Forests at the Front: Forest Governance in the Midst of War in Ukraine

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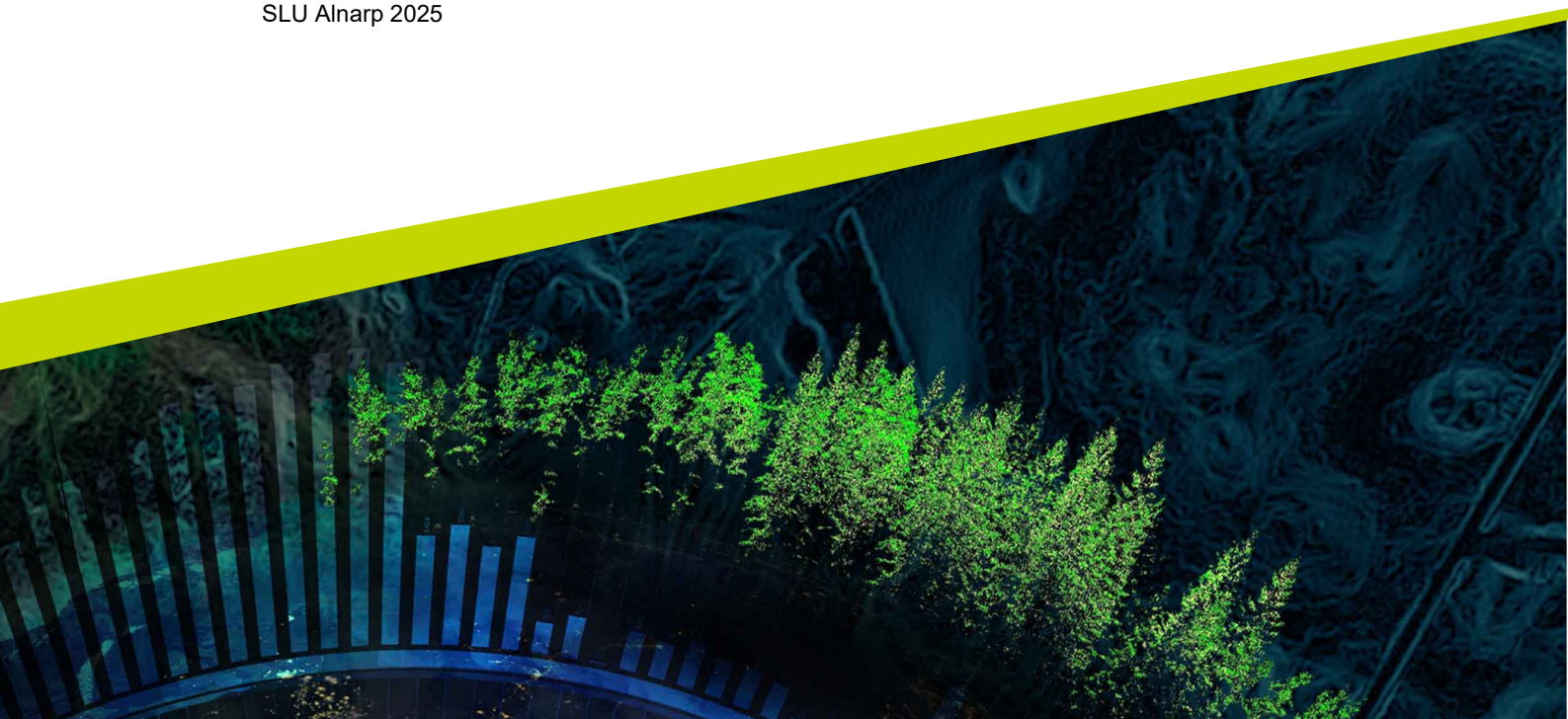

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Abstract

The environmental impacts of armed conflicts is often a matter that is overlooked both during and after conflicts. This has been the case historically and continues to be the case in modern conflicts such as the Russian invasion of Ukraine. Environmental impacts of modern conflicts, however, when put in the context of ever-increasing and increasingly pressing global environmental challenges, require extra care through strengthened governance frameworks. However, literature has shown the general lack of applicability of international legal frameworks pertaining to the matter. Therefore, analysing national-level environmental governance highlights what gaps could be more realistically tackled.

The research of this thesis is conducted at the hand of interviews with relevant stakeholders and literature research. It gives an overview of Ukrainian environmental governance responses to challenges facing forests in Ukraine resulting from the Russo-Ukrainian conflict. This is done first by giving context to the matter through an overview of the primary challenges facing Ukrainian forests. First, I highlight issues primarily relating to littering of explosives in forested areas, forest fires, illegal logging, and contamination of soil and groundwater. Next, a review of Ukrainian governance responses to these challenges is given, underlining the difficulties caused by the simplification of logging procedures, a lack of cooperation between stakeholders, and a lack of standardized environmental impact assessment methodology, among others. This is followed by a series of suggestions given for improving the existing governance framework.

Keywords: Forest governance, environmental governance, environmental law, armed conflict, Russo-Ukrainian conflict, ecocide

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Abbreviations

Abbreviation	Description
MEPR	Ukrainian Ministry of Environmental Protection and Natural Resources
SFRA	Ukrainian State Forest Resources Agency
CEOBS	Conflict and Environment Observatory
CEAN	Conflict and Environment Academic Network
ICC	International Criminal Court
FSC	Forest Stewardship Council
UN	United Nations
EU	European Union
NGO	Non-governmental organization
ENMOD	Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques
IHL	International Humanitarian Law
EIA	Environmental impact assessment
ha	Hectares
WLS	Widespread, long-term, and severe
AP I	Additional Protocol One to the 1949 Geneva Convention
Art.	Article (in the legal context)

1. Introduction

During and after armed conflicts, focus is often put on humanitarian responses and consequences. However, as a result of combat and economic hardship, the natural environment is often a silent victim, overlooked by governance responses. Yet, between 1950 and 2000, approximately 80% of armed conflicts took place in biodiversity-rich areas (Hanson et al. 2009; Francis & Krishnamurthy 2014; Ordway 2015). Meanwhile, a global increase in political instability and armed conflict can be observed (Armed Conflict Location and Event Data 2024). Though, in the context of modern armed conflict, there is the added dimension of the ever-increasing challenges of the biodiversity and climate crises, requiring extra care for the environment even in times of conflict. With more cases of armed conflict arising, a strong governance framework is required to protect natural resources and the natural environment during armed conflict.

As understanding of environmental science and processes develops, so does the understanding of the relationship between conflicts and the natural environment (Dinstein 2016). As such, the field has been gaining awareness, with notable cases of environmental impacts being observed in conflicts, including those in the Democratic Republic of Congo, Sudan, Lebanon, Iraq, Afghanistan, Occupied Palestinian Territories, and Kosovo (Droege & Tougas 2013). These impacts are varied in nature, often being divided into direct and indirect impacts. Direct impacts most commonly include deforestation, soil degradation, and loss of wildlife and biodiversity (Meaza et al. 2024). Additionally, bombing and shelling often leads to forest fires (Hanson 2018). The challenge with many of these impacts is that long-term consequences are difficult to predict and quantify. For example, soil disturbance and pollution of heavy metals from munitions and explosives are known to lead to long-term adverse ecological effects (Certini et al. 2013), though the exact impact may be context dependent. While armed conflicts lead to such direct yet unpredictable impacts, they are often paired with indirect impacts. This frequently comes in the form of natural resource exploitation for military use and/or economic gain. This can be seen in many cases through illegal logging during and after conflicts due to economic hardship, weakened institutions, and loss of traditional management methods (Grima & Singh 2019).

Despite the clear effect of armed conflicts on the natural environment, including forests, environmental matters are generally given low priority during armed conflicts (Kaplan et al. 2022). On the international stage, there seems to be little interest from politicians in discussing the relationship between armed conflict and the natural environment (Kicaj et al. 2023). While there exist legal tools surrounding the matter, they have their shortcomings and generally lack applicability, as will be outlined in this thesis. Overall, environmental protection during conflict “remains an uphill fight” (Bothe 2023). It should therefore be

questioned how the environmental challenges caused by wars can be managed through effective governance.

Most recently, an armed conflict which has seen extensive damages to the natural environment, particularly forests, is the Russo-Ukrainian conflict. Russian aggression on Ukraine already began in early 2014 with the illegal annexation of Crimea, further intensified by the full-scale invasion of Ukraine by Russia on February 24th, 2022. This war has led to damages on the environment especially in the context of forests (EcoAction 2025; FSC Ukraine 2025; SFRA 2025), direct impacts on soil health (Solokha et al. 2023; Hryhorczuk et al. 2024; EcoAction 2025) and water cleanliness (Klinkenberg 2022; CEOBS 2023b; Hryhorczuk et al. 2024). Further challenges are presented resulting from contamination of natural areas with explosives (Doyle & Huang 2023; ReliefWeb 2023; United Nations News 2023; Brown 2024; SFRA 2025). Furthermore, the invasion of Ukraine has led to the implementation of martial law and a war economy. Within the context of forest management in Ukraine, strains on the economy, combined with current forest reforms (EcoAction 2025; FSC Ukraine 2025), as well as direct challenges facing forests, leads to difficulties in sustainably developing the forest industry both during the war and in the post-war context. Additionally, Ukraine holds approximately 35% of Europe's biodiversity (Convention on Biological Diversity n.d.), which is under threat due to the war.

Within the case of Ukraine specifically, attempts at governance responses to forest and environmental damages due to the invasion have been made, however there exist many remaining challenges and gaps to be filled as will be outlined in this thesis. International law has largely been ineffective in deterring the committing of damages to the natural environment during the war (Welsh et al. 2022). Therefore, to identify policy gaps and realistic opportunities for improvement, it may be necessary to analyse the national governance response to war-related forest damages.

1.1 Aim and research questions

The aim of this thesis is to analyse the governance responses to tackle forest and environmental challenges caused by the Russian invasion of Ukraine, at the national level of Ukraine. While the focus of the thesis is centred around forests, to understand the impacts of the conflict on forests, other relevant parts of the natural environment must be considered such as soil and water health. Therefore, when necessary, environmental governance and damages will be discussed as a wider context within which forests are included.

This review will be conducted at the hand of two research questions. (1) 'What are the impacts of the Russo-Ukrainian conflict on Ukrainian forests?', with the aim to give context as to why governance responses are necessary, and what specific challenges need to be tackled. (2) 'How has Ukrainian forest and

environmental governance changed since the start of the war and what gaps and opportunities exist within it?', to give an overview of domestic governance responses to forest-related challenges within Ukraine and highlight areas where they could be strengthened.

This thesis may serve as a stepping stone towards a better understanding of the strengths and weaknesses of Ukraine's forest governance in the context of war. This could prove to be useful for Ukraine to improve its governance response in the continuation of the conflict, as well as in the post-war context. Furthermore, it may serve as an overview of lessons learned from the case of Ukraine, to be applied in other conflicts in the future or in other countries.

