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Protection of mineral resources under martial law: Problems of administrative-legal and criminal-legal support

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Abstract. The purpose of the study was to identify and analyse key administrative and criminal problems in the field of subsoil protection under martial law, and to develop proposals for reducing the level of offences and combating corruption. The methodology covered an integrated approach, including analysis of current legislation, processing of official statistics and expert surveys. The main factors affecting the effectiveness of law enforcement and control over the use of subsoil resources were identified, gaps in the regulatory framework were identified, and the effectiveness of existing tools for combating violations was assessed. The study involved 15 experts: lawyers, representatives of law enforcement agencies and specialists in the field of public administration. The results showed that the situation with subsurface protection has progressively become more complicated: the criticality indicators of individual problems have increased from "significant" to critical. The most important areas of improvement were the creation of transparent administrative and legal procedures and effective counteraction to corruption groups. The change in the configuration of threats is characterised: from mostly moderate manifestations to a combination of significant and critical conditions, which are aggravated by complementary control failures. The actual scale of law enforcement has been established. The proposed recommendations are aimed at strengthening control, updating the regulatory framework, and introducing electronic tools for recording the activities of subsurface users. The practical significance of the study lies in the fact

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that its results can become the basis for making managerial decisions aimed at ensuring legality and transparency in the use of natural resources even during a difficult period of martial law

Keywords: protection of mineral resources; martial law; administrative and legal problems; criminal and legal problems; corruption; paired comparisons; regulatory framework

Introduction

Countering criminal offences in the field of subsurface use and protection requires a set of organisational, operational-search, and other measures aimed at constant monitoring of the operational situation at subsurface use facilities and along the line of work to respond in a timely manner to negative changes, detection, prevention, and disclosure of criminal offences. Subsurface protection is a critical component of environmental safety and rational use of natural resources in Ukraine. Mineral resources constitute an object of property rights of the Ukrainian people – Article 13 of the Constitution of Ukraine (1996), so the state is obliged to ensure their protection both in peacetime and in special conditions, such as a pandemic or martial law. Since 2019, the situation in the field of subsurface use has undergone drastic changes: if in the pre-war period (2019) the main challenges were to improve outdated regulation and combat illegal mining, then in 2020-2021 (the period of the COVID-19 pandemic) quarantine restrictions were introduced, and in 2022-2025 (the period of martial law) there were unprecedented threats caused by a full-scale war.

When considering the issues of subsurface protection from the standpoint of an interdisciplinary approach, then it is important to turn not only to the administrative-legal and criminal-legal planes, but also to the socio-legal dimension. Thus, the deterioration of the efficiency or total destruction of the system of control over the use of mineral resources during martial law and in the long-term post-war period leads to complex consequences. This is an imbalance of the ecological balance, a decrease in available economic resources and the appearance of significant social tension at the local level. However, the deterioration of the environment and the lack of strategic resources will lead to a decrease in confidence in the state regulator and create the risk of prolonged destabilisation in society.

Criminalisation of the facts of illegal use of mineral resources can perform a dual function. This is a powerful legal tool for protecting national heritage and a means of preserving the economic security of regions and their social stability. The onset of martial law on the level of public environmental safety should be considered as a complex social phenomenon. In this context, it includes a complex relationship between legal mechanisms for environmental protection, the sustainability of local communities, and the state's ability to prevent environmental threats. The implementation of this relationship requires a comprehensive adaptation of existing regulatory instruments, including administrative and criminal measures, to ensure their effective operation in the conditions of war and post-war reconstruction.

Notably, the issue of administrative and legal regulation of subsurface use was considered by O.I. Lysiak (2021), who analysed in detail the legal conflicts that arise in the process of issuing permits for the development of minerals. The expediency of updating the mechanisms of criminal legal response to criminal offences against the environment was outlined in the study by O.O. Dudorov and R.O. Movchan, (2020), who proposed to strengthen responsibility for the illegal use of natural resources. For its part, M.I. Panov *et al.* (2021) emphasised the need for a clear definition of the object of a criminal offence, especially with regard to the environmental component. When there is a threat of illegal or uncontrolled use of mineral resources, society begins to realise the weight of transparent procedures and effective control mechanisms. As a result, this encourages deep reform not only of individual legislative acts, but also forms a request for a general increase in legal awareness – from officials and businesses to ordinary citizens, who are increasingly demanding that the authorities protect national interests and preserve natural resources for future generations.

