

A CONCEPT FOR RECONSTRUCTING THE POST-MINING REGION UNDER THE LISBON STRATEGY

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Abstract

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Mining activities are known to have a negative impact on the environment in the area of their operation. The most serious is a devastation of large territories. Mining legislation (No. 44/1988 dig.) has been put in place to remedy these ecological disturbances. Recultivation of the land does not simply refer to restoring the soil in the damaged areas, but it also seeks out other methods of utilizing the land in terms of restoring its former function, or maximising its potential to regain this function. It is unrealistic for the region's development to aspire for a return to the functional state of the area that existed there prior to the devastation. In this paper, solutions to the pressing issues are proposed in support of ecological values on the impacted areas. These cover the aspects of production, housing, manufacturing, recreation, sporting and other activities, and proposing new complex methods of how the region may be used by the population (recreation, sports, hiking, instruction paths, and systems of entrepreneurial activities). Conditions for a gradual return of habitation (permanent and seasonal) into areas with longstanding coal mining history are being set up, showing respect for the ecological values of the Podkrušnohoří Region.

Key words: recultivation, Lisbon strategy, social and economic development, horizontal plan for development of the countryside, reconstruction of the region, devastated regions, sanitary measures

Introduction

Prior to its accession into the EU and just like other new European Union member states, the Czech Republic was asked to take part in the Lisbon strategy in 2001. The main argument used to defend such participation was born out of the belief that the tasks contained in the Strategy are identical both for the old as well as the new EU member states. It is not difficult to compile a list of the common problems encountered: low-level employment,

stimulation of growth and competitiveness, the implementation of new technology, increased support for research and the conveying the innovation, support for education, ecological programmes etc.. Ever since 2003, the results from summary reports concerning processes in the Lisbon Strategy have also included evaluation of results from the Czech Republic.

The EU has been promoting a reform of current proceedings ever since the assessment of results from the first half of the ten-year period of the Lisbon strategy (in the spring of 2005) was complete. Growth and a spurt in employment levels are supposed to be the top priorities for the renewed strategy, first and foremost to promote the objective of attaining economic goals, so that high social ecological standards may be maintained. In the case of post mining regions which have been severely damaged as a result of human intervention such as the Mostecka and Sokolovska regions, it is, however, of great importance to adopt a modified approach. First of all it is necessary to provide ecological standards in these areas i.e. to attain the functional levels of the recultivated regions. It will subsequently be possible to approach finding a solution to the economic and social objectives in such a way as to ensure that the restored region is made use of effectively.

One particularly relevant EU document on the topic of making effective use of the already urbanised territory can be found in *Thematic Strategy on the Urban Environment*. The Ministry of the Environment has launched preliminary work on creating a concept for the tenable development of human settlements as part of the Local agenda 21.

The Lisbon strategy of the European Commission 2000 aims to approach the issue of natural resources in a more responsible manner. This requirement stems from the understanding that the relationship between economic growth and the consumption of natural resources and the production of waste is no longer tenable. A high economic performance must be linked to a tenable use of natural resources accompanied by a reasonable volume of waste while preserving biodiversity, keeping the ecosystem afloat and must avert the danger of spreading wastelands under extreme conditions.

The National Lisbon programme corresponds to the Strategy of Economic Growth by the year 2013 and contains a list of measures which should be implemented in the years to come the region affected by the mining of brown coal is a subcategory of a cultural region which places a significant emphasis on production. Economic activities have the most pronounced features which also contrast most starkly with the natural merits of the region. Cultural characteristics have complete control over the structure of this regional category. In the course of mining production, the region is usually identified as a devastated area. It's post-mining renewal makes a return to regional types possible which in terms of their poly-functional character are relevantly balanced by contrast to city agglomerations, for instance with comparatively devastated regions however which remain without prospects of renewal (Löv, Míchal, 2003).

