THE ENVIRONMENTAL APPROACH IN RESTORATION PROCESSES DURING THE RUSSIAN WAR IN UKRAINE

Strategic planning for sustainability and resiliency of buildout in the moment of the full-scale war

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ABSTRACT OF THESIS

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This thesis study analyses how an environmental approach, which includes risk assessment and identification of territory vulnerabilities, can be integrated into strategic spatial planning, which is necessary for the recovery of the country in the conditions of war and can be used by the government of Ukraine to plan the recovery process and what opportunities the country has after the war. Also, the study analyses the evolution of the nature of wars from the time of the PSV to today, as it influenced changes in the world's perception of the threats of the consequences for the environment and climate change. The study tells about the situation surrounding the state of the environment during the reconstruction processes of Croatia and Bosnia and Herzegovina and how this experience can be helpful in Ukraine. To formulate research questions and hypotheses, the thesis uses the method of personal interviews with people involved in the processes of reconstruction and development of Ukraine, and also uses methods of geospatial assessment of the landscape, using the example of the Lubotyn territorial community in the Kharkiv region in Ukraine, to answer the research question on the integration of environmental issues into spatial planning. The main conclusions of the work are how an environmental approach can have a positive effect on ensuring the stability and sustainability of the recovery of Ukraine for building a fair post-war development and protecting the environment for strengthening the issue of national security. The discussion section summarises the thesis research and indicates directions for further deepening the research.

Keywords: environment, spatial planning, war, environmental impact of war, environmental risks assessment, post-war restoration.

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LIST OF ABBREVIATIONS

CEOBS - The Conflict and Environment Observatory
CEDOS - NGO Centre for Society Research
COP - Conference of the Parties
DMZ - Demilitarized Zone
EIA - Environment impact Assessment
ESPON - European Observation Network for Territorial Development and Cohesion
EU - European Union
IPCC - The Intergovernmental Panel on Climate Change
ISP - Integrated spatial planning
KMU - Cabinet of Ministers of Ukraine
MFA - Ministry of Foreign Affairs of Ukraine
NATO - The North Atlantic Treaty Organization
NGO - Non-government organization
OECD - Organisation for Economic Co-operation and Development
RES - Renewable Energy Sourses
SDG - Sustainable Development Goals
SEA - Strategic Environment Assessment
SIPRI - Stockholm International Peace Research Institute
USAID - United States Agency for International Development
UNDP - United Nations Development Programme
UNESCO - The United Nations Educational, Scientific and Cultural Organization
UNFCCC - United Nations Framework Convention on Climate Change
UNMAS - United Nations Mine Action Service
URC - Ukraine Reform Conference
USSR - the Union of Soviet Socialist Republics
WWF - World Wide Fund for Nature

1. INTRODUCTION

Strategic planning in the future life is a tool for building a conscious path of development and achieving a goal (McMillan et al. 2022). Today, in the conditions of the complex process of globalisation, complicated international relations, a market economy, environmental pollution and biodiversity loss, it is challenging to find out which country does not have long-term goals for its growth, mitigation of social inequality, pollution negative impacts and climate change adaptation. Life is not easy and always consists of pitfalls we must overcome. It is called experience. It hardens and teaches us resilience, flexibility and adaptability to each new challenge. Now imagine that a war breaks out in your planned life.

At the time of the collapse of socialist and communist countries in 1990, when the world was shaken by a series of bloody wars and conflicts, Ukraine gained its independence in a reasonably democratic way (Terajima, 2022). Developing during 23 years of peace, we did not expect that there would be a war. The beginning of the war in Ukraine in 2014 resulted from political, economic and cultural contradictions that increased in the country after the Revolution of Dignity in 2013. The Russian aggression in Ukraine began with the annexation of Crimea in March 2014. Rallies and protests began in various regions of Ukraine, and the full-scale war continues today (MFA, 2019). Then Ukraine first encountered the problems of the consequences of hostilities, as a result of which 7% of the territory came under the control of puppet governments, which Russia still controls. The country had to adjust the development path and introduce new terms into life, such as *temporarily displaced people*, *occupied territories, and grey zone*. Then Ukraine faced the challenge of building blossoming under "half-war and half-peace" conditions. We all got used to such situations for eight whole years, but in our minds, we were waiting for peace. Russia's full-scale invasion of Ukraine changed everything. Almost 40% were affected in the first days. No one can make accurate predictions

about the end of these terrible events, and it can happen right now or maybe in five years. There are so many reasons for this awful war that it is difficult to determine the most important.

"War is the greatest environmental catastrophe man can cause," said Jacques-Yves Cousteau (UNESCO, 1991). The harmful and destructive impact on the environment of any military conflict is a global problem that requires a comprehensive and joint solution (CEOBS 2021). Our life experience is interrupted when war appears, and get stuck between pre-war and post-war times. Throughout history, numerous proverbs and expressions have emerged regarding wars and human existence, dating back to the time of the earliest civilisations. For example, the famous Latin phrase "Si vis pacem, para bellum" (If you want peace, prepare for the war) tells us to prepare for a battle, but for what and when do we need to prepare? Moreover, why do we need to be prepared for the war? Does this signify that we must now abandon our efforts towards planning for harmonious future development because our life consists of continuous segments of "War and Peace"? The famous German general and military philosopher Carl von Clausewitz wrote in the preface to his most famous book, "On War", that "War is the continuation of politics by other means." In his work, the philosopher said that war is a type of human relationship and part of human existence (Lawlor, Nale, 2014). Then what kind of politics and relations is this, which knows no other option for conducting international relations except armed conflict?

Russia's war in Ukraine became the world's first "*First TikTok War"* war (Chayka, 2022). And thanks to this, people could see and feel the entire destructive impact of war on the environment. Society cannot exist without the Earth, to which it owes its life. The earth, which we call our world, is a single ecosystem where all processes are interconnected. Understanding that our nature is not an unlimited resource but a complex balance that requires careful

maintenance is essential. We can not exist with existing ecosystem services, or we will need to find a new planet. Therefore, today we must find a compromise between human needs and preserving the environment for future generations.

My background is in spatial planning and I know a lot about the sustainable development of cities and territories, the modern challenges of spatial and urban planning, and the importance of adaptation to climate change. But before writing this work, I did not know what to do during the war? How to develop planning documentation in conditions of complete uncertainty of wartime?

Using the example of regions vulnerable to natural anomalies, mistakes in the world history of spatial planning and architecture teach us to rebuild cities or settlements considering the risks of a tsunami or an earthquake. However, when humanity neglects to prepare for these potential nature risks, fatal consequences occur, such as the history of Pompeii. Terms like *sustainability* and *resiliency* appeared in spatial planning as a need to increase the strength and adaptivity of buildings and infrastructure to various natural disasters and climate change (Sanchez Rodriguez, 2018). Sustainable spatial and urban planning are now critical approaches in mitigating environmental issues because it helps reduce the negative impact of urbanisation and development on natural ecosystems and biodiversity and adapt us to climate change (Wheeler, Beatley, 2014). By carefully considering the environmental consequences of environmental development decisions such as land use zoning, transport infrastructure and building design, risks can be minimized by adapting to climate change, as well as impacting ecosystem conservation and protecting endangered species (Sanchez-Rodriguez, 2018). Sustainable spatial and urban planning is the key to resisting inequality, environmental injustice

and climate change (McMillan et al., 2022). But what shall we do during the war? Could we fight with enemies and protect the environment?

According to the Stockholm International Peace Research Institute (SIPRI), more than 30 armed conflicts are recorded annually on the planet, which leads to the death of more than 1,000 people a year (SIPRI, 2022). That also means that each year this 30 armed conflict somewhere destroys the local environment. According to the latest research, in the last 10 years, wars have had a significant negative impact on the environment and accelerated climate change (SIPRI, 2023). In political science, the concept called "Securitization Theory" claims that issues such as pandemics, trade and distribution of natural resources can be raised to the level of national security and become the object of protection to preserve peace (Sjöstedt, 2017). Applying the securitisation theory to environmental protection at the level of development planning processes means that environmental issues can be considered a threat to national security. During the Cold War in the 1970s and 1980s, considering the increasing role of economic and ecological factors in international relations, there was a need to apply a comprehensive integral approach to understanding security beyond "*traditional*" political militarism. The idea of such an integrated approach was supported by many researchers who noted the emergence of new threats unrelated to the military sphere and highlighted several security spheres. "In other words, today's security issues are transboundary in nature, and the traditional external–internal security divide must be bridged in order to handle the security issues effectively. The separation of domestic or international problems and the designation of separate sets of solutions to these problems are thus called into question" (Butler, Sjöstedt, 2019). Securitisation theory is a framework for understanding how certain issues, such as terrorism or migration, are constructed as security threats and subsequently treated as such by governments and other actors (Helberg, 2011). It is a well-known fact that climate change can

cause not only the migration of people in search of a better destiny but also cause a local war for natural resources, such as water.

In recent years, environmental protection has increasingly been framed as a security issue, with climate change and resource scarcity seen as potential drivers of conflict and instability (Dalby, 2010), especially if we still use oil (Johnstone, McLeish, 2020). So that is meant preventing the war is a matter of national security. Adapting to climate change and reducing the negative environmental impact directly connected with national security tasks. Armed conflict could easily be stirred up when humanity does not react to environmental pollution, injustice and the reduction of free access to natural resources. At a time when international politics is becoming more and more complicated in the modern world due to the shift from the use of fossil fuels to the transition to renewable sources of electricity, the war can take on an even different scale and form (Kuzemko, Blondeel, 2022).

Despite the existence of some territories in war conditions, where the main hostilities during 2014 - 2022 took place, Ukraine took a course towards European integration (Sologoub, 2022). In 2014, the state signed the Association Agreement with the EU. And the war did not put this process on hold. Strategic planning is part of building national security, and the EU takes these issues very seriously. To become part of the EU, Ukraine is obliged to bring strategic planning to European standards and strengthen environmental legislation (Shynkaruk, Baranovska, 2015). And so, if we adopt protection of the environment regulations and make EU Green Deal a national security base, we could become a member soon. Therefore, I chose this research topic to understand how to achieve this goal. I became interested in researching whether ecological methods can become the basis for renovating damaged areas in Ukraine and how to use them during our integration process. In the conditions of complete uncertainty throughout

the war, which may last at least my entire life, if there is a chance to develop the territories more ecologically and nature-based? At a time when the country is actually divided into several parts, is it possible to introduce such a development that would at least try to reduce the negative contribution of the war to the environment and become a foundation for integration in the EU?

This research aims to understand how the Ukrainian government is currently planning reconstruction by identifying opportunities in the strategic planning process for integrating environmental goals because the planning process in Ukraine is still at the stage of adaptation and transformation (Tyminskyi, 2022).

At the conference in Lugano, the Ukrainian Primiere-Minister Denys Shmyhal presented Sectoral Recovery plans for Ukraine based on the ideology of the well-known Marshall Plan, in which it is mentioned that the reconstruction will be in style "*build back greener*". However, these plans have no time frames or specific strategic aims (Zozuliya, 2022). "The main contrast was that many promising positive words were said. But against the background of all this, their detachment from life is still more clearly visible" (Zozuliya, 2022). A year and a half of my observations and monitoring of the activities of politicians and experts in building the recovery process led me to the opinion that the process is not systematised, speculative, where everyone pursues their own goal. Ukraine's government considers economic development and people's return as priorities (kmu, 2023). Also, they published the cost of restoration works and the primary focuses related to critical infrastructure: housing, essential social and transport facilities (ukrinform, 2023). However, where is the environment? Also, the parliament changed some laws on local self-government, and planning policy to rapid the recovery procedure with *fast and simple solutions*. Today's recovery process receives strong criticism from foreign partners and civil society. Even though the Government of Ukraine has developed mechanisms

for attracting and redirecting donor funds for recovery, the government still needs to create a transparent public council to coordinate the process. There is no understanding of "Have the recovery started yet?" and "What are our strategic plans regarding the war challenges?". Furthermore, there is a significant risk that all we get is the repayment of the wartime budget deficit, and that is it (Dligach, 2023).

The difficulty of the topic I chose is that there is no single, perfectly correct solution. “Every country or region emerging from conflict has its unique history and distinct political, economic, social, and natural environment, and such factors determine the applicability, prioritization, and efficacy of any particular form of natural resource management as a peace-building approach. (Bruch, Jensen, 2009). There are generally accepted rules and trends according to which the world develops and interacts. If my topic were only about peacebuilding, it would be much easier to consider the gaps in research around implementing an environmental approach in restoration processes. My subject confronts three completely opposite and incompatible contexts - ongoing war, current growth, and environmental restoration, which is essential right now, especially in front of the climate change agenda. However, there is a significant research gap on how to develop a country in an area of total uncertainty during the war and what steps should be taken to build a strategic planning process for successful goal achievement.

Therefore, my work is devoted to using an environmental approach in the restoration of the country in the conditions of war. In the literature review section, I describe philosophical reflections on the nature of war and draw parallels with how awareness of the effects of wars on the environment and climate has led to a global greening and greening of strategic planning

visions. I also make a brief overview of the situation in Ukraine regarding the topic of reconstruction in war conditions at the time of writing (spring-summer 2023).

In the methodology, I describe how I chose my research topic and what research questions I want to address. I also describe the methods I used to obtain results to answer the research questions. I divided the results into three parts. In the first part, I describe the reasons why the reconstructions of Croatia and Bosnia were not ecological and how this affected the situation now. In the second part, I define an environmental approach as one of its components that can be integrated into strategic planning for positive benefits. In the third part, I describe the opportunities that the war in Ukraine can provide if we use them correctly. In the discussion section, I describe possible directions for strengthening the work and options for further research.

2. LITERATURE REVIEW

All the existing literature around the topic of my research I can split into the following topics including reconstruction and renewal of territories after crises, restoration of human activities, analytical reflections on the impact of crises on space and social relations, historical perspectives on crises and strategic planning, environmental spatial planning, and criticism of planning in the context of climate change adaptation. These topics address the broad and uncertain nature of my research objectives, encompassing recommendations, historical insights, and the significance of sustainability and the rights of nature.

I decided to narrow my readings to three mindset bubbles to avoid drowning in the global ocean of scientific works, philosophical books and research by using a thematic review structure around which I built my research. This literature review places my research questions in the context of the existing literature and describes how this research contributes to knowledge in the field. The experience of 9 years of the war showed that "*temporary become permanent*" (Chamberlain, 2022) in the country not only to the lack of necessary knowledge, technology, finance, or human capacity. Sometimes this happens due to the lack of political solutions. For example, in Dnipro, Nikopol and Zaporozhye, there are still temporary modular houses for people displaced by the war, who have not been provided with apartments by the state since 2014.

Currently, the recovery process is complicated to monitor. It looks like a wholly uncoordinated and multi-scale process. Today, awareness of the environmental and social impacts of the war is increasing. And because the government is currently focused on addressing the immediate security and humanitarian challenges the conflict poses (Kanevskyi, 2022), efforts to promote environmental sustainability are receiving less attention. Why does this happen? The main

warfare actions between the Ukrainian and Russian militaries are taking a a place in the Eastern and South-Eastern lands. The main threat for the rest of the territory is missiles and bombs launched from Russia. Attacks on forests, terrestrial and marine ecosystems, industrial facilities, transport infrastructure and buildings, and destruction of water supply, sewage and waste management systems provoke large-scale and severe damage with long-term consequences for the environment and human health (Himmelfarb, 2023). The war in Ukraine is being waged through one of the world's most industrialised and polluted areas (UNDP, 2023). The legacy of Soviet heavy industry was already a public health disaster, but the Russian incursion risks further damage to the natural systems on which people living in these regions depend (OECD, 2023). The environmental effects of the conflict are a reminder that even when the fighting stops, the violence will be felt for generations to come. From the shelling of chemical plants to forests burned by rockets, the consequences will be felt not only by the ecosystems of Ukraine but also by its people (Himmelfarb, 2023). All environmental issues need to be addressed or considered on the same level as primary priorities. In addition, needs to be a clear understanding of what to do after its end (Society and Environment, 2022) and therefore, I formed the following levels of reading literature.

The outer bubble is the philosophical paradigm and essence of war, how its presence tempers our living conditions and affects the balance between humans and nature. Here I emphasise that war is a temporary crisis phenomenon that does not put the country's life on hold. Modern wars are becoming more concentrated locally, presenting us with tough challenges, especially environmental protection. The middle bubble is the short overview of how strategic spatial planning came to conclusions that is should be green and how environmental thinking is nessecary during recovery processes. Here I only briefly mention the cases of Croatia and Bosnia and Herzegovina, because I focus the review in more detail in the results.

The central bubble is Ukraine and its strategic planning gaps, prerequisites for green recovery and how not to lose opportunities.

2.1 Military "breath of changes" on nature and humans.

The role and impact of war on nature and people have always been a topic of acute social relevance. People have had to contend with natural phenomena such as floods, earthquakes and other cataclysms for centuries. For centuries, people fought among themselves and destroyed entire states. However, in our days, humanity, in addition to the existing heavily armed wars, faced a new kind of war, which we started against nature (Gardashuk, 2022). During its development, mankind constantly caused environmental damage. However, since industrialisation, the consequences have become more visible and felt in health, especially since the moment of radical changes in the conduct of wars.

In studies, one French geographer and historian, Jean Brunhess, drew attention to the impact of war on nature and the population during the First World War, and in 1916 he published the book "La Guerre et la Nature" (War and Nature), where he described the destruction and pollution of natural resources as a result of war. In his work, he described the severity of the fighting and the use of mass chemical weapons, predicted the possibility of soil and water pollution, and described the dire consequences of the mass destruction of forests and other forms of nature (Huerta, 2019). After using terrible poisonous chemicals and the complete depletion of the Earth, humanity began to notice that the environment was not recovering quickly. In 1921, the French government decided to transfer the land under Vedena to the National Forestry Bureau to create a nature reserve because the surrounding land had been completely burned by shelling and chemical weapons and also because severe soil erosion was observed in France at that time (Hupy, Schaetzl, 2008). The nature reserve area was organised to protect this land from further damage and destruction and ensure its self-restoration (Vasylyk, Shamina, 2022). This case become a first big precedent where the government noticed horrible damages to the nature. But did the wars stopped after?

The most famous disaster of the Second World War was the first use of atomic bombs. After the dropping of nuclear bombs on Japan and the end of the war in the Pacific Ocean in 1945, the country began to feel the catastrophic consequences of the destroyed environment on the health of its inhabitants. The recovery process of the country was based on the method of building "Social capacity for environmental management" (SCEM) (Nakagoshi, Watanabe, Kim, 2006) that was based on the spiritual connection between people and nature. The environmental restoration process in Hiroshima lasted almost 60 years, and governments implemented different environmental protection laws (Karan, 2010), but it still faces many challenges, namely the integration of sustainable urban development and adaptation to climate change, especially after the 2011 earthquake that showed that their cities are not prepared to such type of natural crisis at all.

Environmental protests began sweeping the world at the height of the Vietnam War and a series of nuclear weapons tests. Thus, in 1971, as a counterbalance to the desire of the US government to test new weapons in Alaska, it influenced the emergence of the world's largest and most influential global movement, Greenpeace. "The public response was strong and supportive, helped by the rise in environmental interest among the public in the late 1960s and early 1970s" (Eden, 2006). The rise of environmental movements, public pressure from the scientific community, and increased globalisation have all contributed to the fact that in 1972 Sweden held its first UN Conference on the Human Environment, where experts publically talked about environmental pollution. In the 1980s, publications began to appear on assessing the consequences of the deliberate use of offensive resources, such as rivers and agricultural lands, to adjust the dynamics of war. As a result of such actions, numerous deaths of animals, salinisation or flooding of lands in Europe during the WWII were recorded (Westing, 2013).

At the peak of the Cold War, the issue of environmental protection and air pollution should have shifted people from armed conflicts to a joint fight against environmental pollution (Eden, 2004). Unfortunately, military operations did not decrease from that time. Studies on the consequences of the war in Vietnam, in places where hostilities took place from 1959 to 1975 and the impact of chemicals "Agent Orange" proved the presence of long-term effects on deforestation, contamination of water sources, and impacts on wildlife populations (Westing, 2013). Nowadays, researchers are still emphasising that the consequences of using these substances on the animal world need to be correctly researched because the latest updates showed examples of ecosystems on which toxic substances have had catastrophic effects, such as the Indochinese tiger, which disappeared from Vietnam but survived in neighbouring countries. Also, it is interesting that some species have evolved to adapt to toxins and now show resistance to certain heavy metal compounds (Truong, Dinh, 2021).

The civil war in Mozambique lasted from 1977 to 1992, and elephant numbers declined in the Gorongosa National Park in the southwestern part of the country (Stalmans, Massad, 2019). The Falkland Islands War in 1982 and the depopulation of local penguins (Panel, Pietri, 2022). The bloody genocide in Rwanda led not only to thousands of human losses but also to land degradation and the death of wild animals (Moodley, Gahima, Munien, 2010). Wars in Colombia and rainforest deforestation (Moore, Mpingo, 2023). The oil spill in the Persian Gulf in the 90s and decades of recovery (Linden, Jerneloev, Egerup, 2004). 15 years of civil war in Lebanon resulted in catastrophically low population growth (Kobeissi, Inhorn, 2008). Even in conditions where humanity recognises that wars have a catastrophic impact on the environment, conflicts still continue to occur and destroy ecology (Lawrence et al. 2015).

With the increase in the number of local wars, the number of tangible consequences on the environment increased. These events influenced the emergence of environmental movements (Borunda, 2021). The negative contribution of human activity began to accumulate and accelerate climate change. Moreover, these processes, in turn, started to affect people's health. Close hands against diseases began to become more and more severe and influenced the emergence of a whole network of activists (Stephens, Chang, 2023). In the 1980s, the environmental movement gained significant momentum in many countries, including Eastern Europe, like USSR, symbolising opposition to communist regimes (Hess, 2011). At the same time, the rise of environmental awareness and public activism in many countries worldwide also led to policy and legislation changes. In the 1990s, the environmental movement continued to gain momentum, leading to environmental protection and steel becoming key on the international stage (Werrell, Femia, 2019).

Disasters show how human's impact on the Earth leads to large-scale and/or long-term implications. An uncontrollable desire to get a boost led to the appearance of a *black spot* on the map of unheard-of scale. The case of an explosion at the Chornobyl NPP in 1985 showed how an environmental disaster could become not a local phenomenon but a critical emergency that touched the whole world (Baranovska, 2011). Even after 30 years, conclusions on mutation and adaptation to changes in the ecosystem among some biological species still undefined. Some studies prove that living organisms retain high chromosomal aberrations and visible mutations in the near exclusion zone (Morgun, Yakimchuk, 2021). After these events, which gained global resonance, global institutions began to pay attention to the fact that the issue of the consequences of human action on the environment may take on a global scale and will require more efforts to eliminate the damage it will be necessary to make efforts not only for physical reconstruction but also and curbing the degradation of the natural environment. In

addition to the black spots on the maps, many new ones appeared on the world map with the inscription *mined territories* (UNMAS).

