URBAN INNOVATIVE ACTIONS

SPIRE Baia Mare

SUSTAINABLE USE OF LAND AND NATURE BASED SOLUTIONS

STATE OF PLAY IN BAIA MARE

Desk analysis, Research repository & Awareness appraisal

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EXECUTIVE SUMMARY

Baia Mare is a municipality along the Săsar River, in north-western Romania. With a population of ca. 145.000 and a metropolitan area home to more than 230,000 residents, Baia Mare is the capital of the Maramureș county.

The city's industrial past in the mining and metallurgical sector left a legacy of approximately 627 ha of land polluted by HMs (up to 5 times the acceptable value) within the municipal boundaries, which is totally disconnected from the urban framework.

SPIRE - Smart Post-Industrial Regenerative Ecosystem proposes an innovative approach to the reuse of heavy metal-contaminated land in the city of Baia Mare, through adaptive phytoremediation and the creation of new urban ecosystems, as a long-term strategy for sustainable local economic development.

In this State of Play. Desk Analysis, Research Repository and Awareness Appraisal Report we analysed the socio-economic, territorial, and environmental dynamics that characterised Baia Mare over the last decades; the current strategic, policy and regulatory framework within which SPIRE develops; the evolution and state-of-play of Baia Mare's environmental pollution and its impacts on human health; as well as the perceptions and the level of awareness of local citizens in relation to the local economy and labour market, socio-cultural framework, and the quality of the city's environment and public spaces.

Chapter 1 focussed on Baia Mare's development, providing an overview of the socio-economic context of the city as well as of the land-use and urban planning strategies and regulations deployed at different governance levels and currently in place.

With respect to the evolution of the local urban system, what emerged from the study is that over the past decade Baia Mare has been characterised by two main dynamics. On the one hand a constant demographic decline and a progressive ageing of the population. On the other hand, the transition towards a new industrial and economic model after the cease of mining activities.

In this context, as several academic commentators highlighted, the crucial challenges for the city are and will be the remediation and regeneration of the large number of contaminate brownfields left as a legacy by the city's industrial past, as well as the revitalisation of the local economic and entrepreneurial framework.

These challenges are also recognised at all governance levels, thereby resulting in a coherent strategic and regulatory framework to which the core principles and objectives of SPIRE's agenda are well aligned. SPIRE taps on the most innovative aspects of those strategies in proposing a pioneering sustainable land-use and development model. In particular, it leverages on the core principles set by the regulations and proposes:

- digital solutions and participatory techniques at the benefit of the principles of subsidiarity and good governance, with the largest possible involvement of citizens and stakeholders not only

as co-designers in the landscaping projects, but also as co-creators of a local value system sustained by the iLEU and iGIS

- nature-based solutions at the benefit of urban regeneration and economic growth, with a circular ecosystem based on the phytoremediation of contaminated soils and the upcycling the resulting biomass into cascading value streams for the production of materials and energy.

Chapter 2 specifically engaged with the issues of environmental pollution in Baia Mare. On the one hand, Chapter 2 provides a digest of recent academic studies investigating the level and impact of heavy metal pollution on the city's soils and cultivations, as well as on human health. On the other hand, it reports the results of the most recent monitoring of Baia Mare's environmental pollution. What emerged from the study is that:

- Literature unveiled that heavy metal concentration in soil samples significantly exceeded the normal values set by the corresponding legislation in Romania. Specifically, Pb exceeded the action limit in 91.09% of the area, followed by As (81.20%), Cu (41.52%), Zn (26.69%), and Cr (5.58%). The concentrations of Zn tended to increase with the sampling depth with the highest concentrations being detected in samples collected at 60–80 cm (2734.93 mg/kg), and the highest data have been registered by the most recent studies.
- The highest estimated probabilities of surpassing the Romanian action limits were found around the smelting plant and dispersal stack.
- Environment pollution in the Baia Mare area has also impacted on the health of the population. Studies on the risk groups for lead, cadmium and arsenic pollution have shown concentrations of pollutants in the human body that have largely exceeded the reference levels, especially for the lead , which explains the increased incidence rates of specific morbidity in the area of respiratory, digestive, renal, endocrine and metabolic disease. SEM-EDAX analysis revealed that the average values of the pollutants (lead) concentration are higher in Baia Mare.
- Studies on the soil-to-plants contamination unveil critical heavy meatal concentrations especially in parsley, kohlrabi, and lettuce from areas close to non-ferrous metallurgical plants, whose consumption on a regular basis may therefore expose to major health risks.
- Compared to previous years, the evolution of air quality in Baia Mare presented an improvement, with a decrease in the number of exceedances of the limit value for SO2, while for the PM10 indicator, the situation is still critical and difficult to resolve.
- Exposure to high levels of air pollution can cause a variety of adverse health outcomes. It increases the risk of respiratory infections, heart disease, stroke and lung cancer. Both short- and long-term exposure to air pollutants have been associated with health impacts.
- Although air pollutants measured in the monitoring stations did not exceed the limit values in the analysed time period (2016-2018), the adverse health effects of particulate air pollution, even at relatively low levels, remain a global public health concern.

SPIRE aims at contributing to the mitigation of the effects of environmental pollution in many ways. In particular, with its phytoremediation activities SPIRE will trigger a long-term process for the remediation of selected pilot sites, as well as, more broadly, experiment the potential of this innovative method and assess whether and how this approach could be mainstreamed in Baia Mare an in Europe.

Chapter 3 reported the results of the field research conducted in Baia Mare in November 2019 and provided an appraisal of citizens' and stakeholders' perceptions and awareness with respect to socio-economic, socio-cultural, and environmental issues at local level.

From a socio-economic point of view, the field research highlighted two main aspects. On the one hand, our sample of the population revealed a rather weak socio-economic framework, with a large share of single-income households earning less than RON 3.500 (i.e. slightly more than 700 Euro) per month. On the other hand, stakeholders pinpointed a gap between the job offered in the city and the availability and willingness of potential employees to take those open positions. This gap has been generally explained as the combination of several factors. Namely, these include an averagely insufficient remuneration that is a key driver for outmigration; as well as a mismatch between demanded and available skills, complemented by a general difficulty in coordinating the educational offer of technical schools with the needs and requirements of local industries.

Through its co-designed mentoring and support programme for innovative, youth-led start-ups in the biomass upcycling sector, SPIRE precisely aims at triggering and stimulating innovative and appealing employment opportunities in the city.

From a socio-cultural point of view the field research revealed three key aspects. First, a rather dense network of neighbourhood relations, mostly based on weak ties. Thereby, people seem to be confident in the possibility of receiving basic support, yet not so keen on trusting their neighbours on fundamental personal matters. Second, with respect to the fruition of public spaces, both indoor and outdoor places, are common for the local community, yet not always the main gathering points as opposed to private places. Finally, respondents reported either a lack at neighbourhood level or a very low level of fruition of most types of cultural and recreational spaces/events.

Finally, from an environmental point of view, we acknowledge that, despite heavy-metal pollution of soils and water is still a major problem in Baia Mare, this does not seem to be a major concern for the citizenry. Rather, the population appeared to identify the current core environmental issue for Baia Mare in waste pollution. In fact, we registered a general dissatisfaction of the population on the quality, maintenance and cleanliness of Baia Mare natural spaces, especially due to waste pollution. This seems to be perceived as the worst environmental problem at local level and appears to significantly undermine the willingness of citizens to make use of green and blue spaces.

Additionally, we registered an increasing awareness about the impacts of individual behaviour on the environment and on the need to take concrete actions, yet this is counterbalanced by a still large resistance to behavioural change, especially (but not exclusively) among the older generations.

In this context, the aims of SPIRE – and especially of the iLEU and the co-creation laboratories – are twofold. On the one hand, SPIRE will aim at raising further awareness about the human health risks of

soil, water and air pollution; on the other hand, it will aim at promoting and triggering environmentally positive behaviours in the city.

Ultimately, this Report highlighted that all the different components of SPIRE - Smart Post-Industrial Regenerative Ecosystem are suited to address the core environmental, and development challenges of Baia Mare, and are well aligned with the priorities and objectives set by land-use strategies and regulations at all governance levels, as well as with the needs of local citizens and stakeholders.

Over the next few years, the implementation and testing on the ground of all the proposed activities and measures will try and demonstrate the validity and replicability of SPIRE's innovative approach.

INTRODUCTION

Baia Mare is a municipality along the Săsar River, in north-western Romania (Figure 1). With a population of ca. 145.000 (Eurostat, 2018) and a metropolitan area home to more than 230,000 residents, Baia Mare is the capital of the Maramureș county.

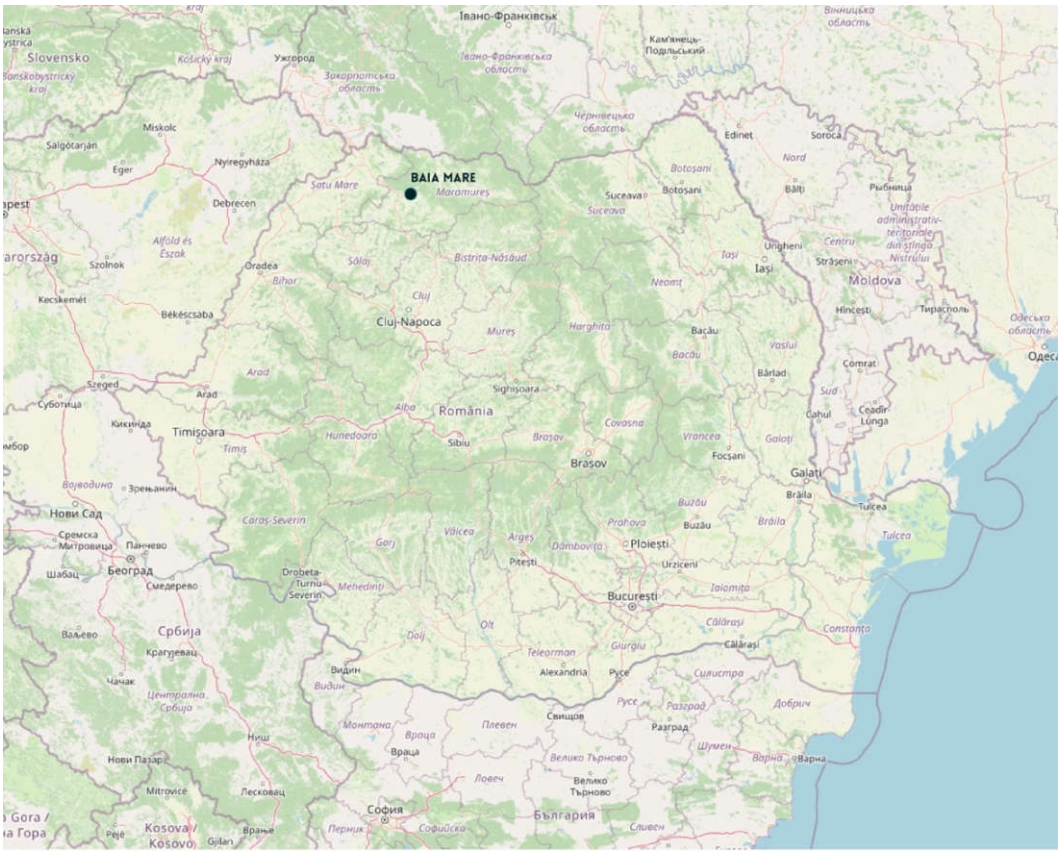


Figure 1 - Location of Baia Mare[3]

The city's industrial past in the mining and metallurgical sector left a legacy of approximately 627 ha of land polluted by HMs (up to 5 times the acceptable value) within the municipal boundaries, which is totally disconnected from the urban framework.

Following Coman (2006), pollution in Baia Mare led to strong public health consequences: compared to Romanian average life expectancy is reduced by 2,2 years; overall mortality index is 10-15% higher; D2 avitaminosis frequency is 65-95% higher; and the frequency of metabolic diseases caused by Pb is 40-60% higher. Additionally, according to the city's Integrated Urban Development Strategy (IUDS) and Sustainable Energy Action Plan (SEAP), 74,45% of the total housing units in Baia Mare are in need of capital energy refurbishment, also because approx. 55% of the total energy consumption in households is dedicated to ensuring thermal comfort.

Nonetheless, after the closure of mines and metallurgical industries (the last one in 2012), Baia Mare shifted to a secondary-tertiary profile, becoming one of the most economically evolved cities in the

[3] Map source: OpenStreetMap.org

region: e.g. the number of registered enterprises grew by 21.5% (2010-2013, INS), and GDP pro capita in the city grew by 35% (2010-2015, INS).

In this context, SPIRE – Smart Post-Industrial Regenerative Ecosystem – has the ambition of starting a long-term environmental, social and economic redevelopment in Baia Mare through the co-development of new adaptive and productive landscapes, integrated into a circular ecosystem of cascading material and energy value chains. Precisely, as Figure 2 illustrates, SPIRE will test its innovative solutions on six pilot sites located in four areas of Baia Mare: Centre, Craica/Vasile Alecsandrii, Ferneziu Lower, and Ferneziu Upper.

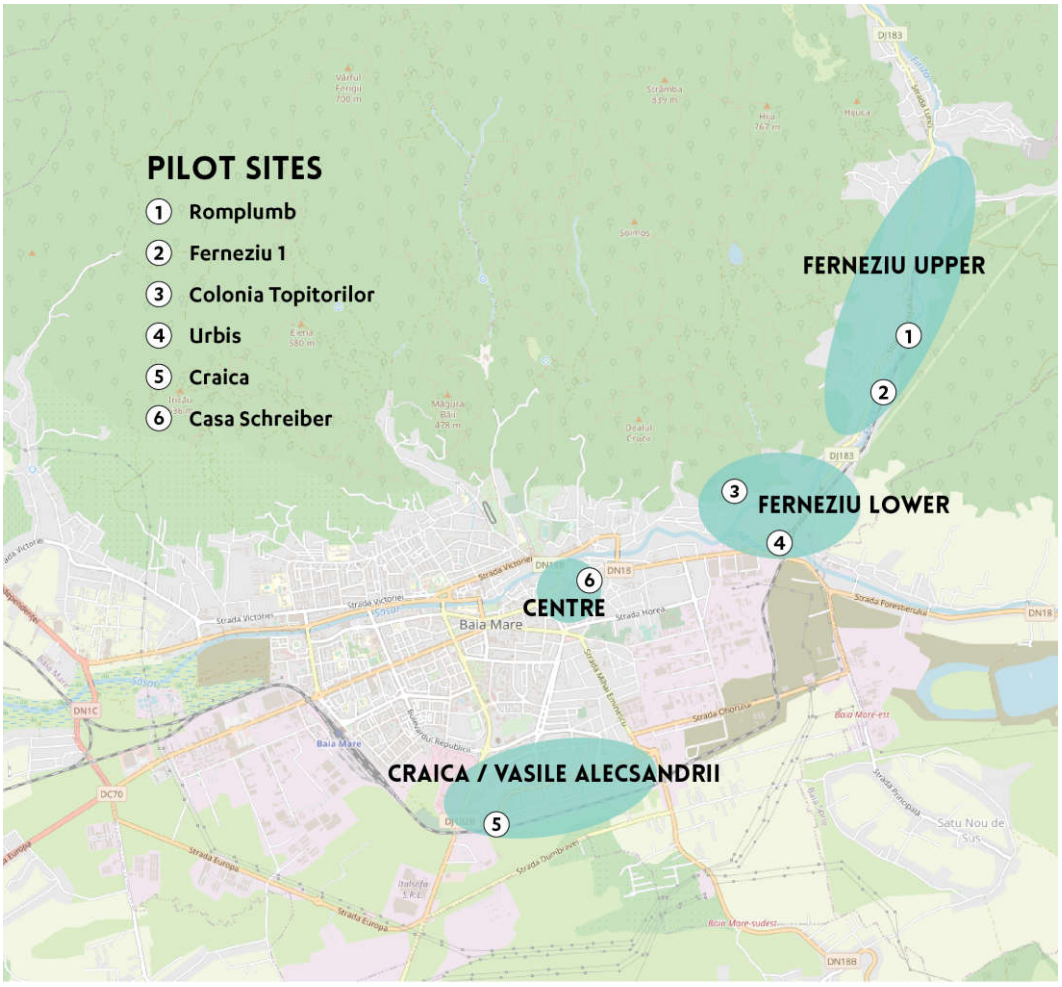


Figure 2 – SPIRE's Main Intervention Neighbourhoods and Pilot Sites[4]

This Report constitutes the third and final of SPIRE's benchmarking deliverables and aims at describing and analysing the context within which SPIRE is developed and implemented. Specifically, it tackles:

- the socio-economic, territorial, and environmental dynamics that characterised Baia Mare over the last decade;
- the current strategic, policy and regulatory framework within which SPIRE develops;

[4] Authors' elaboration on map by OpenStreetMap.org

- the perceptions and the level of awareness of local citizens in relation to the aforementioned dynamics and their implications.

In doing so, the Report is organised as follows:

Chapter 1 provides an overview of the socio-economic and territorial dynamics in Baia Mare over the last decade as well as of the strategic, policy and regulatory frameworks that have an impact on SPIRE's intervention areas. From a methodological standpoint, Chapter 1 is grounded on:

- a thorough review of the most recent academic literature dedicated to the evolution and development of Baia Mare;
- the analysis of plans, policies and regulations of interest to SPIRE issued at different governance levels (i.e. national, regional, county, metropolitan, and local);
- socio-economic data provided by Eurostat.

Chapter 2 explores the historical development and public health effects of heavy-metal environmental contamination in Baia Mare, as well as the state-of-play of the city's soil and air pollution. To the purpose, Chapter 2 relies on:

- a comprehensive literature review of academic articles focused on Baia Mare's soil and environmental pollution from 1996 to nowadays;
- the survey of existing sets of environmental and public health indicators developed at international level;
- the analysis of Romanian definition of- and regulatory framework for contaminated sites
- the overview of contaminated sites in Maramureș' and Baia Mare developed by the Romanian National Agency for Environmental Protection (APM);
- the data on the concentration of pollutants recorded by APM Maramureș' five Air-Quality Monitoring Stations active in Baia Mare's agglomeration.

Chapter 3 provides an overview of citizens' and stakeholders' perceptions about the state-of-play of Baia Mare's economy, labour market, socio-cultural life, and environment and public space domains.

In doing so, Chapter 3 draws on the outcomes of a field visit to Baia Mare in November 2019, which encompassed:

- seven semi-structured or open interviews to local privileged witnesses;
- four focus groups with key stakeholders and members of the local community;
- a multiple-choice questionnaire to the population.

Lastly, the Conclusions briefly summarise the main points of the Report and draw the final remarks.

1. BAIA MARE'S DEVELOPMENT

This Chapter provides an overview of the socio-economic and territorial dynamics in Baia Mare, as a response to the restructuring processes of the mining industry. It draws on academic literature and recent statistical data and presents the structural changes which laid the foundation for Baia Mare as a development pole. Additionally, the chapter will focus on the contextual elements of potential and the shortcomings that influence the urban dynamics in Baia Mare. In what concerns the socio-economic transformations, the literature clarifies the evolution of the economic profile and the structural changes in the entrepreneurial profile of the city, thus contributing to the understanding of the social and demographic dynamics. Subsequently, literature draws attention on the untapped potential of the city, emphasising the clustering opportunities based on endogenous resources. Last but not least, it offers potential scenarios for reintroducing the big surfaces of derelict land in the socio-economic circuit of the city.

1.1 Socio-Economic and Territorial Evolution

This section investigates the evolution and transformations of Baia Mare from a socio-demographic, economic, and urban development point of view.

1.1.1 Socio-Demographic Evolution

Over the past 90 years, Baia Mare witnessed different phases of population growth and decline.The city occupied the 50th rank in 1912, it experienced several prolific decades starting with the interwar period, especially during the communist era when the mining industry flourished. As such, at national level, the city advanced from the rank of 53 in 1930, to 18 from 1966 until 1977 and 17 in the years 1992 as well as 2002 (Ianoș, Talângă, 1994; Pop and Stefanescu, 2018). Following Pop and Stefanescu (2018), Baia Mare experienced "a spectacular advance from the beginning until the middle of the 20th century, after which it remained at the same level until now" (Pop and Stefanescu, 2018, p. 57).

However, over the past decade, the city started to steadily depopulate. Figure 3 clearly illustrates the decline Baia Mare's population, which lost 3,7% of its inhabitants between 2010-2018 (Eurostat, 2018).

Furthermore Table 1 shows the progressive ageing of the city's population between 2010-2018, especially highlighting a 33,4% decrease in the age group 15-24 years old paralleled by a 35% increase in the age group over 65 years old.

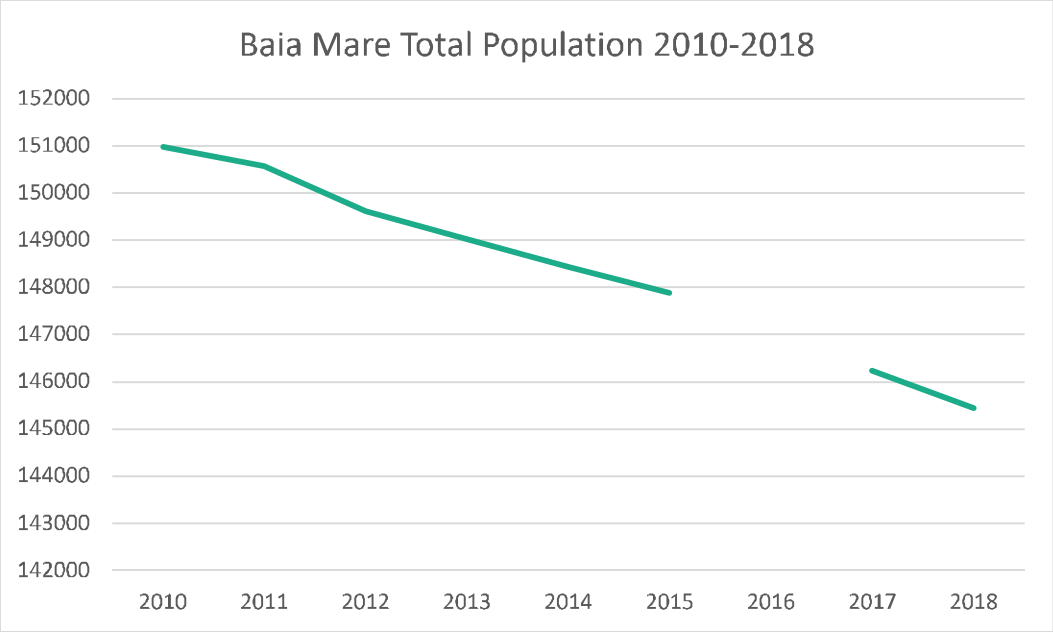


Figure 3 – Baia Mare's Total Population at 1st January (2010-2018)[5]

Age Groups/ Year	0-14	15-24	25-44	45-64	Over 65	Total
2010	21.745	20.850	52.701	40.726	14.961	150.983
2011	21.660	19.521	52.950	40.930	15.514	150.575
2012	21.286	18.328	52.038	41.982	15.985	149.619
2013	20.895	17.021	51.280	43.171	16.664	149.031
2014	20.694	15.884	50.746	43.793	17.312	148.429
2015	20.618	15.091	50.087	44.085	18.016	147.897
2016	-	-	-	-	-	-
2017	20.360	14.099	48.262	44.105	19.415	146.241
2018	20.205	13.882	47.101	44.047	20.209	145.444
Delta 2010-2018	-1540	-6968	-5600	3321	5248	-5539
Growth Rate 2010-2018	-7,1%	-33,4%	-10,6%	8,2%	35,1%	-3,7%

Table 1 - Baia Mare Population by Age Group (2010-2018)[6]

Additionally, Figure 4 illustrates the distribution of the population by age group in 2018, with less than a quarter of Baia Mare inhabitants being under 25 years of age, 32% between 25-44, 30% between 45-64 and nearly 14% over 65.

[5] Authors' elaboration on Eurostat data
[6] Authors' elaboration on Eurostat data

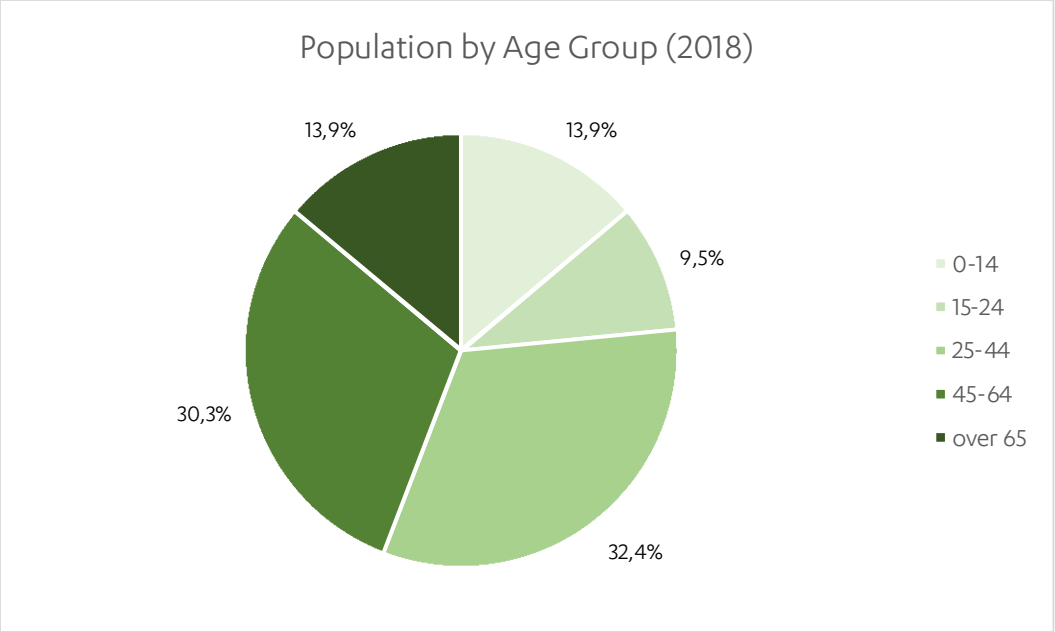


Figure 4 – Baia Mare Population by Age Group (2018)[7]

1.1.2 Economic Evolution

The steep socio-economic and demographic decline occurred at the end of the 20th century came as a result of the city's incapacity to recover after the collapse of the mono-industrial system which described Baia Mare before the fall of the communist regime (Pop, 2018).

Yet, in his study on the evolution of the economic profile of the city in the first decade of the 21st century, Butrea (2013) shows an increase in the number of firms, turnover and employment ratio in 2010 compared to 2006, facts that describe a positive economic trend in the city. The same study highlights the changes occurring in the economic profile of the city, as Baia Mare has started to shift from a secondary-primary to a tertiary-secondary profile, focusing on strengthening its entrepreneurial character.

In this regard, another scientific study focusing on the structural changes in the entrepreneurial profile of the industrialized cities highlights the positive evolution of the entrepreneurial sector in most Romanian cities, including Baia Mare (Schwab et al, 2014). The study aims at analysing the emergence and functionality of the system consisting of Baia Mare and its area of influence, by focusing on the connections established between them. The measurements were grounded on statistical data showcasing economic development and synergies established between the city and its surroundings, confronted with the evolution of the population, from 2001 until 2010. Both scientific papers analyse the same economic indicators and have similar conclusions, highlighting the positive path in the economy from different perspectives. For instance, the number of companies increased 2,4 times between 2001-2010 in Baia Mare, while in its area of influence the number of new companies increased 2,9 times during the same period (Schwab et al, 2014).

[7] Authors' elaboration on Eurostat data

For Baia Mare, other economic indicators also proved a positive trend. In what concerns the working places, it was observed a 15% increase from 2006 until 2010, while the turnover had an increase of 50% in the same period (Burtea, 2013). Yet, in what concerns the turnover, the studies mention a strong fluctuation in its values, which made it impossible for territorial clusters to define (Burtea, 2013; Schwab et al, 2014). The total number of employees is unbalanced in both subsystems; while in Baia Mare the total number of employees showed a decrease of 6% from 2001 until 2010, in its surroundings the employment rate has doubled (Schwab et al, 2014). As a conclusion, Schwab et al. (2014) observe that Baia Mare and its surrounding territory encountered discontinuities in the economic evolution of the city. According to the author, they could betray non-linear dynamics and complexity. Furthermore, the study concludes that Baia Mare's influence area did not manage to support the unemployed people of Baia Mare and to limit the socio-economic impacts caused by the restructuring of the economy.

Similar to most of the heavily industrialized Romanian cities, Baia Mare underwent a tough period in its attempt to make the transition to the tertiary economy, but there are significant improvements, (partially) recognized in the academic debate. According to a study on the trends in the economic evolution of development poles (Burtea, 2013), Baia Mare represents one of the 13 development poles at national level, as it respects the following criteria defined by governmental decree (H.G. 998/2008):

- Potential for economic development (degree of functional specialization);
- Ability to research and innovation (universities, research institutes, centres of excellence, scientific cores with a critical mass of high-quality research that have the ability to keep pace with advances in science and technology);
- Adequate business infrastructure (industrial parks, incubators, science parks and technology which provides market research results);
- Environmental and entrepreneurial culture based on diversity of business relationships and social connections;
- Accessibility (road, rail, air, sea);
- Public services (health infrastructure, cultural);
- Administrative ability association.

