

LOCATION OF A LANDFILL FOR HAZARDOUS WASTE IN THE REPUBLIC OF MACEDONIA - PLANNING AND DEVELOPMENT

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ABSTRACT:

One of the basic problems in Macedonian industry is disposal of the hazardous waste from the mining industrial complexes. Choice of locations for deposition of the dangerous waste is priority for future development of Macedonian economy and it is a subject of many public hearing. Today we are witness daily debates, discussions, opinions of professional and political public, directly related to the location of future sites for the disposal of solid waste. This paper is an attempt to analyze the current state of the places - future sites for hazardous waste landfills, their importance of economically and from an ecological point of view. Minimizing the negative impact of landfills for solid waste is imperative for the further development of a region or area in the Republic of Macedonia.

KEY WORDS: landfills, hazardous waste, location - allocation methods, choice

1. INTRODUCTION

Environment is treated as a complex and dynamic system, where each element directly or indirectly affect other elements of the system, which itself suffers change, is exposed to everyday processes in space, of which the dominant influences on qualities have: populating the area, urbanization, production processes and industrialization, agriculture, development of traffic, changes in use of land use, the use of natural resources and dispersion of infrastructure corridors. The basic conflicts in the environment, which are also characteristic for Macedonia, are:

- Deepening the differences between developed and undeveloped areas;
- Effects of industrialization on some basic natural processes;
- Capture valuable parts of space, their no rational, extensive, or spontaneously use;
- Excessive concentration of population in areas with no adequate or inadequate functional organization and infrastructure;
- Imbalance between material production and natural assumptions about quality of life, air, water, space for recreation and others.

The paper will present an analysis of potential sites for hazardous waste landfills in the Republic of Macedonia. Finally, the conclusion will be given and a proposal for further research in the field of location - allocation methods for determining the optimum sites for disposal of hazardous waste.

2. SPATIAL PLAN OF REPUBLIC OF MACEDONIA IN TERMS OF LOCATIONS OF LANDFILLS

Spatial Plan is a managed document, in character is a integral development project which helped to define the spatial organization of state, goals and concepts of spatial development of certain areas and conditions for their realization. Spatial plan is defined as a document with lasting value, and will align with all development documents which will be prepared and bring.

Based on perceived global conditions and trends in the country, the Plan defines the primary goals for solving problems in the organization, use and spatial development and environmental protection [1]. Spatial Plan is with a long-term character, i.e. the timeframe to 2020. But is based on the principle of flexibility and adaptability of developmental processes and structural changes in the near future will occur.

2.1 BASIC GOALS AND ASSUMPTIONS OF THE PLAN

The main strategic goal of the Spatial Plan of Macedonia is achieving a higher degree of overall functional integrity of the state space, and providing conditions for significantly more infrastructure and economic integration with neighboring and other European countries. Long term development of the country will largely be determined by the changes to be made in the political system and the creation of stable political conditions in the country, implementation of radical activities in the economic system, increasing the reproductive capacity of the economy, higher economic efficiency, qualitative changes the socio-economic structure, development of villages and areas, saving and rational use of natural resources, protection of agricultural lands. The basic strategy of the organization and use of space in terms of supporting the development of the economy consist such solutions in the space that allow:

- Greater attractiveness of the area and a wider choice of solutions, from aspect of investing in the domestic and foreign capital;
- Protection of natural and man-made resources and wealth, in terms of economic interests for the preservation of environmental quality;
- Transport, information and control connection as a prerequisite for efficient production and social development;
- Development of an information system for the space and environment;
- Location flexibility in making investment decisions.

