

STRATEGIC ENVIRONMENTAL ASSESSMENT AS A PREVENTIVE MECHANISM TO ENSURE ECOLOGICAL SAFETY IN THE DEFENCE SECTOR

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Purpose. The regulatory framework to introduce the practice of strategic environmental assessment and its relationship to development programs of administrative units of the state government considered and analyzed. **Methodology.** Dependencies and risks attracting demilitarized and abandoned former military facilities to comply with environmental safety and sustainable nature of the organization due to lack of information on their environmental state are grounded. **Results.** The content and improved method of assessment of the environmental impact of military activities by combining the technologies of modeling of geographic information systems and calculation of the index level of environmental safety for the implementation of further phases of the strategy rehabilitation of military sites and control their involvement in economic use described. **Originality.** The procedure and specification features stages of the Strategic Environmental Assessment described on the basis of the methodology for assessing the impact on the environment and rehabilitation of former military facilities. **Practical value.** The application of strategic assessment will prevent environmentally hazardous effects on the environment or the onset of emergencies, to make objective decisions about choosing alternative use or withdrawal (conservation) of former military facilities. *References 23, figures 1, tables 1.*

Key words: ecological safety, strategic environmental assessment, military objects, environmental impact assessment.

ВИКОРИСТАННЯ СТРАТЕГІЧНОЇ ЕКОЛОГІЧНОЇ ОЦІНКИ ЯК ПРЕВЕНТИВНОГО МЕХАНІЗМУ ЗАБЕЗПЕЧЕННЯ ЕКОЛОГІЧНОЇ БЕЗПЕКИ НА ТЕРИТОРІЯХ ВІЙСЬКОВИХ ОБ'ЄКТІВ

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Розглянуто і проаналізовано нормативно-правове підґрунтя запровадження практики проведення стратегічної екологічної оцінки та її зв'язок із програмами розвитку адміністративно-територіальних одиниць устрою держави. Наведено і обґрунтовано залежності та ризики залучення покинутих і демілітаризованих територій колишніх військових об'єктів щодо дотримання рівня екологічної безпеки та організації збалансованого природокористування у зв'язку з відсутністю інформації щодо їх екологічного стану. Розкрито зміст і удосконалену методику проведення оцінки впливу на навколишнє середовище військової діяльності шляхом поєднання технологій моделювання географічних інформаційних систем і розрахунку індексу рівня екологічної безпеки для реалізації подальших етапів стратегії реабілітації територій військових об'єктів та контролю залучення їх до господарського використання. Описано процедуру та специфікацію особливостей етапів виконання стратегічної екологічної оцінки на основі поданої методики оцінки впливу на навколишнє середовище і реабілітації територій колишніх військових об'єктів. Застосування стратегічної оцінки дозволить попередити екологічно небезпечні наслідки для довкілля чи настання надзвичайних ситуацій, приймати об'єктивні рішення щодо вибору варіанту використання або вилучення (консервації) територій колишніх військових об'єктів.

Ключові слова: екологічна безпека, стратегічна екологічна оцінка, військові об'єкти, оцінка впливу на навколишнє середовище.

PROBLEM STATEMENT. In modern conditions critically important is to develop effective tools for implementing the strategic environmental assessment (SEA), which is the basic foundation of eco-sustainable development for society and nature. The relevant provisions are stipulated in the Article 1 of the Protocol on Strategic Environmental Assessment [10], which is

ratified by the Law of Ukraine "On ratification of the Protocol on Strategic Environmental Assessment to the Convention on the Assessment of the Environmental Impact in a transboundary context" from 01.07.2015 №562 -VIII [4]. The Article 1 states that the purpose of the Protocol is to ensure a high level of environmental protection, including health by taking into account

relevant issues in the development of plans and programs, policies and legislation; establishing clear procedure for public participation in SEA, taking into account in measures and instruments applied for sustainable development [5, 12, 17].

EXPERIMENTAL PART AND RESULTS OBTAINED. The Law of Ukraine "On Basic Principles (Strategy) of State Environmental Policy for the Period until 2020" (adopted by the Verkhovna Rada of Ukraine on 21 December 2010) defined the principles of the new approach in environmental policy in Ukraine in the framework of reforms being implemented in the process of association with the European Union (EU) [3]. The SEA law is mentioned as one of the basic principles of the national environmental policy instruments for implementation of the Strategy. One of the indicators of Goal 4 of the Strategy "Integration of environmental policy and improvement of integrated environmental management" is the indicator "Share of government, industry, regional and local development programs undergone strategic environmental assessment".

The ability to use the areas of the former disposition of the Strategic Missile Forces (SMF) and their continued presence as part of the government, industry, regional and local development programs [5, 9, 12] is consistent with the provisions of National Environmental Policy of Ukraine till 2020 [11] and the Protocol on Strategic Environmental Assessment [10]. Appropriate methods and criteria for assessing environmental safety of the territories of the former SMF facilities, informed recommendations for their functioning, improvement, and rehabilitation should be worked out.

