

THE IMPACT AND THE RISK OF ABANDONED BUILDINGS FROM PETROȘANI CITY ON THE URBAN ENVIRONMENT

Florin FAUR¹, Izabela-Maria APOSTU^{1*}

¹*University of Petroșani, Faculty of Mining, Department of Environmental Engineering and Geology, University Street, no. 20, 332006, Petroșani, Romania*

**Corresponding author: izabelamaria.nyari@yahoo.com*

ABSTRACT. The city of Petroșani, as well as the whole area known as Jiu's Valley, is integrated in a general vision of transforming a mining region into a tourist destination and, in this context, the aspects related to the quality of the urban landscape must be taken into account in a very serious manner. Although most people, when they hear about landscape, think of the wonderful areas surrounding Petroșani city, the urban landscape should not be ignored either, this being the first that comes in contact with the tourists who will visit this region and will contribute to the economic well-being of the inhabitants. The present paper analyzes the impact of abandoned buildings on the urban landscape (environment) having as a starting point a reality valid in many former industrialized regions, namely that due to the countless restructuring, the population is constantly decreasing and one of the common consequences is represented by the large number of abandoned buildings, in different stages of degradation. These buildings, besides the fact that they strongly degrade the urban landscape (environment), often represent true outbreaks of infection and a real public danger, being exposed to the risk of arson or collapse. For this purpose, we have adapted the methods for identifying/ estimating the anthropic impact on the environment (the network method and the impact/risk matrices) for the situation under study.

Key words: *Petroșani, urban environment, abandoned buildings, impact.*

INTRODUCTION

In order to understand the reason why in the urban environment of Petrosani city more and more abandoned buildings have appeared, we must briefly present the demographic evolution and identify the reasons underlying this evolution.

According to the census from 2011, the population of Petrosani city rises to 37,160 inhabitants, decreasing from the previous censuses of 2002, when there were 45,195 inhabitants and from 1992 when the number was of 52,390 inhabitants, and the tendency of the last 8 years is the same, in decrease (***, 2014).

Correlating these data with the socio-economic evolution of the city, we cannot fail to observe that the main change is represented by the restructuring of the Romanian industry as a whole, and, especially the extractive one. In fact, we can say that everything starts from here, the restructuring of the mining sector (in particular coal exploitation) and the related ones (mining machinery and equipment companies, institutes and design-research-development companies in the field, etc.) started in the mid-90s. This restructuring also meant a first wave of migration but also a worsening of the socio-economic situation of the population in the area.

Restructuring of the mining sector has not only led to a decrease of the employees in the field and in those directly related, but also to a restriction of the activities in other sectors (services and utilities, public food, education, health, etc.), practically being seriously affected the zonal economy and encouraged labor migration. Of course, this process continues today and in conjunction with the lack of jobs in alternative sectors leads to a continuation of the phenomenon of labor migration to other cities and regions of the country with a much higher economic potential (Faur et al., 2017).

However, we should not neglect the fact that migration is also a worrying phenomenon for Romania as a whole, with many choosing to leave the country for destinations in Western Europe in search of a better life (Ianoş, 2004).

In the context of those presented, it is easy to understand why abandoned buildings have appeared and continue to appear in the urban landscape of Petrosani city.

MATERIAL AND METHODS

Location of the investigated area

The city of Petrosani is located in the central part of Romania, in the south of Hunedoara county (figure 1), at the confluence of the East Jiu with the West Jiu, geographically at the latitude of 45°24'44" north and the longitude of 23°22'24" east (***, 2014).

Outside the town of the same name, the municipality of Petroșani has the following localities in administration: Peștera Bolii, Dâlja Mare, Dâlja Mică and Slătinoara.