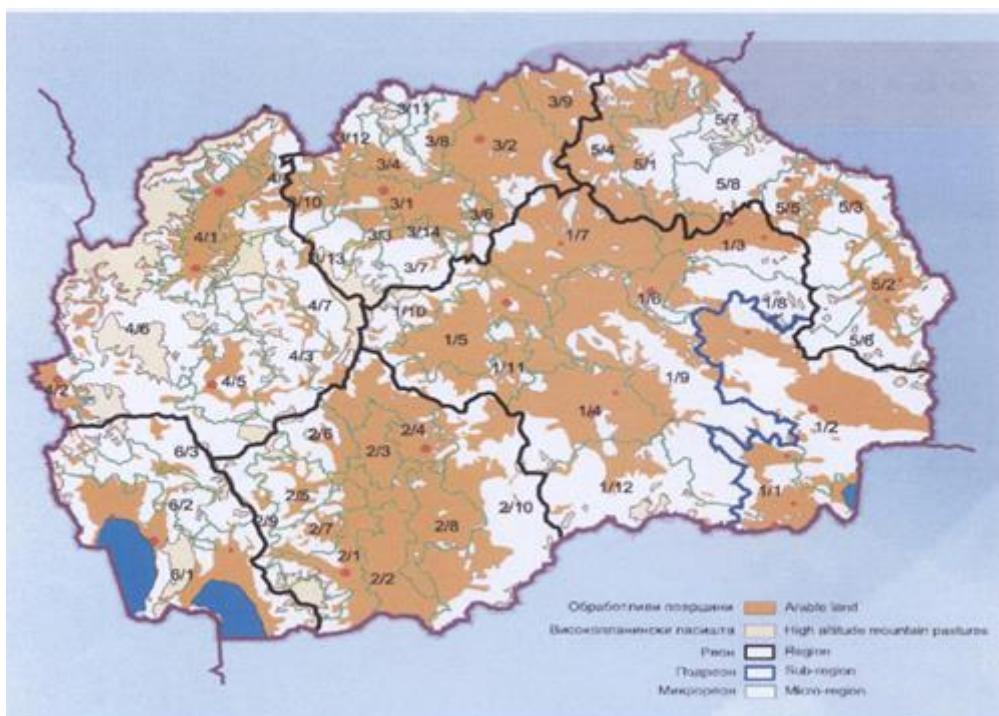


Fig.1 Use and protection of natural resources-farmland

3. LEGISLATION AND WASTE MANAGEMENT

This Law regulates the management of waste, principles and objectives waste management, plans and programs for managing waste; rights and obligations of legal and natural persons in connection with waste management, requirements and obligations of legal and natural persons, manufactured products and packaging and that the end of life cycle environmental burden, ways and conditions under which it can be done collection, transportation, treatment, storage, processing and disposal waste import, export and transit of waste, monitoring, financing and supervision of waste management. Law of waste Management classifies three types of landfill: hazardous, non-hazardous and inert waste.

3.1. STRATEGY FOR WASTE MANAGEMENT

Strategy for waste management reflects national policy in the field of waste management and represented the base for preparing and implementing integrated waste management, which will be effective in terms of cost. With this strategic document, the Republic of Macedonia defines the fundamental directions in the field of waste management for the next 12 years (2008-2020) [1]. The strategy determines the basic guidelines for the gradual establishment of a system for waste management, and basic principles of sustainable use of natural resources. The success and effectiveness of the implementation of the strategy depends from capital investment and space limitations, primarily in the proper balance between the legal, institutional, organizational and sociological particular economic / financial instruments. Strategy for waste management in the Republic of Macedonia was adopted by the government in 2008.

4. SELECTION OF LOCATION FOR SOLID WASTE

The level of environmental awareness and waste problem in Macedonia is on the lowest level [2]. Most of the municipal solid waste and other collected waste are disposed without prior treatment of municipal landfills such as: old tires, car batteries, car oil and other waste components. Landfills are working without work permits, without any techniques that apply to landfills and no regular monitoring in terms of environmental impact. There is no record of delivered waste, not any visual inspection of the characteristics of waste that is deposited. Deposition of mixed hazardous and not hazardous waste and incineration of municipal waste, waste plastics plant tissues and the open space, represent the most serious risks and consequences for the environment. Landfills in our country are often improperly managed and do not pleased minimum standards regarding the environment and human health. Municipalities are generally responsible for organizing an effective system for managing of solid waste on their territories, except for hazardous waste, which is under responsibility of legislation is the state. The management of waste in our country is still a problem because the quantity of waste is increasing steadily, and legislation in some cases is poorly implemented. In recent years in Macedonia were developed several strategic and planning documents (Legislation in the Republic of Macedonia in the part of waste management) that analyzed the issue of managing hazardous waste. The first step in realizing the goals should be preparing a feasibility study which will analyze the performance of the natural area of the Krivolak, in geographical boundaries of an area of about 400 km². The choice of this region is the result of complex analysis based on modern criteria for selecting these locations, using the results of previous research in this area [3]. Also, the choice of analysis of this region, respected in the settings of the study of the Spatial Plan of Republic of Macedonia, where ranking is made of space in the country in terms of distribution of water resources, water management, natural heritage, agricultural areas and areas with mineral and geothermal water. As basic criteria for the analysis of the proposed region are used:

