

FROM BROWNFIELD TO GREENFIELD. MAJOR ECOLOGICAL IMBALANCES IN BAIJA MARE. SĂSAR MINE RECLAMATION AND RECONVERSION

ANDRA CONDOR¹

ABSTRACT. - From Brownfield to Greenfield. Major Ecological Imbalances in Baia Mare. Săsar Mine Reclamation and Reconversion. This article is an extract of a more exhaustive study of the Săsar mine based on a multi-level approach of the environmental degradation caused by the long-lasting activities of the mining industry in the city of Baia Mare and the reconversion methods of the underutilized and contaminated properties into green spaces. The presence of brownfields in this city is a matter of great concern to the administrative bodies due to insufficient and ineffective measures for environmental protection, precarious expertise and lack of initiative to regenerate former mining sites. Furthermore, the industrial pillars refuse to get involved and take responsibility for the problems many of them have caused despite state efforts to ease liability fears. But viable projects and solid action are indispensable for overcoming this hurdle. As such, this work is an attempt to cover these exact issues as follows: after setting on the legal framework and the fundamental regulatory considerations, the vulnerability of the environment will be assessed in order to determine the level of pollution in the area surrounding the Săsar mine. Then the premises for a cultural landscape reconversion will be established through direct field observations and interpretations, the examination of scholarly studies and the use of GIS tools and social data. This project will try to offer a coherent transformational model of a brownfield area into a useful space for the community and the environment in compliance with the economic purposes.

Keywords: *environment, mining industry, reconversion, urban planning, Baia Mare*

1. INTRODUCTION

Baia Mare was one of the most important industrial areas in Romania and one of the most polluted too. The city has been a major mining centre for more than 100 years with a great capacity of resources, especially non-ferrous minerals which were vital for the local economy. The downfall of the mining and metallurgical sectors in the last decay together with the relinquishment of large industrial areas have generated major economic, social, health and environmental problems. The city is now marked by the historical pollution generated during the industrialization period with insufficient financial resources and technologies needed for decontamination strategies and actions.

¹ Babeş-Bolyai University, Faculty of Geography, 400006, Cluj-Napoca, Romania, e-mail: andra_cdc@yahoo.com

In the present, the mining activity is closed but Remin (the National Company of Precious and Non-ferrous Metals) still runs its activity in the city. This company is the former state owned Baia Mare Mining Corporation, assigned with the extraction and processing of raw materials from all the mines surrounding the city of Baia Mare, including Săsar. This mine has 5 perimeters: Sofia, Borzaș, Wilhelm, Valea Roșie and Dealul Crucii, developed on NV-SE axis. The expansion of the cross-cut access and connection galleries reaches a total length of 16-17 km (Beregic, V., Cosma, N. and Bogdan M., 2001). The ores extracted at the Săsar mine were processed by the Aurul S.A company. The Romaltyn Mining plant, a descendant of the Transgold group (the one involved in the ecological accident from the year 2000), has now the headquarters in the building of the former Aurul. The new company of Romaltyn is in negotiation terms with the local council to restart the exploitation activity of gold extraction and processing from the remaining tailings of the Central Flotation (with 10.5 million tons of gangue) and Aurul (with 9.5 million tons of gangue). However, the exploitation of this type of deposits for the obtainment of useful minerals implies many dangerous and hazardous physical and chemical operations, which could result in the massive contamination of the natural environment and the human health. The effects of the past exploitations of the Săsar mine are still visible today and can be summarised as follows:

- Pollution of surface water and bed water with chemical substances and solid suspension particles. Rain and ground water infiltrate in the abandoned mines and are gravitationally collected by the river courses without being treated and therefore pose a constant threat for the clean water sources of the local population. In addition to that, the discharges of used water in the Săsar River from the 28 polluted tributary streams have caused its permanent degradation.
- Air pollution with gases coming from the oxidation and burning of the minerals contained in the tailings ponds. The transportation of gangue and useful materials with cable railways, transportation bands, dumpers or railway wagons, were all generating industrial dust and gases which polluted the atmosphere. There were many cases in which the admitted limit of silicon dust release has been exceeded. Beside the employees, the vegetation was also affected by the dust, which slowed down the process of photosynthesis.
- Soil pollution with heavy metals. The acidification of the soil inhibited the activity of the bacteria and therefore, the content of nutrients decreased considerably. This had direct repercussions on the specific micro flora and fauna, which in the affected area are almost non-existent. The surface covered with waste dump and unexploited ore in the yard of the Săsar mine still lays unprotected. This can lead to the spreading of the harmful dust with direct consequences on the agricultural crops and human health.
- Negative visual impact due to altered landscapes. The deallocated buildings of the Săsar flotation left unreclaimed after the mine closure have been partly demolished. However, a large part of these dilapidated buildings are still standing, together with stock-piled gangue which is left unexploited, unsafe and in direct contact with the soil.
- Unused economic potential. Occupying large surfaces of land with destructing buildings for a long period of time causes the stagnation of the city development.

