

# Population protection tasks in the event of environment pollution

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**Abstract.** Nowadays, we are struggling with floods of exceptional size and inland waters year by year, meanwhile summer is unbearable because of the drought and heat. Winters are colder and colder, storms have the power of tornadoes and there are more and more seismic activities in Hungary as well. In connection with industrial activities hazardous substances can be released into the environment. These factors put humans, the flora and fauna and the environment alike to the test, and can even destroy them. It is an important question in which fields there is an interconnection between environment protection and the protection of the population. The authors search for answers to this question in this article.

**Key Words:** environmental protection, environmental pollution, population protection.

**Preface.** Disaster management is a field of defense looking back to a past and traditions of several decades. Their connection and relation has been subject to several research projects. There are ideas implying that both are independent fields that can be split further into subsystems and in the course of the development certain segments are integrated into a larger segment, like the authority-related tasks of industrial safety into disaster management, other segments became independent systems (Vámosi et al 2013; Halász & Földi 2000; Láng 2002)

Several organizations, authorities are responsible for the security of the population, and all in all the whole society plays a role in it. It is important to examine some questions and connections of population protection and environment and environment protection belonging to the scope of disaster management/civil protection. In this article the interconnection between environmental protection and in a wider sense the protection of the population is analyzed.

**Main fields of environmental protection.** "The condition of environment protection in the given moment, the protection of the Earth, the waters, air, natural and artificial environment from negative effects affecting humans, society and the whole organic and inorganic world and all assets, values." (Nagy 2001).

Man is able to destroy the environment by pollution and also by activities not connected to pollution. Environmental pollution is a process, it always originates from somewhere, propagates in a medium, and then reaches the location of the environmental pollution and creates a condition different (in our case: worse) from the original condition. The definitions used in the process are: emission (emission from the pollution source), transmission (propagation of the pollution), and immission (totalized value of pollution at the specified location), intermediary (the medium, e.g. water, air, pollutants pass through) (Moser & Pálmai 2006).

The goal of environment protection is, taking the principle of sustainable development into consideration, the creation of environmental security as to preserve the environment for the future. One of the laws of human life is development. In the beginning man was still in close connection with the living environment, took care of its assets as this meant survival and then this balance was overturned by development and while mankind averted some dangers, created new hazards through development. In our days environment protection has to face challenges mainly in the following fields (Földi & Halász 2009): protection of air purity, water protection, soil protection, waste management, and noise and vibration protection.

**Disasters and environment pollution.** In the previous chapter we examined the factors affecting the environment that usually develop slowly, in case of a long-term exposure to danger, and we analyzed the points of environment protection that can potentially jeopardize the population. In this chapter suddenly arising, usually unexpected events, disasters contributing to the environmental load are examined. The definition of disaster is, based on Act 3 CXXVIII. 3. § clause 5. on disaster management and on the amendment of individual, related acts: "Disaster is a condition or situation, which is suitable for the announcement of an emergency or not reaching the level of the announcement of emergency, jeopardizing or impairing human lives, health, material assets, basic supplies to the population, the natural environment, natural assets in such a way or to such an extent that the prevention of or response to the damage, respectively, or the elimination of consequences exceed the response possibilities of the appointed organizations within the required cooperation scheme and requires to take special actions and the continuous and strictly harmonized cooperation of the municipalities and state organizations, and the use of international help." (Törvény CXXVIII 2011).

As it can be seen from the aforementioned definition, every disaster causes some environmental load to be corrected, remedied in the course of the response and restoration, reconstruction activities. Now let's examine these factors in view of the danger sources that are most typical of Hungary!

Flood, inland waters: in this case the soil, the flora and fauna, built-in environment, buildings, roads, bridges alike are damaged.

Geological danger sources (earthquake, landslide, implosion, change of the soil level, collapse of the embankment): in such cases as primary effect the soil and the built-in environment are damaged, including the complete infrastructure in the built-in area, and such events endanger life directly because of the destruction of the biosphere. In case of the collapse of the embankment, in addition to the soil, also the water can be polluted, and beyond the infrastructure on the mainland also the fauna of the water can be damaged and water transportation can also be hindered.