With the development of technology, foreign policy between countries, changes in economic models and the fight against climate change, wars began to change in time, size and consequences. But with our actions, we influenced an unprecedented transformation of landscapes and stole valuable land plots, creating *closed areas*. The theory of critical geopolitics tries to unite people and space in its research. The theory of *securitisation* states that issues of environmental pollution affect the security situation in a country. As climate change and numerous other environmental topics focus on the biospheric context of human existence, they automatically become part of international policy discourse, emphasising "*climate security*" (Dalby, 2010). The theory of the Anthropocene, as a new geological and geopolitical era, is based on the fact that it tries to define how humankind's activities transform the borders of countries, distort landscapes, and affect the emergence of new properties of biological species (Crutzen, 2021, p. 141-144)

In 2005, Lt. Gen. James N. Mattis (US Marine Corps), and Lt. Col. Frank Hoffman (US Marine Corps Reserve), in an article on the New Course of National Defense Strategy, defined modern warfare as becoming more *hybrid* through the modernisation of weapons and combat methods. "*Hybrid war* is a mixture of classical warfare with the use of irregular armed formations…" (Mattis, Hoffman, 2005). For NATO, hybrid wars are complex and still uncertain episodes where life between peacetime and hostilities blurs depending on financial capacity and technological resources. Local wars received a more local scale but with the support of the strongest countries in the world (Bout, 2022). "Building, rebuilding, and fortifying trust remain critical to creating durable resilience in the face of hybrid threats that acutely imperil the

security at the state and societal levels" (Bilal, 2021). Hybrid wars of the moment of emergence of the definition have become a tool with which humanity affects changes in the environment. But it is still difficult for us to accept the process of the existence of war in our own lives. "War as a socio-political phenomenon is endless" (Tkachuk, Tkachuk, 2021). Therefore, taking into account modern threats from the side of the existence of a new type of warfare or even nuclear war, the issue of prioritising environmental protection and reducing the amount of pollution can become an opportunity to reduce the risk of war because there will be greater security in questions of protection natural resources.

"We must change our attitude towards nature and move to a new concept of security, which is based on understanding the relationship between the environment and our security" (Brundtland, 1987). The concept of sustainable development, that was promoted at the UN Conference in Rio in 1992, has become an essential tool for modern environmental and social development planning. Using an environmental approach as a basis for strategic spatial planning for different territories and at different levels, from local to national, can help reconstruct regions after the war and strengthen national security.

Sustainable solutions have contributed to the expansion of knowledge about eliminating the effects of pollution, treating the environment and helping nature to recover. Numerous new studies proposed that municipalities not be afraid of implementing "urban climatology" in strategic planning (Hebbert, Jankovic, 2013) because knowledge about local meteorology could help to understand the climate shiftings and become more prepared. Theoretics and scientists also concentrated on other solutions, for example, how plants can be used to mitigate the effects of environmental pollution in an inexpensive financial way (Tonelli, Bhat, 2022) or how plants could help to clean the soil (Podhajska, Drzeniecka-Osiadacz, 2023).

New ideas for solutions arose along with new ideas for punishments for intentional and physical destruction of the environment. For example, *ecocide* as a separate term for describing the conscious destruction of the environment appeared in international environmental law (Milburn, 2012). Emphasises the importance of the relationship between humans and nature and proposed to recognise the destruction of the natural environment that violates human rights. The International Criminal Court (ICC), formed in 2002, is an international judicial body with jurisdiction to investigate and prosecute major international crimes such as war crimes, crimes against humanity, murder, violence and sexual crimes. Today possibilities of international criminal law to protect the environment during and after armed conflicts have become more popular (Gillett, 2017). But studies shows that indirect methods, like the condemnation of environmental damage through criminal liability, are only a temporary measure and cannot completely solve the problem of environmental damage (Gillett, 2017). Only in May 2021, the Inter-Parliamentary Union officially recognised "*ecocide*" as a war crime that causes or permits damage to the natural environment on a massive scale and violates the duty of care towards humanity.

Global society has gone through a problematic evolutionary path in more than 80 years to understand how war's effects are interconnected and negatively impact the entire planet. Tens of years of lengthy negotiations stimulated countries to think about changing the game's rules and creating a framework in which it would be possible to reduce at least the negative consequences (Lawrence, Stemberger, 2015). To achieve the goal of decarbonisation and keeping the temperature at 1.5C, researchers began to look for and count all the sources of air pollution that lead to climate change. This is how the study of *the Military Emissions Gap* (CEBOS, 2022) arose, which refers to the discrepancy between the declared climate goals of countries and the actual emissions of greenhouse gases due to their military activities. It is a

concept that highlights the significant contribution of the military sector to global carbon dioxide emissions and the need to address this issue in climate action plans. The impact of climate change on the security of nations is becoming increasingly apparent and widely recognised. However, Western allies have mainly articulated these concerns through the lens of *climate security*, where the idea that climate change will lead to, or at least exacerbate, existing levels of instability, insecurity, and violent conflict worldwide (Busby, 2022). Environmental concerns eventually extended to defence greenhouse gas emissions, or "*carbon footprints*" (nato, 2023). It is noteworthy that the issue of military emissions was raised at first during the negotiations on the 1997 Kyoto Protocol. But since than there is still no clear consensus considering pollution from the hostilities (CEOBS, 2023). Even more, the CEOBS organisation under the UNFCCC panel created the online platform "*militaryemissions.org*"[1], which notes the importance of calculating these data when humanity lives in total threat from climate change. Unfortunately, only several countries in the world show actual data about pollution from the military, others or lie or hide information.

For more than 50 years, society has tried to come to an agreement that the environmental damages from the war and excessive industrialisation lead to catastrophic consequences for the state of the environment (Milburn, 2012). Considering the environmental consequences of military operations should be an essential component of security and development strategies. "Wartime environmental damage has a humanitarian impact, and environmental protection and the protection of civilians should no longer be viewed as separate and distinct policy objectives" (CEOBS, 2015).

[1] The Military emissions gap - This site is dedicated to tracking, analysing and closing the military emissions gap (https://militaryemissions.org/)

The last COP27 climate conference and the agenda of the war in Ukraine crucially increased attention to military emissions, but they were again not included in the last IPCC report (CEOBS, 2023). "The earth's rapidly changing climate and an increase in weather extremes have led NATO to accelerate its efforts in environmental security and environmental protection" (nato, 2022). Despite this, in recent years, the governments of individual countries have begun to introduce more permanent and independent solutions to the "decarbonisation" of their armies (Depledge, 2023). And not only armies. For the sake of guarantee and their own salvation, each country begins to implement its methods of taking into account the interests of the environment during development.

2.2 Greening strategic planning as a tool for successful restoration

Strategic planning plays a crucial role in forming long-term development goals and priorities (Albrechts 2004). "Greening" refers to incorporating environmental considerations, sustainable practices, and developing green spaces and infrastructure into various aspects of society. Considering environmental requirements and goals when formulating strategic development plans, using green indicators to measure success and ensuring partnerships with natural resources (Lindley, Handley, 2007). However, why is it so crucial to use for reconstruction places affected by war?

The movement of *modernism* after the WWI influenced the emergence of new approaches to planning and developing territories (Bullock, 2002, p.26). Cities were growing and needed new districts. Planning became more integrated, and new roads were built, considering new types of transport, such as the subway. The building standards and social agenda influenced the emergence of new types of housing, which influenced the transformation of design inside (Rodríguez-Lora, Navas-Carrillo, 2021). After WWII came the era of significant reconstruction, every destroyed capital of a European country was rebuilt based on the global trends of modern urbanism, where everything had its function and purpose based on local history (Diefendorf, 1989). Urbanism came as a solution for numerous problems of pre-war European cities, when during the development, green spaces were neglected, leaving them only in historical parks. Rivers in cities were built into canals or hidden in industrial areas. Modernist urbanism solved many of the pre-industrial problems of cities (Diefendorf, 1989). Planning made it possible to look into the future in step with economic development. However, the modernist planners did seek to create beauty, but it was an esoteric beauty linked to function and beauty of monumental proportions viewed from a distance, not a human scale (Mehaffy, 2022).

Nevertheless, 20 years after ambitious planning started to fail (Vanderbeek and Irazábal 2007). Crucial critical works like "*The Image of the City*" (Lynch, 1964) and "*Death and Life of Great American Cities*" (Jacobs, 19693, led to advocating the pedestrian's walkability priority over the city's car (Matan, 2011). The approach of *new urbanism* appeared as a solution to fix rising environmental problems that faced urban areas. It envisages *human-oriented design*, and also promoted smart, sustainable growth of cities.

In parallel more those two new visions aroused *ecological urbanism* theory (Spirin, 1984) (Register, 2002) and *green urbanism* (Lehmann, Mainguy, 2010), which all aimed to advance the understanding of the importance of the links between the environment and humans on more landscape level (Archibugi, 2019). Changes on local level influenced the fact that the countries of Europe moved to t*erritorial landscape planning* at the national level, promoting more wise land-use and preserving natural resources.

Before the war in Ukraine in 2014 had started, the wars in the Balkans from 1991 to 1998, which are still often called the Yugoslav Wars, were considered the largest modern war on the territory of Europe after WWII. At the end of the Cold War in the 1990s, when NATO was expanding its influence in Europe and the socialist republics were choosing their independence, environmental pollution problems were not a priority. Post-war recovery efforts have primarily focused on priority needs such as people's return and economies' stabilisation. The war led to the destruction of the political system, so there was no comprehensive long-term vision. The perspectives and needs of the local population were not fully taken into account since, at that time, the pressing issues were the search for and punishment of the perpetrators of the genocide. The lack of resident involvement has resulted in missed opportunities to create inclusive

planning processes that reflect the aspirations and priorities of affected communities. The first years of the country's recovery process focused on meeting local needs, rebuilding cities, infrastructure, and demining territories. Only now, when the awareness of the lost years has come, with the help of the EU, countries are integrating landscape challenges into strategic planning because they have begun to realise the path and direction of their development.

It is worth noting that understanding the *greening* of spatial planning took place only during the last 20 years. After the adoption, new 17th SDGs and the signing of the Climate Agreement in 2015, *integrated spatial planning* (ISP) became more oriented to solving urgent climate challenges because the importance of using all existing knowledge on climate change to mitigate the consequences became stronger (Rodriguez, Ürge-Vorsatz, 2018). With the evolution of different green tactical approaches, ISP has become a tool for transforming territories to meet the modern challenges of climate change, such as flooding, biodiversity loss, abnormal heat, etc (Yigitcanlar, Teriman, 2014). On the example of the development of these countries, the recognition and understanding of the importance of ecological principles and climate change in reconstruction planning has recently gained significance. Therefore, it is an excellent advantage for Ukraine to plan the recovery process sustainably (Society and Environment, 2022).

Today, in the world arena of spatial planning, climate change is increasingly recognised as a real threat, and all countries included adaptation as an integral base for national planning (McMillan, Birkmann, 2022). The planning community recognises that crises are becoming more frequent and real. Wars become a threat to national security. And only the adaptability and flexibility of territorial planning can teach us to adapt to changes faster and lose less. Growing attention to using sustainable solutions to restore war-affected territories only in

recent years. Sustainable solutions encompass practices and strategies that aim to restore the environment while promoting local communities' social and economic well-being in a long-term and environmentally responsible manner (Jordán, 2012). Studies have shown that more environmental methods can have multiple benefits, including restoring biodiversity, improving water and soil quality, and promoting livelihood opportunities for local communities (Kumar, 2022). Recent ideas about opportunities that could give us the post-crisis period told us that shifting to energy-efficient technologies in new constructions can reduce dependence on old power plants (Langan-Riekhof, Avanni, 2017). Also, environmental clean-up reduces resource consumption and minimises environmental impacts (Tortorici, Fiorito, 2017).

Social sustainability, which promotes social cohesion, inclusivity, and equity, has been recognised as a critical dimension of sustainable solutions. The involvement of social workers in planning can allow them to work on future risk prevention (Hay, Pascoe, 2022). Studies have shown that engaging local communities, particularly vulnerable groups such as women, children and indigenous peoples, in the decision-making processes and incorporating their traditional knowledge and practices can lead to more effective and sustainable restoration efforts, especially in cases with natural resources management (Lamond, Everett, 2019).

Green strategic planning is an effective tool for successfully restoring degraded urban areas and ecosystems, ensuring a balance between ecological, social and economic aspects of development and will help prevent the manifestation of new problems in the future due to adaptability and resilience (Archibugi, 2019).

2.3 Ukrainian context

"Uniquely at a time of war, Ukraine applied for and received EU candidate state status in record quick time" (Cox, 2023). At the same time, Ukraine faces many challenges, from overcoming

enemies in the East to resisting corruption and climate change issues. Currently, Ukraine is virtually divided into several parts: the front-line and occupied regions, liberated regions and more or less peaceful areas that are subject to partial losses due to massive rocket attacks. And unfortunately, this situation is unprecedented in spatial planning history.

The government has published the cost of restoration works and the main priority areas, which are critical infrastructure: housing, essential social and transport facilities (ukrinform, 2023). However, where is the environment? The parliament changed some laws on local self-government and planning policy to facilitate the recovery procedure and make it easy. The government is actively engaged in the proclamation that the rebuilding will be green and sustainable (Malkova, 2023). According to the civil reports, the Ministry of Ecology and Natural Resources of Ukraine is working on specific sectoral reforms by adapting legislation to the EU in the field of natural resource management and pollution prevention reform but does not cover the macro-systems where is the main success. The report also notes that the government's lack of political will and consolidation regarding the green course threatens recovery (Society and Environment, 2023). However, for now, these are small steps of the necessary reforms, which, unfortunately, will not yield results, while the internal enemy of corruption hinders positive processes (Basel Inst, 2022). At the moment, Ukrainian national strategic planning failed (Sydorenko, 2022). Even if Ukraine, under soft pressure from the EU, updated its environmentally sustainable politics (Tymoshuchuk, 2016) and created all the necessary tools for ecological planning (Rudenko, Marunyak, Golubtsov, 2017), we have a complete lack of political will and desire (Boyko, 2023) the make environment as a priority during recovery.

Local environmental defenders are actively advocating for the environmental growth of the country (Ecoaction, 2022) and constantly focus attention on the opportunities provided by the war. When Ukraine left the Soviet Union, the state received powerful industrial and energy complexes and an insane number of environmental problems. Today Ukraine could have an advantage of the opportunities. Regions that have been subsidised and unprofitable for more than 20 years due to their mono-concentration on coal production and can get completely new principles of development in the future (Ackermann, 2023).

Unfortunately, currently, there is no qualitative connection between ecological and economic development on a national scale. Environmental protection exists at a completely separate level from the tasks the government sets before itself, especially in the recovery the affected by war areas. For the past 80 years, Ukraine has been part of the USSR, where spatial "five-year plans" were always centralised with limited perception of the territory and instead documented for obtaining planned results and did not consider the challenges associated with environmental pollution (Bunkse, 1979). It is a fact that Soviet Union`s so-called development led only to exploiting natural resources. We received huge environmental problems as a Soviet legacy (Shamina, 2022).

My personal hopes and expectations are that in the absence of consolidation at the national level, there is hope that something will succeed at the local level, thanks to spatial planning. And here's why. So, after receiving independence spatial development in Ukraine was balancing "*between*" - between East and West, between Soviet inheritance and the desire for other values, etc (Marunyak, 2014). Since 2000 we tried to implement new European visions, but only after the 2010s ISP began to appear with strong technical assistance from the German

and Swiss governments due to the spread of the "*European model*" and best practices (Tyminskyi & Thomann, 2016).

In January 2023, the Government of Ukraine officially formed the State Agency for Reconstruction and Development of Ukraine's Infrastructure "Recovery Agency" by merging two ministries, the Ministry of Infrastructure and the Ministry of Regional Development and Territorial Communities (kmu, 2023). The mandate will include the complete coordination of the issue of the receipt of investment for reconstruction and the prioritisation of the selection of what should be restored. Unfortunately, the local opposition movement is alarmed by such actions. It warns that it will destroy the country's planning systems as the road repair organisation becomes the leading institution. The task of the Agency is to restore the critical infrastructure of the first phase of restoration (ukrinform 2023), where the issue of environmental protection is not a priority. Activists warn that the centralisation of decisions leads to the destruction of the recently formed decentralisation.

As I mentioned previously, EU spatial planning is now based on sustainability, resiliency and adaptation to climate change. To help other countries, the Western world spreads these role model principles of strategic planning through the prism of analysing its own mistakes of the past (Clos, 2005). The situation in Ukraine is interesting because from the beginning of the war in 2014, we have been helped by various donor organisations that are representatives of various methods of developing and implementing strategic planning by helping finish the decentralisation process (Tyminskyi, 2022). The process of decentralisation, which international partners and donors already recognise as a "*Ukrainian phenomenon*" (Tyminskyi, 2022), also helped to stand on the beginning of the full-scale war (Huss, 2022). The Ukrainian process of developing strategic spatial planning is very different from world practice. We have

the opportunity to immediately develop according to new human-oriented standards, instead of repeating mistakes (Obukh, 2023). During *the decentralisation* reform, thanks to the multi-level governance model, local territorial communities[2] can establish international cooperation directly without the national level (Tyminskyi, 2022). What is allowing implementing green recovery even without support from the government?

Post-Soviet development in Ukraine has resulted in an underdeveloped political culture, weak political parties, a lack of transparency in justice, and weak systems of prohibitions and checks (Cox, 2023). Since 1996, the Constitution of Ukraine has been amended seven times (Borovyk, 2020). The main planning document - the general spatial planning scheme - has stayed the same since 2002, and only one population census was conducted in 2001 during the last 31 years. Ukraine has integrated environmental considerations into strategic planning processes (Golubtsov, 2021), but this is not enough to achieve strong results because of a lack of insufficient public awareness about pollution level and the importance of participating in development projects. Very important for the Ministry of Environment, civil society and the environmental committee of the Verkhovna Rada to take action to ensure that all damage to the environment is recorded as much as possible and that the aggressor will be punished in the future (Omelchuk, Sadogurska, 2022). In addition, the war has been going on for the ninth year, and there needs to be a clear understanding of what to do after its end (Society and Environment, 2022), but since the government of Ukraine is currently making big mistakes in building the recovery process, the issue of the environment remains on the public mind.

[2] Territorial communities (An amalgamated hromada) - special unit of administrative division in Ukraine from 2015 to 2020

3. METHODS

Declaration of interest

This work is a complete reflection of my thoughts and my desire to be of service to my country in times of war. I understand that the work may seem generalised, due to the uncertainty of the situation in the country, where every day there are changes related to either the consequences for the environment or the state recovery processes.

The situation in Ukraine is very complex. The country cannot hang in the middle of nowhere and wait only for victory. The country needs decisive action now. And that's why when I bring up conversations about ecological restoration, I often hear the phrase "It's not the right time" from ordinary citizens. I understand why people in the frontline can`t think about implications for nature, but what about liberated territories or cities on the back?

One Ukrainian journalist, Marina Tereshenko for the media press "Svoi", wrote an article about this issue and mentioned the words of one defender: "When we are in the field, we don't have time to think about pollution, [...], but in terms of our attitude to the land, I think we should think about it. Because now we are in a situation where we can say that it's not the right time [...], but we have to live with it. The next step for us after the victory will be a big clean-up" (Tereshenko, 2023).

And it looks like it is so easy to excuse why people avoid thinking about environmental issues by covering their unwillingness with the topic of the ongoing war. But can we afford to think like this when we are aware of the climate change situation? I know, that the defenders are really super busy with tasks, but why is it so hard to archive results in cities ordinary cities or at least develop a national strategy on how the country is going to mitigate pollution. In my

opinion, individual responsibility can help a lot in the country's restoration, but individual responsibility is difficult to monitor. But successes can be achieved at the stage of strategic spatial planning, where the principles of circular economy and environmental approach can be introduced.

Research idea

After martial law was introduced in Ukraine, which a priori makes decision-making centralised, military state administrations were introduced and began to manage the processes on the ground. All conferences or public discussions were organised only at the government's initiative. Furthermore, only a narrow circle of influential participants in the spatial planning movement was involved in these conferences. After the first international conference on the restoration of Ukraine in Lugano (urc, 2022), the media space began to be dominated by the thesis of "quick and easy solutions in the first phase of recovery", which sounds more like a part of military propaganda than a balanced and sustainable solution. In practice, the decisions made do not look easy, quick and simple.

In October, the government approved decree #1159, "On Approval of the Procedure for Developing [...] Programmes for the Comprehensive Restoration of [...] Territorial Community [...]" (Cabinet of Ministers, 2022). I understood that this document relates directly to strategic planning. I decided to study the current situation in Ukraine's spatial planning systems and how rebuilding processes fit into this structure.

To understand the gap and find research direction, I conducted a series of online interviews in February-March 2023 with people of different backgrounds and professional skills related to the decision-making process or the public sector. Some of them are currently enrolled in the

units of the armed forces of Ukraine, and their opinion about Ukraine's ability to start the renovation process is very different from those who are in the back cities. Thoughts and mindsets, like habits and behaviour, of those who became a part of the Armed Forces have changed under the influence of critical circumstances. Therefore it is difficult for such people to imagine far-reaching possibilities or possible opportunities. Civilians, on the other hand, continue to live as they have almost no threats. As I tried to understand if planning restoration during the war was possible, it was, therefore, crucial to ask different people? I have asked questions about what should the process of restoration look like after the war ends. What is the government's and ordinary citizens' role in managing the processes? What steps the government have already taken? What slows down the process, and how could we measure successes? And the most important was the environment's role and status in the country's restoration process.

Some of the answers surprised me. I was not expected to hear that people, even from the front line, would agree that the restoration process of the country should be only green through the implementation of new sustainable technologies and recycling of all military waste. But unfortunately, they also told me the same that I already knew. The environment will receive a prior role if civilians start to understand their personal impact in pollution mitigation and, in a case, of solid willingness from the politician's side.

According to the majority of respondents, no one can predict a war because, due to strong destructive actions and deaths, this should not happen in principle. But history shows that wars do not disappear anywhere. Are we not waiting for an earthquake? Or a flood? But they happen all the time. And suppose there are methods of planning and risk reduction for regions vulnerable to natural disasters. In that case, there should be adaptive planning even under the conditions that a war may occur. Precisely because we do not know how to analyse events and

understand the dimensions of the consequences and their effect over time, we cannot understand how to reduce the negative impact on the environment.

Thanks to these interviews, I formed clear research questions:

1) What threats and challenges does war bring?

2) How to ensure environmental sustainability during the restoration process in strategic spatial planning?

3) Can war create opportunities for country growth in the future?

Analysis of world experience and interesting findings of field research

To answer my first question, I looked for sources from different years to explore the evolution of thoughts about the war and the recovery process. By searching necessary literature and studies, I decided to check what is feasible to achieve, if there any similar trends, what were the strengths or what could be easily missed during post-war restoration. This study draws on a variety of literature, for example:

- methodologies developed by international institutions on the creation of damage assessment reports, risk assessment reports and general principles of recovery.
- articles by scholars, both Ukrainian and Western, who analysed the recovery experience of other countries, what were the consequences of the war and what was not taken into account.
- Journal articles from open sources with interesting and relevant theses (in my opinion).
- Relevant books and studies in the field of green transformation and sustainable development in spatial planning.

One article motivated me to narrow the geography of my search to the Balkanian case. "New offices and shops were built where parks and public spaces used to be" said urbanist and architect Dr. Haris Piplas in the Kateryna Kozlova interview for Birdinflight Journal, where they mentioned challenges and implications in the rebuilding process of Sarajevo (Kozlova, 2022). Dr. Haris Piplas emphasised how the lack of comprehensive urban planning during the reconstruction could harm the city's development. In this regard, the experience of the recovery of countries after the wars in the Balkans from 1991 to 1998 appears valuable. These wars are the closest in terms of time to the wars on the territory of Europe that have occurred in the last 30 years. This makes them particularly interesting for comparison, especially when some Balkans countries have recently integrated or are on the path of integration into the EU. The example of the study of the reconstruction of Zagreb in Croatia and the reconstruction of Sarajevo in Bosnia and Herzegovina provides an opportunity to study a wide spectrum of processes. And no matter if they are positive or negative, it is just experience that we should admit how it is and learn a lesson. The bloody war at the end of the 20th century seriously affected the affected areas, including the destruction of infrastructure, refugees and environmental problems. Analysing the approaches adopted for the restoration and stabilisation of these territories, I obtained important lessons from the Balkanian case, what risks, difficulties and challenges we, in Ukraine, could expect after the formulated recommendations, based on lessons, for the implementation of an environmental approach in the restoration processes of Ukraine, to avoid or at least reduce the amount of possible future implications.