Figure 5 shows the decline in the number of economic activities in Baia Mare until 2011, and its subsequent increase since 2012, and Figure 6 shows a significant increase also in the number of Baia Mare students in higher education between 2014-2018.

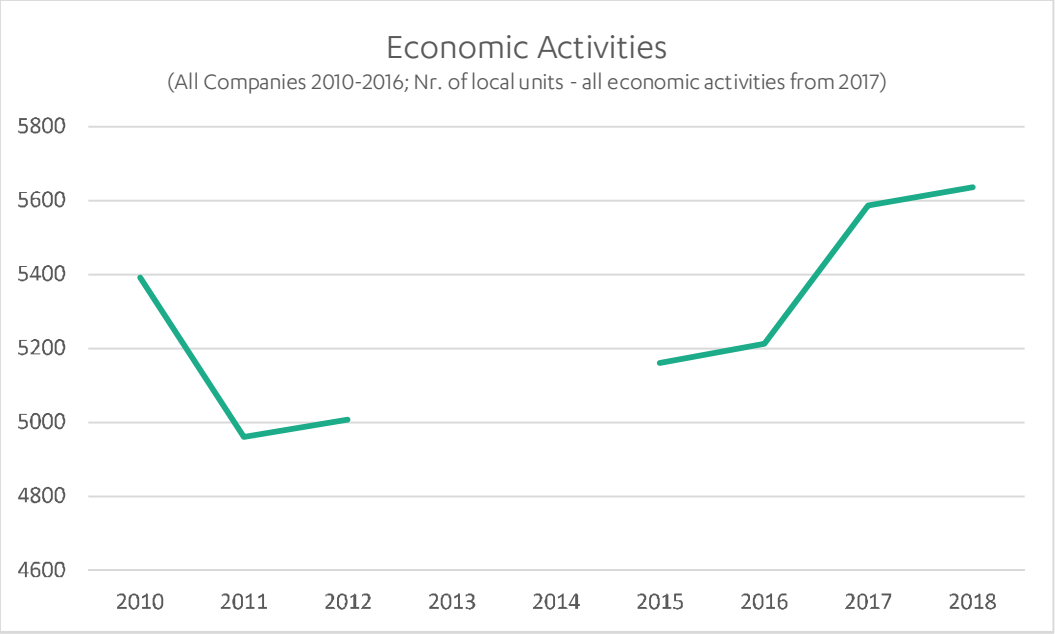


Figure 5 – Economic Activities in Baia Mare (2010-2018) [8]

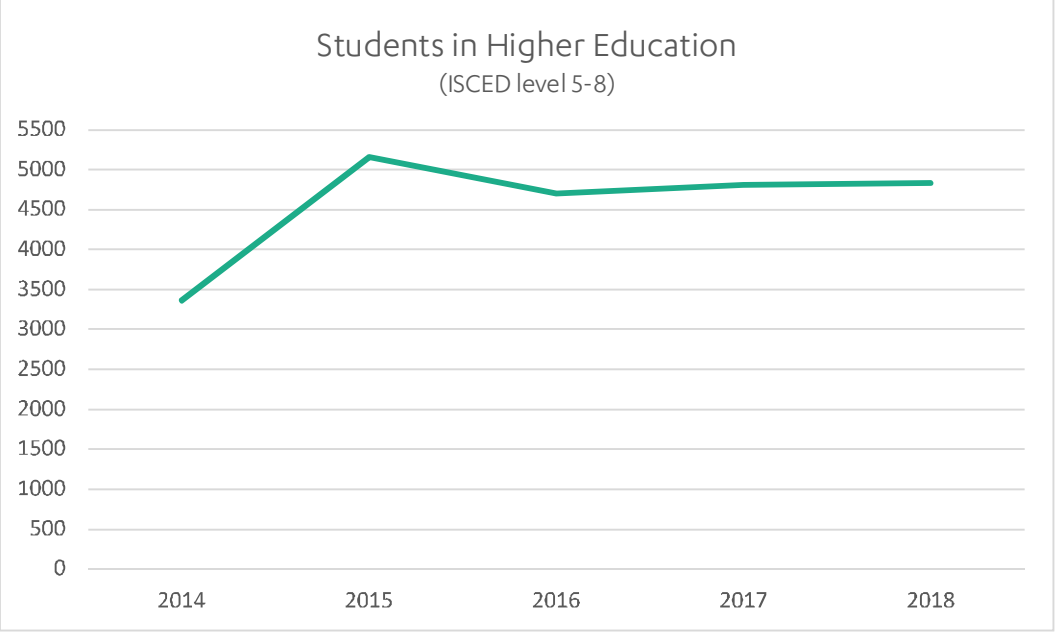


Figure 6 – Baia Mare Students in Higher Education (2014-2018)[9]

Yet, according to Breban (2013) and Pop and Stefanescu (2018), the city is still lacking balance in many key fields, as the transition period is not complete, and there are still several shortcomings which need to be overcome. In a study on urban development strategies, Pop and Stefanescu (2018) list the four main challenges considered a priority for future planning instruments. Contrary to the attributes listed in the previous chapter, within this document the state of economy is still presented as precarious, due to an insufficient interest from investors, a lack of adequate business infrastructure and the difficulties

[8] Authors' elaboration on Eurostat data

[9] Authors' elaboration on Eurostat data. Higher education includes ISCED levels 5-8, defined as follows: ISCED 5: Short-cycle tertiary education; ISCED 6: Bachelor's or equivalent level; ISCED 7: Master's or equivalent level; ISCED 8: Doctoral or equivalent level

in accessing European funds. Another aspect, strongly linked to the first one, is the high level of migration within the young population, which leads to an aging population and to a lack of skills of the remaining. Furthermore, the paper emphasizes the loss of opportunities in the field of tertiary education, as a result of the annexation of North University in Baia Mare to Babeș-Bolyai University in Cluj-Napoca, one of the six national growth poles, which is located 140 kilometres away from Baia Mare. Another shortcoming for the future development of the city consists of the environmental problems caused by the mining industry, namely the high level of pollution with heavy metals (such as copper, lead and gold) in soil land water. This issue leads to associated health pollution and degraded abandoned landscapes covering big surfaces close to the city centre. Last but not least, the study on urban development strategies by Pop and Stefanescu (2018) highlights the poor quality of transport infrastructure at all territorial levels, which leads the city to isolation and makes it unattractive to potential investors.

1.1.3 Land-Use and Urban Development

The urban development strategy for Baia Mare (Pop and Stefanescu, 2018) proposes a change of optics regarding the territorial development options for the city, and the professionals are invited to make an experiment and take into consideration the derelict land (so called brownfields) in Baia Mare for future economic development. The document highlights the multiple benefits resulting from this particular approach, for the environment, the society and the local economy.

Pop and Stefanescu (2018) also recognise the fact that this approach is not without risks, saying that undoubtedly, it would be an experiment, but an attractive and interesting one. Otherwise, it risks becoming an isolated city that will face depopulation, poverty and isolation.

A study highlighting the major ecological imbalances in Baia Mare (Condor, 2014) proposes a holistic approach for the particular case of Săsar mine reconversion and rehabilitation. It starts with listing the environmental and economic challenges in the area, and continues with proposing several solutions for environmental rehabilitation, generation of a cultural landscape, reconversion and reintegration.

According to the Condor (2014), the past exploitations at Săsar mine were harmful for most of the environmental factors. As such, surface and bed water, air and soil pollution are the main burdens of the area. Water pollution is due to chemical substances and solid suspension particles; furthermore, rain and groundwater contaminated after getting in contact with the abandoned mines are collected by the river without pre-treatment, causing a permanent degradation to Săsar river and its tributaries. Air pollution is caused by the gases coming from oxidizing and burning the minerals from the tailing ponds, which are very harmful for the human health, the agricultural crops and the vegetation, as it slows down the process of photosynthesis. Last but not least, soil pollution is due to the presence of a big amount of heavy metals in the ground, which leads to the inhibition of bacteria activity and a decrease of nutrients in the soil, affecting the flora and fauna in the area (Condor, 2014). On another hand, the derelict land of Săsar mine led to an unpleasant landscape, described by the existence of deallocated buildings and their damaged surrounding territory. In this regard, the author highlights the

big economic potential laying in both the industrial infrastructure and the surroundings, which in the present are a cause of city development stagnation (Condor, 2014).

As such, Condor (2014) proposes an integrated process of land reclamation and rehabilitation, sustained by ecological principles. In a similar line with other scientific papers, the author highlights the new perspectives this approach would bring to the local economy and the fact that it would be an opportunity for attracting new investors in abandoned areas of the city. As punctual interventions, the envisioned environmental rehabilitation procedures are land restoration through including nourishing substances and vitamins in the soil, bringing clay for increasing soil fertility and re-vegetation. Furthermore, water cleaning activities are foreseen, backfilling the open pits and the rehabilitation of waste dumps by also redesigning the slopes. Secondly, in order to assure the premises for a cultural landscape, it is proposed the reconversion of the buildings for cultural tourism purposes, by including the industrial premises in a larger project for touristic and scientific purposes. More concretely, Condor (2014) proposes the creation of a science centre with a mining museum, surrounded by open green spaces.

While the articles presented previously are focusing on innovative ways for future territorial development, the current paragraph will focus on the scientific work concerning clustering opportunities for Baia Mare Municipality. Based on an analysis of the current situation of the city, Pop and Stefanescu (2018) highlight several strategic advantages present in Baia Mare, which may be the basis for future clusters.

As such, its favourable location close to the borders with Ukraine and Hungary brings opportunities for cross-border development, through a close communication and collaboration with the local authorities in geographical proximity areas of both countries. Cross-border collaboration could start from complementary areas in economic, social, cultural or educational areas. In this regard, it is highlighted the need for a well-developed transport infrastructure which would support Baia Mare as a supra-regional development pole. Furthermore, the emphasis is put on the need to engage key stakeholders such as SMEs, associations of local councils, etc in the process (Pop and Stefanescu, 2018).

A second clustering option is based on regional tourism and includes all communities, institutions and artisans in Maramureș county. In this regard, Baia Mare has several competitive advantages such as forests, the Chestnut Tree Reservation, 38 protected areas, museums, libraries and theatres, but also human resources skilled in the field of tourism. Furthermore, a distinctive element is the Cuprom tower, as proof of the vast mining industry, measuring a height of 351 meters, the tallest in Romania.

Another clustering option could be in the field of creative industries, considering the existence of various arts & crafts in the area. Yet, in order to further develop this field, the city needs to invest in contemporary cultural infrastructure and to support the knowledge-based economy.

Agricultural and eco-tourism is also considered as a potential cluster, due to prolific activity of the agri-food producers and the gourmet event organizers who value the local production. Given the high level of appreciation for the regional gastronomy, several agritourist facilities were developed in the vicinity of local producers.

Yet, the authors admit that all the envisioned cluster opportunities are feasible only if a proper environment is assured. In this regard, a well-developed transport system, high quality living conditions, an adequate educational infrastructure and a skilled workforce are considered the main issues to be considered.

1.2 Land-Use and Urban Planning Policies, Plans and Regulations

This Section provides an overview of the main strategic and regulatory documents concerning Baia Mare Municipality and its surroundings. The purpose of the analysis is to understand the development goals and the overall vision of the key actors until 2030 at both macro and micro level, in order to provide a strong strategic basis for the process and the outputs envisioned by SPIRE, especially in relation to the remediation of contaminated sites.

Specifically, this Section focuses on two key aspects of land-use management: socio-economic challenges on the one hand, and environmental protection and landscape valorisation on the other.

It does so by analysing the main policies, regulations, measures and priority projects issued at all governance levels and that are listed in Table 2.

1.2.1 Legislative Framework at National Level

The overarching legislative framework for the management of contaminated sites is set at national level with two key documents: *Law no. 74 of 25 April 2019*,[10] and the *Government Decision no. 683/2015*.[11]

The former document provides measures at national level regarding the:

- identification of potentially contaminated and contaminated sites in order to make a national inventory of them;
- definition and setting objectives for the remediation of contaminated sites at a level of functionality and in accordance with current and future uses, taking into account the costs of remediation;
- classification and prioritization of contaminated sites at national level;
- management of potentially contaminated and / or contaminated sites;
- public access to information on potentially contaminated sites and contaminated sites;
- improving cooperation with the Member States of the European Union in order to reduce soil contamination.

In particular, Law no. 74 of 25 April 2019 determines that the National Environmental Protection Agency shall assign a risk score to each contaminated site included in the national list of contaminated sites, and on these grounds prioritise at national level the contaminated sites in order to carry out the

[10] LEGE nr. 74 din 25 aprilie 2019 privind gestionarea siturilor potențial contaminate și a celor contaminate

[11] Hotararea de Guvern nr.683/2015 privind aprobarea Strategiei Nationale si a Planului pentru Gestionarea Siturilor Contaminate din Romania

Governance Level	Document	Year	Key Topics
National	Government Decision no. 683/2015 on the Approval of the National Strategy and the Plan for the Management of Contaminated Sites in Romania	2015	• Soil and groundwater contamination • Risks to human health and the environment
National	Law no. 74 of April 25, 2019 on the Management of Potentially Contaminated and Contaminated Sites	2019	• Identification, classification and prioritisation of potentially contaminated and contaminated sites • Management of potentially contaminated and / or contaminated sites
North-West Region	Regional Development Plan 2014-2020 (RDP)		• Economic competitiveness; research and innovation • Accessibility and mobility • Quality of life of life • Protection of the natural and anthropic environment, efficient use of resources and reduction of pollutant emissions.
Maramures County	Local Environmental Action Plan (LAMP)	2013	• Environmental quality, pollution's reduction • Efficient use of renewable and non-renewable natural resources • Environmental education and promotion of low-impact socio-economic activities • Soil and groundwater pollution: - Greening of tailings dumps and tailings ponds - Monitoring soil contamination
Baia Mare Metropolitan Area	Baia Mare Metropolitan Area Development Strategy 2010 – 2020 (MADS)	2009	• Strategic goals, policies, programmes and projects for: - Infrastructures - Economy - Public administration - Environment
Baia Mare Metropolitan Area	STATUS - Integrated Strategic Territorial/Urban Agenda in Baia Mare Metropolitan Area (ITS)	2013	• Metropolitan Area's development goals • Implementation strategy • Priority projects • Management structure
Baia Mare Metropolitan Area	Land Use Policy in the Baia Mare Metropolitan Area (LUP)	2015	• Land-use policy's strategic objectives • Integrated land-use policy / Local Action Plan • Impact assessment • Participative process
Municipality of Baia Mare	Sustainable Energy Action Plan (SEAP)	2011	• Action plan for energy sector and environmental protection • Renewable energy sources • Reduction/management of energy consumption
Municipality of Baia Mare	General Urban Plan (GUP)	2012	• Functional zoning
Municipality of Baia Mare	Memoir for the General Urban Plan (MGUP)	2012	• Functional zoning of land and indication of intervention possibilities • Conditions and possibilities for achieving the public utility objectives • Identification of landscape categories and capitalization
Municipality of Baia Mare	Local Urban Regulation (LUR)	2012	• Regulatory framework for the implementation of the projects, during the validity period of the GUP
Municipality of Baia Mare	Integrated Urban Development Strategy 2015-2030 (IUDS)	2015	• Land resources and urban regeneration • Soils' decontamination • Strategic approach

Table 2 - Planning and Regulatory Documents Analysed

remediation projects. Moreover, the law specifies that the remediation of contaminated sites consists in the application of technically and economically feasible measures so as to eliminate the risk to human health and the environment, taking into account the present and future use of the contaminated site, as well as the development potential of the area.

Government Decision no. 683/2015 concerns the National Strategy and the Plan for the Management of Contaminated Sites in Romania, promoted by the Ministry of Environment, Waters and Forests. It addresses soil and groundwater contamination issues as a result of past and recent anthropogenic activities on industrial sites and aims to eliminate or limit (potential) risks to human health and the environment. In doing so, the strategy identifies a set of environmental, socio-economic, and technical objectives chiefly oriented at the decontamination of soils, their repurposing for economic and social development goals, and the promotion of the principle of subsidiarity.

The provisions of the national regulatory framework are matched in the rooting principles of SPIRE's phytoremediation strategy, which indeed provides a rather inexpensive, nature-based approach to the remediation of contaminated soils and their repurposing for new socio-economic goals. Furthermore, it will do so strongly abiding by the principle of subsidiarity, thereby promoting and facilitating citizens' and stakeholders' involvement in the co-design of short- and long-term landscaping plans and development strategies for 6 pilot sites in Baia Mare.

1.2.2 Strategic Framework at Regional Level

The Regional Development Plan 2014-2020 is the main strategic document for the North-West Region. It provides the strategic basis for the future projects and investments at regional level, in accordance with the development policies set at national level. The document was issued by the Regional Development Agency North-West (RDA NW) which has the responsibility to prepare it for each programming period, by respecting the methodology provided by the Regional Development Ministry.

The document has set as a main goal for the long run (year 2034) to make Northern Transylvania one of the most dynamic European Regions, by targeting a sustained, constant development for the next period. The communities of the North-West Region will achieve this goal by capitalizing together (while respecting the principles of sustainable development) the natural, material and human resources, together with historical and intercultural traditions.

The general objective of the RDP is to assure the growth of the regional economy through multidimensional and integrated development, reducing intra- and inter-regional disparities and increasing the regional standard of living. In order to sustain the general objective, several thematic priorities were set:

- Priority 1: Increasing the economic competitiveness of the region and stimulating research and innovation;
- Priority 2: Increasing the accessibility of the region, the mobility of inhabitants, goods and information;

- Priority 3: Increasing the quality of life of the inhabitants of the region;
- Priority 4: Protection of the natural and anthropic environment, efficient use of resources and reduction of pollutant emissions.

The Priority 1 and Priority 4 are of special interest for SPIRE as they tackle the land use management from both a socio-economic and an environmental perspective.

Priority 1 strives for the stimulation of socio-economic development. The aim is to increase the applicability and use of research results in the business environment by supporting cooperation between regional, national, European and international actors in academia and research. Joint projects will be stimulated through consistent investments in infrastructure for RDI and technology transfer, in order to enhance the multi-level cooperation.

Priority 4 focuses on the environmental challenges in the NW region. Despite the reduction of air, water and soil pollution in the recent years, the decommissioning of several economic agents in the field of industry and the investments for environmental protection, there is still a significant number of polluting factors in the region, chiefly related to traffic, uncontrolled waste storage, insufficient green spaces and also the existence of contaminated industrial sites.

In what concerns contaminated industrial sites, which are often in the vicinity of important urban settlements, the RDS aims to protect both the environment and human health through soil remediation, greening of historically polluted sites and natural ecosystems restoration.

Additionally, the RDS also focuses on increasing the production capacity of energy from renewable sources, as well as on institutional capacity building aimed at introducing measures to increase the quality of regulations and improve public policies. SPIRE will address both dimensions: the former with its actions for biomass upcycling; the latter by stimulating a participatory, co-creation approach to local development policies, as well as through the deployment of the iLEU (Baia Mare's signature *Immaterial Local Environmental Utility*) and its locally based value system.

Finally, the Regional Development Strategy foresees the establishment of a network of eco-industrial, technological and logistic parks, including RDI type support structures in the Baia Mare area, which could constitute a valuable opportunity to develop synergies with the start-ups and local businesses that SPIRE intends to stimulate and support.

1.2.3 Environmental Action Plans at County Level

Local Environmental Action Plans (LAMPs) are strategic documents aimed at improving the quality of environmental factors, reducing pollution, efficient use of renewable and non-renewable natural resources, developing environmental education and promoting socio-economic activities with minimal impact on the natural environment. LAMPs also emphasize the importance of complying with current economic requirements, taking into account the need to comply with the principles of cohabitation with the natural environment. Based on the principles of the right of the public to have

access to environmental information (according to the provisions of the Aarhus Convention), local authorities must achieve effective public participation in the environmental decision-making process.

SPIRE relates to the LAMP of Maramures County in particular with respect to the contaminated / potentially contaminated sites inventoried according to Government Decision no. 1408/2007 on the modalities of investigation and evaluation of soil and subsoil pollution. The list includes 30 positions,[12] these being sites contaminated with heavy metals by the presence of tailings ponds, mine tailings dumps and pyrite ash deposits belonging to CNMNP Remin SA Baia Mare, but also lands contaminated with heavy metals of SC Romplumb SA Baia Mare and Cuprom SA Bucharest - Baia Mare Branch.

SPIRE will relate with the objectives of the LAMP especially for what concerns the protection of soil and groundwater from pollution of mining activities and metallurgical systems.

1.2.4 Strategic Planning at Metropolitan Level

At metropolitan level, three strategic documents are of interest for SPIRE:

1. Baia Mare Metropolitan Area Development Strategy 2010 – 2020 (MADS)
2. The Integrated Territorial Strategy for the Metropolitan Area of Baia Mare (ITS), developed as part of the South-East Transnational Cooperation Programme's project STATUS[13]
3. Land Use Policy for the Metropolitan Area (LUP), developed as part of the USE ACT project under the URBACT II framework.

The Baia Mare Metropolitan Area Development Strategy 2010 – 2020 aims at increasing the quality of housing in BMMA by improving supply and the management of drinking and wastewater, and the improvement of the environment by mitigating natural, anthropogenic risk factors, by rehabilitating contaminated land.

The projects proposed by the MADS strengthen the technological profile of BMMA, ensuring the development of the partnership between the academic and private sector in research and in the implementing of new investments in alternative energy resources, and also methods for the rehabilitation of contaminated sites as a result of mining activities.

SPIRE's partnership is precisely built following this approach, and indeed it brings together the public (Municipality of Baia Mare, Baia Mare Metropolitan Area), academic (USAMV-Cluj Napoca), and private sectors (Urbasofia, Indeco Soft, Green Energy Cluster, Aries Transilvania). In doing so, different skills and expertise are integrated in the design and implementation of innovative strategies for the sustainable use of land and of its resources.

The Integrated Territorial Strategy aims at supporting the Metropolitan Area in prioritizing the interventions until 2020 in order to assure a coherent development at metropolitan level. The ITS' ultimate goal is to set the stage for a future strong regional pole in Baia Mare Metropolitan Area, and in to do so it is organised along 5 strategic objectives. Namely:

[12] www.apmmm.anpm.ro/Report on the state of the environment in Maramures county in 2010
[13] STATUS: Strategic Territorial Agendas for Small and Middle-Sized Towns

- Objective A: Functional urban area with competitive economic concentrations, innovative and logistical centres, strongly linked to external markets;
- Objective B: Intelligent specialization and consolidation of the innovation process in a synergistic system, supported by research and training;
- Objective C: Sustainable local development based on strong urban-rural partnerships and links, by stimulating agricultural production and eco-tourism;
- Objective D: Integrated and sustainable public service systems, including transport;
- Objective E: Intelligent governance and stimulation of active participation at ZMBM level

Objectives C and E are of specific interest for SPIRE respectively for what concerns:

- the creation of green corridors across the main rivers in the Metropolitan Area,[14] thus raising the need for renaturing the polluted sites adjacent to Săsar and Firiza rivers.
- smart governance measures aiming to create functional territorial pacts in the metropolitan area and an active management of the project portfolio for the 2014-2020 programming period, especially through the deployment of iLEU and the activation of the iGIS.

Furthermore, one of the priority projects envisioned by the ITS is the creation of an Eco-Industrial Park in the Eastern part of Baia Mare. The project envisions the decontamination and re-functionalisation of the CUPROM industrial platform site, thus responding to the current economic and environmental problems of the Metropolitan Area. The park will leverage on the wood industry, by associating the furniture production with the secondary production of electricity and heat through the use of wood biomass as solid fuel. Given the location and focus on secondary energy sources of this project, possible synergies could be developed in the future with SPIRE's initiatives for biomass upcycling.

As part of the URBACT II project USE Act, the goal of Baia Mare's Land Use Policy is to increase development opportunities in urban areas, through integrated policies and instruments designed to improve the management of urban development planning, taking into account the nature of sustainable interventions that can be implemented in order to reuse abandoned vacant or unused urban lands, both in historical areas and in the newly built ones.

Specifically, the LUP identifies the following three core objectives:

1. Supporting the development in urban and metropolitan land supply by ensuring the coordination of demand from existing and future functions
2. The efficient use of land to ensure a balanced territorial development for the involved localities as well as for the whole metropolitan area

[14] Priority project 8: Reinforcing the Green Infrastructure at metropolitan level. The priority actions for implementing the projects are the following: applying the legal/institutional framework regarding green areas, planning the blue-green corridors based on metropolitan and local land use plans, establishing an infrastructure for interconnected green links between natural heritage areas along watercourses.

3. Increasing the involvement and responsibility of the local public authorities regarding the sustainable use of land resources

As well as a list of principles at the base of the land management process:

- The principle of participation and transparency: nongovernmental organizations, the private sector and local authorities contribute to the planning of public policies of urban development in general, and of lands in particular.
- The principle of continuity and coordination: the process of urban planning includes the update of the current policies of the public authorities and institutions as well as the coordination with other initiatives.
- The principle of responsibility: urban planning and the use of tools affecting the land market is a process oriented towards results. Responsibility is present in all levels of public administration.
- The principle of subsidiarity: in the planning and decentralization of urban development tasks the level of government best suited to implement public policies on land is assessed.
- The principle of good governance: public authorities and institutions shall establish clear and effective actions based on quality objectives and actively prepare to have the ability to foresee and respond quickly to changes and demands arising in the urban land market mechanism.
- The principle of cooperation: public authorities and institutions responsible for formulating and implementing policies must prove their readiness for cooperation with other public institutions, as well as with civil society organizations interested in or affected by a particular public policy initiative, thereby ensuring a coherent conception of the objectives to be fulfilled and the measures to be taken.

Ultimately, the LUP provides a set of recommendations to increase the efficiency of land in the Baia Mare Metropolitan Area. Among many, the following is of specific relevance for SPIRE:

- The urban landscaping plans must relate to the existent situation, the real needs of the community and their development strategies. Investment objectives, which by their nature adversely affect the efficient use of urban land, require a reassessment of long- term impact.

SPIRE will significantly build on the principles and recommendations of the LUP, especially through its co-creation laboratories, Masterplan 2050 and Life Cycle Assessment.

1.2.5 Strategies and Regulations at Municipal Level

At local level, the reference documents for urban planning and land-use in Baia Mare are the Integrated Urban Development Strategy (IUDS), the General Urban Plan (GUP) and the Local Urban Regulation (LUR). Additionally, the city's environmental policy is regulated by the Sustainable Energy Action Plan (SEAP).

The Integrated Urban Development Strategy is a strategic document developed by Baia Mare Municipality; whose ultimate goal is to provide a clear Action Plan until 2030. The document builds on

local data tackling socio-economic, environmental and cultural issues, by also taking into account the European and national planning framework and the two-stage vision (short term - 2023 and medium term - 2030) developed together with the local stakeholders. The resulting Action Plan consists of a portfolio with thematic strategic projects, tackling socio-economic, environmental and institutional issues of the city.

The document strengthens the vision developed at metropolitan level, by recognizing the economic potential represented by inner-city derelict land. In this regard, IUDS proposes actions for remediation and functional reconversion. In terms of figures, the IUDS Baia Mare aims at remediating, regenerating and integrating in the urban economic circuit of the city more than 50% of the abandoned industrial land by 2030. The Mission for the short (2023) and medium (2030) term consists of the following strategic activities:

- Regenerating and integrating the industrial sites in the urban circuit;
- Enhancing the attractivity of the city through the creation of a public spaces system which will integrate derelict areas;
- Creating a dynamic business environment through attracting investments based on innovation and R&D.

The strategy has also developed a set of sectoral objectives, as follows:

- O1. Tourism: An attractive city, with a representative urban image; a cultural pole, with a touristic sector which is representative for the local economy;
- O2. Local transport: Sustainable local mobility, which prioritises green transportation, a fluid transport and an energy efficient public transport system;
- O3. Economy: Performant and dynamic economy, based on research and innovation, attractive for investors and with a skilled workforce;
- O4. Quality of life: A city with a high quality of life, benefitting from comfortable living conditions and a performant educational and health system;
- O5. Environment: Energy efficient, green and sustainable city, with a minimum impact on the environment;
- O6. Social: A community united in diversity, a social inclusive environment and an equitable access to social services;
- O7. Regional accessibility: A city accessible by car, train and airplane, connected to the European transport corridors.

The economic objective states that urban regeneration of industrial sites should be prioritized for a future performing economy. The reasoning behind this decision lies on the fact that any economic activity foreseen by other objectives can be developed on the existing derelict land. Furthermore, the environmental issues are tackled by both economic and environmental objectives, as particular

emphasis is put on the ecological reconstruction of polluted sites together with the valorisation of industrial heritage. Hence, the Visions for the short (2023) and the medium (2030) term foresee the recovery of derelict industrial land resources and the piloting of at least one soil remediation project. Furthermore, they envision a system of green spaces which will cover the city's needs and will assure 26 sqm of green space per capita until year 2030.