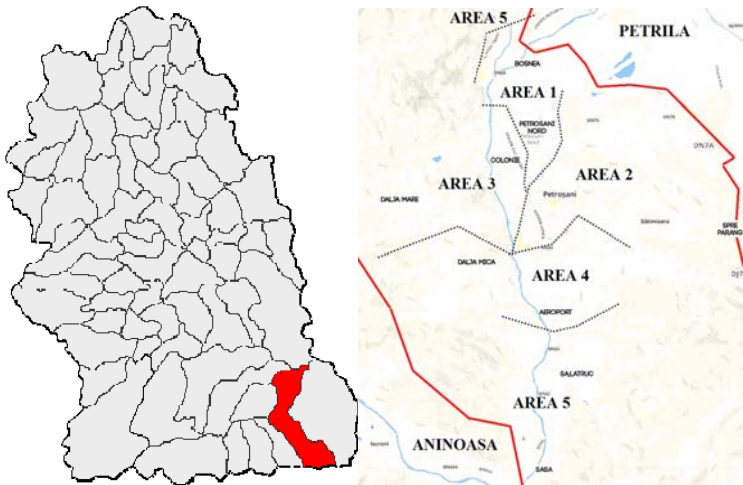


Fig. 1. Location of Petroșani city within Hunedoara county and its areal divisions (***, 2014)

It is the most important city within the Jiu Valley Basin (Petrosani Depression). It has an administrative area of 19,556 ha (195.56 km²), being located between the Retezat and Sebeș mountains (component unit of the Șureanu Mountains) to the north, the Vâlcan Mountains to the south, Godeanu to the west and Parâng to the east (Faur, 2018).

The relief of Petroșani city is typical for mountain depressions (figure 2), it is located at an altitude of 615 - 620 m, the highest altitude in the area being recorded in the Parângul Mare Peak (2519 m) and the smallest at Livezeni (the riverbed of East Jiu is at an altitude of 560 m) (Faur, 2018).



Fig. 2. *Panoramic view of Petroșani city (photo by: Daniela Baciu)*

Petroșani city is located on two important communication routes: DN 66 (E 79) Târgu Jiu - Simeria at the intersection with DN 66A Petroșani - Uricani - Câmpu lui Neag, with extension to Herculane and DN 7A connecting the city to Valea Oltului, Petroșani - Voineasa - Brezoi) (Negoe, 2019).

Regarding the distance to the big cities, the city of Petroșani is located at 370 km from the country's capital, Bucharest, and 91 km from the capital of Hunedoara County, Deva city. Other important cities near it are: Târgu Jiu - 56 km, Craiova - 161 km, Timișoara - 250 km, Alba Iulia - 200 km, Sibiu - 220 km (***, 2014).

Short history

The official story of Petroșeni begins in 1788, when the name is recorded in the book "Journey from Postdam to Constantinople" by Prussian officer Gotze. Only in 1818 the name of Petroșeni town is mentioned in official documents, with the census attesting the presence of 233 inhabitants, whose main occupation was sheep breeding (***, 2014).

After 1840, the region will experience a rapid development, as the surface exploitation of coal discovered in the area begins. The mining basin would become the largest coal field in Romania and one of the most important in Europe (***, 2014).

Starting with 1848, the development of the locality is closely linked to the development of the mining industry. In 1918, after the Great Union, the

Petroșeni region is included in the new territorial-administrative organization of Hunedoara County. Until 1920, Petroșani was known as Petroșeni (a name still kept today by the natives peasant, the so-called "momârlani"), but from February 14, 1921 the settlement will become as we know it today, namely Petroșani.

On January 4, 1924, Petroșani commune becomes a town, and on March 1, 1968 it becomes a city (municipality).

Also, since 1948, the city of Petrosani becomes a university center, by establishing the "Coal Institute", today the University of Petrosani, which was to become one of the most prestigious higher education institutions with mining profile in Romania and Europe.

On the other hand, at present, on the administrative territory of the city is the Livezeni Mining Exploitation (located on Lunca street, no. 153), the headquarters of the Hunedoara Energy Complex (Timisoara street, no. 2), but also a museum, the only one in the country with a mining technique profile, the Mining Museum (Nicolae Bălcescu street, no. 2), and since 1949, Petrosani has hosted one of the most prestigious research institutions in Romania, "Testing Station for Mining Security - a subsidiary of ICEMIN Bucharest ", currently the National Institute for Research and Development for Mining Security and Explosive Protection (INSEMEX) (General Vasile Milea street, no. 32-34) (***, 2014).