As such, the surrounding environment of the Săsar mine has suffered and continues to suffer many ecological imbalances. The challenge nowadays is to re-establish the equilibrium between the natural and anthropogenic components, between the past and present.

2. RESEARCH METHODS

The rehabilitation of the site, guided by an ecological conception should be a primary concern for the city, where the public opinion is the most important actor and the private sector is open to changes. Although it is extremely difficult and costly to address the remedial measures, a field ecologization and reclamation of this former mining site is needed. But first the vulnerability of the environment has to be assessed in order to determine the pollution degree, the resistance and potential of transformation of every element affected. The disappearance of this industrial site would thus allow the expansion of the Baia Mare city and the development of new spaces of public utility which could bring new perspectives for the local economy. The preservation and reconversion of the historical particularities in the form of cultural and artistic commodities will be part of the urban regeneration and also a strategy of attracting investments. The identity of Baia Mare will be reiterated by reinterpreting the mining culture which has characterized the city and the entire county for centuries. Also, the study requires the analysis of the human settlement models in correlation with the communication networks in order to determine the spatial relations of the industrial landscape within the urban fabric and redesign the functionality of the mining site in the neighbourhood. So the future reconversion proposal will be based on aspects like the relationships with the wider context, the movement and linkages, the land use, the facilities and accessibility illustrated with the help of the GIS data and analysis.

2.1. Study area

The brownfield site of the Săsar mine proposed for reconversion is located in the western industrial zone, on the upper shore of the Săsar River. It is split by the Victoriei Street into two parts. The lower part embodies the land of the former Săsar flotation and preparation plant, which is now partly demolished. The main building of the flotation belongs now to the Romaltyn mining plant. A hostel, a restaurant, a sports ground and a block of flats are located in the southern proximity of the former factory. The upper part of the site comprises the main entrances of the Săsar mine, the Tarna and the adjoined galleries, through which the transportation of workers and ore has been made in the past, the office buildings of the Săsar mining exploitation which belong now to Remin, many annexes of the mine, industrial equipment, storing places, the former shunting yard, tailings, a deposit of unexploited ore, houses belonging to the former miners and a small electrical power station.

The study area is considered to be a brownfield land because it was previously used for industrial purposes and although the land is contaminated by hazardous waste, it still has the potential to be reused once it is cleaned up. Adaptive re-use and disposal of a brownfield site require the site to be analysed in relation to the close proximity and

to be integrated into the functional zonification of the area. Consequently, the studied area has been expanded up to the Săsar River in the south, Victor Babeș St. in the east and the two roundabouts on Victoriei St. and Independenței Blvd. in the west. This area integrates individual and collective housing, a few small industrial businesses, a shopping mall, the Romaltyn plant, public facilities such as a restaurant, a polyclinic, a high school (with sports field and gym) and a university (with student dorms, sports ground and other facilities).



Fig. 1. Forefront of the study area

In 2006, a closure plan was elaborated for the Săsar mine, which can be seen below. The buildings belonging to the exploitation have been proposed either for decommission or capitalization. From the northern buildings, only the administrative body and offices are being used by Remin. The remaining buildings and deposits are dismantled. The dispensary has been converted into a student dorm, belonging to the North University. The aerial railway does not exist anymore, but its route is illustrated in the below map. The Săsar cyanidation plant belongs now to the Romaltyn company, which intends to restart the exploitation activity. The buildings proposed for decommission, have been partially demolished, and from the buildings proposed for capitalization, only two have been valorised. One building has been transformed into a hostel and the other one into a club and a restaurant.

The impact of the reconversion project will reflect upon the whole city of Baia Mare as a unitary system. As such, it must be integrated into the urban fabric and be in accordance with the development strategy. In relation to the character of the mining site there is the potential to strengthen distinctiveness by re-using the buildings and equipment which have industrial heritage, vary the building typology to integrate and connect with

the existing context as well as create a new character founded on the need of green and sustainable solutions for the people and environment, imperatives on which the proposed project is built.

