

Landscape management in an area affected by surface brown coal mining

J Vráblíková¹, E Wildová¹, P Vráblík¹ and M Blažková¹

¹Department of Natural Sciences, Faculty of Environment, J. E. Purkyně University in Ústí nad Labem

Abstract. The contribution summarizes results of a project concentrated on landscape management of an area affected by brown coal mining located in northern Bohemia (The Most basin) focusing on restoration and reclamation processes. It describes in particular the shares of individual types of reclamations in the area of interest. A strategic document that also supports landscape restoration in anthropogenically burdened regions was written within the project called "Restart" and the second part of the contribution is focused on its chapters which address this issue.

1. Introduction

The area of interest is the Most basin of 1420 km², located in the northern part of the Czech Republic. Intensive extraction of brown coal has influenced a wide area, first of all the Chomutov, Most, Teplice and Ústí nad Labem districts. Those districts were the most burdened regions in Central Europe as part of the so called "Black Triangle". The greatest problem in the entire "Black Triangle" area was air pollution, caused by thermal power stations, heating plants, open surface coal mines and chemical plants. The long-term burden on the environment in the past was the cause of its deteriorated condition, with some of its components also reflected in the poor health condition of the inhabitants. The area is severely damaged, not only from an environmental point of view (landscape degradation, air pollution etc.), but economic and social problems also occur there. Landscape management of the area is based on restoration and reclamation processes, which ensure integration of the damaged landscape back to the environment. The article is generally focused on the shares of individual landscape recovery methods, which help with the resocialization of the area. [1].

The contribution also describes the "Restart" project, which is concentrated on financial and systematic support for regions affected by coal mining, and on its connection with restoration processes. Official title is "The project for restructuring of the Ústí nad Labem (ÚR), Moravian-Silesian (MSR) and Karlovy Vary (KVR) regions" and is being implemented in collaboration with the Office of the Government Commissioner, the Ministry of Industry and Trade and the Ministry of Regional Development, under the patronage of the Government of the Czech Republic.

2. Methods

Methods of research consisted firstly in studying available materials that are connected with landscape recovery in the model area. The main documents were Mining Yearbooks that are published by Czech Mining Authority and the Mining and Oil Industry Employers' Union [2].

Individual companies participating in the restoration of the landscape after mining in the Most Basin describe here the amount of completed reclamations, but not always with a distinction into individual types of reclamations (agriculture, forest, hydrological and other). Professional experience



and results of several researches done by Faculty of Environment of the J. E. Purkyně University provided necessary information to analyze acreage of completed and planned reclamations in the model area. Second important document which had to be studied was “Overall Action Plan of the Restructuring Strategy for the Ústí nad Labem, Moravian-Silesian and Karlovy Vary Regions 2017 – 2018” [3].

Programmes concerning reclamation of the landscape affected by mining were chosen for further description.

3. Results

3.1. Landscape restoration in the model area

The reclamation of the landscape must be understood as the managed regeneration process of a landscape affected by mining and possibly also other human activity. Its aim is the restoration of the landscape's natural balance. It includes work of a technical nature (landscaping, stabilization measures, hydro-technical measures, etc.) and also of a biological nature (creation of agro-ecosystems, agricultural use, forest plantation, silvicultural care etc.). It is necessary to continue supporting revitalisation, i.e. functional integration into the landscape or a final treatment of the devastated area that will ensure the creation of an aesthetic landscape phenomenon and the restoration of the ecosystem's natural functions, while at the same time enabling the full utilisation of the area in accordance with the zoning plan [4].

The largest share within the scope of reclamation completed by 2016 is represented by the reclamation of 6,433.49 ha (46%) of forest. Next in line is agricultural reclamation at 4,150.88 ha (29%); however, land fertilisation during this process has been complicated. The area involving other forms of reclamation is constantly increasing (2,600.3 ha, or 18%), as the areas created adapt to society very well. That is why a significant expansion of these other areas is expected in the future. For now, the smallest share is represented by hydrological reclamation (986.56 ha, or 7%). However, with the end of open-cast coal mining, their share will increase thanks to the possibilities of utilising residual quarries (figure 1). The entire strategy for reclaiming the landscape below the Ore Mountains is based, in the long term, on the real possibilities in this area for creating conditions for this region to become, in its post-mining phase, a valuable recreational area, equipped not only for leisure-time activities, but also for a production capacity that is environmentally sustainable and undisruptive.

Within the scope landscape regeneration, it is necessary to apply the principle of integrated regional management, which ensures the involvement of all interested subjects, both from the state and private sectors, as well as the local inhabitants, who ensure that the newly created areas are subsequently utilised within the scope of reclamation and restoration. If the concept of sustainable development is adhered to within the scope of reclamation, whereby all of its pillars are taken into consideration, the newly created landscape will also be prepared for the possible consequences of global warming. Sufficient water and forests will create suitable conditions for housing, recreation and regional agriculture.

An important concept that links the ecological interests of an anthropogenically burdened landscape with economic and social aspects is its so-called resocialization [5] whose main aim is the return of people to the reclaimed and restored area.