1.2 Researcher positioning

My background, as a researcher, consists of a double bachelor's degree of Forest and Nature Conservation from Wageningen University & Research (Netherlands) together with Forest and Landscape Sciences from the Swedish University of Agricultural Sciences. The Netherlands, with a low forest cover, emphasizes the need for conservation of forests both as economic and cultural assets. Meanwhile, Sweden's forest cover is much higher, with forest resources being of high economic importance; focus is placed on timber production while increasingly exploring sustainable forest management methods. As such, I approach this topic from the lens of seeing the need for ecologically healthy forests under sustainable and conservationist management regimes, while understanding how forests can be important economic assets. Therefore, this thesis does not aim to discredit Ukraine's validity in extracting forest resources, but also approaches forest governance from the perspective of the need for sustainability.

My interest in this topic stems firstly from a literature review about the effects of the United States' use of 'Rainbow Herbicides' (commonly known as Agent Orange) under operation Ranch Hand during the Vietnam War of forest health I wrote for a forest ecology course. This review increased my awareness for the detrimental effects of armed conflict on the natural environment. After specialising in forest and nature policy & governance, I continued my interest in an essay I wrote for a forest and nature governance theory course, analysing international legal frameworks pertaining to wartime ecocide in the context of Ukraine. In the essay, I conclude that these international legal frameworks are weak. As such, for this thesis, it was my will to assess Ukraine's national forest governance, rather than focus on international governance.

The Russo-Ukrainian conflict is the first major state versus state armed conflict I have witnessed in my lifetime. Alarmed by both a rise in global political instability and tension, and increasing global environmental challenges, I wish to

dedicate my work to understanding the dynamics between armed conflict and environmental challenges, as well as how these challenges can be tackled. It should be noted that this thesis is not inherently anti- or pro-war, but rather sees war as a natural product of political tension, with environmental damages being one of the many consequences to be dealt with.

2. International legal context

On the international stage, environmental matters during armed conflict are dealt with mainly through legal frameworks. This comes in the form of three main legal tools to be used. (1) The 1976 Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (ENMOD), adopted in the wake of the Vietnam war to prevent belligerents from artificially modifying the environment for military purposes (General Assembly of the United Nations 1976; Manna 2024). (2) International Humanitarian Law (IHL) attempts to address the matter through the Additional Protocol I (AP I) of the Geneva Convention of 1949, containing two particular articles (Art. 35 (3) and Art. 55 (1)) pertaining to taking care for the environment when implementing means and methods of warfare which pose environmental risks (International Committee of the Red Cross 1977). (3) The Rome Statute of the International Criminal Court (ICC) was adopted in 1998 and under Art. 8 (2)(b)(iv) outlines the prohibition of ecocide (International Criminal Court 1998).

2.1 ENMOD

The ENMOD convention shows promise with a relatively low application threshold, that is, the requirements an act of war must meet to be in violation of the ENMOD convention. It states that environmental damages must be *"widespread, long-lasting or severe"*, requiring only of these thresholds to be surpassed (General Assembly of the United Nations 1976; Jarose 2024). Here, widespread is understood as the impact to *"an area on the scale of several hundred square kilometres"*, long-lasting as *"a period of months, or approximately a season"*, severe as *"involving serious or significant disruption or harm to human life, natural and economic resources or other assets"* (United Nations Consultative Committee of Experts 1976 p. 91). Furthermore, the convention is not subject to a proportionality assessment, meaning any violation cannot be justified by military necessity.

Nevertheless, issues arise in what exactly ENMOD aims to address. Within the convention, environmental modification

> "refers to any technique for changing through the deliberate manipulation of natural processes the dynamics, composition or structure of the earth, including its biota, lithosphere, hydrosphere and atmosphere, or of outer space." (General Assembly of the United Nations 1976 Art. II)

Here, a distinction can be interpreted between the environment being modified to be used as a weapon, and militants damaging the environment, the former being of relevance for ENMOD (Roberts 1996). The understanding of exactly what falls

under the scope of the convention is varied, being recognized as dealing with e.g. futuristic weather modification technology by some states such as Iran, and e.g. destruction of forests, diverting rivers or water contamination by others such as the German Democratic Republic and The Netherlands (Jarose 2024). While the exact scope remains unclear, specific examples provided during the reviews of the convention gave an indication of the convention only being applicable to cases of environmental modification using technology that does not yet exist. It does not deal with matters of, for example, destructive techniques such as the bombing of dams to create floods (Jarose 2024). While some understanding of what falls under the convention exists, there remains ambiguity, making it difficult to apply in an actual legal case; a law is difficult to use in a case if it is unclear what the law is. As such, it is clear that ENMOD is only applicable to few or no real-world cases of environmental destruction during armed conflicts, proving not to be of use for the case of Ukraine. Additionally, cases of the breaching of the ENMOD convention are handled first through the UN Security Council, giving Russia VETO power over moving any cases to a criminal trial (Jarose 2024).

2.2 International Humanitarian Law (IHL), AP I

Another legal tool which could be used is AP I to the Geneva Convention of 1949, under IHL. It contains two articles of particular importance for environmental protection in times of armed conflict; Art. 35 (3) and Art. 55 (1). Under Art. 35 (3):

> "it is prohibited to employ methods or means of warfare which are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment." (International Committee of the Red Cross 1977)

Furthermore, Art. 55 (1) states that:

> "care shall be taken in warfare to protect the natural environment against widespread, long-term and severe damage. This protection includes a prohibition of the use of methods or means of warfare which are intended or may be expected to cause such damage to the natural environment and thereby to prejudice the health or survival of the population." (International Committee of the Red Cross 1977)

These laws are further promoted under the 1994 International Committee of the Red Cross Guidelines for Military Manuals and Instructions on the Protection of the Environment in Times of Armed Conflict which summarizes existing International Humanitarian Law rules relating to the protection of the environment (International Committee of the Red Cross 2020). While these laws are more relevant to the matter of environmental destruction during armed conflict, studies have demonstrated that the application threshold is too high for any real-world applicability. Firstly, the threshold of *"widespread, long-term and*

severe", in this case, is cumulative meaning that all three criteria must be met for an act of war to be in violation of the laws (International Committee of the Red Cross 1977; Das 2013). Second is how the natural environment is seen within AP I. The natural environment, in how it's referred to, is considered a civilian object, meaning it is immune from attack unless classified as a military target (International Committee of the Red Cross 1977; Droege & Tougas 2013). In the case of forests, combatants often use forested areas as cover and protection, making the forests legitimate military targets (Manna 2024). Finally, these articles are subject to a proportionality assessment, which in this case is assessing how necessary an act of war is for the quickest complete surrender of an adversary. It has in numerous cases served as a way to excuse environmental destruction (Hulme & Weir 2021). To conclude, AP I is hardly applicable, being theorized to only truly be applicable in cases of e.g. nuclear warfare (Loets 2012), and thus serves little purpose for the case of Ukraine.

2.3 Rome Statute of the ICC

The final tool which can serve as a legal basis for environmental justice during armed conflict is the Rome Statute of the ICC. Generally, it covers rules of war related to genocide, war crimes, crimes against humanity, and crimes of aggression. Under Art. 8(2)(b)(iv) it outlines the prohibition of environmental destruction as:

> "Intentionally launching an attack in the knowledge that such attack will cause incidental loss of life or injury to civilians or damage to civilian objects or widespread, long-term and severe damage to the natural environment which would be clearly excessive in relation to the concrete and direct overall military advantage anticipated;" (International Criminal Court 1998)

Once again, this article seems relevant and of use. However, analyses by academics highlight its lack of applicability and nuanced rationale. A high application threshold can again be seen when considering the *"widespread, long-term and severe"* is cumulative in this case as well. Furthermore, the article is inherently anthropocentric in its rationale and applicability, focussing of the effects of environmental destruction on the human population. As such, the ICC would only persecute when environmental harm is connected to harm against people, property and state territory (Lostal 2021; Safferling & Petrossian 2021). Cases of destruction to the environment as an end in itself are not handled by this statute, further restricting its applicability. The article has never been used in a criminal case (Killean 2021; Gillett 2023).

Altogether, it is clear that the actual use of the three above mentioned tools is very limited. Therefore, work is needed to improve the international legal framework, primarily through lower and clearer application thresholds. Better

organization for applicability is furthermore required by appointing institutions to deal with disputes, compensation, and a standardized damage monitoring methodology to better quantify damages (United Nations Environmental Programme 2009). Currently, for the case of Ukraine, these tools serve little purpose, meaning that it is more valuable to analyse the governance response to forest damages at the national level. This will therefore be the focus of this thesis.

3. Conceptual Framework

To facilitate the understanding the focal themes of research, *Figure 1* presents the conceptual framework of the thesis. This conceptual framework additionally serves as an overview to the topics focused on in the literature analysis and the interviews. As such, the variables defined in the conceptual framework are the sum of the focus areas of the coding data collected. The framework is based on an initial literature screening, in which key variables and their interactions were identified. The primary research topic of this thesis can be summarized as: *Ukrainian forest governance since the start of the Russo-Ukrainian war.* This main topic can be split into forest damages, to contextualize the need for a governance response, and forest governance itself. Much of the literature found covered environmental damages, some studies were discussing areas of the environment relevant for forests. From these papers, key variables of environmental damage were identified including the decline of forest resources & services, fires, pollution, and the presence of explosives.

As the next step, key variables of forest governance were developed based on focus areas of the forest stakeholders interviewed. This thesis firstly divides structures and actors in line with previous studies on approaches to forest policy. The validity of this division has been a long-standing debate. Ultimately, both are important drivers for political outcomes. Actors are viewed as individual, intentional agents (Arts 2012), which include stakeholders such as forest enterprises, NGOs and ministries (Brukas 2015). Meanwhile, structures can be defined as the pathways and frameworks which limit or enable actors' behaviours (Arts 2012), including legal, economic, and institutional frameworks (Brukas 2015). Hence, actors and structures are co-dependent and cooperative, but individually play an important role for policy outcomes. Therefore, analysing both of these is important for a holistic understanding of Ukraine's forest governance during the war. Both structures and actors specifically in the context of forests, as well as their interactions, are taken as the definition of forest governance for the sake of this thesis. Nonetheless, the scope of this thesis is limited due to time constraints; as such, national-level actors and structures are focussed on, while local ones are not discussed as much.

For actors, areas of interest were identified; (1) shifts in the focus areas of stakeholders, where it was apparent that forest stakeholders in Ukraine saw a shift towards different activities to manage environmental challenges resulting from the war. This included, in particular, monitoring environmental damages and illegal activity, and gaining support from partners. (2) Within structures, post-war strategies and policy changes/responses were of interest, as it was observed that interviewees have both implemented policy changes during the war, and have started developing a post-war strategy. Within forest governance, attention was

paid to gaps in the governance responses to forest damages to identify weaknesses with the intention to form an overview of where it could need improvement.