2.2. Assessment of environmental vulnerability

With the gathered data, we managed to build an impact matrix which provides a comprehensive review for the investigators of the variety of interactions involved in the industrial process in order to evaluate the environmental hazards and identify potential solutions for the ecological amelioration.

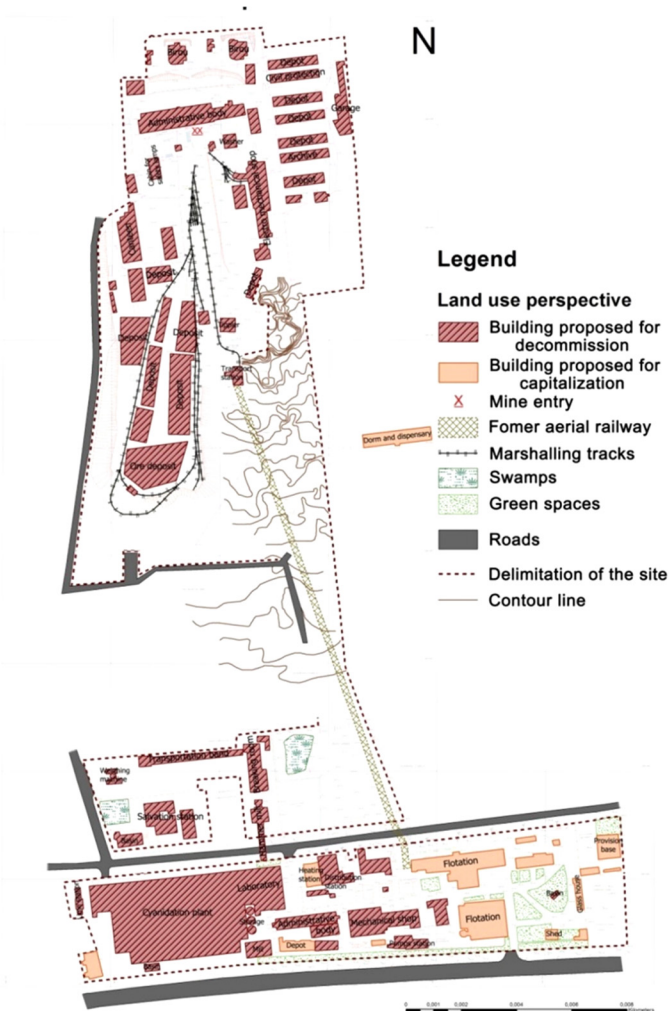


Fig. 2. Closure plan of the Săsar mine (based on the confidential official map of REMIN)

The impact was numerically evaluated in terms of magnitude and importance, using a degrees system in order to determine whether the interactions were deemed sufficiently important:

- 1 = unaffected environment/component/system by the mining activity;
- 2 = environment subjected to negative impact, but without exceeding the admitted limits;
- 3 = environment affected by mining activity and being induced in a discomfort state;
- 4 = environment affected by the mining activity, producing disturbances to life forms;
- 5-6 = severely affected environment by the mining activity, endangering the life forms.

Table 1.

The impact matrix for the exploitation activity of the Săsar mine

Impact Matrix					
Environmental system components/industrial processes	Emplacement of tailings	Industrial site and buildings	Underground exploitation	Mineral processing	Spills and leaks
Air	3	1	1	3	1
Soil and geomorphology	5	4	4	1	2
Surface and ground waters	6	3	3	5	2
Biosphere/biodiversity	4	1	2	3	3
Agricultural production	3	1	1	1	1
Human health	3	1	4	2	1
Climatic factors	3	1	1	1	1
Landscape	6	6	3	1	3

The landscape and the scenic view together with the surface and ground waters are the most seriously impacted by the former exploitation activities and were accordingly given the highest number in magnitude. The quality of the landscape is very low, with almost no vegetation and impaired views of the abandoned industrial buildings and unused transmission lines which give you the impression of an apocalyptical city. There is also a very high contrast between the recently built shopping mall on the nearby perimeter and this scenery which degrades the entire neighbourhood. Furthermore the excavations and emplacement of tailings which lie unprotected possess a real threat to the people living in the surrounding area.

The ground and surface waters have been polluted for so many years that the harmful chemical substances and suspensions still exceed the maximum limits admitted by the environmental institutions. Within the Săsar mine perimeter, the evacuation of mining waters is made through traverse cavities with access from the main gallery. These waters come from the external infiltrations in the remnants holes of the mine or from the infiltration of rainfall in the soil. Therefore, the waters accede in the mine, wash the unexploited mineral deposits, get charged with heavy metals and many times are directly released in the tributary streams, without being neutralized.

