

ENVIRONMENTAL CONSEQUENCES OF DISASTERS CAUSED BY ELEMENTARY DISASTERS AND PROTECTION MEASURES

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Abstract: *Natural disasters that occur in various forms in our area, in addition to endangering the lives and health of the population, also cause significant material damage and significantly cause environmental pollution. The most significant forms and profiles of danger in this area are floods, earthquakes, forest fires, storms and others. Each of these hazard profiles has certain and specific impacts on the environment, and above all they cause pollution of water, air, soil and forest ecosystems. The appearance of various forms and amounts of waste and hazardous materials as a consequence of natural disasters also represents a significant ecological problem. In order to successfully implement environmental protection measures in the presence of hazard profiles, that is, in the event of natural disasters, it is necessary to take measures of a preventive nature, concrete environmental protection measures as well as through measures to eliminate the consequences of natural disasters. The goal of the work is to analyze the scope and level of environmental integration, organization and activities to solve potentially present environmental problems, and determine and propose the necessary environmental protection measures based on the estimated and potentially present natural disasters in local communities. For the successful implementation of environmental protection measures in the event of a natural disaster, it is necessary to establish an organizational model in local communities that includes the well-coordinated activity of the city-municipal headquarters for emergency situations with the administrative body responsible for the environment and professional-specialized institutions. Specialized units for protection and rescue, public companies, institutions and the population are engaged in operational activities for the implementation of emergency measures. The basic prerequisite for the implementation of urgent environmental protection measures is the determination of the level of pollution and the determination of the zone of pollution, on the basis of which, on the proposal of a professional and specialized institution, appropriate measures are taken to protect and rescue the population, which will eliminate the danger in the shortest possible period of time, that is, lead to a reduction in the level of pollution.*

Keywords: *environment, natural disaster, protection measures*

Introduction

Occurrences of natural disasters in the municipalities and cities of the Banja Luka region significantly cause environmental degradation and cause ecological consequences. The most significant forms and profiles of danger in this area are floods, forest fires, earthquakes, storms and hail. Each of the mentioned hazard

profiles has certain and specific impacts on the environment and leaves ecological consequences. Threats to the environment are manifested through pollution of surface and underground water, air pollution, soil pollution and degradation of forest ecosystems. Consequences that manifest themselves on the quality of the environment in the event of natural disasters can also arise due to damage to infrastructural facilities that are responsible for water supply and wastewater drainage, the appearance of solid and hazardous waste, the appearance of various toxic substances and the appearance of mine explosives in the threatened area [1].

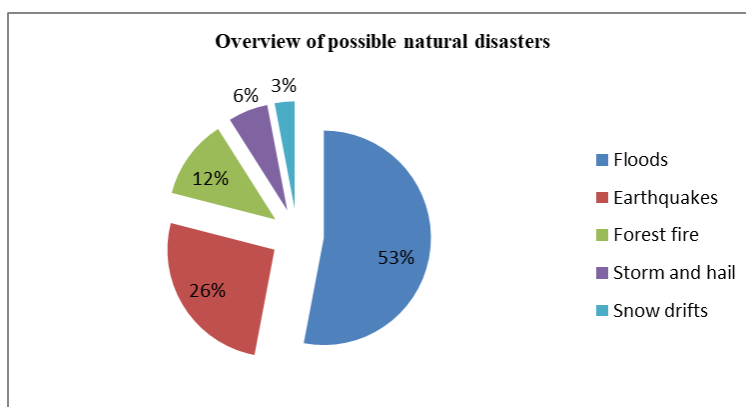
Environmental protection measures in the event of natural disasters must be carried out through protective measures of a preventive nature, specific protection and rescue measures, as well as through measures to eliminate the consequences of natural disasters. The most significant contribution to the implementation of preventive measures can be achieved through the development and maintenance of communal infrastructure, communal hygiene measures and especially the measures that include the implementation of monitoring, adequate supervision, adoption of planning documents and education of the population [2]. Due to the present phenomena of environmental pollution due to natural disasters in local communities, it is necessary to undertake a whole series of environmental protection measures through timely and high-quality monitoring of the situation, environmental quality control and timely removal of dangerous and toxic substances causing pollution in the threatened area. In particular, in order to eliminate the consequences of natural disasters on the environment, it is necessary to carry out well-organized and well-organized ground sanitation measures, which include: removal of waste materials - municipal and hazardous waste, disposal of dead animals, cleaning, washing and disinfection of buildings and elimination of defects in communal infrastructure facilities and other. The aim of this work is to determine the forms and possibilities of environmental pollution and ecological consequences, as well as the necessary protection measures, on the basis of possible and present natural disasters.