Surface mining has an influence on all elements and functions of a region. A region which includes mining, loses the logic of relatively constant development and may lead to the dissolution of several ecosystems, irreversible changes in topography, changes in ecological structures, and decrease of biodiversity (Pecharová et al., 2001). As a rule, it also

means a reduction of the region's structural diversity, and as a result, subsequent worsening of ecological stability, a major violation of aesthetic values and eventually to a decrease in the housing and recreational potential of the region. (Cibulka, 2002). Several of the authors identify mining regions as regions suffering from amnesia (Pecharová, Hezina, 2000; Lipský, 2002; Trpák et al., 2001; Květ, 2003; Capra, 2004).

Any region, which may be defined in a multitude of ways, not only proves its highly complex foundations, but also the specific viewpoints held on the region. It refers to a complex system, impossible to grasp by means of analysing each individual part, but only by a systemic and so-called holistic approach (Pokorný, 2001; Ripl et al., 1996). For this reason, exploring structures, processes and principles is important. There are many suitable definitions of a region depending on which methods and forms to evaluate it are used. According to the valid legal enactment (§ 3, lett.k, leg. nr. 114/1992 dig.), a region forms part of the land surface with a characteristic topography, created by a set of functionally connected ecosystems and elements of civilisation. This definition is, however, formulated from the title of its further legislative and administrative usability and therefore requirements for its actual correctness are not as strict as would be required in the case of an expert or scientific interpretation.

In terms of the concept of restoring a so-called post-mining region and the process of reconnecting it to the surrounding regions, the most appropriate definitions are used in the ecological or regionally ecological sense, which considers a region to be a system of natural elements or perhaps natural elements conditioned by man, the relationships of which may be either in harmony or unbalanced. When viewed from this angle, the object of the study concerns the structure, function and dynamics of a region. In order to comprehend structures in a region, knowledge of its heterogeneity, structural elements and the character of structures and currents between these elements is essential (Lipský, 2002).

In terms of their legal, ecological, geomorphologic and social relevance, a whole range of different definitions exist to describe a region. A region may also be perceived as a place for production taking place (from an economic point of view), as a manifestation of an anthropocentric stance, to a problem area where the essence of the region is to be used to benefit mankind, regardless of the ecological impact and harmonic relations it may inflict upon the region. Some typical activities which assert this understanding of a region most intensively are agriculture, forestry, mining, mineral raw materials and urbanisation. As a consequence of the irrational exploitation of a region, possible effects may include an excessive decline in natural ecosystems (or those close to nature), their conversion into the ecosystem conditioned by man as completely metamorphosed, and damage or devastation of cultural, historical and aesthetic values of the region. In this instance, man relegates the function of a region to interests realised in a specific time frame, which may take several generations. The outcome of this is the presence of ecosystems without a natural capability to regulate itself (Ružička, 2000).

A region inflicted by surface mining is a subcategory of a cultural region, by some authors also referred to as anthropogenically conditioned post-industrial regions (Míchal, 1994; Wiegleb, Feligs, 2001). The insensitive approach adopted by humans towards the

region, driven to the extreme in the case of the Podkrušnohorské furrows, which, in many parts of the region, disrupted or interrupted the hydrological cycle and affected flow of energy and transportation of matter. An essential pre-requisite to secure that loss of water and matter is minimized is therefore the renewal of vegetation and soil heavily saturated with water. Wetlands, which effectively dissipate energy in the right area and at the right time, help to moisten the climate, to curtail and close the hydrological cycle, sustain the level of water underground, maintain a high content of nutrients and minerals in the soil, while at the same time help cut back on the loss (Ripl et al., 1996).

Results and discussion

Landscape renewal concept

The first concept of renewal of complex mining areas was prepared at the request of the Ministry of Environment in 1991–1992. Major reason for preparation of these documents had been the need to estimate cost of reconstruction for the purpose of reserves. These locality-based concepts dealt only with the reconstruction of areas directly afflicted by mining and deposits of above-surface soils. They did neither tackle the issues of elimination of negative impacts of mining on wide surrounding area, nor the concept of renewal of the area as a whole. So-called “Long-term recultivation general plan” was made in 1992 within this approach, following Cabinet decree No. 443/1991, with the purpose to propose suitable solution of recultivation for the whole North Bohemian coal basin (SHP) after the mining activities are suspended. This material has already considered territorial – environmental boundary limits of individual quarries and their spoil banks (Cabinet decree No. 444/91). Moreover – it did not deal with separate local issues, but regarded all necessary relations instead.