To better understand the current state of cities, I decided to make a research trip to Zagreb and Sarajevo. During my fieldwork, I conducted a series of interviews with people who were involved in post-war reconstruction processes and who were involved in contemporary development. In Croatia, I spoke with a historian and philosopher, Ozren Zunec, who

participated in the defence of his country and then studied the aftermath of the war. I met with Irina Zupan, a naturalist and head of the department of Maksimir Park and other protected areas of the city of Zagreb. I also talked to the archivist of the National Archives. I also met with the NGO "Zelena Akcija" director, where we discussed the current ecological state of the country and the green course. Unfortunately, I did not find people in Bosnia and Herzegovina in advance before the trip. The messages that I sent were not replied. Therefore, upon arriving in Sarajevo, I decided to act spontaneously and spoke with the staff of the Museum of Crimes Against Humanity and Genocide and the Siege of Sarajevo Museum. All these conversations made it possible better to understand the complexity and multifaceted nature of reconstruction processes. From this experience and communication with people, I realised there is no single correct methodology in reconstruction. And it is not worth expecting perfect results in a disorganised government system. During my visits, I also visited open memorials and museums dedicated to the events that took place between the countries. The issue of commemorating the memories of the war will not be relevant to my research topic. But suppose you look at the From the point of view of comparative analysis and the availability of research material on previously studied strategies and approaches to post-war reconstruction. In that case, this case is important for developing hypotheses about the future challenges and risks that Ukraine will face during and after the war.

Analysis of the legislative vision and search for cross interconnections

My next stage was analysing the legislative system of strategic spatial planning in Ukraine. The field of my search was to identify the links between the laws on local self-government and urban planning activities, as well as the existing national strategic documents and environmental legislation. It was also important to study the formation process of territorial communities and decentralisation reform, as spatial planning is interconnected with the

formation of communities. The analysis of existing documents allowed me to create a scheme of interconnections between different levels, and to see how realistic my thoughts are in promoting the idea of implementing an environmental approach in restoration processes and strategic documentation.

Data collection and analysis of materials

Since the topic of my diploma examines the territories that were damaged as a result of Russia's armed aggression, I decided to limit the research only to the strategic documentation of territorial communities located in the liberated territories. According to the latest changes in the legislation, the affected areas must develop a Plan and a Recovery Program. Thanks to the support of international donors, 3 documents were developed that describe the process of step-by-step development of the Recovery Program. These three documents have many similar features and have a common purpose. Based on the results of the analysis of these recommendations of the step-by-step mechanism and based on the Ukrainian legislation, I provided descriptions of how to implement environmental approaches to the step-by-step mechanism and why it is important.

Also, I managed to find more than 35 references to the development of documents describing the vision of municipalities for the restoration and reconstruction of a settlement or the territory of a territorial community, based on the principles of sustainable development. Most of them are developed with the support of international donors, partners working in Ukraine and local NGOs. To understand the relevance of restoration and the importance of nature-oriented solutions, I prepared questions for local self-government bodies and sent them through the mechanism of public appeals. The survey I designed is a list of open questions, where a detailed answer must be given to the presence of approved strategic documentation, existing priorities

in restoration and environmental pollution challenges. Unfortunately, I did not receive an answer, rather because in martial law conditions, there is a certain fear and mistrust of filling out questionnaires, and the ultimate goal of my research was unclear. Therefore, upon my return to Ukraine, I want to meet personally with representatives of the municipalities of territorial communities and tell them about the importance of the topic of my research.

During my first interviews, I established a connection with the organisation ZeroWaste Kharkiv[3], which led the process of developing the implementation of environmental approaches in the process of restoration of the Lubotyn urban territorial community, located in the Kharkiv region. This document is the only document in open access that analyses the climatic and ecological challenges of the territorial community and provides clear recommendations on the adaptation of the territory to climate change and reduce pollution. In cooperation with this public organization, I decided to take the case of the Lyubotyn community to test my hypotheses regarding the possibility of implementing an environmental approach to spatial planning. The Lubotyn urban territorial community does not have strong destruction due to hostilities, but several rockets fell on the community's territory. This community has no approved comprehensive spatial development plans, which gives hope that the archived results can be included in the work process. And also, this community is the first and only community that joined the ZeroWaste Alliance[4] Ukraine initiative from the EU and has ambitions for sustainable development. The experience of this community can inspire other communities to think more environmentally.

[3] Zero Waste Kharkiv initiative - local active movement, that promote recycling and no-plastic lifestyle in Kharkiv, www.zerowastekharkiv.org.ua

[4] ZeroWaste Alliance Ukraine -it is a union of organizations and activists of Ukraine working on solving the problem of waste in Ukraine https://zerowaste.org.ua

Based on the materials found in the literature, I explored the key differences between ecological and environmental approaches and principles, especially when they are implemented in spatial strategic planning. Since Ukraine is a candidate country for membership in the European Union, the state should start implementing the principles and approaches of EU legislation on environmental protection and adaptation to climate change. Therefore, for further work, I decided for augmenting the importance of the environmental approach using "The EU environmental principles" approved by "Green Deal" in 2019. According to it, projects (private or public) that may have a significant impact on the environment, for example, the construction of a highway or an airport, are subject to an environmental impact assessment. Similarly, a number of government plans and programs (for example, on land use, transport, energy, waste or agriculture) are subject to a similar process called strategic environmental assessment. In Ukraine, such documents are approved, but they have recommendatory characteristics and can be ordered for implementation at the request of local self-government bodies. Therefore, an environmental approach based on assessing of the risks of negative impact on the environment, as part of the development of recovery plans, sounds like a rational solution.

In 2020, ESPON, with the support of the European Commission, analysed the development of green infrastructure (GI) in Latvia (Ruf et al. 2022). In the methodology section, the researchers describe that the spatial analysis of the country was carried out through the use of geospatial data and assessment of possible risks of impact on the environment. According to the document "Integration of Geographic and Statistical Data for better EU policy-making", developed in 2021 by the European Committee of the Regions, Geospatial data can significantly strengthen territorial resilience and adaptation to possible challenges in the future during the transition to sustainable "green" development by the 2050 year

Based on the already developed "Ecological restoration of Lubotyn. Development of recommendations" (Khandogina, Yarotska, 2022) and available tools for geospatial analysis of the territory (SuntinelHub, WorldClimate, EarthData.nasa.gov, Global Wind Atlas, Google Earth Engine), I developed a series of analytical maps of the environmental vulnerability of the community territory under the influence of anthropogenic factor among the key visions, the community in its strategic documentation indicates the desire to develop recreational and tourist potential, the development of which can negatively affect the state of the environment. Adaptation recommendations developed by the NGO and the received analytical data, I drew on a spatial map, which can become the basis for developing the complex scheme of the spatial development of the community territory, which is required according to Ukrainian legislation. The developed materials, which I describe further in the results, are a clear example of how the use of modern satellite observation methods and data on the territory can be used to calculate the possible risks of impact on the environment and measures for mitigation and reduction of pollution can be included in Recovery Plans and further Development Strategies. which will be the basis of the environmental approach.

4. RESULTS

4.1 Learning from the past

While I was writing this work, all the time, I was worrying about how long it would take to rebuild my country. Will the issue of restoring and preserving the environment be a priority, as is the importance of restoring residential buildings? In my opinion, people transform cities in a new way and according to new standards only when they feel dissatisfaction with the past. Pre-industrial cities had many problems that the modernist era solved after WWII. New towns have become unfair and not human-oriented over time, and we are rebuilding them again, trying to bring nature back to our streets. But why did significant transformations not take place in the post-socialist countries that suffered from wars in the period after the 1990s? So it turns out that everything suits people and there is enough nature there? Ukraine can take advantage of the opportunities created by the post-war recovery to lay the foundations for future green growth (UNDP). This perfectly reasonable and realistic goal can be achieved in the green national recovery strategy.

In the conditions of the threat of climate change and the disappearance of biodiversity, restoration should be based on the principles of sustainable development, an integrated and environmental approach to strategic spatial planning. This idea is not super new, but it was formed only recently, and, unfortunately, some countries are only in the process of greening their policies. But what about post-war counties? Therefore, I decided to look at the history of countries that suffered from war in the period when I was born and where the consequences are still visible. I made a research trip to the capitals of these countries. I saw that in 28 years of post-war restoration, they hid the visual implications of the war. However, more time is needed to renew the country mentally and restore social and political processes that would help rebuild the cities and the environment.

George Santayana, an American-Spanish philosopher, said: "Those who cannot remember the past are condemned to repeat it". Therefore, the experience of the countries that I decided to consider can teach Ukraine a couple of valuable lessons. However, whether Ukraine will take advantage of this is still being determined.

Analysis of the context

The wars in the Balkans from 1991 to 1998, which are still often called the Yugoslav Wars, were considered as ethical conflicts between Serbs, Croats, Albanians and Bosniaks. These armed actions have violated people's rights, destroyed cities and political governance systems, and caused significant damage to the environment. In both cases, environmental renovation and pollution elimination were not primary goals. For example, the reconstruction processes in post-war Croatia aim to return people and rebuild cities (Elden, 2004). There were no new principles and approaches to renovating territories, as it was, for example, after the Second World War, when cities were rebuilt based on new ideals instead of the simple rebuilding of critical infrastructure.

The case of the war for the independence of Croatia is almost the most consistent with the Ukrainian context because the enemy was only from one side. During the conflict, Serbian troops occupied about 20% of Croatian territories, and civilian infrastructure and residential buildings became the main targets of shelling and bombing. Over 10% of the residential area was destroyed or seriously damaged. The number of destroyed factories was small because Serbian troops occupied mostly economically depressed agricultural regions. As a result of the successful post-war reconstruction, Croatia fulfilled the EU accession requirements and became a full member in 2013, 18 years after the war (Kosarevych, 2023). Today, the Croatian

government fully supports Ukraine and shares its experience in its reconstruction and demining processes.

The case of the war in Bosnia and Herzegovina (BiH) is relevant for Ukraine regarding the scale of the hostilities deployment and the environmental consequences (Radio Slobodna, 2015). The experience of this country can serve as a reminder of what should not happen and what should be avoided in the reconstruction process (Brezar, 2022), especially regarding to EU integration. Perhaps, one day Ukraine might become a successful experience for Bosnia and Herzegovina.

After the great Bosnian War, as the locals call it, the territory was divided into two entities, the Federation of Bosnia and Herzegovina and the Republika Srpska, as well as a separate territorial unit, the Brcko district, where the EU still supports peacekeeping activities. Due to the principle of a three-party government, complex constitution and completely different government institutions, and low management efficiency, the general official data on the number of damaged territories and houses in the country is not full (World Bank report, 2000). According to official data, the loss of critical infrastructure in cities such as Sarajevo, Mostar, Tuzla, and Goraj was between 60% and 80% per cent, and destroyed villages in depressed areas were never revived. Cultural and historical heritage suffered the most significant losses: libraries and mosques. According to the World Bank, the country's population continues to decline rapidly due to solid economic instability and migration (World Bank report, 2020). Since 2003, Bosnia and Herzegovina has become a potential candidate country for EU membership and, in 2016, officially applied for the association.

During the war in Croatia in the 1990s, the Greenpeace organisation carried out some missions and was active in the region to provide aid and monitor environmental problems (Greenpeace, 1992). For example, in one of their reports from 1992, they described how Osijek used a defunct clay pit as a new waste dump since the original one was under shelling, leading to the pollution of the Sava River. Also, Dubrovnik dumped all its waste into the Adriatic Sea because the city was surrounded and constantly exposed to shelling (Greenpeace, 1992). Today, the issue of harbour pollution is still critical, as, after every storm from the south, the harbour is filled with waste, including from Albania (thedubrovniktimes, 2017). Also, local and international naturalists recorded the consequences of pollution during a conference in Zagreb in 1992 on the negative impact of war, which emphasised the importance of urgent solutions to the problems and the elimination of pollution (Richardson, 2002).

Moreover, among the effects of the war on the environment, not only the destruction of ecosystems from shelling and bombing are determined, but also thousands of square kilometres of mined earth's surface are included. As of 2022, minefields in Croatia cover 149.7 square kilometres (IHL, 2019). According to the latest demining strategy, Croatia will officially be demined in 2026, when it will have neutralised an estimated 17,285 anti-personnel mines. According to the national environmental impact assessment of the war, 98.7% of mined lands are forested areas where tourists and animals walk. Rains become a terrible problem for demining because streams from the mountains carry mines to the rivers and there are reports of mines being caught by locals on the banks of the Sava River. Since Croatia's economy depends on tourism, demining has priority and constant financial support (HCR, National programme, 2009).

Bosnia and Herzegovina is widely forested, with approximately 43% of the total area covered by forested landscapes (upland forests and woodlands), and the forest products industry has been and remains an essential part of the economy. Currently, tourism is also a significant contributor to the local economy. By 2022, BiH was considered the largest substitute country in the world (UNDP, 2019). In May 2014, large-scale landslides and severe flooding led to the discovery of even more landmines, prompting the international community to send additional demining workers (NATO, 2014). About 80,000 anti-personnel mines, located on 2.2% of the territory of BiH, have not yet been cleaned (Clayfield, 2017), creating additional danger for tourists and locals. Therefore, with the support of the EU, wes developed a special app "BH Mine Suspected Areas", for residents based on Google Maps, which contains information about marked dangerous areas that should be avoided when travelling (undpeurasia, 2020).

The results of my spatial studies in the cities of Zagreb and Sarajevo showed that war has a negative impact not only on the fragmentation of society and the collapse of the political system but also on the lack of an environmental component in priorities, even if the issue of pollution is directly related to human lives. "Often, the environmental consequences of war are overlooked or overshadowed by the immediate human suffering and destruction of infrastructure. Environmental degradation from armed conflict may be less visible, but it can have long-lasting and far-reaching impacts on ecosystems, natural resources, and human well-being" (Susskind, Ali, 2014). Spatial studies of the cities of Zagreb and Sarajevo showed that the countries began to develop in entirely different ways after the wars were more important to bring people back and restore buildings than think about the negative impact of the war on the environment was the last thing. The question of pollution and the consequences of the war was raised only when they related to the population's physical health. During the trip, I was able to talk with representatives of Zelena Akcija (NGO Croatia) and Centar za životnu medženje

(NGO BiH) and find out how the situation with the environment is today after 28 years of wars in the Balkans.

Almost half a century of urban planning in Croatia and Bosnia and Herzegovina took place under the socialist regime of the Yugoslavia period. As historians determine, strategic planning before 1991 strongly influenced the formation of new planning approaches to urban infrastructure and created specific development standards (Tandarić, Ives, 2022). Despite the dominant socialist ideology, planners and architects were adherents of international modernism rather than the socialist realism that swept across Central and Eastern Europe (Blau and Rupnik, 2007).

After the Second World War, before spatial planning, people independently eliminated the consequences of pollution from hostilities. They planted trees in shell holes and trenches, and destroyed neighbourhoods were turned into parks. With planning development, these self-planted green zones were fully considered in developing master plans (Tandarić, Ives, 2022). Yugoslav socialism fundamentally differed from Soviet communism, as it introduced decentralisation, thanks to which the redistribution of resources and new administrative-territorial communes ensured rapid growth and reconstruction of destroyed cities. The objectives of urban planning were to support socio-economic development plans (Nedović-Budić and Cavrić, 2006), indicating that the early socialist regime saw urban planning as a continuation of the economic strategy based on the best practices of post-World War II French and German recovery. Social planning was officially introduced alongside a self-government and land nationalisation system in Yugoslavia.

Zagreb

The first socialist development plan for Zagreb (Figure 1) was developed in 1953. It envisaged the expansion of the city to the south across the Sava River by applying Le Corbusier's concept of "*towers in the park*", according to which the districts were built up with ensembles of high-rise architecture, around which there would be green areas of public and special appointment.

After the earthquake in Skopje (Macedonia) in 1963, a new master plan was developed in 1971 (Figure 2), according to which the city developed until the War of Independence. This plan laid the foundations of the modern image of the city, and it defined strategic directions, including zoning, transport infrastructure with wide highways and residential areas with sanitary gaps between buildings in the form of green zones, in case of destruction (Tandarić, Ives, 2022). The new plan envisaged the preservation of the historic centre, forest parks such as Maksimir and Rybniak, and the conservation of a large green area around the Sava River with the creation of artificial barriers and a network of footpaths (Dumbovic, 2019), in order to prevent the risks of flooding that could happen again. In 1964, the Sava River overflowed its banks and caused great destruction and death, so planners decided that a building buffer should be maintained, allowing the river to have a spillway area (Mohl, 2011).

After the collapse of Yugoslavia and the "Homeland War", the system of institutions for planning and territorial development was destroyed. The decline in the functioning of state institutions and the economic crisis led to privatisation, during which green zones were threatened with destruction and growth. Croatia's post-war reconstruction was forced, with a conscious decision to neglect planning in favour of rapid reconstruction and return (Radić, 2009). Most development plans were developed under socialism and stayed relevant even after the war, so the naturally important landscapes were preserved within their limits and protected

by legislation. Today, the Maksimir Public Institution for the Management of Protected Areas of the city of Zagreb operates in Zagreb, and is engaged in developing and protecting all-natural and protected areas within and around the city (parkmaksimir).

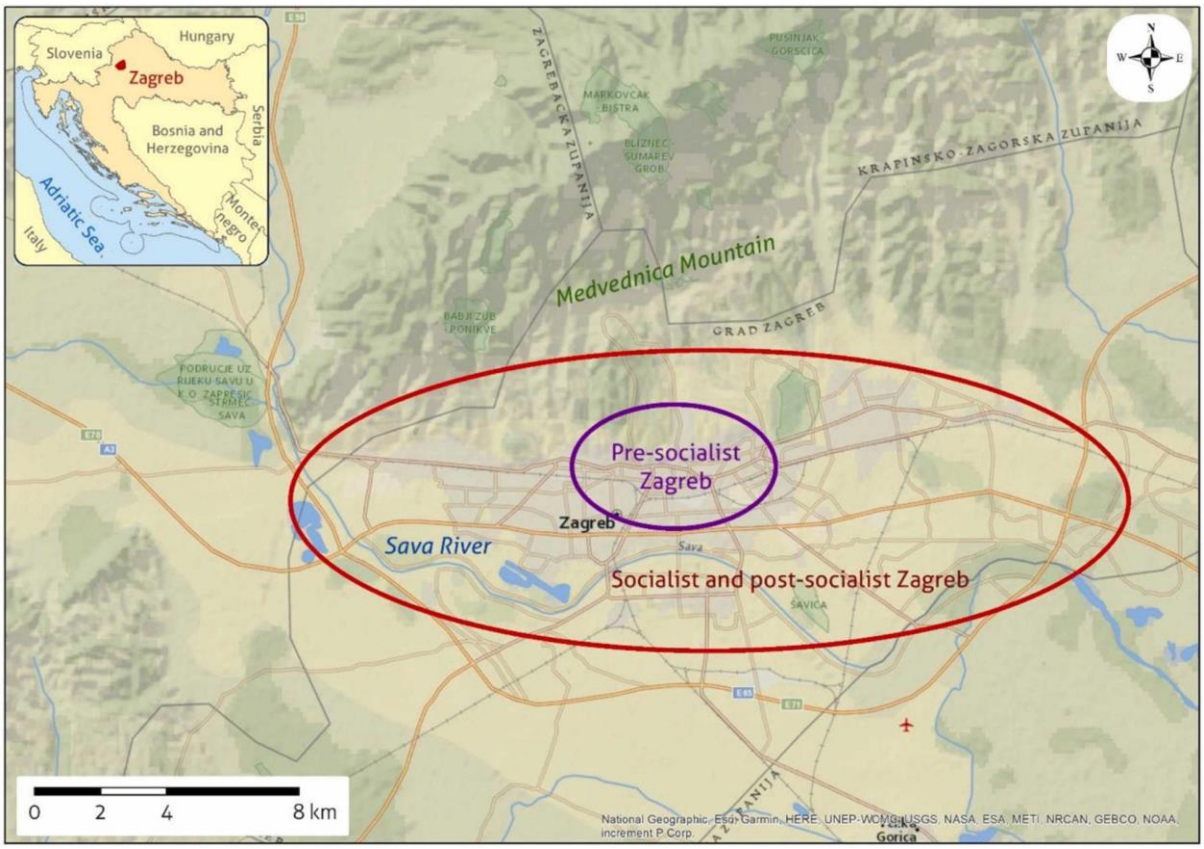


Figure 1. Approximate spatial coverage of pre-socialist, socialist and post-socialist Zagreb (Tandarić, Ives, 2022)

Figure 2. Photo of the model of the socialist centre of Zagreb (Photo by author)

During Yugoslavia, the 950 km long Sava River was one of the symbols of the country, as it originates in the mountains of Slovenia and merges with the Danube in Serbia, passing through Croatia and Bosnia and Herzegovina – symbolically and physically connecting several countries through shipping, which was destroyed during the wars. After Yugoslavia's breakup and the war's end, green areas and the river ecosystem were threatened by development. Architectural and urban concepts (Figure 3) for development and construction were developed

for open areas (Matkovis, Šsitaroci, 2012). Due to the lack of funding, the ambitious plans remained unrealised. Since the Sava River is navigable, the government wants to improve a section of the river and turn it into a canal. Since Croatia has been part of the EU since 2013, freshwater activists have appealed to the European Commission to prevent such regulation (WWF, 2011). Arno Mol, a local environmental activist and expert said: "European river authorities are proposing more environmentally sound river management methods that leave more room for rivers. They do this because […] a naturally functioning river not only has more life than a canal but also provides natural mechanisms to better deal with droughts and floods" (Mohl, 2011). I was pleasantly surprised by the large open undeveloped area around the Sava River in the city. However, it lacks more wildlife, such as shrubs, grasslands and riparian trees, to support and develop biodiversity threatened by climate change. Even though the territory has a grass cover, it is vulnerable to the open rays of the sun.

Figure 3. Spatial planning of the riverfront in Zagreb (Dumbovic, 2019)

I was also impressed by the historic Maksymir Park (Figure 4), one of the city's largest hornbeam forest parks. Back in the 19th century, the forest territory was artificially divided into several zones, which are very noticeable when walking through the park. The further you go into the forest park, the less noticeable the impact of human activity. Since this forest park is a haven for unique, rare species like the stag beetle, spotted salamander and black woodpecker, the park staff continuously monitors these species and involves residents in the count.

Figure 4. Photo collage of the Maksimir Park in Zagreb (Photo by author)

Compared to other similar cities in the EU, the city is difficult to call convenient for pedestrians and cyclists. According to information from environmental activists, the comprehensive planning resumed in Zagreb sometime after joining the EU. Before that, issues of

environmental pollution or liquidation of the effects of the war were not raised at the state level. The only priority program for the elimination of consequences was the demining program. Moreover, the naturalisation of forests, rivers and biodiversity received funding last. These were independent programs that operated separately from economic development and the physical reconstruction of cities. The integrated approach is implemented at a very slow pace. For example, in Zagreb, the introduced bicycle infrastructure is hazardous and inconvenient because the voice of cars is still dominant in the city. Space for cyclists and pedestrians is provided at last, on sidewalks, instead of narrowing the carriageway for cars. The pedestrian space is inconvenient, and to cross the road, you have to wait a long time for the green light to turn on. Nevertheless, despite these problems at the local level, the country's authorities have implemented a program of sustainable development and climate resilience after the horrible big earthquake in 2020 and developed an action plan for the adaptation of vulnerable areas to climate change SECAP and a plan to strengthen and strengthen buildings at the expense of repeated of earthquakes (MPGI, 2021).

