

Environmental emergencies: public civil protection mechanisms

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The author refers to the general goals of preventing public mechanisms of civil protection concerning environmental emergencies, namely the creation of a system ensuring the occurrence of environmental emergencies; creation of conditions for localization of dangerous factors of environmental emergencies; training of population and personnel of enterprises, personnel of rescue formations; creation of conditions for environmental emergency response and minimizing of its consequences; carrying out of measures aimed at reducing of environmental emergency risk. The following classification of current norms of modern foreign legislation in environmental risk and disaster mitigation is presented: general norms of legislative and other acts, preventive, situational, post-emergence, compensatory, and security. The following main provisions of the State strategy for environmental protection and sustainable development are defined: ecologically appropriate placement of productive forces; ecologically safe development of industry, power, transport, and municipal services; ecologically safe development of agriculture; expansion of the use of secondary resources, utilization, neutralization, and waste disposal.

Keywords: environmental emergencies, public mechanisms, environmental disasters, civil protection.

Introduction

Unsustainable environmental management and corresponding civil protection public mechanisms are the reason for environmental crises and disasters. Technical accidents and natural disasters become serious factors destabilizing the human environment. Many scientists and experts point to strengthening the connection between them and acquiring by many of them a global environmental character. The following accidents are most dangerous for environmental consequences: in the coal, oil, and gas processing industries, metallurgy, chemical, petrochemical, and microbiological industries and transport. Considerable destruction and loss of people's lives are observed in human-made accidents and during natural disasters.

It is worth noting that many scientists of Ukraine and abroad devoted their research to environmental emergencies. Among such scientists, it is necessary to note R.E. Adams, D.A. Alexander, A. M. Birk, J.A. Boscarino, C.R. Figley, B.J. Gallant. Nevertheless, in current conditions, the development of effective civil protection mechanisms of population and territories from environmental emergencies remains actual and significant.

The information and analytical basis of the research is the regulatory framework governing in the field of protection of people and territories from environmental emergencies; scientific achievements and applied achievements of scientists and practitioners of Ukraine, and near and far abroad; consolidated statistical reports of State and local authorities.

Results

The current difficult economic situation in Ukraine, many territories where technical transformation and environmental pollution led to degradation of ecosystems, deterioration of public health, and associated significant economic losses led to the need to the zoning of the territory of the country by environmental tension and development of criteria for allocation of environmental emergency zones and ecological disaster zones.

The explosions, fires, and eruptions of products during an accident in 1986 at the fourth power unit of the Chernobyl nuclear power plant that became a global disaster could be an extreme example (Birk, 1996; Adams et al., 2008). Severe social consequences accompany the deterioration of the environmental situation. First, this concerns the global deterioration of public health. The scale of the adverse impact of modern industrial production, including the development of nuclear energy on the environment, has now reached such a size that it must be noted that there are irreversible changes in practically all components of the geo- and biosphere of the Earth: air, water, soil, plant and animal world. In other words, we are talking about pathological changes in the biosphere on a global scale.

Today, pollution of the environment by various radioactive waste is also becoming a serious global environmental problem. Many major environmental disasters are not too late to be prevented. For example, at sea, through the creation of technologies that ensure the safe rise from the bottom of the seas of buried shells and bombs filled with mustard gas and other poisonous

substances and their subsequent destruction, and through quickly clean of seas from petroleum products and products of chemical industries, nuclear installations, and nuclear waste. On land – by creating new approaches to restore the ozone layer by introducing new technologies to increase its concentration in the stratosphere, by creating new technologies and technologies that exclude the use of fossil fuels, and by creating new technologies to combat forest fires (Alexander & Klein, 2001; Gallant, 2006).

Environmental emergencies are very diverse and cover almost all aspects of human life and activities. By the nature of their phenomena, they are divided into four main groups.

1. Land emergencies (soil, subsoil, landscape):

- Catastrophic subsidence, landslides, collapses of the Earth's surface due to subsoil production during mining.
- Presence of heavy metals and other harmful substances in the soil above their maximum permissible concentrations.
- Intensive soil degradation, desertification in vast areas due to erosion, salinization, waterlogging of soils.
- Crises related to the depletion of non-renewable natural resources.
- Critical situations are caused by the overflowing of storage facilities with industrial and household waste and pollution of the environment.

2. Emergencies related to changes in composition and properties of the atmosphere (air):

- Abrupt changes in weather or climate due to human activities.
- Exceeding the maximum permissible concentrations of harmful impurities in the atmosphere; temperature inversions over cities; acute oxygen famine in cities; significant excess of the urban noise limit.
- Formation of acid precipitation zone; depletion of the atmosphere ozone layer; a significant change in the atmosphere transparency.

