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THE CRITERIA AND INDICATORS FOR DEFINING THE SOCIAL ASPECTS IN SPATIAL PLANNING OF MINING REGIONS

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Abstract

Development in regions with the extensive mineral extraction leads to the employment increase with economic and demographic growth at the local and regional level, as well as numerous negative effects during and after the extraction period. This paper reviews and systematizes the social impact methodologies, criteria, and indicators for the mining regions. The research indicates the necessity of analyzing the social impacts based on communication and cooperation with the local community. There is an evident need for an ex-post study that applies the social impact assessment techniques and indicators for the decision-making improvement.

***Keywords**: indicators, social development, mining regions, spatial planning*

1 INTRODUCTION

Spatial development in the regions with a large-scale mineral extraction creates the substantial changes, from the employment increase at the local and regional level to the economic and demographic growth in the surrounding areas. Those activities induce the numerous negative effects, both during (e.g. monofunctional economy causing the economically dependent workers, hard environmental problems, health problems) and after the extraction (e.g. demographic decrease due to the loss of jobs, environmental quality decrease, degraded landscape).

There is no universal international law on mining, but each country decides for itself. Both "hard" and "soft" international regulation have increased in scope and implementation in recent decades and became an important factor. The majority of planners and decision-makers have realized the significance of analyzing the social impacts parallel with the economic and environmental ones [1].

An evaluation of alternatives, including the status quo, is part of several instruments: (1) the project oriented Environmental Impact Assessment (EIA), and (2) Territorial Impact Assessment, Sustainability Impact Assessment, Sustainability Appraisal, Extended Impact Assessment, etc. at a higher (plan, program, policy) level. The European Union obliged its member states to transpose the EIA Directive (85/337/EEC) in their national legislation until 1988 and to start applying the Directive on Strategic Environmental Assessment (SEA Directive, 2001/42/EC) from 2004. The law in Serbia prescribes the application of the SEA to analyze the social aspects together with the ecological, economic, and other possible impacts, whereas in some countries (as the USA, Canada, Australia), a Social Impact Assessment (SIA) is compulsory as a separate document that analyses only the socio-economic impacts. Both documents should be developed in the initial planning phase.

2 RESULTS AND DISCUSSION

2.1 Methodological approaches to the social impacts assessment

The most common tools for assessment the social impacts of plans and programs are the SEA and SIA. The SEA is a systematic process for evaluating the environmental, economic and social consequences of a proposed policy, plan or program to ensure their inclusion and analysis at the earliest stage of decision-making [2]. On the other hand, the SIA is exclusively oriented to the analysis of social impacts. It is the processes of analyzing, monitoring and managing positive and negative social consequences and changes of the planned development [3]. The general methodologies for the SEA and SIA are based on several steps: scoping, collecting basic information, defining problems, establishing indicators, establishing alternatives (including zero alternative), projection, assessment and evaluation the alternatives, mitigation measures, monitoring and follow up.

To successfully assess the possible social impacts, various quantitative and qualitative methods and techniques have been developed since the 1970s. The application of a certain method depends on the specific circumstances of the planned development. These methods vary from the relatively simple extrapolation techniques of different social indicators, where the interrelationships between values are partially considered to the complex models. Some techniques were developed specifically for the SIA, whereas the others were borrowed from the other fields, including sociology, psychology, economy, anthropology, risk assessment, market research, etc. [1]. The majority of methods enable the interpretation of current trends, prediction of future events, calculation the extent of the identified impacts, and selection the best development alternative [1]. Most commonly used methods (see [1,4,5]) include the brainstorming, surveys and interviews, desk studies, checklists and matrices, network analysis, system analysis, the Delphi technique, questionnaires, public meetings, stakeholder analysis, modeling, trend analysis, correlation and regression statistical techniques, simulations, scenario prediction, cost-benefit analysis, SWOT analysis, workshops, expert systems, and others.

Different phases in the process of assessment the social impacts require the application of different methods that are usually combined. Here is an example of the key steps in the SIA prescribed for the mining proposals in Western Australia, with proposed methods (Table 1).

2.2 Criteria and indicators for assessment the social impact in mining

Potential social impacts that occur before, during, and after mining can be direct, indirect, or induced. The assessment of cumulative impacts is central for understanding the potential impacts, possible adaptations, reactions, and aspirations [7]. The Interorganizational Committee on Guidelines and Principles for the SIA has proposed the following SIA variables for measuring a change in human population, communities and social relationships resulting from a development project or policy change [8]: 1) population characteristics – population size and expected change, ethnic and racial diversity, temporary residents, seasonal or leisure residents; 2) community and institutional structures – voluntary associations, interest group activity, size and structure of local government, historical experience, employment/income characteristics, minority

groups employment, local/regional/national linkages, industrial/commercial diversity, planning and zoning; 3) political and social resources – distribution of power and authority, identifications of stakeholders, interested and affected publics, leadership capability and characteristics; 4) individual and family changes – perceptions of risk, health, and safety, displacement/relocation concerns, trust in political and social institutions, residential stability, density of acquaintanceship, attitudes toward policy/project, family and friendship networks, concerns about social well-being; 5) community resources – change in community infrastructure, native tribes, land use patterns, effects on cultural, historical, and archaeological resources.