- Geological environment,
- Configuration of the terrain,
- Hydro geological characteristics of the environment,
- Seismotectonic characteristics,
- Presents of natural built objects,
- Potential resource,
- Concentration of population.

According to previous findings, the area of Krivolak has emerged as the most suitable from many aspects, for which priority is given to analyze a possible landfill site for hazardous waste to the Republic of Macedonia. This area has exceptional advantages, which ultimately means the integral protection of the environment and human health in terms of locating a landfill for hazardous waste and long-term function of the same. This is conditioned by the specific geological structure which is introduced with a homogeneous structure, then outstanding hydro-geological features that point to run without setting inside or negligible waters in the deep parts. These data are known from the period 1967-1972, when the area of Krivolak was research for oil. According to the technical documentation that results from drilling are not registered tanks of groundwater, nor changing geological conditions and the derived depths, giving a special quality of the area in relation to most priority criterion.

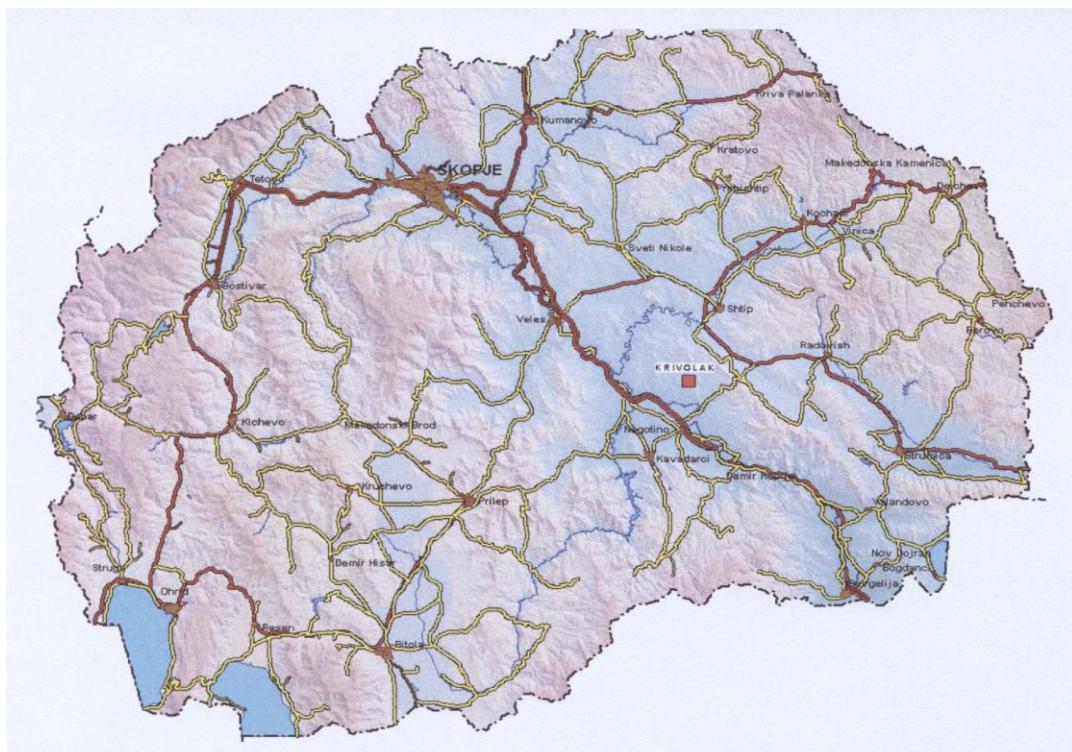


Fig. 2 Map of Republic of Macedonia with location of Krivolak

Agricultural land in the area and quality forest stands are not known, but most of it is an area of steppe, the local and semi-arid character. This atmospheric feature can be priced as a quality of space, because it is a unique phenomenon in country, but despite the eventual construction of the landfill will remain large areas with no disturbed original setting.