3. Hydrosphere (aquatic environment) emergencies:

- Severe shortage of drinking water due to depletion or contamination of water sources;
- Depletion of water resources necessary for the organization of domestic water supply and provision of technological processes;
- Disruption of economic activities and ecological balance due to pollution of the seas and oceans.

4. Biosphere change emergencies:

- Disappearance of species of animals and plants sensitive to changes in habitat conditions;
- Loss of vegetation in a vast area;
- Dramatic change in the ability of the biosphere to reproduce renewable resources;
- Mass death of animals (Kirchsteiger, Christou & Papadakis, 1998; Gallant, 2006).

The current environmental situation in Ukraine can be described as crisis one, and the main reason for this is negligence and disregard for the objective laws of development and reproduction of the state natural resource complex. Besides, the following principal reasons for the deterioration of the environmental situation within Ukraine are distinguished:

Lack of effective laws for protecting the natural environment and laws for their effective implementation.

- Lack of effective state control over the implementation of environmental laws and system of adequate punishment for environmental damage.
- Lack of effective economic incentives for resource and energy conservation.

Sharp acceleration of negative economic, socio-political and environmental processes connected with the largest man-made disaster – the accident at the Chernobyl nuclear power plant, which entailed a situation approaching the level of global environmental catastrophe.

- Extensive use of all types of natural resources, lasting for decades, excluding natural regions' ability in self-healing and self-cleaning.

Long-term administrative and command concentration of attention on small areas of a large number of powerful industrial complexes accelerated the implementation of gigantic plans of intervention into the natural environment.

- "Re-chemistry" of agriculture and false foundations of its organization.

It increases the volume of land reclamation and its implementation in huge areas' volumes without adequate scientific justification and efficient technologies.

- Lack of long-term environmental assessments of all plans and projects to develop industry, energy, and transport.
- Use of old technologies in most industries and equipment requiring long-term replacement.
- High share of resource and energy-intensive technologies, their implementation and building up cheaply – without the construction of treatment facilities.
- Lack of continuous objective information on environmental status and causes of degradation.
- Deficient level of environmental education of not only population, but also heads of enterprises, governmental organizations, generally low level of ecological consciousness and culture (Deschamps, Momas, & Festy, 1995; Birk, 1996; Alexander & Klein, 2001; Adams, Figley & Boscarino, 2008).

The indicative structure of environmental emergencies in Ukraine in 2020 is shown in Fig. 1 (<https://www.dsns.gov.ua>).

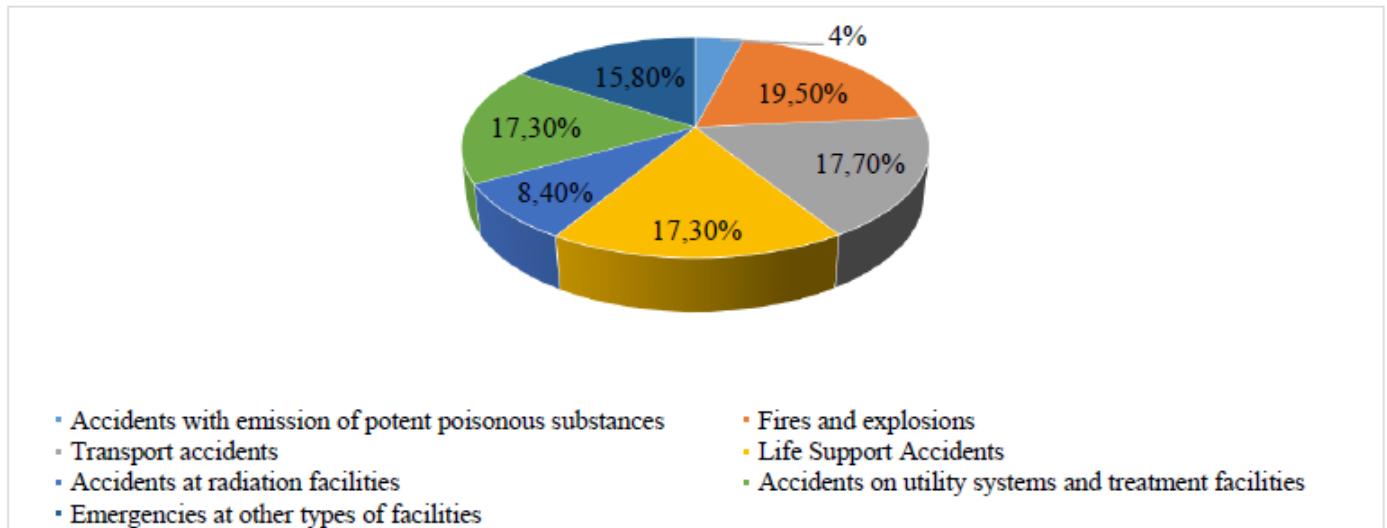


Fig. 1. The structure of environmental emergencies in Ukraine in 2020

The guarantee of technological and environmental security is determined primarily by the development of safe technologies, quality of production, and availability of resources used to reduce the likelihood of dramatic consequences of its functioning. The author refers to the general goals of preventing public civil protection mechanisms concerning environmental emergencies the following.