Figure 5. Photo of bicycle infrastructure in the Zagreb city center (Photo by author)

Sarajevo

Sarajevo historically has a particular geographical location that has maintained a central role in its population's spatial distribution, with residential areas exposed to potential geomorphological hazards (Martín-Díaz, Palma, 2018). After the war and post-socialist urban processes, to which people are accustomed, the built environment of the city is constantly moving in an increasingly unstable direction, even despite the existence of a modern and EU-agreed principle of sustainable and integrated development (Aquilué, Roca, 2016).

During the period of socialist Yugoslavia, the territory of Bosnia and Herzegovina lagged in economic development, which also affected the development of the cities themselves. In 1968, the Yugoslav government applied to host the Winter Olympic Games in Sarajevo in order to popularise the city and increase its financial and investment attractiveness. After the candidacy was approved, the city began preparing to host the Olympic Games in 1984 and actively developed (Husukić, Zejnilović, 2020). Then the population grew to almost 500,000 thanks to the new planning principles of urban expansion along the river and industrialisation, similar to Zagreb (Donia, 2006). Socialistic transformation of the city of Sarajevo focuses on the fact that urban planners wanted to develop the territory taking into account the cultural and natural features of the local landscape and religious diversity, but the socialist system made its adjustments (Zagora, 2021). The general plan scheme of the city from 1965 to 1986 considered the expansion and longitudinal development of Sarajevo to the west and the differentiation of the city territory. This document introduced a strict functional division of urban zones. The pre-Olympic period can be characterised as a stage of adaptation of the traditional functions of the city to support modern needs as in other socialist cities, which foreshadows the post-Olympic period (Gül, Dee, 2015). Affordable typical housing, Olympic campuses, large public spaces and transportation highways provided more opportunities for people to develop and prepare to

receive the global community of athletes but completely erased nature as a full participant in the city. The socialist period developed territories but also subjugated nature. In the case of Sarajevo, the mountains were brought to the city in such a way that the spatial structure of the Olympics is an example of a bipolar spatial structure that facilitated the relationship between the city and the mountains (Husukić, Zejnilović, 2020). After the Great War, when territories were divided into cantons and people were settled by ethnic groups, the process of uncontrolled urbanisation began on the slopes and in the river valley. Today, the success of development in preparation for the Olympics is lost in the shadow of the bloody history of war and occupation. The former infrastructure is abandoned and non-functioning, and the former towns for sportsmen have been rebuilt for housing in "*sleeping districts*", recognised by urban planners as a problem of post-socialist and post-communist cities of the 21st century due to their mono-purpose.

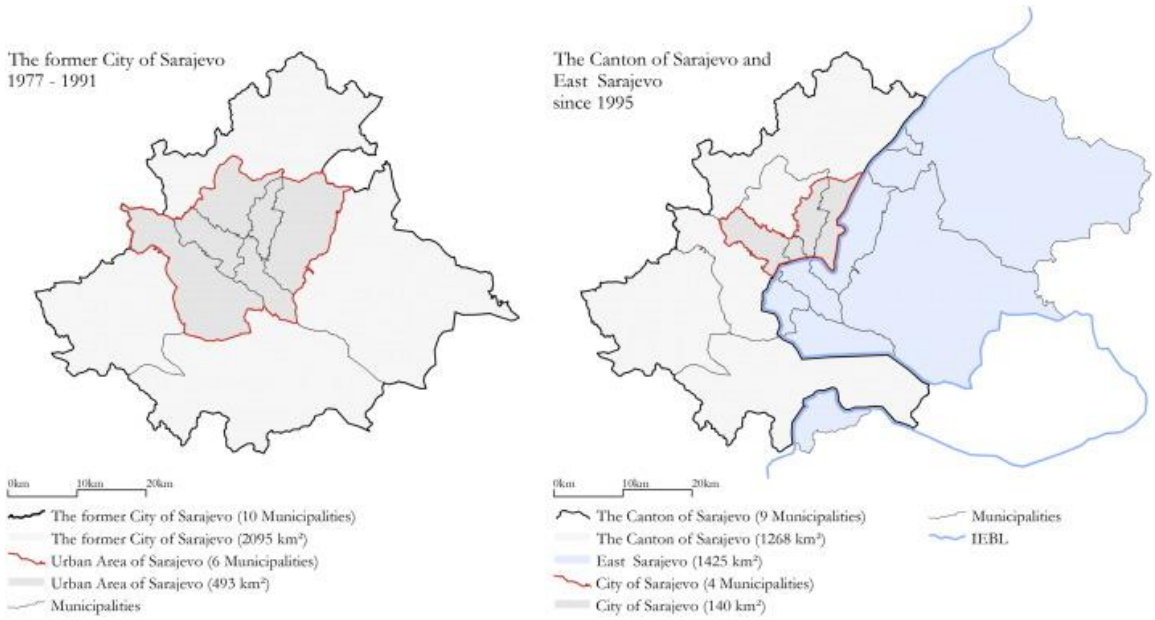


Figure 6. The urban region of Sarajevo in 1991 and the Canton of Sarajevo after 1995 (Aquilué, Roca, 2016)

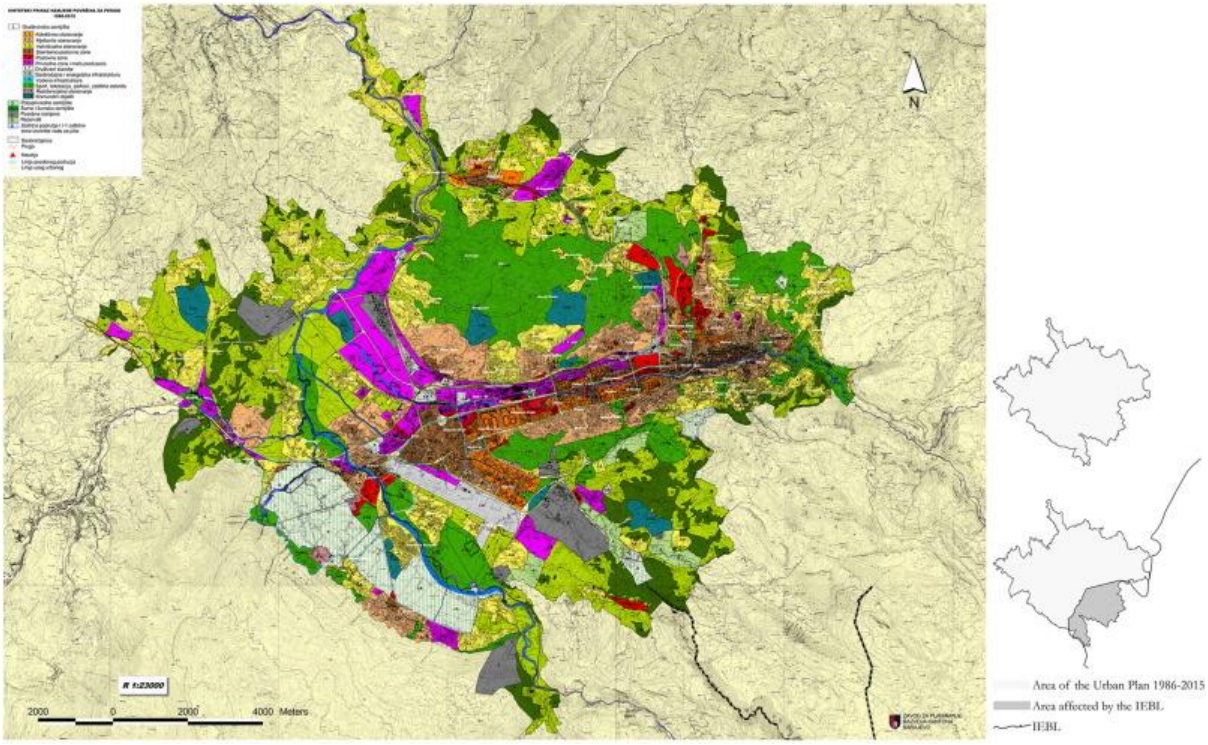


Figure 7. Urban Plan of the City of Sarajevo 1986–2015. Original scale 1:23,000 (Aquilué, Roca, 2016)

In an interview for *Birdinflight*, urbanist Dr. Haris Piplas points to the current problem of uncontrolled urbanisation of the city and division into ethnic-historical districts, which has led to the city's defragmentation and complete disconnection. Urbanization also affected the city's frantic pace of motorisation, the lack of sustainable public transport and air pollution (Niksic, 2019). "Serious environmental problems are developing, such as air pollution, where high concentrations of sulfur dioxide and polycyclic aromatic hydrocarbons (PSHs) have been reported in the winter months" (Gül, Dee, 2015). According to Word Bank data, impoverishment of the population, migration and the lack of economic development in the country lead to the extinction of villages and the resettlement of people to cities. The new settlements created by rural migrants now exist on the nearby hills and artificially expand the cities. But according to local environmental activists, the impoverished population constantly suffers from natural disasters when water, not retained by trees, flows from the mountains and destroys houses, and floods on the river cause flooding of valleys (ukrinform, 2023). "The

ethnic division between the Republic and the Federation, created by the Dayton Treaty, is the main obstacle to institutional reform" (Gül, Dee, 2015), which also leads to negative consequences for the environment because the environmental protection system is helpless in the framework it exists now. Since Sarajevo is located in a seismic zone, the issue of an earthquake is a matter of time (Martín-Díaz, Palma, 2018). Moreover, if it happens, colossal destruction will occur in the city, leading to deaths. Ethnic fragmentation also harms the waste disposal situation. For example, near the city of Mostar, there was once a coal mining quarry interrupted due to the war. Currently, it has turned into an illegal dump, which is not served by any companies operating in the city and under various ethnic groups. Furthermore, the data on water intake from the Neretva River, the source of drinking water in the city, said that the indicators are exceeded (Calò, Parise, 2009).

During the siege of Sarajevo, after the city's power supply was cut off, more than three-quarters of all the city's trees and almost all of the suburban trees within the siege line were cut down for firewood. (Lacan, McBride, 2009). What amazed me, the trees were cut down by locals for survival. Although during the bombing of Serbian positions by NATO forces, the forests were heavily damaged due to bomb ruptures. Also, felling during the siege resulted in the uneven removal of urban trees from the city, so that some areas lost all their street and park trees, while other areas (some "sniper alleys", Serb-held quarters, etc.) look the same today as before. The increase in the suburban population affects the fact that the surrounding forests are turned into rural areas uncontrolled (Lacan, McBride, 2009). After the hostilities and the process of demining the mountains and areas adjacent to the city, people began filling the trenches and planting trees on their own.

The Milyatska (Figure 8) and Bosna (Figure 9) rivers are an example of the robust construction of natural banks, which restrains the development of the ecosystem and eliminates the interaction of people and nature. A similar process occurred in the city, the river was jammed in stone and between expressways. During the research, I noticed that solid waste, such as plastic bottles and cups, accumulates in the water. And the water quality is constantly deteriorating and the river no longer seems transparent (Isaković, Toroman, 2021). Institute for Public Health of the Sarajevo Canton said: "Based on the conducted analysis, we determined that waters in the Sarajevo Canton are polluted and they represent a hygienic-epidemiological threat for the health of citizens" (sarajevotimes, 2016). The Milyatska River flows into the Bosna River, which flows into the Sava River, the Danube, and the Black Sea (Csagoly, 2006). The war in Ukraine has already caused terrible ecological damage to the environment, including the waters of the Black Sea, and here pollution from Sarajevo can be transmitted by water to the already damaged waters. There are already examples of wars in the world over problems of access to drinking water and rivers, so could the lack of urban planning and problems with the state of the environment in one country lead to the emergence of new wars?

Figure 8. Milyatska River in the center of the city (Photo by author)

Figure 9. Bosna River in Sarajevo (Wikipedia. Public Domain)

My professional experience while visiting the city of Sarajevo indicates that integrated spatial planning needs to be more present in the city. It cannot be implemented based on the experience of European cities. Public transport in the city operates according to its internal rules, which are not announced at any stop. The streets are full of private vehicles (Figure 10) because there is no confidence in public transport. Those trolleybuses that I have seen are overcrowded and there needs to be more of them. There is no bicycle infrastructure as a form of transport, and those cyclists who met are rather exceptions and local heroes, as drivers exceed the speed limit. The city's various architectural styles and eras are more chaotic than orderly. Since the city and surrounding areas exist as a separate canton with a separate municipality, and the entire country is divided into completely different self-government systems, compliance with uniform standards is impossible.

Suppose Croatia could start functioning independently and understand the advantages of independent territorial management. In that case, BiH, in order to function successfully, needs to renew those approaches and principles that existed during the times of socialism, to create equal conditions and opportunities for different ethnic groups of the population. It is precisely integrated planning that can help increase the comfort of residents and balance development but also help integrate the importance of the environment into everyday life. The presence of unmined territories and diverse steakhouses in the landscape are still the only significant environmental challenges due to the war.

Figure 10. Parking on the streets in Sarajevo (Photo by author)

Conclusions

Both the cities I researched, Sarajevo and Zagreb, faced environmental pollution and biodiversity loss due to hostilities. In particular, the threats related to the pollution of water resources, the use of forest lands and uncontrolled growth lead to the destruction of natural areas. During the Homeland War, Zagreb was attacked by rockets just a few times in 1995, but the city felt the effects of the war as it received waves of refugees and soldiers. Moreover, the local ecosystem felt the consequences due to the increased anthropogenic load on the Sava River. Sarajevo went through almost four years of occupation hell, during which the city was destroyed by more than 60% due to constant shelling and killing of people. In the conditions of constant survival, the issue of environmental pollution was not even discussed. Instead, the services available to the ecosystem became the only means by which people managed to survive. Greenpeace's research missions in these years consisted of recording losses and organising scientific discussions about eliminating the consequences of war after the war. After more than 25 years, as the wars ended, cities are found at entirely different levels of development, and the common elements of the cities are only modern urban, climatic and ecological challenges inherent in most cities of Ukraine. From here, it turns out that overcoming challenges occurs according to completely different scenarios. Both countries still have mined territories, the negative effect of which is constantly present. But today, under cooperation with the EU, these countries are trying to implement sustainable solutions to restore destroyed ecosystems.

4.2 The environmental approach in strategic spatial planning

Analysis of the context

The biggest challenge of my topic is that I try to understand and characterise the processes that are just taking place, namely the role of the state and ordinary citizens in managing the recovery processes and using the human and institutional potential of the country to achieve success. Studying the experience of countries that have gone through war or are going through it now, like Ukraine, I realised that there are the same evolutionary steps in building the process of rebuilding the country after hostilities.

The main common patterns are:

- Assessment of infrastructure destruction without risk assessment of consequences.
- The desire to return the population and return to the economic level of development.
- Restoring critical infrastructure is priority number 1.
- Decision-making regarding long-term processes/strategies takes a back seat.
- There is no clear understanding of the framework of "recovery" and the criteria for achieving the goal.
- Centralization of decision-making from top to bottom.
- Changes in legislation to speed up decision-making processes.
- Financing clear and measurable point projects instead of intelligent investments.

My thought may sound very strange, but the war in Ukraine since 2014 has influenced the formation of a basement of a certain level of resistance to unforeseen risks. During the nine years of the war, we received specific knowledge and skills regarding risk awareness and consideration when planning one's normal development. Thanks to signing the association agreement with the EU in 2014, Ukrainian legislation began to reform and become more similar

to European legislation. The decentralisation reform made it possible to make decisions more quickly regarding constructing defence positions, redistributing humanitarian aid, and providing shelter to temporarily displaced persons (Umland, 2019). The division of responsibilities and the cohesion of a common idea allowed volunteer groups and international aid to be distributed more quickly (OECD, 2022). Thanks to the latest reforms of the digital transformation of the government institution, the process of collecting data on the assessment of destruction, analysis and monitoring of changes is almost online. Also, the most significant advantage is that, within the framework of the association agreement, Ukraine must fulfil its obligations under "fit for 55" and achieve the set goals for decarbonisation and adaptation to climate change, which reflect the holistic approach of the EU Green Deal, and is a solid argument for the importance of implementing an environmental approach.

The Declaration on Rebuilding Ukraine in Lugano in 2022 (URC, 2022) recognises this and commits the Ukrainian government to the Paris Climate Agreement and the 2030 Agenda for Sustainable Development. All these moments strongly distinguish the experience of Ukraine from the case of the restoration of the Balkan countries and make it unique (Humphreys, 2022). At the time when the Balkan countries began their post-war phase, integrated sustainable spatial planning as a practical model of development and territorial management did not exist. In the 90s of the 20th century, the relatively recently formed EU countries were only on the way to forming a structure of spatial documentation and understanding the importance of reducing the harmful effects of pollution after the climate conference in Rio in 1992. Therefore, the difference is entirely logical. However, even with the dominance of advantages in the recovery processes in Ukraine now, similar patterns are beginning to follow.

Today in Ukraine, despite the martial law, the government continues to introduce changes to the legislation within the framework of integration into the EU. Currently, land reform and the

continuation of the decentralization reform are being implemented, which provide for the transfer of powers and resources to the level of territorial communities. A critical component and key to the implementation of these reforms is the formation of capable communities and the ability of communities to manage their territories, including through the development of strategic spatial planning documents, one of which is a comprehensive plan for the spatial development of the territory of the territorial community. Although strategic spatial planning in Ukraine is still in the process of forming and stabilising the hierarchy of urban planning documentation, it has been actively used by local self-government bodies since 2019, based on the Sustainable Development Goals (SDGs) and the Leipzig Charter "Cities of Europe on the way to sustainable development" of 2015. According to the latest changes in 2022 in the law on local self-government, territorial communities need to develop Territorial Restoration Programs, which in turn become the basis for developing comprehensive spatial development plans. The development of these plans begins with the announcement of the development process and the formation of a working group. Local self-government bodies carry out the implementation of measures related to the formation of the task through the mechanism of public discussions. At the moment, the Ukrainian government, with the support of the USAID DOBRE program, has released a scheme (Figure 11) for the development of programs for the comprehensive restoration of territories.

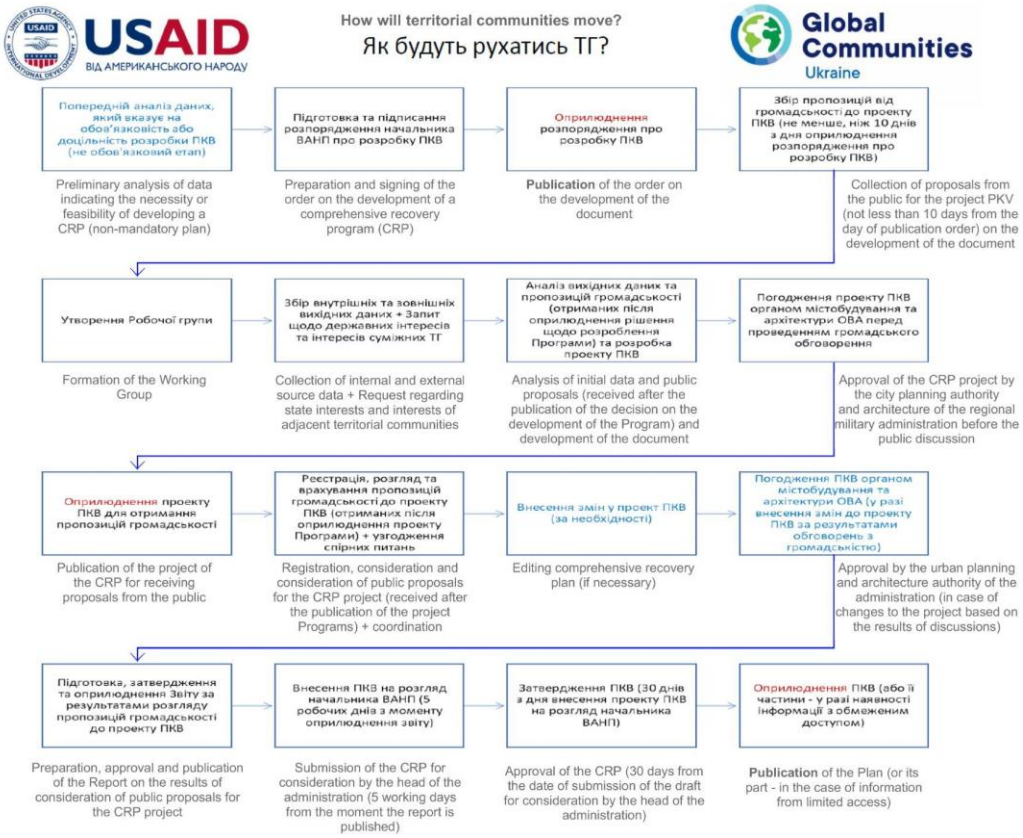


Figure 11. Step-by-step scheme of the implementation of the comprehensive recovery plan (USAID, 2023)

The current Ukrainian legislation describes the procedure. There are clauses on collecting proposals from the public within ten days of the announcement of intentions to develop a recovery document. Furthermore, after the formation of the working group, there is a process of data collection and analysis of the initial data already during the development of the program document. However, the question of the importance of assessing the impact of war on the environment is not presented here as a separate component of the program development process.

In the Ukrainian scientific space, there are many studies on the history of spatial planning in Ukraine from the times of the USSR (Tretyak, 2021) to the present (Berdanova, Vakulenko,

2012). Undoubtedly, the globalisation processes that affected Europe's nature-oriented development also affected Ukraine (Marunyak, 2014) by introducing new tools for assessing the impact on the environment, which, unfortunately, are of a recommendatory nature rather than a basis for the formation of development projects. Scientific studies on the advantages and weaknesses of strategic spatial planning indicate that in Ukraine, there is no comprehensive landscape planning as a separate type of urban planning documentation, the essence of which is the ecological and economic assessment of the functions of various territories and the subsequent coordination of development priorities and risks with all stakeholders (Rudenko, Marunyak, Golubtsov, 2014). This approach is the basis of European spatial planning regarding the protection, care or improvement of landscapes and contributes to achieving environmental goals (Ustinova, Aylikova, 2019). In most European countries, assessing the territory for vulnerability and risks is the basis of landscape planning. According to the latest changes in the legislation, landscape planning in Ukraine was made a part of standard spatial development schemes, which precede the stage of development of basic drawings and contain a more descriptive function about the current state and climate in the considered territory than a protective one. The document that should ensure consistency with the principles of sustainable development and answer questions about the expected risks of impact is the Strategic Environmental Assessment (SEA). The main problem noted by environmental NGOs is the conflict of interests among the authorities as customers and developers of SEA, the lack of independent expert assessment of the SEA report, the lack of certified specialists for the development of reports, the low level of analytical tools and the lack of a scientific approach to the development of strategies, etc. (Stratichuk, 2019). The Environmental Impact Assessment (EIA) should monitor the planned activities of entrepreneurs polluting the environment, but "In a large number of cases, the reports lack information on the most significant impacts on the environment, which makes it very difficult to issue substantiated

conclusions, and violates the public's right to proper environmental information" (Yanenko, 2019). Ukrainian environmental legislation is currently imperfect and wholly separated from strategic spatial planning, which affects the fact that natural resources in Ukraine are under constant threat. Recent changes in the legislation on SEA and EIA have shown that the launch of the environmental protection process faces the barrier of oligarchy and corruption due to the reluctance to pay for pollution (Topalov, 2021). And if we now take into account the negative patterns from history, when the war has such a negative impact on the functioning of government institutions, and the issue of eliminating the consequences of pollution is pushed to the background, then the use of the environmental principle becomes a serious challenge for Ukraine, because this approach requires integration in all areas, as a social and economic.