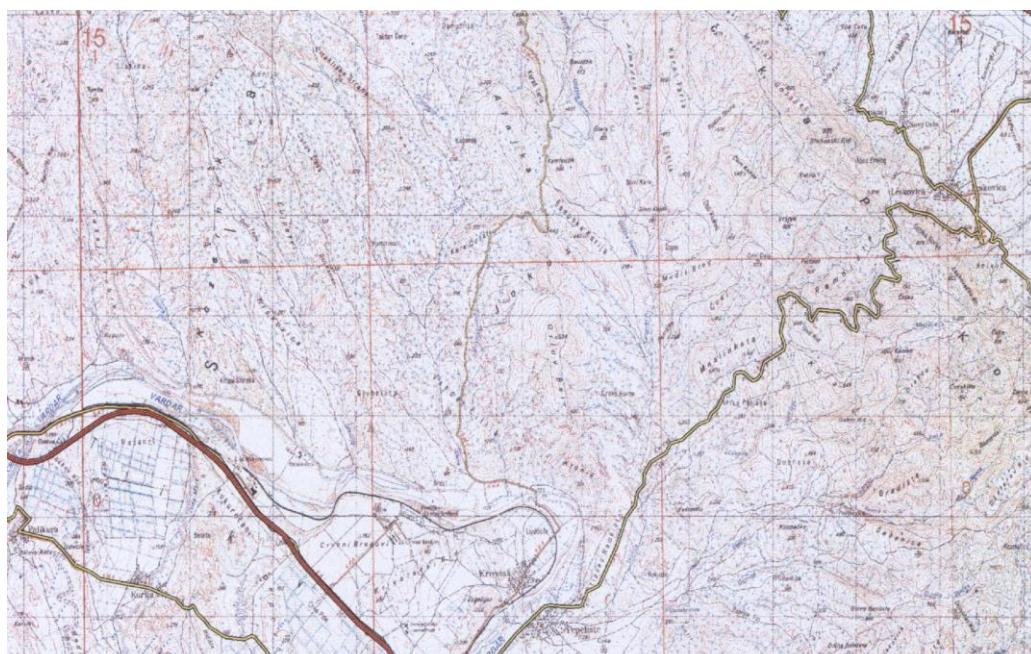


Fig. 3 Map of the area of Krivolak

Also, the hydrographical grid of the area is very poorly developed and practically represented by the Bregalnica and possible occurrences of temporary watercourses in conditions of intense atmospheric precipitation, which were in this area showed minimum. The concentration of population in this area is the lowest compared to the rest of the country; this area is populated as a area for military training.

5. DISCUSSION AND CONCLUSION

In Macedonia, the quantities, types and condition of hazardous substances has generated very little known. In other countries, where is established system for managing hazardous waste, we have found that this quantity is about 2% of the total waste.

Existing facilities and capacitates for treatment and disposal of waste are inadequate, legislation and standards are not applied effectively, and current practices of waste management contribute to air pollution, water resources and soil. In the world there are many technical and technological solutions for treatment and disposal of hazardous waste. In this paper, as already mentioned above, the construction of a landfill for hazardous waste is treated only in terms of function and successful implementation of planed decisions in the spatial plan for the provision of choice for a possible landfill site and the adoption of methodology and criteria for final selection of micro locations for landfill for hazardous waste [4]. According to the information for making this paper, area of Krivolak has ideal conditions for the construction of a landfill for hazardous waste. Taking into account the obvious environmental damage caused by past practice in the management of hazardous waste, it is necessary to begin preparation of feasibility studies for construction of a landfill for hazardous waste in the area of Krivolak.

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