The Sustainable Energy Action Plan (SEAP) is the main reference at municipal level for SPIRE's streams of action related to green energy and environmental-friendly virtuous behaviours.

The SEAP aims to ensure short-term implementation and environment of local policies formulated by approving the socio-economic development strategy of the municipality. It details its general objectives and directions of action in the energy and environmental protection sectors, in accordance with the objectives of the Convention of the Mayors.

The Sustainable Energy Action Plan will implement measures to streamline the use of resources at the local level, the introduction of renewable energy sources, the development of local programs and actions to reduce energy consumption in the field of community utilities, in public buildings and blocks of flats.

The General Urban Plan and the Local Urban Regulations are the main normative and regulatory documents for the municipality. The General Urban Plan includes the analysis, functional zoning and the regulations for the entire administrative territory of the city. At the same time, the GUP establishes general norms, on the basis of which the ZUPs (Zonal Urban Plans) and then the DUPs (Detailed Urban Plans) are elaborated in detail, on a smaller scale.

In the next pages we report the specific zoning and land-use provisions (i.e. the regulatory framework) for the areas surrounding SPIRE's five phytoremediation pilot sites, whose location is specified in Figure 7.

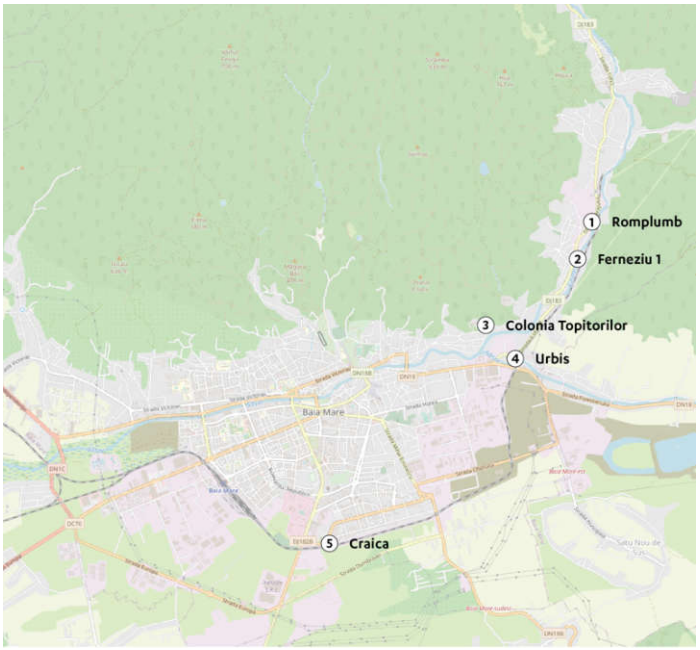


Figure 7 - Location of SPIRE's Phytoremediation Pilot Sites

Romplumb is included in the following categories: 'area proposed for restructuring (whose development will be detailed through a ZUP) and 'green spaces, sports and leisure area' (see Figure 8).

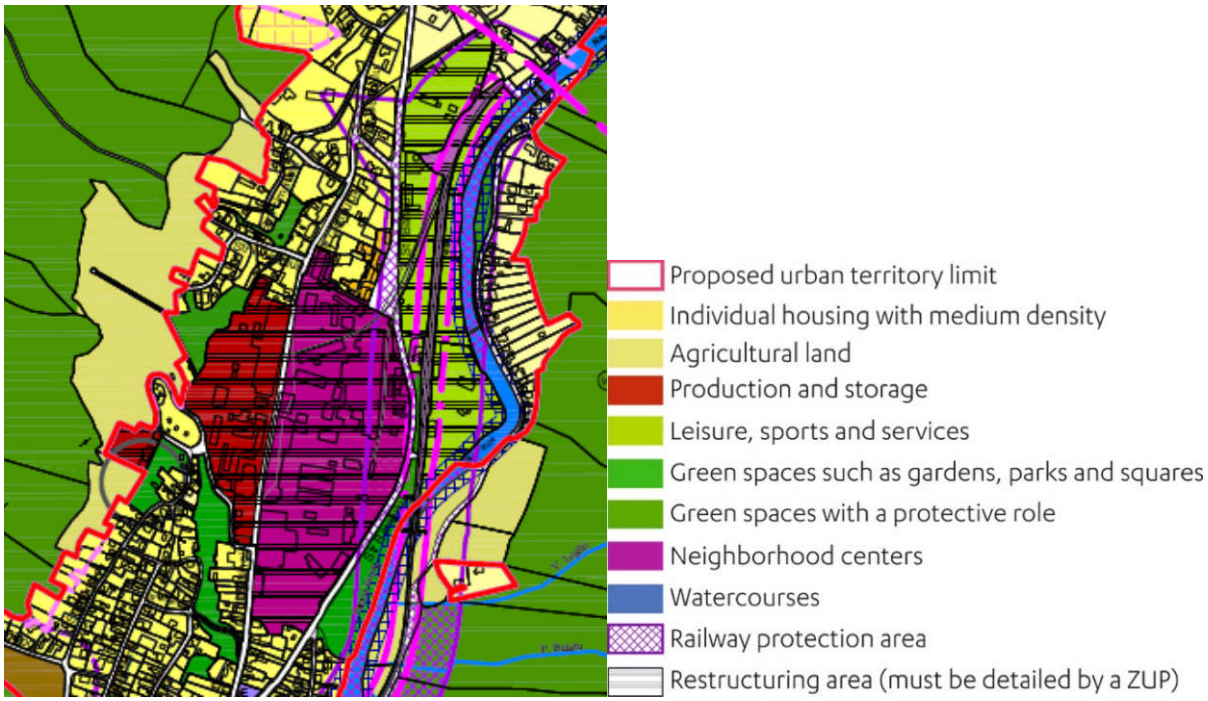


Figure 8 – GUP's Zoning Provisions for the Surroundings of Romplumb Pilot Site

Ferneziu 1 is included in the following categories: 'area with public institutions and services of general interest (educations)', 'living area (small individual and collective housing with medium density)' and 'protection area for railway'. On Ferneziu 1 site are only permitted educational and housing areas, and there are also rules related to the presence of the railway. Thus, LUR imposes a protection area of twenty meters for the railway infrastructure (see Figure 9).

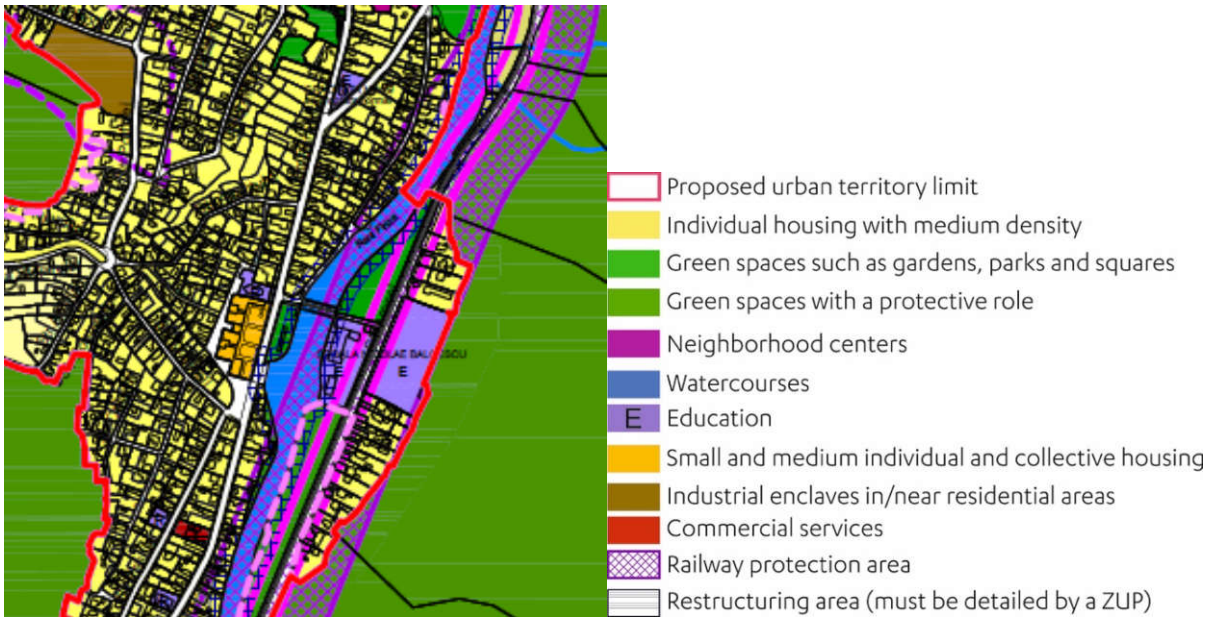


Figure 9 - GUP's Zoning Provisions for the Surroundings of Ferneziu 1 Pilot Site

Colonia Topitorilor is included in the following categories: 'green spaces, sports and leisure area' , 'protection area for water courses' and 'area proposed for restructuring, whose development will be detailed through a ZUP' (see Figure 10).

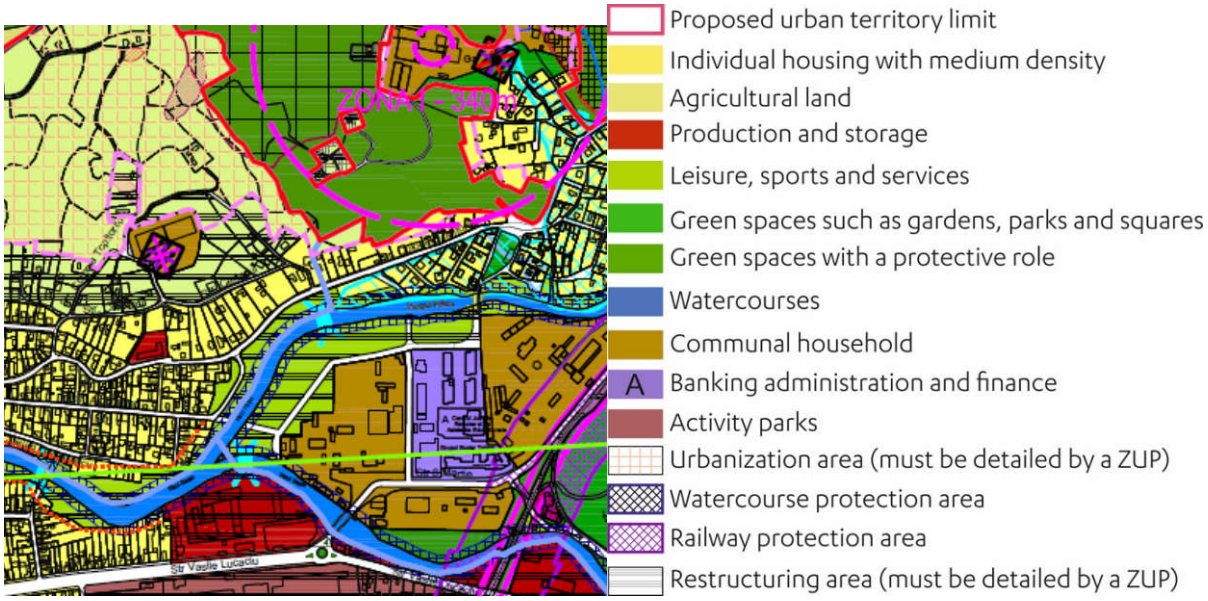


Figure 10 - GUP's Zoning Provisions for the Surroundings of Colonia Topitorilor Pilot Site

Urbis site is included in the following categories: 'green spaces, sports and leisure area' and 'protection area for water courses' (see Figure 11).

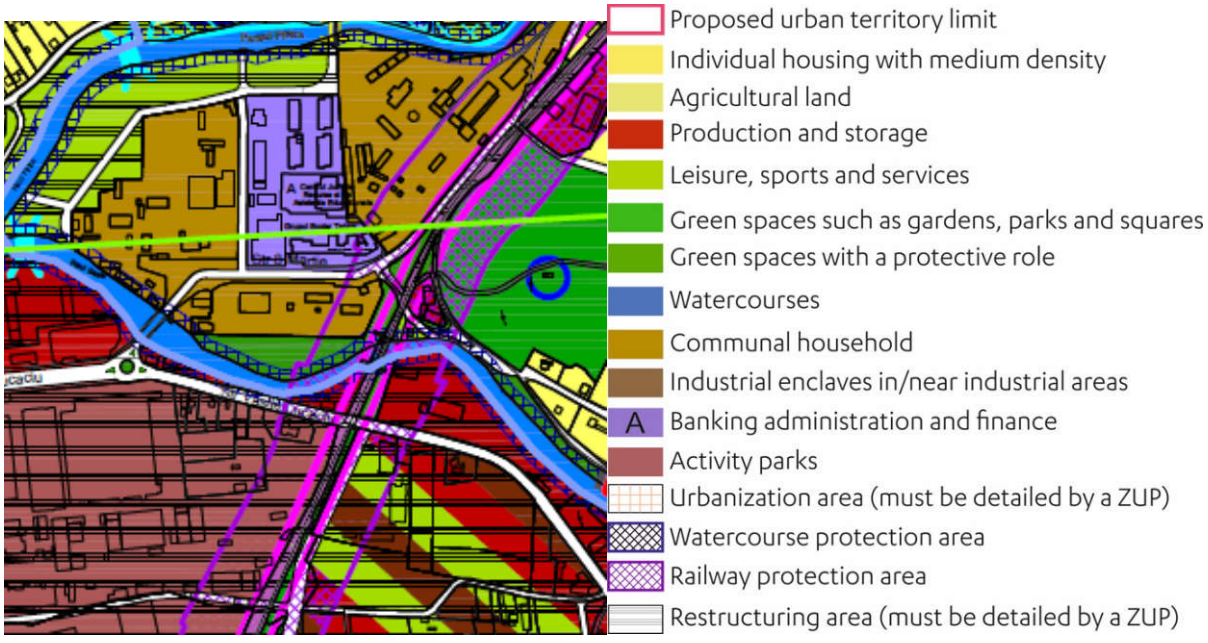


Figure 11 - GUP's Zoning Provisions for the Surroundings of Urbis Pilot Site

According to LUR, on Urbis site will only be permitted the development of recreational activities such as leisure centres, other sports and leisure areas, swimming pools and complementary commercial services. Additionally, the green spaces need to cover at least 30% of the area and the degree of

waterproofing cannot exceed 50%. The percentage of land occupation with buildings cannot exceed 40%.

Furthermore, several other regulations are set for protecting the river. In order to create the green corridor along Sasar river, LUR imposes a building ban on a fifteen meters distance; where there is a distance of more than 15.0 m between the edge of the slope and the property limits, the interdiction extends over the entire surface.

Craica site is included in the following categories: 'area likely to be flooded at flows with a probability of 1% by draining on the ground' and 'urbanization area (whose development will be detailed through a ZUP)'. For the above-mentioned categories, the LUR imposes that it is forbidden to place the main (permanent) residential constructions in the flooded areas with a risk higher than 1%. The location of other constructions of low importance in the floodable areas is allowed only at the risk of the beneficiary and with the proof by him of the consideration in the design of the flood risk and the elaboration of an evacuation plan in case of risk (see Figure 12).

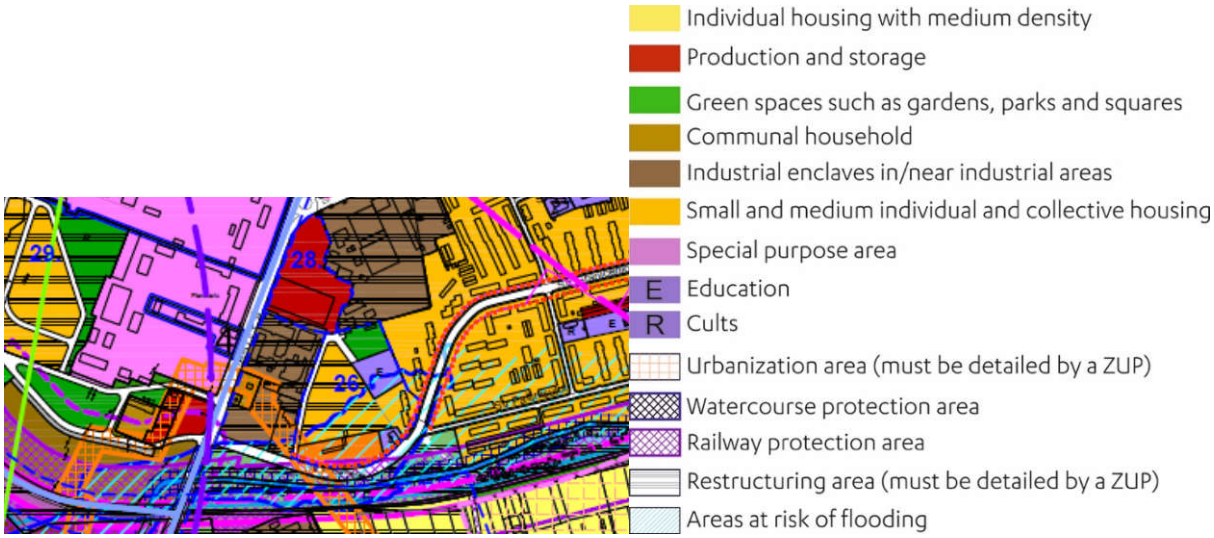


Figure 12 - GUP's Zoning Provisions for the Surroundings of Craica Pilot Site

The Local Urban Regulation is also addressing several protection measures for mitigating the risks posed by contaminated sites. Namely:

- Establishing a construction ban on contaminated land until decontamination is achieved for any type of construction and arrangement except for protection fences. Until the elaboration of the specialized study described below, the construction interdiction is provisionally established by the local authority on the historical perimeter of the brownfield site based on the old plans of the respective industrial premises; after drawing up the specialized study, the construction interdiction area moves on the exactly identified perimeter; in the absence of the application of the greening measures of the contaminated site, the construction interdiction has a permanent character.

- Preparation of specialized studies to delimit the contaminated area (considering that the respective sites are currently identified by the coordinates of a single topographic point), and to identify all contaminants;
- Proposing through a specialized study the measures to eliminate the identified contaminants up to levels that do not present a danger to human health based on the cost / benefit analysis; the greening proposal must take into account the subsequent use of the land for the purposes provided in this regulation for the respective building
- Remediation of the contaminated site by removing the contaminants according to the previous paragraph
- Lifting the construction interdiction in order to authorize the execution of works according to the regulations of the present urbanism regulation.

The Memoir for the General Urban Plan of Baia Mare is a supporting document of the General Urban Plan, with a time span of 10 years, from 2013 until 2023. The document is setting several development priorities for the next period. They are established in accordance with the economic policy and the main objectives of the General Urban Plan. The local economy policy aims at increasing competitiveness and relaunching the local economy in order to improve the living conditions of the inhabitants. In what concerns the main economic objectives, they are the following:

- O4. Diversifying the local economy, through developing knowledge economy and leveraging on natural resources and innovation potential
- O9. Developing local partnerships in domains related to sustainable land development

The document foresees several priority actions until 2023. Among them, a constant monitoring of the regeneration and re-development of the industrial areas is considered. Priority will be given to productive activities that capitalize on local resources, those in the field of high technologies and in the field of renewable energies. In this regard, a key action concerning derelict areas regeneration will be the greening of polluted sites. Another key action is considered the provision of more public spaces in strategic parts of the city, considered necessary for sustainable urban development. Ferneziu and Firiza neighbourhoods are part of this category, as they will be transformed into tourist corridors. Furthermore, the land in the proximity of Săsar and Firiza rivers is considered as a future system of public spaces. As measures and recommendations, the document suggests a specialized study provided under the General Urban Plan on toxicological aspects. The study should assess the level of contamination with heavy metals, especially lead and cadmium, in residential, industrial and green areas.

The contribution of SPIRE in achieving the results envisioned in the strategic documents is manifold. Firstly, the project aims at ensuring a resource-efficient development through sustainable land use. Second, it will sustain the competitive character of the region through an innovative value chain at European level. Last but not least, SPIRE will also increase the applicability and use of European and

global research results in the field of bioenergy and bio construction materials, while strengthening the collaboration between a wide range of institutions through its collaborative character.

The project tackles both socio-economic and territorial challenges faced by the city of Baia Mare in the present. On one hand, it aims at rehabilitating and reintroducing in the economic circuit of the city several derelict areas close to Săsar and Firiza rivers. Furthermore, considering the fact that it will use nature-based solutions in the remediation process, the areas will be re-natured and will contribute to strengthening the rivers' ecosystems in the long run. On the other hand, the project aims at improving public education in the field of environmental protection. As such, the capacity for public participation in environmental decision-making will be improved, the level of community ecological education will be increased and their involvement in volunteering for environmental purposes will be sought.

2. BAIA MARE'S POLLUTION

This Chapter explores the historical development and public health effects of heavy-metal environmental contamination in Baia Mare, as well as the state-of-play of the city's soil and air pollution.

2.1 Soil and Environmental Pollution

Situated in the north-west part of Romania, the Baia Mare area is well known for the metallurgical industry and non-ferrous mining and chemical activities. The environment and particularly the soils are polluted due to the acid rains and heavy metal emissions from the industrial activities previously developed in the area. The region became of international concern after the cyanide spill accident in January 2000 that affected the ecosystem of Tisa and Danube rivers. Despite the fact that the copper smelter was lost in 2008 and the lead smelter in 2012, and it was reported an improvement in the air quality, the area is still highly polluted and has a high level of soil contamination with HM. The dumps that formed due to metal extraction and processing of ores, are considered "hot spots". These hot spots exist even inside the city of Baia Mare (Figure 13).

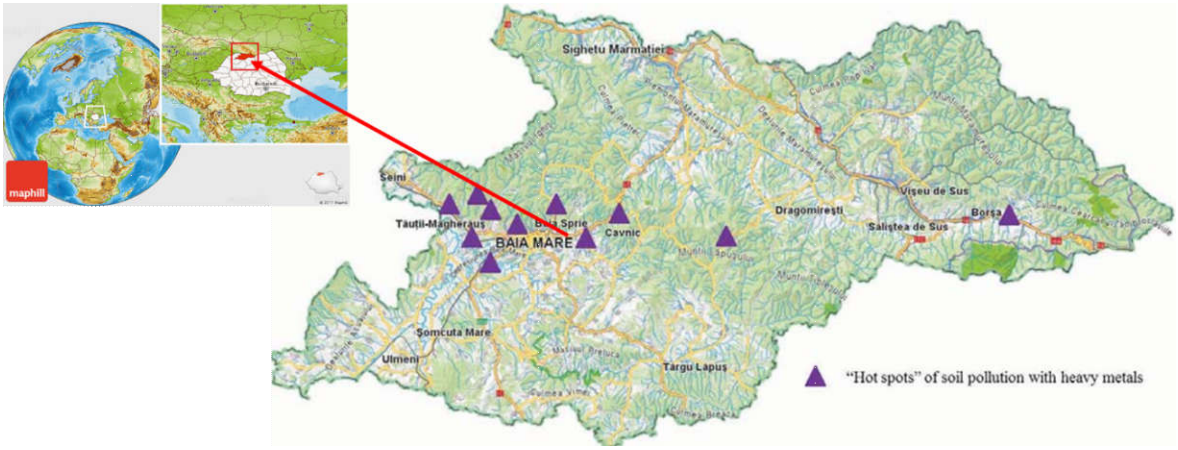


Figure 13 - Hot spots of soil HM soil pollution in Maramureș County[15]

The metropolitan area of Baia Mare is situated in a hilly region, at an altitude of 220 m above sea level, covering an area of 1250 km^2 and having a population of more than 200.000 residents.

The Baia Mare area has represented over time an area of great interest for studies on the behaviour of heavy elements in contaminated soils. The main research in the Baia Mare area focused on the following objectives:

a) to evaluate the environmental quality of these hot spots and polluted areas (investigation of the HM contamination and spatial distribution in soils);

b) to investigate the HM metal contamination in fruits and vegetables cultivated in the area;

[15] Source: Boros et al. 2015 and http://www.maphill.com/romania/maramures/location-maps/physical-map/highlighted-country/entire-country/

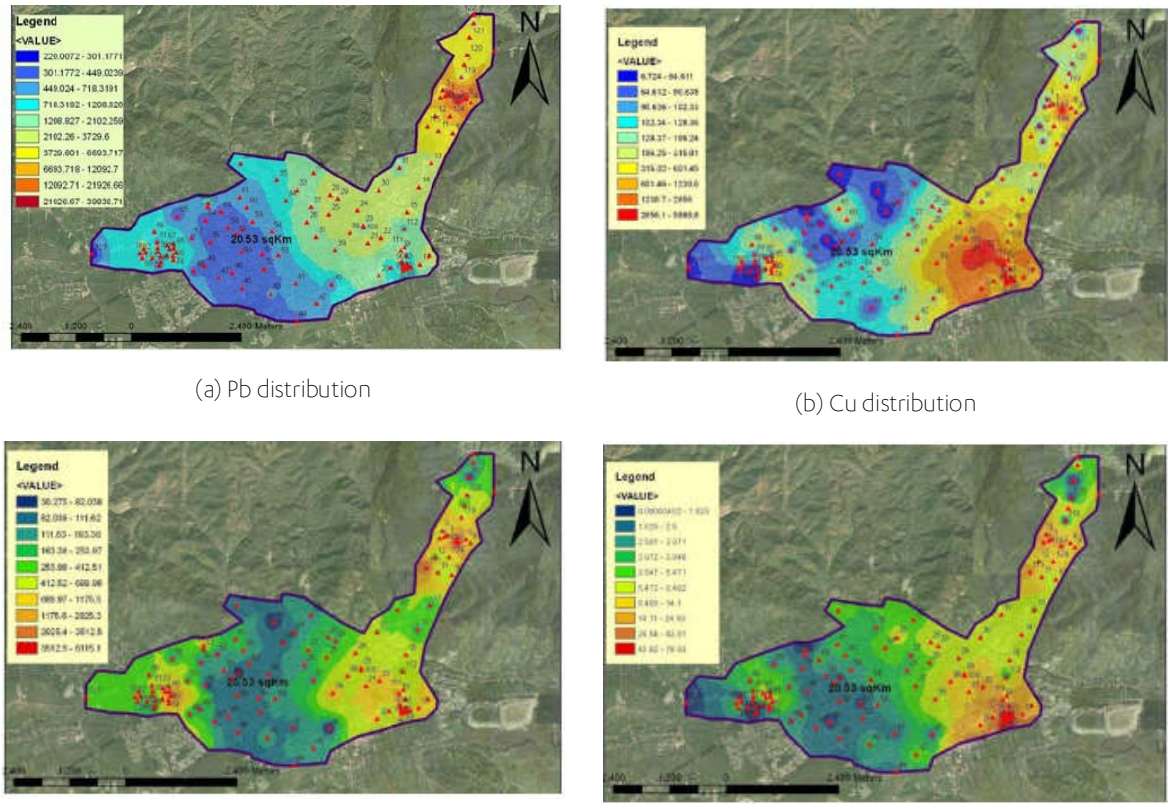
c) to evaluate the possible health risks to local population through food chain transfer.

A summary chronological presentation of these studies will be presented below.

2.1.1 Heavy Metal's Concentration in Soils

In a study conducted by Damian et al (2008), the HM (Pb, Cu, Zn and Cd) soil pollution was studied on a surface over 20.53 km^2 of Baia Mare. The total concentration of HM was measured in the upper horizon for the entire surface of Baia Mare city and for each pedogenetical horizon within the soil profiles up to 1.20 m depth in the industrial zones (Figure 14).

The results obtained highlighted the fact that the analysed soils (through the composition and physic-chemical properties) influences the concentration level and heavy metals mobility of Pb, Cu, Zn, Cd. The total contents of Pb, Zn and Cd are higher in the eutricambosols and aluviosols from Romplumb area than in the luvosols and aluviosols from Cuprom area. The total content of Cu is significant for the organic horizon in the luvosols type. All the soil profiles from both industrial areas are characterized by high acidity with variation related with the soil type. The content of nutrients from the soils is decreased and the ratio C/N in the organic horizon is high.



(a) Pb distribution

(b) Cu distribution

(c) Zn distribution

(d) Cd distribution

Figure 14 - The map of HM distribution in Baia Mare zone on the 0 - 10 cm depth[16]

The highest concentrations of the heavy metals analysed in the upper horizon of the soils are present in the eastern side, the industrial zones and in the south-western part on the location of the tailing

[16] Source: Damian et al, 2008

dump. The spatial distribution of Pb shows a high degree of variability. The average concentration of Pb over 2417.71 ppm, for the entire investigated area corresponds with the state of high pollution. Maximum concentrations of Cu which indicate this high level of pollution are over 400 ppm-5823 ppm are specific for the Cuprom area on a big surface around the influence zone of gaseous emissions, associated with albic luvosol type. The maximum values determined for Cd (80-39ppm) in Cuprom area, 24.2-5.2 ppm for Romplumb area and 15.13-3.05 ppm in south-western part sustain the high pollution for the characteristic type of soils. The concentrations for Zn (6122-4513.2 ppm) correspond with the state of increased pollution on small surfaces in Romplumb area and in south-western part of the investigated zone. For Cd and Zn, in case of high value of acidity of the upper horizon, it took place the mobilization of metals within the soil profile. The maximum content of Cd is greater than the maximum allowable limit on the soil profile (3.17-21.5ppm). The maximum values for Zn (928 ppm and 627 ppm associated with maximum values for Cd: 50 ppm and 40 ppm) are related with B horizon of the eutricambosol.