F.A.F. Alazzam and M.F.N. Alshunnaq (2023) examined the impact of the latest challenges on legal training, emphasising that the pandemic has become a catalyst for the digital transformation of the legal sphere. The researchers emphasised that the transition to remote formats and digital services requires lawyers not only knowledge of legislation, but also developed creative thinking and the ability to integrate technological solutions into law enforcement practice. In the context of our research, these conclusions are relevant for the block of administrative and legal problems, because the effectiveness of procedures and control mechanisms largely depends on the competence of specialists who can design and maintain transparent digital tools for monitoring subsurface use. Yu.A. Turlova and H.S. Polischuk (2020) focused on criminalising illegal amber mining, describing the legal elements of crimes and typical schemes of illegal activities. Such approaches can only be effective if they are integrated with unified administrative and legal procedures and digital control tools, since local oversight without proper coordination and information support can leave room for avoidance of liability. Ultimately, both studies complement the vision of ways to reduce risks in the field of subsoil protection: the first through the training of qualified personnel with digital skills, and the second through the improvement of practices for detecting and stopping criminal violations. In addition, as an example, M.V. Stelmakh (2017) noted that the qualification of illegal mining of local minerals still raises many questions in law enforcement activities due to the inconsistency of the norms of the Criminal Code and bylaws.

Apart from that, as noted by D. Makovicka and D. Makovicka (2014), engineering solutions should be integrated into legal subsurface use regimes and environmental impact assessment; this reduces damage from legal work and facilitates the detection of anomalies inherent in illegal mining. Secondly, the determinants of industry efficiency lie in the quality of regulation and human resources capacity of the public service. In the absence of transparent procedures, digital registers and responsibility, institutions lose out to criminal networks (Kryshtanovych *et al.*, 2022a; 2022b; Leonova, 2025). Thirdly, comparative studies by A.K. Gupta (2024), and C.F. Neto *et al.* (2024) proved that without interagency coordination, remote sensing monitoring, and the inevitability of punishment, illegal mining is replicated even after one-time raid campaigns.

But despite such attention, there is an acute problem among researchers to rethink the problems of administrative-legal and criminal-legal support, considering the martial law in Ukraine. The fact is that the subsurface contains strategically important minerals – from energy resources (coal, oil, gas) to building materials and rare minerals. During the period of martial law, the need for these resources becomes even more urgent, since their rational use depends on ensuring defence capability, the functioning of industry and the restoration of damaged infrastructure. Any violations related to mineral resources harm not only the environmental balance, but also weaken the economic and military potential of the state. As a result of military aggression, part of the Ukrainian territories was under the temporary control of the occupation administrations, which leads to systematic and uncontrolled theft of mineral resources: from unauthorised mining and quarrying to the removal of valuable minerals. This not only reduces national natural reserves and causes irreparable damage to the environment, but also creates precedents when criminals avoid responsibility, because they are outside the zone of Ukrainian justice.

Accordingly, the purpose of this study was to identify and further analyse key administrative and criminal problems in the field of subsoil protection under martial law, and to develop proposals aimed at reducing the level of offences and improving the effectiveness of countering corruption. The objectives of the study were to analyse key macroeconomic factors that affect the effectiveness of law enforcement and control over the use of mineral resources, identify gaps in the regulatory framework, and evaluate the effectiveness of existing tools to counteract violations.

Materials and methods

The paper used a comprehensive approach that combines qualitative and quantitative methods. Initially, four key issues (P1, P2, P3, and P4) were identified based on expert opinions. Fifteen experts were involved: practising lawyers, representatives of law enforcement agencies, and specialists in the field of public administration. All had at least five years of experience in subsurface use and proven practical involvement in cases related to martial law. The survey was conducted in November-December 2023, and focus group approvals were conducted in January 2024. Prior to participation, written informed consent was obtained; voluntary participation, anonymity, and confidentiality were ensured. All procedures were in accordance with the International Code of market, public and social research and data analysis ICC/ESOMAR (2025). The survey was conducted in two stages: completing structured questionnaires with scores of 1-3 points for three periods (until 2022; 2022; 2023-2024) and subsequent focus groups to coordinate responses. Estimates are aggregated through binary logical matrices to the final indicators by period; in the future, the shares of expert estimates of the "minimum", "moderate", and "high" levels were summarised and their dynamics were analysed.