The urban patrimony

The development of tourism activities in Petrosani, as an alternative to mining, involves, beyond the completion of the project "Development of the Parâng ski area" and its promotion, the arrangement and maintenance of the urban area (urban landscape/environment), so that it fits into the general vision.

According to official data, in Petroșani city there are almost 30,000 taxable buildings, the public and private patrimony, owned by the community of Petroșani being composed of the following assets (Negoe, 2019):

a) public: 19 roads; 150 streets; 34 bridges; 11 parks (respectively: Carol Schreter Central Park; European Community Park; Ion Luca Caragiale Park; Anghel Saligny Park; Romtelecom Park; Pensioners Park; Avram

Iancu Park; Spring Park; Pistruiatul Park; Micropiața Park; Peace Park); 11 green areas; 116 car parks; 29 children's playgrounds; 1 stadium - Jiul Stadium; 2 cemeteries; 7 buildings and lands where the Local Council and the City Hall operate; 118 social housing; 467 dwellings housing; 16 ANL dwellings; 4 traffic lights; 6 roundabouts.

b) private: forests, with a total area of 11,721 ha; pastures, with a total area of 3,082 ha; means of transport 17; fixed assets and inventory items in the accounting records.

According to the list of the Ministry of Culture, the following historical monuments exist on the administrative territory of Petrosani city (***, 2014):

➤ The first headquarters of the Romanian Petroșani Joint-stock Company, founded in 1920. At present, the building houses the Petroșani Mining Museum. Address: Str. Nicolae Bălcescu, no. 2;

➤ The headquarters of the Mining Trade Union between 1921-1946, at present is the social canteen. Address: Str. Cuza Voda, no. 6;

➤ The wooden church of the Holy Archangels (Sânonilor), built in the 18th century. Address: Str. Lunca, no. 8;

➤ The Officials Casino, built in 1905, houses the Dramatic Theater I.D. Sîrbu. Address: Str. Mihai Viteazul, no. 2;

➤ Prince Mircea dispensary, established in 1925, is today the headquarters of the Petroșani Students Cultural House. Address: Bd. December 1, 1918, no. 62;

➤ The Workers Casino, inaugurated in 1925. Currently the La Belle Epoque Restaurant. Address: Str. Grivița Roșie, no. 38;

➤ The "Colonia Workers Housing" neighborhood was created at the end of the 19th century, today it is known as the Colony Neighborhood. The Colony Housing District was included in the list of D.M.A.S.I. in the category "urban historical area". Location: the neighborhood is bounded by the East Jiul river, Cărbunelui (Coal) street, railway station and CFR lines, Vlad Țepeș street.

➤ The historical center of the city (between Victoriei Square and the Civic Center), dating from the end of the 19th century. Location: Mihai Viteazul (Michael the Brave) street.

It should be noted that these buildings cannot be considered as monuments in the true sense of the word, the spectacular architectural elements being poorly represented (Dura and Nistor, 2014).

Description of the studied abandoned buildings

It is practically impossible to include in this study all the abandoned buildings in Petrosani city and for this reason we have selected a number of 6 buildings, which we considered to be representative and which can best highlight the impact and risk manifested on the urban environment.

B1. Former Military Unit 01032 (private property, area 1) - constructed in the central area, is ruined on the day that passes, without the authorities being able to intervene (figure 3).



Fig. 3. *Former Military Unit 01032*

Restituted, the building in question housed the Military Unit 01032, and is located on Timișoara street, at number 5, in the city of Petrosani. In the building that has an area of 335.44 m², as well as an interior courtyard of 279.27 m², the City Hall intended to move the Community Public Service for the Evidence of Persons.

In the end, the one storey building, with 18 rooms and two bathrooms, being requested and received by the descendants of the former owner has no other destination. In the meantime, the "central pavilion" building was immediately struck by the thieves of building materials. Over the years, from here almost everything that could be stolen was stolen. The terracotta stoves in the 18 rooms were broken, completely disappearing. On the same street, in the center of the city, there are other buildings, all being restituted to former owners or their descendants, that are now trampled by thieves.