Another study, published in 2010 (Levei et al., 2010) investigated the availability of HM (Cu, Pb, Zn and Cd) from soil to plants in Baia Mare mining region using selective extraction in water and DTPA. The obtained results showed that the total contents of all metals were high, exceeding the alert values for sensitive soils (residential and agricultural use) for the most samples (Cu: 38.1- 1770 mg/kg, average 314 mg/kg), (Pb: 87.8 - 23300 mg/kg, average 1790 mg/kg), (Zn: 109 - 11500 mg/kg, average 1828 mg/kg), (Cd:1.9 - 29.9 mg/kg, average 7.9 mg/kg). In case of Pb and Zn the 1 quartile was higher and in case of Cu and Cd was around the corresponding alert level for sensitive soil. For all samples the 3rd quartile was much higher than the action trigger value for all metals. The average total metal content exceeded the action trigger values for sensitive use according to Romanian legislation, 1.5 times in case of Cu and Cd, 3 times in case of Zn and 18 times in case of Pb. The conclusions that resulted from the study highlighted that HM concentrations of polluted soils varied widely, in most cases exceeding the corresponding alert levels, indicating a severe situation, needing urgent measures of pollution stopping and applying soil decontamination solutions, especially they cannot be degraded or destroyed. The high percentages of DTPA extractable metals indicate an anthropogenic pollution, and a potential metal accumulation in vegetables, posing a potential risk for public health.

Another study conducted in 2012 (Big et al., 2012) reported the values of HM in soils 9.1-2593 mg/kg for Cu, 1.1-27 mg/kg for Cd, 83-8040 mg/kg for Pb and 60-11445 mg/kg for Zn.

Roba et al (2015) determined the total fraction and the bioavailable fraction of HM (Cu, Cd, Pb and Zn) from private garden soil and evaluated the influence of soil pH on the metal bioavailability in soil. The analysed soil samples proved to have high levels of Pb (50 –830 mg/kg), Cu (40 – 600 mg/kg), Zn (100 – 700 mg/kg) and Cd (up to 10 mg/kg). The metal abundance in the total fraction is following the sequence Zn > Pb > Cu > Cd, while the bioavailable fractions were considerably lower, and their sequence was as follows: Cd > Cu > Pb > Zn. Higher proportions of mobile fractions of metals were detected in samples taken from soils with acidic pH.

2.1.2 Heavy Metal's Concentration in Food Products

Considering the fact that the information about HM concentrations in food products and their dietary intake are essential for assessing the health risk of local inhabitants, Roba et al (2015) (as a continuation of the previous study) aimed to investigate the concentrations of HM in several vegetables and fruits cultivated in Baia Mare mining area (Romania) and to assess the human health risk associated with the ingestion of contaminated vegetables and fruits. an improvement in food safety. The concentration order of HM in the analysed vegetable and fruit samples was Zn>Cu>Pb>Cd. Generally, the highest contents of heavy metals were found in the industrial areas, in the samples collected from the close vicinity of the non-ferrous metallurgical plant SC Romplumb SA and SC Cuprom SA. The results showed the HM are more likely to accumulate in vegetables (10.8–630.6 mg/kg for Zn, 1.4–196.6 mg/kg for Cu, 0.2–155.7 mg/kg for Pb, and 0.03–6.61 mg/kg for Cd) than in fruits (4.9–55.9 mg/kg for Zn, 1.9–24.7 mg/kg for Cu, 0.04–8.82 mg/kg for Pb, and 0.01–0.81 mg/kg for Cd). Parsley, kohlrabi, and lettuce proved to be high heavy metal accumulators. It was investigated, also, the spatial distribution of heavy metals in the analysed vegetables and fruits. Pb and Cd spatial distributions were relatively similar, indicating two hot spots in the NE of Baia Mare (Ferneziu district and Grivița district) as a result of the continuous emissions from the lead metallurgical plant SC Romplumb SA, located in the close vicinity of the sampling sites. For both Pb and Cd, the average levels were lower in the samples collected from rural areas than those from urban areas. The average Zn concentrations increase in close proximity of lead metallurgical plant Romplumb SA and copper metallurgical plant Cuprom SA. The Cu spatial distribution showed a hot spot in close proximity of copper plant Cupom SA as a result of the dust emissions from the copper metallurgical plant located in the south-east side of the city (Figure 15).

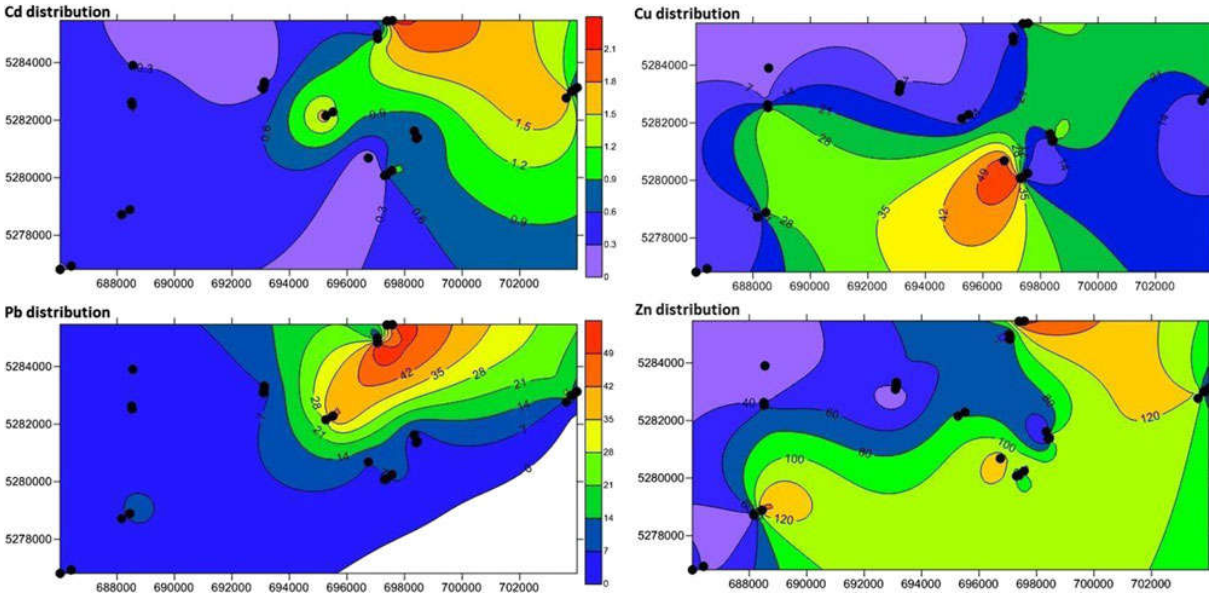


Figure 15 - Spatial distribution of average content (mg/kg dw) of Zn, Cu, Pb, and Cd in the analyzed vegetables and fruits[17]

[17] Source: Roba et al (2015)

2.1.3 Risks to Human Health through Food-Chain Transfer

The daily intake rate (DIR) and the target hazard quotient (THQ) calculated data indicated that consumption of parsley, kohlrabi, and lettuce from the area on a regular basis may pose high potential health risks to local inhabitants, especially in the area located close to non-ferrous metallurgical plants (Romplumb SA and Cuprom SA) The DIR for Zn (85.3–231.6 μg/day kg body weight) and Cu (25.0–44.6 μg/day kg body weight) were higher in rural areas, while for Pb (0.6–3.1 μg/day kg body weight) and Cd (0.22–0.82 μg/day kg body weight), the DIR were higher in urban areas, close to the non-ferrous metallurgical plants SC Romplumb SA and SC Cuprom SA. The THQ for Zn, Cu, Pb, and Cd was higher than 5 for <1, <1, 12, and 6 % of samples which indicates that those consumers may experience major health risks. The results were in agreement with similar studies conducted in Baia Mare area (Big et al., 2012; Lăcătușu and Lăcătușu 2008; Lăcătușu et al. 1996).

The study conducted by Chakraborty et al (2017) combined portable X-ray fluorescence (PXRF) spectrometry with non-parametric indicator kriging for rapid soil pollution hotspot mapping. PXRF was used to assess As, Cu, Cr, Mn, Pb, Zn, and V at 131 georeferenced points in and around the city of Baia Mare, Romania. Pb exceeded the action limit in 91.09% of the area, followed by As (81.20%), Cu (41.52%), Zn (26.69%), and Cr (5.58%). Indicator kriging was used to estimate the probabilities of data exceeding certain threshold levels. The highest estimated probabilities of surpassing the Romanian action limits were found around the smelting plant and dispersal stack. Results indicated a likelihood of exceeding action limits of 75% for Cu and between 50 and 75% for Zn. A major portion of the study area showed high probabilities for As and Pb surpassing the Romanian action limits by 75% (see Figures 16-18).

Matei et al (2019) conducted a study in the northwest of Baia Mare, where S.C. Romplumb S.A is located. There were identified acidic soils with a pH between 4 and 6. Acidic soils contamination favour the increasing of the mobility of heavy metal ions and lead to soil degradation by exceeding the values for HM content up to about 100 cm.

Environment pollution in the Baia Mare area has also impacted on the health of the population. Studies on the risk groups for lead, cadmium and arsenic pollution have shown concentrations of pollutants in the human body that have largely exceeded the reference levels, especially for the lead indicator (lead in blood being the main parameter to indicate the concentration of lead in the human body), which explains the increased incidence rates of specific morbidity in the area of respiratory, digestive, renal, endocrine and metabolic disease. SEM-EDAX analysis revealed that the average values of the pollutants (lead) concentration are higher in Baia Mare.

Another study published in 2020 (Bora et al, 2020) confirms previous published results highlighting that HM concentration in soil samples significantly exceeded the normal values set by the corresponding legislation in Romania (Order of the Ministry of Waters, Forests and Environmental Protection No. 756/3 November 1997), as well as by the Council Directive 86/278/EEC for Protection of the Environment (European Communities Council 1986).

Detected values of Cu (average 3165.26 mg/kg) were higher than those reported previously from this area (640.6 mg/kg, Senila et al, 2010), (599.75 mg/kg, Mihali et. al., 2013), (314.00 mg/kg, Levei et. al, 2010) but are conformable to those obtained by Damian et al. (44–5823 mg/kg).

All detected values of Zn greatly exceeded the normal levels allowed by the law (100 mg/kg). The concentrations of Zn tended to increase with the sampling depth with the highest concentrations being detected in samples collected at 60–80 cm (2734.93 mg/kg). The Zn values obtained (average 1989.12 mg/kg) are higher than data published in previous reports from Baia Mare area (Levei et. al., 2010).

Analysing the results obtained by different researchers in the synthetically presented studies can be highlighted the following conclusions.

In Baia Mare zone the air circulation had a local character determined by the influence of the orography of this zone and the presence of the atmospheric calm. These conditions favoured the high concentrations of heavy metals in soil near these two sources of emission, Romplumb and Cuprom. After closing the activity of these two sources of atmospheric pollution, the air became less polluted, but the soil remained highly contaminated.

The high concentrations of Pb, Cu, Zn, Cd confirms the role of atmospheric gases deposition in soil`s pollution. In Romplumb area Pb, Zn and Cd pollution is excessive and in Cuprom area Cu has the highest level.

From environmental point of view, all heavy metals are very important because they cannot be biodegraded in soils, so they tend to accumulate and persist in urban soils for decades. Lead, cadmium, copper, zinc and nickel are metals frequently reported to have a high impact on organisms. Heavy metal pollution of soil enhances plant uptake causing accumulation in plant tissues and eventual phytotoxicity.

For Baia Mare area the remediation of the contaminated areas is an important issue. The serious environmental pollution caused by mining activities lead to health problems for the population. Dangerous types of contaminants like Pb, Cu, Zn, Cd require finding good solutions for decontamination of these zones.

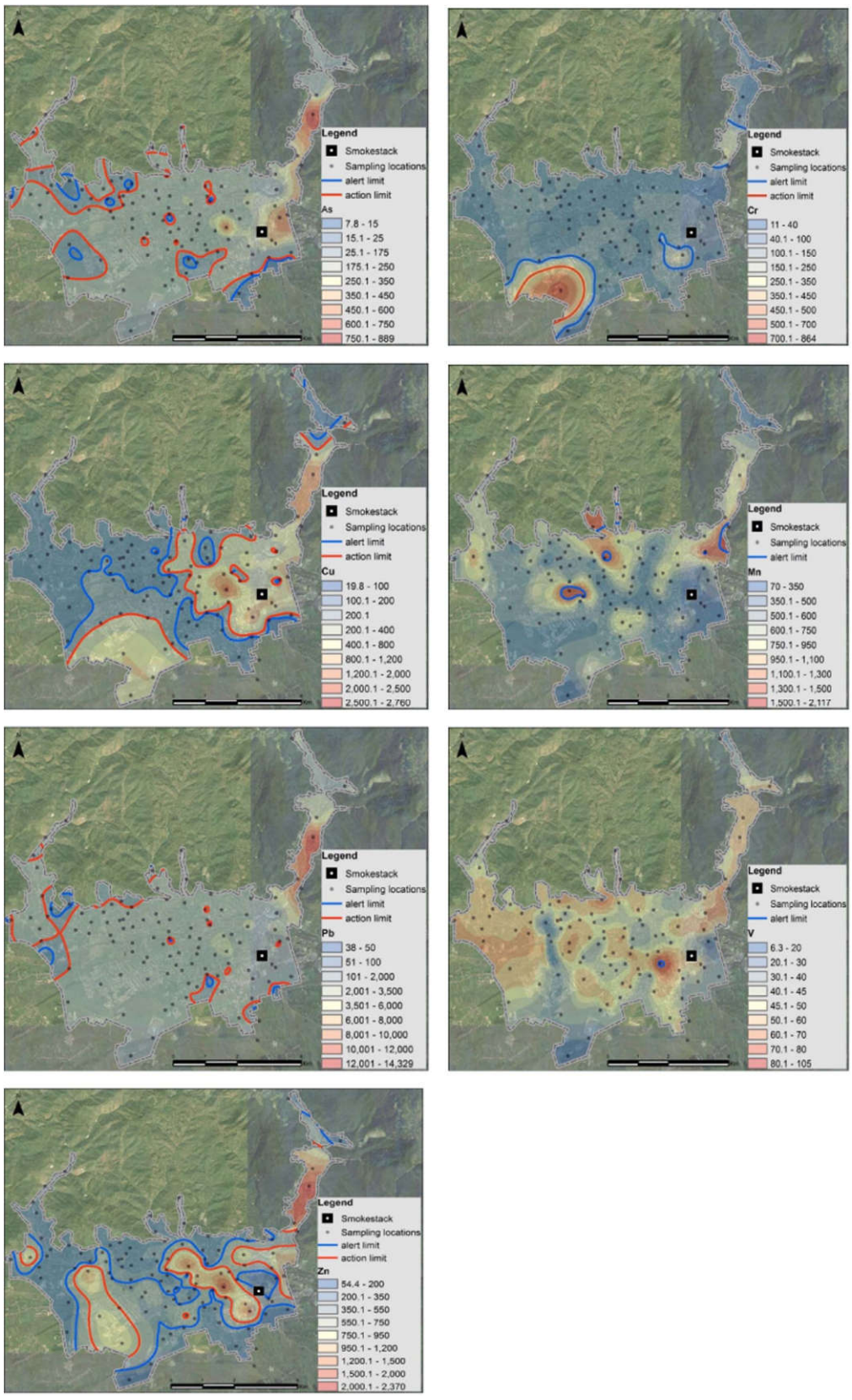


Figure 16 - Ordinary kriging interpolations of elemental concentrations (mg/kg) in smelter impacted surface soils (0–5 cm) of Baia Mare, Romania[18]

[18] Source: Chakraborty et al, 2017)

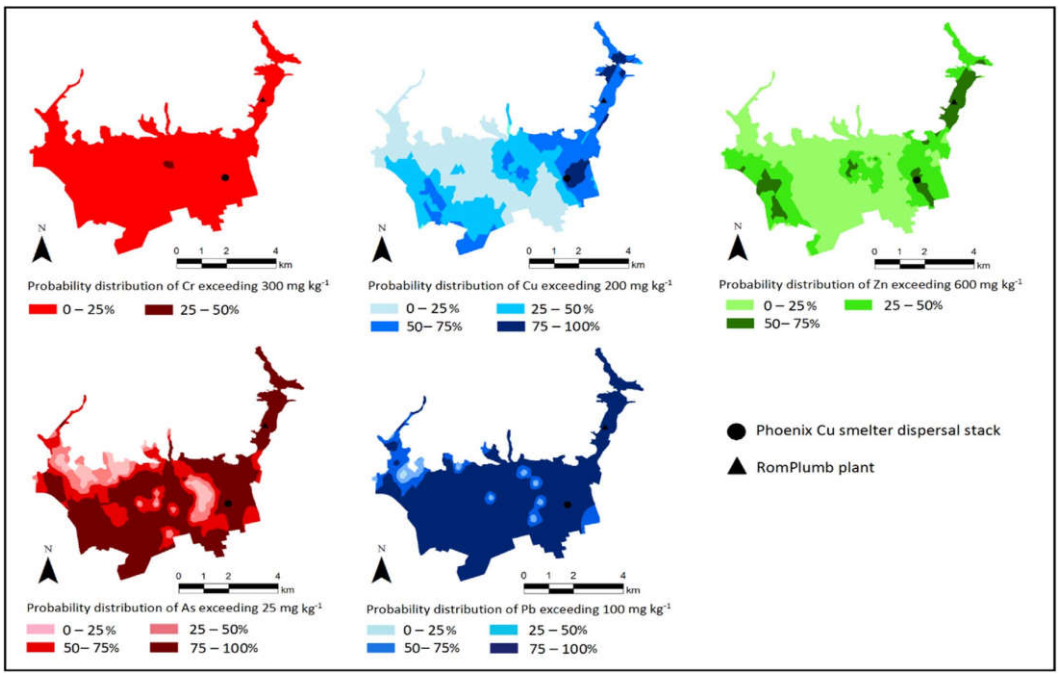


Figure 17 - Estimated probability maps of metals in smelter impacted surface soils (0–5 cm) of Baia Mare, Romania, produced by indicator kriging based on PXRF reported values (considering Romanian action limits as threshold values[19]

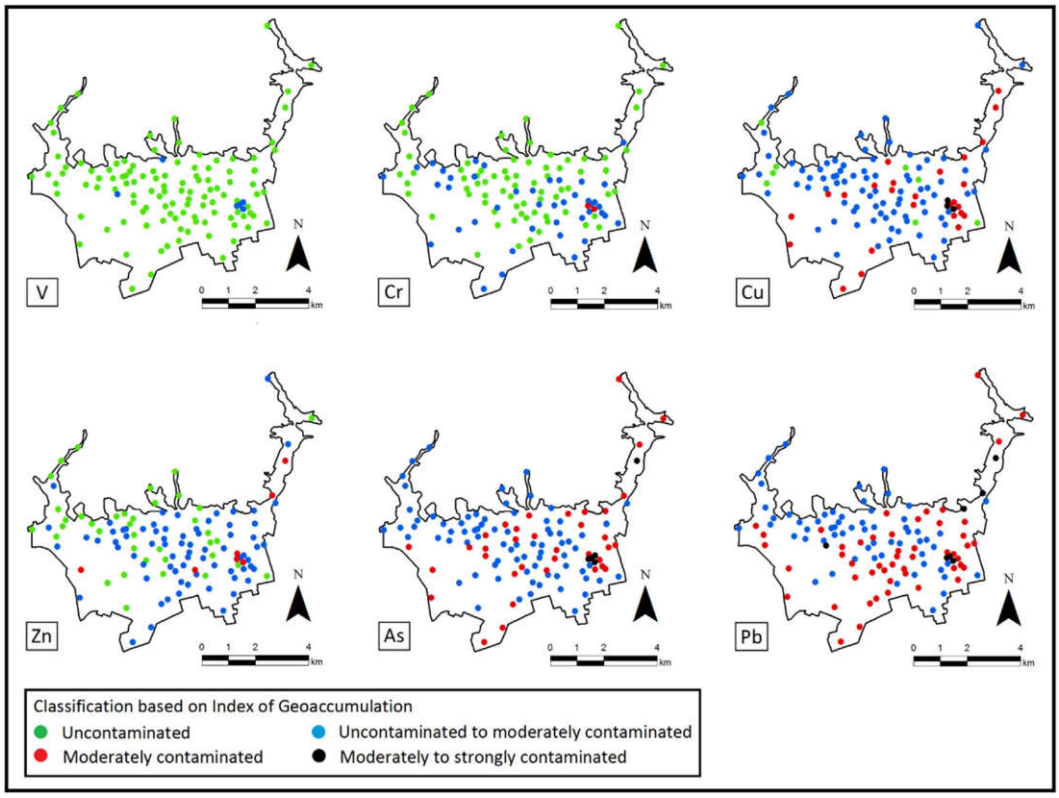


Figure 18 - Map showing Index of geo-accumulation based classification of soil samples of Baia Mare, Romania[20]

[19] Source: Chakraborty et al, 2017)
[20] Source: Chakraborty et al, 2017)

2.2 Quantitative Environmental and Public Health Indicators

An indicator provides an easily interpretable measure of the state of the environment or health of a population (DRAFT EPHI Impact Report – March 2018). The U.S. Environmental Protection Agency (EPA) initiated its Environmental Public Health Indicators (EPHI) research program in 2006 [DRAFT EPHI Impact Report – March 2018].

Since 2012, EPA pivoted toward the development and application of sustainability indicators. This type of indicator is defined as a measurable aspect of environmental, economic, or social systems that is useful for monitoring changes in system characteristics relevant to the continuation of human and environmental well-being [U.S. Environmental Protection Agency (2012) EPHIs are sustainability indicators.

Environmental public health indicators (EPHIs) provide information about a population's health status with respect to environmental factors. They can be used to assess health, or a factor associated with health in a specified population through direct or indirect measures [1]. There are two types of EPHIs:

- Exposure indicators, which measure or estimate the direct contact of humans with chemicals in their environment. These can be tied to projected health outcomes using toxicity information or epidemiological data that relate exposure to health outcomes.
- Outcome indicators, which measure actual environmental or health-related results such as cleaner air or water or reduced incidence of disease known or believed to be caused by exposure to environmental pollutants.

Environmental indicators summarise, simplify and communicate more complex data sets: 'an environmental indicator is a measure, generally quantitative, that can be used to illustrate and communicate complex environmental phenomena simply, including trends and progress over time — and thus helps provide insight into the state of the environment' (Digest of EEA indicators, 2014).

Policy relevance and utility for users	An environmental indicator should: provide a representative picture of environmental conditions, pressures onthe environment or society's responses; be simple, easy to interpret and able to show trends over time; be responsive to changes in the environment and related human activities; provide a basis for international comparisons; be either national in scope or applicable to regional environmental issues of national significance; have a threshold or reference value against which it can be compared, so thatusers can assess the significance of the values associated with it.
Analytical soundness	An environmental indicator should: be theoretically well-founded in technical and scientific terms; be based on international standards and international consensus concerning its validity; lend itself to being linked to economic models, forecasting and informationsystems.
Measurability	The data required to support the indicator should be: readily available or made available at a reasonable cost/benefit ratio; adequately documented and of known quality; updated at regular intervals in accordance with reliable procedures.

Table 3 - OECD criteria for selecting environmental indicators[21]

[21] Source: OECD, 1993, Digest of EEA indicators 2014; These criteria describe the ideal indicator, and not all criteria will necessarily be fulfilled in practice.

2.2.1 Examples of Indicators

Environmental Public Health Indicators

The Environmental Public Health Indicators (EPHI) research supported through the U.S. Environmental Protection Agency's (EPA) Science to Achieve Results (STAR) grant program has supported the development of new and improved indicators of linkages among environmental hazards, human exposures, and public health disease outcomes. EPHIs can be used for assessing the actual impacts of environmental risk management decisions, long-term tracking and surveillance of environmental public health, or informing health or environment-related decisions. These indicators provide ways to measure and track the state of the environment or better monitor community health at a local, regional, or national scale (DRAFT EPHI Impact Report, 2018).

In DRAFT EPHI Impact Report – March 2018 are presented 12 significant contributions to improving air pollution indicators from EPHI grants. These EPHI researchers investigated the links between air pollution exposure and adverse (and costly) health outcomes, such as cardiovascular events and hospitalizations.

Environmental public health indicators (EPHIs) are used by local, state, and federal health agencies to track the status of environmental hazards; exposure to those hazards; health effects of exposure; and public health interventions designed to reduce or prevent the hazard, exposure, or resulting health effect (Adele Houghton and Paul English, 2014). Climate and health EPHIs have been developed at the state, federal, and international levels. However, they are also needed at the local level to track variations in community vulnerability and to evaluate the effectiveness of interventions designed to enhance community resilience (Adele Houghton and Paul English, 2014).

Jie Ban et al. in 2019 shows that many developed countries use environmental public health tracking to gain a better understanding of the link between environmental hazards and public health. To respond to complicated environmental health issues, the National Institute of Environmental Health (NIEH), Chinese Center for Disease Control and Prevention (China CDC), has begun to build a Chinese Environmental Public Health Tracking (CEPHT) system (Jie Ban et al, 2019). On behalf of the CEPHT, authors provide insight into the CEPHT's development, current status, and future plans. In the initial stage of CEPHT, an indicator framework linking environment and public health that included a list of publicly available data sources regarding environmental hazards, public health outcomes, and risk factors in China was developed. An analysis of data availability, along with a comparison between CEPHT's indicator system and other tracking networks, revealed the existence of barriers and gaps in data integration that affect China's ability to track environmental public health (Figure 19).

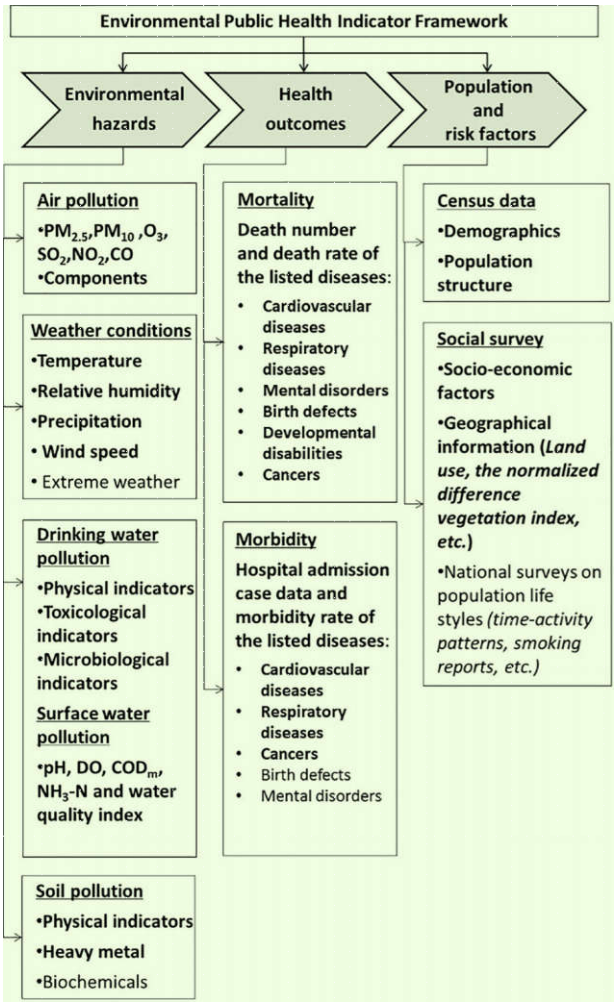


Figure 19 - Proposed environmental public health indicator framework. Indicators shown in bold were included in the regular surveillance at the current stage of Chinese Environmental Public Health Tracking (CEPHT) network[22]

Air Quality-Related Indicators

Air pollution can affect everyone, including citizens in both urban and rural communities (DRAFT EPHI Impact Report – March 2018).

The annual EU limit value for nitrogen dioxide — one of the main air quality pollutants of concern, which is typically associated with vehicle emissions — was widely exceeded across Europe in 2017

(https://www.eea.europa.eu/themes/air/indicators#c5=all&c13=20&c10=&c7=all&bstart). Some 86 % of these exceedances were detected at roadside monitoring locations. The EU limit values for the two categories of particulate matter (PM 10 and PM 2.5) were also widely exceeded in 2017. For PM 2.5, the percentage of exceedances recorded at traffic stations was very similar to that recorded at background stations. For PM 10, a higher percentage of exceedances was recorded at background stations than at traffic stations. This indicates the importance of other emission sources for these pollutants, such as commercial and institutional buildings, household heating, etc.