However, it is not to be assumed that the mining organisations will prepare concepts of renewal of whole territorial units, as they would claim full responsibility for damages related to mining in wide neighbourhood, and subsequently they would have to take over an adequate solution. That is why the concept was ordered by state bodies.

Residual pits play dominant role in dealing with the consequences of quarry mining. These can be either buried in after the mining stops, thus serving as external spoil bank for other location, or filled with water, or as the case may be, left empty, without material or water. It was recommended to fill all the residual pits with water during comprehensive evaluation. The project of ME VaV/510/2/98 “Water management solution of recultivation and revitalisation of Podkrušnohorská coal basin” whose major contractor was Hydroprojekt Praha, was based on the presumption that all the residual pits in local basins would be filled with water, and tackled issues related to this variant.

Project VaV 640/3/00 “Renewal of the function of landscape afflicted by opencast mining” that took place in 2000–2002 proved the necessity of global view of the issues related to the renewal of functions of the landscape afflicted by opencast mining. That is why

hydrology and hydrogeology of the area concerned, local ecosystems, diagnosis of the landscape, aesthetic functions and soil conditions were assessed in the process. Evaluation of the area's morphology was also part of the project (namely spoil banks and residual pits), being a starting point for the follow-up solution. When looking for optimum ways satellite images were used, together with climate forecasts for quite remote periods of time, when most of the quarries will be suspending their activities. Part of the project was also methodology that enables to solve the landscape issues in a comprehensive manner. This procedure provides not only for the solution of consequences of opencast brown coal mining, but also for formation of a landscape, which is going to fulfil all the required functions, including human activities. However, due to its extent the project could not cover the issues of individual parts of the Podkrusnohoří area in detail as it dealt mostly with model locations. The possibility of alternative utilisation of residual pits could not be researched in detail for the same reason.

Mining of mineral materials, namely the large-scale one, such as brown coal mining in both Podkrusnohoří districts, represents adverse impact on the environment, particularly devastation of the area and whole territorial structures. Remedy of this situation is governed by the Mining Act (No. 44/1988 Coll.) by reconstruction and recultivation, which has been taking place for over 50 years. This activity has gone through certain development stages, from mere installation of green fields in specific areas, to significant preference of agricultural recultivation (in centrally planned era), to forestry recultivation (after 1990), and finally to current approach to planning the recultivation goals within wider comprehensive relations. Until recently, all the forms of recultivation were dominated by the focus on future economic utilisation of the postmining areas. This objective was reflected in shaping the method of drainage of the terrain, namely spoil bank structures, with the aim to provide geo-technical stability of the operated quarries (according to provisions of the Mining Act and other related legislation).

New approach to reconstruction and recultivation goals is based on the level achieved in this activity, appraised by number of experts from developed countries with mining and recultivation tradition. However, it should considerably strengthen (in accordance with holistic approach) the principle of renewal of landscape as a whole, with functional incorporation in neighbouring landscape types not afflicted by mining activities. The Mining Act stipulates that miners have to do the reconstruction and recultivation works only within the areas of mining spaces and external spoil banks, whereas full-scale renewal of landscape's functions includes these surfaces plus other areas in the vicinity, afflicted by the mining. Scope of the area concerned by the function renewal is logically much bigger.

The mining has not only locally damaged the landscape; it has been totally disruptive on vast territory, including the whole ecosystem of the landscape, historic settlements (vanished villages) and infrastructure (communication-transportation system).

Some parts of the area have even been damaged several times. Firstly by the "common mining" on geological bed bassets, later by deep mining, which damaged (with few exceptions) all the coal beds, and the area was "finished over" in the 20th and 21st centuries by large-scale opencast quarries and vast spoil banks of redundant above-surface soil on neighbouring lands. Other large properties were damaged as a result of negative phenomena that

accompany large-scale mining. The effects of dust, noise, underground water level, and last but not least de-population of the area led to loss of any the property values. Vast uncontrolled waste dumps of mining and other organisations, and wild destruction of the neighbourhood, came as a result.