2.3. *Social analysis*

The following information has been extracted from the social analysis conducted by myself for the reconversion project. It is based on the interviews applied on the people living in the neighbouring area of the Săsar mine. All the interviewed people have stated that they were living in the area when the Săsar mine exploitation was still functioning. Almost half from the families live in the area for 15-30 years and the rest of the families live in the area for 45-60 years. More than 80% from the people living in the proximity of the mine admitted that at least one member of the family has been working in the mine and that all of them had health problems. More than a half of the former workers still have health problems. Breathing problems and headaches are the most common impairments among the former employees. I have also encountered a few cases of heart failures during the time some of the family members have been working in the mine. Other negative effects with impact on the population living in the area were phonic pollution (during the period of the exploitation activities, the ore transportation band passed through a few people's backyards and the anti-breakage installations were located near their homes), bad smell from a polluted nearby river and tailing deposits and soil pollution which impeded the growth of their vegetables.

In the present, the bad smell of the river still persists because it has not been cleaned. Additionally, unexploited ore deposits lie unprotected in the yard of the Săsar mine, which have a negative visual impact and a bad smell. The tailing dust is carried into people's yards in the windy days and affects the vegetation. The soil gets polluted from the rainfall water which washes the tailings. Also, in the rainy periods the valley overflows people's yards and has a great health risk potential. 20% of the people declared that during flooding some of their animals died. Despite the complaints they made to the local administration, no measures have been taken. When asking about the future perspective of the Săsar mine site, 30% from the interviewed people were in favour of the mine reopening because they considered this action would create working places for the unemployed population. Nonetheless, they also enjoyed the idea of a green place for recreation with playground for children and giving a touristic value to the area. A percentage of 70% of the people agreed that there is a need for green spaces and recreational activities in their neighbourhood.

2.4. *Functional zonification of the studied area*

The studied site is situated in the western part of the city which was predominantly an industrial area. A large part of the surface area is still occupied by the constructions and material deposits of the former Săsar mine and exploitation. The area which surrounds the mine field is more dynamic, with mixed functions, such as individual housing and public use. The headquarters, student dorms and a sports ground of the North University are located in the eastern proximity of the site. Also, the „Gheorghe Lazăr” high school, with all the annexed buildings and sports field is located near the North University campus. In the south east of the studied area, there is the new shopping mall of the city, Gold Plaza. In the northern and western proximity of the studied area, the predominant function is individual and collective housing, with a few public facilities. In the south of the area,

there are the remnants structures of the old buildings, the Romaltyn plant based in the former building of the Săsar flotation, a recently built block of flats, a hostel and a restaurant. From the configuration of the functionalities in the studied area, illustrated below, we can observe that the Săsar mining site is in contradiction with the surrounding areas. The industrial profile of the site is in conflict with the main housing and public functions of the area and we can observe the impetuous need of a green space in the area.