The stages of evaluation the environmental impacts of SMF sites and their contents are described and discussed in [13]. Environmental assessment allow tracing changes of ecological situation at the territories of abandoned SRF sites, assess the negative impacts and implement the measures to minimize these sites. The stages of SEA include environmental monitoring of a SMF site, analysis and assessment of the impacts on the environment, development of measures to ensure environmental safety, identification and study areas of land use. The boundaries and areas of the spread contamination is measured and analyzed by preparing GIS models based on spatial interpolation method. The use of the term index ($I_{peб}$), which is calculated by summing of indices of the formula [13, 14] is proposed for the comprehensive assessment of environmental safety of the territory of the abandoned SMF sites:

$$I_{peб} = D + I + G + S + R, \quad (1)$$

D – weighted total reduced concentration factor; I – weighted integrated pollution index of vegetation; G – weighted geological base area and transit potential of the underlying rocks; S – weighted pollution area ; R – weighted hydrological mesh density.

Determining the level of environmental safety is the final stage of a comprehensive evaluation. For this purpose the 5-tiered scale is developed (Table. 1).

Table 1 – Scale integrated assessment of ecological state of territories

Level	Category of environmental safety	The value $I_{peб}$ (weighted)
1	high level	0-10
2	sufficient level	11-25
3	satisfactory level	26-50
4	low level	51-75
5	very low level	76-100

As shown in the Table 1, the ranges of the degree of danger of contamination are allocated and graduation standard name is assigned for different levels of pollution and degradation of the areas [13]. Such tools can be used in the creation of methodology for SEA and development of training programs of the relevant professional personnel. In particular, the results as a "formula for the integrated assessment of the degree of chemical contamination of vegetation" and "formula for a comprehensive assessment of environmental safety areas" used in the educational process of the National Aviation University at the Department of Ecology for the curricula of the discipline "Environmental Impact Assessment" for students of specialty 6.040106 "Ecology, Environmental Protection and Balanced Nature Use" as well as in the educational process of the Kamyanets-Podilsky Ivan Ohienko National University in the department of "Ecology" ain curricula disciplines "environmental monitoring" and "environmental impact assessment" for students of specialty 6.040106 "Ecology, Environmental Protection and Balanced Nature."

The incorporation of territories of the former SRF sites into plans (programs) of proposed investments means their consideration through the SEA procedures in the context of the long-term and cumulative effects [1, 5, 12, 20-23].

The SEA procedure (based on the experience of Canada, the EU [2, 15, 18-23]) includes six stages: preparatory, decisive, environmental evaluation, comparative analytical, documentary synthesis, monitoring (Fig. 1). The Procedure and stages of the SEA projects that incorporating abandoned SMF territories consist of:

Preparatory stage. When a decision on the need of the SEA for the proposed plan/program adopted the free access to information and the possibility to make changes/amendments in proposed program for a working group of qualified experts as well as executive authorities involved in environmental protection, stakeholders and the public shall be unconditionally granted. In the course of SEA process the public shall be kept.

Decisive stage. A scope SEA shall be outlined, the main environmental threats of the area covered by the project/program and environmental components that are most vulnerable shall be identified; the boundaries and relationships of natural, social, economic, cultural resources, which hypothetically could affect the program shall be considered. Based on the consultations with the competent environmental the terms and scope

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of the considered issues shall be presented in the environmental report [7, 15].

Ecological evaluation stage includes identification of parameters and indicators for the environmental assessment of the plan/program. The advantages and weaknesses of the existing environmental state, opportunities and threats that may affect the plans/programs are reflected in the SWOT-analysis [6, 7, 15]. In this publication the features of the formation and development of environmental problems in the area, the nature of change for working out effective preventive mechanisms that will be included in the development program are studied

Comparative Analysis phase. The Working Group made analysis of legislation, the compliance of the strategic plans and programs of with the environmental objectives of the adopted Strategy. The obtained results of the evaluation were discussed with the public in order to obtain amendments and proposals. The natural and anthropogenic factors that may directly or indirectly affect the change of environmental situation in the region.