Within each period and each problem, probabilities were determined by expert means (through legal specialists, representatives of regulatory authorities, etc.) (these probabilities were designated as m_{ij}), with which the problem can be considered:

- 1 (minimal problems) – the problem has almost no effect on the effectiveness of subsurface protection;
- 2 (significant problems) – the problem has noticeable effect, but there are mechanisms to partially contain it;
- (critical problems) – the problem has become large-scale, systemic in nature and requires an immediate response.

The study was based on the analysis of key laws and regulations governing subsurface use under martial law. The main source was Law of Ukraine No. 2805-IX "On Amendments to Certain Legislative Acts of Ukraine on Improving Legislation in the Field of Subsoil Use" (2022), which entered into force in March 2023. In the field of administrative responsibility, the provisions of articles 57 and 58 of the Code of Ukraine on Administrative Offences (1996), which define sanctions for illegal use of mineral resources, were used. Section 8 of the Criminal Code of Ukraine (2001), which covers crimes against the environment, in particular illegal mining and storage of minerals, was also analysed. Data from the Unified State Register of Court Decisions (2025) reflecting administrative and criminal practice in 2022-2024, and reports from the Office of the Prosecutor General of Ukraine (2024) on investigations in the field of subsoil use, were used.

Results and Discussion

The full-scale military aggression that began in February 2022 put Ukraine in emergency conditions of martial law. This dramatically changed the priorities of the national policy, including in the field of subsurface use and subsurface protection. On the one hand, there is an urgent need to meet the country's internal needs for minerals (energy resources, building materials for restoration, strategic minerals for defence, etc.). On the other hand, military operations have complicated the normal functioning of the industry and its control. In response to the challenges of wartime, the state has implemented urgent regulatory changes. The Law of Ukraine No. 2805-IX (2022) entered into force in March 2023 This act reformed the codified legislation on mineral resources. It significantly updated the Code of Ukraine on Subsoil (1994) and related laws. The law reduced the time frame for obtaining special permits for the use of mineral resources, introduced their full digitalisation (transition to electronic auctions, an electronic cabinet of a subsurface user, etc.). Mandatory approvals of local councils regarding the provision of mineral resources for use for local minerals have also been cancelled – previously, this bureaucratic requirement often delayed projects and could become a source of corruption. However, the war also led to an objective reduction in cases of illegal mining in a number of regions. For example, in the northern oblasts (Rivne, Zhytomyr), which were traditionally a hotbed for the illegal extraction of amber, a curfew and enhanced territorial defence patrols were in effect in 2022 – large illegal mines were not recorded there. Notably, the legislation updated in 2022 continued to operate during the war. If it was possible to expose the fact of illegal mining, the perpetrators were already subject to much stricter punishment. There were few such cases, but it is significant that even in 2022, the courts sentenced prospectors under Article 240 of the Criminal Code of Ukraine (2001). Thus, the legal framework for criminal prosecution of violators of subsurface protection in 2022-2023 was extremely effective, but its application was limited by objective military circumstances (Legal amber mining in Rivne..., 2025).

Under martial law, it is extremely important to comply with the requirements of the legislation regulating liability for violating the rules for the use of mineral resources and causing damage to the environment. In the sphere of administrative jurisdiction, the defining norms are articles 57 and 58 of the Code of Ukraine on Administrative Offences (1996), which establish the composition of the offence and sanctions for illegal actions with mineral resources (in particular, mining without appropriate permits, unauthorised use of mineral resources, etc.). Therefore, within the scope of the chosen topic, it would be appropriate to highlight Section 8 "Criminal Offences against the environment" of the Criminal Code of Ukraine (2001). It covers articles that define liability for serious encroachments on natural resources (including illegal extraction, storage, or sale of minerals), and provide for increased penalties for acts that have a particularly harmful impact on the environment during military operations. It is these norms of legal regulation that are designed to ensure effective protection of mineral resources at a time when their safe and rational use becomes critical for the national security of the state.