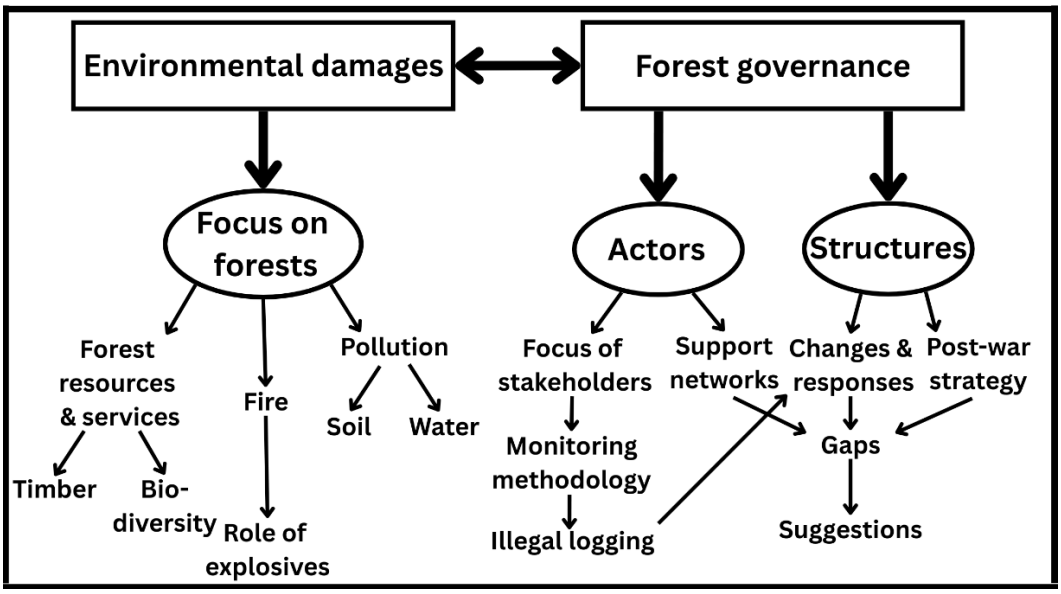

Figure 1: Conceptual framework for understanding the research topic: Ukrainian forest governance since the start of the Russo-Ukrainian war.

4. Methodology

This research project was carried out both by conducting a literature review of pre-existing information surrounding the research topic, as well as semi-structured interviews with relevant stakeholders and officials. The literature review was used to gain an overview of facts on what forms of damages to the natural environment have been caused by the war in Ukraine. The interviews were conducted primarily to gain an understanding of what challenges exist within natural resource (particularly forest resource) management and environmental management strategies and policies within Ukraine since the start of the conflict. The interviews also provided data on forest damages that are currently not available in literature.

4.1 Literature review

Throughout the literature review, the aim was to search for information relating to different focus areas of the research. Within the broader literature search, there were multiple specific searches relating to national governance, as well as reported damages from the war. It should be noted that literature was selected between January 20th and May 9th 2025.

An important source of literature was the Conflict and Environment Academic Network (CEAN) bibliography, provided by the Conflict and Environment Observatory (CEOBS) drawing articles from Web of Science, Directory of Open Access Journals, and Google Scholar (CEOBS 2023a). The bibliography contains 119 articles relating to the environmental impact of armed conflicts and policy relating to it. Within the bibliography, 7 articles were selected based on being relevant specifically for Ukraine or their discussion of policies.

A further literature search was conducted primarily through Scopus and Google Scholar (in English), with key words shown in *Table 1*. These keywords were combined in specific ways when searching for sources related to specific research questions. When searching for sources related to the damages the war has inflicted on Ukraine's natural environment, the keywords related to 'impact' were selected instead of those related to 'policy', and vice-versa. Within Scopus, these keywords were strung together using Boolean operators, where the operator 'OR' was used between keywords relating to the same topic, and using 'AND' between different topics. This ensured the relevant topics were found in the title, abstract, or keywords of the search results, while accounting for synonyms between search terms, giving a wider result.

For Scopus, an example of a search string relating to environmental damages from the war is: *(Ukraine OR Russia OR "Russian Federation" OR "Russo-*

Ukrainian") AND (war OR "armed conflict" OR conflict OR invasion OR hostility* OR combat OR fighting OR violence) AND (environment OR forest* OR ecology OR "land use" OR "land cover" OR landscape OR ecosystem) AND (impact OR degradation OR change OR damage OR influence OR harm OR risk OR affect OR effect OR collateral OR victim OR consequence OR relationship).* In Google Scholar, the most relevant synonyms were selected (i.e. Ukraine and Russo-Ukrainian being selected under parties involved), and were strung together in a search query. For example: *Impact of armed conflict in Ukraine on the environment.* Based on experience, Scopus provided more accurate results, though Google Scholar was used supplementarily to find articles not available in Scopus' database.

Parties involved	**War**	**Environment**	**Policy**	**Impact**
Ukraine	Armed conflict	Environment	Polic(y/ies)	Impact
Russia	Conflict	Forest(ry)	Law(s)	Degradation
Russian Federation	Invasion	Ecology	Governance	Change
Russo-Ukrainian	Hostilit(y /ies)	Land use	Protect(ed /ion)	Damage
	War(fare)	Land cover	Manag(ement /ing)	Influence
	Combat	Landscape	Responsibility	Harm
	Fighting	Ecosystem	Justice	Risk
	Violence		Legal	Affect
			Conservation	Effect
			Eco(cide /centrism)	Collateral
			(Sustainable) development	Victim
				Consequence
				Relationship

Table 1. Overview of search terms for literature search, divided by overarching topic.

Various factors were considered for selecting literature both from the CEAN bibliography and the literature search. These included date of publication and the journal within which the articles are published. This was, however, not carried out in a systematic way with strict criteria, given a general lack of literature. Instead, sources were mainly selected based on containing information relevant to the research topic. Nevertheless, more recent literature was always prioritized, and when selecting sources for damages related to the war, only sources discussing damages after 24th of February 2022 were selected, as this date marks the start of the full-scale Russian invasion of Ukraine. One article related to the policy response of Ukraine after the annexation of Crimea by Russia in 2014 was selected as an exception to demonstrate still ongoing policy challenges facing Ukraine, such as the politicizing of environmental damages for political gain. Generally, the literature found focussed on damages to the whole Ukrainian natural environment. Therefore, both damages and policies related to forests and the forestry industry were favoured over other parts of the natural environment in the subsequent analysis.

Next to the literature search, snowballing was used as a technique to find original information and further sources (i.e. using sources cited in literature found during the literature search). Primarily through snowballing, grey literature sources were also found and used within this thesis due to a general lack of scientific literature surrounding the topic, and the grey literature containing original information. These include news articles and webpages of institutions relevant to the research. While the literature search was conducted in English, through snowballing relevant sources in Ukrainian and Russian were selected and translated using the Deepl software.

The literature found in both the CEAN bibliography and the literature search was predominantly related to environmental damages of the war in Ukraine. Literature found about Ukraine's governance response to environmental challenges was limited. As such, any literature found about the latter was generally screened for information related to forest governance and which matched information revealed during interviews. Articles pertaining to environmental damages, however, were more systematically analysed and coded in Microsoft Excel to find information relating forest damages and damages to other parts of the environment relevant to forests. The data was split into categories as seen in *Table 2*.

Topic	Focus
Water	Groundwater pollution and damages to water infrastructure, especially with consequences for forests
Explosives	Extent of contamination, especially of forested areas, with landmines and unexploded ordnance
Fire	Extent of damages to forests from fires
Soil	Chemical soil contamination, soil disturbance, and the extent thereof
Forest resources	Forest loss from major environmental disasters and logging, as well as loss of biodiversity

Table 2. Overview of key variables identified and used for coding in analysing literature related to war-induced environmental damages in Ukraine

4.2 Semi-structured interviews

During the course of the research, five interviews were conducted in a semi-structured format. This meant the interview had guiding questions and topics, though within the interview there was the possibility to ask more in-depth about certain topics that arose during the conversation. The interviews took place over online video-call (via Zoom), which were then recorded and transcribed. In one case, due to language barriers, an interviewee chose to have a list of questions (translated to Ukrainian) be sent to them, and answered in writing via email.

The interviews were conducted with representatives and officials from Ukrainian governmental branches, including the Ministry of Environmental Protection and Natural Resources (MEPR), and the State Forest Resources Agency (SFRA). These were complemented by other Ukrainian and international stakeholders and NGOs related to forest and environmental management, including the CEOBS, EcoAction, and the Forest Stewardship Council of Ukraine (FSC). These organizations were selected based on their direct involvement in forest resource management in Ukraine, as well as the environmental response of Ukraine since the war. A mix of both governmental and non-governmental institutions were selected to give a wide range of views, and to avoid results being overly directed by political agendas. While this does give risk of bringing to light sensitive information and critique of certain parties, the participants are kept anonymous and have signed informed consent forms, aware of how data is processed for the sake of this research.

The questions for each interview varied depending on the organization and the function of the interviewee within the organization. Generally, however, there were main overarching themes throughout each interview:

(1) *Background and context*; here, focus was laid on gaining an understanding of the main challenges facing the forestry and environmental sector in Ukraine since the start of the war. Often the interviewee was additionally asked to give an overview of how their organization's work had changed or adapted to the war, which is of special relevance for institutions with local projects or offices such as EcoAction or the SFRA.

(2) *Policy and governance*; this gave an impression of what policy changes the institution has experienced or has carried out since the war in relation to forest and environmental management. Next to this, understanding how the policy changes affected the institutions' work and the sector was of importance.

(3) *Support from and cooperation between national and international partners*; these questions gave insight into support and information-sharing networks or the lack thereof existing between national level institutions and international partners. It was also meant to give insights into where these networks could be strengthened and what needs the Ukrainian institutions have from each other or internationally.

(4) *Illegal activities*; this in the context both of whether cases of illegal logging have been seen, as well as what responses have been implemented to combat these illegal activities. These questions were additionally combined, for certain interviews, with questions about monitoring damages from the war, how it is done and what role it plays in policymaking.

(5) *Post-war recovery*; these questions were specifically in the context of the vision the interviewed institution has for its role in the post-war green recovery of Ukraine. These institutions were additionally questioned on their suggestions for the integration of the green recovery into the wider reconstruction of Ukraine, i.e. where the post-war recovery could be strengthened to better include and prioritize the green recovery in areas affected by the war.

(6) *General vision and recommendations for policy tools*; this gave an overview of what policy/legal reforms would help the respective institutions more effectively respond to the environmental challenges facing Ukraine. Furthermore, the interviewees were asked about any aspect of the environmental response of Ukraine they feel has been overlooked, and whether researchers or policymakers should know anything else related to the topic.

The interviews were transcribed through auto-transcription on Zoom, manually corrected using audio recordings of the interviews. These were then coded in Microsoft Excel, by making notes from the transcription and organizing topics discussed into various sections as outlined in *Table 3*.