[22] Source: Adele Houghton and Paul English, 2014

This indicator shows the effect that transport has on air quality, focusing on particulate matter (both PM and PM) and NO. The negative impacts of these pollutants on human health are outlined in CSI004 (EEA, 2018). Road transport is the largest source (or one of the largest sources) of emissions for these selected pollutants. Especially in urban areas, where the majority of the European population lives and works, the contribution of road transport emissions to observed pollutant concentrations is particularly high, leading to increased exposure to those pollutants. It is, therefore, relevant to compare concentrations observed at traffic stations (stations located close to road traffic emission sources, which are often in city centres) with those observed at background stations.

Waste and Contaminated Land

In the European context, the health impacts of long-term, low-level (or 'chronic') exposure to soil contaminants is of particular interest, and decision makers and researchers have both noted the lack of information in this area (Paulo Manfredi, 2016). However, the study of soils and human health is a complicated endeavour; singling out a single contaminant to study in isolation does not necessarily offer scientists a true picture of the complex relationships between contaminants, soil and health at work in real life situations.

Taking as a starting point the World Health Organization (WHO)'s ten major chemicals of public health concern, a number of studies and field testing have been conducted over the last decade in order to define the agronomic and environmental characteristics of reconstituted soils mostly thanks to LIFE + 2010 (Life 10 ENV IT 400 "New Life") funding which has supported both research and technological implementation (Paulo Manfredi, 2016) .

A wider review of European Union policies supporting soil management agendas reveals numerous interrelated strategic initiatives, directives and regulations. These cover topics as diverse as water, air, waste, pollution, industrial production, agriculture, pesticide use, urban planning, forestry, and rural development, amongst others (LIFE and Soil protection, 2014). In the 'Roadmap to a Resource Efficient Europe'4, proposes that, "by 2020 EU policies take into account their direct and indirect impact on land use in the EU and globally, and the rate of land take is on track with

an aim to achieve no net land take by 2050; soil erosion is reduced, and the soil organic matter increased, with remedial work on contaminated sites well underway" (LIFE and Soil protection, 2014).

2.2.2 Indicators in contaminated sites

On European Environment Agency can be find this type of Indicator set: CLIM (Climate state and impact indicators), CSI (Core Set of Indicators), SEBI (Streamlining European biodiversity indicators), TERM (Transport and environment reporting mechanism), MAR (Marine indicators), ENER (Energy indicators), LSI (Land and soil indicators), WAT (Water indicators), INDP (Industrial Pollution indicators), SCP (Sustainable consumption and production), WST (Waste indicators), WREI (Water resource efficiency indicators).

In the Report of Progress in management of contaminated sites from EEA is shows that local soil contamination in 2011 was estimated at 2.5 million potentially contaminated sites in the EEA-39, of

which about 45 % have been identified to date. About one third of an estimated total of 342 000 contaminated sites in the EEA-39 have already been identified and about 15 % of these 342 000 sites have been remediated. However, there are substantial differences in the underlying site definitions and interpretations that are used in different countries. The term 'contaminated site' (CS) refers to a well-defined area where the presence of soil contamination has been confirmed and this presents a potential risk to humans, water, ecosystems or other receptors. Risk management measures, e.g. remediation, may be needed depending on the severity of the risk of adverse impacts to receptors under the current or planned use of the site.

In the SPIRE the activity result indicators will be:

1. number of soil and plant analyses
2. analysis bulletins regarding the balance of metals in soil and plant
3. defining the surface / species of culture according to the uniformity of the soil and the content in heavy metals
4. the number of technologies implemented for each species taken in culture
5. the amount of biomass harvested on the experimental plot
6. heavy metal extraction coefficient

For reliable, relevant, targeted and timely environmental information is an essential element in implementing environmental policy and management processes.

The development of such information can be divided into a number of phases that link the generation of information to its final use and distinguish information according to its level of aggregation (see Digest of EEA indicators 2014).

In 2010, a new Strategic Plan for Biodiversity 2011–2020 was adopted at the 10th meeting of the Conference of the Parties to the Convention on Biological Diversity in Nagoya, Japan. It was clear that the global 2010 target had not been met, and that in fact biodiversity loss had been continuing. The strategy includes the development of a coherent indicator-based framework for monitoring, assessing and reporting on progress in implementing actions and meeting targets (Digest of EEA indicators, 2014). While more attention has been paid to integrating environmental and economic indicators and accounts, less progress has been made on integrating social factors and environmental information. One way of linking environmental and social issues is to focus on aspects linked to the environment of existing social indicators (Digest of EEA indicators, 2014). Another is to integrate social aspects into existing environmental indicators. In the latter approach, the rationale is one of providing information on relationships between population categories such as socio-economic status or age and contribution to environmental pressures, vulnerability and access to ecosystem services. The increasing focus in Europe on societal inequalities provides a platform for greater focus on socio-environmental considerations and indicators (Digest of EEA indicators, 2014). Current environmental indicators reflect environmental policy concerns over the last decades. Well-established indicators tend to relate to policy challenges of the 1980s and early 1990s such as air and water pollution, waste

generation and nature conservation, in terms of protection of endangered species and habitats. Since the late 1990s, recognition of more diffuse policy challenges resulted in the development of indicators focused on the integration of environmental considerations into sectoral domains with the greatest environmental impacts, e.g. energy, transport, agriculture and industry (Digest of EEA indicators, 2014). This is why the SPIRE's Project wants to cover integration of environmental Indicators.

Considering the ones presented above, starting with 2008, in accordance with the provisions of the Government Decision no. 1408 / 23.11.2007 regarding the modalities of investigation and evaluation of soil and subsoil pollution, art. 9, paragraph 2), the Romanian National Agency for Environmental Protection (APM) through subordinate units performs the preliminary identification of contaminated sites based on the questionnaires provided in Annexes 1 and 2, the documentation that was the basis for issuing regulatory acts and annual reports of the Offices for Pedological and Agrochemical Studies, simultaneously with the introduction in the "on-line" database of the available information regarding the economic operators / landowners on whose locations the presence of such sites is possible.

The new regulations in the field also establish the legal framework for carrying out the activities of cleaning, remediation and / or ecological reconstruction of the areas where the soil, subsoil and terrestrial ecosystems were carried out, according to the Government Decision no. 1403 / 26.11.2007 on the restoration of areas where soil, subsoil and terrestrial ecosystems have been affected.

In Maramureș County, the area of Baia Mare municipality still faces episodes of worsening of air quality, a situation mainly determined by emissions of pollutants into the air atmosphere predominantly from S.C. Romplumb SA Baia Mare, unit with profile non-ferrous metallurgy (primary lead production), residual soil pollution due to metallurgical and mining activities in the area, carried out for a long period of time and of the social activities carried out (especially the residential heating), in meteorological conditions and area-specific relief, which disadvantages the dispersion of pollutants (http://www.anpm.ro).

From the activity of non-ferrous metallurgy, gases with sulphur dioxide and dust are emitted into the atmosphere containing lead, cadmium and other metals. To these is added the pollution caused by heavy metal powders entrained from tailings ponds in the Baia Mare area. High, as well as emissions into the atmosphere from fuel combustion in processes technological, industrial, commercial, institutional and residential thermal power plants for production of heat, steam and domestic hot water and from road traffic.

The company S.C. Romplumb S.A. Baia Mare had a transition period until 31.12.2010, negotiated with the European Union. The company has an IPPC plant for production primary lead (from metal sulphide concentrates) and at the end of 2010 completed the measures in the action plan, part of the integrated environmental permit. In the second semester of 2010, the company installed the installation for the retention of sulphur dioxide from the emitted gases, which, however, was not completed by the end of the year, so that the ambient air quality of was further damaged by this indicator. SC Cuprom Bucharest - Baia Mare Branch, with a profile for obtaining secondary copper (from copper waste),

although he held a IPPC compliant installation, temporarily ceased operations in October 2008, for reasons economic situation, a situation that continues today (http://www.anpm.ro).

In accordance with the provisions of Council Directive no. 96/62 / EC on the evaluation and management of ambient air quality and of Directive 2008/50 /, Romania carried out starting with 2004, an extensive program for the establishment and commissioning of the Network National Air Quality Monitoring. Within this program, in the Baia Mare agglomeration, on December 1, 2007, 5 automatic quality monitoring stations were put into operation air, which records and transmits in real time data to the server within APM Maramureș, at the billboard in Mara Park in Baia Mare (in the form of hierarchical quality indices on a color scale) and on the website www.calitateaer.ro. Considering the specific and critical issue regarding the air quality in the Baia agglomeration Large, long-term recorded for certain indicators, the Agency for Maramureș Environmental Protection initiated in 2009 the elaboration of the Integrated Program of air quality management for the Baia Mare agglomeration, in accordance with the provisions Government Decision no. 543/2004 on the elaboration and implementation of plans and air quality management programs and the Order of the Minister of Environment no. 35/2007 on the approval of the Methodology for the elaboration and implementation of plans and programs air quality management.

The integrated air quality management program for the Baia Mare agglomeration was elaborated by the Technical Commission appointed by the Order of the Prefect of Maramureș County no. 184 / 09.11.2009, was approved by the Decision of the Maramureș County Council no. 74/28 May 2010 and refers to the following indicators (situation of 2007 and 2008):

- PM10 fraction of suspended powders (exceeding the daily and annual limit value);
- Sulphur dioxide - SO_2 (exceeding the hourly and daily limit value);
- lead (Pb) in PM10 (exceeding the annual limit value).

Compared to previous years, the evolution of air quality in Baia Mare presented an improvement, with a decrease in the number of exceedances of the limit value for SO2, although average hourly values higher than 350 μg / m3 and average values were still recorded in 2011 daily higher than 125 μg / m3. The level of SO2 and Pb concentrations in PM10 is influenced further by the operating regime of S.C. Romplumb SA (http://www.anpm.ro).

For the PM10 indicator, the situation is still critical and difficult to resolve. The fine fraction of Powders suspended in the air come from heating systems in general and from those that use solid fuel (wood and wood waste) of the inhabitants, small industries and service providers, but also from the resuspension of street dust and traffic. Switching on individual heating systems and the abolition of zonal / neighbourhood thermal power plants led at the appearance of multiple sources of diffuse noxious emissions, spread over the entire area.

In 2010, most exceedances of the hourly and daily limit value at the SO2 indicator were registered in the MM2 station located in Mara Park in the centre of the municipality (46 exceedances of the hourly limit value and 5 exceedances of the daily limit value). The MM2 automatic air quality monitoring station

is an urban background station, but due to the fact that it is located on one of the predominant wind directions blowing from SC Romplumb SA Baia Mare, in this station there are frequent high values and exceedances hourly and daily averages at the SO2 indicator, coming from the gaseous emissions at the 120 m dispersion chimney of this company. In 2011, the situation improved, but there were still overruns on this indicator, but their number was lower.

In 2010, the annual limit value was also exceeded at the Pb indicator in PM10, in the automatic station MM4, located on the left bank of the river Firiza, downstream of SC Romplumb SA Baia Mare, at a distance of 1.4 km in a straight line by the scattering basket of society. In the other stations, the average annual concentration at this indicator was well below the annual limit value, a situation determined by the operation of SC Romplumb SA Baia Mare. In 2011, the annual averages of this indicator were lower than the annual limit value in all monitoring stations.

2.3 Results for Soil and Plant Samples

Sampling date: 30 October 2019

At European Union (EU) level, the Seventh Environment Action Program (7EAP) has set a long - term goal of achieving a risk - free air quality level that does not have a significant negative impact on human health and the environment. The European Commission's Thematic Strategy on Air Pollution has subsequently set targets for improving human health and the environment by improving air quality by 2020 (the Romanian National Agency for Environmental Protection, 2018).

The urban environment is a specific ecosystem, a complex of natural and artificial factors that provide a number of facilities for a more comfortable life, but at the same time expose the population to various risks and discomfort, depending on the organization and use, more or less balanced, of them. In urban systems, artificial factors are expanding more and more, to the detriment of natural ones.

Urban localities face a number of problems that affect both the health and quality of life of the population, such as those related to air quality, high noise, abandoned land, unsystematised areas and insufficient green space, waste and wastewater generation (http://www.anpm.ro).

NO2 concentrations in ambient air are assessed using the hourly limit value for the protection of human health (200 μg / m3), which must not be exceeded more than 18 times / year and the annual limit value for the protection of human health (40 μg / m3).

The concentrations of SO2 in the ambient air are assessed using the hourly limit value for the protection of human health (350 μg / m3), which must not be exceeded more than 24 times / year and the daily limit value for the protection of human health (125 μg / m3), which must not be exceeded more than 3 times / year.

The concentrations of CO in the ambient air are evaluated using the limit value for the protection of human health (10 mg / m3), calculated as the maximum daily average of 8 hours (moving average).

Ozone concentrations in ambient air are assessed using the alert threshold (240 μg / m3 measured for 3 consecutive hours), calculated as the average hourly concentrations, the information threshold (180

µg / m3) calculated as the average hourly concentrations, not exceeded more than 24 times / year and the target value for the protection of human health (120 µg / m3), calculated as the maximum daily average of 8 hours (moving average), which shall not be exceeded more than 25 times / year.

Concentrations of suspended particles with a diameter of less than 10 microns PM10 in the ambient air shall be assessed using the daily limit value, determined gravimetrically (50 µg / m3), for the protection of human health (200 µg / m3), which shall not exceed 35 times / year and the annual limit value determined gravimetrically (40 µg / m3).

Within the air quality monitoring activity, APM Maramureș also monitors the quality of precipitation and monthly quantities of sedimentable dust, in a network consisting of several points located in Baia Mare and other areas of the county.

	MM1		MM2		MM3		MM4		MM5	
	Conc.	Data capture%	Conc.	Data capture%	Conc.	Data capture%	Conc.	Data capture%	Conc.	Data capture%
Average conc/year NO2 - µg/m^3	31.8	55.5	23.5	89.8	12.7	87.0	11.5	92.5	8.8	87.0
Average conc/year SO2 - µg/m^3	6.7	92.3	4.6	93.5	5.4	91.4	7.0	94.8	5.6	93.9
Average conc/year CO - mg/m^3	0.31	87.3	0.27	87.0	0.42	90.5	0.24	94.7	0.26	95.0
Average conc/year PM 10-grav. - µg/m^3	19.7	96.4	21.8	85.8	17.7	95.3	23.0	98.9	18.3	95.3
Average conc/year PM 2.5 -grav - µg/m^3	-	-	22.4	34.5	-	-	-	-	-	-
Average conc/year Pb din PM10grav - µg/m^3	0.008	96.4	0.011	85.5	0.007	95.3	0.015	98.9	0.011	95.3
Average conc/year Cd din PM10grav - ng/m^3	0.27	77.5	0.35	70.4	0.30	75.6	0.45	77.8	0.41	73.7
Average conc/year Benzene - µg/m^3	2.13	51.1	2.37	68.7	5.95	32.6	-	-	-	-
Average conc/year O3 - µg/m^3	-	-	44.6	92.2	46.6	89.8	51.77	95.8	51.7	95.1

Table 4 – Average Concentration of Pollutants Recorded by Automatic Stations in Baia Mare - Year[23]

	MM1	MM2	MM3	MM4	MM5
No. days with conc. daily averages with PM10 > 50 µg/m3	4	13	2	13	1
No. days with conc. daily averages with SO2 > 125 µg/m3	0	0	0	0	0
No. days with conc. daily maximum averages over 8 hours for O3> 120 µg/m3	-	0	0	0	1

Table 5 - Number of Days with Pollutants' Concentration Above Alert Threshold - Year 2018[24]

[23] Source: APM
[24] Source: APM

2.3.1 Environmental indicators

Exceedance of air quality standards in urban areas[25]

The indicator shows the fraction of the urban population that is potentially exposed to ambient air concentrations (expressed as μg/m^3) of certain pollutants (PM2.5, PM10, O_3, NO_2, SO_2 and BaP) which exceed the limit or target value (EU, 2004, 2008) set for the protection of human health.

The indicator is based on measurements of air pollutants as reported under the Air Quality Directives (EU, 2004, 2008) and the Decisions on the exchange of information (EU, 1997, 2011). Exceedance of air quality limit/target values occurs when the concentration of air pollutants exceeds these limit/target values. When there are multiple limit values, the indicator uses the most stringent case.

Pollutant	Averaging period	Legal nature and concentration	Comments
PM_{10}	1 day	Limit value: 50 μg/m^3	Not to be exceeded on more than 35 days per year
	Calendar year	Limit value: 40 μg/m^3	
$PM_{2.5}$	Calendar year	Limit value: 25 μg/m^3 Exposure concentration obligation: 20 μg/m^3 National Exposure reduction target: 0-20% reduction in exposure	 Average Exposure Indicator (AEI) (a) in 2015 (2013-2015 average) AEI (a) in 2020, the percentage reduction depends on the initial AEI
O_3	Maximum daily 8-hour mean	Target value: 120 μg/m^3	Not to be exceeded on more than 25 days/year, averaged over 3 years (b)
	1 hour	Long term objective: 120 μg/m^3 Information threshold: 180 μg/m^3 Alert threshold: 240 μg/m^3	
NO_2	1 hour	Limit value: 200 μg/m^3 Alert threshold: 400 μg/m^3	Not to be exceeded on more than 18 hours per year To be measured over 3 consecutive hours over 100 km2 or an entire zone
	Calendar year	Limit value: 40 μg/m^3	
BaP	Calendar year	Target value: 1 ng/m^3	Measured as content in PM10
SO_2	1 hour	Limit value: 350 μg/m^3 Alert threshold: 500 μg/m^3	Not to be exceeded on more than 24 hours per year To be measured over 3 consecutive hours over 100 km2 or an entire zone
	1 day	Limit value: 125 μg/m^3	Not to be exceeded on more than 3 days per year

Table 6 - Air Quality Standards for the Protection of Health, as Given in the EU Ambient Air Quality Directives

Exposure to high levels of air pollution can cause a variety of adverse health outcomes. It increases the risk of respiratory infections, heart disease, stroke and lung cancer. Both short- and long-term exposure to air pollutants have been associated with health impacts. More severe impacts affect people who are already ill. Children, the elderly and poor people are more susceptible. The most health-harmful pollutants – closely associated with excessive premature mortality – are fine PM2.5 particles that penetrate deep into lung passageways.

[25] EEA indicator code: CSI 04; Romania indicator code: RO 04

2.3.2 Level of Annual Mean Concentrations of Atmospheric Pollutants in Ambient Air

The annual concentrations of NO_2, SO_2, PM_{10}, O_3, C_6H_6, Pb, As, Cd and Ni atmospheric pollutants determined at the background, traffic and industrial stations for the period 2016-2018 in relation to the annual limit value / target value are presented in Figures 20-24.

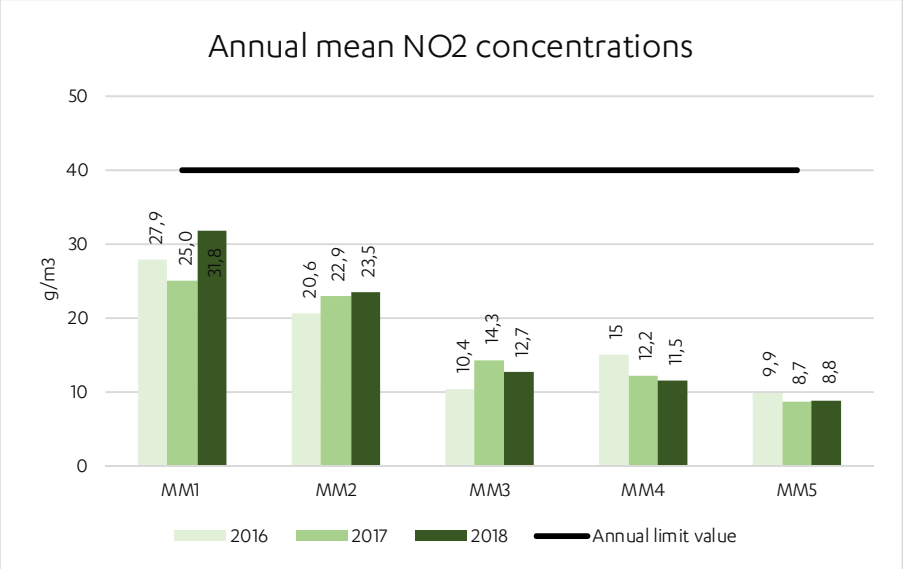


Figure 20 - Trends in Annual Mean Nitrogen Dioxide Concentrations (µg/m³) at the Baia Mare Monitoring Stations (2016-2018)[26]

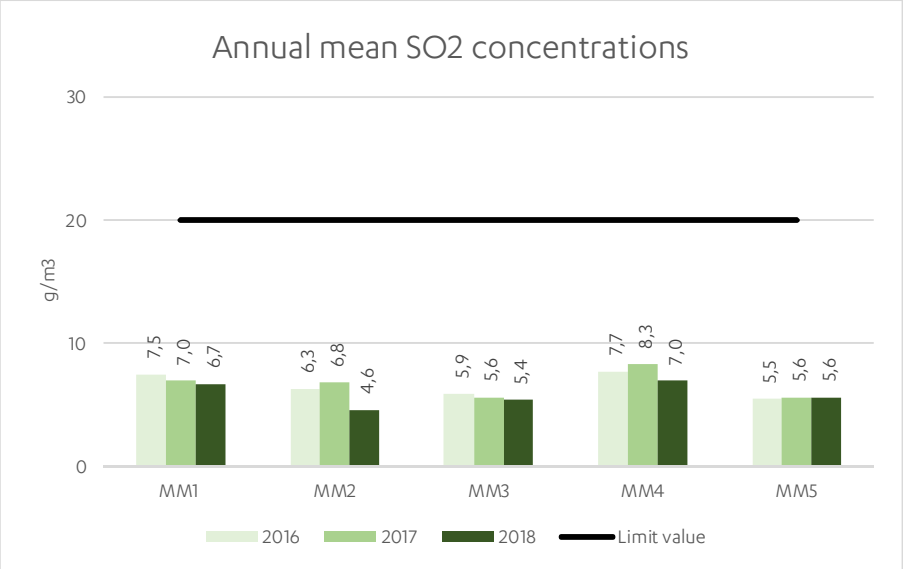


Figure 21 - Trends in Annual Mean Sulfur Dioxide Concentrations (µg/m³) at the Baia Mare Monitoring Stations (2016-2018)[27]

[26] MM1: Traffic station; MM2: Urban background station; MM3: Suburban background station; MM4 and MM5: Industrial type station). The annual limit value set by EU and Romanian legislation is marked by the red line (Source: based on Baia Mare Environmental Protection Agency Reports 2016-2018

[27] MM1: Traffic station; MM2: Urban background station; MM3: Suburban background station; MM4 and MM5: Industrial type station). The annual limit value set by EU and Romanian legislation is marked by the red line (Source: based on Baia Mare Environmental Protection Agency Reports 2016-2018

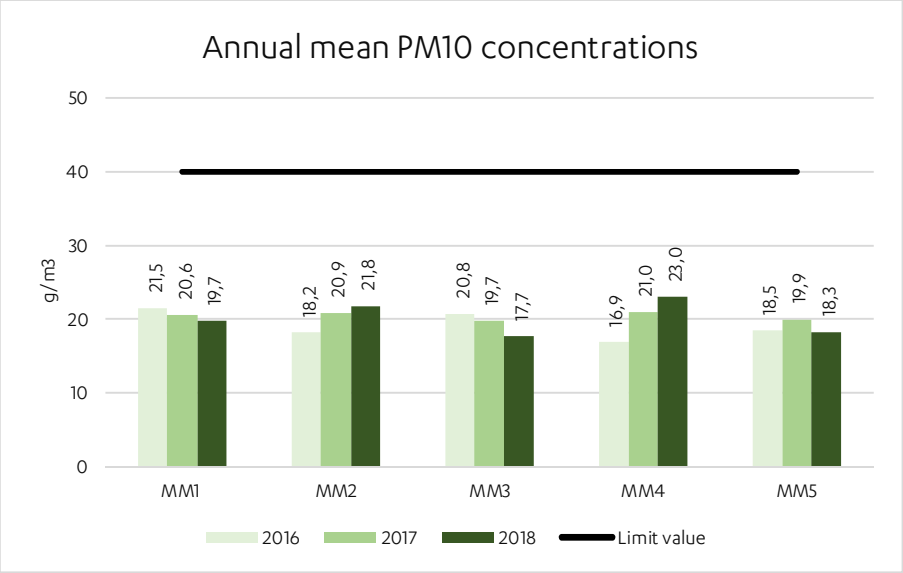


Figure 22 - Trends in Annual Mean Particulate matter (PM10) Concentrations (µg/m3) at the Baia Mare Monitoring Stations (2016-2018)[28]

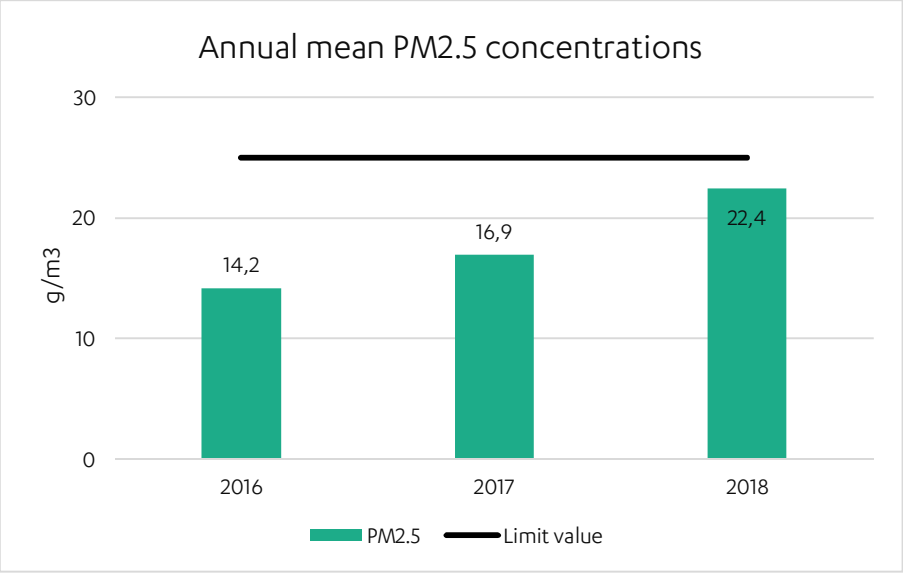


Figure 23 - Trends in Annual Mean Particulate matter ($PM_{2.5}$) Concentrations (µg/m^3) at the Baia Mare Urban Background Monitoring Station (2016-2018)[29]

[28] MM1: Traffic station; MM2: Urban background station; MM3: Suburban background station; MM4 and MM5: Industrial type station). The annual limit value set by EU and Romanian legislation is marked by the red line (Source: based on Baia Mare Environmental Protection Agency Reports 2016-2018)

[29] The annual limit value set by EU and Romanian legislation is marked by the red line (Source: based on Baia Mare Environmental Protection Agency Reports 2016-2018)

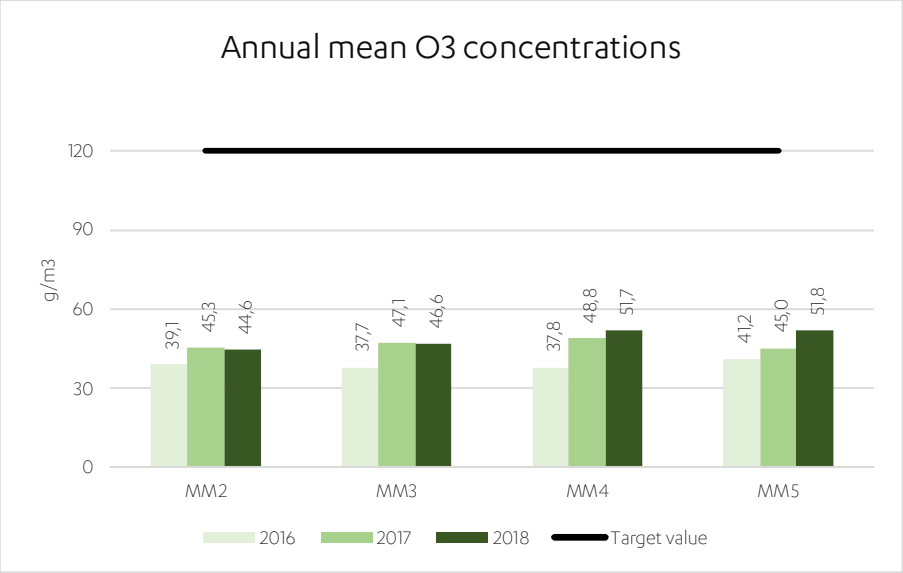


Figure 24 - Trends in Annual Mean Ozone concentrations (µg/m³) at the Baia Mare Monitoring Stations (2016-2018)[30]

The atmospheric pollutants in ambient air concentrations, measured at the monitoring stations in Baia Mare, did not exceed the limit or target values for annual mean set by the Romanian Law no. 104/2011 and Air Quality Directives (EU, 2004, 2008).

Table 7 presents the number of exceedances of the daily limit value for atmospheric pollutants in ambient air in the analysed period (2016-2018).