Instead, a new, unprecedented criminal legal challenge has emerged – the looting of mineral resources in the occupied territories. Russian occupation forces and occupation "administrations" under their control seized a number of fields and mines in the temporarily occupied territory (TOT). In particular, coal deposits in Donetsk and Luhansk oblasts, titanium ore deposits, salt production (in Soledar), etc. There is evidence that the invaders use these resources without authorisation: they export the extracted coal and ore to the Russian Federation, damage the mines with barbaric mining methods. Such actions are actual theft of Ukraine's national heritage and are classified by Ukrainian law as serious crimes (theft, damage to property, criminal offences against the environment), and under certain conditions may also be considered ecocide. Ukraine will be able to bring those responsible to justice only after the de-occupation of these territories. These facts are recorded by the Prosecutor's Office (collecting data for future cases) and international organisations that recognise such actions as a violation of international law (UK Defence Ministry, 2024). This aspect of subsurface protection is completely new and extremely dangerous, because the damage caused to subsurface resources during military operations and occupation (mine explosions, flooding of mine workings, and uncontrolled mining) can be irreversible. All this only increases the relevance of the chosen research topic.

Firstly, it should be noted that according to data released by law enforcement agencies, during the period of martial law (from late February 2022 to mid-2024), more than 300 people were brought to administrative responsibility for illegal use of subsoil resources and other related offences (Unified State Register of Court Decisions, 2025). The main administrative proceedings concerned the lack of proper permits, non-compliance with the established limits, and unauthorised mining. Within the framework of criminal proceedings under the articles of Section 8 of the Criminal Code of Ukraine (2001), approximately 40 cases were initiated and charges were brought against 15 defendants involved in serious violations of the rules for the protection of mineral resources or theft of resources (Office of the Prosecutor General of Ukraine, 2024). In comparison with the pre-war period, there is a qualitative change in the nature of offences: if earlier "shadow" extraction activities prevailed (in particular, illegal amber or sand), then as of mid-2024, there are frequent cases of organised theft of minerals, sometimes covered up by military needs (Fig. 1).

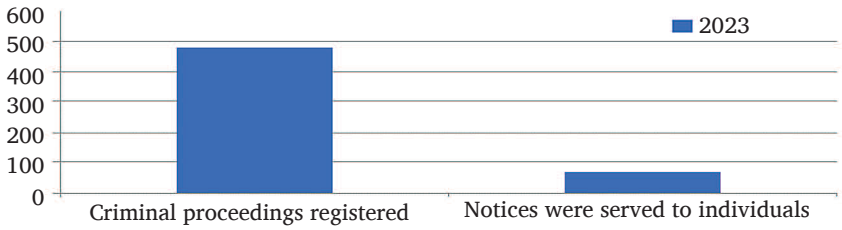

Figure 1. Dynamics of changes in the number of open offences during martial law for illegal use of mineral resources under articles 240 and 188-5

Source: developed by the authors based on Specialised Environmental Prosecutor's Office of the Prosecutor General's Office (2023)

Based on a study of the current regulatory framework, law enforcement analytics, and official statistics, the problem area was identified and, using factor grouping and the Ishikawa diagram, they were narrowed down to four positions. It should be noted that the selection was based on repeatability in sources, the scale of influence on the subsurface protection regime, and the stability of manifestations over time. As a result, the key factors are reasonably identified: P1 – procedural licensing and control deficits; P2 – inefficiency of legal liability mechanisms; P3 – illegal mining and shadow operations; P4 – corruption practices. According to the authors of this study, they were the primary "nodes" of risk, from which other problems were derived, which was further confirmed in empirical results. For each group, the method of paired comparisons based on the preference of variants was applied, and reduced logical convolution matrices were constructed that allow calculating the integral indicator of the problem level (Fig. 2). Then there is an aggregation of problems P1/P2 and P3/P4, respectively. Each row and column contains possible points (1, 2, or 3). The cell contains the result of a "summary" assessment according to the expert method (for example, the "maximum" or "greater of two" rule). The model shown in Fig. 2 captures a shift in the threat configuration: by 2022, criminal law factors (P3-P4) were mostly minimal or moderate, while administrative law factors (P1-P2) were moderate. Since 2022, the criticality of liability and sanctions (P2) and the corruption and criminal component (P4) has sharply increased; in 2023, the share of high ratings for P2 and P4 became dominant. It should be noted that maintaining moderate procedural and control failures (P1) reinforces criminal practices, creating the highest final risk in the

P1-P2 and P3-P4 combinations. Logical convolution matrix in Table 1 summarises these observations. A brief explanation on one of the examples from Table 1: if P1 = 1 and P2 = 3, the summary score takes on the value 2, because the second problem is "critical", so as a result, group A is evaluated as "2" – significant.