It should be noted that in addition to the danger it poses for passers-by, periodically pieces of plaster, bricks and tiles falling from the building, there is also the danger of arson and its propagation in the neighboring buildings. In fact, in the last 5 years, firefighters were forced to intervene 4 times in order to extinguish fires caused by those who sheltered in these ruins and tried to warm themselves.

Also, because of the homeless, more precisely the dejections and household waste generated by them, the area has also become an outbreak of infection.

B2. Petroșani Central Workshops/IUMP/UMIROM/GEROM (private property, area 3) - at the north entrance in the city of Petroșani, between Dărănești and Petroșani Rail Station, we are greeted by the ruins of what was once an important mining equipment company in Romania.

Beyond the importance on the industrial and socio-economic level (here being employed more than 3,500 people at one time), some of the buildings now abandoned are loaded with history, here being cast the famous Infinity Column, a masterpiece of the famous sculptor Constantine Brancuși.

Today, with the exception of the building located at gate 1, which functions as an event hall, from the former company a few workshops still operate (whose days are counted), the rest being practically abandoned (figure 4). And in this case we are also talking about a private property about which we weren't able to obtain much information.



Fig. 4. *Petroșani Central Workshops*

Of course, the "restructuring process" of mining in the Jiu Valley is one of the main causes of the decline of this symbol of Petroșani, but we cannot fail to notice the complicity and lack of interest of those who have taken over the company's assets through privatization.

This industrial objective could easily be rethought and integrated into the local and national economy. Even if there is no demand for mining machinery, equipment and subassemblies, a wide range of products for other industries and for general use could be produced here.

Some of the old buildings could easily have been passed in the Industrial Heritage of Romania together with some of the equipments (on the model of the former buildings of Petrila mine) and could have gained a later destination (even introduced in a wider industrial tourist circuit, developed throughout the entire Jiu Valley).

B3, B4. CONSMIN buildings (private property, area 3) - as the company name suggests, it had as object of activity mining constructions and, as expected with the restructuring of the activities in this sector, the company went bankrupt.



Fig. 5. CONSMIN buildings on Mihai Eminescu street (a) and Cărbunelui street (b)

Two of the buildings (located on Mihai Eminescu and Cărbunelui streets) were abandoned, at present being in a state of ruin and constituting a real public danger for passers-by (by collapsing of constructive elements) (figures 5.a and 5.b).

B5. CFR (Romanian Rail Ways) Deposits (CFR patrimony, area 3) - located at the north exit from Petrosani Rail Station, on the left side on the direction towards Simeria, these deposits have not been used since the early 90s (figure 6).



Fig. 6. *CFR deposits*

For a long time in these buildings, the needy people in the Colony District found their shelter turning them into real outbreaks of infection and causing some small fires.

At present the structure of resistance is severely affected, the roof presenting an imminent danger of collapse, was abandoned by people, being "taken over" by homeless animals.

B6. Former Military Unit 01032/Former Gendarmerie (in the patrimony of the Ministry of Internal Affairs, area 3) - the building is also located in the Colony District, on Vlad Țepeș street and after the military unit 01032 was disbanded it was taken over for a long time by the Romanian Gendarmerie.

At the moment it is completely abandoned and like many other buildings it has been trampled by thieves of building materials.

However, being a newer building, with concrete structure, the resistance elements and the exterior walls are presented under acceptable conditions, which is why we consider that it could be used for another purposes (figure 7).

Moreover, another similar building, which belonged to the same military unit, was transferred to Petrosani City Hall and transformed into a building with social housing.



Fig. 7. *Former Gendarmerie*

In reality, in Petroșani city, there are a multitude of abandoned buildings (housing buildings especially in Airport neighborhood, residential houses, industrial buildings and structure, former thermal distribution points, etc.), which are in different stages of degradation and can be considered as factors of impact and risk on the urban environment.