Material and working methods

The analysis of environmental consequences arising from natural disasters as well as the possibility of implementing protection measures in the local communities of the Banja Luka region was carried out on the basis of monitoring the situation and collecting and processing data on the occurrence of natural disasters and the consequences and intensity of environmental pollution. We also used data from the assessment of vulnerability due to natural disasters in the Banja Luka region and certain local communities, as well as data from the urban and spatial planning documentation of local communities. The results of empirical research were used to rank the existing forms of environmental endangerment [3].

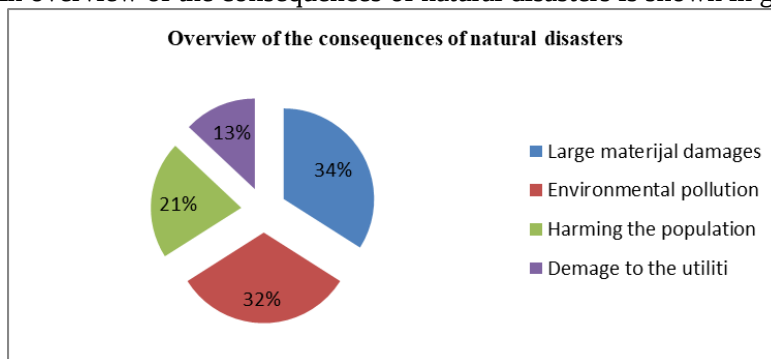
Results and discussion

Natural disasters that mostly occur in cities and municipalities in the Banja Luka region are: floods, earthquakes, forest fires, storms, hail and snow drifts. An overview of the most significant threats to the population, material goods and the environment in cities and municipalities in the Banja Luka region is shown in graph 1 [4].



Graph 1. Overview of possible natural disasters

An addition to endangering the population and material goods, occurrences of natural disasters cause environmental pollution in the affected area to a significant extent. An overview of the consequences of natural disasters is shown in graph 2.

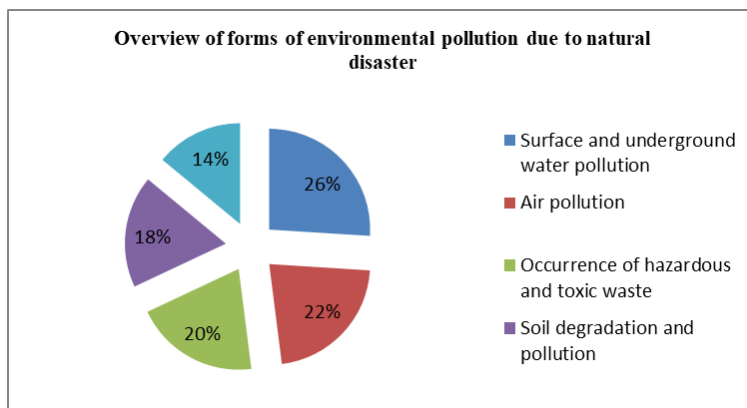


Graph 2. Overview of the consequences of natural disasters

Manifest forms of endangering the environment due to natural disasters are mainly manifested as:

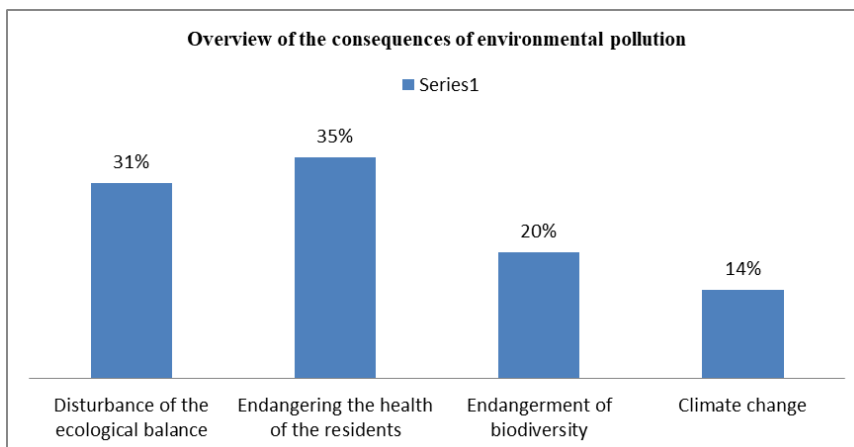
- Groundwater pollution due to the arrival of mechanical and chemical components as well as microbiological pollution, which often causes a violation of the hygienic regime in the supply of drinking water.