With external financial assistance, it will be easier for us to pull off the post-war recovery independently. Furthermore, the European Commission clarifies that without a "green recovery", we will not receive financial support. "No matter how low the current environmental downfall is, Ukraine can reverse its situation after a military victory if it prioritises green recovery in its post-war revival. This would mitigate the huge war-related environmental damage and transform Ukraine's energy and resource-intense economy into an innovative sustainable economy, contributing to the goal of a climate-neutral Europe" (Mishchuk, 2023). Therefore, I try to think optimistically and believe that we will take advantage of the "window of opportunity" and prioritise the issue of the consequences of the war on the environment. "It is essential for the Government of Ukraine to identify environmental hazards from the war and to prioritise and implement options to minimise environmental risks to public health. This will require an assessment of hazardous environmental pollutants that impact the health of Ukrainians, as well as the identification of those environmental hazards that require immediate attention" (Himmelfarb, 2023). I want to note that strategic planning of long-term solutions

right now will make eliminating pollution's consequences more realistic. The OECD recommendations emphasise that "Ukraine must address urgent reconstruction priorities and long-term development needs during post-war recovery. Well-informed, evidence-based decisions about reconstruction and recovery at the sub-national level will be fundamental" (OECD, 2023), which only confirms my hypotheses.

Moreover, at the moment, reforming the environmental protection legislation in the conditions of war is a challenging process. Among the political elite, there needs to be more interest and desire to promote and implement tools for quality integrated environmental assessment, which should protect the environment and ensure quality recovery. According to the United Nations World Commission on Environment and Development (WCED), environmental sustainability involves living so that future generations have better or at least equal access to natural resources than current generations. Furthermore, it turns out that Ukrainian politicians did not read the well-known phrase defined by the "Brundtland Commission" in "Our Common Future": "Meeting the needs of the present without compromising the ability of future generations to meet their own needs."

In the UN's Urban Recovery Framework, analysis, evaluation and data collection for recovery plans should be developed through the direct participation of residents, stakeholders, authorities and the community. While a diverse group of relevant urban response actors typically have different priorities and policy goals, a shared understanding of the situation derived from the analysis creates the basis for a shared vision and prioritised interventions among different stakeholders at the national, regional, city or district levels (UN, 2022). The Environmental Emergencies Center (EEC) recommendations emphasise the mandatory attention of the community on actual threats to their health, from mine hazards to the

consequences of environmental pollution and involve people in the monitoring and data collection processes. In the manual Framework for Integrated Land Use Planning, developed by the Food and Agricultural Organization, it is noted the importance of including at the stage of spatial planning the identification of existing risks and their negative impact through inventorying, analysis of geospatial data and the mandatory involvement of stakeholders living in vulnerable areas (Erdogan and Bastidas 2020, p. 6). Ind in the guides on Integrated Environmental Assessments from the UN Environment committee, they wrote: "The analysis in an Integrated Environmental Assessment could produce far-ranging findings with options such as product to programs which encourage environmentally friendly lifestyle choices. The timing and urgency of the findings will typically be determined by the seriousness of the environmental issue, which may affect the options for action available to governments, businesses or society" (UN Environment, 2019, p.11).

Before the start of the full-scale war, until today, with the support of international donors, methodological recommendations were issued for the development and approval of Recovery Plans, as well as a translation of the recommendations of the Sendai Framework Program, which emphasises that risk assessment should be a tool for spatial planning. "The insufficient level of consideration of risks in strategic documents is because today there is a lack of unified methodological bases for risk determination and assessment of the probability of their occurrence and the complexity of possible solutions. The only one is the missing approach to collecting information about risks and managing it: collection, processing, storage belching, distribution and order of its use. The information about the risks has to be the basis for making strategic decisions" (Shutyak, 2022). The comprehensive restoration program of the region is not urban planning documentation, although there are no restrictions on the development of additional maps in the law. Also, these programs are not subject to strategic environmental

assessment and consideration by the architectural and urban planning council, which is very risky, as there is a possibility that the issues of environmental pollution risks and the protection of natural resources will be neglected or performed by non-professional experts.

After analysing the current situation of the recovery process, I realised that my proposal is entirely consistent, does not contradict the existing legislative framework of the Government of Ukraine, and does not require additional changes. The environmental approach, which I propose to be used in developing integrated restoration programs, helps to answer the question "Why should we preserve these landscapes?" and "How exactly to implement projects for the development of the territory." This approach mainly focuses on understanding the interaction between people and the environment, emphasising how human activities can negatively affect natural resources and ecosystems and what we stand to lose if we continue to pollute the environment.

The environmental approach

The environmental approach, according to UNEP, is a way of incorporating and integrating issues related to the environment and natural resources into human activities and seeks to balance human needs and development with environmental protection and sustainability (Crabbe, 2016).

The environmental approach could also be as a methodology that involves the analysis and ecological assessment of a specific area to assess its current state and identify ecosystem services, risks and vulnerabilities resulting from anthropogenic factors. This approach aims to understand human activities environmental impact and develop strategies to mitigate negative impacts and promote sustainable practices. It covers various methods, such as environmental impact assessment, ecological modelling and risk assessment, to provide a comprehensive

understanding of the ecological dynamics of an area and to inform decision-making processes for environmental management and conservation.

Analysis of the literature and its synthesis allowed me to formulate clear recommendations regarding using a circular approach while developing recovery programs. I used the principles of the circular economy, the concept of zero waste and environmental indicators developed by the OECD (Organization for Economic Co-operation and Development) as a basis. Among all the existing literature on ecological restoration, I would like to highlight a guide developed by the UN-supported Ecological Restoration Society, which works to reverse this degradation and restore the land for the benefit of both people and nature. Their guide, in the 2nd edition, contains valuable recommendations and steps for restoring ecosystems to achieve ecological balance (Gann et al., 2019). Also, based on the Environmental Assessments guide from the UN Environment Committee, I updated and clarified the step-by-step scheme (Figure 12) with the expansion of its data developed in the USAID manual for territorial communities (USAID, 2022). Its primary purpose of using such an approach is to minimise the generation of waste, promote the efficiency of the use of resources and stimulate a sustainable way of developing and protecting the environment.

In spatial planning, this approach provides an opportunity to move from a linear form of development of plans and schemes to a more sustainable integrated approach to the development of schemes. The integration of the environmental approach to spatial planning is necessary for the successful restoration of the territory destroyed by the war and integration into the EU. An environmental approach involves a thoughtful and comprehensive process that considers environmental aspects and considerations of sustainable development.

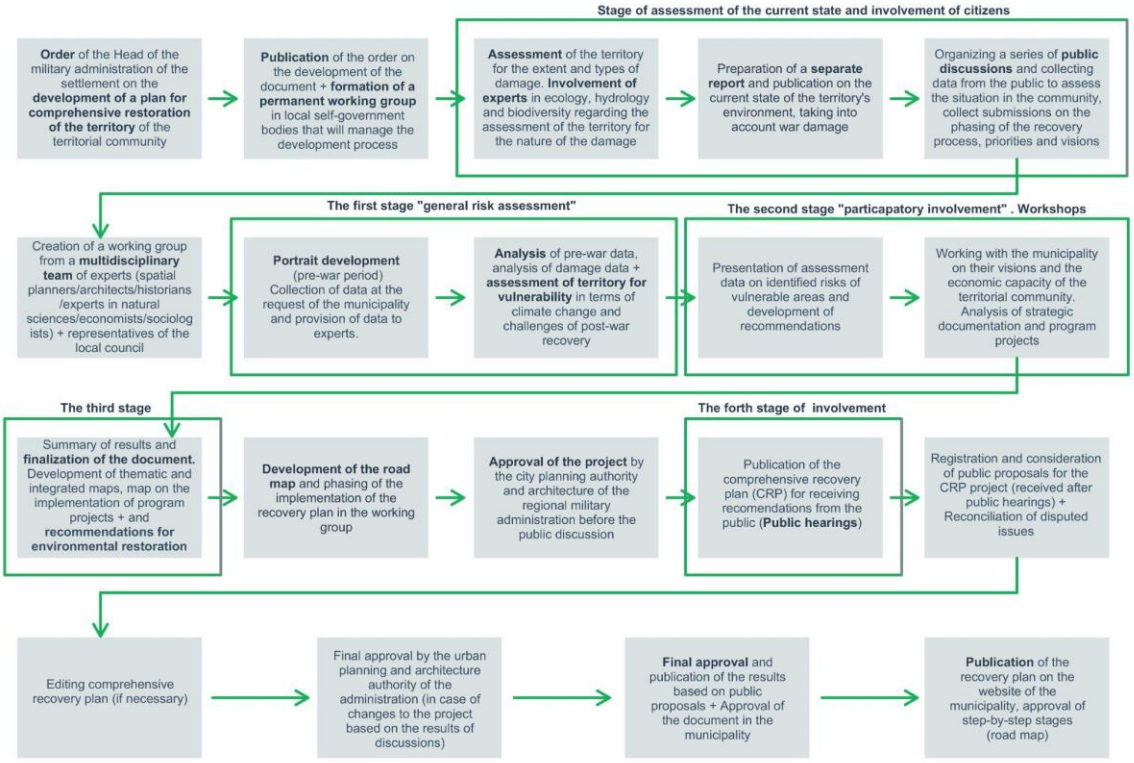


Figure 12. Proposal scheme of step-by-step scheme of the implementation of the comprehensive recovery plan

Challenges

The main challenges of implementing an environmental approach during the war are the difficulty of understanding the impact of environmental pollution on people's health, as well as the lack of clear information about the consequences and types of pollution, financial limitations for the elimination of consequences, political instability and the lack of nature-oriented will, social tension and the need for coordination various stakeholders. Unfortunately, splitting restoration projects into phases can harm environmental restoration projects. The first phase of "*quick and simple actions*", focusing only on critical infrastructure, can take all the finances initially and leave nothing for the subsequent phases. For example, the International Committee of the Red Cross recognises that mined lands are contaminated, which means that we cannot just demine land; it is also essential to consider remediation. Also, people cannot simply clean up rivers after pollution by destroying engineering structures because there should be a plan for revitalisation and naturalisation as essential components. Therefore, the integration of the environmental approach from the beginning, at the stage of "quick decisions" where the main goal will be to reduce the negative impact on the environment, as one of the steps to prevent its increase, is a critically important action that will help in the further implementation of the environmental approach. The success of implementation depends on the conscious choice and decision of local self-government bodies and the public to reduce the negative impact on the environment.

Why is this important?

At a time when Ukraine's environment is being severely and destructively damaged every day, every small positive step matters. Every initiative aimed at protecting the environment and reducing pollution in Ukraine can improve citizens' quality of life, preserve natural resources and promote sustainable development for successful targeted integration into the EU and post-

war renovation. Despite the challenges and difficulties, the work to implement ecological solutions is necessary to ensure a healthy and viable environment for future generations.

How does the environmental approach work in practice?

During the 1.5 years of full-scale war in Ukraine, thanks to international partners in cooperation with local public organisations, reports were prepared with assessments of the impact of the war on the environment, as well as recommendations for the implementation of the "green transformation", which can play a largely positive role in the country's renovation. Over 35 territorial communities have announced their intention to develop spatial documentation to restore the territory. Ten territorial communities have official information on their pages that Recovery Programs have been developed, but only three documents were officially published:

- Ecological restoration of the Lyubotynska urban territorial community ((Khandogina et al. 2022), developed by the NGO "Centre of Public and Media Initiatives" with the participation of highly specialised specialists in natural sciences;
- The plan for the recovery and development of the Chornobayivska territorial community developed with the British government's support (UK aid) (Abt Britain, 2023).
- The concept of restoration and development of the Makarivska rural territorial community, with the participation of leading specialists in mobility, urbanism and social initiatives (Bespalov et al. 2023).

Also, there were independently developed tree recommendation documents about nature-oriented post-war restoration for Belogorodska, Krasnokutska and Myrnogradska territorial communities produced by the Ukrainian Nature Conservation Group (UNCG, Vasylyk, 2022).

Figure 13. Comparative scheme of recommendation documents on restoration

I analysed the available materials (Figure 13) on the subject of sustainability and environmentalism and spatial planning component based on the defined principles of the environmental approach. I want to emphasise that each territory is unique and goes through a completely different experience of territorial development. Also, these territorial communities have different experiences of living in hostilities, different scales of consequences for the environment and destruction of infrastructure.

The programs for the Makarivska and Chornobayivska communities have a similar content structure divided into general portrait, economic development, demographic potential, housing infrastructure, etc. These documents also consider the situation regarding cultural and natural heritage. The proposals for the Lyubotynska community differ from the previous two documents in that they consider the loss of the territory and what fills it. The authors consider

the dynamics of climate change, the existing natural reserve fund and types of pollution in the community.

The development process of the concept of restoration of the Makarivska community involved representatives of self-government bodies and residents. At the current moment, there was no warfare, but the area was marked by significant destruction due to constant shelling at the beginning of the full-scale war and the occupation regime. During the process were held discussions and workshops with citizens to determine the critical directions of development and assess the situation of the environment after military operations. In the final part of the document, an integrated spatial map was developed, based on the human-oriented principle, emphasising the importance of activating the natural potential for residents' tourism and recreation, bicycle infrastructure, and mobility.

The document is entirely based on the principles of sustainable development. Among the main vision principles, the authors mentioned the importance of preserving and protecting natural resources, introducing new rules for waste management, and energy efficiency principles during the reconstruction of destroyed housing and social infrastructure. The document also mentioned the existing shortcomings of the development of the territory before the full-scale invasion of Russia into Ukraine, which must be taken into account in developing detailed plans. The point where the authors emphasised the importance of infrastructure development and showed the comparison on the maps of the road distance between settlements and in a straight line, was made me worry because there could a possibility that there will be a desire to build a new road through the nature reserve fund, which could lead to the disruption of ecosystems. I also lack in this document an element of the nature-oriented principle, which would show which territories are valuable and vital for restoration and protection, which territories have felt

the negative impact of hostilities and why they need to be restored, what potential climatic and natural risks exist, that can negatively affect the lives of residents, and why the city authorities should work to prevent these risks. The document would have been much more influential if, from the very beginning, there had been a stage of identification and assessment of the risks of the impact of human activity and the consequences on the environment. The concept states the residents' wishes to develop natural and recreational areas with places of rest. However, it does not consider the importance that the development of such a direction should be environmental.

In the case of the Chornobayivska community, the document needs to contain information on exactly how the document was developed. There were no active hostilities with action military activities on the territory, although rocket attacks were recorded with the destruction of infrastructure facilities, residential buildings, and energy systems. At the beginning of the document, in addition to general descriptive information about the territory and the population, an assessment of damage to critical infrastructure and agricultural lands was prepared.

The document also contains a map of the assessment of the extent of soil contamination due to mined areas and constant shelling. The vision part of the document is presented as a text description of the main directions of recovery and next improvement, with a mention of the importance of reducing the effects of pollution and preserving the environment. In the end, there is a list of specific infrastructure facilities that need to be restored and indicators of the plan's success. This action plan has a fragile part of assessing and analysing the conditions of the environment and the consequences of pollution from the war. Among the concrete list of tasks, there is no emphasis on the fact that each task should have an environmental component.

Recommendations for the ecological restoration of the Lyubotynska community developed with the involvement of a team of specialists in natural sciences with the support of local municipality representatives and citizens. There were no active hostilities on the community's territory, although sometimes rocket attacks were recorded. At the beginning of the document, authors collected general descriptive data about the relief, soils, river systems and local nature reserve areas. Also, they analysed the current demographic and economic situation. The document also presents a rapid assessment of the possible effects of the implications of the war on the development of the community and an assessment of the impact of climate change on the general state of the environment.

The recommendation part of the document, in my opinion, is the most valuable and vital part that sets this document apart from others, namely a detailed list of recommendations on projects that must be implemented by communities in order to achieve successful sustainable development and reduce the negative impact on the environment. However, this document lacks a spatial component, like analytical assessment and integrated maps, which will allow us to look at the ecological restoration of the territory more comprehensively and assess the scale of work required and coordinate various aspects of development, including infrastructure, housing, social sphere, ecological condition and economic stability. By seeing all the tasks simultaneously, the reader can better understand the importance of integrating an environmental approach and how it can reduce environmental pollution.

Therefore, my practical part of the research is a meaningful and logical addition to the already developed ecological plan for the restoration of the Lyubotyn territorial community, with the permission and agreement of the developer. This set of maps assesses the territory for existing risk factors, potentially vulnerable ecosystems and factors affecting their condition. Combining

the results is the basis for the next step, namely a people-oriented assessment of the community territory, accessibility and mobility between settlements, the state of housing infrastructure, and workplaces. Evaluating the consequences of human activity on the environment makes it possible to formulate clear visions and programmatic steps to achieve them. Identifying all potential risks and decisions regarding their prejudice allows us to formulate better a general integrated map of the spatial development of the territory.

Limitations

Developed maps are limited by available inputs used as a basis for project. I did not have the opportunity to analyse the territory in nature, so I took most of the data from open sources of information and general open GIS data. The maps need to be refined and updated during the next work step on a comprehensive spatial planning document.

Results

A map of natural resources (see Appendix 1, Figure 14) is a landscape portrait of a territorial community. According to official data, the community indicates in its general data that two rivers flow on the territory. However, with the help of the ArcMap program and the river system detection algorithm, relying on the relief (DEM map) and the curvature of the landscape, I managed to build a map based on the River Stream Order algorithm (this is a method of identifying and classifying the types of streams based on the number of their tributaries (gisrsstudy.com). It turned out that the river system could be much more extensive in the community's territory. The evaluation of satellite images shows that in certain places (beams) there is a mass of trees, indicating a source of water. Most likely, part of the small rivers may have gone underground under the influence of climate change and the negative impact of agricultural activities. Identifying these rivers needs authentic clarification, but this does not significantly affect the general idea.

Also, thanks to the algorithm for calculating Watershed Delineation (ArcGISPro) and delineation from zones by calculating the flow direction, it was possible to build approximate watershed zones. Watersheds are an excellent tool for spatial planning because they determine the water regime of the territory, which helps to understand which anthropogenic factor falls under which zone of influence. Secondly, hydropower affects ecological processes, biodiversity and ecosystem services, which are critical for the balanced development of territories. Taking hydroponics into account in spatial planning helps to understand which territories of the Lyubotynska territorial community need additional interest.

A water bloom index map (see Appendix 1, Figure 15) is a geographic image that indicates the level of algal blooms, or overgrowth of aquatic plants, in bodies of water such as lakes, rivers, or coastal areas. This map provides valuable information on the spatial distribution and intensity of water blooms, helping to identify areas where algae or aquatic plants are spreading. Excessive levels of nutrients in water can negatively affect the balance of biodiversity. Using the Aquatic Plants and Algae Custom Script Detector (sentinel-hub) I was able to get data on which lakes on rivers consistently have issues with blooms.

The map of local biodiversity (see Appendix 1, Figure 16), created with the help of the iNaturalist.org resource, helped to determine that among the red book plant species in the area, only Cheremsha (Allium ursinum) and Epipactis helleborine are officially registered. Biodiversity experts suspect that there may be flesh-red cuckoos (Dactylorhiza incarnata) in the floodplain of the Merefa River or in other wet open places and in the forests - red tulip (Tulipa quercetorum). Among the regionally rare species are Cardamine bulbifera (Dentaria bulbifera), Inula helenium, Primula veris, Paris quadrifolia, and Equisetum hyemale. Rare plant groups from Vilkha Kleikoya in the floodplain of the Merefa River were also noticed.

During the territory analysis (see Appendix 1, Figure 17) regarding urban development, zones at risk were identified. For example, areas bordering rivers are subject to potential pollution from sewage and sewage, as well as solid waste, due to their adjacency to urbanised areas. Areas where settlements intersect with highways are potential sources of risk for the health and safety of residents, so they require special attention to save people's lives. The zone adjacent to the railway is accompanied by noise and soil pollution. In addition, woodlands with trees adjacent to urbanised areas are also at risk. Identifying these approximate zones is valuable and has been superimposed on the following maps. There are also enterprises of increased danger

on the territory of the community. One of them, the "Karavan" alcohol production plant, has lakes with wastewater - bauxite (red mud), which is extremely dangerous in case of a breach of the fortifications.

The flash flood risk (see Appendix 1, Figure 18) susceptibility map indicates areas with an increased risk of flash flooding. It was created with the help of an algorithm (Kazeem-Jimoh6 2023) by overlaying and calculating different spatial data for areas with insufficient data (where more complex flood modelling methods are not supported). Elevation, slope, land cover, rainfall, and distance from small rivers and large bodies of water are reclassified using the same classification scheme and then weighted (appropriate logical expert weights are assigned) to produce a susceptibility map. The map is based on analysing geographical features, hydrological data and other factors affecting the possibility of flooding. The map helps identify vulnerable areas and contributes to developing effective strategies to minimise risk and prevent flood events. Data from this map can be used in the process of planning the development of territories, ensuring the proper management of flood risks and maintaining the safety of residents and property. The map shows which areas in the city should be adapted to climate change and use Nature-based solutions.

The vulnerability map (see Appendix 1, Figure 19) of river ecosystems reflects the level of vulnerability of river ecosystems, which is based on a comprehensive analysis of factors affecting their stability and ability to self-preservation. The map is constructed using a similar algorithm for flash flood maps. Using distance calculation and risk matrix (Nkeki, Bello Agbaje, 2022). The map takes into account the following factors, river systems, zones of proximity to water, biodiversity and nature protection strip. The map helps identify river ecosystems requiring special protection and management to preserve their functions, diversity

and ecological balance. These data can be used to develop strategies for preserving river ecosystems and sustainable management of water resources. Two rivers flow on the community's territory: Lyubotinka and Merefa, which belong to the Siverskyi Donets basin. According to the official data of the Ministry of Environment, this river has been strongly negatively affected by military operations since 2014 and, at the same time, is a source of drinking water for the region. Therefore, reducing the negative impact on the growth of the great river should be a priority task of the community for collective work to reduce the negative impact on the environment due to the war. The Lyubotinka River is a right tributary of the Uda River, which originates in the village of Nesterenky on the northwestern edge of Lyubotyn and flows through the city's centre. The Merefa River originates on the southwestern edge of the Karavan settlement, flows mainly to the southeast and on the southeastern edge of the city of Merefa, it flows into the Mzhu River. The watershed of the rivers passes through the city of Lubotyn, within which the railway line is located. Pollution from these areas can negatively affect some waters.

The region's wind map (see Appendix 1, Figure 20) shows the characteristics and directions of the prevailing winds in a specific region, built using the global climate and weather data, the global wind atlas. The map is based on analysing and compiling wind speed and direction data collected over a long period. The map indicates that the western-northern part of the territory has the highest wind indicators at 100-150 m above the ground. Moreover, based on the analysis of Ukraine's potential for producing wind electricity (Kudria, Ivanchenko, 2021) indicates that the Kharkiv region has the potential to install windmills.

This map (see Appendix 1, Figure 21) was developed by using Global climate and weather data to indicate that the area can use solar photovoltaic panels to generate electricity. The data is also confirmed using an online solar calculator for the territory of Ukraine.

These two maps show that the community has the potential to install and transition to green energy, using both individual plots of land and rooftops to develop energy cooperatives. The land use map (see Appendix 1, Figure 22) directly impacts the level of biodiversity, its vulnerability and conservation. According to the calculation portal using Google Earth Engine and Sentinel Hub algorithms, the community's territory is occupied by such types of land use as grass vegetation, cultivated vegetation and agricultural land, built-up areas, water bodies, grass-marsh land, and forest vegetation. As you can see, almost half of the area of the community is built-up areas, and natural vegetation makes up 48% of the area. There are 3,050 hectares of forest massifs and 310 hectares of green spaces for public use, and local nature reserves that have a protective status, on the territory of the Lyubotynsk urban territorial community.

The map of areas needing protection (see Appendix 1, Figure 23) identifies and visualises areas that need special protection for ecological, hydrological and protection reasons. Based on the legislation of Ukraine, namely the Water Code and the Law on the Subsoil of the Earth, a natural protective strip with a depth of 150 m must be preserved around the river. Also, based on the obtained data indicated in the past maps, the territories of forest massifs are worth preserving due to their vulnerability to climate change and the consequences of war for the environment.