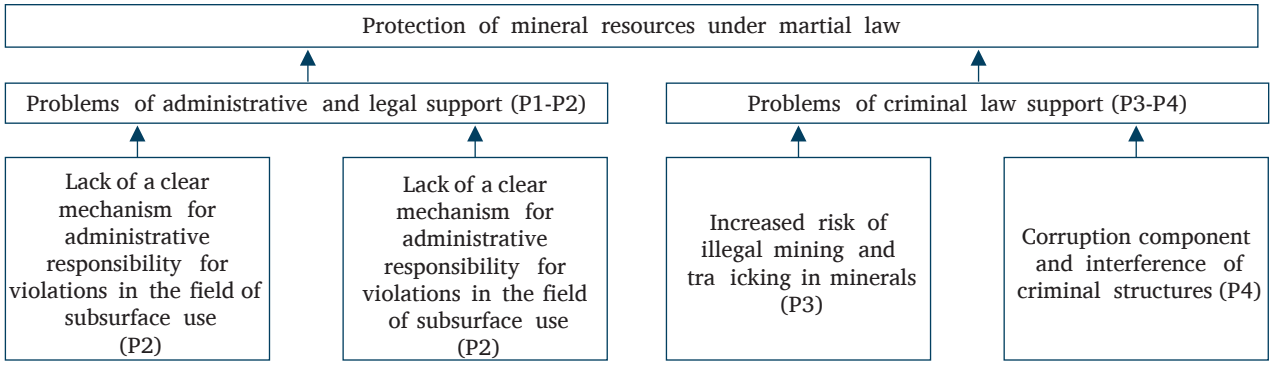

Figure 2. Model of identification and impact of problems of administrative-legal and criminal-legal support
Source: created by the authors

Table 1. Logical convolution matrix for problems of administrative-legal and criminal-legal support

P1/P2			
	1	2	3
1	1	1	2
2	1	2	2
3	2	2	3
P3/P4			
	1	2	3
1	1	1	2
2	1	2	3
3	2	3	3

Source: created by the authors

Another important step is a retrospective expert assessment of the severity of problems in each group for each period. Summary estimates are presented separately by period in Table 2. Further analysis is provided for the periods 2022-2023 and 2023-2024, since the impact of individual problems is long-term and is correctly estimated only in this time perspective.

Table 2. Logical convolution matrix generalisation of shares of expert assessments of strengthening a particular problem of administrative-legal and criminal-legal support

Before 2022			
	m_{i1}	m_{i2}	m_{i3}
P1	0.4	0.4	0.2
P2	0.3	0.4	0.3
P3	0.5	0.3	0.2
P4	0.45	0.35	0.2
2022-2023			
	m_{i1}	m_{i2}	m_{i3}
P1	0.2	0.5	0.3
P2	0.15	0.4	0.45
P3	0.3	0.4	0.3
P4	0.25	0.35	0.4
2023-2024			
	m_{i1}	m_{i2}	m_{i3}
P1	0.1	0.55	0.35
P2	0.1	0.4	0.5
P3	0.25	0.35	0.4
P4	0.15	0.4	0.45

Source: created by the authors

Next, using convolution matrices, for each period, the integral probability of obtaining the result “1 (minimal)”, “2 (significant)”, or “3 (critical)” is determined within the groups P1/P2 and P3/P4. The last step is to combine two groups (administrative-legal and criminal-legal) into a single integral indicator R (Table 3).

Table 3. Logical convolution matrix for integrating two groups of problems

P1-P2 / P3-P4	1	2	3
1	1	2	2
2	2	2	3
3	2	3	3

Source: created by the authors

If both groups are “minimal” (1), then the integral assessment of the problem (on the scale of the entire subsurface protection system) is also “1”. If one of the groups is “critical” (3) and the other is “significant” or :minimal”, the integral score will be 2 or 3 – depending on the accepted convolution rule. Next, considering the probabilities for each group, the probability for the final result “1 (min)”, “2 (significant)”, and “3 (critical)” is calculated. Next, the numerical value of the integral indicator can be calculated, for example, using the equation (1):

$$R = 1*p(R = 1) + 2*p(R = 2) + 3*p(R = 3), \quad (1)$$

where, $p(R=k)$ – probability that the integral estimate will be k. So the results within the defined period are the following:

1) before 2022: $R_{before2022} = (1 \times 0.35) + (2 \times 0.50) + (3 \times 0.15) = 1.80$;

2) 2022-2023: $R_{2022} = (1 \times 0.20) + (2 \times 0.40) + (3 \times 0.40) = 2.20$;

3) 2023-2024: $R_{2023} = (1 \times 0.10) + (2 \times 0.45) + (3 \times 0.45) = 2.35$.