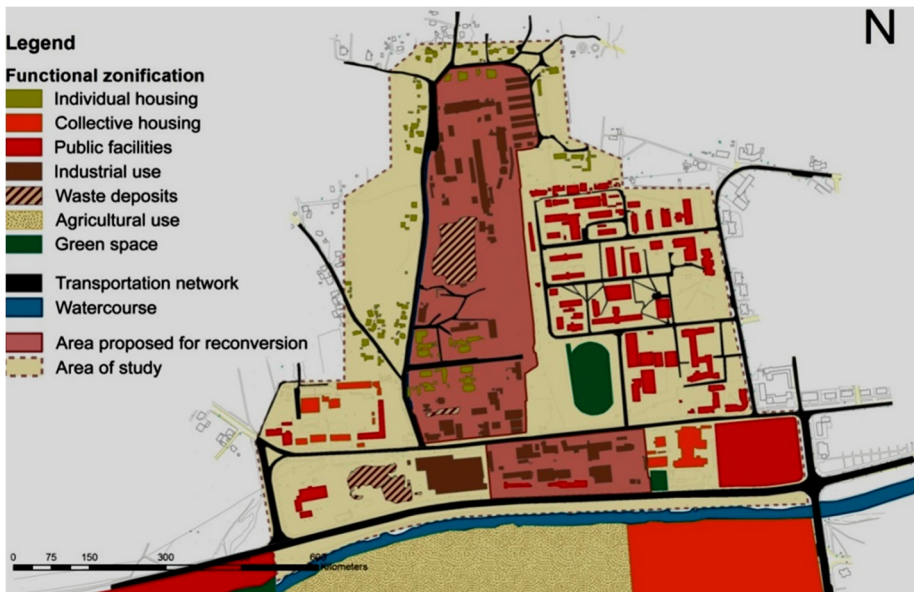


Fig. 4. Functional zonification of the analysed area

2.5. Transportation network analysis

This part of the analysis looks at the movement framework which sets out the main connections into and through the study area and the main arrival points. It also studies the connectivity of the area. The main traffic flow runs on the Independenței Boulevard, which is an integrated part of the E58 which crosses the city longitudinally and connects Baia Mare with Satu Mare. Independenței and Decebal Boulevards, which form a junction at the eastern limit, are the only streets of category II in the studied area. The majority of the streets which surround the area are of category III and the streets located in the inner area of study are of category IV.

In the area there are no footpaths or pedestrian nodes, only a few small streets with mixed circulation. There are two major circulation nodes in the studied perimeter. The first one includes the two roundabouts of Victoriei and Independenței streets, which form the western limit of the studied area, where the traffic spreads in the direction of Satu-Mare and Borcutului Valley. The second one is formed by the traffic-lighted junction of

Independenței and Decebal boulevards and the the junction between Decebal boulevard and Victoriei St. The latter presents a discordant zone with traffic congestions due to the location of the Gold Plaza shopping mall, the lack of traffic lights, the short distance between the junctions and the proximity of a small traffic nod. This transportation nod is determined by the junction between Victoriei and Victor Babeș streets, with low sight distance and tight traffic beds. The Nucului and Victoriei streets do not form a transportation nod due to the low traffic flow on the Nucului St. This street forms the western limit of the proposed area for reconversion. Despite the good maintenance of the street, the adjacent arteries, with individual houses, do not have asphaltic floors.

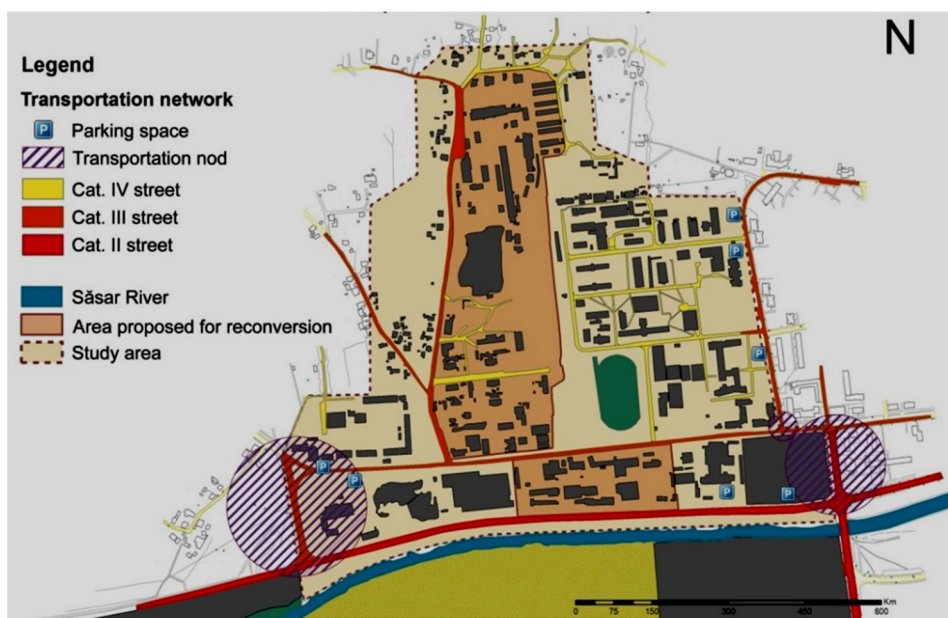


Fig. 5. Analysis of transportation connections and nodes

2.6. Landscape and open space character

A deeper analysis of the landscape character is provided in this section, with a deeper look at habitat and ecological value of the study area and provides a strong visual analysis of the sites characteristics. The landscape character type of the site is that of a riverside meadow in the south and a hill in the north. However, the environment has undergone significant alteration of the topography, hydrology and vegetation mainly due to hundreds years of heavy industrial use, mineral extraction and land filling. The Săsar mining site is split into two parts analysed individually in relation to their proximities. The north side has a mixed use of land, with industrial areas, housing areas, small surfaces of green spaces with a protection belt and spontaneous vegetation. However, the largest surface of the site is unused and presents severe soil erosion. A compositional and visual contrast between the industrial space and housing space is also present.