Table 1 *SIA prescribed for the mining proposals in Western Australia [6]*

Step Label	Description
1. Community profiling	Making a working model of the examined communities. Selected socio-economic variables should portray the various community groups, and the type and strength of links between them. **Methods:** Power groups, community cohesion, social, economic (with occupational) structure, historical growth trends, life quality indicators, demographic structure (including migration).
2. Likely impact projection	Projecting or forecasting probable impacts: analyzing the probable social consequences of current trends and events. **Methods:** impact tree, social modelling scenario writing or storytelling, gaming, and simulation.
3. Impact assessment	Assessment the difference between the profile projections with and without the proposed intervention including the next best option. **Methods:** Input/output, cost-benefit, surveys community involvement, factor analysis, social indicators, newspaper analysis, matrix methods.
4a. Alternative project evaluation including the mitigation programs	Comparison and evaluation of the alternative project proposals, recommendation of programs to enhance the positive, and mitigate negative impacts. **Strategies**: Town/social planning, community development.
4b. Best recommendation	Choice: best option/s, sensitivity analysis, option listing. Choice by: management, political process, community involvement.
5. Implementation of the monitoring and feedback	Development of an action plan for implementation. The process then needs to be monitored, so that we can learn from mistakes. **Methods:** Feedback. Also, social monitoring by a development company or local government authorities. Post-development field research.

The above variables and indicators can serve as a reference point in defining specific indicators for the assessment of the social impacts of mining activities. Table 2 is an illustrative example of the **Australia's (Queensland) practice, showing some sample** indicators [9].

Table 2 *SIA indicators – example from Australia*

Demographics	**Employment**	**Agricultural family financial characteristics**
Population size Distribution and projections Age distribution Population density/structure Net migration trends Fertility rate Life expectancy	Occupations Employment rate by gender Employment rate by age Employment rate by industry Unemployment rate Economic dependency	Agricultural family income Non-agricultural income Value of land Rate of return Debt-service ratio
Housing	**Education**	**Economic dependency**
Dwelling structure Classification Housing tenure trends No. of occupied dwellings No. of rented dwellings	Education institutions Highest qualification attained Qualification by area of study Participation rates by age and gender	Agricultural sector; Mining sector; Manufacturing sector; service sector The relative importance of different sectors Economic diversity
Households	**Income**	**Linkages**
Household size Families without children Single-parent households Female-headed households Single-person households Group households	Individual income Household income Household income by occupation Overview of incomes trends in predominant industry/s	Share of regional income dependent on exports Trends in world prices for commodities produced Terms of trade
Cultural diversity	**Social Infrastructure**	**Indigenous**
Place of birth Language groups Languages spoken at home Languages spoken at home by age Ethnic groups	Major centers of the region Access to health services Access to community services Level of local government support Level of state/federal govt. agency presence/investment	Population size Age profile Life expectancy Criminal justice rates Education data Employment data Community development Programs Income/Poverty levels Linkages with external society Land tenure/ownership Language groups Sacred cultural sites
Industrial infrastructure	**Land tenure**	
Manufacturing setups Processing setups Other small-medium businesses	Freehold Types of leases National Park Indigenous	

Impacts on the natural environment such as the degradation of land, air, water, and landscape, also represent an important part of social impact, though they are not often analyzed as a part of the SIA for the mining projects. Those impacts can directly endanger health both physically and psychologically, decrease the income through a crop reduction, induce the communication problems due to the destroyed/relocated infrastructure, etc.

3 CONCLUSION

Substantial changes and large impacts induced by the mining activities at the local and sometimes regional level outline the necessity of analyzing the social impacts, defining the proper indicators, and applying the diverse methods in sensitive circumstances created during the exploitation of mineral resources. In that process, the importance of communication and cooperation with the local community is emphasized. In the countries without the legal obligation for conducting the SIA, a bigger importance should be given to the social indicators in the SEA. Also, there is an evident need for an ex-post study to apply the SIA techniques to assess the post-development impacts of mining. The information on how to relocate managed to start a "new life" and the challenges they faced could provide more efficient solutions.

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