The overall level of problems (considering administrative and criminal factors) before 2022 was mostly in the “significant” zone (the indicator was close to 1.8-1.9). The indicator of 2.35 in 2023-2024 indicates that the situation remains difficult, and the share of “critical” components is actually growing. Thus, the greatest role in the development of general “criticality” in different periods was played by two problems:

- P2 (increased administrative and legal uncertainty and lack of effective recovery mechanisms),
- P4 (corruption and organised crime in the field of subsurface use).

It is for them that a response mechanism has been created to overcome these problems (Fig. 3). Given the priority of P2 and P4 problems, an integrated response mechanism is proposed. For P2, it is envisaged to improve legislative procedures with a clear definition of the powers of regulatory authorities, simplification of proceedings in wartime, and unification of regional instructions with the national database, which will minimise conflicts and speed up actions at the local level. In addition, electronic platforms for monitoring issued permits, cash flow, and production volumes are introduced for continuous supervision. For P4, the key is the institutional strengthening of specialised anti-corruption bodies (powers, resources, independence), the creation of interdepartmental working groups with the participation of the State Service of Geology and Mineral Resources, the Environmental Inspectorate, the National Police, the Security Service and the Prosecutor General Office as a single coordination centre, and the involvement of communities through public councils under regional military administrations and motivational programmes for reporting illegal mining. After the end of martial law, full-fledged environmental impact assessment procedures and public hearings adapted to the updated legislation should be restored.

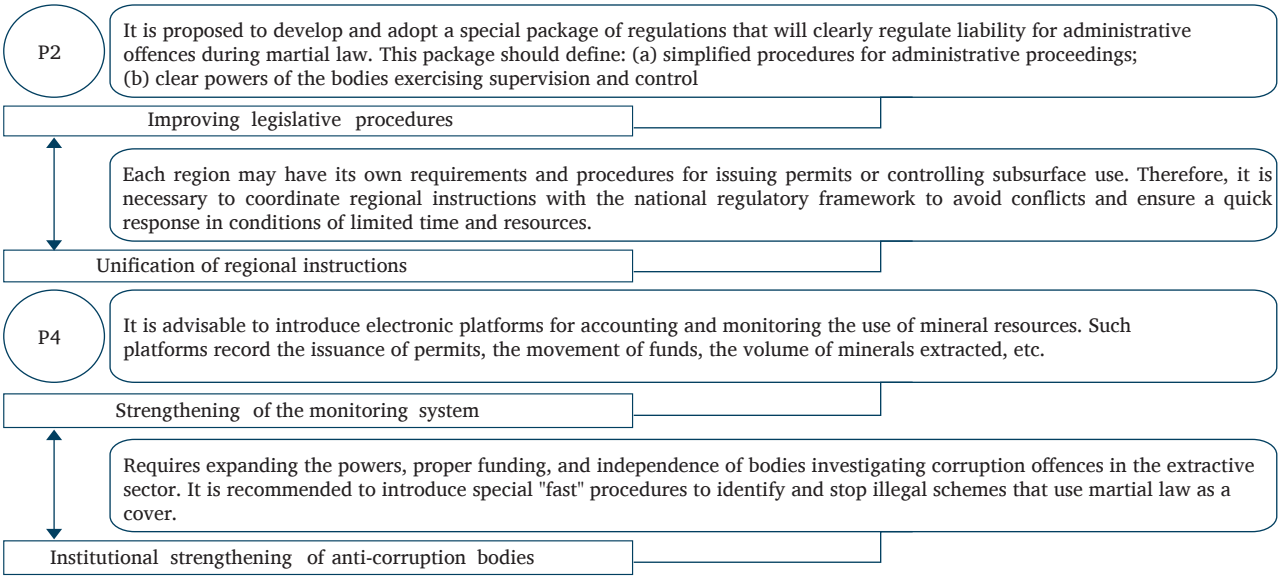

Figure 3. Mechanism of response to the most significant problems of administrative, legal, and criminal law provision of subsurface protection in Ukraine in the current conditions