1. Creation of a system ensuring (excluding) the occurrence of environmental emergencies.
2. Creation of conditions for localization of dangerous factors of environmental emergencies, that is, building up forces and means as soon as possible, including for emergency evacuation of the population.
3. Training of population and personnel of enterprises, personnel of rescue formations.
4. Creation of conditions for environmental emergency response and minimizing its consequences.
5. Carrying out of measures to reduce environmental emergency risk, including environmental audit and environmental expertise (both state and public) (Alexander & Klein, 2001; LaTourrette, Peterson, Bartis, Jackson & Houser, 2003).

Accordingly, the main provisions of the State strategy for environmental protection and sustainable development are defined as follows.

1. Ecologically suitable placement of productive forces.
2. Ecologically safe development of industry, power, transport, and municipal services;
3. Ecologically safe development of agriculture.
4. Expansion of the use of secondary resources, utilization, neutralization, and waste disposal.
5. Improvement of public mechanisms of civil protection in the field of environmental emergencies (Birk, 1996; Mitchison & Papadakis, 1999).

Accordingly, the state's efforts to counter threats related to emergencies should focus on the following aspects.

1. Development of scientific and methodological bases for forecasting and assessing risks (threats) related to environmental emergencies.
2. Development of methods and technologies for managing natural and human-made risks.
3. Developing an acceptable risk strategy in various areas of economic and military activity.
4. Establish a regulatory and legal framework for assessing risks in the country's natural and human-made spheres.
5. Development and functioning of a unified state system for prevention and elimination of environmental emergencies.
6. Properly informing the public about environmental emergencies and training them in this area's actions.
7. Social protection of population affected by environmental emergencies.
8. International cooperation in preventing environmental emergencies and protecting the population and economic facilities from natural and human-made hazards (Guidotti, 1995; Ligon, 2006).

Accordingly, departmental environmental expertise should be carried out following the leadership of the ministry or department. Its conclusions are valid only within the relevant departmental structure and provided if they do not contradict the state environmental expertise's conclusions.

Environmental audit is increasingly practiced abroad and in Ukraine, at the initiative of the enterprise itself, whose management is concerned about the state of environmental protection, responds to negative public opinion, or wants to promote its products to foreign markets.

Scientific, environmental expertise is carried out at the initiative of scientific institutions, universities, or specific groups of scientists.

Public environmental expertise is carried out at public associations' initiative and is carried out by non-State actors.

The goals of public and state environmental expertise traditionally coincide; however, their tasks are different. As a rule, public expertise is intended to draw state bodies' attention to specific objects, especially to the wide dissemination of scientifically based information about its potential environmental danger. (Birk, 1996; Kirchsteiger, Christou & Papadakis, 1998).

The main result of the project examination is an expert opinion, which should reflect the following aspects.

1. Data characterizing the state of the environment before starting the project and the technical features of the project.
2. A list of environmental impacts of the designed object, including primary, secondary and long-term effects, irreversible and inevitable consequences. At the same time, quantitative and qualitative indicators characterize impacts.
3. Data on the impact of various versions of the designed structure on the natural environment's initial state.
4. Compensatory measures, including technical and/or financial ones, provide for reducing negative environmental impacts (Deschamps, Momas & Festy, 1995; Adams, Figley & Boscarino, 2008).

Post-project examination examines existing equipment, enterprise, construction, and the applicable legislation. Post-project expertise's main task is to assess the impact of a functioning environmental object and determine the degree of risk to human health and environmental quality.

In other words, the following parameters and characteristics of the facility parameters and characteristics of the object operation are checked.

1. The requirements of environmental legislation.
2. The environmental quality standards.
3. The provisions and conclusions of the project environmental assessment.

The classification of current norms of modern foreign legislation in environmental risk and disaster mitigation can be presented as follows (Birk, 1996; Guidotti, 1995).