Topic	Further subtopics	Focus
Main challenges	-	Main challenges facing Ukrainian forests since the start of the war; direct and indirect impacts
Work change	-	How the interviewed organization has changed its work in response to the war
Ukrainian policy changes	(1) New policies introduced (2) Coordination between policy bodies	Policy changes introduced since the start of the war that affect Ukrainian forests, or as a result of impacts on forests
Monitoring methodology	-	How the interviewed organization monitors damages to forests
Illegal logging	(1) Cases observed (2) Governance response	Whether illegal logging has been observed, factors contributing to it, and what responses have been implemented
Support networks	(1) International support (3) National support	What support the interviewed organization receives from other Ukrainian bodies or international organization
Post-war recovery	(1) Organizations' roles in recovery; (2) Suggestions for recovery	How the interviewed organization aims to tackle post-war green recovery, and what suggestions it has for effective recovery of forests
Policy suggestions	-	What policy changes would help the interviewed organization better tackle challenges related to forests
Final comments	-	Open-ended; any further comments on any matters discussed during the interview

Table 3. Overview of key variables identified and used for coding in analysing interviews

5. Results

5.1 Direct Impacts of the Conflict on Ukrainian Forests

As a result of the Russo-Ukrainian conflict, Ukraine faces many challenges to its forests and natural environment. Many of these challenges are direct impacts of combat activities, but also mismanagement of the environment and negligence of environmental risks in and surrounding combat areas. These challenges will be long-lasting; the representative of CEOBS (2025) tells: *"the magnitude of the impact is massive… it will take decades, centuries maybe even, to fully recover."*

One of the primary issues affecting forests and the forestry industry is the presence of landmines and unexploded ordnance in and around combat areas. These explosives not only pose a threat to local civilians, but also to forest workers and firefighters. Already within the first year of the war, combined between territories under Ukrainian and Russian control, an estimated 17.4 million ha have been contaminated with landmines (Brown 2024). Currently, in areas under Ukrainian control, including those reclaimed from Russia, roughly 450,000ha of forest land are *"considered to be covered with explosive elements, potentially*", which has led to a general lack of management due to safety concerns of local forest workers (SFRA 2025). SFRA's representative expresses their concerns regarding landmines:

> "The aftermath of war will be very lasting and it's mostly related with mines and demining problems, which in turn also cause a lot of problems for the health of workers" (SFRA 2025).

As of 2023, the total estimated cost of demining operations in Ukraine was expected to surpass 37 billion USD (United Nations News 2023) and may take up to 50 years to clear after the war (Brown 2024) or "*decades, decades, decades,"* according to CEOBS (2025). Besides landmines, other explosives pose threats to Ukrainian forests and worker safety; many areas are suspected to be littered with explosives such as rockets or bombs which failed to detonate upon impact and may detonate at unpredictable times (Doyle & Huang 2023; ReliefWeb 2023; United Nations News 2023). The contamination of Ukrainian forests and other territories with explosives thus not only poses risks to human safety, proving to be an obstacle for forest management, but will also be a significant economic strain on Ukraine in the post-war context.

In eastern parts of the country directly affected by the war, the past years have seen hot and dry summers, leading to increased fire risks in the pine monocultures that are grown there. There have already been reports of Ukraine seeing large-scale war-related forest fires (Pereira et al. 2022). Currently, an estimated 150,000ha of forests in Ukrainian control have been adversely affected by forest

fires (EcoAction 2025). Including areas under Russian occupation, this figure totals 250,000 ha as of December 2024. It is important to compare this figure with that of approximately 50,000ha of forests damaged by fires observed by the end of 2022 (Odruzhenko & Matsala, *unpublished*), showing an increase in the rate at which fires have become a notable damage resulting from the conflict.

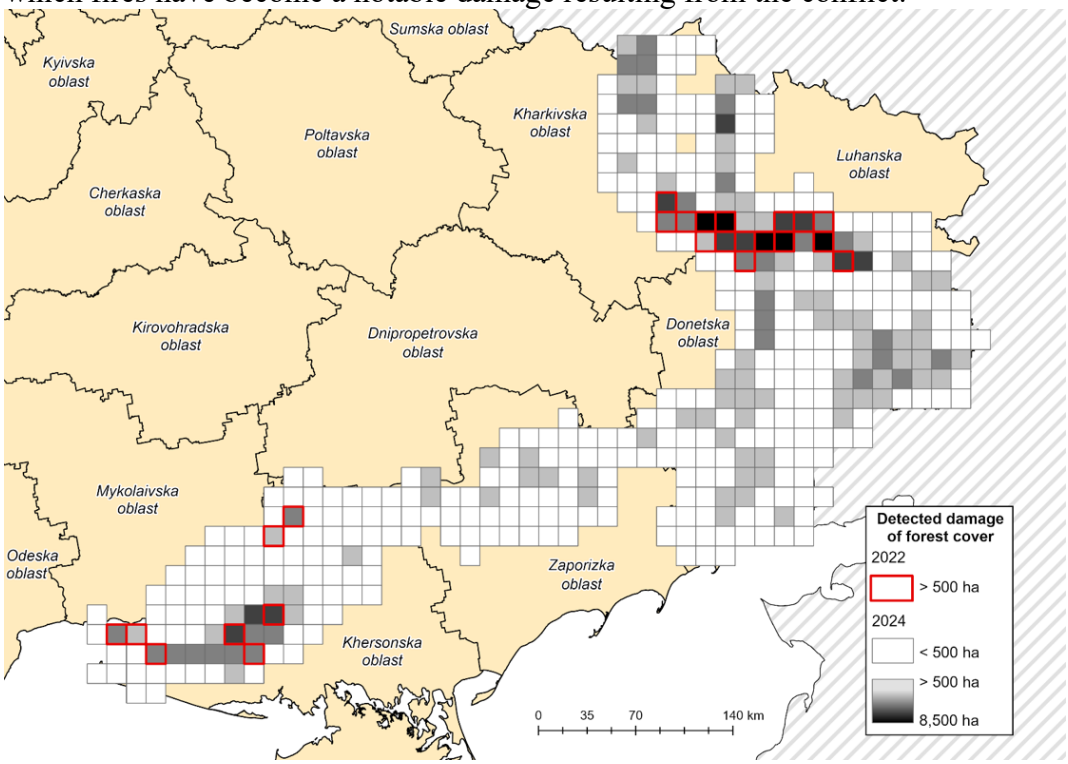

Figure 2: Detected damage of forest cover from forest fires, comparing damages from the start of the war until the end of 2022 and the end of 2024 (Odruzhenko & Matsala, unpublished)(permission granted for use of this figure, in writing, by Maksym Matsala)

These fires are partially the result of collateral damage from combat activities such as the detonation of explosives. However, there have been multiple cases reported of fires deliberately started by the Russian military to distract Ukrainian militants and firefighters (EcoAction 2025). While firefighters do continue to respond to these fires, they are faced with safety concerns of being near combat areas, with cases having been reported of firefighter casualties due to landmines or being targeted by artillery. Furthermore, there is currently a shortage of firefighting equipment and transport, making responding to forest fires a greater challenge (SFRA 2025). Challenges will continue to exist with high fire risks; many recently burned areas contain unexploded ordnance and landmines, making it difficult to remove remaining fire fuel buildup and post-fire herbaceous vegetation, which is highly flammable in dry seasons (Matsala et al. 2024). As such, it is suggested to regenerate these areas with more mixed stands, especially mixes of pine and deciduous species, and to vary planting density to prevent fires from spreading, even in the future where unexploded ordnance increases fire risks

(Zibtsev et al. 2022). Breaking up high-density pine plantations with deciduous belts, or only partially regenerating burned areas (creating a fragmented forest) may also provide opportunities to prevent spread of fires in the future (Matsala et al. 2024).

Besides direct damages to forests, threats to ecology and soil productivity exist from soil and groundwater contamination. Here, again, explosives are partially responsible, with it being speculated that Ukrainian groundwater may be contaminated with explosive residues including perchlorate and nitrate (CEOBS 2023b). Moreover, concerns have been raised over 49 coal mines which, after having fallen under Russian occupation, were flooded (as of July 2023), which has led to contamination of ground and surface water (Hryhorczuk et al. 2024). This also includes the Oleksandr-Zakhid mine in which hazardous waste materials have been stored since 1989, and the Yunyi Komunar mine in which the USSR detonated a 0.3-kiloton nuclear bomb to facilitate methane release. Water pumping operations in these mines have stopped since they've been under Russian occupation, leading to the risk of water and soil contamination potentially even with radioactive materials (Klinkenberg 2022). Further soil contamination has been observed as a result of chemical spills from military operations, as well as the littering of combat areas with heavy metals from munitions including lead, arsenic, mercury, and zinc (Solokha et al. 2023; Hryhorczuk et al. 2024).

While the exact consequences of these contaminations are not yet known, other cases of armed conflict show that it may be detrimental for soil productivity and ecology. For instance, extensive heavy metal contamination was similarly seen in an area in France known as the 'Zone Rouge' (red zone), which still remains unusable for agricultural purposes since the first world war (Turns 2023). Similarly, during the Vietnam war of 1965-1975, as a result of the United States' use of so-called 'Rainbow Herbicides', which were arsenic-based defoliants (Verheyen 2017), inland Vietnamese forests have not yet fully recovered and may take up to 100 years (after 1975) to fully rehabilitate (Chiras 2009 p. 499). Nevertheless, the exact consequences depend on the extent of the contamination and local conditions. Contamination of soil not only degrades soil, but as confirmed by Bawa-Allah (2023), soil pollutants may further transfer to ground- and surface water.

Next to chemical soil contamination, Ukrainian soils have also experienced disturbance from combat operations and military infrastructure. As of 2024, it was estimated that the Russian armed forces have constructed 1000km of defensive works along the frontline, notably including trenches, ditches, barriers, and tunnels (Hryhorczuk et al. 2024). While not confirmed by data, it could be assumed that Ukrainian forces have similar defensive works along the frontline. This has led to soil disturbance along the frontline which may have unwanted ecological consequences and may produce difficulties in restoring productive land

including forests (Hryhorczuk et al. 2024). Further soil disturbance, as well as general damages to forests, were additionally caused by artillery fire and bombings, though the extent of the damage remains uncertain due to difficulties in monitoring such damages (Solokha et al. 2023; Hryhorczuk et al. 2024; EcoAction 2025). Soil disturbance has also been the result of vehicle movement, posing threats to natural ecosystems, particularly in protected areas (Ukrainian Nature Conservation Group 2022). Despite the lack of knowledge on the extent of the damage, within the first year of the war it was already estimated that damages to soils and lands totalled to 34 billion USD (Kucher & Kucher 2024). Nevertheless, it is suspected that forests damaged from shelling will likely recover, as the main damage reported has been the temporary defoliation of trees, though actual mortality rates will become more apparent in coming years (Matsala et al. 2024).