Source: created by the authors

Under martial law, it is important to ensure transparency, even in the absence of broad access. It is possible to create public councils under regional military administrations on ecology and mineral resources, which would receive information about plans for the use of mineral resources and the state of the environment, and could signal problems. After the war, it is mandatory to return to decision-making the mechanisms of environmental impact assessment (EIA) and public hearings adapted to the updated legislation. In addition to the above, it is also proposed to establish joint working groups on subsoil issues under military administrations or regional councils (after their restoration) with the participation of representatives of the State Geological Service, the Environmental Inspectorate, the National Police, the Security Service of Ukraine, and prosecutors. Such groups will ensure the exchange of information on the situation with mineral resources, coordination of actions to identify and stop violations. A single decision-making centre will reduce the likelihood of duplication or conflict of authority. Communities should become an ally of law enforcement agencies in detecting illegal mining. It is recommended to introduce motivation programmes: for example, remuneration for reporting an underground mine that led to its liquidation. In addition, after the war, it is necessary to create opportunities for legalising small-scale mining for the local population (cooperatives of prospectors under state control), which will provide an alternative to illegal activities.

It is also necessary to implement the provisions of Law of Ukraine No. 2805-IX (2022) and the updated Code of Ukraine on Subsoil (1994) in practice as soon as possible. This includes approving all bylaws, launching digital services for subsurface users, and conducting an information campaign for businesses regarding the new rules. New transparent procedures should really work even under martial law. The moratorium on inspections should be gradually lifted, at least in relatively safe regions. The State Geological Service and the State Environmental Inspectorate should introduce a risk-based approach: conducting on-site inspections primarily at facilities where there are indications of violations (e.g., based on remote monitoring data or complaints from the public). Advanced technologies such as aerospace monitoring (drones, satellite images) for detecting illegal subsurface development in real time will help with this. In addition, in the context of improving the effectiveness of subsurface protection during martial law, it is advisable to introduce a clear procedure for applying administrative responsibility (including specifying the composition of offences and mechanisms for imposing sanctions in accordance with articles 57 and 58 of the Code of Ukraine on Administrative Offences (1996)) and synchronise it with the criminal law requirements of Section 8 of the Criminal Code of Ukraine (2001). Perhaps an appropriate step will be to expand the powers of the State Environmental Inspectorate and relevant divisions of the National Police in terms of prompt suppression of illegal actions.

The study obtained similar conclusions: administrative and legal uncertainty (P2) and corruption activities of criminal structures (P4) demonstrate a significant negative impact on the state of subsurface protection. The growth of illegal mining and the “legalisation” of income from it leads not only to economic losses, but also to increased public risks (Zdorovylo, 2019). The researchers also pointed to challenges in the cyber environment that are becoming relevant for accounting and controlling subsurface use (Bani-Meqdad *et al.*, 2024). The studies by B. Golovkin and K. Marysyuk (2019) and R.O. Movchan (2020) focused on empowering the law enforcement system and international cooperation, and L.O. Mostepanjuk and A.A. Pavlovsjka (2020) detailed the elements of crimes in the field of subsurface use and points out gaps in the Criminal Code of Ukraine. However, the above analysis showed a different pattern: the key trigger for escalation is a combination of procedural and sanctions dysfunctions (P1-P2) with corrupt practices (P4), while “power” strengthening without eliminating procedural gaps gives a limited effect; this is consistent with the dominance of high ratings for P2 and P4. The claim about the sufficiency of international cooperation seems debatable, since the reason for different interpretations may lie in different time horizons and data types: the obtained results are based on retrospective expert assessments during the war period, while the mentioned studies mainly consider institutional settings in more stable conditions. Conclusions of V. Alkema *et al.* (2024) on the importance of strategic management and sustainability are considered in a different plane – as complementing the results of the current study, but not replacing the needs for priority normalisation of procedures and responsibilities. In the results of discussions on the results of the study, it is worth emphasising the fact that after the end of hostilities, Ukraine is waiting for a large-scale recovery, which will require a huge amount of construction and other resources. Subsurface protection should already be integrated into the overall strategy of post-war reconstruction to prevent unauthorised mining, which will lead to devastation of territories and environmental disasters. In addition, in an effort to integrate into the European space, Ukraine is obliged to adhere to international environmental standards and transparent rules of management in the field of subsurface use.