	Monitoring station	2016	2017	2018
No. days that exceeded the daily mean concentrations (PM_{10}> 50 µg/m³)	MM1	5	6	4
	MM2	2	17	13
	MM3	4	17	2
	MM4	1	12	13
	MM5	1	12	1
No. days that exceeded the daily maximum 8-hour average concentrations (O_3> 120 µg/m³)	MM2	0	0	0
	MM3	0	1	0
	MM4	0	1	0
	MM5	0	0	1

Table 7 - Number of Days with Atmospheric Pollutants in Ambient Air Above the Daily Limit Value

The other air pollutants measured in the monitoring stations did not exceed the limit values in the analysed time period (2016-2018).

Although air quality in Baia Mare area has been generally improved over the last years, the adverse health effects of particulate air pollution, even at relatively low levels, remain a global public health concern.

[30] MM2: Urban background station; MM3: Suburban background station; MM4 and MM5: Industrial type station). The limit value (maximum daily 8 hour mean) set by EU and Romanian legislation is marked by the red line (Source: based on Baia Mare Environmental Protection Agency Reports 2016-2018

3. AWARENESS APPRAISAL

This Chapter provides a preliminary overview of citizens' and stakeholders' perceptions about the state-of-play of the economy, labour market, socio-cultural life, and environment and public space domains in Baia Mare.

The information reported in this Chapter have been collected by the Report's main author during a field visit in Baia Mare between 26th-29th November 2019, by means of seven semi-structured or open interviews; four focus groups; and sixty multiple-choice questionnaires.

Semi-structured interviews were conducted with Florin Hosu, leader of the workers' union Cartel Alfa; Florentin Tus, president of Maramureș ' Chamber of Commerce and Industry (CCI Maramureș); Adina Iuliana Cosma, director of Vasile Alecsandrii Secondary School; and Tamas Ioan Marin, director of Mihail Sadoveanu Secondary School.

Open, collective interviews were conducted with Silvia Florina Pop, Constantin Muresan and Violeta Horvat, respectively director of Nicolae Balcescu Secondary School, president of the Civic Council Freneziu de Sus, and representative of the Roma minority in the school's Board of Directors; and with Todorut Victor, Orha Ioan and a ninth-grade student[31], respectively director, deputy director and students' delegate of Transylvania Technical High School.

Focus groups were organised with pre-selected stakeholders, experts and privileged witnesses on the following topics:

- Focus Group 1 – Children and Youth in Baia Mare, with principals and teachers of local schools, as well as parents' and students' delegates;
- Focus Group 2 – Public Perceptions and Local Dynamics, with the director of the city's Social Assistance Department; the chief of the Control Corps Service of Baia Mare's Local Police Directorate; the citizens' delegates of Firiza's, Ferneziu's and Vasile Alecsandrii's neighbourhood councils; and local journalists;
- Focus Group 3 – Teenagers in Baia Mare, with fifteen students of the Nenitescu High School;
- Focus Group 4 – Perceptions, Practices and Expectations of the Youth in Baia Mare, with delegates from different associations part of Baia Mare's Youth Federation.

Questionnaires (see Annex 1) were circulated among the population of the neighbourhoods directly targeted by SPIRE (i.e. Centre, Craica/Vasile Alecsandrii, Ferneziu Lower, and Ferneziu Upper) through the local schools, and sixty valid forms were returned. Respondents are chiefly female (62,7% against 37,3% of male) and belong to the following age-groups: 14-25 years old (37,3%); 26-45 years old (39,0%); 46-65 years old (22,1%); and over 65 years old (1,7%).

[31] In order to protect the privacy of the underage students' representative, their identity is kept confidential

Among our questionnaire's respondents, age-groups 14-25 and 26-45 are overrepresented (37,5% against 9,5% and 39,0% against 32,4% respectively) while age-groups 46-65 and over 65 are underrepresented (22,1% against 30,3% and 1,7% against 13,9% respectively) as compared to the actual composition of Baia Mare's population[32]. This has been an intentional choice, aimed at better investigating the opinions and perceptions of SPIRE's chief target groups: the youngest generations of Baia Mare.

The following Sections present the outcomes of the interviews, focus groups and questionnaires along the following topics: economy, labour market, socio-cultural life, and environment and public space.

3.1 Economy and Labour Market

The outcomes of the questionnaire, interviews and focus groups provide a multifaceted overview on Baia Mare's economic framework, unveiling crucial challenges for both businesses and households.

3.1.1 Households' Economic Conditions

Drawing on the information provided by citizens and local stakeholders, Baia Mare appears to have a rather weak and poor socio-economic framework. As Figure 25 shows, only 31,8% of the questionnaire's respondents lives in a dual income household, while more than half (52,3%) lives in a single income household.

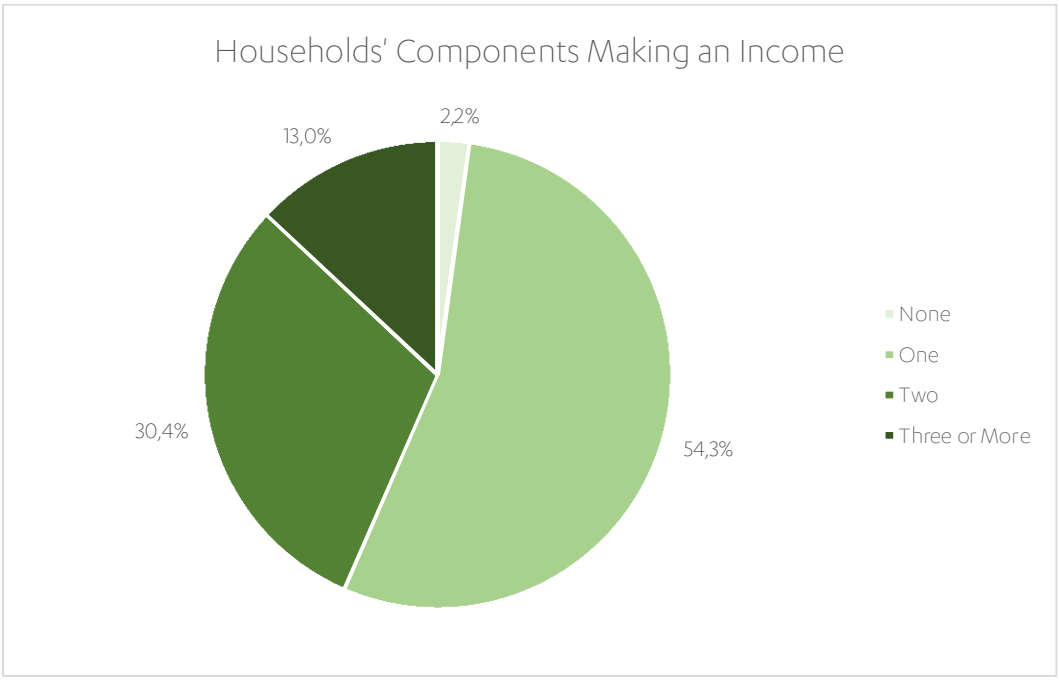


Figure 25 - Questionnaire Outcomes on the Number of Households' Components Making an Income

Figure 26 shows that 43% of respondents perceives that their financial situation is unchanged as compared to the previous year, while 27,6% reports to be better-off in 2019 than in 2018 (17,2% no answer).

[32] Data as of 01.01.2018, source Eurostat

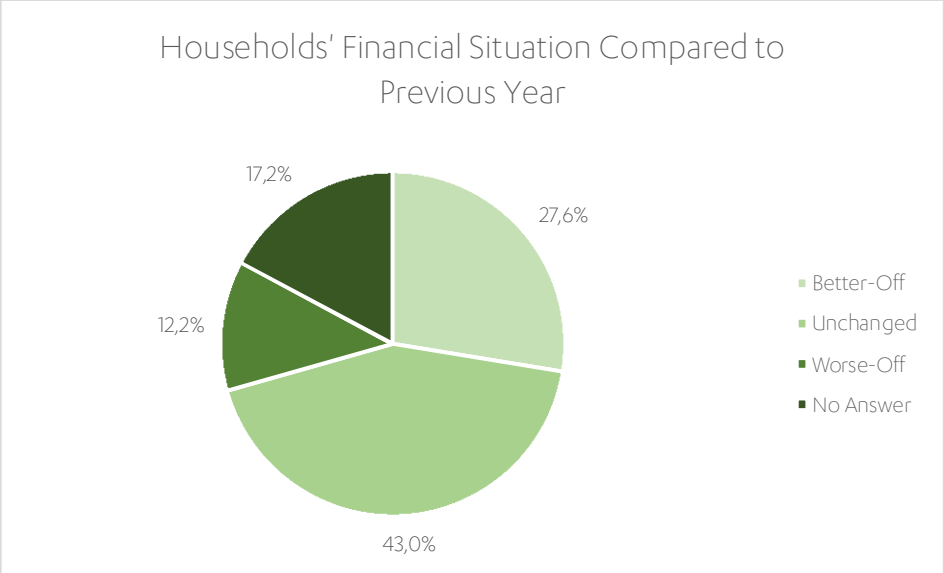


Figure 26 - Questionnaire Outcomes on Households' Financial Situation Compared to the Previous Year

Nonetheless, as stated by Mr Tus, Maramureș is ranked 38th out of 42 Romanian counties on average monthly salary (RON 2.300 against a national average of over RON 3.200). Coherently, as Figure 27 illustrates, 51,7% of questionnaire's respondents reported a households' monthly income below RON 3.500 (with 34,5% below RON 2.500) while only 13,8% declared a monthly income above RON 5.000 (22,4% no answer).[33]

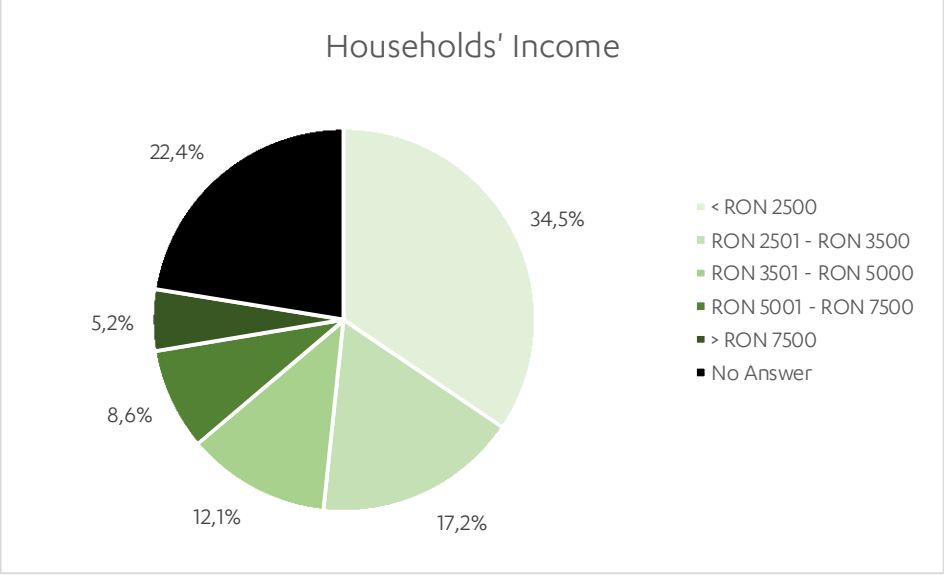


Figure 27 - Questionnaire Outcomes on Household's Income

3.1.2 Local Economy and Labour Market

Yet, since the cease of mining and metallurgic activities in 2012, Baia Mare has been transitioning towards a new economic and productive configuration. As reported by the president of CCI Maramureș , Florentin Tus, currently the main economic sector in the city is commerce, and from an

[33] 1 RON = 0,20646 EUR (official conversion rate for the month of May 2020 provided by InforEuro), thereby e.g. RON 2.500 correspond to circa EUR 516,00

industrial point of view Baia Mare's chiefly focuses on wood-processing and manufacture of furniture, metal and electric products. The Chamber of Commerce estimates that in 2019 in Baia Mare there are 6.281 Ltd registered companies, overall employing circa 40.600 workers.

As mentioned in Chapter 1, the number of local economic activities in Baia Mare has been steadily growing since 2011. In this context, according to workers' union leader Florin Hosu, there are at least 500 job vacancies, yet only half of them could be actually filled. This is in line with the trend of the entire Maramureș County, where, despite a 44% growth of GDP between 2009-2016, the available labour force declined by circa 9,4% in the same period.

However, the results of the questionnaires unveil that the citizenry, and especially the youngest generation that constitute the majority of our sample population (37,3% of responders are under 25 years of age and 39% are between 25-45 years old; 48,2% are employees and 32,1% students), has a different perception on the city's labour market situation.

As Figure 28 illustrates, when asked about the likelihood to find a decent job,[34] most of the respondents deem it hard or very hard in Baia Mare (55,3%) and even more in the neighbourhoods they live in (65,8%), while only 15% of our sample deem it easy in Baia Mare and 12,5% in their neighbourhood.

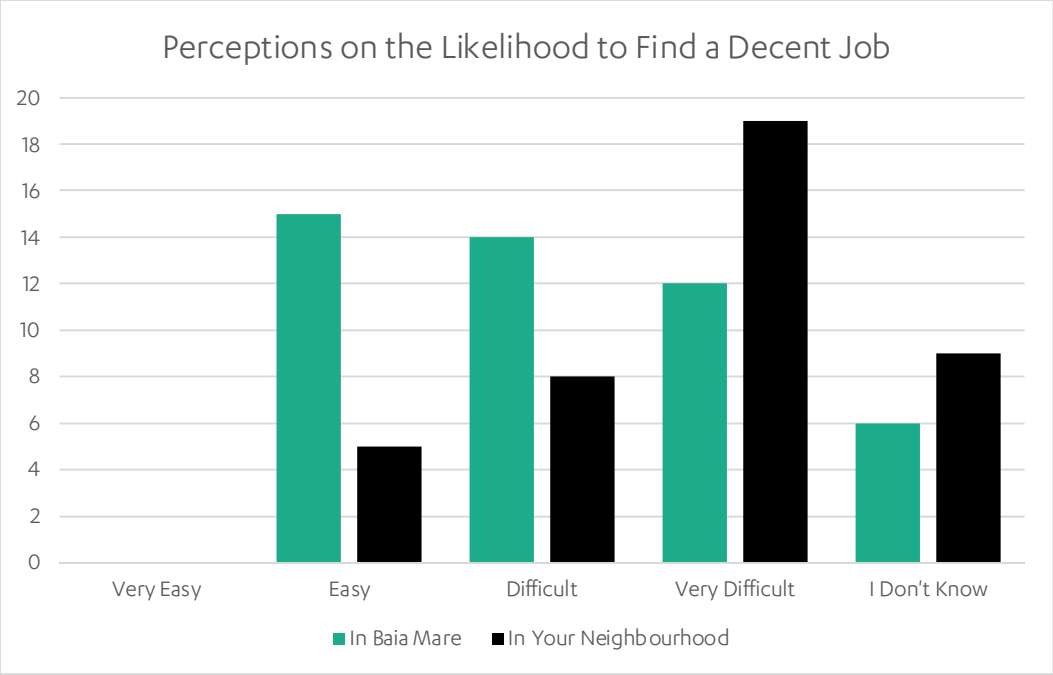


Figure 28 – Questionnaire Outcomes on Citizens' Perceptions on the Likelihood to Find a decent Job in Baia Mare and in their Neighbourhood

According to both the president of CCI Maramureș and the leader of the workers' union Cartel Alfa, the available vacancies cannot be filled due to the (allegedly) wrong attitude of the workers. Following Mr Tus:

[34] Precisely, the questionnaire posed the following question: "Do you believe it is easy to find a decent job in Baia Mare? And in your Neighbourhood?", offering five answer options: "Very Easy; Easy; Difficult; Very Difficult; Don't Know".

" The main activity sector that creates working places is the production of furniture, but they have to cope with a great migration of employees. The companies are employing anybody, no matter what status or qualification they have, but they leave in 2 weeks, even without taking their salaries. The main reason for the employee's migration is the small salary, so people prefer to migrate even for an extra RON 50, or they prefer to stay home, satisfied with the money gained from social help".[35]

Moreover, Mr Hosu claims that:

"*It isn't difficult to find a job, but it is difficult to keep it. [... Many people] don't have the basic working culture. This means that they don't respect the working place, they get bored quickly and leave after they take the first salary. Also, I have noticed that there is a strong migration of the employees between different working places, depending on the benefits offered by the companies*".[36]

Yet, the participants to Focus Group 1 and Focus Group 4, provided a different perspective and identified the insufficient remuneration and the mismatch between demanded and available skills at local level as the main causes of hardship in finding a decent job in the city. On the one hand the low salaries offered in Baia Mare are a key driver for outmigration, as a significant part of local youth would move elsewhere (in the country or abroad) chasing better paid jobs that would allow them to pursue their life project. On the other hand, several participants reported a general difficulty in coordinating the educational offer of technical schools with the needs and requirements of local industries. It was indeed reported that in many cases industries were not open to a dialogue with schools and preferred instead to organise training courses internally, while in other cases the courses offered did not attract enough students. The result of this, however, is that the jobs available in Baia Mare rarely match with the qualifications and interests or expectations of the local youth, which thereby tend to migrate elsewhere.

This is confirmed by official statistics,[37] which reveal that between 2010-2018 Baia Mare's population decreased by 3,7%. This population decline particularly affected the young population, with a 33,4% loss in the age group 15-24 and 10,6% decrease in the age group 25-44, whereas the population over 65 years of age grew by slightly more than 35%. Contrasting population ageing is thus a key challenge for Baia Mare and offering quality job and training opportunities in the city would be a crucial step in this direction. Participants to Focus Group 4 also reported that most of the youth tend to be reluctant towards self-entrepreneurship, either due to the unwillingness to take upon the risk of owning a business, either due to the difficulties in finding a suitable commercial or office space at an affordable price.

Following Vele (2018), encouraging people to think in an innovative, creative manner and supporting them to become an active part in the decision-making process can positively stimulate workers' profitability and local economic development. Similarly, with its co-designed mentoring and support

[35] Verbatim from the interview with Mr Florentin Tus, conducted on 27.11.2019 in Baia Mare.
[36] Verbatim from the interview with Mr Florin Hosu, conducted on 27.11.2019 in Baia Mare.
[37] Source of data: Eurostat, "Population on 1 January by age groups and sex - cities and greater cities" – last update 8.05.2020, extracted on 12.05.2020

programme for innovative, youth-led start-ups in the biomass upcycling sector, SPIRE precisely aims at triggering and stimulating innovative and appealing employment opportunities in the city.

3.2 Social and Cultural Domains

From a socio-cultural point of view, the focus groups and questionnaire describe a rather dense network or social and neighbouring relationships, paralleled by a rather low usage of cultural or aggregation facilities.

3.2.1 Neighbourhood Relations

As for what emerged from the questionnaire, Baia Mare citizens tend to have regular interactions among them, especially at neighbourhood level. As Figure 29 illustrates, the vast majority of respondents (78%) declared to have frequent contacts with their neighbours (60% almost daily and 18% at least once a week) as opposed to slightly less than 12% who has contacts less than once a month or never.

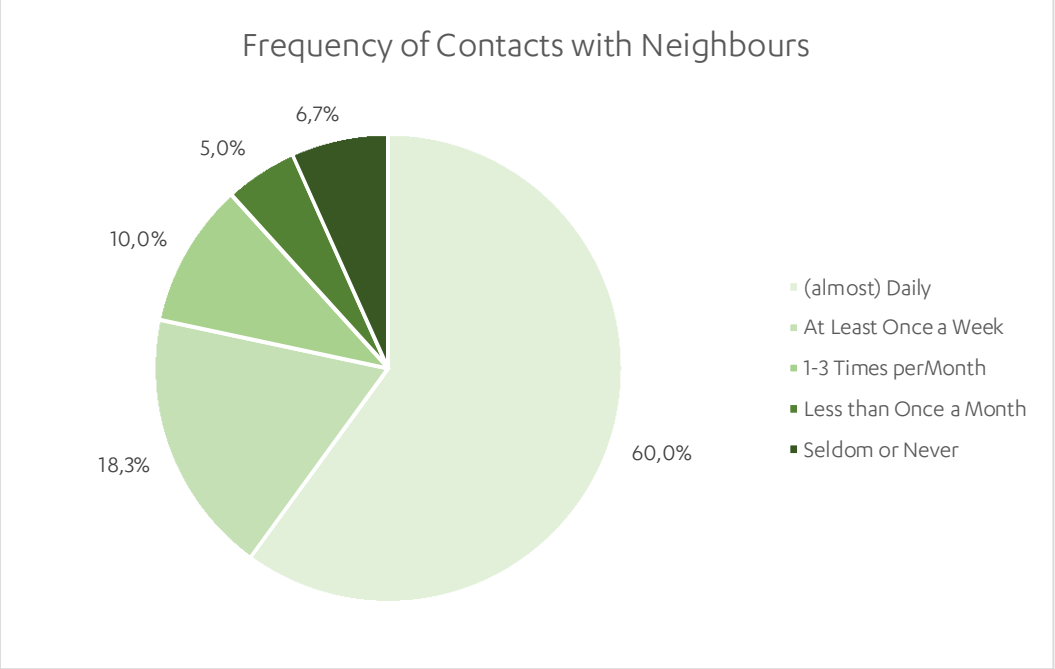


Figure 29 - Questionnaire Outcomes on the Frequency of Contacts with Neighbours

As Figure 30 and Table 8 show, the questionnaire provided a multifaceted picture on the quality of such interactions and, more precisely on how respondents feel they can trust their neighbours on different matters. Overall, respondents seem to agree on the ease of obtaining basic social support from their neighbours, while stronger trust relationships seem to be rather limited.

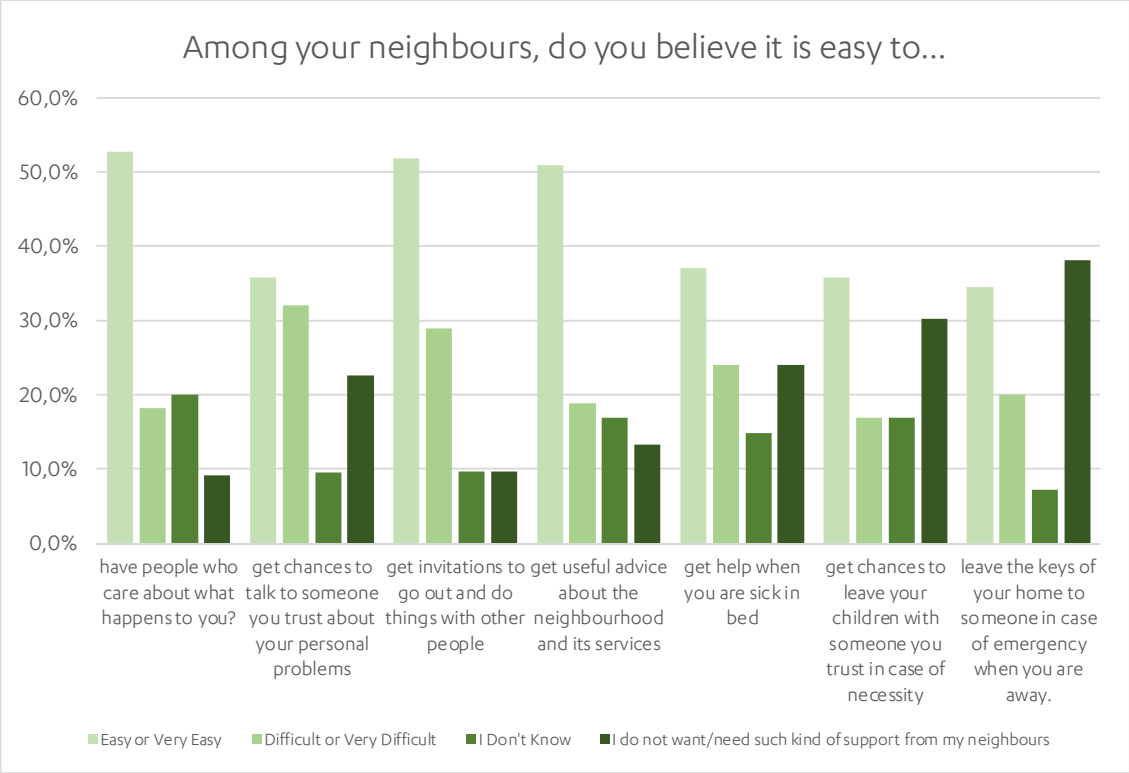


Figure 30 - Questionnaire Outcomes on Citizens' Expectations about the Support they Can Receive from their Neighbours

Among your neighbours, do you believe it is easy to...	Very Easy	Easy	Difficult	Very Difficult	I Don't Know	I do not want/need such kind of support from my neighbours	Total
have people who care about what happens to you?	20,0%	32,7%	10,9%	7,3%	20,0%	9,1%	100,0%
get chances to talk to someone you trust about your personal problems	15,1%	20,8%	15,1%	17,0%	9,4%	22,6%	100,0%
get invitations to go out and do things with other people	19,2%	32,7%	15,4%	13,5%	9,6%	9,6%	100,0%
get useful advice about the neighbourhood and its services	15,1%	35,8%	7,5%	11,3%	17,0%	13,2%	100,0%
get help when you are sick in bed	16,7%	20,4%	16,7%	7,4%	14,8%	24,1%	100,0%
get chances to leave your children with someone you trust in case of necessity	18,9%	17,0%	9,4%	7,5%	17,0%	30,2%	100,0%
leave the keys of your home to someone in case of emergency when you are away.	18,2%	16,4%	7,3%	12,7%	7,3%	38,2%	100,0%

Table 8 - Questionnaire Outcomes on Citizens' Expectations about the Support they Can Receive from their Neighbours

On the one hand, the absolute majority of respondents (overall 52,7%) believes that it is easy or very easy to have people who care about what happens to them, as opposed to 20% who does not know and slightly more than 18% who deems it difficult or very difficult.

Additionally, there is also a general agreement among respondents with respect to the possibility to easily do social activities with- as well as to find useful advice from their neighbours.

In the former case nearly 52% perceives easy or very easy to *get invitations to go out and do things with other people* as opposed to nearly 29% who find it difficult or very difficult.

In the latter case nearly 51% finds easy or very easy to *get useful advice about the neighbourhood and its services*, while almost 19% finds it difficult or very difficult.

On the other hand, respondents have more scattered opinions on how easily they could rely on their neighbours for matter that require higher personal trust, with a significant share declaring of not needing or seeking such kind of support in the neighbourhood.

37% of respondents finds easy or very easy to get support when sick in bed, against 24% who finds it difficult or very difficult and another 24% who does not need or seek such kind of help from their neighbours.

Almost 36% considers easy or very easy to talk about personal problems with a trusted neighbour, but 32% deems it difficult or very difficult and more than 22,5% is not interested in the matter.

Leaving their children with a neighbourhood in case of necessity is considered easy or very easy by nearly 36% of respondents, as opposed to 30% who do not need or want this type of assistance and 17% who finds it difficult or very difficult.

Finally, slightly more than 38% does not want or need to leave the keys of their home to a neighbour to act in case of emergency when they are away, while 34,5% would find the instance easy or very easy and 20% would find it difficult or very difficult instead.

3.2.2 Use and Availability of Socio-Cultural Public Spaces

According to the outcomes of our questionnaire, respondents tend to slightly prefer outdoor public spaces over indoor ones. Nonetheless, as shown in Table 9, only 22% declares to meet often or regularly in indoor public spaces, 35,6% sometimes and 42,4% rarely or never; while 27,6% claims to meet often or regularly in outdoor public spaces, 41,4% sometimes, and 31% rarely or never.

	Never	Rarely	Sometimes	Often	Regularly	Total
Public Indoor Spaces	16,9%	25,4%	35,6%	20,3%	1,7%	100%
Public Outdoor Spaces	10,3%	20,7%	41,4%	20,7%	6,9%	100%

Table 9 - Questionnaire Outcomes on How Often Respondents Meet in Indoor and/or Outdoor Public Spaces

More specifically, several participants to Focus Group 3 and Focus Group 4 identified parks and forests, and shopping malls among the most favourite gathering places for Baia Mare's people. Additionally,

"Other places where young people from Baia Mare meet, especially those in high school, are the libraries [...] There are three libraries that have low prices, which is why they are more frequented by teenagers". [38]

Yet, as Table 10 shows, only less than 14% of our questionnaire's respondents declared to make use of public libraries rather regularly (i.e. once a month or more often).

Finally, the questionnaire's result show interesting insights related to how often citizens make use of different types of cultural and recreational spaces (see Figure 31 and Table 10).

What emerged is a general lack of such spaces at in non-central areas of the city (most of respondents in fact live in Craica/Vasile Alecsandrii, Ferneziu Lower, and Ferneziu Upper): except for restaurants, bars and pubs, in fact, the non-availability of cultural or recreational spaces of events at neighbourhood level has been reported by a range of 23%-29% of respondents, depending on the type of space/event.