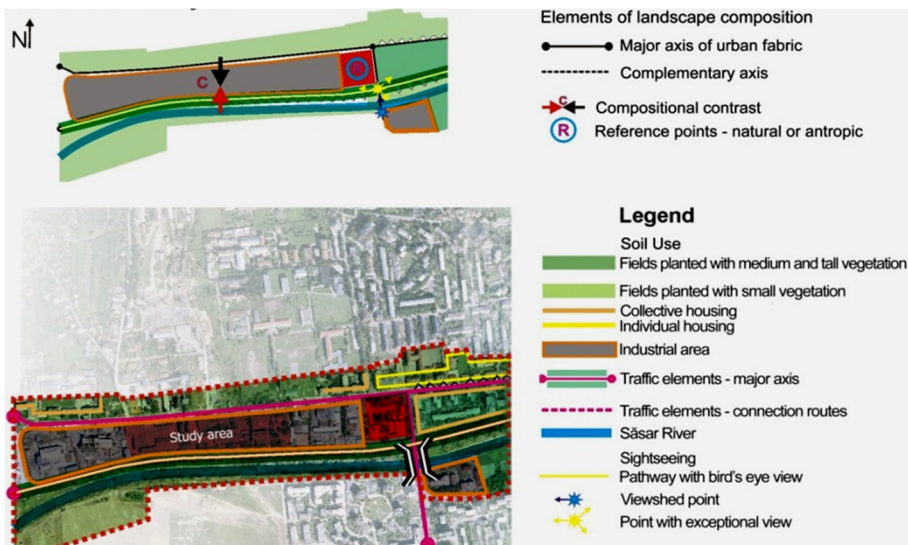
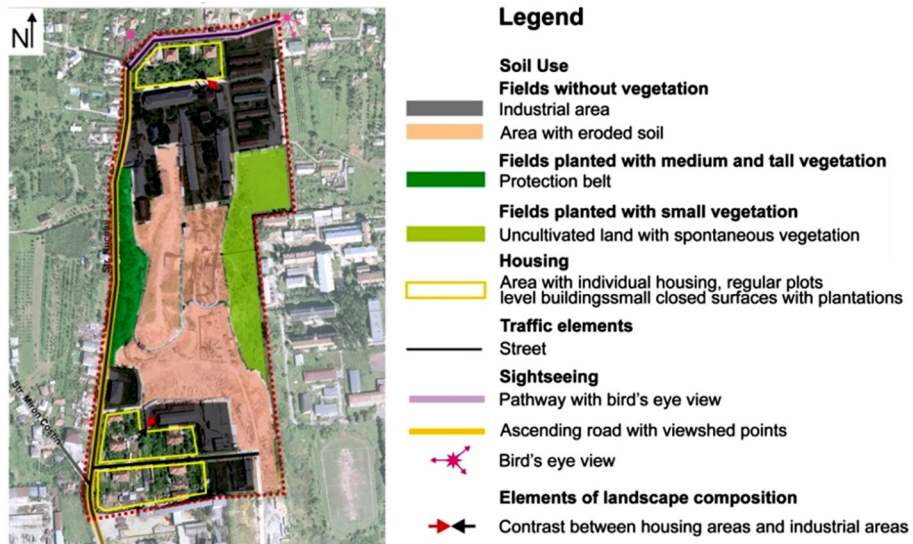


Fig. 6. Landscape and open space character of the northern and southern areas of the Săsar mining site (based on the official maps of the local administration)

3. RESULTS, RECOMMENDATIONS AND DISCUSSIONS

3.1. Environmental rehabilitation procedures

In general, the physical rehabilitation of the Săsar mine site will include:

- restoration of surface land including clean-up of the premises, levelling the ground and re-vegetation;
- establishing the nature of any water remaining in the open pit and treat it;
- ensuring that there is easy access to the water in the open pits;
- backfilling the open pits;
- rehabilitation of waste dumps including surface drainage, redesign of slopes to an acceptable angle and re-vegetation;
- rehabilitation of natural water courses directly affected by mining operations;
- collection and treatment of polluted mine water;
- treatment of surface soil wherever affected by mining activities;
- monitoring the results for a specified period after the completion of the remediation.

In order to minimise the risk of contaminated water leakage from the tailings dam, good management and active monitoring processes, such as the installation of piezometers and regular structural assessment around the existing tailings during and after rehabilitation processes, has to be implemented. The mining waters of the Săsar mine which are now discharged in the Săsar river course have to be collected in one point and treated. Water depollution in Baia Mare can be done with water treatment installations, but the existing ones don't function at their highest capacity and the technologies used in the process are old. The researches regarding new methods of water purification, have demonstrated that 'the cyan ion has the capacity of ozone oxidation until it can reach the admitted concentration limit estimated in the water management agreement' (Damian, 2008). Another solution could assert the supplying of water for the industrial plants from downstream. Maybe by applying this measure, the plants will be forced to maintain clean water.