One of the most significant shock events and environmental disasters of the Russo-Ukrainian conflict was the bombing and breaching of the Nova Kakhovka dam in June of 2023 (Gleick et al. 2023). The breaching of the dam led to the flooding of roughly 100,000ha of agricultural lands, nature parks, and forests with an estimated 19.9 billion cubic meters of water (Hryhorczuk et al. 2024). Approximately 30% of the protected areas downstream in the Kherson region, amounting to 24,000 ha, are estimated to have been flooded (Shahini et al. 2024; MEPR 2025). Damage to protected areas alone is estimated to cost 3.7 billion USD (MEPR 2025). From the breaching of the dam, the flood water was contaminated with 150 tons of machine oil and an unknown number of landmines, now having been spread to the flooded areas (Hryhorczuk et al. 2024). As a result, roughly 1 million ha of productive land downstream in the Kherson, Zaporizhzhia, and Dnipropetrovsk oblasts are deemed unusable for at least another 1-3 years as of the writing of this thesis (Wilson Center 2023). While the Nova Kakhovka bombing remains the most well known case of dams being targeted, CEOBS (2025) reports that over 20 dams in Ukraine have been the target of strikes.

Finally, the extent of damage to protected nature reserves, including protected forest areas, is noteworthy. According to MEPR (2025), biodiversity loss from the degradation of protected areas poses the biggest threat to Ukraine's environmental health. Approximately 1.8 million ha of protected areas have been invaded by Russia, 0.9 million of which have been adversely affected. MEPR (2025) shares that:

> "In my opinion, protected areas have suffered the most. As a result of Russia's armed aggression, rare species of flora and fauna, including species listed in the Red Book of Ukraine - 600 species of animals and 750 species of plants and fungi - are now under threat".

Ukraine has numerous sites, totalling 4.7 million ha, in the Emerald Network (Parchuk 2020), a European network of conservation areas resulting from the Bern Convention. As reported by MEPR (2025), 2.9 million ha of the Emerald Network in Ukraine are *"under threat of destruction"*.

The direct damages of the war on Ukrainian forests have evidently been multifaceted and widespread, summarized in *Figure 3*. Moreover, many damages will be challenges for long-term recovery, posing threats to land productivity and water quality for decades to come. With the added issue of explosive contamination of affected areas, recovery will be a risky, lengthy, and costly process.

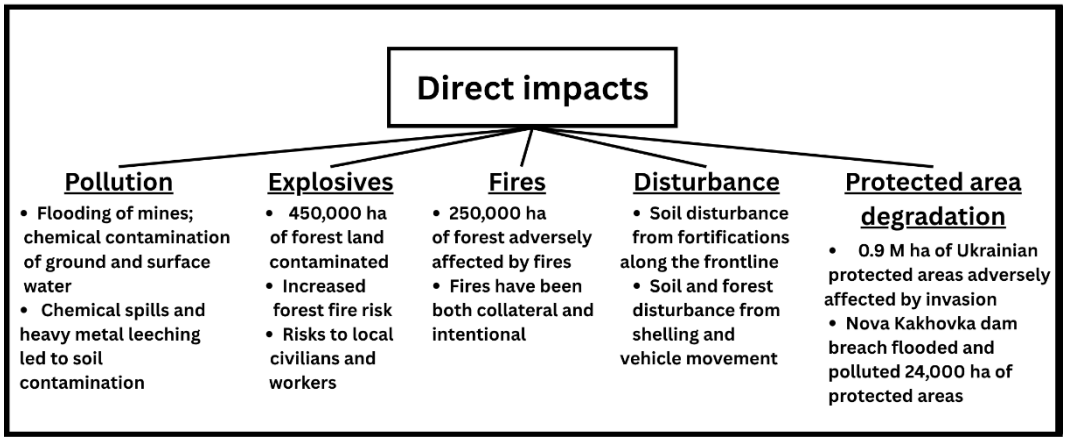

Figure 3: Overview of the direct impacts of combat on Ukraine's forests and other relevant environmental variables

5.2 Ukrainian Governance Responses and Challenges

The Russian aggression on Ukraine has required that Ukrainian forest stakeholders adapt to wartime conditions and shift priorities to tend to damages caused by the war. Some policy changes have been observed at the national level, while individual stakeholders have shifted their way of working. Nevertheless, there remains an array of challenges to be solved in Ukrainian forest governance during and after the war, much of which is the result of the exacerbation of challenges already existing prior to the war.

5.2.1 Governance Changes

The most prominent change in national forest legislation in Ukraine since the start of the conflict has been the simplification of the procedures surrounding forest resource use, particularly for military use. For military infrastructure, the

Ukrainian armed forces have a high demand for timber; as such, it is no longer required that the military follows the regular due process of paperwork and state approval for logging (EcoAction 2025; FSC Ukraine 2025; SFRA 2025). SFRA (2025) states: *"They don't have to make any paperwork or address to the respective forest authority. As I understand, they're just allowed to harvest wood".* Initially, reactions to this change from forest stakeholders were mixed, however, now there is a general consensus on the necessity of timber for military use, and with it comes acceptance and following of the new law (SFRA 2025). Still, there remain concerns particularly for old-growth forests that currently do not have protective status. Currently, logging priority is given to production forests, however, new forest road networks have already been constructed in anticipation of the exploitation of up to 100,000ha of old-growth forests (EcoAction 2025). Besides logging, the military has in addition been granted easier access to nature reserves for military operations (CEOBS 2025).

Next to logging for military use, there has been a nationwide increase in logging for exportation to compensate for timber loss in regions affected by the war (EcoAction 2025). Currently, approximately 30% of Ukrainian forests are under Russian occupation, with areas near the frontline also having been excluded from logging operations (SFRA 2025). As a result, increasing amounts of timber have been extracted from western areas of the country, especially the Carpathian region (CEOBS 2025; EcoAction 2025). Moreover, Ukrainian state forest stakeholders had made an attempt to remove conducting environmental impact assessments (EIAs) from felling procedures nationwide, though this was countered by a coalition of Ukrainian and international environmental NGOs. Still, EIAs are no longer required for the restoration of critical infrastructure, such as industrial plants, including the extraction of construction materials such as timber (EcoAction 2025).

While regulations surrounding logging have been relaxed, another change with far-reaching effects has been the closing of the national forest registry (EcoAction 2025). The national forest registry was an open access platform containing extensive data of Ukrainian forests, which was used by forest stakeholders as a basis for decision-making in forestry. When Russia invaded Ukraine, however, there were fears it would be used by the Russian military. As such, the forest registry was closed throughout the whole country. This has led to challenges in managing forests even in areas not directly impacted by the war; without accurate data online, local foresters need to do more field measurements to effectively carry out management interventions (EcoAction 2025).

Furthermore, some changes have been made to forest access due to safety concerns. Firstly, a new firefighting policy has been introduced, implementing new safety measures for firefighters working in forests contaminated with landmines and other explosives. Nevertheless, there have still been multiple cases

of firefighter casualties (SFRA 2025). Next to firefighters, many local forest workers fled from conflict areas, while some have stayed because they had no time to leave. They have continued management to a degree, though SFRA (2025)'s representative expresses: *"Of course it's not regular work in terms of their usual duties and responsibilities, I think if they did something, they did it at their own risk"*. Besides this, there has also been a prohibition put on civilians entering forested areas contaminated with explosives (SFRA 2025). This was primarily due to safety concerns, as already within the first year of the war, 855 civilian casualties due to landmines were reported (Doyle & Huang 2023), with forests being particularly dangerous (SFRA 2025). Besides safety concern, this restriction may additionally help in preventing illegal forest resource exploitation, as many communities near the frontlines experience economic hardship and a general lack of resources, often resorting to exploiting natural resources for income, construction, or as an energy source (EcoAction 2025).

More generally, Ukraine is currently in the process of a strategic forest management reform, already started in 2005 and spanning to 2035. In 2022, the reform was amended due to wartime circumstances to implement a more top-down and centralized decision-making approach (FSC Ukraine 2025; SFRA 2025). Ukrainian forests are predominantly controlled by the state, of which production forests are managed by local state forestry enterprises. Initially this comprised of over 300 local offices, allowing for a generally decentralized decision-making approach. However, a process of merging these enterprises into one large state forestry enterprise has begun. In the first stage, the initial 300+ local enterprises are to be merged into 156, then in the second stage to one large state company (SFRA 2025).

With respect to FSC certification of Ukrainian forests, changes to methodology and standards have been introduced. First and foremost, FSC withdrew all certifications from forests in occupied areas, as these do not fall under Ukrainian law or control anymore. Forests in such occupied areas are now theoretically being managed by Russia, for which FSC has withdrawn all certificates (FSC Ukraine 2025). Initially, certificates were also withdrawn from areas near the frontline (in Ukrainian control) as well, mainly in relation to the presence of landmines. However, as of December 2024, FSC amended its international standards allowing local foresters to be able to identify areas contaminated with explosives and exclude them from certified forests. This allows for at least partial certification, rather than none (Performance and Standards Unit FSC 2024; FSC Ukraine 2025).

Environmental NGOs in Ukraine have also implemented changes since the war, notably EcoAction, Ukraine's leading environmental NGO. For EcoAction, these changes have mainly comprised of shifting responsibilities and focus away from the development of the energy and climate sector, towards projects related to

sustainable land use (EcoAction 2025). The rationale is that the majority of the direct impacts of the war on the natural environment are related to land use, especially forestry and agriculture. This, for a large part, consists of monitoring damages and writing reports thereof. Other environmental NGOs also manage damage tracking websites to raise awareness for the issue, such as SaveEcoBot, managed by SaveDnipro (SaveEcoBot 2023). Furthermore, more effort and resources have been put into pressuring EU countries to put sanctions on Russia for ecological crimes and irresponsible natural resource use (EcoAction 2025).

Similarly, state stakeholders have shifted attention to gaining support for environmental restoration. For example, 10 million EUR have been accumulated for the Green Recovery Action Platform, developed by MEPR with the Organization for Economic Cooperation and Development (OECD), UNEP, and the United Nations Economic Commission for Europe (UNECE). With this initiative, it is the intention to conduct EIAs, monitor biodiversity, and develop water quality (MEPR 2025). MEPR has additionally started cooperation with the Food and Agriculture Organization for projects related to sustainable forestry. Within the state, effort is being put into improved allocation of environmental funds, such as the development of the new National Environmental Fund, including a reform of environmental taxes (MEPR 2025). Finally, as of April 2025 the Ukrainian state is setting up a new research institute, the Institute for Ecological Restoration and Development of Ukraine. It will be subordinate to MEPR, and is responsible for conducting research and managing initiatives for ecological development (MEPR 2025). This institute may help in gaining an understanding of the extent of environmental damages from the war, as well as methods to tackle them.