The map of recreational potential (see Appendix 1, Figure 24) is an integrated map based on the wishes and visions of the territorial community regarding the development of recreational potential on their territory, as they have a network of lakes and wetlands that create attractive cultural landscapes. The development of a pedestrian-tourist network that combines these natural beauties and the local historical and cultural heritage will allow the implementation of measures to reduce the negative impact of human activity on landscapes. Also, in the case of mined and potentially dangerous territories, it can become part of the complex of demining and cleaning dangerous areas for the safety of residents. There is also a recreational boarding house on the territory of the neighbouring community. Thanks to cross-border cooperation, the protection of natural areas can be strengthened.

The Integrated Map of the reduction of negative impact on the environment (see Appendix 1, Figure 25) shows the various areas and locations where actions and projects must be implemented to reduce environmental impact. The map takes into account such aspects as the introduction of the principles of sustainable development (circular economy, Zero Waste concept), namely: energy efficiency, use of renewable energy sources, waste management, protection of water resources, rational use of land and other measures to adapt the territory to climate change. This integrated map includes the results of assessing the territory for potential environmental risks and the work of the authors of the Environmental Program itself. The map facilitates coordination and collaboration between different sectors and stakeholders in the space. It is an essential tool for demonstrating the application of an environmental approach in spatial planning.

Conclusions

I believe that assessing the ecological context and identifying existing problems and risks for the ecosystems that exist at the time of the research is a "must-have" (an integral part) of implementing an environmental approach. For example, if this is a territory where active hostilities were conducted, then, in addition to collecting data on the past state of the territory, it is necessary to collect data on the assessment of the state of pollution today and then assess the possible risks of pollution for people and the environment. The environmental approach in spatial planning is about more than just identifying areas vulnerable to climate change or studying which areas have been affected by war. The environmental approach in spatial planning is about the relationship of the strategic future vision of the territory's development with the existing situation in the space, using methods for assessing the territory's vulnerability and forecasting challenges.

After the collapse of the Soviet Union, Ukraine inherited a large number of problems related to environmental pollution. Most of these problems are caused by the "exploitative" approach to the development of territories since the time of Stalin's "Great Transformation of Nature" program (Shamina, 2022), for example, meadows and steppes were turned into agricultural land or planted with trees, as part of low-quality greening programs, which led to the loss of steppes. Also, due to the development and growth of the settlement, the entire natural watercourses of small rivers disappeared.

In the Ukrainian space, especially in the conditions of war, there is a widespread opinion about prioritising one's own human needs without realising the consequences of activities for the environment. But a person is part of a biosystem. All any negative influence we have will then turn against us. Therefore, if the territorial community does not assess the risks of

environmental impact and combine this with human health, any new construction can become a potential source of new waste that will affect the life of unique species, depending on the national state of the environment.

A mandatory stage of work on developing spatial documentation should involve interested residents, particularly environmental experts, local activists, state institutions and relevant organisations. This collaboration allows for the inclusion of diverse perspectives and ensures the integration of environmental considerations into the decision-making process. It is imperative to investigate the daily habits of the population and understand what caused the pollution. Conveying to people the idea that changing their habits can help reduce the negative impact on an already damaged environment is a critical step in developing spatial documentation. Therefore, including an environmental approach as a basis for developing spatial documentation for reducing the effects of environmental pollution and its restoration must be a necessity, not a recommendation.

The view on the process of post-war reconstruction of Ukraine by the union of the Government of Ukraine and international partners is still being formed. Today, among side meetings, the statement about the "green and sustainable recovery of Ukraine" is becoming more bright. All parties agree on dividing the recovery process into stages, but the main difficulty at the moment is overcoming the immediate consequences of the war in the conditions of an active threat. The second difficulty is the interest of the political elite to keep their promises. The third difficulty is the availability of funding and budget allocation. The fourth is the presence of people and experts on the ground who know how to implement changes and are ready to take responsibility.

The development of a comprehensive plan for the medium- and long-term perspective of the country's development in conditions of war should have several scenarios, from realistic to ambitious (Society and Environment, 2022) (OECD, 2023). With proper consideration of the green components of recovery, modernisation and sustainability in individual sectors can be completed on time. Reconstruction should include physical restoration, such as the restoration of residential buildings or critical infrastructure, and the return of people or the protection of the environment with the preservation of biodiversity. Insufficient attention to ecological aspects in the reconstruction process can have long-term and far-reaching consequences for ecosystems, and no one will give an exact answer to the question, "How long will the negative consequences of the war be felt?".

The benefits of using an environmental approach can be helpful not only for protecting biodiversity or reducing pollution. First of all, these are advantages for meeting the people's basic needs. Because by being aware of the risks now, we will know how to spend funds more efficiently and develop the economy of the territorial community in order to lose less in the future. Spatial planning should be sustainable and adaptive; an environmental approach contributes to this. Every flood on the river is a loss for residents of nearby residential buildings. Every fire in the field is a loss of crops and farmers' money. Every river pollution is a disease of the residents of the surrounding areas. Of course, an environmental approach at the local level will not protect or save from war. But if it is part of a national green recovery program, it will strengthen national security! The possibility of war can be reduced when countries begin to pay attention to the issue of preventing the emergence of risks from the negative impact on the environment and climate.

An environmental approach helps to identify essential ecosystems and unique natural resources that require special attention. Protecting these ecosystems helps to preserve biodiversity and increase the sustainability of ecological systems. The provision and preservation of natural ecosystems contribute to maintaining key ecological processes, such as water circulation, land cycle, dust dispersion and pollination, which contribute to soil fertility and plant growth. Preservation of ecosystems ensures the continuation of these services.

Ensuring a healthy environment by providing healthy living conditions and preserving the health of the residents of the territory. Healthy natural barriers such as forests or grasslands can protect against natural disasters and natural disasters such as floods and landslides. Preserving natural landscapes and ecosystems allows people to enjoy nature and engage in ecotourism and recreation.

The development of ecotourism and recreational industries can generate income and promote the development of small businesses, which may be related to waste disposal or the production of valuable environmental goods. Sustainable agriculture will be able to bear fewer losses as a result of climate change. Using an environmental approach helps to balance the distribution of land resources between different uses, ensuring an optimal ratio between areas to be preserved and used.

4. 3 Green windows of opportunity

The first thing that comes after the end of the war is exhaustion (Hoeffler, 2012). Tired people will think within the framework of Maslow's classic pyramid, namely "satisfaction of basic needs", especially if they search for work and housing. Some theories indicate a stronger relationship between poverty levels and susceptibility to environmental problems due to differences in essential health and access to health care (Lipfert, 2004). Therefore, the issues of reducing the negative impact on the environment and eliminating the consequences of hostilities will become acute for the Ukrainian government. Moreover, "sustainable green recovery" can help overcome these challenges.

"*Window of opportunities*" refers to the period when there is potential to begin renovating and reconstructing war-affected areas and infrastructure until the country is back on the path of complete and adequate development growth. This is a time when governments, international organisations, local activists and communities can use new strategies, approaches and resources for recovery and development. The window of opportunity in a country's reconstruction may include elements such as peace-building, political stabilisation, humanitarian assistance, international cooperation, financial support, and the involvement of experts. This period provides an opportunity to implement innovative strategies such as sustainable development, environmental restoration, social reconstruction, implementation of circular economy and future green growth, etc.

The principle of *zero waste* refers to a philosophy and approach to waste management that minimises its generation as much as possible and focuses on the reuse, recycling and recovery of resources (Zaman, 2015). The main idea of zero waste is to move from the traditional model of "*take-make-throw*" to a cyclical approach, where waste becomes resources for new use. This

leads to a move from a linear economy to a circular economy, in which resources are conserved, reused and regenerated to avoid loss and minimise negative environmental impact. The circular economy currently plays a crucial role in the energy transition, the implementation of intelligent waste management and global security (Chishti, Dogan, Zaman, 2023). Furthermore, after hostilities, the issue of strengthening security and border protection becomes a necessary component of the national renovation strategy.

According to World Bank estimates, Ukraine's economic development was one of the most carbon-intensive and energy-intensive. Integration into the EU and the conditions that Ukraine must fulfil to join should make the country's development more stable and sustainable. Under martial law conditions, achieving the requirements of green transformation is not elementary. However, post-war reconstruction can provide great opportunities in the form of necessary investments and grants that can be used to implement greenness (Abdullah, 2023). Even before the full-scale invasion, more than 250 municipalities in Ukraine signed a document on the implementation of energy-efficient measures, and such cities as Lyubotyn, Vinnytsia, Khmelnytskyi, Sumy and Lviv announced their intentions to implement a strategy for adapting the city to climate change already in war conditions (UNDP Ukraine, 2020). Of course, this will be long and detailed work, which will require municipalities to be fully included in the processes of mitigating the negative impact of the war on the environment and its restoration, as well as the maximum involvement of urban and ecological public initiatives in the development processes.

Ukraine has already adopted several important strategic documents on the transition to green energy, decarbonisation of industry, waste management, and adaptation to climate change (Vyshnytska, 2023). Also, at the moment, the European Parliament is working on the Green

Marshall Plan, under which the industrial, energy and residential sectors will be rebuilt most sustainably by implementing the principles of the circular economy. However, implementing this plan may fail due to the need for more communication and cooperation between institutions and public organisations (Letzing, 2023).

Usually, crises are perceived as dangerous, costly and distracting from other plans and priorities. Analysing history showed that crises and extreme threats can benefit individuals, countries and even the world in making decisions and solving global problems (Langan-Riekhof, Avanni, 2017) related to improving our lives. The French philosopher and writer Jean Beaudin said, "War is the engine of progress". According to this opinion, any severe crisis can affect the necessary changes and accelerate development if the situation is correctly used as an opportunity for innovation. At a time when traditional approaches are destroyed during war, it is meaningful to promote innovative solutions to mitigate the effects of the crisis and accelerate recovery. For example, medical revolutionary discoveries during the rescue of the military in the First World War were widely used in civilian life in the post-war period. New discoveries influenced medicine and first aid during and after World War II. Also, the nature of wars, their location, and the number of forces involved influenced the tools used to stop bleeding, such as the evolution of the medical tourniquet (Welling, McKay, 2012). In 2010, the Deep Water Horizon rig exploded and collapsed in the middle of the Gulf of Mexico, causing the most significant single oil spill in history. At the time of the incident, no technologies or mechanisms were in place to contain an oil leak at great depth (Pallardy, 2010). During several months of intensive work, the VP company team developed a unique cap, "Capping Stack" (Figure 26), which ultimately allowed to control the release of oil and stop the man-made disaster. This technology is now incorporated to aid deepwater drilling operations worldwide (Biello, 2011).

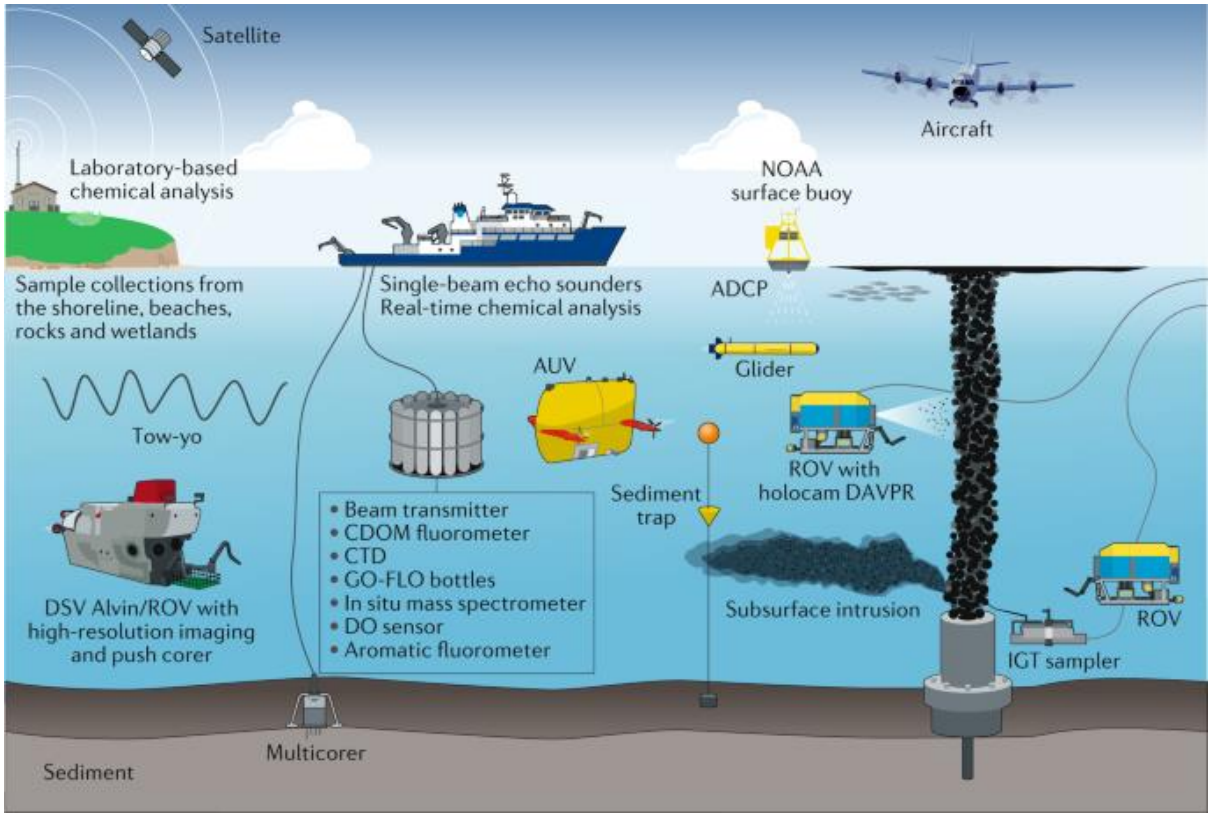


Figure 26. Solving the problem scheme (Kujawinski, Reddy, 2020)

Analyzing and studying war and crises teaches us and influences the hardening of resilience and faster adaptation. Once a crisis begins, turning it into an opportunity often requires new ways of seeing, thinking, and responding. Classical methods can temporarily reduce pain but are often insufficient to solve the underlying problems (Langan-Riekhof, Avanni, 2017). Therefore, crises restrain the application of new technologies and knowledge for quick and high-quality recovery.

For these changes to become successful and valuable for society, politicians and the government must act decisively and in the citizens' interests because studies of post-war changes in society or post-crisis situations indicate that people are unaware of opportunities and miss the chance. For example, studies of the impact of COVID-19 on the perception of the urban environment found that lifestyle changes were less noticeable for those under less

stringent quarantine restrictions. In high-income countries, due to the impact of the strictness of quarantine restrictions, people's needs have changed a lot. However, these needs were not related to awareness of environmental pollution because, according to surveys, people felt the changes due to the loss of the opportunity to visit an entertainment centre, museum, cinema or club. When people face sudden changes that threaten basic needs such as work, food security and access to recreation, more complex needs such as environmental sustainability become less of a priority (Esam Awuh, Elbeltagy, 2021). The link to climate change shows that failure to conserve and protect critical environmental resources can contribute to local and international conflict. Therefore, when there is a possibility that environmental degradation can lead to conflict, it means that environmental quality in the region can act as a tool to restore and build socio-economic and political resilience (Milburn, 2012) in the region and serve as a mediator for green transformation. If the World Pandemic did not affect the citizens' thinking, it definitely affected the government's policy. For example, in the EU, total CO2 emissions from fossil fuels increased by 6.5% in 2021 after the COVID-19 pandemic in comparison to 2019 data (Figure 27). However, this increase is only half of the reduction between 2019 and 2020 (-10.8%). Thanks to the continued implementation of the Green Deal and clear reforms, emissions in the EU fell by 5% between 2021 and 2019, continuing the downward trend (Joint Research Centre, 2022).

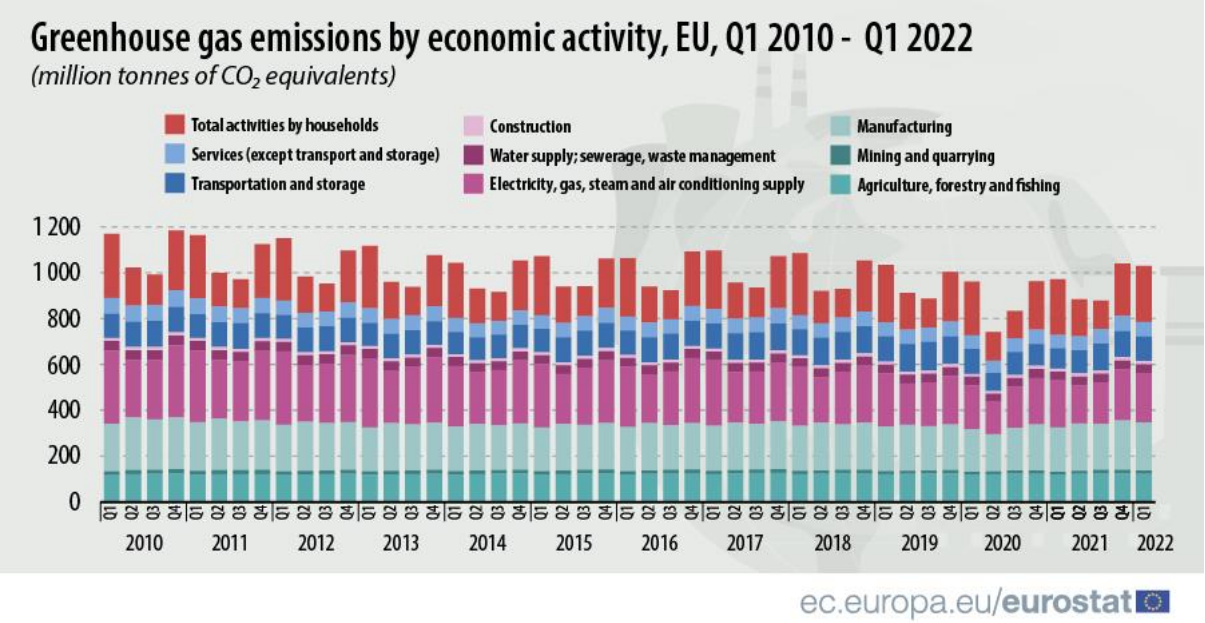


Figure 27. EU economy greenhouse gases are still below pre-COVID levels (ec.europa)

Experience and practice show that cities in developing countries face an increased risk of natural disasters, which increases the likelihood of a negative impact on economic development due to low-quality city management (Tarhan, Aydin, 2016). Statistics show that developing countries must spend twice as much electricity and resource consumption annually to adapt to climate change. By 2040, developing countries will account for 65 per cent of global energy consumption (Woody, 2013). There is a direct correlation that in the conditions of certain crisis restrictions, we begin to save the consumption of resources and as soon as the restrictions disappear, our expenses begin to increase again, sometimes more than before. Therefore, there is an excellent risk that we will restore the country in a very non-ecological way during the restoration of Ukraine. If the investments are used wisely, they can be redirected to projects that will reduce the negative impact on the environment during the recovery of the country's development.

Implementation of alternative sources of electricity

According to the national action plan for the development of alternative electricity, by the end of 2020, Ukraine should produce 5,700 MW of such energy, and by 2035, 25% of its needs will be covered by renewable energy sources (RES). Due to martial law and hostilities, achieving ambitious goals becomes unlikely due to significant losses of existing stations, and investors will not finance the installation of structures due to the threat of rapid destruction by missiles. Unfortunately, RES development could be accelerated only with the will and support of the government after the war (Vyshnytska, 2023). Therefore, the development of alternative energy to the level specified in the Energy Strategy of Ukraine until 2030 will only increase the energy and economic independence of our country, reduce import dependence on the supply of traditional energy resources, reduce emissions of greenhouse gases into the atmosphere, contribute to the preservation of the environment, and reduce the energy intensity of the gross domestic product.

Using contaminated land to develop renewable energy sources (RES) has the potential to become a meaningful factor in the country's recovery. Contaminated land, which may result from hostilities, is often considered unsuitable for traditional uses, including agriculture or development. However, such land may be suitable for installing solar panels, wind turbines and other RES systems that allow the use of polluted areas to produce clean and sustainable energy, which contributes not only to reducing dependence on traditional energy sources but also improves the state of the environment. Using contaminated land for RES can help create green jobs, attract investment and develop an environmentally sustainable energy sector. Spatial analysis and planning of territories can identify contaminated territories based on potential maps of Ukraine and schemes of spatial development of territorial communities. The development of urban concepts, with the placement of RES systems, can allow the construction

of permanent and sustainable settlements. Also, during planning, territories can be combined into special energy development zones, energy cooperatives. Moreover, the lands themselves can be restored with the help of sustainable solutions. Since such energy facilities have a limited access regime, this will protect the population from the negative impact of contaminated land on health.

Alternative energy is also becoming useful at the front of the Armed Forces of Ukraine (Ecoaction, 2022). Panels (Figure 28) are beneficial at deployment locations outside populated areas, for example, military become autonomous and does not have to look for power sources or go somewhere to charge constantly. This is an excellent alternative to generators, which require a constant fuel supply and potentially harm the environment.

Figure 28. Armed forces and tactical solar panels (Ecoaction, 2022)

Today, during the reconstruction of public institutions, such as medical clinics, schools, kindergartens or private houses, with the support of international donors, solar panels are installed to ensure the sustainability and energy efficiency of the building in the future. For example, in the photo (Figure 29), you can see the solar panels installed on the roof of the City Outpatient Clinic in Irpin, which was destroyed by massive shelling by the Russians in March 2022 (Gryba, 2022)

Figure 29. Solar panels for Irpin`s medical clinic (Gryba, 2022)

Demilitarized and protective zones

Participants in armed conflicts use various military equipment and weapons, including dangerous explosives and chemical agents, resulting in severe environmental destruction (Kiernan, 2020). In the absence of control, military actions contribute to the spread of corruption, illegal hunting and illegal logging of natural resources. War also leads to a selective disregard for preserving the environment and natural resources in terms of survival (Kiernan, 2020). During combat, the environment suffers due to the use of a variety of military equipment and weapons, which include not only the standard tools of the trade, such as machetes, chainsaws and graders but also the most destructive explosive devices created by mankind. Armies on all sides of the conflict use a variety of other weapons, including chemical and biological agents that leave their mark and destroy the environment (Kiernan, 2020). The large number of small organisms that create and maintain the soil, as well as its biological cover - grasses, mosses, lichens and fungi - are most vulnerable due to the virtual lack of mobility. In other words, all living organisms in the soil layer or those that protect its surface from erosion cannot leave the area where the munitions explode or protect themselves from the harmful effects. These effects are primarily the short-term destructive effect of the blast wave and the long-term effect of chemical pollution (Vasylyuk, Kolodezhna, 2022). As a result of the explosion leads to soil and atmosphere pollution with toxic gases SO2, NOx, and CO (including aromatic hydrocarbons, which are much more toxic than conventional ones) (Vasyliuk, Norenko, 2016). Contamination of soils due to war significantly differs from what happens to soils in landfills or industrial zones. Military activity leads to ecosystem degradation due to the excessive accumulation of heavy metals that migrate from the soil to groundwater, contributing to the pollution of the natural environment outside the war zone and affecting human health (Shamina, 2022).