Extraordinary weather: destroys the built-in and natural environment and because of this new polluters can be created, but it can disturb the fauna as well because of the noise. Flash floods can result in high water levels.

Accidents happening during the transportation, storage of hazardous substances: primary pollutants of the air, water and soil. The hazardous substance released can destroy the flora and fauna, depending on the type of the hazardous substance. A special case are accidents involving radioactive substances that result in a hardly decomposable or permanent pollution in the air, soil and water. Because of the permanent pollution the conditions of life can be eradicated completely in the area affected. Radioactivity results in immediate and long-term health consequences in living organisms, usually with a tragic outcome.

Fire, explosions: destroy the living environment and the soil and pollute the air. The noise effects of explosions can disturb living beings and can result in permanent injuries. Fire, bushfire, forest litter fires destroy the soil and pollute the air.

Human and animal epidemics: can pollute the air and the water, depending on the transfer media, and destroy the flora and fauna.

Thus disasters can contribute significantly to the damage of the environment and can at the same time endanger human lives. Every responsible state, thus also the state of Hungary provides for the security of its citizens, which means today not only military but also environmental security. Let's examine what the protection of the population and of the material assets means and if this has any environmental aspect.

**About the protection of the population in general.** We have examined the effect of disasters on the environment. In this chapter we present one of the disaster management/civil protection activities, the protection of the population and we examine its environmental aspects. „The protection of the population is the protection of people living on a certain area in case of war, natural and civilization disasters and other extraordinary events. The goal of the protection of the population is to protect the life,

health and material assets of the population in case of the occurrence of events from harmful and destructive effects". (Hornycsek 2011).

From the professional perspective, tasks of the protection of the population can be split into two groups: individual and collective protection, in other words protection of groups.

Individual protection: means that the population is provided with personal protective equipment in an organized manner. Providing personal protective equipment includes the provision of breathing and skin protection equipment, including preventive medication using iodine and individual dose measurement.

Collective population protection tasks: can be split into local and remote protection. Remote protection is evacuation, rescuing and the related reception and resettlement. Relocation is when there is sufficient time available for the extraction of the population living in the endangered area and of the goods that cannot be protected locally, in case of rescuing the endangering effect is already present, or can occur any time, thus at such time the goal is to protect human life and the extraction of material assets from the rescued area is evacuation. A local protection task is staying in the houses, closing and sealing the doors and windows and going into the shelters. With regard to staying in the houses, closing and sealing the doors and windows it shall be mentioned that in most cases this happens individually, as this is ordered for the complete population living in an area affected by a specific danger. According to the main rule, in case of the release of hazardous substances into the air the primary method of the protection of the population is staying at home, closing and sealing the doors and windows.

The activity of reception is closely related to this, where those leaving their residence on temporary basis are supplied with foodstuffs and are accommodated and the related administration is carried out.

As we can see, the common goal of the activities aimed at the prevention of disasters and at the elimination of consequences is the protection of the people and material assets endangered, however it is also obvious that the examination of rescuing, relocation, reception alone would show only a narrow spectrum of the complex system of the protection of the population. Earlier only the aforementioned points were understood to be covered by the protection of the population, and also all the tasks are included that are in the narrow sense indispensable for the protection of the population, like alerting, informing and preparing the public. Thus the various population protection methods are complemented by all the actions that are indispensable to reach the basic goal.

Population protection tasks can be split into three groups based on the protection periods. These are the following:

- prevention and preparation tasks, that is the group of preventive tasks;
- response and damage mitigation, that is the group of active protection activities;
- the group of tasks aimed at the restoration of the original condition.

The three groups of tasks are interconnected. Using a danger-based approach, the simplest method of the protection of the population is to keep dangers far from the population, to prevent the occurrence of consequences, and this can be achieved by keeping the population far from dangers or by reducing the danger to the lowest level possible. Prevention can be implemented by using the tools of the authority and by extending the range of such tools as needed. One of the methods of the authority to be used for the protection from floods is for example construction ban in the wash land, but it is also obvious that preventive population protection based on authority methods only is not sufficient.