5.2.2 Ukrainian Post-War Strategies

While Ukrainian forest stakeholders are tackling current challenges of the war, work is also being done to prepare strategies related to the green recovery of Ukraine after the war. Within national legislation, the national strategic forest reform has been amended to include the immediate actions to be done after reclaiming Russian-occupied territories. These primarily involve damage assessment and demining operations. After these first two stages are completed, new fire safety regimes are implemented, followed by the reintroduction of forest guards (SFRA 2025). Nevertheless, forest recovery is given a very low priority with respect to the national recovery strategy. Furthermore, it is a challenge for these stakeholder to create an effective strategy without knowing the full extent of the damage as of now and at the end of the war (CEOBS 2025; SFRA 2025).

Meanwhile, environmental NGOs have also worked on developing a post-war strategy. A coalition of 30 NGOs has been formed for cooperation on the recovery

plan (EcoAction 2025). The strategy currently focusses on the local-level promotion of sustainable land use in areas heavily affected by the war, both now or in the future to be reclaimed by Ukraine. There are concerns that local communities may exploit natural resources for income. By promoting sustainable land use, environmental NGOs aim to support knowledge-building for creating a healthy environment as well as sustainable economic growth. Nevertheless, carrying out these projects are challenging due to a lack of funds, as well as the strict nature of forest laws (EcoAction 2025).

Outside of Ukraine though with the blessing of the Ukrainian government, CEOBS, in cooperation with the Organization for Cooperation and Security in-Europe (OCSE) and UNEP, has started developing the Green Recovery Platform. The aim hereof is *"to centralize, make accessible, and understandable data for green recovery stakeholders"* (CEOBS 2025). The data would be used for e.g. providing data environmentally responsible construction methods and materials, additionally aiming to promote a circular economy (CEOBS 2025).

5.2.3 Remaining Governance Challenges

Many of the forest governance challenges facing the Ukrainian forestry industry are related to pre-existing challenges from before the start of the war, now exacerbated by the conflict. One such challenge has been the general lack of rule of law and law enforcement. Officially, it is reported that 1% of Ukrainian forests are harvested illegally (though it is not clear what variable is used to measure this). However, according to EcoAction (2025), the actual number is likely much higher. CEOBS (2025) in addition reports increased corruption in the Ukrainian timber trade. This comes from a lack of enforcement of forest regulations, leading to much logging being not in accordance with regulation. With high demand for timber due to the war, it is now suspected that more logging is done illegally. Though CEOBS (2025) explains: *"There's the sort of peacetime illegal logging… but then the legality of what's happening along the front lines or in occupied territories… is more complex."*. This shows ambiguity in the forest law in relation to the legalities of war, making it both difficult for stakeholders to understand what activities are illegal, and to get a complete overview of how much logging is done illegally. This is complimented by the fact that the state and Ukrainian environmental NGOs lack a standardized methodology for EIAs. For example, CEOBS (2025) explains:

> "[Data collection] is mainly taking in all we can get… consultations with staff, surveys, virtual interviews. […] Having that triaging approach helps reduce uncertainty… But there remains a lot of uncertainty in the magnitude of what's happened."

This makes it more difficult to keep an overview of cases of illegal logging and direct damages to forests due to the war, as well as how to respond to them during and after the war (EcoAction 2025; SFRA 2025). About how a lack of data influences post-war recovery plans, SFRA (2025) tells:

> "There is a general, quite broad strategy but no strict plans since there is no clear vision of present damages, it is completely unknown how massive the damage will be when the war ends. This is the problem."

Not having a standardized EIA methodology has also led to issues of trustworthiness of environmental data during the conflict, as well as the politicizing thereof. This issue was already present before the start of the full-scale invasion, during the Russian occupation of Crimea from 2014 onwards. It was found that data collection of conflict- or occupation-related damages was partially directed by which stakeholders receive funding to collect specific data (van der Vet 2024). This can be an issue, as environmental damages may be used as political tools; disasters and shock events, particularly during conflicts, can be used to shift blame for political gain (Toal & O'Loughlin 2018). This was very clear for example with the breaching of the Nova Kakhovka dam, where neither Ukraine nor Russia claimed responsibility, and instead both shifted blame onto each other. Cases before the full-scale invasion also show this issue clearly: for example, during the previous Russian occupation of the Donbas region, Ukraine blamed Russia for the spilling of pollutants around industrial sites but further research showed that most of the pollution was pre-existing from Ukrainian mismanagement and negligence (van der Vet 2024). Similarly, a month prior to the full-scale invasion, Russia shipped leaking containers of ammonia to occupied Gorlovka, and blamed Ukraine for the resulting environmental harm, using this as a pretext for expanding military aggression into the region (Pravda 2022). Without standardized EIAs from an independent stakeholder, there exists the risk that environmental damages are portrayed in ways that do not match the reality, making it both difficult to gain a full understanding of the extent of the damage, and to hold certain parties accountable.

A further challenge in Ukrainian forestry has been the lack of decentralized decision-making, now made more challenging due to the amendments made to the national strategic forest management reform. While having 300+ local state forestry enterprises allowed for some operational-level decision-making room, generally Ukrainian forest law is very prescriptive in nature. What is meant by this is that the law is strict and *"[Foresters] must follow some very narrow corridor of decision making"* (FSC Ukraine 2025). Now, with the merging of the state forestry enterprises, the corridor for decision-making has become even narrower, further exacerbated by the general lack of local stakeholder engagement in Ukrainian forestry. Even the decision to reform the structure of the forest

enterprises did not include local stakeholder involvement. As FSC Ukraine (2025) explains: *"The reform was not very well prepared and [was] not discussed with stakeholders… it looks like the decision of one man at the top".* This has led, firstly, to a lack of room for innovation and resilience to the extraordinary circumstances caused by the war. Furthermore, it has led to issues for FSC certification of forests. Forest stakeholders worry that the FSC standards are contradictory to the national forest legislation, i.e. FSC certification has been implemented on a voluntary basis, and has not been integrated into forest legislation. As a result, many forest stakeholders choose to follow the national legislation, rather than implementing the FSC standards and running the risk of breaking the law. FSC Ukraine (2025) explains that "*FSC cannot rewrite regulation… it's a challenge to introduce these standard requirements without problems for foresters".* Especially in these wartime conditions, this is proving to be an issue since, as aforementioned, operational-level decision-making is increasingly restricted. Besides, FSC may provide opportunities for the Ukrainian forestry industry to increase its competitiveness in the EU market while building the industry sustainably in the long run (FSC Ukraine 2025).

The merging of the state forestry enterprises has also led to other challenges to be tackled. Firstly, the merging of offices primarily causes issues related to the operational level, as transferring responsibilities from one office to another has proven to be an issue. Tackling this requires a complete restructuring of the organizational structure of the forestry enterprises (FSC Ukraine 2025). The restructuring is now an even greater challenge with less people working in the field, as many have fled or joined the military (CEOBS 2025; EcoAction 2025). Furthermore, for FSC certification, the merging is causing difficulties as some of the local state enterprises are certificate-holders, however when they merge with other offices which are not certified, FSC must restart the certification process. Until then, again, Ukrainian timber is much less competitive in the EU market (FSC Ukraine 2025). It is worth noting that EcoAction (2025) generally disapproves of the Ukrainian state's legislative changes surrounding forests, including this one. It is expressed that:

> "In general, there was no significant changes in the field of forest conservation which has a really positive impact or aims to decrease the negative impact of war on our forest" (EcoAction 2025).

A final and more general challenge is, as aforementioned, the low priority given to forest recovery in the national recovery strategy. This is of special importance for demining, as without immediate demining operations, local foresters cannot carry out any management interventions or generally recover forests previously under occupation or near the frontline (SFRA 2025). When

commenting on actions related to forest recovery in territories regained from Russia, SFRA (2025) states:

> "I think these are the least immediate actions after liberation of previously occupied territories […] and the problem is that forests are at the end of the line when it comes to the priority of demining".

Once again, this also delays the process for FSC of recertifying forests for which certificates were withdrawn due to the presence of landmines (Performance and Standards Unit FSC 2024; FSC Ukraine 2025). This is not only an issue in the post-war context, but also for previously Russian-occupied regions which have already been reclaimed by Ukraine (SFRA 2025). Additionally, demining operations themselves pose risks, as most humanitarian demining operations are conducted by stripping topsoil. According to CEOBS (2025), a shift towards more environmentally-friendly methods is in progress, though damages from demining remain a challenge. With respect to reconstruction, there is more support for reconstructing Ukraine quickly rather than carrying it out sustainably. This is exacerbated by a current lack of consensus on environmental economics and how funds should be allocated for green recovery (CEOBS 2025). Ultimately, the degree of post-war environmental recovery and financing thereof is largely dependent on the geopolitical climate, and whether Russia pays reparations.

It can thus be concluded that forest governance changes are, in certain cases, carried out to tackle environmental challenges from the war as aforementioned. However, it is equally clear that there remain challenges in forest governance, and some governance changes and challenges have triggered indirect adverse impacts on Ukrainian forests. These are summarized in *Figure 4.*

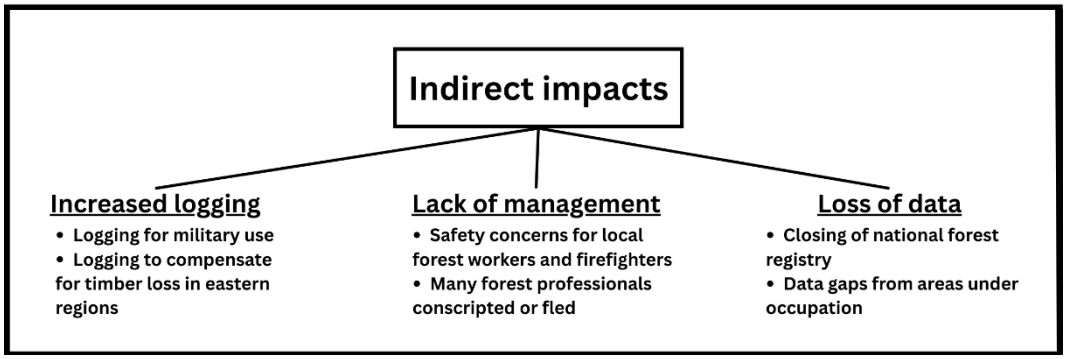

Figure 4: Overview of the main indirect impacts (not directly the result of combat) of the war on Ukrainian forests triggered governance changes and challenges

5.2.4 Policy Suggestions from Interviewees

Most generally, the main stakeholder suggestion for strengthening governance is a general reform of the forest legislation model (FSC Ukraine 2025). Currently, it is far to prescriptive, not allowing for innovation and resilience at the local level. By allowing more operational-level decision-making, the industry as a whole could be more resilient to the specific localised challenges caused by the war, and may allow for more sustainable development within the industry. For example, more forest stakeholders could have forests FSC certified without fear of breaking the law (FSC Ukraine 2025). Furthermore, it is suggested that a consensus towards sustainable approaches is required, especially in light of the new EU Deforestation Regulations coming into effect in December 2025, and the will of Ukraine to join the EU (FSC Ukraine 2025). Currently, too much Ukrainian logging is done illegally to be in accordance with these regulations and international sustainability standards (EcoAction 2025). To meet the EU requirements, more capacity building for Ukrainian forest stakeholders from EU member states in the form of information and skill sharing may be required (EcoAction 2025).