1. General norms of legislative and other acts – they formulate a wide range of relations and establish general principles of environmental behavior, taking into account the prevention of risks and ensuring the security of the population and territory.
2. Preventive ones – they include a large number of extent norms in the field of expertise, impact assessment, licensing, permit system, technology assessment in various environmental projects, various plans, programs, projects, preliminary hearings, and other measures implemented at the stage of planning, forecasting, placement, coordination and impact assessment of environmental emergencies. The preventive measures are based on a system of norms and standards that establish the acceptability of environmental risk (permissible loads on human health and environment).
3. Situational ones – norms of legislative and other legal acts that mediate activities for direct preparation and response to environmental emergencies related to protecting population and territories.
4. Post-emergency ones – they establish a special regime in a separate, damaged (degraded) territory and provide a system of measures to withdraw such territories from the crisis.
5. Compensatory ones – they provide a system of insurance of risks, social payments.
6. Security ones – they establish rules of civil, criminal, and administrative liability and procedures for their imposition. It is undoubtedly necessary to resort to integrate the most effective norms and procedures of foreign legislation into the national legal system of Ukraine, taking into account the developed experience of legal regulation of relations concerning environmental emergencies when improving the relevant national Ukrainian legislation and its provisions of international legal acts and instruments.

Incorporation of certain norms, principles, and procedures of specific foreign laws into Ukrainian legislation takes into account the national-territorial, economic, political, and historical features of the Ukrainian legal system.

Conclusions

Considering the above mentioned, public civil protection mechanisms concerning environmental emergencies presuppose certain governmental and non-governmental institutions.

The experience in the field of environmental emergencies shows that public mechanisms of civil protection must include the following types of state and legal events:

- Organizational measures – a set of actions aimed at identifying ecologically hazardous objects and activities, natural zones and territories, and are characterized by a deterioration of the environmental situation and preventing their harmful effects on human health and the environment;
- Regulatory measures – the activities of State bodies concerning organizational, managerial, control, and supervision functions for safe operation production, scientific and other activity in the field of ecology and environmental security;
- Interim measures – a set of actions aimed at prevention and cessation of environmentally hazardous activities and environmental offences.

In particular, they include the following measures: – Cessation of environmentally hazardous activities under systematic violation of environmental security standards; – liability (disciplinary, administrative, criminal one) for pollution of natural environment and violations of requirements and norms concerning environmental security;

- Property liability for causing harm to the health and property of citizens and their judicial authorities.

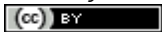
References

- Adams, R.E., Figley C. R., & Boscarino J.A. (2008). The Compassion Fatigue Scale: Its Use With Social Workers Following Urban Disaster, *Research On Social Work Practice*, 18, 3, 238–250.
- Alexander, D.A. & Klein, S. (2001). Ambulance personnel and critical incidents. Impact of accident and emergency work on mental health and emotional well-being, *British Journal of Psychiatry*, 178, 76–81.
- Birk, A.M. (1996). Hazards from propane BLEVEs: An update and proposal for emergency responders, *Journal of Loss Prevention in the Process Industries*, 9, 2, 173–181.

- Deschamps, S., Momas, I., & Festy, B. (1995). Mortality amongst Paris fire-fighters, *European Journal of Epidemiology*, 11, 643–646.
- Gallant, B.J. (2006). *Hazardous waste operations and emergency response manual*, John Willey & Sons, New Jersey.
- Guidotti, T.L. (1995). Occupational mortality among fire-fighters: assessing the association, *Journal of Occupational and Environmental Medicine*, 37, 1348–1356.
- Kirchsteiger, C., Christou, M.D., & Papadakis, G. (1998). *Risk assessment and management in the context of the Seveso II directive*, Elsevier, Amsterdam, The Netherlands.
- Kropyvnytskyi, V.S., Maistro, S.V., Shvedun, V.O. & Stankevych, S.V. (2020). Prognosis of emergencies and their impact on population and territory of Ukraine. *Ukrainian Journal of Ecology*, 10(4), 218–224.
- LaTourrette, T., Peterson, D.J., Bartis, J.T., Jackson, B.A., & Houser, A. (2003). *Protecting Emergency Responders, Volume 2: Community Views of Safety and Health Risks and Personal Protection Needs*, RAND, Santa Monica – Arlington – Pittsburgh.
- Ligon, L. (2006). Infectious diseases that pose specific challenges after natural disasters: A review, *Seminars in Pediatric Infectious Diseases*, 17, 36–45.
- Mitchison, N. & Papadakis, G. (1999). Safety management systems under Seveso II: Implementation and assessment, *Journal of Loss Prevention in the Process Industries*, 12, 43–51.
- State Emergency Service of Ukraine. Available from: <https://www.dsns.gov.ua>

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