As an example it can be mentioned that in case of industrial accidents, 50% of the primary causes can be traced back to human mistake, 24% to technical failure, 10% to runaway chemical reactions and 16% to other external factors (Kátai-Urbán & Révai 2013). Human mistakes cannot be eliminated from this equation by authority methods, the danger awareness of the population, the cooperation of settlements and the plants there, and the prevention of intentional damage are important. However this of course does not lessen the weight of authority tasks, as events can be prevented by means of such tasks to the fullest extent possible. During the preventive period the work of the

authority is one of the most important factors that can maintain the most optimal distance between the danger and the population. The other part of preventive tasks is the complex system of preparation tasks.

The preparation tasks embrace basically the following main areas:

- preparation of the population and of the organizations participating in the protection for the active protection activities;
- making the infrastructure, materials and assets needed for the protection available;
- organization of the logistics needed for the completion of the tasks;
- planning related to the aforementioned points.

There are two directions in the field of active protection measures:

- efforts focusing on the prevention of the occurrence of the threatening event, or if this is not possible, then on the mitigation of effects;
- all the activities aimed at the elimination of the events happening and at the mitigation of the damage.

The period of active protection measures connects the implementation of the tasks of population protection and the damage prevention and cleanup, which is nothing else but rescuing. In the first part of the chapter, when we examined the professional approach to population protection, rescuing was not listed, but the goal of rescuing is the protection of the population and of the material assets, complementing classical population protection tasks.

The goals of rescuing can be:

- the prevention of further damage from occurring;
- the cleanup/elimination of the damages incurred and their consequences;
- gaining time for the implementation of classic population protection tasks, like relocation, evacuation and rescuing.

The group of tasks aimed at the restoration of the original condition (called also restoration period among professionals) covers all activities and actions that create the conditions of regular residence in the areas affected by the harmful effects. Such tasks can be:

- the restoration of the damaged infrastructure;
- disinfection (public health, epidemiology);
- ensuring the conditions needed for the function of public administration, education and health systems;
- creation of the conditions of agricultural and industrial production;
- reconstruction of properties used for the accommodation of the population and of material assets.

**Potential population protection tasks in case of environmental pollution.** It is expedient to examine the tasks of population protection to be completed in case of environmental pollution according to the types of pollution. We have found earlier that environment protection shall be maintained in at least five, clear-cut, but highly interdependent areas, therefore it is reasonable to analyze the protection of the population and of the environment based on these five areas.

*In case of air pollution* from the point of view of population protection special attention shall be paid to plants producing, using and storing hazardous substances, and situations arising in the course of air, water and land transportation needed for such activities. In case of the release of hazardous substances into the air the primary method of the protection of the population is to stay at home, close and seal the doors and windows, and then, after the danger has passed, the cleanup of the area as needed or, as the case may be, also a ban on fishing, grazing and/or hunting is possible. The population can be protected from the emission of suspended particles by personal protective equipment, by particle filter respirators. In Hungary, recently there was a major air pollution caused by the red sludge disaster on October 4, 2010, when in the areas over flooded with basic material the sludge drying was spread by the wind in big particles and this was the reason why for everyone living there and participating in the cleanup was given a breather. After the nuclear disaster in Chernobyl, because of the

propagation of the radioactive cloud, though there are no accurate data available, the total number of those evacuated exceeded 100,000 people.

In case of water pollution from the point of view of the protection of the population the basis of the decision is to check, if the water pollution affects the water used for drinking water supply. In case the population cannot be supplied with healthy drinking water locally because of the pollution, then water supply shall be ensured by cleaning or transportation. Here the calculation of the water demand and the planning of the water quantity to be supplied are critical. In the course of the calculation, in addition to the number of the inhabitants also the number of animals and also the needs of agriculture and industry shall be considered, therefore it is necessary to separate the need for drinking water and for raw water. The cleanup of the areas affected by the polluted water shall be implemented and fishing/angling shall be banned on the polluted waters. In the course of the water pollution the fish and the animals drinking from the water often die, and in the cleanup period there are activities that shall be immediately carried out to dispose of the dead animals. If water pollution is mentioned anywhere in Hungary today, then first almost all think of the cyanide pollution occurring on January 30, 2000 flowing down the Tisza River. The magnitude of the pollution is obvious from the fact that fish died beyond the Hungarian river section, even in the country of our southern neighbor, up to Belgrade. As cyanide and the heavy metals carried along with cyanide could have accumulated in the living organisms, to prevent the ingress of cyanide and heavy metals into the food chain, dead fish were continuously collected and destroyed.