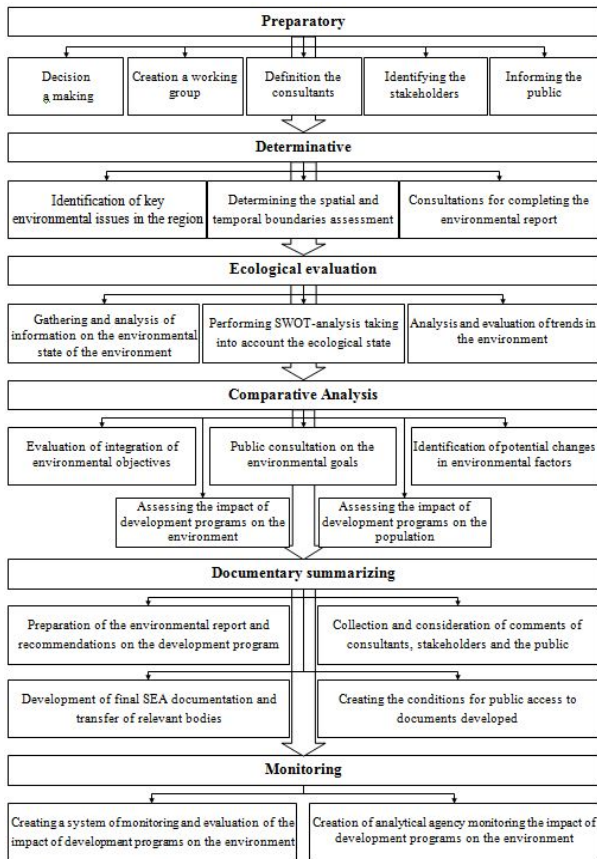


Figure 1 – Stage of the SEA with consideration of the former SMF area

Documentary synthesis stage. Prepared environmental report outlining possible significant environmental impacts and reasonable alternatives to the proposed program shall be outlined and draft program shall be discussed / consulted with competent environmental authorities, stakeholders and public. The environmental report and the results of the consultations shall be taken into account in making final draft

program. Once the program is adopted, the competent environmental authorities and the public shall be informed and provided the access to relevant information.

The monitoring stage. In order to identify unforeseen adverse effects the likely significant environmental impacts of the program shall monitored at an early stage. For this SEA documentation provides guidelines on creating systems and analytical agency to monitor the impact of development programs on the environment [7, 15].

For example, the estimated area of abandoned SMF sites in the Khmelnytska oblast that requires rehabilitation is 5373439 m².

To restore this area to the natural conditions requires integration of the research monitoring, eliminate pollution and restoration of ecosystems into a single component by constructing a logical sequence of actions on the rehabilitation activities: the survey and decontamination > decontamination and dismantling > reclamation. Reclamation involves two stages: first - the physical, the second - biological. During biological remediation environmentally sound indicators of the deposits of soil aeration zone and aquifer restoration, soil structuring, accumulation of humus and nutrients shall be achieved. Works of this phase is carried out according to the intended use of reclaimed territory.

The assessment of environmental safety of sites of the former missile forces, ways of comprehensive rehabilitation of disturbed areas, environmental, economic and social recommendations for their use allow inclusion of these sites in the plans (programs) of Khmelnytska oblast using as a tool the strategic environmental assessment carried out by the Department of Environment and Natural Resources Khmelnytskyi Oblast state administration.

CONCLUSIONS. The effective tool to make final decisions about choosing the alternative use or withdrawal (conservation) sites of the former SMF is a complex combination of the results of the relevant studies and environmental safety index I_{pe6} . Use of the former SMF sites and their presence as an element of national, sectoral, regional and local development programs must comply with the Main Principles (Strategy) of the State Environmental Policy of Ukraine till 2020 and the UN ECE Protocol on Strategic Environmental Assessment. The inclusion of former SMF sites in the development plans/programs (applications) is to be done on the basis of their strategic environmental assessment that includes six stages: preparatory, decisive, environmental evaluation, comparative analytical, documentary synthesis, monitoring.

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ИСПОЛЬЗОВАНИЕ СТРАТЕГИЧЕСКОЙ ЭКОЛОГИЧЕСКОЙ ОЦЕНКИ КАК ПРЕВЕНТИВНОГО МЕХАНИЗМА ОБЕСПЕЧЕНИЯ ЭКОЛОГИЧЕСКОЙ БЕЗОПАСНОСТИ НА ТЕРРИТОРИЯХ ВОЕННЫХ ОБЪЕКТОВ

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Рассмотрены и проанализированы нормативно-правовые основы внедрения практики проведения стратегической экологической оценки и ее связь с программами развития административно-территориальных единиц устройства государства. Приведены и обоснованно зависимости и риски привлечения брошенных и демилитаризованных территорий бывших военных объектов относительно соблюдения уровня экологической безопасности и организации сбалансированного природопользования в связи с отсутствием информации об их экологическом состоянии. Раскрыто содержание и усовершенствованна методика проведения оценки воздействия на окружающую среду военной деятельности путем объединения технологий моделирования географических информационных систем и расчета индекса уровня экологической безопасности для реализации последующих этапов стратегии реабилитации территорий военных объектов и контроля привлечения их к хозяйственному использованию. Описана процедура и спецификация особенностей этапов выполнения стратегической экологической оценки на основе представленной методики оценки воздействия на окружающую среду и реабилитации территорий бывших военных объектов. Применение стратегической оценки позволит предупредить экологически опасные последствия для окружающей среды или наступления чрезвычайных ситуаций, принимать объективные решения по выбору варианта использования или изъятие (консервации) территорий бывших военных объектов.

Ключевые слова: экологическая безопасность, стратегическая экологическая оценка, военные объекты, оценка воздействия на окружающую среду.