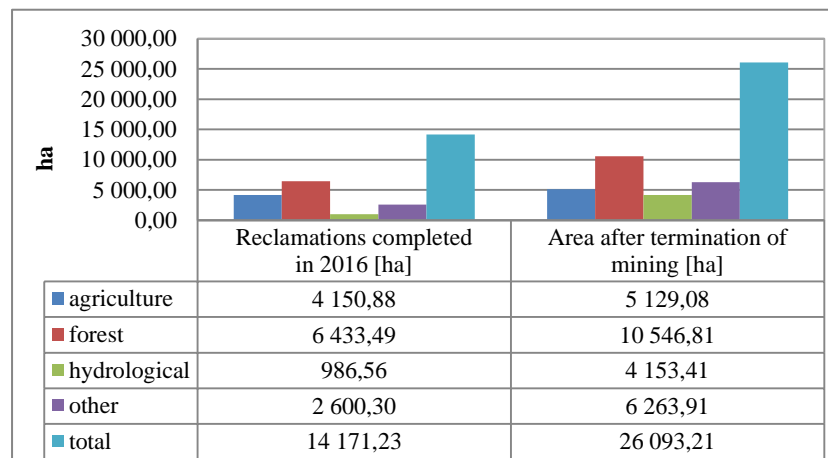


Figure 1. Reclamations completed in 2016 in the model area [ha][2].

3.2. Programmes supporting landscape management within the “Overall Action Plan of the Restructuring Strategy for the Ústí nad Labem, Moravian-Silesian and Karlovy Vary Regions 2017 – 2018”

The government decided, via Resolution no. 826 of the October 19th 2015, to economically restructure the Ústí nad Labem, Moravian-Silesian and Karlovy Vary regions, thereby showing that it is aware of the problems in these structurally affected areas, and committed to stop them lagging behind, and to kick-start their prosperity in 7 different areas: Entrepreneurship and Innovation (Objective: growing businesses capable of dealing with changes in global markets), Direct Foreign Investment (Objective: more direct foreign investment with higher added value), Research and Development (Objective: research and development with greater benefits for the economy), Human Resources (Objective: competent people for industry, services and public administration), Environment (Objective: revitalised and regenerated areas for better entrepreneurship and healthier lives of the inhabitants), Social Stabilisation (Objective: removal of barriers to development connected with social instability) and Infrastructure and Public Administration (Objective: higher quality infrastructure and public services). Via the Office of the Government, the Ústí nad Labem, Moravian-Silesian and Karlovy Vary regions requested financial and systemic support for specific measures which will help to restart these regions' economies. What specifically will happen in the Moravian-Silesian, Ústí nad Labem and Karlovy Vary regions is formulated in the so-called Action Plans. These programmes are based on the strategic framework and relevant discussions, and include the specific measures proposed in the particular localities. The first Restart Action Plan focuses on support for the creation of new activities in the areas after mining ceases. The objective is a regenerated landscape which is ready for further use and resettlement, including the maximum utilisation of its new potential, whether it is business opportunities, new houses, lakes, the option of pumped-storage power stations etc. [6].

The Action Plan for 2017 - 2018 is the first implementation document of the economic restructuring process of MSR, ÚR and KVR. Therefore, the draft Action Plans are the result of broad discussion at many levels, and among many participants from various sectors. The measures represent consensus among these participants on activities and programmes which will begin to improve the situation in structurally affected regions, and which at the same time can soon begin to be implemented. The Action Plans are divided according to the 7 pillars of the Strategic Economic Restructuring Framework. Within every pillar, the measures are divided according to the strategic objectives to which they contribute. Some measures can contribute to multiple strategic objectives or, in exceptional cases, also to the strategic objectives of multiple pillars. Each pillar sets forth so-called “supra-regional” measures, i.e. measures which are common for all three structurally affected regions,

and for both Action Plans. As a rule, these measures take the form of programmes in which regional players will apply for support. In some cases, these programme measures take the form of specific invitations (within the scope of existing across-the-board programmes), which will be announced for structurally affected regions, or will be focused on their specific problems. Furthermore, some pillars also set forth so-called “regional” measures, which are specific for the relevant region or take into account its particular needs. These are either significant actions with a region-wide impact, or a mutually (factually, time) interconnected set of sub-interventions/projects, where only the implementation of the entire integrated set of interventions linked to a certain area will bring about significant change in the region.

The Action Plans also contain measures which are not expected to commence this year or in the first half of next year, but whose implementation will be prepared so that they can be put forward for implementation in one of the subsequent Action Plan updates. These measures are desirable in the regions, or are regarded as beneficial for the restructuring, but their preparation requires more time, more complex negotiations or the reaching of a consensus on their content. Therefore, they are included in the Action Plans as important, but the Office of the Government Commissioner will be entrusted with their verification and possible further development, in concord with regional players and players at a national level. The revitalisation measures in the Ústí nad Labem region, which relate to the regeneration of the area after mining, are addressed by the Environment pillar. In the Overall Action Plan, a chapter is devoted to this issue in more detail. The sub-chapter “Revitalise and regenerate an area heavily affected by mining and industrial activity” is directly related to support for the regeneration of the model area. The sub-chapter includes several points.