Additionally, in all cases except for restaurants, the absolute majority of respondents (with ranges between 52%-66%) declared to benefit of any of these spaces/events less than once a month or never. Bars and pubs, on the contrary, are most commonly available in neighbourhoods (i.e. the least of the respondents reported their absence), and they are the only public space attracting more than 10% of our questionnaire's respondents on a daily basis (precisely, 14,3%).

Overall, only three types of public spaces seem to attract more than 20% or our questionnaire's respondents on an occasional or rather regular basis (i.e. once a month or more often): cinemas (20,7%), bars and pubs (circa 34%), and restaurants (41%).

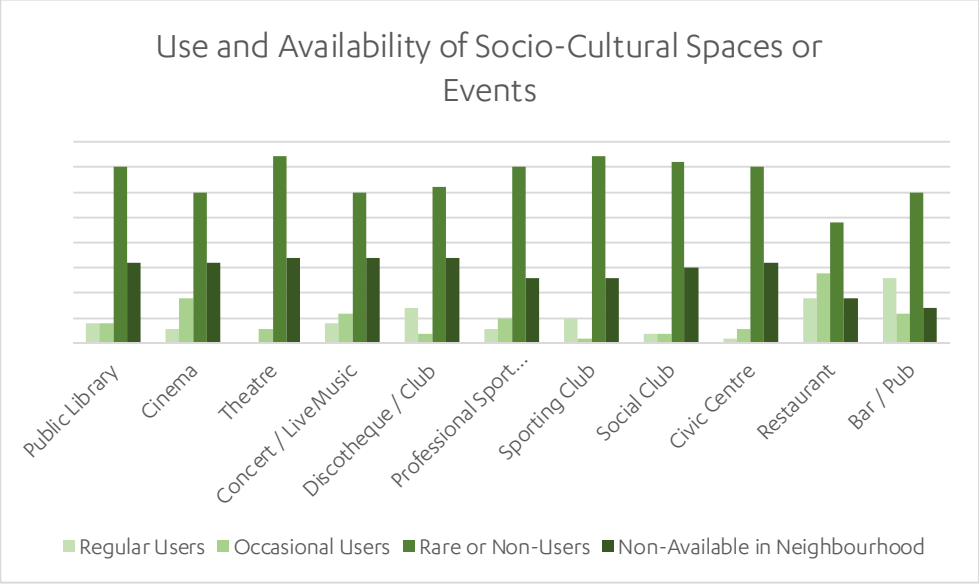


Figure 31 - Questionnaire Outcomes on the Frequency of Use of Cultural and Recreational Spaces/Events in Baia Mare

[38] Verbatim from Focus Group 4, conducted on 29.11.2019 in Baia Mare

	Seldom or never	Less than once a month	1-3 Times per month	At least once a week	(almost) Daily	This facility/event is not available in my neighbourhood	Total
Public Library	49,2%	10,2%	6,8%	3,4%	3,4%	27,1%	100%
Cinema	32,8%	19,0%	15,5%	3,4%	1,7%	27,6%	100%
Theatre	45,6%	19,3%	5,3%	0%	0%	29,8%	100%
Concert / Live Music	24,6%	28,1%	10,5%	5,3%	1,8%	29,8%	100%
Discotheque / Club	45,6%	8,8%	3,5%	8,8%	3,5%	29,8%	100%
Professional Sport Events	46,4%	16,1%	8,9%	1,8%	3,6%	23,2%	100%
Sporting Club	57,1%	8,9%	1,8%	7,1%	1,8%	23,2%	100%
Social Club	56,4%	9,1%	3,6%	1,8%	1,8%	27,3%	100%
Civic Centre	52,7%	10,9%	5,5%	1,8%	0%	29,1%	100%
Restaurant	21,4%	21,4%	25,0%	8,9%	7,1%	16,1%	100%
Bar / Pub	35,7%	17,9%	10,7%	8,9%	14,3%	12,5%	100%

Table 10 - Questionnaire Outcomes on the Frequency of Use of Cultural and Recreational Spaces/Events in Baia Mare

What emerged in this Section about the socio-cultural dimension of Baia Mare is a rather dense network of neighbourhood relations, mostly based on weak ties. People seem to be confident in the possibility of receiving basic support, yet not so keen on trusting their neighbours on fundamental personal matters.

With respect to the fruition of public spaces, both indoor and outdoor places, are common for the local community, yet not always the main gathering points as opposed to private places.

Finally, respondents reported either a lack at neighbourhood level or a very low level of fruition of most types of cultural and recreational spaces/events.

3.3 Environment and Public Space

This Section analyses how the local population perceives and deals with environmental issues in Baia Mare. Specifically, it does so by investigating: 1) how environmental pollution and its risks for people's health are perceived by different generations of citizens; 2) how citizens use and assess Baia Mare's green and blue spaces; and 3) what are the most widespread individual behaviours with a positive or negative impact on the environment.

3.3.1 Perceptions of Environmental Pollution and of its Threats

Overall, as a participant to Focus Group 4 stated:

" The awareness level of the population regarding the local pollution is high because everybody knows that Baia Mare was an industrial and mining town and that it is a polluted town. Even the children know that the rivers are polluted, the forests are getting cut down and that there are a lot of abandoned factories. So, they are aware regarding the local pollution and they grow up knowing that once upon a time, Baia Mare was one of the most polluted cities in Europe. Also, they know that the soil and groundwater are contaminated and the fact that they can have health issues from this reason".[39]

[39] Verbatim from Focus Group 4, conducted on 29.11.2019 in Baia Mare

However, as for what emerged during the field visit, different generations of citizens have very different perceptions and interpretations of Baia Mare environmental situation and of the threats posed by soils' pollution.

On the one hand, the older generations tend to evoke more frequently the dramatic pollution levels before the closure of Romplumb (2008). Several participants to Focus Group 1 and interviewees above 45 years of age recalled how in the 1990s and early 2000s citizens were widely suffering from lead poisoning and intoxications, which provoked severe illnesses as well as long term effects on children's intellectual development. For example, Mr Marin reported that:

> *"A neighbour of mine, which was very healthy and practiced sports, had his liver badly affected by heavy metals, after he had been working 10 years in Romplumb. This kind of contamination can generate all kinds of diseases, like blood diseases, cancer, liver diseases, etc. There are a lot of cases of Saturnism disease, in which the lead accumulates in the blood, under the skin, creating small accumulations like peppercorns. Also, these lead accumulations can affect the intelligence of the children. We have cases in our area and if you look at them, they are well grown, but mentally they are limited".*[40]

Additionally, the same sources also reported how heavy-metal pollution contaminated and made inedible all of local fruit and vegetable crops, as well as the dense fog due to sulfuric acid air pollution that used to characterise Baia Mare in the 1980s and 1990s.

Drawing on these experiences, the older generations acknowledge a significant improvement in Baia Mare's environmental situation. Participants to Focus Group 1 indeed reported that:

> *"Baia Mare is an industrial city and of course we cannot forget about the historical pollution: there are still huge slag deposits in the Romplumb area that cannot be covered, and several pollutants are retained in the city due to its peculiar topography of the area being located in a 'pit'. Yet the present situation, cannot be compared with the past: since 2008, when Romplumb closed, we have been witnessing major changes. For example, in Săsar and Firiza rivers, there have never been fishes or ducks, but now there are. This means that the water quality is good".*[41]

On the other hand, as Figure 32 clearly shows, the vast majority of respondents to our questionnaire (i.e., for the most part, also the youngest generations of Baia Mare's residents) agrees (33,9%) or strongly agrees (22,0%) with the fact that the pollution of soil and/or waters in Baia Mare is a direct threat to their health. Nonetheless, this does not seem to be reflected coherently on the attitude towards the use of green and blue spaces, nor on fear to contract a pollution related illness.

Indeed, only slightly more than 20% of respondents declares of not using green or blue spaces due to health concerns,[42] and only 7% of those prevents their children from playing outside to protect their

[40] Verbatim from the interview with Mr Tamas Ioan Marin, conducted on 28.11. 2019 in Baia Mare.
[41] Verbatim from Focus Group 1, conducted on 27.11. 2019 in Baia Mare
[42] Specifically, 15,52% agrees and 5,17% strongly agrees to the claim "I do not use green/blue spaces because I am afraid for my health"

health.[43] With respect to the fear of contracting a pollution-related illness, 17,2% of respondents agrees and 3,45% strongly agrees with this claim, whereas circa 19% strongly disagrees and 24% disagrees.

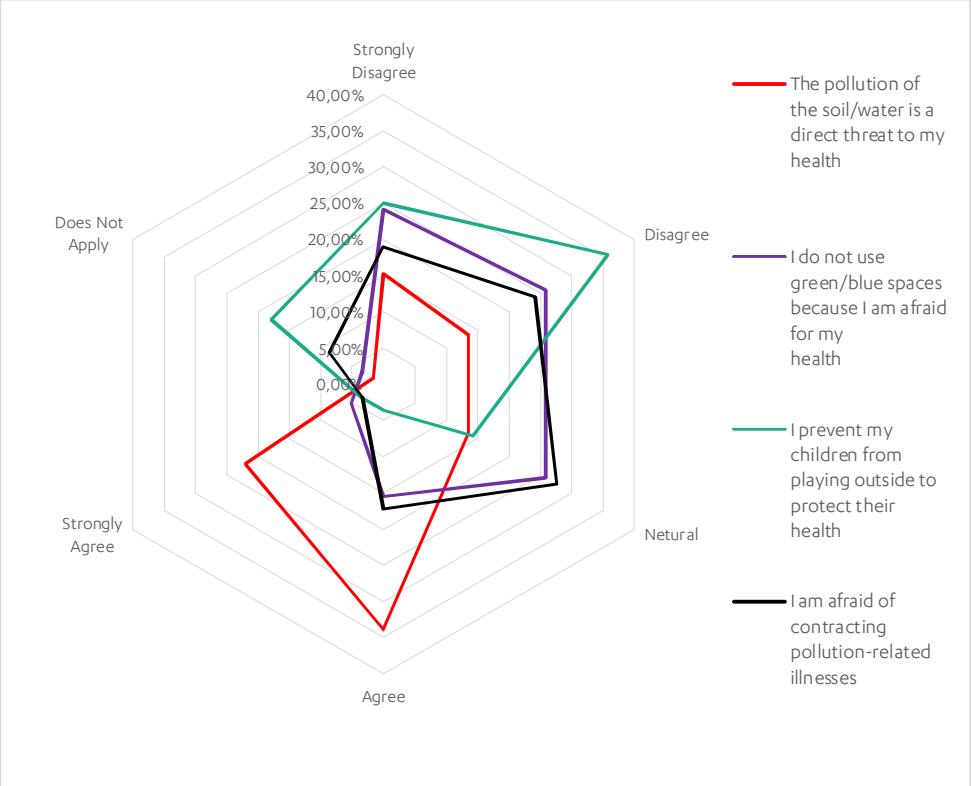


Figure 32 – Questionnaire Outcomes on Citizens' Perception of Environmental Pollution Risks

Additionally, it appears that the main factor of concern, especially for the youngest generations, is waste pollution rather than heavy-metal soil and water contamination.

As reported during Focus Group 4:

"People avoid going to the parks because of the dirt, not because of the contamination; that is underground, and people cannot see it. But if they see a lot of garbage, they won't go in that area".[44] *This is confirmed by the claims of many different students of Nenitescu High School, which indeed acknowledge and show concern only with respect to waste pollution and almost never mentioned heavy-metal contamination: "Mainly [Baia Mare] is polluted and the forests are full of garbage. The same situation is also at Nistru lake, in the dam area, at the Blue lake (Usturoi area), in Regina Maria park, on the Usturoi Valley (in Leurdei area), because people go there and make barbeques and picnics and throw the garbage. Many times, people already come with bags full of garbage in their cars and throw it away in those areas. [...] at Cuprom there is a lot of garbage and also on Săsar River there are a lot of empty bottles and garbage. [...] there is another polluted area, the old public swimming pool, next to the Stadium: this is a really dirty place, where all junkies gather".*[45]

[43] Specifically, 3,57% agrees and 3,57% strongly agrees with the claim "I prevent my children from playing outside to protect their health". However, 17,86% of the respondents decalres that this instance does not apply to their case.

[44] Verbatim from Focus Group 4, conducted on 29.11.2019 in Baia Mare

[45] Verbatim from Focus Group 3, conducted on 29.11.2019 in Baia Mare

Despite, as Figure 33 exemplifies, heavy-metal pollution of soils and water is still a major problem in Baia Mare, the field work revealed that this does not seem to be a major concern for the citizenry. Rather, the population appeared to identify the current core environmental issue for Baia Mare in waste pollution. The next Section will explore how these perceptions affect the way residents use and assess local green and blue spaces.

Figure 33 - Copper deposits in the Săsar River

3.3.2 Use and Assessment of Green and Blue Spaces

According to the results of our questionnaire, more than 78% of respondents lives in close proximity (i.e. within a 10 minutes' walk range) to a green or blue space, and, among the four typologies of natural spaces identified,[46] people seem to prefer parks and public gardens or woods and other types of natural green spaces. Yet, as shown in Figure 34-35 and Table 11, the frequency of use of such spaces is rather low.

Parks and public gardens during the spring/summer season are used at least once a week or daily by only 33% of respondents, while 47% declares to use them less than once a month or never. During the autumn/winter season, regular users decrease to slightly less than 20%, whereas the share of rare or non-users rises to almost 70%.[47] Similar figures were reported also for the frequency of use of woods and other natural green spaces during the spring/summer season, with circa 30% of regular users as

[46] i.e. Parks and Public Gardens; Woods and Other Natural Green Spaces; Agricultural Fields; and Blue Spaces (rivers, lakes, etc...)

[47] We define "Regular Users" those questionnaire's respondents who declare to make use of a given space either "At least once a week" or "(Almost) Daily"; "Occasional Users" those who answered "1-3 times per month"; and "Rare or Non-Users" those who answered either "Less than once a month" or "Seldom or Never"

opposed to nearly 45% of respondents who rarely or never spend time in such spaces. In winter, however, regular users drop to 9% while rare or non-users rise to 74%.

Finally, the least frequently used natural spaces are agricultural fields and blue spaces. Regular users of agricultural fields are 17% in spring/summer and 6% in autumn/winter, as opposed to 67% and 88% of rare or non-users in spring/summer and autumn/winter respectively. Regular users of blue spaces are 12% in spring/summer and 10% in autumn/winter, as opposed to 67% and 78% of rare or non-users in spring/summer and autumn/winter respectively.

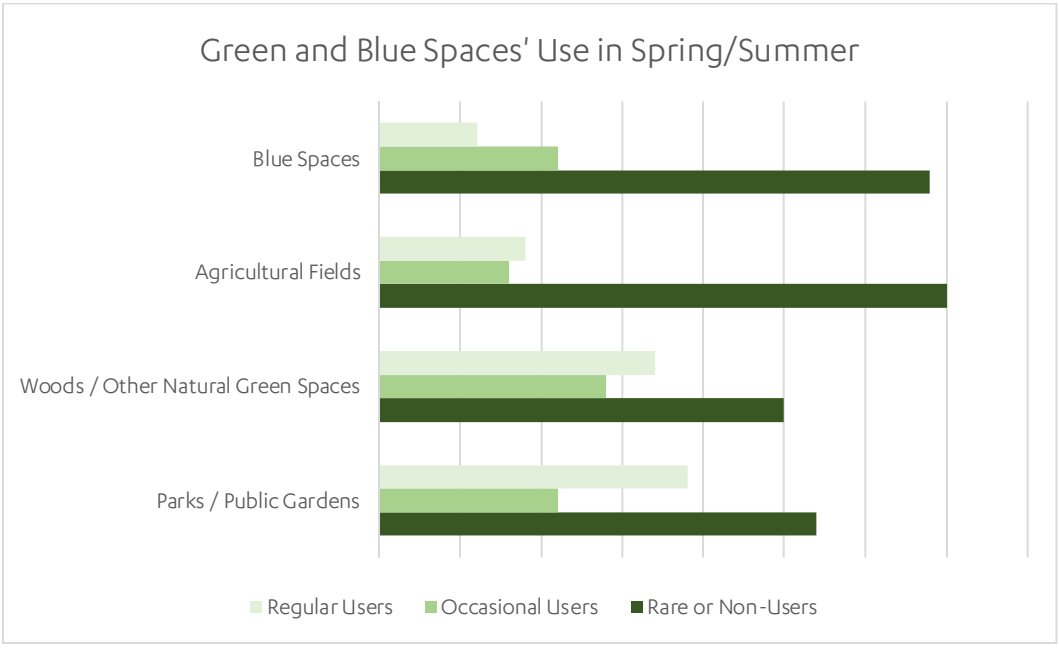


Figure 34 – Questionnaire Outcomes on the Frequency of Green and Blue Spaces' Use in the Spring/Summer Season

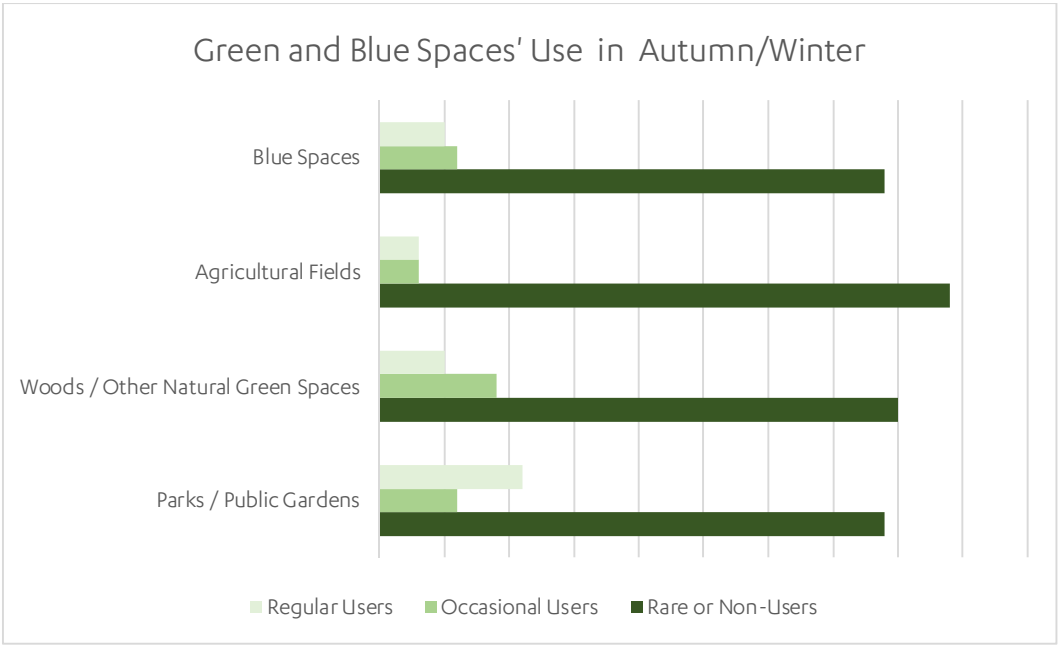


Figure 35 - Questionnaire Outcomes on the Frequency of Green and Blue Spaces' Use in the Autumn/Winter Season

SPRING / SUMMER	Seldom or Never	Less than once a month	1-3 times per month	At least once a week	(Almost) Daily	Total
Parks / Public Gardens	25%	23%	19%	16%	18%	100%
Woods / Other Natural Green Spaces	20%	25%	25%	20%	11%	100%
Agricultural Fields	46%	21%	15%	13%	4%	100%
Blue Spaces	57%	10%	22%	6%	6%	100%
FALL / WINTER	**Seldom or Never**	**Less than once a month**	**1-3 times per month**	**At least once a week**	**(Almost) Daily**	**Total**
Parks / Public Gardens	55%	14%	11%	16%	4%	100%
Woods / Other Natural Green Spaces	48%	26%	17%	9%	0%	100%
Agricultural Fields	74%	14%	6%	6%	0%	100%
Blue Spaces	68%	10%	12%	6%	4%	100%

Table 11 – Questionnaire Outcomes on the Frequency of Green and Blue Spaces' Use by Season

Focus Groups complement the questionnaire's results with additional details on which public spaces are the most used by the population of Baia Mare. Participants to Focus Group 4 reported that:

"Depending on the time of the day and the season children and youth usually meet in parks, such as the Big Park (Parcul Mare) and Dacia Park [...] Youth also meet in the Central Park [...] Also young people gather in Ferneziu neighbourhood, especially in summer, because there is a lake, where they can take a walk or swim". [48]

Teenagers from Focus Group 3 reported that:

"People of our age usually meet during the week in the parks from the neighbourhood or in pubs, depending on what they like to do. Also, they can go out and play football, or take a walk or just spend the free time in green areas. [...]. We mostly meet at the mall or in parks such as the park from Decebal Boulevard, the Central Park, Regina Maria Park, Dacia Park, as well as in Meda or in the area around the Obor Market [... Some of us] also meet at the block stairs next to Cuprom, where we listen to music, talk and play cards". [49]

Additionally, participants to Focus Group 3 showed a general preference for rather out-of-reach natural spaces over urban parks, and agreed on stating that:

[48] Verbatim from Focus Group 4, conducted on 29.11.2019 in Baia Mare
[49] Verbatim from Focus Group 3, conducted on 29.11.2019 in Baia Mare

"Even if we had a park closer to the centre we would still go to the forest, far away from the noise, in a quieter area. Anyway, the Ferneziu area and the dam's area are almost clean. There is garbage, but when there is a high-water flow in the river, the water comes and takes away the garbage".[50]

Questionnaires provided also an overview on how citizens assess and perceive different qualitative aspects of Baia Mare's green and blue spaces (see Figure 36).

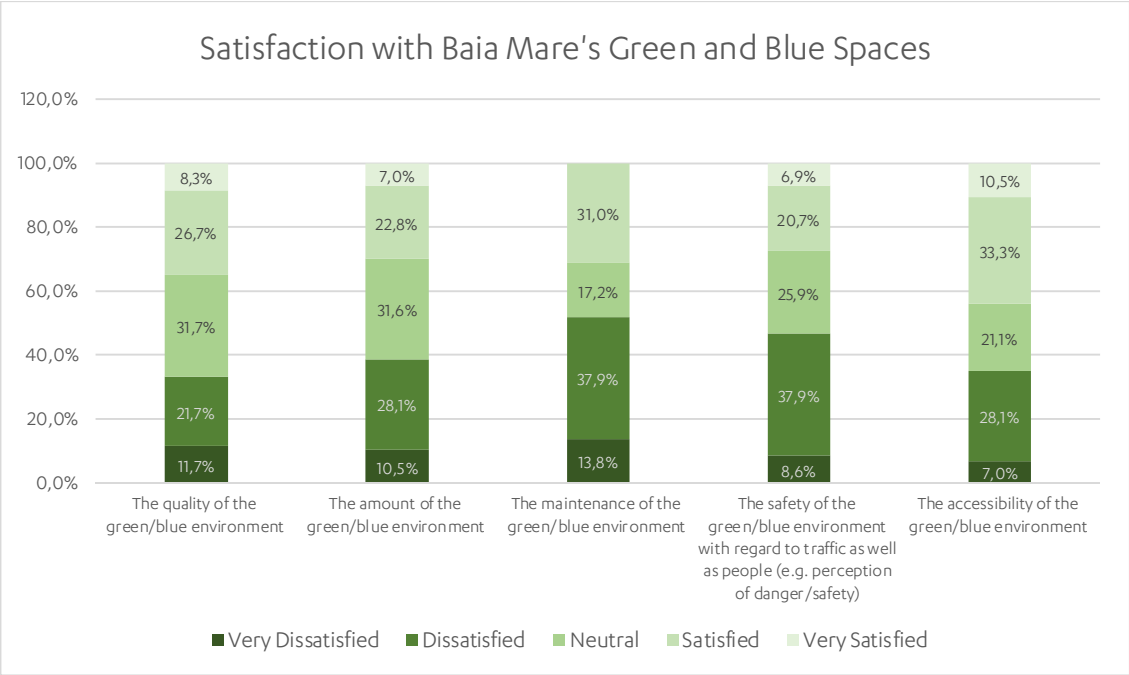


Figure 36 - Questionnaire Outcomes on Citizens' Satisfaction with Baia Mare's Green and Blue Spaces

On the one hand, citizens tend towards a more positive evaluation of the quality and accessibility of natural spaces: 35% of respondents are either satisfied or very satisfied, 32% are neutral, and 33% are either dissatisfied or very dissatisfied with the quality of the city's green blue spaces; and 44% of respondents are either satisfied or very satisfied with the accessibility of green and blue spaces, 21% are neutral and 35% are either dissatisfied of very dissatisfied.

The main negative remark raised on the quality of Baia Mare natural spaces during Focus Group 4 concerns the lack of design and usability of public spaces:

"It isn't thought for using. I mean that the public space is just there, it exists, but it doesn't have a certain using destination. So, people just use it as they consider".[51]

On the other hand, 39% of respondents declared to be either dissatisfied or very dissatisfied, 31% neutral and 30% either satisfied of very satisfied with the overall amount of such spaces. Moreover, according to the participants to our questionnaire, maintenance and security are the weakest aspects of Baia Mare's green and blue spaces.

[50] Verbatim from Focus Group 3, conducted on 29.11.2019 in Baia Mare
[51] Verbatim from Focus Group 4, conducted on 29.11.2019 in Baia Mare

With respect to the level of maintenance, 52% of the respondents are either dissatisfied or very dissatisfied, 17% are neutral and 31% are satisfied (with nobody claiming to be very satisfied).

In particular, the issue of waste pollution (exemplified in Figure 37-40) is one of the main concerns and complaints for most of the population. For example, among many observations on the same tone, a participant to Focus Group 1 claimed that:

"I would like to have the Săsar River to be cleaned, because it is full of garbage".[52]

Figure 37 - Garbage deposits on Săsar 's banks

Figure 38 - Waste pollution in the Craica River

Figure 39 - Illegal dump in Ferneziu

Figure 40 – Accumulation of garbage in Ferneziu

With respect to the safety of Baia Mare natural spaces, 47% are dissatisfied or very dissatisfied, 26% are neutral, and 27% are either satisfied or very satisfied. In this regard participants to Focus Group 3 pinpointed that "there are areas where our parents do not allow us to go, such as the former industrial areas or Vasile Alecsandri, Craica and Pirita neighbourhoods. Not because these areas are polluted, but because these areas are really dangerous".[53] For example, in fact, during Focus Group 4 participants acknowledged that:

"The youth avoid taking walks [along the Firiza river in Ferneziu], because that area is really dangerous, and often populated by delinquents".[54]

[52] Verbatim from Focus Group 1, conducted on 27.11.2019 in Baia Mare
[53] Verbatim from Focus Group 3, conducted on the 29.11.2019 in Baia Mare
[54] Verbatim from Focus Group 4, conducted on the 29.11.2019 in Baia Mare

Overall, this Section highlights a general dissatisfaction of the population on the quality, maintenance and cleanliness of Baia Mare natural spaces. Waste pollution in particular seems to be perceived as the worst environmental problem at local level, and this also appears to significantly undermine the willingness of citizens to make use of green and blue spaces.

3.3.3 Individual Behaviours

After discussing citizens' perceptions and assessment on Baia Mare's environmental condition, this Section investigates the awareness of the local population on environmental sustainability as well as on the impact of individual behaviour on the city's environmental situation.

In particular, this Section focuses on issues related to waste collection and recycling; home heating methods; and mobility habits.

As for what emerged from our field work, waste collection and recycling are a key matter of debate – and at times even conflict – at local level, with a share of the population committed to ecological sustainability and directly active in raising awareness and organising environmental-protection initiatives, and another share of unconcerned and uncaring citizens. Specifically, we addressed two types of activities: volunteer parks' and forests' clean-up initiatives, and individual waste sorting habits.

Schools appear to be one of the key players in environmental awareness-raising and in fact they are at the frontline in the organisation of clean-up initiatives. This commitment clearly emerged also during our interviews with school principals, whose statements are reported below:

"We organize volunteer activities in order to clean the central park, from Firiza. This year 300 volunteers participated".[55]

"Last year, we had activities in which the children cleaned the areas from Ferneziu Upper. Also, we had tree planting activities".[56]

"I'm the county organizer of 'Let's do it' – the great cleaning from October. Then we have ecological activities near school: we collect the rubbish thrown by others. In school we do awareness raising. We [implemented measures for recycling the garbage] but they didn't work because the children are in a hurry and just mix it".[57]

As a student from Nenitescu High school reported during Focus Group 1, the level of concern and commitment of the population, instead, seems to be very variable:

"One measure to protect the environment that I apply is the fact that I do not throw garbage on the streets, I collect it and then throw it in containers. I am also participating in cleaning activities and tree planting activities. My colleagues are also involved, but only part of them. For example, when we had an activity to collect waste in the area where the dam is, only 2-3 of them where really involved, the rest

[55] Verbatim from the interview with Ms Adina Iuliana Cosma, director of Vasile Alecsandrii Secondary School, conducted on 27.11. 2019 in Baia Mare.

[56] Verbatim from the interview with Mr Tamas Ioan Marin, director of Mihail Sadoveanu Secondary School, conducted on 28.11. 2019 in Baia Mare.