The war's end will require a solution to the question of what to do with the damaged lands and how to arrange the border between Russia, Belarus and Ukraine. In Europe, Ukraine is one of the countries least endowed with rivers. Approximately 70% of the water resources in the country come from our neighbours and most of the water resources in the Dnipro and Siversky Donets come from Russia and Belarus (Vasylyuk, Kolodezhna, 2022). Various forests and ecosystems are located between Russia, Belarus and Ukraine. In the northern part of these countries are boreal forests with coniferous trees, while in the south, there are forest-steppe forests with deciduous species. Marshes and wetlands are also important ecosystems, and montane forests can be found in mountainous regions. Each area is influential in conserving biodiversity and natural resources and serves as a habitat for numerous species of plants and animals.

In 1992, Ukraine signed an agreement with Russia on the joint use and protection of border water bodies in matters of natural resource conservation, which ceased to operate after a full-scale invasion in 2022. Therefore, in the conditions of post-war recovery, the issue of settling these problems will require help from the international community (Vasylyuk, Kolodezhna, 2022). Currently, the government of Ukraine sees that the only solution in matters of national security is to create a protective wall like the one between the United States and Mexico. After the start of the war in 2014, the Ukrainian government started the "Wall" project, according to which the border between the countries should turn into a fortified wall with the highest security measures by 2025. However, unfortunately, this project became the most corrupt during the war, billions of hryvnias were allocated to it, and it is still not implemented (Khymychuk, 2020). Today, in the face of a full-scale invasion, politicians in Ukraine have once again made a fool of themselves about security. Unfortunately, the wall is not a way out of the situation and is unlikely to stop the enemy from re-starting the war. The defragmentation

of ecosystems resulting from creating borders between countries can seriously affect biodiversity and ecological integrity. Moreover, it definitely will not stop the enemy if they want to attack the country.

The issue of environmental protection and restoration, as well as the introduction of a demilitarised zone on the territory of the Belgorod, Bryansk, Kursk, and Rostov regions of Russia should be a vital topic of the post-war system and national security of Ukraine. This is necessary to avoid the repetition of aggression in the future. This demarcation zone (Figure 30) can also become an opportunity to eliminate the possible disconnection of ecosystems, similar to the territory between North and South Korea, which arose after the signing of the UN Security Council Resolution in 1953, formally ending hostilities during the Korean War. The demarcation line that divided the Korean peninsula into two parts became the border between the two countries, and the DMZ was created as a wide strip of land and turned into a national park. The width of this line is 4 km, and the length is 240 km. The primary purpose of creating the DMZ was to ensure the cessation of hostilities and reduce tension between the parties. Now, for over 45 years, the area is a unique ecosystem home to rich biodiversity and nature reserves (Kim, 2013). Preserving biota and adjacent natural areas in buffer zones is the foundation for developing a successful strategy for nature conservation and cooperation between countries. A conservation strategy should begin with creating a system of biodiversity reserves with legal means to limit human use (Kim, 1997).

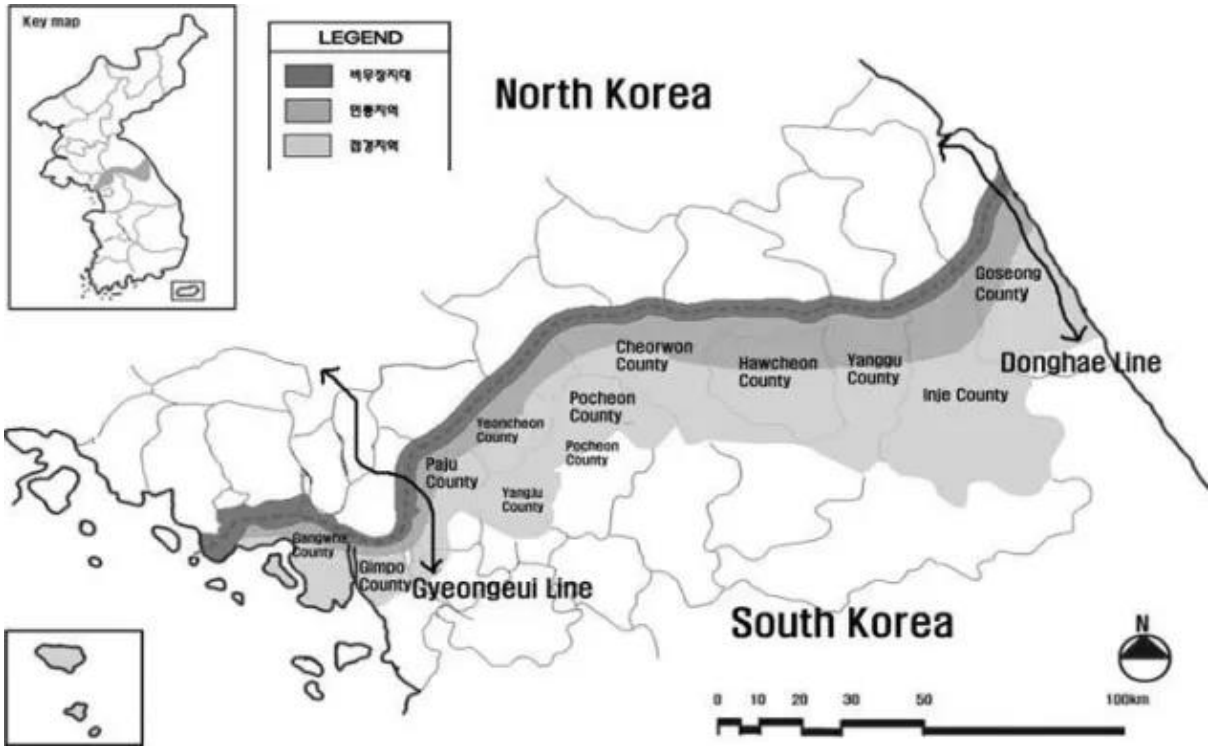


Figure 30. This map shows the location and spatial extent of the Korean Demilitarized Zone (DMZ) and its surrounding geographies (Kim, 2013).

Creating a demilitarized zone (DMZ) can improve the state of the environment. Imposing a restricted status may include banning military field testing, movement and reducing the use of heavy fuels and other potentially hazardous materials. Also, such a zone can become a place for environmental protection measures and restoration of natural ecosystems, which will become a natural barrier between countries. This approach can include restoring landscapes, accommodating wildlife and creating reserves that promote biodiversity and conserve natural resources. A demilitarized zone can promote the natural regeneration of natural resources such as soil, water and ensure sustainable development and conservation of valuable flora and fauna (Liu, Gibson, 2020).

The rehabilitation of land dismembered by sinkholes and burned trees is expensive and resource-intensive, so decisions about it should be made based on the analysis of the density

and severity of the consequences of damage. The option to leave the territory alone and let nature recover by the method of natural succession can become very rational.

Thanks to spatial planning, it is possible to define these boundaries and give them a new legal status as invalid. Establishing closed buffer zones, especially when there is a large area of mined areas, may have some opportunities for environmental restoration, but it also comes with risks and challenges. The creation of closed protection zones can contribute to the preservation and restoration of biodiversity in affected areas. Landmines and unexploded ordnance can harm local people and those involved in environmental restoration. Creating and maintaining closed protection zones requires significant financial and human resources. Deploying and maintaining infrastructure, conducting research, training staff, and implementing security measures can require significant effort and investment. Inclusion and partnership with the local population must be ensured to consider their needs and interests.

It should not be forgotten that Ukraine got closer than ever to the EU during the war, so new interstate relations will have to be restored according to European standards. These standards are based on the unconditional implementation of international cooperation: joint projects, monitoring, basin management strategies, etc. Furthermore, in the end, "to destroy is not to build", so if Russia and Belarus want to cooperate thoroughly with Ukraine, then the legal basis for this will be preserved.

Pollution of agricultural lands

Contamination of land, including agricultural land, as a result of hostilities, can create significant challenges for residents and farmers (Turns, 2023). Contamination of the soil and the microorganisms living there is the result of destructive solid processes, including the rupture of the shell, the leakage of pollutants and hazardous substances from damaged tanks and waste due to the destruction of dams of the filtration field, the destruction of treatment or hydro-technical structures. As a result of the mass death of people and animals, the land and underground waters are poisoned with corpse poison (Yatseno, 2022). Ukraine is one of the largest agricultural countries, and grain export is integral to the economy (OECD, 2022). The Ukrainian government asked the United Nations Environment Program (UNEP) to help it assess the environmental damage caused by the conflict. Preliminary monitoring by the agency and its partners suggests that urban and rural landscapes may be left with "toxic legacies for future generations" (Turns, 2023).

World experts recognize that Ukraine urgently needs to develop infrastructure for the long-term storage of war waste, which is currently scattered over war-affected territories and is a source of permanent soil pollution (Dzombak, 2022). The longer the storage of dangerous substances in the open air, the greater the penetration of pollution. Fuel spills, spent munitions, chemical weapons, and animal and human remains can contaminate soils, sometimes for decades or longer. Potentially toxic metals such as lead, arsenic, and mercury can leach from munitions and weapons into the soil (Dzombak, 2022). The European Journal of Soil Science published a study predicting that today's destruction will damage crop yields for 100 years (Cavallito, 2022). Predictions are based on the study of soil samples taken from fields in France where there were battles during the First World War. Data indicate that these lands still have a percentage of contamination (Rintoul-Hynes, Williams 2022).

At the moment, there are public organizations in Ukraine, for example, the Association of Landowners of Ukraine (Figure 31) (Ostapenko, Bonchkovskyi, 2022), which collect and analyze data on soil pollution and search for options for their restoration. This method helps establish priorities and develop land remediation plans to develop comprehensive community recovery plans. For example, a study of the movements of military vehicles crossing the fields of Fort Riley, Kansas, showed that dry soil recovered after compaction from machinery in about one year, while wet soil recovered in up to four years (Althoff, Thien, Todd, 2010). But this directly concerns the restoration of soils and the life of microorganisms. In the case of using these plots of land for planting cereals, it is necessary to use the phytoremediation method to extract chemical residues and prevent the risk of contamination of cultivated plants, through which there is a risk of dangerous organisms reaching humans (Pryvalov, Panova, 2020).

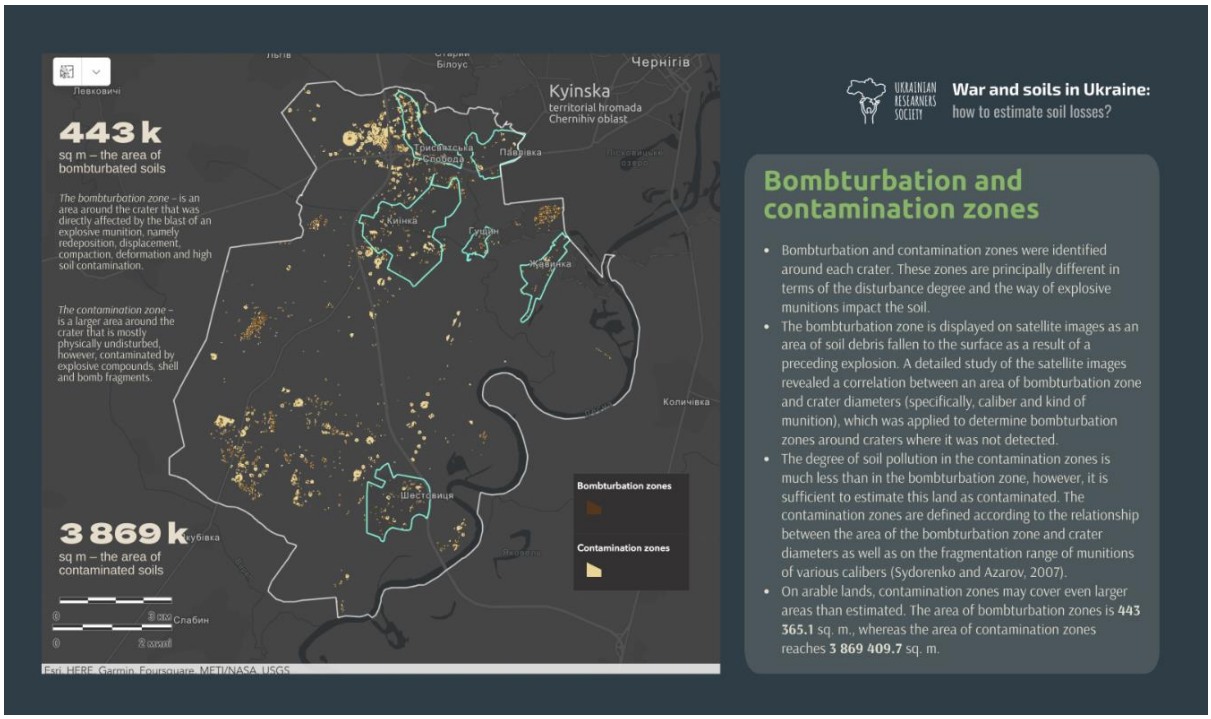


Figure 31. The screenshot from the web platform loss.tdukr.com showed identified contaminated soil (Ostapenko, Bonchkovskyi, 2022).

Methods of phytoremediation of contaminated land can restore fertility and ability for agricultural use. Certain plants, such as alyssum and pteris ferns, are known as "hyperaccumulators" because they can absorb and store significant amounts of inorganic pollutants such as nickel or arsenic without any detrimental effect on their own growth or functioning (Reeves, Baker, 2017). Such a recovery method will be useful not only for use in the treatment of agricultural land. This method is also relevant for restoring public areas subjected to constant rocket and projectile attacks. In an urban context, green areas can prevent air pollution and modify or reduce polluted airflow. Studies show that specially selected plants successfully reduce the permanent load on the soil from lead and other benzenes that enter from highways and increase the aesthetic and social attractiveness of the territory (Podhajska, Drzeniecka-Osiadacz, 2023). High-quality urban green infrastructure affects the well-being of residents, the implementation of circularity in the city, and the success of planning is achieved through the study of the benefits of ecosystem services in their entire range.

In general, to reduce the negative sense of loss from the reduction of classical agricultural activity due to contaminated land, the country's government should take responsibility for developing programs for sustainable nature-oriented agricultural farming methods. It is necessary to increase the number of educational programs for the rural population regarding the necessity of conducting ecological agriculture and growing crops, as well as the real danger of soil contamination due to hostilities. Research shows that collective environmental awareness increases actions aimed at reducing the negative impact on the environment. There are also reasons to believe that the development of human capital and pro-environmental consciousness strengthens the recognition of national identity and increases awareness of the existence of a collective threat in conditions of uncertainty, be it a pandemic, crisis, war or global climate change (Barth, Masson, 2021). Such approaches will require joint efforts, high-

quality financial support, technical consulting and a creative approach to finding alternative ways out of the post-war crisis.

Housing reconstruction

The war caused the most significant housing crisis in the history of Ukraine. Over the past year, thousands of homes have been destroyed by Russian attacks. According to various estimates, during 2022, losses in the housing stock ranged from 135 to 817 thousand destroyed or damaged buildings. Since the beginning of the full-scale war, the Ukrainian independent analytical centre CEDOS has been conducting a survey every few months on the nature and types of changes in the daily life of Ukrainians who remained or moved from Ukraine.

According to the results of the report "The Year of full-scale War in Ukraine", one of the biggest challenges for the respondents was hesitation when deciding to leave their settlement and fear due to the lack of understanding of the possibilities of settling in a new place of residence (CEDOS, 2023). Regarding the current challenges and fears, Ukrainians note the problem with housing restoration. During the last year, the need for housing increased and diversified. There was a need for temporary crisis accommodation — for example, while the restoration of damaged housing continues or for the period of searching for long-term rental housing (Bobrova, 2023).

According to the latest CEDOS data, 82% of respondents agree that the state should provide housing for people who need it (Bobrova, 2023). Unfortunately, the housing policy in Ukraine is being replaced by a reform of urban planning activities, which increases the rights of developers, who can independently regulate the prices and quality of the built environment. The unbalanced growth of regions in Ukraine was an obvious fact even before the full-scale

war, so the post-war realities will only accelerate social and economic processes that lack clear, coherent solutions (Constantinescu, 2023). This can lead to artificial segregation and inequality in settlements, especially during the reconstruction of damaged housing.

Ukrainian cities have adopted many urban innovations from Western Europe and the USA but still need long-term urban development plans. Bright solutions in commercial and comfortable residential real estate, inscribed in the fragmented post-Soviet landscapes, do not consider the new challenges the city leadership will face after the war (Constantinescu, 2023). Such an approach created a particular imbalance and need for harmony in development. In addition to social injustice, Ukrainian settlements now also face environmental injustice. Environmental injustice among people can be recognised by observing the unequal distribution of environmental burdens and risks, unequal access to natural resources and ecosystem services, as well as the concentration of socially vulnerable groups in polluted or risky areas, depending on the region.

Overcoming imbalances will help the "New UN Sustainable Planning Strategy" (UN-HAB1TAT, 2013), which is based on the approach of "sustainability" and "viability" of cities, to be flexible and adaptable to constantly changing challenges. Especially in the current threat of climate change, housing reconstruction should consider safety issues, energy efficiency, and environmental friendliness. Restyling for Ukrainian settlements should consist in preserving its identity, supplemented by technological innovations. Balancing utilitarianism and simplicity with historical value and architectural aesthetics is important. Each settlement must be restored considering its characteristics and society, from the landscape to the economy. It is necessary to preserve uniqueness but abandon morally and physically outdated projects. Research shows that ecologically restoring housing can overcome injustice-related challenges

(Haase, Koprowska, 2022). Without a comprehensive approach and modern practices, there is a possibility of neglecting the principles of risk forecasting (Kramer, Butsic, 2021).

During 2022, local self-government bodies, with the support of foreign donors, took a central role in restoring destroyed housing. The role of municipalities and regions in the rapid restoration of damaged housing is currently key but with the risk of developing control and bureaucratisation. Therefore, it stimulated that many works were carried out by the owners themselves, including involving local communities and using fundraising practices (Bobrova, 2023) (Kurinna, 2023).

Developed new master plans imposed "from the top" to try to level historical, social injustice at the expense of greening and improving the yard environment in multi-story buildings. However, greening alone does not solve the problem of inequity. Sometimes the green regeneration of spaces can even have the opposite effect and either worsen the existing one or lead to new injustice without the qualitative involvement of all population representatives (Haase, Koprowska, 2022). Therefore, housing reconstruction should be not only about space but also about involving residents in participation. Also, housing reconstruction should be considered in conjunction with developing a strategy for the stability of the territorial community and adaptation of the territory to climate change. It should also be possible to "upgrade" the old housing stock using sustainable adaptive solutions in the event of new crises. To rebuild the housing sector, it is desirable to use secondary materials, recycle and reuse of building materials.

In recent years, the EU has been implementing the New European Bauhaus initiative, which combines culture, architecture, sustainability, and technology to create a vision for a new

approach to housing and living environments in Europe. The initiative focuses on social, environmental, and cultural sustainability and includes ideas for social transformation. It supports innovative technologies promoting sustainability, renewable energy, resource conservation, reduced CO2 emissions, and other aspects contributing to a green, circular, and fair economy transformation. As part of the EU's recovery plan after COVID-19, NextGenerationEU, it was decided to launch a series of pilot projects that will be highly decarbonised and involve community engagement in the design process. “The ecosystem vision promotes the idea of the networked ‘place for life’, as well as the creation of public space; the smart city concept thus needs to transcend itself into a concept of ‘smart territory’ which revolves around the co-habiting of the planet” (Rosado-García et al. 2021)

Conclusions

The world is on the step of significant changes and opportunities regarding changing the role and value of the environment in our lives. The war in Ukraine influenced global shifts in the consolidation of opinions that wars commit ecocide and must end to save our home's future (Iwanejko, Maiboroda, 2023). Nevertheless, only time will tell if we will take advantage of the opportunities. The environment is often not a priority during a war (Milburn, 2012). Economic and political factors often prevail and can lead to the neglect or insufficient attention to the importance of nature conservation in times of conflict. But there are cases in the world where military actions have stimulated technology and science to investigate the negative impact on the environment and find unexpected solutions to solve problems.

The Government of Ukraine is entrusted with the great challenge of reducing the negative environmental impact and eliminating the war's consequences. "Could we build better and greener?" - this is the biggest open question requiring discussion and relevant specialists' involvement. During war, exhaustion occurs not only among people on the battlefield, but also among civilians. People get used to the conditions of "survival" and interest in satisfying basic needs, such as work and housing. Environmental injustice can develop in the unbalanced development of settlements, where socially vulnerable groups and territories receive an unequal distribution of environmental burdens and risks. This can be seen by analysing the distribution of pollution, access to natural resources and environmental services, and the concentration of socially vulnerable groups in polluted or at-risk areas (Weir, 2015).

Over nine years, territorial communities in Ukraine and the population gradually got used to martial law, considering it as a new norm in their lives (Huss, 2022). However, Russia's large-scale attack radically changed the situation, presenting the population and local self-

government bodies with difficulties that they had to deal with immediately, hoping only for the support of the people (Eigelson, Yeligulashvili, 2022). Leaders on the ground became experts in the evacuation and placement of tens of thousands of people across the country and organised emergency management systems in conditions of the dispersed location of workers in different cities. In addition, local municipalities strengthened horizontal ties with residents and cooperation with the state and international support projects (Darkovich, 2023). The research, supported by USAID and the Decentralisation Program, analysed the main challenges territorial communities are currently going through, especially in war-torn regions. Among the priority challenges are: the return of people, reconstruction of housing, restoration of critical infrastructure, demining of territories, restoration of agricultural activities and cleaning of the environment. Municipal leaders name the challenges that have accumulated since the pre-war period: financing and tax revenue, non-inclusiveness of the environment, and employment. "Despite extremely high damages and collective trauma from numerous civilian deaths and war atrocities that have occurred in the four months since the invasion, Ukraine demonstrates surprising resilience of the state and society" (Huss, 2022). Despite the demonstrated resilience and adaptability, existing and accumulated challenges can be overcome only thanks to high-quality strategic planning and implemented approaches based on risk analysis and nature-oriented approaches to growth (Lindley, Handley, 2007).

5. DISCUSSIONS

My subject confronts three diametrically opposed and incompatible contexts – ongoing war, future development, and environmental restoration, which is essential right now, especially in the face of the climate change agenda. However, there is a significant research gap on developing a country in a zone of complete uncertainty during the war and martial law in the territory and what steps should be taken.

Although taking into account the current situation, how events are developing at the level of international politics and on the front in Ukraine, the biggest gap is what the policy should be to change the focus from arming countries for the sake of strengthening national security in the conditions of the existence of the risk of the emergence of the Third World, to the focus of abandoning fossil fuels and uniting to reduce the effects of climate change. As long as these disputes exist at the international level, green development becomes impossible. However, I believe in the power and effectiveness of spatial planning that if a change of focus is introduced at the local level, then the issue of armament will be replaced by the issue of disarmament.

In the discussion, I want to deepen and strengthen my thoughts about the relevance of the research topic and how I expand the field of knowledge in which I conducted research. My topic consists of several layers, and it is from the understanding of the recovery processes in Ukraine today and the power of the destructive impact on the environment, then the evolution of the nature and dynamics of wars and the course towards greening. In parallel with this, the environmental approach is now being integrated into strategic spatial planning, possibly reducing the negative environmental impact while leaving room for development.

There is no clear understanding of when the recovery process should start and how long it will last. A more precise understanding exists, but it is a field of great international politics. Also, there is no clear time frame, what exactly should become a priority and how to determine these priorities in recovery. The fact that recovery can and should be permanent and sustainable in climate change conditions and for the preservation of the environment is already a proven fact. In "hybrid wars" conditions, restoration occurs the day after destruction. This "spot recovery" must also be nature-oriented. Modern wars are becoming more and more like locally focused military conflicts, where the outcome depends on domestic and foreign politics. A local military conflict can influence changes in the foreign policy of the world's powerful countries and worsen the global state of the environment. Against the background of severe destruction and the number of human victims, which are instantaneous, the issue of negative impact on the environment remains as an echo in the background.