Reconstruction activities have been going on around the segments not needed for further mining. The form of local reconstruction projects without solution of wider territorial relations still prevails. However, this procedure does not provide for concept dealing with large landscape areas. This process is called mosaic creation (Štys, 2002), but the incorporation of newly formed landscape in the neighbouring areas can't be included in the mosaic. It is not possible to create full-value landscape without connections to the systems of neighbouring areas. Local reconstructions may deal with partial functions (counter erosion measures, hydrologic cycle and the like), but not landscape's function in all of its aspects. Improvement of connections with the strong ecosystems in the vicinity is a basic precondition of benefits from successive reconstruction forms (Sklenička et al., 2002). That is why creation of basic conditions for future renewal of landscape's functions, and not the solution of local reconstruction measures should be the priority.

The whole vast area with coal beds is continuously covered with the mining rights of individual companies (allotments). Any use of the area different from mining is conditioned by approval of mining authorities and owners of the rights, even where mining activities are not expected in the horizon of tens of years, or the deposits are not anticipated to be mined out (so-called reserve locations).

The approval of other than mining activities in the allotments is usually provided under the condition applicant will not claim any damages in case mining starts. The applicable laws even do not allow complex redevelopment measures in the allotments. Thus all the non-mining activities are dramatically pushed out of the allotments, and the area is systematically and continuously depreciated. The above-mentioned unsustainable conditions are tackled in part by Cabinet decree No. 444/1992 Coll., which sets territorial environmental limits of mining, mandatory for decisionmakers.

The objective for the renewal of functioning cultural landscape is (Příkryl et al., 2002; Pecharová et al., 2004):

1. renewal of water conditions in the landscape – previously wetlands with numerous water surfaces of various sizes, and creation of favourable conditions for short-closed water cycle;
2. establishment of long-term functional ecosystems on the surfaces directly afflicted by mining (spoil banks, residual pits), and rehabilitation of historic continuity of precious ecosystems typical for basin areas (water surfaces, wetlands, salt marshes, savannas, forests of various age);
3. support and establishment of major connections between individual ecosystems, namely between environmentally valuable ecosystems, and the ecosystems intensively used by people (both at present and in the future);
4. support of environmental stability systems in the basin areas and their vicinity, support and establishment of new migration routes for various groups of live organisms, elimination of the existing barriers of expansion and migration of live organisms, and strength-

ening of environmental stability of landscape with regards to possible climatic changes in long-term horizon;

5. promotion of the environmental value of ecosystems intensively used by people (production, housing, manufacturing, recreation, sport and other lots), and draft of new comprehensive methods of landscape utilisation by people (holiday making, sports, tourism, educational paths including supplementary business activities);
6. establishment of conditions for gradual return of settlements (seasonal and permanent) into the areas that have been long used for coal mining, while respecting overall environmental values of Podkrusnohoří area.

In this respect we wish want to emphasize the role of monitoring and evaluation of these objectives by environmental indicators (Hrabánková, 2000; Boháčková, Hrabánková, 2004). One of the opportunities that may have a positive impact on returning settlements, and subsequent sustainable development, is improved land management. One of the most important conditions of sustainable development with regards to the character of the area concerned, is the improvement of quality of surface and underground waters, particularly by those exposed to agricultural activities. Following the Council Directive 91/676 EC of 12 December 1991 on protection of waters against pollution by nitrates from agricultural resources (Cabinet decree No. 103/2003 Coll.) issued on April 11, 2003 for vulnerable areas, . The decree deals mostly with the vulnerable areas (under Section 33 Act No. 254/2001 Coll. on waters) set on the basis of monitoring of waters, pedologic and geologic characteristics of the area, and utilisation of soils. The above-mentioned areas are set by cadastral boundaries, and take about 46% of agricultural land, and about 37% of the Czech Republics territory. Monitoring of shallow boreholes showed that the ratio of non-conforming samples of underground waters as regards the nitrates, ammonia ions and CHSKM, went up slightly. For the first time in 2003, results of monitoring of quality of surface waters by nitrate directive were included in the set of indicators.