The reconstruction of soils can be achieved by 'inserting nourishing substances and vitamins for the stimulation of micro flora multiplication, mineral and organic fertilization and the correction of acid by embedding calcareous and dolomitic amendments' (Damian, 2008). Clay is also recommended for re-establishing and increasing soil productivity. Vegetation is a natural barrier, and also a regenerative component for the soil. The growth of suitable and rational vegetation can favour the stability of tailings and can also provide protection against erosions and dust. Moreover, gangue can be used in other activities, such as: material for road bed or railway bed, construction of dams or dykes, filling underground cavities from the extraction industry, etc.

3.2. Premises for a cultural landscape

The possibilities of generating new socioeconomic dynamics of the former Săsar mine and 'performing actions to conserve the heritage and the cultural identity, are based on the exploitation of the potential of the cultural tourism' (Padró-Werner, 2000).

In the industrial sites there is a 'change in the perception of the resource, from a productive raw material to a consumptive viewing of the past' (Pretes, 2002). Moreover, this heritage represents 'the identity of the local community, the testimony, the signs and emblems from one prosperous and glorious past that helped strengthen the image and self-esteem of these populations' (Carvajal, 2002). According to Armesto-Peña there are 'in Europe at least five hundred sites in old mining exploitations which have been converted into mining museums, natural protected areas, leisure sites', etc., but in Romania I am not aware of any such reconversion project. The mining site and its related elements are considered to be a part of the local heritage because of their historic values. Nevertheless, the potential mining heritage tourism has four problematic points according to Edwards and Llurdés, which can also be applied to the Săsar mining site:

- the low attractiveness for people due to a different standard of beauty;
- the large size of the mining exploitation which make it very expensive to restore;
- the degradation of the environment due to the historical pollution;
- the location of the site is not included in the traditional tourist circuits of Baia Mare.

The buildings, refining centres, old machinery, factories, smelters, pit head frames are all elements present in the Săsar mining area which reflect the history of the human technology. There are some inventories of the mining heritage of the area which include mining machinery, underground galleries, open pits, etc. The mine has managed to preserve some of the old processing infrastructure, especially in the perimeter of Dealul Crucii. The uniqueness of its characteristics favours the preservation and the integration of these elements in a larger project for touristic and scientific purpose, with great benefits for the local community, administration and investors.

3.3. Reconversion and reintegration

Following the imposed restrictions and the possible opportunities, as well as the public opinion and research methods, the reclamation and revitalization project I have proposed in the Săsar mining area consists of a science centre with a mining museum and open green spaces. The science centre will offer educational programs for pre-school through primary and secondary students. These will consist of workshops, live science shows, competitions, etc. which will be related to the school curriculum or day to day curiosities. A specialized team could tour in the remote area of the county and work with under-privileged children. The centre could also offer games and experiments on various topics, which children will be able to do by themselves. The local planetarium could be moved and improved within the science centre. Agreements of collaboration could be made between the science centre and the local schools.

The centre will be expanded with a mine museum which will exhibit all types of material related to the history of mining in the county and it will be connected with the mine galleries of the Săsar mine through the old aerial railway route, which will be rehabilitated. People will have access in the mine through a railway track which will reach the Dealul Crucii perimeter, where preserved medieval dikes and installations can be seen. Hence, the Săsar mine will be given a touristic value with a great potential of attraction, but the local needs will be also taken into consideration. The northern part of

the Săsar site will be revegetated. A small park, green fields with playgrounds, bicycle tracks and skateboard ramps will be enhanced. The bicycle tracks could be connected to hill cycling routes and tracking paths because the area is very beautiful and has many bird's eye views. I have opted for a green space due to the small percentage of green surface in the city of Baia Mare. The total green spaces in the city sums up 80 ha, from which parks and recreation areas are around 14 ha. At the moment, the surface for each inhabitant of Baia Mare is of only 5.67 square meters, a very low value in comparison with the requested limit. Therefore, due to the lack of natural resources of the city and the environmental and health risk of the former exploitation activities, there is a need of expanding the green spaces and recreational areas in this neighbourhood.