In addition to these, there are also a number of buildings whose status is uncertain (such as the “New” Students Cultural House, whose construction began in 1992 and has not been completed), with the intention that they will assume different functions, but which at the moment contributes to the degradation of the urban environment of the city.

In the rest of the paper the references to the abandoned buildings taken in study will be made through the abbreviations B1 - B6.

RESULTS AND DISSCUTION

According to a previous study (Buia and Nimară, 2019), based on the recommendations in the specialized literature (Baciu, 2014; Bold and Nimară, 2016; L.I. and I.E.M.A., 2013; *** 2000;), the urban landscape of Petroșani municipality fits in the category of distinct landscapes, in which the localities have a predetermined plan or are developed organically, with a clear structure, the presence of craftsmanship skills, recognized outside the local community,

average number of pictures, paintings or postcards of the available landscapes, one or more recognized events for traditional features, relatively stable urban dynamics, with very few changes in recent years, a few industrial constructions in operation, a few new constructions, recent beginning of an urbanism system, few historical monuments, good accessibility (one or more national roads or railway transport of medium-good quality);

In this general context, for the identification and quantification of the impact we used a well-known instrument (impact matrix), adapted for the present study, and also for the evaluation of the risk that these buildings present for the urban environment, we used a simplified procedure, adapted according to the legal regulations in force (***, 1997).

Impact assessment by matrix method

The matrices are made up of double entry tables, in which, on lines, usually, the environmental components and factors involved, divided and grouped into categories are written, and in the columns are written the elementary actions in which the impact generating activity was broken down. Each intersection of the matrix represents a potential impact relationship between the causal factors and the components of the environment (Lazăr and Faur, 2011).

Generally, the most used are the quantitative type matrices, which aim to evaluate, through a numerical score, both the individual impacts and the overall impact of the project, and are constructed by assigning to each crossing point a numerical coefficient that expresses the importance of that interaction compared to the others. In this case, the matrices become operative tools of the impact analysis and evaluation phase (Lazăr and Dumitrescu, 2006; Lazăr and Faur, 2011).

In order to identify and quantify the impact of abandoned buildings in the city of Petrosani on the urban environment, we built a matrix (table 1) in which, on lines, we have the buildings identified and described in the previous paragraph (the 6 buildings), and on the columns we have the types of degradation and the dangers that they represent (7 categories: a - the state of the resistance structure; b - the external appearance; c - the internal appearance; d - the stability of the constructive elements; e - the danger of arson (the presence of combustible elements); f - the presence of the waste/outbreaks of infection; g - flooded spaces).

The last column presents the average impact that each of the analyzed buildings has on the urban environment. The value of the average impact is important for the last subchapter, the one assessing the risk that these buildings represent for the urban environment and implicitly for the most important component of it, humans.

Since we cannot talk about a positive impact of the abandoned buildings on the urban environment, the following values were adopted for the construction of the matrix (Negoe, 2019):

0 - no impact (not applicable for the analyzed building);

1 - minimum impact:

a - there are no indications that certain elements of the resistance structure may be affected, no detailed specialized investigations are necessary (a visual inspection by a specialist in structures is sufficient);

b - visible areas affected by infiltration, lack of small plaster fragments, inscriptions (graffiti), discolored areas;

c - visible areas affected by infiltration, lack of small plaster fragments, inscriptions (graffiti), discolored areas, local cracks in walls, ceilings, steps, etc.;

d - no drops of plaster blocks, bricks were reported, but isolated tile drops caused by snow sliding were reported;

e - wooden structures and flammable materials are reduced in volume and their distribution in the building does not allow the generalization of a fire;

f - there are waste materials in the building, but these are not organic in nature, dejections are not reported, rodents and insects have been reported;

g - water accumulates in some rooms during torrential rainfall, but it evaporates shortly.