Regularly monitored indicators are:

- arable and grass lands in %, share of arable lands in 2005 rose to 74.2% despite the requirements of agricultural policy,
- share of areas vulnerable to nitrogen in total CR territory in % – about 36.6%, and 46.2% of agricultural land,
- area potentially endangered by erosion (ha, %) – 1.797 thousand ha is endangered by water erosion (42.1% of a.l.), 320 thousand ha by wind erosion (7.5% of a.l.),
- area potentially endangered by lack of irrigation (ha, %) – 151 thousand ha, 3.5% of a.l.,
- area with higher content of hazardous elements in soil (%) – about 5% of a.l.,
- pollution of underground waters – shallow wells (% of samples not complying with CSN 75711 standard – drinking water),
- quality of surface waters by nitrate directive (% of samples exceeding limits – 3.3%).

Strategic objective for these areas devastated by mining (so-called small, or specific areas) remains to keep the framework of landscape and environment in these areas for renewal and maintenance of opportunities for housing, recreation and tourism.

Recultivation procedures and horizontal plan of rural development

Mining activities have a negative impact on the regional environment. The most serious impact is complete devastation of the area. The Mining Act (No. 44/1988 Coll.) as the basic law for the above-mentioned activities in its Section 31 (5) stipulates measures to remedy these negative impacts: “Organization is obliged to arrange reconstruction of all the properties damaged by mining. The reconstruction of properties afflicted in the course of mining follows the opening, preparation and mining plan (Section 32). Reconstruction means remedy of damages to landscape by complex redevelopment of the territory and territorial structures”. However, this obligation applies only to so-called mining spaces and outer spoil banks, not other areas in the vicinity negatively influenced by the mining. The Act further stipulates in Section 31 that “To provide for the activities under paragraph (5) the organization is obliged to create financial reserve. Such a reserve charged to costs shall correspond with the needs of reconstruction of properties afflicted by mining”. As regards precise regulation of the financial reserve, the Mining Act has been added by acts No. 168/1993 Coll. and 169/1993 Coll. (Svoboda, 1999).

Current legislation establishes comparably favourable conditions for the implementation of recultivation procedures, objective of which is future economic utilisation of the recultivated properties (laws on protection of agricultural land fund and forestry act are preferred). The Act on protection of nature and landscape (114/1992 Coll.) does not have necessary importance in practical terms, and as such does not support the renewed function of landscape in wider sense (Svoboda, 1999). As current trends of the renewed function of landscape damaged by opencast coal mining focus on strengthened environmental functions, such role of the legislation is adequate.

We may assume – with the Czech Republic joining the Model of European multi-function agriculture – mainly non-production features will be managed in these areas with emphasis on landscape maintenance, environmental services, non-agricultural activities and other services related to sustainable rural development. Economic activities in these areas are limited by their specific conditions. However, there is common interest in supporting local population, provided the living standard of the people is adequate.

The Government has approved the Horizontal plan of rural development, part of which are so-called agro-environmental measures that incorporate the requirement of so-called “agricultural best practice” policy towards the environment and landscape. When the management is supported by the program, economic entity undertakes to conduct its activities in the above-mentioned manner for five years.

In the same year, the Government also approved the Operational programme “Rural development and multifunction agriculture”, where facilities and technologies that improve status of the environment are implemented through supported projects (Hrabánková, Brandová, 2001). The Program of rural development for the period of 2007 – 2013 is built on these programmes with its numerous environmental measures oriented at improving environment, landscape, water and climate.

As a part of this program the following were approved:

- rural economy diversification measures, i.e.
 - diversification towards non-agricultural activities,
 - support of start-ups and development of the smallest businesses for the purpose of strengthening economic structures and entrepreneurship in rural areas,
 - support of tourism,
 - protection of increasing value and care of natural heritage as a contribution to sustainable development,
- measures aimed at improvement of quality of life in rural areas, i.e.
 - basic necessary services for rural economy and population,
 - renewal and development of villages, protection of increasing value and care of rural cultural heritage,
 - measures of professional education for economic entities aimed at new qualification and revival of rural environment,
 and the like.

