concerning the roof type carries forth the presence of the buildings covered with tin in a 69% proportion, material which doesn't rise distinct problems, except the lofts which have to be tooled up with air conditioning for the hot season, because the temperature significantly rises, followed by the buildings with tile - 22%, material that is used especially on older buildings. The constructions that have on their superior part a concrete slab – 8%, rise problems because of the poor thermal insulation, regardless of the season and they create discomfort through the infiltrations that take place during the quantitative significant liquid precipitations, but also the solid ones, as a result of the long snow stagnation on the terrace, but also of its melting. A significant impact on the environment have the buildings with asbestos roof, which are numerical fewer, only three, but the harm is given by the advanced state of degradation of this material and the proximity to a pre-university education unit – G. Ibraileanu high school, knowing health effects, especially on vulnerable young people exposed daily in that case. More than that statistics from National Public Health Institute (2006) shows that the most common disease of Iași inhabitants are the respiratory diseases (bronchitis, asthma and others, higher rate among young people), caused by exposure to pollutants and other aggressor in the air like asbestos, with long term effect.

Concerning the facade type, buildings divide in those with polystyrene insulation with a 13% prevalence and the rest of 87% are buildings without polystyrene insulation. The absence of insulation implies higher costs for acclimatization, assured by individual systems for homes and central heating with natural gas for the public buildings, causing increased air pollution, especially in

cold season, but also the resent of an acoustic discomfort for the buildings that are positioned along the intensely circulated streets.

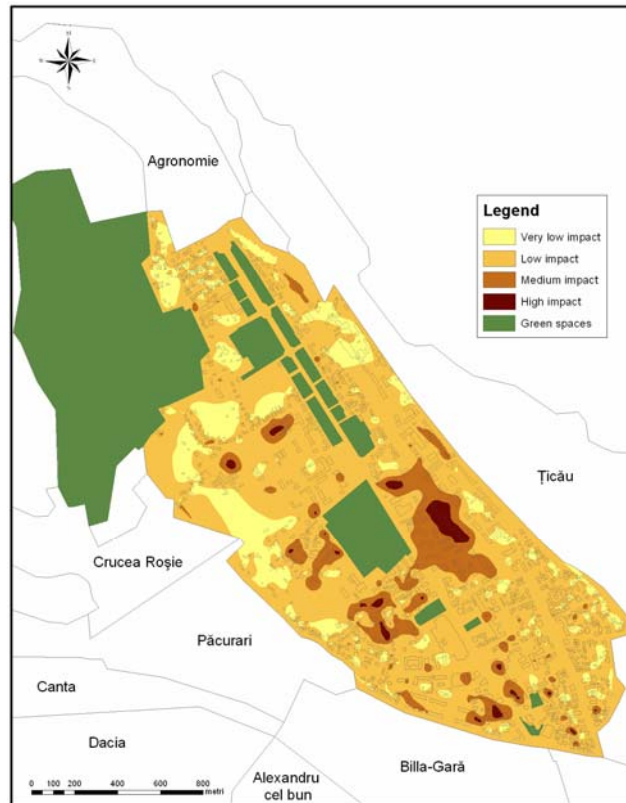


Fig 3 - Classification of buildings according to environmental impact

Referring to the classification of the buildings concerning their age, the data interpolation indicates an enhancement of the buildings density in the analyzed area, this having a significant impact on the environment, 56% of the buildings being raised after 1955, many of these are high and massive constructions that modify the urban landscape, as well as environmental quality, through the concentration of a great number of people on small surfaces. Furthermore, the enhancement of the buildings density on the slightly inclined terrains caused them extension on unfavourable building land like the slope Aurora and Botanical

Garden areas affected by geomorphologic processes slopes, generating or activating old processes, because the new buildings are higher and heavier than the old ones. The effects can be observed thanks to cracking and subsidence of roads and buildings cleaves.

Starting from the resulting information, on the basis of an algorithm (the sum of the attributes for each building and the interpolation of the results obtained through the Natural Neighborhood method have been calculated), the assessment of the impact of the buildings on the environment through the framing of the buildings in four categories has been realized: with a very low impact – 5% that category include small buildings with one level, covered with tin, with polystyrene insulation and built after 1955, low – 62%, including the buildings with one and two levels, covered with tin and tile, without polystyrene insulation, and built before and after 1955, medium – 30% include buildings with three levels, with a concrete slab or asbestos, built after 1955 and without polystyrene insulation and the last category buildings with major impact – 3%, that includes the highest and heavier buildings with four and more than four levels, without roof only with concrete slab, without polystyrene insulation and built after 1955 and the map that highlight the areas where these are located (fig. 3).

Conclusions

The impact of the buildings state in the North-West part of Iași town rises major problems in the areas affected by geomorphologic processes slopes and by overloading with high buildings (over three levels) of the slightly inclined terrains. After data analysis, we can remark the predominance of the one level buildings, with tin roof, without polystyrene isolation and built after 1955, these being small constructions, with their own acclimatization system, modifying air quality especially during the cold season.

For solving some problems concerning the geomorphologic processes aggravated by the rising of the buildings it is imposed the issuance of a restriction of building in these areas, but also of respecting some precise standards for the already existing buildings rehabilitation in order to conserve the general aspect of the area. It is also imposed the thermal rehabilitation of the houses in order to reduce the impact on the environment generated by the acclimatization systems that modify the quality of the air, especially during the cold season. More than that, the buildings with asbestos roof must replace this type of material that harms the population with other materials that exclude this danger.

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