2 - medium impact:

a - the elements of the resistance structures are seriously affected, there is a need for thorough specialized investigations, resistance tests;

b - large areas affected by infiltration, lack of large plaster fragments, inscriptions (graffiti), large cracks visible on the outside;

c - large areas affected by infiltration, lack of large plaster fragments, inscriptions (graffiti), pieces detached from walls, ceiling and steps, cracks extended into walls, ceilings, steps, etc.;

d - periodic drops of plaster blocks, bricks and tiles were reported;

e - wooden structures and flammable materials are extended in volume (25 - 50%), and their distribution in the building allows the generalization of a fire;

f - in the building there are important volumes of organic waste, human and animal dejections are reported, colonies of rodents and insects are present;

g - certain rooms (basement) are partially flooded, the water is infected, it has a strong unpleasant smell and does not evaporate throughout the year.

3 - major impact:

a - the resistance structure is irreparably affected, the collapse of the building is imminent and represents an active danger for pedestrians and vehicles in the area of influence;

b - appearance of ruin, absence of plastering on more than 50% of the outer surface, lack of portions or fragments from the outer walls, building covered by spontaneously installed vegetation;

c - obvious infiltration (practically it rains in the building), absence of plastering on more than 50% of the interior surface, inscriptions (graffiti), partially or totally collapsed walls, lack of pieces of roof, ceiling and floors, partially or totally collapsed steps, etc.;

d - daily falls of plaster blocks, bricks and tiles;

e - wooden structures and flammable materials are expanded in volume (> 50%), their distribution in the building allows the generalization of a fire, there have been fires in the past, they can extend to neighboring buildings;

f - the building is practically an improvised waste deposit, large quantities of human and animal dejections, colonies of rodents and insects are present;

g - the basement of the building is completely flooded, the water is infected, it has a strong unpleasant smell and it does not evaporate throughout the year.

Table 1. *Impact assessment/evaluation matrix*

Impact matrix	Impact factors (type of degradation – danger)							*AVERAGE IMPACT
	a	b	c	d	e	f	g	
B1	3	2	3	3	3	3	1	**3
B2	1	2	2	1	0	1	0	1,4
B3	3	3	2	3	2	2	0	**3
B4	3	3	3	3	0	1	0	**3
B5	2	3	3	3	3	3	1	2,57
B6	2	2	3	2	2	2	1	2

* The average value of the impact is calculated without taking into account the cells marked with 0. For example, in the case of an abandoned building that does not have a basement, there is no problem of water accumulation, but at the same time the building may have the resistance structure severely affected and a high risk of arson. Therefore, even if water is not a problem, it does not necessarily mean that the danger posed by that building is lower than in the case of a building in which the temporary or permanent presence of water is reported;

** If for the state of the resistance structure the awarded score is 3, ie major impact, then automatically and the average impact for the respective building will be considered equal to 3.

Depending on the scores obtained by the analyzed buildings in table 1 (the impact that these buildings have on the urban environment), we can establish 4 intervals according to the type of interventions required:

= 1 → buildings with minimal impact on the urban environment, requires cosmetic works/current maintenance (green);

> 1 - 2 → buildings with medium impact on the urban environment, requires renovation of the exterior and interior, inspection of the resistance structure, sanitation (B2, B6) (yellow);

> 2 - 3 < → buildings with major impact on the urban environment, requires immediate intervention to the resistance structure, extensive works of restoration of the exterior and the interior, sanitation, elimination of the arson risk (B5) (orange);

= 3 → public danger buildings, the impact is maximum, saving these buildings is not justified from the point of view of historical or architectural value and must be removed immediately (demolished) from the urban landscape/environment (B1, B3 and B4) (red).

Risk assessment

Certainly these buildings are at the same time a risk factor for the population of Petrosani city.

There is a wide range of different methodologies for risk assessment associated with objectives, both quantitative and qualitative. For the present study we have chosen the general methodology for risk assessment in accordance with Annex 4 of Order 184/1997 for approving the procedure for carrying out environmental surveys (***, 1997).