3.3. Acceleration of a programme to resolve the remediation of ecological damage - obligations arising from privatisation contracts (competence of the Ministry of Finance of the Czech Republic)

This measure represents an appeal to accelerate the fulfilment of obligations from privatisation contracts. Its objective is to reduce the extent of the ecological damage in MSR, ÚR and KVR, which the state committed to remove at the start of the 90s. This ecological damage restricts regional development, endangers the environment, and prevents companies from utilising their assets. In the model area, this measure relates to the remediation of the landfill area in the Litvínov locality which belongs to UNIPETROL, a.s., ecological contract number 14/94 concluded between UNIPETROL, a.s., and the Ministry of Finance of the Czech Republic.

3.4. Reconfiguration and strengthening of the programme for the remediation of ecological damage financed at the Operational Programme Environment level, which is designated for towns and municipalities - obligations beyond the scope of privatisation contracts (competence of the Ministry of the Environment).

The objective of the programme is to reduce the environmental risks connected with the existence of ecological burdens at the level of the population and individual components of the environment. At the same time, conditions will be created for the reduction of economic and developmental disparities in the region, in which ecological burdens play a part. The interventions will be linked primarily with the Operational Programme Environment, whose objective is:

- inventorying of contaminated and potentially contaminated locations, categorisation of the priorities of the contaminated locations according to severity;
- implementation of research works (including additional researches), risk analyses, and remediation of severely contaminated localities.

3.5. Prepare a draft programme for the revitalisation/resocialization of areas and regions which were previously recultivated after mining.

The objective is to improve the image of the regions, the quality of the environment and economic and social conditions, particularly in the industrial agglomerations of the Moravian-Silesian, Ústí nad Labem and Karlovy Vary regions. The prioritisation of natural successions during reclamations is

suitable for smaller localities, and cannot be applied to already approved general restorations and reclamations, where it is necessary to proceed in accordance with the provision of “Mining Legislation”, which is not familiar with the concept of natural succession. Individual activities will be assessed in terms of respect for the protection of nature and the landscape. The entire implementation period of this programme, 2019 - 2025, is expected to cost 2.7 billion crowns.

3.6. Analyse existing programmes in the area of the environment, and existing measures for the protection of the environment.

A healthy environment is one of the basic conditions for the economic restructuring of all three regions. At the same time, it is an indirect condition for the implementation of all measures aimed at hiring qualified workers, attracting investors to the region, and stabilising the social situation. The task is to analyse existing programmes in the area of the environment, and existing measures for the protection of the environment, on the basis of the following breakdown:

- for these programmes, propose ways of taking the specifics of structurally affected regions into account;
- for problem areas which will not be sufficiently covered by existing programmes and measures, prepare specific target-oriented programmes and measures to improve the air quality in towns and municipalities [3].

4. Conclusion

An area affected by coal mining has its own specifics, and its reintegration into the surrounding environment is a complicated process. The model area of northern Bohemia is a good example of successfully integrated anthropogenic creations into natural landscape. Landscape management is now concentrated on forest reclamations that are supplemented mainly by agriculture reclamations. In the future, hydrological and other reclamations will be expanded, as it will allow resocialization of the area. In this respect, the “Restart” project is an umbrella programme for regions which are dealing with this issue, and helps them to improve their situation from a social, economic and ecological perspective. An Action plan written within the project is an important document as it serves as a conceptual tool that supports sustainable development of the area.

Acknowledgement

This article was supported by project QJ1520307, entitled "Sustainable Forms of Management in an Anthropogenically Burdened Region." This project was carried out with financial support from state budget resources through the KUS program, the Ministry of Agriculture of the Czech Republic.

References

- [1] Vráblíková, J et al. 2016 *Pro. Rep. C 004 „Area Analysis in Podkrušnohoří landscape”*
A study made within the project QJ1520307 Sustainable forms of management in an anthropogenically affected landscape J. E. Purkyně University in Ústí nad Labem p 295
- [2] Czech Mining Authority and the Mining and Oil Industry Employers' Union *Mining year books 2005–2016* Ostrava Czech Republic
- [3] Ministry for regional development and Ministry for industry and trade 2017 *Overall Action Plan of the Restructuring Strategy for the Ústí nad Labem Moravian-Silesian and Karlovy Vary Regions 2017 – 2018* p 237
- [4] Dejmal, I 2007 *Demographical and social limits of development of Podkrušnohoří basin* p 24
- [5] Vráblíková J, Vráblík P and Zoubková L 2014 *Landscape creation and protection* J. E. Purkyně University in Ústí nad Labem p 150
- [6] RESTART 2016 *Restructuring of Ústecký, Moravskoslezský and Karlovarský region*
<https://www.restartregionu.cz/>