- Pollution of settlements and land in the affected area due to the application of a large amount of solid and hazardous waste and mechanical pollution.
- Contamination of soil and plant material with heavy metals and organic pollutants, which affects the quality and bioproductivity of the soil.
- The occurrence of extreme air pollution and endangering the health of the population
- Occurrence of significant amounts of hazardous chemical waste (pesticides, heavy metals, protective agents, etc.).
- Destruction and damage to communal infrastructure facilities that are responsible for water supply and sanitation.
- The death of a large number of domestic and wild animals and the danger of pollution due to animal waste.
- The appearance of a large amount of bulky waste resulting from the destruction of furniture and technical equipment
- The appearance of unexploded ordnance in the area affected by the natural disaster. [5]



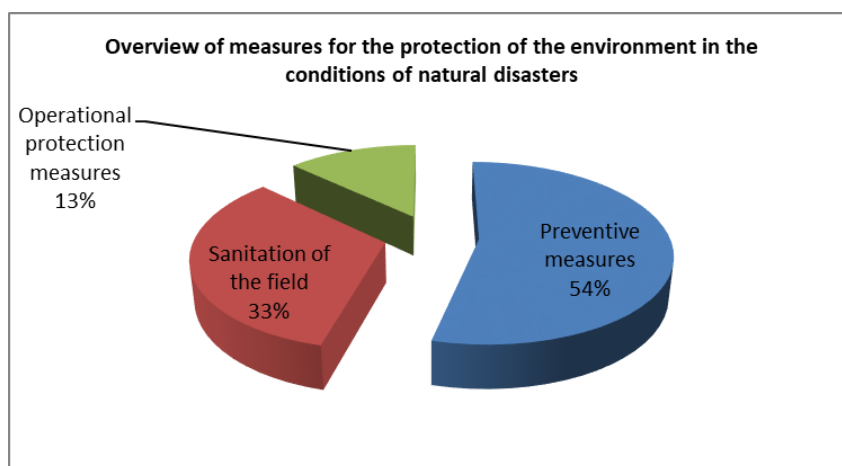
Graph 3. Overview of the consequences of natural disasters

From the ecological aspect, it can be stated that unknown phenomena significantly contribute to the disruption of the ecological balance, endangering the health of the population, endangering biodiversity and causing climate change at the local level. An overview of environmental consequences due to environmental pollution is shown in graph 4.



Graph 4. Overview of the consequences of environmental pollution

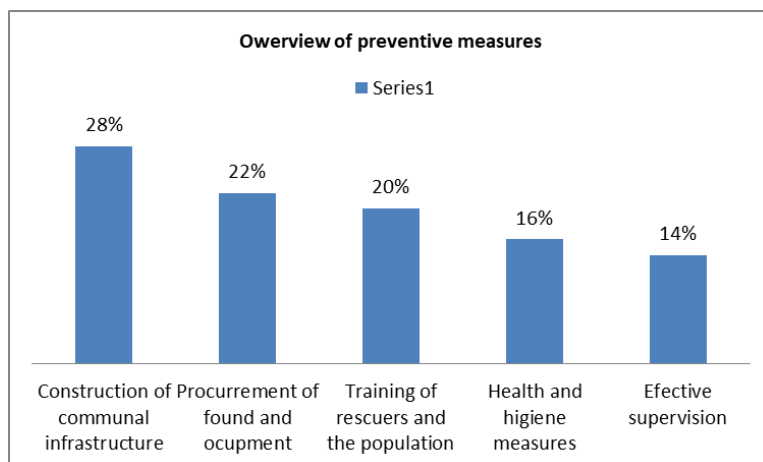
Environmental protection measures that need to be implemented in an area affected by a natural disaster can be seen as preventive measures that have the task of preventing the occurrence of a natural disaster and endangering the environment, as operational protection and rescue measures that remove dangers to people and the environment, and measures to eliminate the consequences of natural disasters, which implement land sanitation measures and solve existing environmental protection problems. The presentation of the possibility of protecting the environment in the event of natural disasters in local communities is given on graph 5.[6]



Graph 5. Overview of measures for the protection of the environment in the conditions of natural disasters