The risk is the probability of a negative effect occurring within a specified period of time and can be reproduced in the form of the equation:

$$\text{Risk} = \text{Danger} \times \text{Exposure}$$

Risk assessment involves an estimation (including hazard identification, magnitude of effects and manifestation likelihood) and risk calculation (including quantifying the importance of hazards and consequences for persons and/or affected environment). The overall objective of the assessment is to control the risks on a site by identifying:

- the most important dangers;
- resources and recipients at risk;
- the mechanisms by which the risk is realized;
- the important risks that appear on the site;
- the general measures needed to reduce the risk level to an acceptable level.

The qualitative assessment of the risk will take into account the following factors: danger/source; the drive path; target/receiver (which may include human beings, animals, plants, water resources and buildings).

The degree of risk depends both on the nature of the impact on the receiver and on the probability of manifesting this impact.

Risk calculation/quantification can be based on a simple classification system where the probability and severity of an event are ranked upwards, assigning them a random score (table 2).

Table 2. *Simplified system for classification of severity a probability*

Simplified model	
Severity (danger)	Probability (exposure)
1 = small (minimum)	1 = small (reduced)
2 = medium	2 = medium
3 = major	3 = high

The risk can then be calculated by multiplying the probability factor with the severity factor in order to obtain a comparative figure. This will allow comparisons between different risks. The higher the result, the higher the priority that must be given to risk control.

Starting from this, we have designed a risk assessment method, starting from the values obtained for the average impact, presented in table 1.

Thus, we considered that these values can be equivalent to the danger posed by these buildings, and the exposure is determined according to the area in which they are located (see figure 1 and the description of the studied buildings). Basically, the areal divisions of the territory of Petroșani city was made based on aspects such as: the presence of heritage, administrative, socio-cultural and educational buildings, accessibility and distance from them, the quality of the infrastructure, parks and recreation areas, pedestrian and auto traffic etc. (***, 2014; Negoe, 2019).

Based on these considerations, we set a scale from 1 to 3 for the exposure (1 small (reduced) exposure, 2 medium exposure and 3 high exposure) as follows:

- 1 - corresponding to area 5 of the city;
- 2 - corresponding to areas 3 + 4 of the city;
- 3 - corresponding to areas 1 + 2 of the city;

Next, we built the risk assessment matrix, presented in table 3.

Table 3. Risk assessment matrix

Building	Risk calculation elements				RISK
	Average impact	Danger	Location (areal division)	Exposure	
B1	3	3	area 1	3	9
B2	1,4	1,4	area 3	2	2,8
B3	3	3	area 3	2	6
B4	3	3	area 3	2	6
B5	2,57	2,57	area 3	2	5,14
B6	2	2	area 3	2	4

According to the general recommendations of order 184/1997, 4 risk classes were established, and the buildings taken into study were framed into them:

1 - 3 → low risk - buildings are in an incipient state of degradation, are located in areas with low pedestrian and car traffic and do not present a risk to the population (B2) (green);

> 3 - 6 < → medium risk - the buildings are visibly degraded, they are located in areas with average pedestrian and car traffic, they present a risk to the population in certain conditions (eg: roof tiles dragging), (B5, B6) (yellow);

6 - 8.5 → major risk - the buildings are in an advanced state of degradation, they collapse, they are located in areas with average pedestrian and car traffic, there are frequently reported falls of the constructive elements, outbreaks of infection, the risk to the population is permanent (B3, B4) (orange);

> 8.5 - 9 → extreme risk - the buildings collapse, they are located in areas with heavy pedestrian and car traffic, there are real outbreaks of infection, they were affected by arsons and there is the risk of their extension to neighboring buildings, the risk for population is permanent (B1) (red).

CONCLUSIONS

In order to facilitate the extraction of general conclusions for the present study, we have constructed table 4. In this table a comparison is made between the impact on the urban environment and the risk for the population generated by the abandoned buildings from Petrosani city analyzed in this paper.