[57] Verbatim from the interview with Ms Silvia Florina Pop, director of Nicolae Balcescu Secondary School, conducted on 28.11. 2019 in Baia Mare.

of them seemed to be forced. I consider that no more than 30% of the adults care about environmental protection, [yet] I think I can influence the involvement of the adults in the environmental protection activities thought my own example".[58]

As the statements reported below illustrate, there are substantial discrepancies between how the different generations of Baia Mare citizens perceive and approach environmental issues:

" Regarding the environment protection, we need to do a lot of work. It's about people education. The way I am trying to raise citizen's awareness is that when I find garbage thrown away, I look into it for invoices with the address and the name of the owner, and I just go to their address personally to give them the garbage back, in order to make them not do it again".[59]

" The forests are full of garbage because people go there and make barbeques and picnics and throw the garbage. Many times, people already come with bags full of garbage in their cars and throw it away in those areas".[60]

" Young people are traveling abroad [and experiencing how environmental issues are treated in other countries other experiences]. These people began to raise awareness. There are different organizations that are organizing cleaning activities in certain periods. [... Yet] there is a permanent need of education for young and adult's people. There are many actions organized by NGOs and administrative bodies to raise this waste. But definitely is place for more".[61]

Along this trend, also the level of citizens' commitment towards waste sorting and recycling seems to be very variable.

On this matter, our questionnaire shows rather balanced results with 35% of respondents declaring to often or always throwing all of their waste in a single bin; 25% only occasionally or partially sorting their waste, and 40% often or regularly abiding by all waste-sorting and recycling procedures and norms.[62]

The majority of our questionnaire's respondents seems to enact rather virtuous behaviours in terms of waste sorting, and, as also Ms Carausan stated,[63] in recent there has been a positive change of mentality and towards recycling. Nonetheless, the statements reported below unveil different attitudes of Baia Mare's residents.

" There are citizens who throw their household waste in the street bins (which are not for this propose). Colleagues did campaign regarding garbage through leaflets delivered to people in their post mail. Some were caught and fined. The rumour spread and people began to be more receptive to this type of action".[64]

[58] Verbatim from Focus Group 1, conducted on 27.11.2019 in Baia Mare.
[59] Verbatim from the statement by Viorica Gainariu (president of Vasile Alecsandrii Neighbourhood Council) during Focus Group 2, conducted on 28.11.2019 in Baia Mare.
[60] Verbatim from Focus Group 3, conducted on 29.11.2019 in Baia Mare.
[61] Verbatim from the statement by Anca Carausan (chief of the Control Corps Service of Baia Mare's Local Police Directorate) during Focus Group 2, conducted on 28.11.2019 in Baia Mare.
[62] Citizens were asked to rank on a scale from 1 to 5 the extent to which they sort their waste, with 1 corresponding to "Not at all, I throw everything in the same bin" and 5 corresponding to "I always sort all my waste according to the city's regulations".
[63] Here we rephrased Ms Carausan statement during Focus Group 2, conducted on 28.11.2019 in Baia Mare.
[64] Verbatim from the statement by Anca Carausan during Focus Group 2, conducted on 28.11.2019 in Baia Mare.

"We all do [sort the waste]. We are more families on the street where I live, and we all do that. Every Thursday we collect household waste, and every Friday the recyclable one".[65]

"I don't recycle, and I also don't know anybody who does it. There are some [containers for waste recycling], but nobody uses them. I would like to recycle, but if I would be the only one who would do this it wouldn't matter". [...] *"Sometimes, we talk with our parents about what we could change. For example, people throw away the garbage next to the containers, instead of putting it inside, and the rats gather there, and if you go and tell them, they start offending you"*.[66]

"Some of the youth we are working with, would like to sort their waste at home, but the parents don't agree because they consider it is an extra effort. So, I think it's a mentality problem". [Moreover] *"the city doesn't support structural mechanisms for recycling. It is a problem, because we sort the paper, but we don't have a place to throw it away and so we have gathered piles of paper [...] Recycling is not an accessible option for us, because it is not easy to find recycling places, not even in supermarkets. Maybe only for batteries. [...] We cannot even recycle large wood waste like furniture because it is really expensive to call a big truck to pick them up"*.[67]

Another crucial and widespread individual behaviour with negative environmental concerns households' heating methods. As emerged during Focus Group 4:

"Baia Mare lacks a public/common heating system. Each apartment has his own heating system (boiler) and each family decides which or how many rooms they want to heat".[68]

Coherently with this statement, 37% of the respondents to our questionnaire declared to use autonomous, often coal-based, heating source for their homes.

Finally, with respect to mobility choices, Figure 41 shows that walking and public transportation are the preferred options for the majority of the respondents to our questionnaire, as well as for a share of local youth:

"I walk, because I do not have a bicycle. If I could I would eliminate all the cars from this city in order to reduce the CO2 emissions".[69]

Nonetheless from the focus groups also emerged that the reliance on private cars is both a current trend and an expectation for the youth. Participants to Focus Group 4 stated that:

"Especially those over 25 years old, in general, travel within the city with their personal cars".[70]

Moreover, teenagers from Focus Group 3 claimed that:

"Now we walk, but when we will grow up, we are going to use the cars, not the public transport".[71]

[65] Verbatim from the interview with the students' delegate of Transylvania Technical High School, conducted on 28.11.2019 in Baia Mare.
[66] Verbatims of the statements of two different participants to Focus Group 3, conducted on 29.11.2019 in Baia Mare.
[67] Verbatims of the statements of different participants to Focus Group 4, conducted on 29.11.2019 in Baia Mare.
[68] Verbatim from Focus Group 4, conducted on 29.11.2019 in Baia Mare.
[69] Verbatim from Focus Group 3, conducted on 29.11.2019 in Baia Mare.
[70] Verbatim from Focus Group 4, conducted on 29.11.2019 in Baia Mare.
[71] Verbatim from Focus Group 3, conducted on 29.11.2019 in Baia Mare.

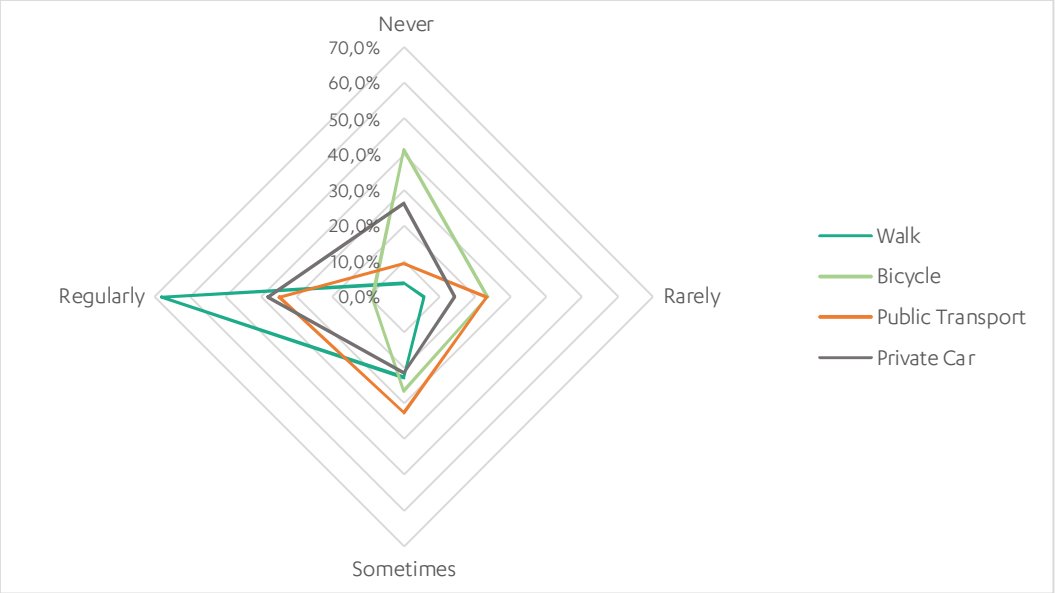


Figure 41 - Questionnaire Outcomes on Citizens' Preferred Mode of Transportation

In this Section we described different attitudes of Baia Mare residents towards environmental sustainability. Overall, we registered an increasing awareness about the impacts of individual behaviour on the environment and on the need to take concrete actions, yet this is counterbalanced by a still large resistance to behavioural change, especially (but not exclusively) among the older generations. SPIRE will start from this and will aim at promoting and triggering environmentally positive behaviours in the city through wide range of measures among which, in particular the iLEU and the co-creation laboratories.

CONCLUSIONS

In this Report we analysed the socio-economic, territorial, and environmental dynamics that characterised Baia Mare over the last decades; the current strategic, policy and regulatory framework within which SPIRE develops; the evolution and state-of-play of Baia Mare's environmental pollution and its impacts on human health; as well as the perceptions and the level of awareness of local citizens in relation to the local economy and labour market, socio-cultural framework, and the quality of the city's environment and public spaces.

Synthetically, we can highlight the following key findings:

- The city's industrial past in the mining and metallurgical sector left a legacy of approximately 627 ha of land polluted by HMs (up to 5 times the acceptable value) within the municipal boundaries, which is totally disconnected from the urban framework.
- Environmental pollution severely affected citizens' health conditions, with increased incidence rates of specific morbidity in the area of respiratory, digestive, renal, endocrine and metabolic diseases.
- The crucial challenges for the city are and will be the remediation and regeneration of the large number of contaminate brownfields left as a legacy by the city's industrial past; the provision of quality and healthy green and blue spaces; as well as the revitalisation of the local economic and entrepreneurial frameworks and the overall adoption of a sustainable and environmentally-friendly development model.
- Coherently, land-use strategies and regulations at all governance levels prioritise sustainable initiatives and nature-based solution for the bioremediation and regeneration of brownfields; promote research and development initiatives geared towards technological innovation and digitalisation; and encourage multi-stakeholder participatory approaches to local governance.
- Citizens' perceptions and awareness towards environmental issues are scattered, yet with a positive tendency towards sustainable and "green" attitudes and behaviours.

These findings provide us with a new layer of understanding about Baia Mare's urban system and pinpoint a number of issues and key points that are crucial to inform the next steps of SPIRE's implementation.

From a land-use and urban planning point of view, we observed an overall coherence of goals and objectives set at all governance levels, with priority given to the remediation and regeneration of contaminated brownfields through environmentally sustainable and economically viable strategies and multi-stakeholders initiatives. SPIRE is well aligned with this strategic and regulatory framework; hence we can foresee a favourable political-institutional environment for the development of the project, with a strong potential for cooperation in a multi-level governance setting.

Moreover, at local level – and specifically with respect to SPIRE's five pilot sites – municipal planning instruments offer relevant insights and opportunities for the development of the sites.

The zoning provisions for Romplumb site envision the restructuring of the former industrial area through a Zonal Urban Plan, as well as the development of green, sport and leisure spaces. Our report pinpointed that the area is one of the most contaminated of the city, but it is also very often used as a gathering point especially by the local youth. On the one hand, this implies the urgency to secure the area preventing citizens to contract pollution-related illnesses and to start a remediation process. On the other hand, the fact that local youth already enact informal uses and feel a sense of ownership over the area, may induce a significant share of the local community to participate to SPIRE's co-creation workshops for the design of the landscaping of the phytoremediation site. The process may not be immune from conflicts among stakeholders and citizens, yet it has the potential to be a broadly participated one and therefore to generate creative and shared visons and projects.

Additionally, in the longer-term, this co-creation process could also inform the development of a Zonal Urban Plan for the area geared towards the design of a new production and neighbourhood centre, also leveraging on the valorisation of the existing industrial heritage.

The area surrounding Ferneziu 1 pilot site is planned to host only educational facilities and housing, but it also requires the creation of a 20-meters protection area between the railway tracks and the urbanisation. In this case no green space for public use is envisioned, nonetheless SPIRE could tap-on the requirement for a mitigation/protection area to co-design with the current and potential future inhabitants and users of the area a quality landscape geared to enhance local ecosystem services as well as to improve the visual aspect of the natural environment of the neighbourhood, also in light of the foreseen future housing developments. Moreover, in the short run until remediation is completed, the whole pilot site could serve as a major source of biomass to be then employed in SPIRE's cascading value steams.

Similarly to the Romplumb site, the GUP/LUR identify Colonia Topitorilor as a restructuring zone (whose details have to be defined though a ZUP) with green, sport and leisure spaces, but they also require the creation of a protection area for water courses. Accordingly, SPIRE's co-creation workshops will reason on both short- and long-term scenarios for the landscaping projects. On the one hand the short-term scenario will provide a detailed project for the landscaping of the entire phytoremediation site and protection area; while on the other hand, the long-term scenario will envision the area post-remediation, possibly informing the area's ZUP.

Urbis site is planned to become a green, sport and leisure area as well as to include a protection area for the river. Hence, SPIRE's co-creation workshops will work with residents and regular users of the area – the students, teachers and staff of the neighbouring CJRAE Maramures school – to design a green space capable of providing, at the same time, a nature-based protection infrastructure from possible flooding as well as a quality leisure area.

Finally, the proximity of Craica pilot site to the river and the consequent high risk of flooding does not allow constructions on the area. Nonetheless, this constitute a unique opportunity for SPIRE to co-

design with the different social components of the Craica/Vasile Alecsandrii district a new public park and thereby to re-incorporate the now-underused south-west side of the city within the urban framework of Baia Mare. Also in this case – as like as for Romplumb pilot site – the co-creation process might not be immune from conflicts among stakeholders and social groups, but at the same time it will offer the possibility to stimulate a strong debate and to channel creative energies into the definition of a shared development scenario. Moreover, the phytoremediation site will constitute a major source of biomass for SPIRE's cascading value steams, hence a precious resource basin to sustain the production of green-energy and materials in the long-run.

From an environmental pollution point of view, the Report pinpointed critical conditions affecting Baia Mare on different dimensions:

- The most dangerous conditions are reported with respect to heavy-metal contamination of soils and – consequently – of cultivations, especially in the surrounding of the former mining and metallurgic industries (i.e. Romplumb and Cuprom above all).
- Waters still suffer from the (decreasing) presence of contaminants that mining and metallurgic industries used to drain in the rivers.
- Air conditions have improved over the past few years, yet monitoring stations keep registering values higher than the alert thresholds beyond what is legally acceptable.
- Severe levels of waste and garbage pollution have been observed across the city, both in green and blue spaces.

Chapter 2 highlighted the high hazard to human health of the abovementioned multidimensional environmental pollution, nonetheless the findings of Chapter 3 unveil that overall the citizenry has a distorted, if not wrong, perception of the issue. As for what emerged from the field research and interaction with the local population and stakeholders, in fact, only visible forms of pollution seem to be a matter of concern and a deterrent from using the public open spaces; whereas the threats to personal health posed by soil and air contamination seem to predominantly go under-looked.

In this respect, SPIRE has the potential and ambition to make a significant impact on citizens' awareness levels concerning environmental issues, the dangers of pollution as well as the impact of individual and collective actions, and thereby to influence and stimulate positive behavioural change. The backbone of this effort will be SPIRE participatory and co-creation activities as well as the iLEU (immaterial Local Environmental Utility). The iLEU will attempt to stimulate a behavioural shift towards environmental awareness and climate change mitigation at both individual and organizational levels through a platform that stimulates community involvement, the development of the local economy and the creation of opportunities for eco-entrepreneurs and eco-innovators. Based on blockchain technologies, the iLEU represents a reward system for environmentally friendly actions and an enhancer for boosting green entrepreneurship and community involvement in turning the city in a climate change mitigation champion.

Among others, SPIRE will leverage on the growing environmental sensibility of the city's younger generations, and it will chiefly target and try and influence positive behavioural change on three core dimensions:

- Reduction of waste pollution. The accumulation of garbage and waste is the most visible and thereby perceived forms of local pollution. It impacts the quality of outdoor public spaces and the willingness of citizens to make use of them. At the same time, however, it is the direct by-product of citizens' unsustainable behaviour. This calls SPIRE to address its efforts in two complementary ways:
    - Through the iLEU rewards system, SPIRE will aim at raising public awareness and incentivising individuals and businesses to enact proper waste-sorting practices.
    - Through co-creation workshops and laboratories, SPIRE will involve all social components in the design of the spaces they live in, ultimately aim at enhancing and/or developing citizens' sense of ownership of public spaces and stimulating a more caring attitude towards the public environment.
- Mitigation of the impacts of soils contamination. The Report pinpointed the strong mismatch between citizens' perceptions and the actual threats to people's health posed by the heavy-metal contamination of Baia Mare's soils. This consequently prevents the population to adopt the necessary protective measures when making use of contaminated green and blue spaces, as well as when consuming fruits and vegetables cultivated on non-safe soils. SPIRE's awareness-raising activities will be significantly informed by these findings:
    - Co-creation workshops and laboratories will specifically focus on designing safe and protected public spaces so that they could be enjoyed without any reasonable risk for users' health.
    - SPIRE's public activities and events – and especially the *Planthatlons* – will offer educational activities and will try and stimulate citizens to autonomously cultivate on potentially contaminated soils vegetation with phytoremediation or pollution-remediation properties instead of fruits and vegetables.
    - Additional effort will be dedicated to the dissemination of correct information on the risks and safety measures to be adopted.
- Improvement of air quality. The Report showed that air pollution in Baia Mare is mainly due to two factors: coal-based heating of private dwellings on the one hand; and private motorised vehicles' traffic on the other. In this respect, SPIRE and the iLEU need to play a leading role in stimulating the use of alternative, green energy sources, the adoption of environmentally sustainable domestic habits; as well as the use of public transit or non-polluting means of transportation. Additionally, the planning and co-design of green corridors along the rivers and main urban axis will be a crucial task for SPIRE. Green corridors, indeed, will be fundamental

both to absorb and mitigate air pollution through vegetation, as well as to provide safe and protected paths for light mobility.

Furthermore, the Report provided key insights that SPIRE will need to consider in the planning of public spaces in the aftermath of the Covid-19 pandemic. As shown in Chapter 3, until the start of the pandemic, people reported a low interest and willingness to gather and socialise in public open spaces. Yet the new situation and the physical distancing regulations that have been imposed are likely to increase the need and willingness of citizens to make use of outdoor spaces. SPIRE, in its co-creation workshops, may leverage on this emerging interest over such kind of spaces to envision and develop new design solutions and innovative forms of use of the open space that at the same time abide by the new distancing requirements but also respond and adapt to the needs and expectations of their users.

Ultimately, we conclude that the different components of SPIRE are well suited to address all of the aforementioned challenges and are well aligned with both the strategic and regulatory frameworks at all governance levels, as well as with the needs of local citizens and stakeholders. Additionally, we pinpointed and assessed the implications of the Report's main findings on the development and implementation of our project in the short- and long-term, and we highlighted the key emerging priorities.

Over the next few years, SPIRE - Smart Post-Industrial Regenerative will be a living laboratory where to test and experiment an innovative, nature-based approach to the sustainable regeneration of post-industrial cities, with the ambitious goal of becoming a leading and replicable model example at European level.

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*** Council Directive 86/278/EEC for Protection of the Environment

*** Order of the Ministry of Waters, Forests and Environmental Protection No. 756/3 November 1997

ANNEX 1. CITIZENS' QUESTIONNAIRE

Dear Citizen,

The Urban Innovative Actions' Project "SPIRE • Smart Post-Industrial Regenerative Ecosystem", financed by the European Commission through the ERDF, is about to kick-off in Baia Mare!

During the next three years we will be working together with the local community, i.e. with all of you, to implement innovative solutions for the renaturing and remediation of polluted land on 6 Pilot Sites, as well as for the development of a locally based sustainable circular economy system throughout the city.

As a first step, we would like to get to know the residents of our target neighbourhoods, and their point of view on many aspects of the life in Baia Mare and within their local community.

This is why we would be very glad if you may dedicate us a bit of your time and answer to the following questions. It will take you circa 10 minutes, but your information will be a fundamental contribution to our project!

This questionnaire is absolutely anonymous. The information collected will only be used for the scope of the project and will not be transferred to any other organisation. If you have any questions, please feel free to contact us at contact@spire.city

Thank you very much!

The SPIRE Team

SECTION 1 – ABOUT YOU

1. Please choose the option that best reflect the gender to which you feel to belong

   - ☐ Male
   - ☐ Female
   - ☐ Third Gender
   - ☐ Prefer not to say

2. How old are you?

   - ☐ 14-17 years old
   - ☐ 18-25 years old
   - ☐ 26-35 years old
   - ☐ 36-45 years old
   - ☐ 46-55 years old
   - ☐ 56-65 years old
   - ☐ Over 65 years old

3. What is your current civil status?

   - ☐ Single
   - ☐ Married / registered partnership
   - ☐ Living together

- ☐ Living apart together (LAT)
- ☐ Divorced / separated
- ☐ Widowed
- ☐ Prefer not to say

4. What is your last successfully completed grade / level of education?
   - ☐ Primary school
   - ☐ Middle school
   - ☐ Secondary / High school
   - ☐ University degree
   - ☐ PhD or similar
   - ☐ Prefer not to say
5. What is your current employment status?
   - ☐ Employee
   - ☐ Self-employed with employees
   - ☐ Self-employed / Freelance without employees
   - ☐ Unemployed
   - ☐ Student (without any studentship)
   - ☐ Stay-at-home parent/housekeeper
   - ☐ Rehabilitation / Disabled
   - ☐ Retired
   - ☐ Prefer not to say
6. How many adults live in your household including yourself? _____
7. How many children live in your household? _____

SECTION 2 – HOUSING CONDITIONS

1. What kind of home do you live in?
   - ☐ Detached house
   - ☐ Semi-detached house
   - ☐ Flat in a building with less than 10 flats
   - ☐ Flat in a building with more than 10 flats
   - ☐ Other: _____

2. Do you have access to the following private outdoor green/blue environments at home? *More than one answer is possible, tick all that apply*
   - ☐ Private garden / yard

- ☐ Private communal garden / space
- ☐ Balcony, patio area, rooftop terrace or similar
- ☐ No access to a private garden or outdoor space
- ☐ A private agricultural field
- ☐ Other: _____

3. Which answer best describes you or your household's living situation?
   - ☐ Homeownership with a loan or mortgage
   - ☐ Homeownership, with no loan nor mortgage
   - ☐ Rent at market price
   - ☐ Rent at reduced price or fee
   - ☐ Other: _____
4. If you rent, how much do you pay per month? _____
5. Do you believe it is easy to find good housing at a reasonable price in...

	Very Easy	Easy	Difficult	Very Difficult	Don't Know
Baia Mare					
Your neighbourhood					

6. In which of the following areas/neighbourhoods do you live?
   - ☐ Ferneziu Upper
   - ☐ Ferneziu Lower
   - ☐ Craica / Vasile Alecsandrii
   - ☐ Centre
7. What is the size of your current home? _____
8. When was your current home built?
   - ☐ Before 1900
   - ☐ 1900-1920
   - ☐ 1921-1944
   - ☐ 1945-1989
   - ☐ 1990-2004
   - ☐ After 2004
   - ☐ Don't know

9. How well is your home insulated from external conditions (e.g. temperature, noise, etc...)

	1	2	3	4	5	
Very Poorly						Very Well

10. How do you assess the state of conservation / maintenance of the building you live in?

	1	2	3	4	5	
Very Poor						Excellent

11. How do you assess the state of conservation / maintenance of your home?

	1	2	3	4	5	
Very Poor						Excellent

12. What is the average monthly value of your energy bill? _____

13. Are you satisfied with the value for money of your energy provision contract?

	1	2	3	4	5	
Strongly Dissatisfied						Extremely Satisfied

14. Do you take any of the following measures to lower the cost of your energy bill?

- ☐ I underheat my home
- ☐ I use less warm water than what I would like to
- ☐ I use alternative autonomous heating sources (e.g.fireplace, coal stove)
- ☐ I have installed solar panels (or similar friendly devices) in my home
- ☐ Other: _____

15. Do you keep plants in your home, balcony or garden / yard? *Multiple answers are possible, mark only one oval per row.*

	Regularly	From time to time	Only on special occasions (e.g. gifts, Christmas tree, etc...)	Never
Indoor plants				
Outdoor plants on the balcony (in pots)				
Outdoor plants in the garden (in soil)				
Outdoor plants in the garden / yard (in pots)				

16. To what extent do you sort your waste?

	1	2	3	4	5	
Not at all, I throw everything in the same bin						I always sort all my waste according to the city's regulations

SECTION 3 – YOUR NEIGHBOURHOOD

1. How often to you normally use the following means of transportation to move within your neighbourhood?

	Never	Rarely	Sometimes	Regularly
Walk				
Bicycle / E-bicycle				
Scooter / E-scooter				
Moped / motorbike				
Public transportation (bus, tram, etc...)				
Taxi				
Private car				

2. Is there any green or blue space within a 10-minutes' walk from your home?

☐ Yes

☐ No

☐ Don't Know

3. How often do you spend time in the following green or blue spaces during the Spring- Summer season?

	Seldom or Never	Less than once a month	1-3 times per month	At least once a week	(almost) Daily
Parks / public gardens					
Woods / other natural green spaces					
Agricultural field					
Blue space					

4. And during the Autumn-Winter season?

	Seldom or Never	Less than once a month	1-3 times per month	At least once a week	(almost) Daily
Parks / public gardens					
Woods / other natural green spaces					
Agricultural field					
Blue space					

5. Overall, in your neighbourhood, how satisfied are you with the following aspects? *Mark only one oval per row*

	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
The quality of the green/blue environment					
The amount of the green/blue environment					
The maintenance of the green/blue environment					
The safety of the green/blue environment with regard to traffic as well as people (e.g. perception of danger/safety)					
The accessibility of the green/blue environment					
The walkability of your neighbourhood					
The availability and safety of bike lanes					
The availability and accessibility of playgrounds / public sport facilities					

6. How strongly do you agree or disagree with the following statements related to the environmental quality of your neighbourhood? *Mark only one oval per row.*

	Strongly Disagree	Disagree	Netural	Agree	Strongly Agree	Does Not Apply
The pollution of the soil/water is a direct threat to my health						
I do not use green/blue spaces because I am afraid for my health						
The air quality in my neighbourhood is good						

I prevent my children from playing outside to protect their health						
I am afraid of contracting pollution-related illnesses						
I / a member of my family contracted a pollution-related illness						

7. In general, how would you say your health is?

- ☐ Excellent
- ☐ Very good
- ☐ Good
- ☐ Fair
- ☐ Poor
- ☐ Prefer not to answer

SECTION 4 – CULTURAL AND SOCIAL LIFE

1. How often do you make use or attend to the following cultural/leisure facilities/events within your neighbourhood? *Mark only one oval per row.*

	Seldom or never	Less than once a month	1-3 Times per month	At least once a week	(almost) Daily	This facility/event is not available in my neighbourhood
Public Library						
Cinema						
Theatre						
Concert / Live Music						
Discotheque / Club						
Professional Sport Events						
Sporting Club						
Social Club						
Civic Centre						
Restaurant						
Bar / Pub						

2. How often do you have contacts with your neighbours?

- ☐ (almost) Daily
- ☐ At least once a week
- ☐ 1-3 times per month
- ☐ Less than once a month
- ☐ Seldom or never

3. How often do you meet your neighbours in...

	Never	Rarely	Sometimes	Often	Regularly
Public indoor spaces (e.g. schools, civic centres, shopping centres, bars/restaurants, etc...)					
Public outdoor spaces (e.g. green spaces, plazas/squares, etc...)					

4. Among your neighbours, do you believe it is easy to..

	Very Easy	Easy	Difficult	Very Difficult	I Don't Know	I do not want/need such kind of support from my neighbours
have people who care about what happens to you?						
get chances to talk to someone you trust about your personal problems						
get invitations to go out and do things with other people						
get useful advice about the neighbourhood and its services						
get help when you are sick in bed						
get chances to leave your children with someone you trust in case of necessity						
leave the keys of your home to someone in case of emergency when you are away.						

SECTION 5 – ECONOMY AND LABOUR MARKET

1. If you are employed, what is your job? _____

2. Do you have a job that is considered in the environmental economy (a green job)?

   ☐ Yes

   ☐ No

3. Do you believe it is easy to find a decent job...

	Very Easy	Easy	Difficult	Very Difficult	Don't Know
Baia Mare					
Your neighbourhood					

4. How many members of our household make an income? _____

5. What is your household's overall net monthly income?

- ☐ Less than RON 2500
- ☐ RON 2501 to RON 3500
- ☐ RON 3501 to RON 5000
- ☐ RON 5001 to RON 7500
- ☐ RON 7501 - RON 11000
- ☐ More than RON 11000
- ☐ Don't know / prefer not to answer

6. Compared to a year ago, how would you say you or your household is doing financially now?

- ☐ Better off
- ☐ Worse off
- ☐ About the same
- ☐ Prefer not to answer

N.B. Please note that in this Annex we include the full questionnaire submitted to the population. However, only a limited number of questions/answers has been taken into account for the analyses presented in this Report. Namely:

- Section 1 "About You": Questions 1, 2, 5
- Section 2 "Housing Conditions": Questions 14, 16
- Section 3 "Your Neighbourhood": Questions 1-7
- Section 4 "Cultural and Social Life": Questions 1-4
- Section 5 "Economy and Labour Market": Questions 3-6