A mining research centre with new technologies for industrial reconversions and sustainable landscapes, environmental and safety hazard control, waste management, etc., will be incorporated in the project. The centre will be the first kind in the country and will offer working places for PhD students and researchers. This initiative intends to teach the next generation of designers, geographers and planners to adaptively reuse waste and incorporate it into the urban fabric, to discover new forms of emerging waste and conduct projects with all types of landscape waste.

3.3.1. Functionality

The proximity of a sports base, the citizens' discontentment with the quality of the natural environment and the need to integrate the Săsar mining site into the functionality of the area, assert the necessity of a green space in the area. I would argue that the proposed project, which combines the green space functionality with the public utility, meets these requirements. The heterogeneous and discontinuous urban fabric in the area allows a certain liberty in organizing the building volumes of the science centre. The present connections between the elements of the urban frame are solved by the urban planning. Also, the buildings which are in an advanced state of degradation must be demolished because they represent a public risk and visually pollute the area. In relation to the character of the mining site there is the potential to strengthen distinctiveness by re-using the buildings and equipment which have industrial heritage, vary the building typology to integrate and connect with the existing context as well as create a new character founded on the need of green and sustainable solutions for the people and environment, imperatives on which the proposed project is built. The touristic industry could be sustained by the accommodation and food offered by the existing facilities in the nearby proximity. Also, the unused building of studio apartments located in the upper part can be converted into an accommodation facility for students, researchers or tourists.

3.3.2. Transportation

In relation to movement there is good access to public transport on the Victoriei road. A bus station could strategically be located in the proximity of the science centre. There is the potential of expanding the transportation network with appropriate connections into the site as part of the new development. New green pedestrian and cycle routes can also be supported, in particular in the northern part, which will be connected with the proposed park and integrated in the forest landscape of the nearby hill.

3.3.3. *Landscape*

The contrast between the industrial space and housing space could be ameliorated by creating new frontages which would open up the site. These could also be green frontages showcasing the potential green character of the site and use the new development project of the science centre and mining tourism to improve the physical and visual relationships with the existing land uses. The site must be given a new commercial character but the vivification of the green areas is also a priority. This could be done by combining leisure oriented spaces with the use and value of the mining galleries which would increase the local attractiveness of the area. In relation to the landscape there is also the potential to develop green infrastructure as a multi-use resource to include educational, water and mining heritage conservation and sustainability objectives by the programmes offered by the science and research centre. The existing landmarks and sightseeing can be highlighted from pathways and view shed points. Hence, new views and experiences of the site from the surrounding areas will be created.

By all these sustainable means, the importance of the area is highlighted and the levels of rationalization and awareness of the local population and tourists regarding the pollution effects and the need to protect our environment will increase and will be directed towards better alternatives for the development and planning of our natural resources. I think that this project meets the objectives of the local strategy of sustainable development through the diversification of the recreation means which do not endanger the surrounding environment and which consolidates the relation between humans and nature. Furthermore, it could become a main attraction for tourists of all ages from all over the country and could bring great benefits for the local economy.

4. CONCLUSIONS

The necessity of searching for economic alternatives in traditional mining sites has found in the cultural aspects of the mining a good source to attract tourists. However, the steps are difficult due to the numerous constraints that appear in the mining communities. In Baia Mare this projects could have the potential to attract tourists on diverse aspects such as: industrial heritage, artistic, cultural and scientific aspects. The proposed project would be useful in order to preserve the identity of the town and also to generate economic flow. Authorities see the tourism like the key for the economic development of the county, but new touristic values need to be defined if the town is going to play an active role and/or a collateral role. The implementation of rehabilitation measures will lead to a geo-ecological balance in the area of the Săsar mine, affected by the extraction activities. The complexity and magnitude of the reclamation works in the mining zone have to be integrated into a well-structured local and regional program in order for the degraded fields to regain economic value. The short term costs have to be set off against the long term benefits, primarily for the benefit of the local community.

I believe that the mine closure planning will evolve into an integrated model which incorporates all three 'pillars' of sustainable development: environmental protection, economic and social development. Mining offers more solid material than any other industry.

‘This should create the opportunity for imaginative post-mining land forms that either fit specific recreational or economic activities or that catch the eye and attract tourist visits (Conesa, 2010). The project is in conformity with the character of the area, meets the requirements of the regulatory framework, aims to increase the green area in the city, preserves the mining heritage, brings innovative research and opportunities for young people, encourages the educational programs and is built on sustainable development principles. The project supports the existing food and accommodation facilities and promotes the local economy. Following all the above arguments, I can state that the proposed reconversion project would be an asset for the city of Baia Mare.

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