Table 4. Comparison between the environmental impact and the risk represented by the abandoned buildings from Petroșani city

Building	The impact over the urban environment	The risk over the urban environment and humans
B1	3	9
B2	1,4	2,8
B3	3	6
B4	3	6
B5	2,57	5,14
B6	2	4

The following can be observed:

- two of the buildings fall into equivalent classes of impact and risk:
 - B1, generates maximum impact and extreme risk (public danger building);
 - B6, generates a medium impact and risk;
- a single building, B2, generates a medium impact and a low risk;
- 2 buildings, B3 and B4, generate maximum impact and major risk;
- a single building, B5, generates a major impact, the risk being medium;

The general conclusion that can be drawn by analyzing table 4 is that abandoned buildings do not always fall into equivalent classes of impact and risk, this fact being strongly influenced by their location (the areal division in which are situated).

Buildings B2, B3, B4 and B5 generate an impact located in a higher class compared to the environmental risk (which is in the immediate lower class) due to aspects related to the positioning of these buildings (the distance to the central area of the city) and to the values of pedestrian and car traffic.

As a result of this study, it can be stated that all these buildings have a negative impact ranging from average to maximum on the urban environment and, with an exception (B2), they present a risk ranging from medium to extreme for the population.

For this reason, part of the abandoned buildings (B1, B3 and B4) must be removed from the urban landscape/environment of Petrosani city (demolished, and the land thus released made available for other purposes), and another part must enter as soon as possible in capital repairs and rehabilitation works.

For buildings B2 and B5 the possibility of their inclusion in the industrial patrimony, restoration and inclusion in a possible urban tourist circuit must be established before is too late.

REFERENCES

- Baciu N., 2014, *Landscape dynamics and typology. Course notes (in Romanian)*. Bioflux Publishing House, 101 p., Cluj-Napoca.
- Bold O., Nimară C., 2016, *Natural and anthropic landscape (in Romanian)*. Universitas Publishing House, 123 p., Petroșani.
- Buia G., Nimară C., 2019, Quality assessment of Petrosani urban landscape. *Quality - Access to Success*, **20** (S1), pp. 259-262.
- Dura C., Nistor M.C., 2014, *Architectural elements. Laboratory guide (in Romanian)*. Universitas Publishing House, 115 p., Petroșani.
- Faur F., Marchiș D., Nistor M.C., 2017, Evolution of the coal mining sector in Jiu Valley in terms of sustainable development and current socio-economic implications. *Research Journal of Agricultural Science* **49** (4), pp. 110-117.
- Faur F., 2018, *Design of environmental monitoring systems (e-book, in Romanian)*. Universitas Publishing House, 223 p., Petroșani. Available at: https://www.researchgate.net/publication/331466329_PROIECTAREA_SISTEMELOR_DE_MONITORIZARE_A_MEDIULUI, accessed on January 2020.
- Ianoș I., 2004, *Urban dynamics: applications to the Romanian city and urban system (in Romanian)*. Technical Publishing House, 213 p., Bucharest.
- L.I. and I.E.M.A (Landscape Institute and Institute of Environmental Management & Assessment), 2013, *Guidance for landscape and visual impact assessment*, (3rd ed.). Routledge-Taylor & Francis Group, Woburn Hampton, Abingdon, 170 p., New York.
- Lazăr M., Dumitrescu I., 2006, *Anthropic impact on the environment (in Romanian)*. Universitas Publishing House, 310 p., Petroșani.
- Lazăr M., Faur F., 2011, *Identification and assessment of the anthropic impact on the environment. Project guide (in Romanian)*. Universitas Publishing House, 96 p., Petroșani.
- Negoe L., 2019, The negative impact of abandoned buildings over the urban landscape of Petroșani city (in Romanian). *17th National Students Symposium "GEOECOLOGIA"*, Petroșani.
- ***, 1997, Ministerial Order (MAPP) no. 184 for approving the procedure for carrying out environmental surveys, Bucharest.
- ***, 2000, European Landscape Convention (ratified by Law 451/2002 and published in the Official Monitor, Part I, no. 536 of 23 July 2002), Bruxelles.
- ***, 2014, The local development plan of Petrosani municipality for the 2014 – 2020 period, Petroșani. Available at: <https://www.primariapetrosani.ro/planul-de-dezvoltare-locala-a-municipiului-petrosani-pe-perioada-2014-2020/>, accessed on January 2020.