Conclusions

The study was devoted to the investigation of changes in the subsurface protection system under martial law, considering the quantitative and qualitative characteristics of threats and their dynamics. The purpose of the study was to identify key problems and determine the degree of their impact on the effectiveness of subsurface management, and it was achieved. The subject of the study was an assessment of the state of subsurface protection during martial law, with a focus on the dynamics of offences and the structure of risks modelled using logical convolution matrices and an integral indicator. It was found that the integral indicator of the level of threats increased from the pre-war period to 2023, approaching a critical limit. Analysis of legislation and factual data helped to establish that administrative and legal shortcomings and corruption factors are the dominant components of the risk environment. The results of the study showed that the configuration of threats was complicated, in particular, due to a combination of significant and critical states that mutually increase the negative impact of each other. Such trends indicate a persistent deterioration in the quality of control and law enforcement.

Four key problems (P1, P2, P3, and P4) were identified, their formalised analysis was performed using binary logic matrices, and the probability of each of them occurring at different time intervals was estimated. Such calculations allowed establishing that the most significant contribution to

the overall level of threats was made precisely by gaps in the administrative and legal mechanism of responsibility (P2) and corruption activities on the part of organised criminal groups (P4).

The results indicate an increase in the risks of a "critical" state in the field of subsurface use, which confirms the need to strengthen control and improve regulatory mechanisms. Based on the integral assessments, it is possible to plan targeted measures aimed at preventing and suppressing violations in the use of mineral resources during martial law. It was proved that the identified trends indicate the need for purposeful improvement of mechanisms for preventing and minimising risks associated with the activities of subsurface users, considering the challenges and restrictions of wartime. Considering the established laws, it can be argued that the problems of subsoil protection during the war period directly correlate with the economic and environmental security of the state, and therefore, require constant monitoring based on agreed metric approaches demonstrated in the study.

The above suggests that the risks in the field of subsurface protection during the war period are systemic in nature, which is formed at the intersection of imperfect law enforcement and organised criminal activity. The analysis performed means that the combination of logical convolution matrices with an integral metric provides a holistic view of transitions between risk states and their time trajectory. In future studies, it is important to analyse the effectiveness of new legislative initiatives in this area and assess whether the proposed changes actually reduce the level of delinquency. In addition, a comparative analysis with the experience of other countries that have had similar experience in applying martial law and introduced special measures to protect resources would be promising.

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Охорона надр в умовах воєнного стану: проблеми адміністративно-правового та кримінально-правого забезпечення

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Анотація. Мета дослідження полягала у виявленні та аналізі ключових адміністративно-правових і кримінально-правових проблем у сфері охорони надр в умовах воєнного стану, а також формуванні пропозицій щодо зниження рівня правопорушень та протидії корупції. Методологія охоплювала комплексний підхід, включаючи аналіз чинного законодавства, опрацювання даних офіційної статистики та експертне опитування. Було визначено основні факторів, що впливають на ефективність правозастосування та контроль за використанням надр, виявлення прогалин у нормативно-правовій базі та оцінку ефективності існуючих інструментів протидії порушенням. У межах дослідження залучено 15 експертів: юристів, представників правоохоронних органів і фахівців у галузі державного управління. Результати показали, що ситуація з охороною надр прогресивно ускладнилася: показники критичності окремих проблем зросли від «суттєвих» до критичних. Найважливішими напрямами вдосконалення виявилися створення прозорих адміністративно-правових процедур і ефективна протидія корупційним угрупованням. Охарактеризовано зміну конфігурації загроз: від переважно помірних проявів до поєднання суттєвих і критичних станів, що посилюються взаємодоповнюючими провалами контролю. Встановлено фактичні масштаби правозастосування. Запропоновані рекомендації спрямовані на посилення контролю, модернізацію нормативної бази та впровадження електронних інструментів обліку діяльності надрокористувачів. Практична цінність дослідження полягає в тому, що його результати можуть стати основою для ухвалення управлінських рішень, спрямованих на забезпечення законності та прозорості у використанні природних ресурсів навіть у складний період воєнного стану

Ключові слова: охорона надр; воєнний стан; адміністративно-правові проблеми; кримінально-правові проблеми; корупція; парні порівняння; нормативно-правові засади