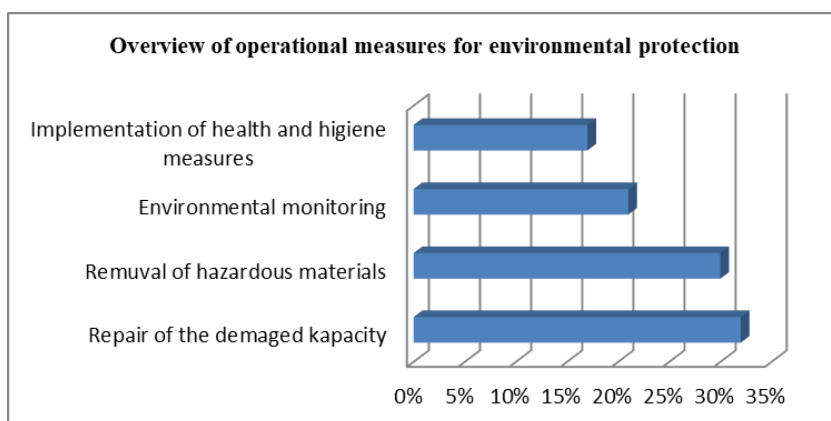
The most significant contribution to environmental protection within the framework of the implementation of preventive measures (graph 6) can be achieved through the construction of communal infrastructure, the provision of the necessary equipment and means for the implementation of protection measures, the training of

rescuers and the population, the implementation of health and hygiene measures, as well as the appropriate and effective supervision of the implementation of the prescribed protection measure. [7]



Graph 6. Overview of preventive measures

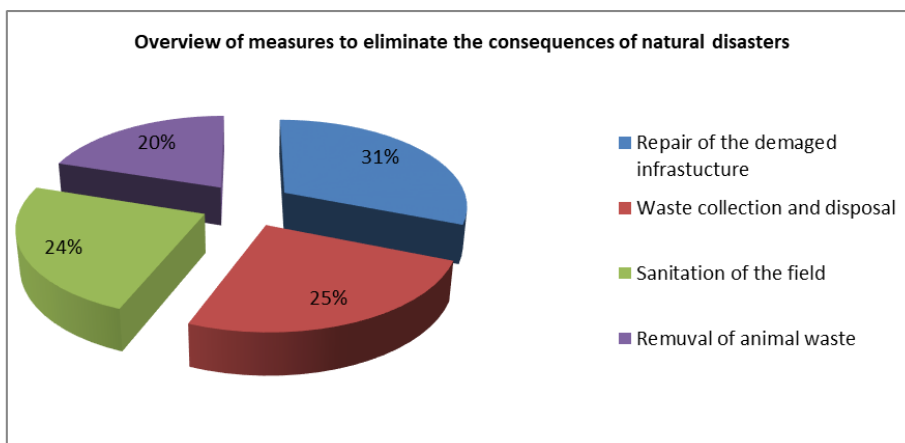
A successful solution to environmental protection problems during natural disasters can be achieved through repairing damaged capacities, removing hazardous materials, monitoring the state of the environment and implementing health and hygiene measures. An overview of operational measures for environmental protection in conditions of natural disasters is shown in graph 7.



Graph 7. Overview of operational measures for environmental protection

In order to normalize the situation and prevent the occurrence of infections and epidemics and to protect the health of the population and the environment in the threatened area, it is first of all necessary to promptly and fully implement measures to eliminate the consequences of natural disasters, repair damaged objects of the

communal infrastructure and rehabilitate the terrain in the threatened area. Review of measures for elimination of the consequences of natural disasters is shown in graph 8.



Graph 8. Overview of measures to eliminate the consequences of natural disasters

Conclusion

1. Elementary disasters in the affected area, in addition to destroying material goods and endangering the population, also cause significant environmental pollution.
2. The most significant forms of environmental pollution due to natural disasters are pollution of surface and underground water, air pollution, occurrence of large amounts of hazardous and toxic waste, and soil degradation and pollution.
3. As a result of various forms of environmental pollution, the ecological balance is disturbed, the health of the population is threatened, biodiversity is threatened, and climate changes occur at the local level.
4. Protection of the environment in the event of a natural disaster can be achieved through preventive measures, operational protection and rescue measures that eliminate dangers to people and the environment, and measures to eliminate the consequences of natural disasters.
5. High-quality implementation of preventive measures can be achieved through the construction of communal infrastructure, provision of the necessary equipment and means for the implementation of protection measures, training of rescuers and the population, implementation of health and hygiene measures, as well as appropriate and effective supervision over the implementation of prescribed protection measures.
6. Solving the problem of environmental protection during natural disasters can be achieved through repairing damaged capacities, removing dangerous and toxic materials, monitoring the state of the environment and implementing health and hygiene measures.

7. The elimination of the consequences of natural disasters in the threatened area is realized through the repair of damaged communal infrastructure facilities, the collection and disposal of waste materials, the implementation of sanitary hygiene measures and the removal of animal waste.

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