Another area in which reform is needed, according to EcoAction (2025), is environmental control and inspection methods. Currently, it is argued that forest law enforcement, which is the responsibility of the MEPR, is too weak. It is suggested that implementing the standardized EU EIA methodology may be beneficial to track and persecute cases of illegal logging, as well as getting clear overviews of damages from the war. The latter would help in holding Russia accountable for ecological crimes, and getting reparations. Since 2021, the Office of Special Environmental Prosecutors has been set up to tackle environmental crimes, including breaching of forest regulations, however they lack support through evidence and local enforcement by the MEPR (EcoAction 2025). MEPR itself states that it lacks resources for environmental monitoring and gathering reliable data (MEPR 2025).

The representative of MEPR additionally suggests that the new environmental tax reform should be drastic. It is suggested, for example, that 80% of state income from natural resource exploitation should be allocated to environmental protection and sustainable methods. It is furthermore urged that the new National Environmental Fund seeks support from EU member sates to effectively gather and allocate environmental funds, and implement the ecosystem services model in Ukraine. MEPR (2025) additionally states:

> “It is necessary to create a separate financial European fund for the restoration of Ukraine's environment, and one of the sources of its filling should be confiscated assets from Russia”.

Support from the EU may also bring Ukraine closer to meeting the EU's environmental regulations. Ideally, EU member states would in addition mediate the demanding of reparations for environmental damages from Russia (MEPR 2025).

Finally, it is suggested that the state forestry enterprises allocate more effort and resources to effective planning with respect to the mergers. Better cooperation between the enterprises and the SFRA, which acts as a supervisory body, may also allow for better restructuring and organization. This would help the enterprises better deal with the challenges during the war, as well as being more organized when it comes to post-war recover (SFRA 2025). Moreover, it is suggested that more state resources be allocated to the forest stakeholders especially for demining and firefighting (MEPR 2025; SFRA 2025). Currently, it is argued that demining forests is not given high enough priority (MEPR 2025)

6. Discussion

6.1 Key contextualised findings

6.1.1 Emergency measures and trade-offs

During the war, national security has understandably been given priority over effective and sustainable forest governance; a state cannot manage its forests if the state does not exist. Thus, a clear trade-off can be observed between the military and economic needs of Ukraine, and sustainable forestry practices. Military logging exemptions have been necessary for ensuring national defence. However, a risk which remains is the institutionalization and normalization of this trade-off after the war.

While military needs could be weighed less heavily in the post-war context, Ukraine may need to keep extracting forest resources for the construction of fortifications along the new border or in a potentially newly established buffer zone. Besides military needs, forest resource extraction might be a quick partial solution to economic burdens Ukraine will face. Even locally, as EcoAction (2025) explains, communities may resort to natural resource exploitation for quick cash, which leads to an unhealthy physical environment but also restricts future opportunities for sustainable economic development. Thus, the question remains as to how Ukraine can balance its economic needs and sustainable forestry practices. It could be beneficial for Ukrainian actors to see forest recovery as a long-term investment for future income. For example, allocating resources to the widespread implementation of FSC standards would allow Ukraine to grow its timber's market value. A general theme which can be observed, mainly through statements by MEPR (2025), is an overall lack of funds for environmental matters. Its representative expresses a lack of resources for environmental monitoring, and shows the need for drastic environmental tax reform. Thus, increased financial support from international actors may be required to decrease the economic burden on Ukraine for environmental recovery, though for this to happen, increased global awareness for the matter is key.

6.1.2 The role of trust in environmental data

The lack of standardized EIA methodology as well as the closure of the national forest registry are not just technical challenges, but shed light onto a seemingly unintentional systemic lack of transparency. While state actors have carried out a degree of environmental monitoring during the war, Matsala et al. (2024) demonstrates that estimates of environmental damages by the state have been inaccurate. This is likely due to a simplified monitoring methodology. Meanwhile, NGOs such as EcoAction, CEOBS, and SaveDnipro have filled some

of these data gaps. Still, the issue remains that with multiple data sources with varying figures and accuracy, it becomes difficult to trust the information being put out. As CEOBS (2025) describes, there appears to be consensus on what kinds of forest damages have been inflicted, but the magnitude thereof remains uncertain.

As demonstrated by the Nova Kakhovka dam breach in 2023, competing narratives over environmental damages and accountability thereof exacerbate the lack of trust in actors' capacities to collect legitimate and independent data. Further examples of politicizing environmental data as observed in Donbas and Crimea may raise concerns over trust, but also the ethics of environmental damage monitoring. Moving forward, both in the continuation of and after the war, a more cooperative and intentional approach to monitoring is required.

Environmental data serves as a crucial tool for holding Russia accountable for ecological crimes, but also for creating an overview of how and where recovery resources should be allocated. Thus, a cooperative approach to data collection within Ukraine with standardized EIA methodology, rather than a fragmented one, allows for better trust and verifiability, promoting better use of this information as a strategic tool for Ukraine. At the same time, data collected by independent and international organizations plays an important role in verifying the damages being reported by Ukraine. While this is already being carried out by NGOs such as CEOBS, its approach of *"taking all we can get"* with respect to data sources may still contribute to a lack of trust. Thus, it may be beneficial for such organizations to explore a balance between accepting a wider range of informational sources (providing less certain data, but with a higher recorded occurrence of damages), and accepting less but more concrete data through a more systematic approach. The latter, while potentially shedding light on less occurrences of damages, could provide more trustworthy information to be used as an intentional tool as aforementioned.

6.1.3 Prescriptive law and its shortcomings

Clear clashes can be observed between global sustainability movements and what could be interpreted as outdated legal frameworks. A good example of this is the implementation of FSC standards clashing with Ukraine's overly prescriptive forest laws. Brukas (2015) explains how such situations are not uncommon, particularly in post-Soviet states. In such states, prescriptive legal frameworks influenced by Soviet-era governance ideologies restricts the ability of local actors to adapt to changes and shifts towards more sustainable management methods. For Ukraine, this lack of adaptability may not only reduce their ability to ameliorate environmental health, but also hinders alignment to EU standards. Accession to the EU could greatly benefit Ukraine's post-war recovery capacity, helping rebuild its economy. As such, the EU could play an interesting role in

driving a systemic shift towards sustainability and local decision-making by using accession as leverage. Here, the forest sector could become a test case for Ukraine's international credibility and broader ability to align with EU ideologies through internal reform.

At the same time, Tricallotis (2023) outlines how such 'command-and-control' forest law frameworks often lack relevant enforcement mechanisms, giving way to illegal activities. This is clearly the case in Ukraine, with actors reporting that a lack of enforcement mechanisms and ambiguity surrounding forest law allows for illegal logging to take place. Therefore, it is again demonstrated how a shift towards less prescriptive and more enforceable legal frameworks may benefit Ukraine in combatting illegal forest resource exploitation.

6.1.4 Hybrid governance and cooperation

Ukrainian state institutions have maintained a presence in forest governance through continued policy development, management, and environmental monitoring. Nevertheless, NGOs have filled roles typically reserved for the state through monitoring, advocacy for environmental recovery, and international lobbying. On the one hand, NGO involvement serves as an empowerment of civil society. On the other hand, it brings legitimacy and coordination of Ukrainian forest governance into question. Ambiguity remains as to who exactly is leading Ukraine's monitoring efforts, green recovery, and more generally, who represents the interests of forest protection.

Furthermore, a lack of trust between state and non-state actors reduces their legitimacy, proving to be an obstacle standing in the way of cooperation between these actors. NGOs have shown critique of the state actors, while state actors have carried out decisions with a top-down approach, such as the merging of forest enterprises. Such actions could be interpreted as showing a lack of will to cooperate with each other. While increased trust could lead to better cooperation, more cooperation may be required for strengthening trust. Thus, by shifting to a more collaborative approach, state and non-state actors may create an opportunity for a positive feedback loop of trust and cooperation, overall leading to more streamlined and holistic approaches to tackling environmental challenges from the war.

Such increased cooperation could take form through a formalized hybrid governance model. Hybrid governance models, in the context of forests and as described by Tricallotis (2023), involves more active engagement from non-state actors, helping to drive not only state policy but the entirety of society towards sustainable and effective practices. During the conflict but especially after the conflict, when state institutions are weakened, formally including more efforts from non-state actors could help transform Ukraine's forest governance towards increased awareness and action relating to sustainability, more information

sharing, and more holistic approaches. Essentially, non-state actors could help fill the gaps left by state actors. However, again it should be emphasized that both trust and willingness from actors are required to effectively form such a hybrid governance model.

6.1.5 The post-war period as an opportunity for sustainability

The post-war period serves not only as a moment for Ukraine to rebuild its forests, but as an opportunity to reimagine forest governance. With weakened institutions and staff shortages during the war, the post-war period is an opportunity to restructure governance to be more efficient but also to tailor to Ukraine's long-term ecological and economic needs. Actions such as the merging of forest enterprises have been justified under efficiency during the extraordinary circumstances of the war. However, it amplifies Ukraine's already existing problem with undermining local forest actor resilience and adaptability, standing in the way of sustainable governance practices. Without local autonomy, Ukraine risks further entrenching top-down control even after the war.

Analysing Ukraine's current green recovery once again demonstrates a fragmented approach. It exists at three levels: that of national legislation, the coalition of environmental NGOs, and international initiatives such as the Green Recovery Platform. While a multifaceted approach could promote the combining of different areas of expertise, interviewees showed no mention of explicit cooperation between these three levels, which may lead to a fragmented approach. Thus, again, greater integration between actors is needed, especially to avoid inefficiency or duplication of actions, as well as creating a more complete picture as to what green recovery itself consists of. CEOBS (2025) sheds light on the fact that multiple actors are working on the green recovery strategy, but ambiguity remains with respect to what 'green' actually is. Ultimately, however, the success of Ukraine's green recovery remains highly dependent on the extent of damages by the end of the war, the geopolitical and financial context, as well as whether Russia is able to be held accountable for environmental crimes.

6.1.6 International law and its need for development

Besides national policy development, the Ukraine war could be an opportunity to strengthen international legal frameworks pertaining to war-related environmental damages. Particularly, the fact that damages have been monitored (with limited trust) could demonstrate the fact that war-related environmental challenges are a legitimate issue, but that enforcement mechanisms are lacking. This may drive the development of standardized EIA methodologies for trustworthy data, as well as mechanisms for the processing of data in legal cases relating to the matter.