In case of soil contamination, depending on the extent of the contamination it is possible that the inhabitants have to be relocated, rescued from the area, or the consumption of foodstuffs produced there and grazing, hunting and harvest shall be prohibited. The soil shall be cleaned or if it is not possible, exchanged. Access to, stay and movement in the area concerned can be prohibited. In addition to the soil recultivation, also the cleaning of the vehicles passing through the area and also the inspection of the area shall be organized. The aforementioned „red sludge disaster” caused, in addition to the pollution of the air and water also a significant soil pollution, though contrary to our preliminary assumptions, based on the inspection of MTA there was no need of complete soil exchange in the area affected by the disaster (MTA.hu 2010).

With regard to waste management the fact that in the regulation No. 292/2013 VII.26) on the rules of non-regular waste transportation and on the appointment of state organizations acting during such transportation the professional disaster management organization is the appointed authority enhances also the efficiency of the protection of inhabitants. This activity of the authority means first of all the appointment of a new service provider to replace the service(s) lost and the related collection of information and planning. In case the wastes pollute the soil and if incinerated the air of the settlement as well, the population is protected if the wastes are disposed of, if the burning of the wastes is stopped and the polluted areas are cleaned up. Also here the preparation of the population and informing the inhabitants, respectively is also a task to be completed. (\*\*\*, 2013) All in all Hungarian waste management regulations guarantee that there is no such kind of waste heap in our public areas like the ones shown by the media in Naples. In terms of waste management in Hungary it has found a big echo in the press in Hungary and therefore also the illegal waste import unveiled in the 2000ies shall be mentioned. As known, some 4,800 tons of waste were illegally transported from Germany, from the province Baden-Württemberg to Hungary for storage.

With regard to noise and vibration protection tasks the tasks of the protection of the population first seem to be hard to understand. From the point of view of the protection of the population an example that happened December 1985 shall be cited. On December 16, 1985 at dawn, next to Fábiansébestyén a natural gas well drilling took a bad turn and the well erupted. Through the well an intensive, high-pressure steam flow started, accompanied by an intense noise, which, based on records made at that time, reached 120 dB at a distance of 3 m from the well. It was possible to stop the blowout after 46 days of extreme fight, but from the point of view of our article the noise load is

significant. The activity of the authority carried out in the course of the licensing procedure of installations and plants causing noise is an important tool used in noise and vibration protection. A further possibility is to check the function of such plants and installations continuously.

It can be stated based on the aforementioned points that in the course of the events negatively affecting the environment there are tasks to be tackled in the area of water, air, soil, noise and vibration protection, including the tasks of the protection of individuals, rescuing, relocation and prevention, and the preparation of the population, and particularly important task of giving information. It covers both the citizens and animals, its planning and organization required coordinated work and systematic approach.

**Conclusions.** In the previous chapters we outlined the basis and interconnections of environmental protection and disaster management, and within disaster management the protection of the population. The most important components of our environment are the natural and built-in environment. The most important elements of natural environment are the air, water, soil that can be damages by forces of nature, and human activities as well. In the course of disasters, whether of natural or human origin, natural and environmental assets are also jeopardized.

By means of environmental protection and its various fields we can protect natural and environmental assets against effects damaging the environment. Man and basic material assets are also part of the environment. The protection of man and material assets is implemented by the protection of the population belonging to the field of disaster management. Consequently environmental protection and the protection of the population are related fields that mutually affect each other in certain fields.

With regard to prevention it can be stated that the protection of the population cannot be guaranteed by the tasks of the authority only, however it can clearly be stated in the course of the split of population protection tasks over the protection period that these tasks of the authority have clear merits during the prevention period. We have proved that the protection of the population seen in the broader sense includes not only direct tasks of population protection, but like environmental protection it covers also the protection of built-in and natural environment being indispensable for life. Environment protection contributes to disaster prevention.

The aforementioned points show that disaster management and environmental protection are interconnected at several points, thinking together can improve practical implementation significantly.

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