At the beginning of 2003, the Act No. 76/2002 Coll. on integrated prevention and reduction of pollution, integrated pollution register, and change of some related laws came into force. In connection with the announcement of areas protected under NATURA 2000 scheme an amendment to the Act No. 114/1992 Coll. on the protection of nature and landscape aimed at protection of environmental diversity and of the most precious natural locations was prepared as soon as in 2003. Ministry of agriculture contributes financially to the establishment of territorial elements of environmental stability every year, for example CZK 3.7 million in 2002, and CZK 1.4 million in 2003. The measure “Methods of agricultural production designed to protect the environment and landscape” was supported within Sapard programme.

Lack of linkage between the Mining and Construction acts regarding approval of master plans related to comprehensive plans of reconstruction and recultivation (recultivation general plans) remains an unsolved issue. These briefly described major legislative problems are one more specific of the areas damaged by opencast brown coal mining (Svoboda, 1999).

Conclusion

The recultivation of areas damaged by mining activities has gone through more than fifty years of development. In the initial stages the recultivation was limited to mere installation of greenery in the preferred areas. Agricultural methods of recultivation prevailed until 1989, followed by forestry variants. Recultivation of landscape nowadays is understood mainly as the renewal of its function – not just natural, but social-economic as well. Thus perceived concept is particularly significant for opencast large-scale mining we can see in the area of Podkrušnohoří.

Territorial recultivation does not concern only the reconstruction of devastated soil, but also other ways of land utilisation from the viewpoint of renewal of its original function, or

potential for such function. To go back to the functional structure of landscape that had applied before the devastation began is to deny development of the landscape. Newly created recultivated landscape should provide about the same potential of possibilities of land utilisation as there had been before the devastation started. However, current level of recultivation should guarantee that economic or social benefits from the recultivated area will be comparable to those from not devastated areas. The experience gained within Lisbon strategy has confirmed it is not enough to establish priorities. If the Czech Republic is to learn from both its success and failures, the strategy has to become “ownership” of not just the Government, but also the whole public administration, business sector, financial institutions, educational and R&D sectors, and the citizen organisations.

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Pecharová E., Hrabánková M.: Koncepce obnovy posttěžební krajiny ve světle Lisabonské strategie.

Rekultivace území narušeného těžební činností prošla dlouhodobým více než padesátiletým vývojem. V počátečních obdobích se rekultivace omezovaly pouze na ozeleňování jednotlivých pozemků. Do roku 1989 převládaly zemědělské způsoby rekultivace, následně převládaly lesnické varianty. Dnes je rekultivace krajiny chápána především jako obnova její funkce – nejen přírodní, ale i sociálně ekonomické. Takto pojatý význam je zvláště výrazný při povrchové těžbě prováděné velkoplošným způsobem, jako je tomu v Podkrušnohoří. Rekultivace území se netýká jen obnovy půdy poškozené devastací, ale i ostatních způsobů užívání území z pohledu obnovení této dřívější funkce nebo potenciálu území pro tuto funkci. Vracet se ke stavu funkčního členění krajiny před počátkem devastací je popření vývoje krajiny. Nově tvořená rekultivovaná krajina má zajistit zhruba stejný potenciál možností využívání území jaký byl před počátky devastace. Současná kvalita rekultivace by však měla být taková, že ekonomické nebo společenské zisky z rekultivovaného území budou srovnatelné s nedevastovanými územími. Dosavadní zkušenosti lisabonské strategie potvrdily, že vytyčení priorit nestačí. Má-li se Česká republika poučit z jejich úspěchů i nezdarů, musí se strategie stát „vlastnictvím“ nejen vlády, ale také celé veřejné správy, podnikové sféry, finančních institucí, vzdělávacího i výzkumného sektoru i občanských organizací.