Nonetheless, issues remain with respect to too high or ambiguous applicability thresholds. The Ukraine war provides an opportunity to review these thresholds, and bring into question the value of the legal frameworks given that they seem to lack any real-world applicability. For example, ENMOD deals with matters of environmental manipulation as a means of warfare, and reviews thereof discuss e.g. cases of dam breaching to create flooding not falling under its scope. However, in the case of the Nova Kakhovka dam breach, environmental manipulation through influencing waterways not only led to the flooding of populated areas, but also areas of economic or ecological importance such as protected forest areas and productive land. Likewise, it could be argued that the use of forest fires as an intentional means of warfare by Russia would be a case of environmental manipulation for military gain, and thus would be in violation of the convention if the applicability thresholds were clearer and lower.

Furthermore, such legal frameworks may require reconsideration in the wake of increasing global environmental challenges, towards a more ecocentric approach. Currently, the laws are largely anthropocentric, focussing on environmental damage only in connection to the effects on human lives and livelihoods. Considering nature as an entity in itself to be legally protected allows for the inclusion of more natural entities and their wartime damages in legal cases. This may potentially deter militaries from inflicting environmental damages and allow for the demanding of reparations for damages even if they are not directly linked to human risks.

6.1.7 Recommendations

By analysing Ukraine's environmental challenges and governance changes that have accompanied them, some key gaps come to light. With gaps come opportunities for improvement. Firstly, developing a standardized EIA methodology for during and after the war would help understand what damages exist, where recovery resources should be allocated, and would provide better support for accountability and justice. This, together with general adaptability of Ukrainian environmental governance, would be strengthened by fostering cooperation between state institutions and NGOs. A more cooperative approach may also help Ukraine build stronger cases against Russia for reparations. Internationally, clearer and more enforceable international law would additionally help Ukraine in seeking environmental justice. Additionally, a more cooperative approach between state actors, NGOs, and international actors may be beneficial for more effective post-war recovery.

As aforementioned, the post-war green recovery will be an opportunity for environmental reform. Shifting towards less restrictive forest legislation may allow forest stakeholders better adapt to challenges and drive sustainable development of the industry. Furthermore, the prospect of joining the EU can

allow EU standards and regulations to act as a guide and set of goals for Ukraine to pursue.

Figure 5 summarizes the governance changes made in Ukraine's forest and environment sector, followed by their impacts and challenges, and finally the primary recommendations to address said challenges. This can serve as a simplified overview of the key findings of the analysis of Ukraine's forest governance during the war.

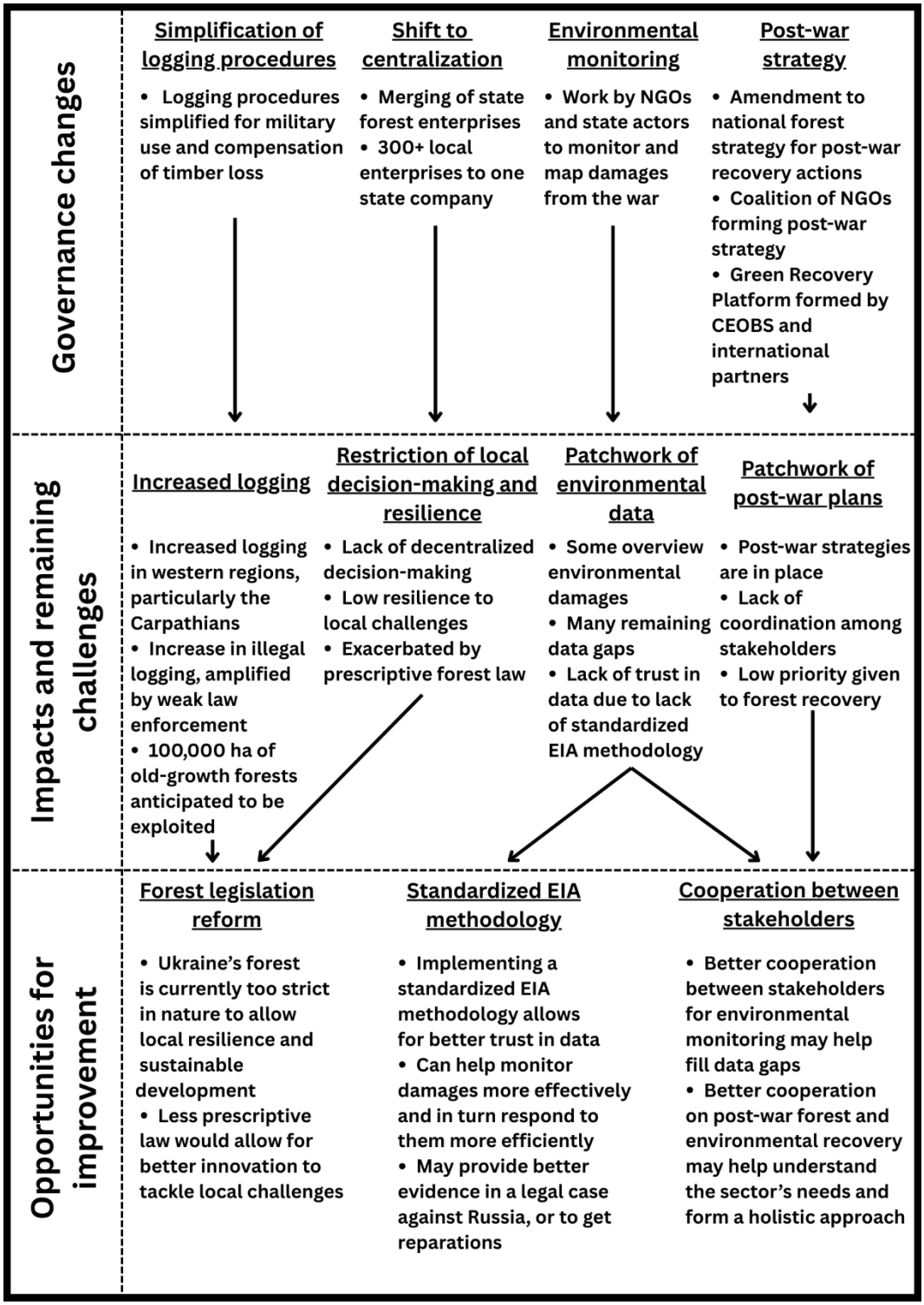

Figure 5: Overview of the key findings of the analysis of Ukraine's forest governance during the war; the governance changes implemented, their impacts and challenges, and suggestions for tackling the remaining challenges

6.2 Future Research

More research may help improve governance structures for Ukraine but also in future conflict internationally. A key area of research would be the development of standardized EIA methodologies. This could be done, for example, by comparing different methodologies used by stakeholders in Ukraine or other conflicts, and assessing their feasibility and validity. This could be accompanied by the development of more reliable, quick, and holistic remote sensing tools, the development of an environmental indicator system, and the validity of these in legal cases.

With respect to international law, further research into the practical interpretations and applications of ENMOD, IHL or the Rome Statute is needed to create a more concrete international legal foundation against wartime environmental damages. Proposals for a more ecocentric approach may provide new possibilities for a more effective implementation of these laws. Additionally, reviews of governance responses from non-Ukrainian post-conflict governance structures may highlight lessons learned for the case of Ukraine and other future cases.

Further research into land restoration methodology may provide a better informed approach for Ukrainian stakeholders. This could include further research of fire-resilient forestry techniques, especially in the context of the presence of unexploded ordnance. Generally, restoration strategies for Ukraine's fragmented and contaminated forests could be useful as guides for post-war forest recovery. This may also include the searching for demining alternatives that take more care for soil health.

6.3 Research limitations

While the methodology outlined earlier in this thesis has provided relevant information, limitations are still present. Primarily, the selection of literature found from the search would ideally be stricter, mainly in the sense of verifying data with more sources and better screening of the credibility of the journals within which the articles are published. This is also the case for grey literature as, for example, some selected articles may be politicized, such as from the Kyiv Post (with a pro-Ukrainian and anti-Russian agenda) or Pravda (with a pro-Russian and generally anti-western agenda). The screening process was not as strict as would be ideal because of a general lack of literature surrounding the topic and a shortage of time for the research project.

Furthermore, literature specifically about the case of Ukraine should be considered cautiously. The fact that the Russo-Ukrainian conflict is still ongoing, means that information about environmental damages, as well as governance responses, cannot be up to date. While specifications of when data was collected

is made clear within this thesis, ideally the information would be as up to date as possible. This is amplified by the fact that, as has been outlined in this thesis, much of the data surrounding environmental damages from the war is inaccurate and difficult to verify, and should therefore be considered with caution. In addition, more accurate and recent data from literature may have aided in forming more relevant or specific interview questions. Instead, the questions were kept broad, meaning the information revealed during the interviews is potentially not as in-depth as it could be.

Similar to the literature, conducting more interviews may have provided more information and/or better confirmed data. Furthermore, information from a wider variety of institutions may have given more policy suggestions and a deeper understanding of what policy changes have been introduced as well as how they affected the respective institutions. Though, many institutions showed a lack of interest, and a lack of time for the research project further restricted the amount of interviews possible.

7. Conclusion

A multitude of environmental challenges have arisen since the start of Russia's invasion of Ukraine. Combat has directly impacted Ukraine's forests primarily in the form of forest fires, the presence of landmines, disturbance and chemical contamination of soils, and the degradation of water quality. In response to the impacts of the war and as a result of the implementation of martial law in Ukraine, forest governance changes have been implemented. For example, logging procedures for military use and to compensate for timber lost in regions affected by the war have been simplified. Consequentially, together with a lack of forest law enforcement, this has resulted in increased illegal logging. The closing of the national forest registry was another measure, but has made it more difficult to carry out management interventions across the country. Various institutions in and outside of Ukraine have started mapping damages to Ukraine's environment resulting from the war. Nevertheless, this is a patchwork of data, bringing light to data gaps which make it challenging to create a complete picture of what the ramifications of the war are for Ukrainian forests. This is further exacerbated by the lack of a standardized EIA methodology being used by these institutions, highlighting issues of trust in the data and its use in holding Russia accountable for damages.

A significant change in Ukraine's forest governance resulting from the war has been an amendment to the ongoing national strategic forest reform. This amendment consists of a shift to centralized decision-making by merging local state-owned forest enterprises into one centralized state forest company. While this may lead to increased efficiency in the sector, it amplifies Ukraine's lack of local decision-making, leading to lower resilience to local challenges. Furthermore, combined with the prescriptive nature of Ukraine's forest legislation, a shift to centralization poses increasing challenges for FSC certification of Ukrainian forests. Not only does this delay sustainable development of the industry, but it also obstructs FSC from being used as a tool to increase the economic value of Ukrainian forests.

International law has proven to be generally ineffective in deterring environmental degradation during armed conflict. As such, it is of high importance to analyse Ukraine's national-level environmental governance. This analysis highlights the current gaps to be filled, and challenges to be tackled, which may serve as both lessons learned for the future of Ukraine, as well as other cases of armed conflict worldwide.

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