In 2015, the world community agreed to limit the rise in global average temperature to 1.5°C above pre-industrial levels. This requires a review of approaches to using carbon in the defence forces, as the burning of fossil fuels is no longer sustainable and prevents the achievement of international commitments on climate change and zero emissions.

Nevertheless, the early 2010s saw some initiatives to decarbonise military operations, but the United States and its allies used fossil fuels heavily (Depledge, 2023). On the one hand, war can reduce emissions from idle industry, but on the other, war is never local. Emissions and people simply move abroad through refugees because the production of weapons and humanitarian products for a country in trouble increases (de Klerk, Shlapak, 2023). Most researchers who study war and its negative impact on the environment point out that, with the

increasing effect of climate change on the development of territories, wars will become more frequent and change their nature, from political to climatic reasons.

Therefore, it is important to continue to develop initiatives to reduce the funding of armies, the emissions of military operations and the transition to sustainable and non-polluting energy sources in the military sector (Lewis, 2021). If the "decarbonisation of the army" and the abandonment of fossil fuels take place, the situation with the emergence of "climate wars" may not happen. The key to recognising this nascent turn is understanding how quickly societies will change and their views on where, when, how, for what purpose, and at what cost military force should be used. Only in this way can we ensure the fulfilment of international obligations regarding climate change and the preservation of our environment for future generations (Depledge, 2023).

Today, in the world arena of spatial development, climate change is increasingly recognised as a real threat (IPCC, 2016), and Western countries include adaptation issues in national planning (McMillan, Birkmann, 2022). However, the impact of urgency has led to criticism that there is little detail on how action should be taken on the ground, which is likely to limit the effectiveness of regional and local strategies and initiatives (McMillan, Birkmann, 2022).

The war in Ukraine highlighted the weakest feature of the international community, especially the EU, namely the slow and protracted response to crises instead of urgent intervention. At the last COP 27 conference, which took place during the full-scale invasion, the first estimates of environmental pollution in Ukraine and forecasts of global consequences were announced. The war started by Russia back in 2014 is already harming the situation in countries vulnerable to climate change (Bryant, 2023). On the one hand, the world rallied around the problem against

Russia, and on the other, it only slowed down the process of green development. Western countries have increased militarisation spending by withdrawing funds from environmental protection programs (Colgan, 2018). "The world's richest countries — including the UK — are spending 30 times more on their armed forces than financial support for nations on the frontline of the climate crisis, according to a new analysis" (Dobson, 2022). Throughout the world, in recent years, due to the increase in politics, a wave of protests against the rise of foreign bases has intensified, for example, residents of Okinawa are protesting against US bases in Japan, which harm the environment (Kimura, 2016).

Strategic spatial planning based on the development of green infrastructure can become an essential aspect of reconstruction now and reconstruction of settlements after the war. Incorporating the principles of UN-HABITAT and green growth into community recovery strategies can create an ecologically just and sustainable society (Lindley, Handley, 2007). Research shows that the development of green-blue infrastructure positively affects human mental and physiological health, increases comfort indicators in the settlement, increases the percentage of investment attractiveness and the creation of new jobs (Jabbar, Yusoff, 2022). Environmentalism in spatial, strategic planning ensures sustainable development and environmental protection (Haase, Koprowska, Borgström 2022).

In post-conflict reconstruction, it is necessary to assess the destroyed infrastructure and the environmental risks and consequences (Lindley et al. 2007). Spatial risk assessment reveals weaknesses and threats to the development of the territory. The presence of vulnerabilities means that people or things have a certain tendency to be negatively affected. They cannot cope effectively with a stressor and quickly recover from it, or they cannot adapt to change. Climate risks are determined by the nature of hazards and their vulnerability level. Reducing

vulnerability is possible by strengthening resilience and adaptive capacity. Moreover, resilience is resisting and adapting to stress, including extreme weather events. The ability to adjust is to adapt to the possible harmful effects of climate change and use the opportunities that arise in connection with it (McMillan, Birkmann, 2022).

The Ministry of Environmental Protection estimates that "one day of war damages the environment by 102 million euros" (kmu, 2023). Therefore, the task of restoration is to build the process not to harm the environment or at least reduce it more safely. Successful implementation of an environmental approach requires broad public participation, including local governments, residents and other stakeholders. The public should actively participate in the processes of decision-making, data collection and monitoring of changes in the environment.

Having finished writing this scientific master's thesis, I understand that despite its length, the topic I tried to reveal probably causes even more problems and remarks than it explains. Therefore, I want to develop further research on the importance of environmental impact risk analysis and its bias through strategic spatial planning. I think this direction can help the international community of climate activists to become heard by the governments of their countries, what the militarisation of countries and increased securitisation can lead to, and how to strengthen national security through an environmental approach that should be integrated into all spheres.

6. APPENDICES

6.1 Appendix 1. Full maps from the 4.2 results part

Figure 14. Map of natural resources.

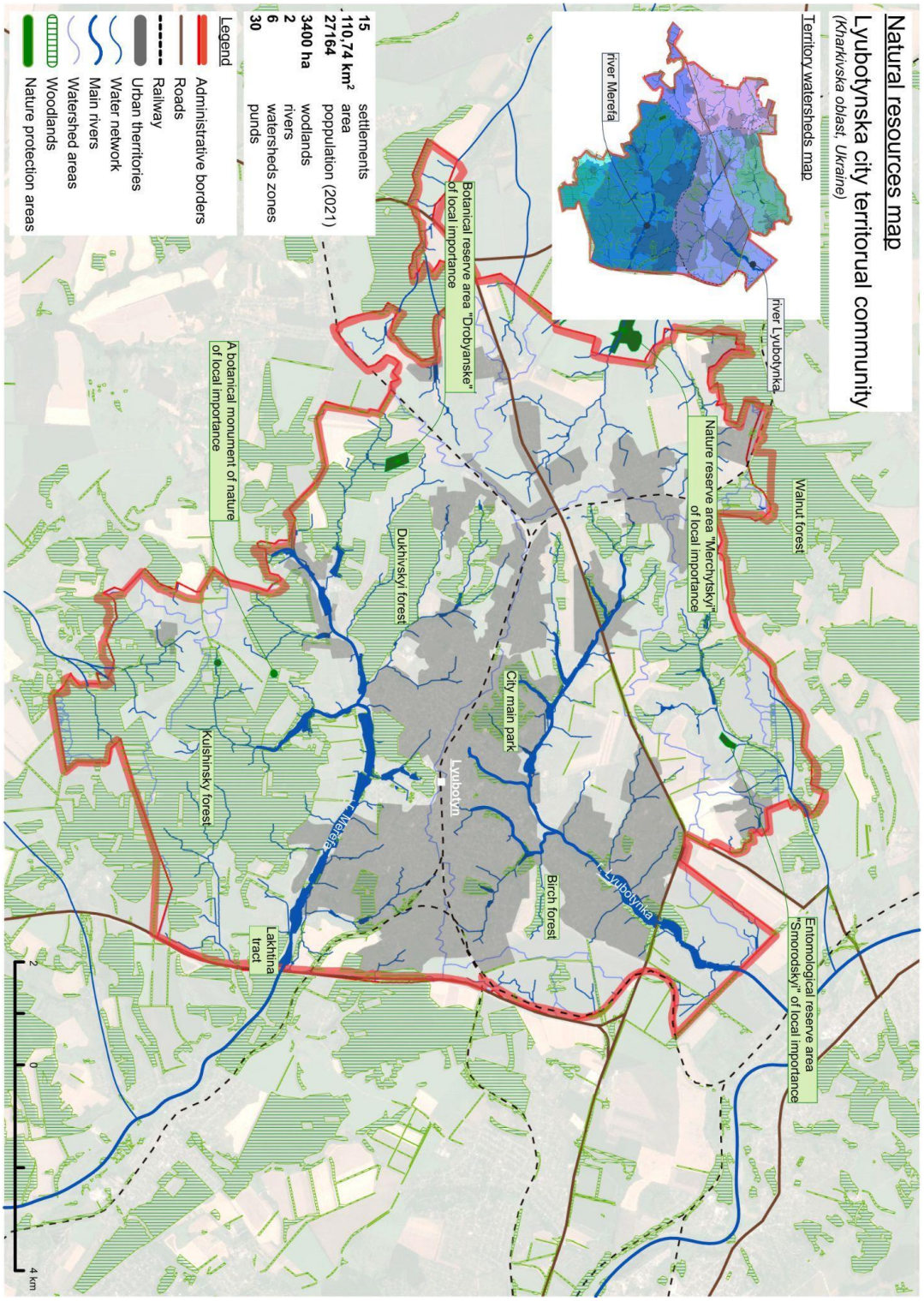


Figure 15. River bloom index map

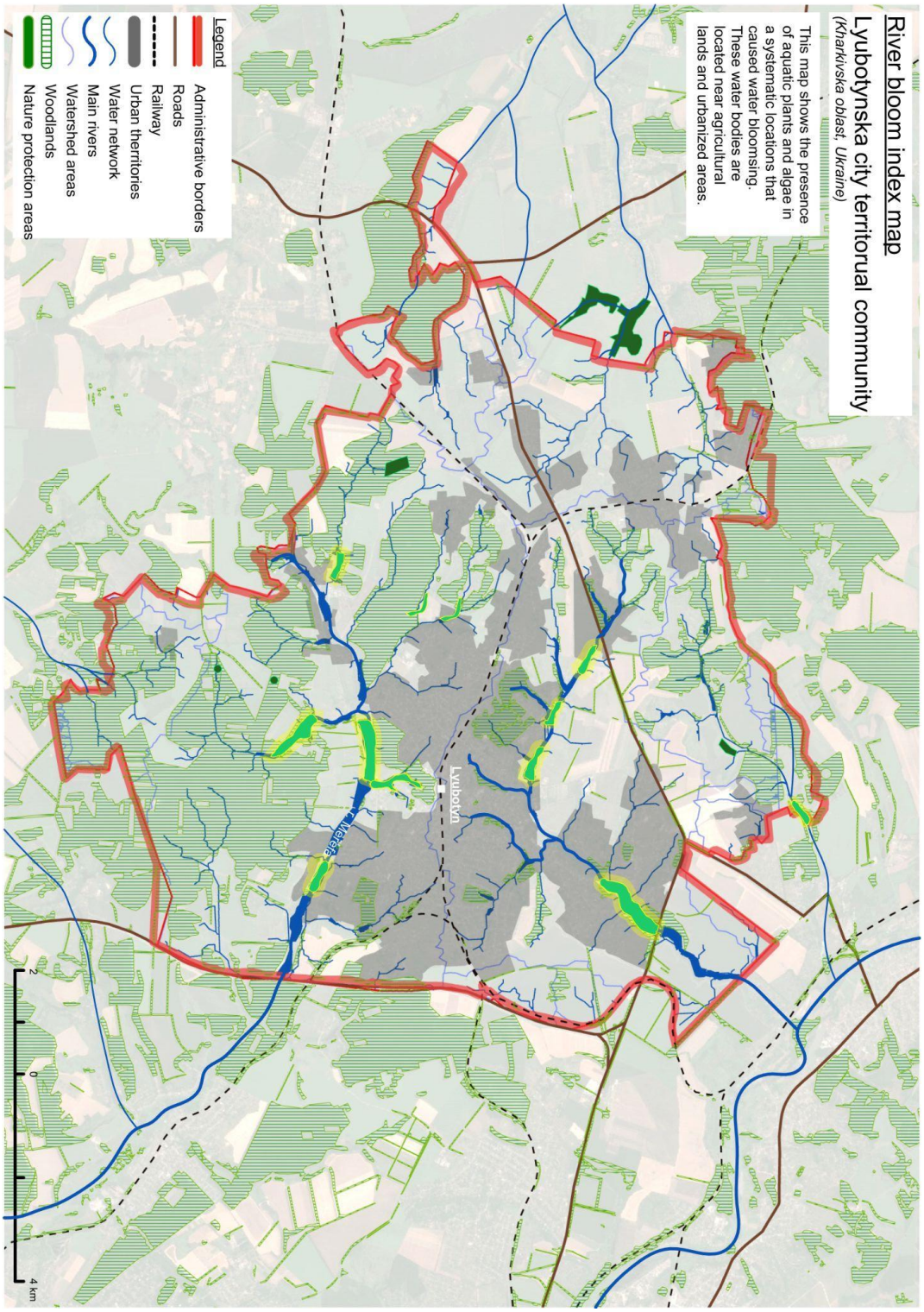


Figure 16. Map of local biodiversity

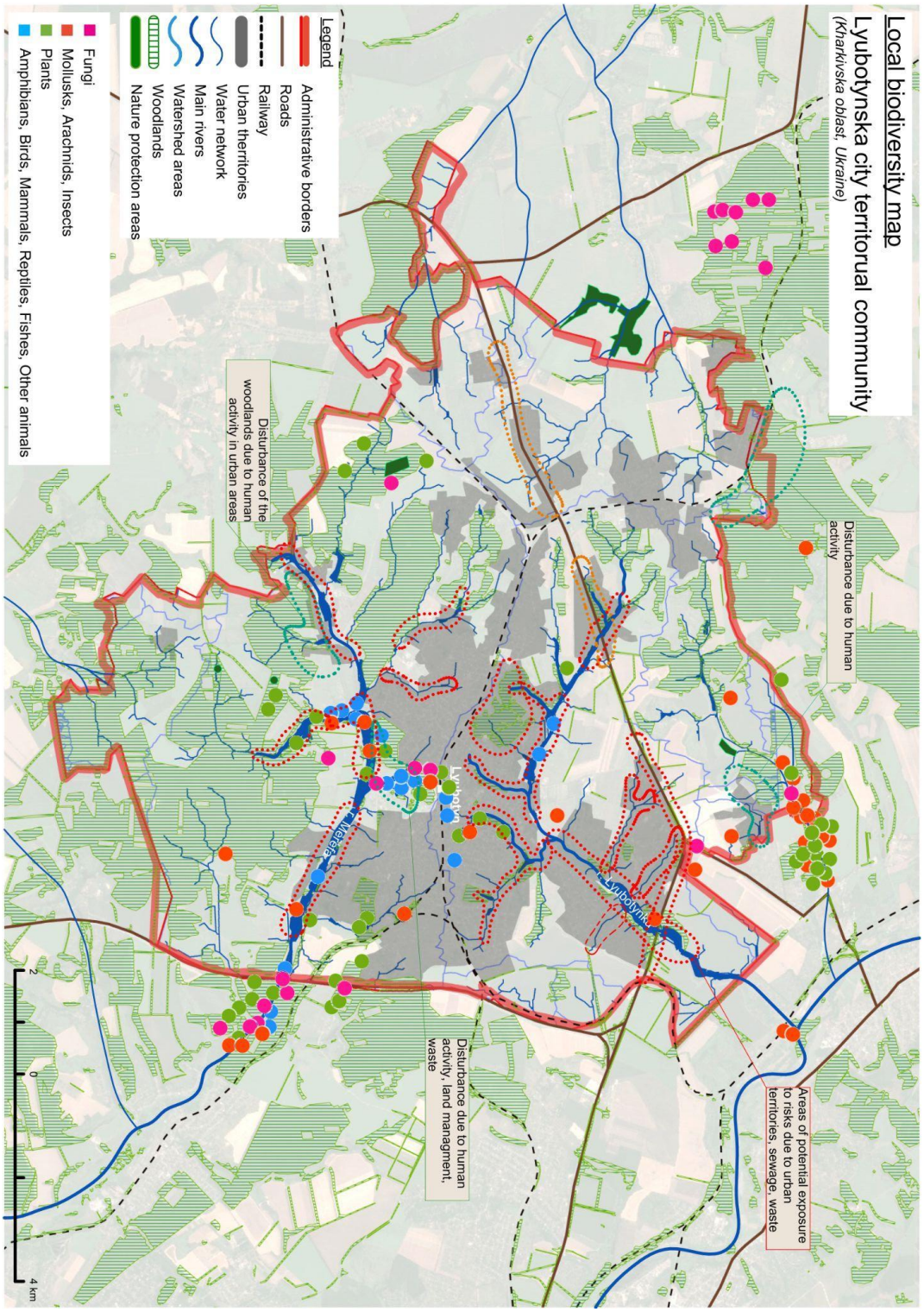


Figure 17. Map of potential risk zones

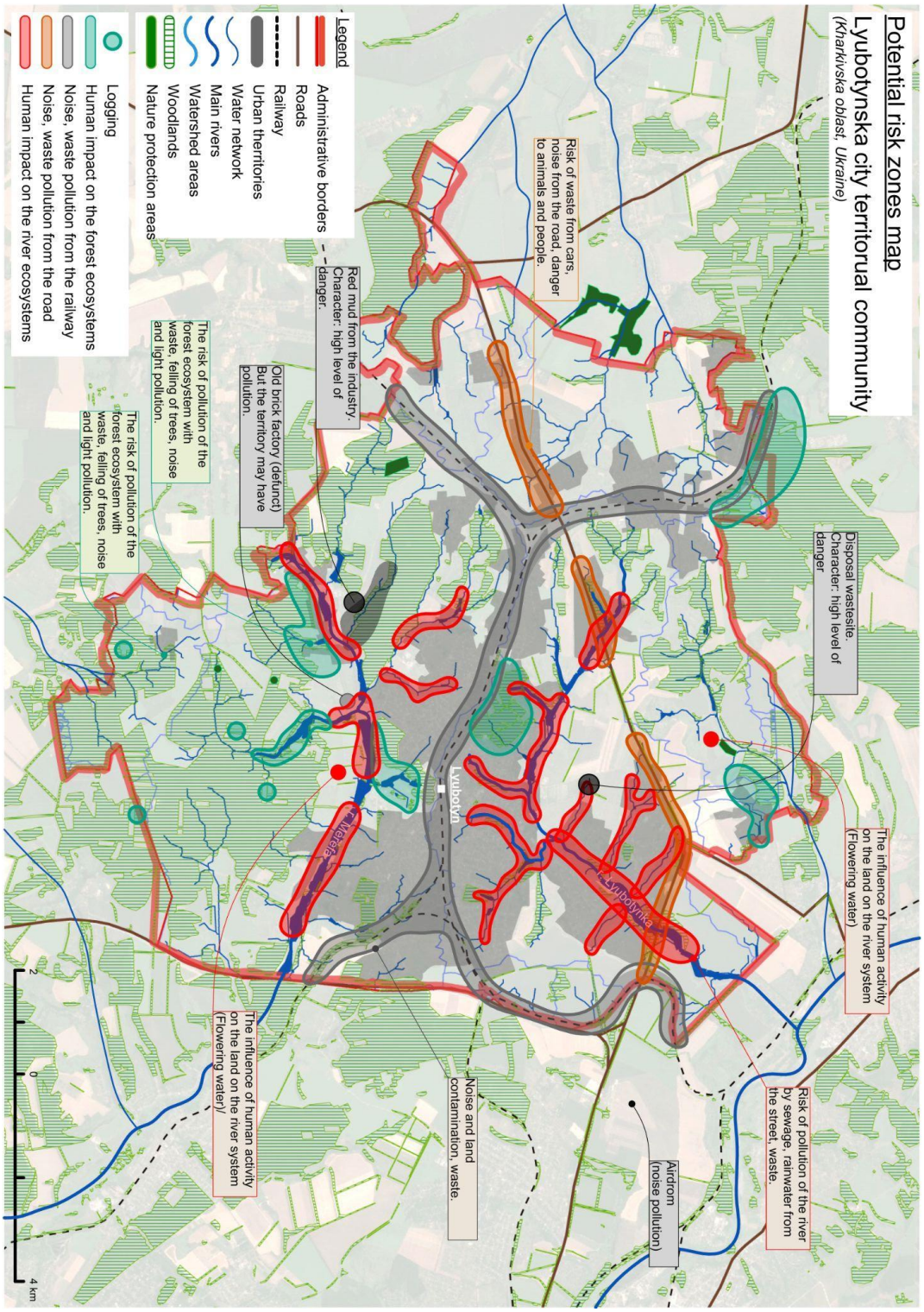


Figure 18. Flash flood risk map

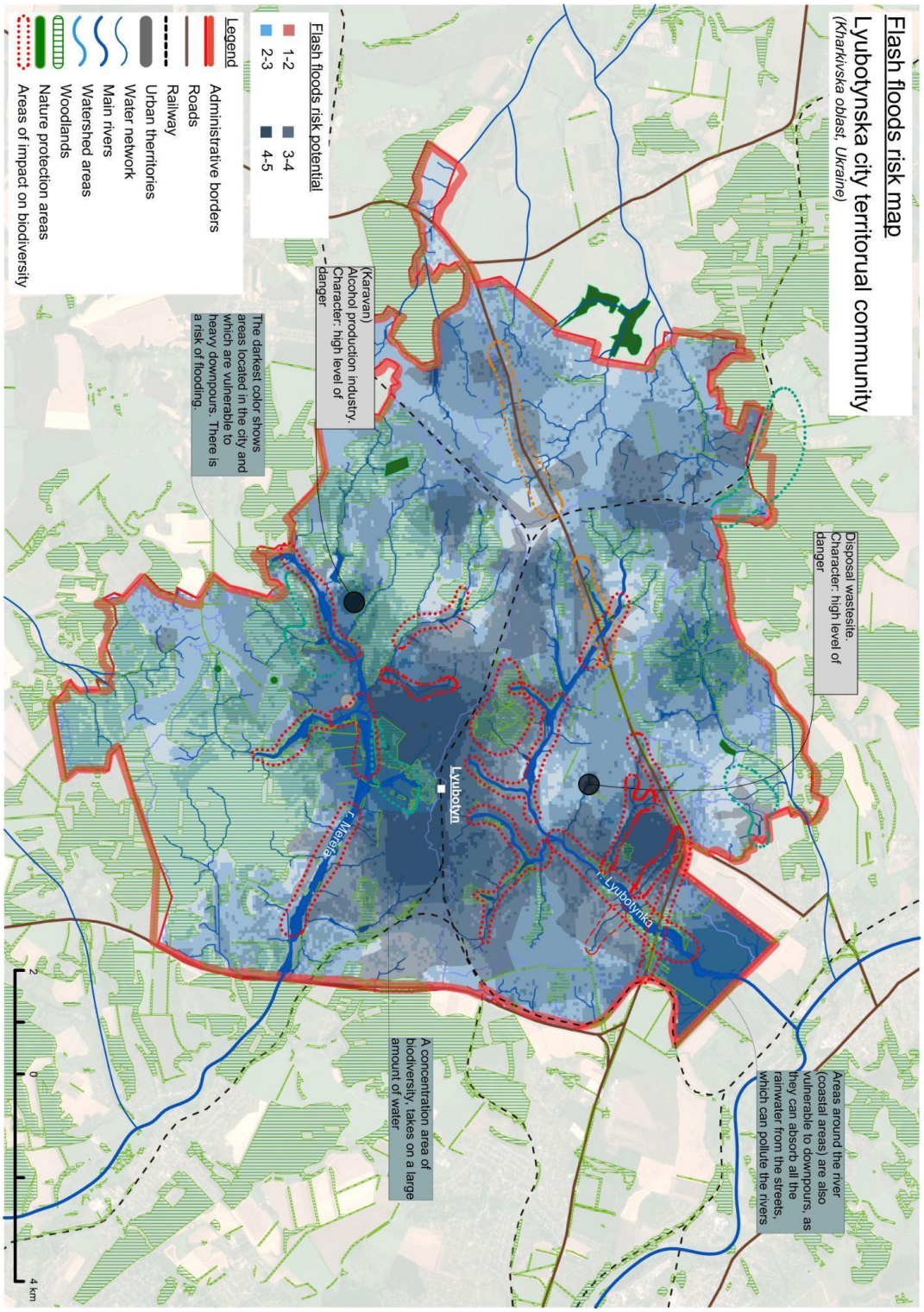


Figure 19. Vulnerability map of river ecosystems

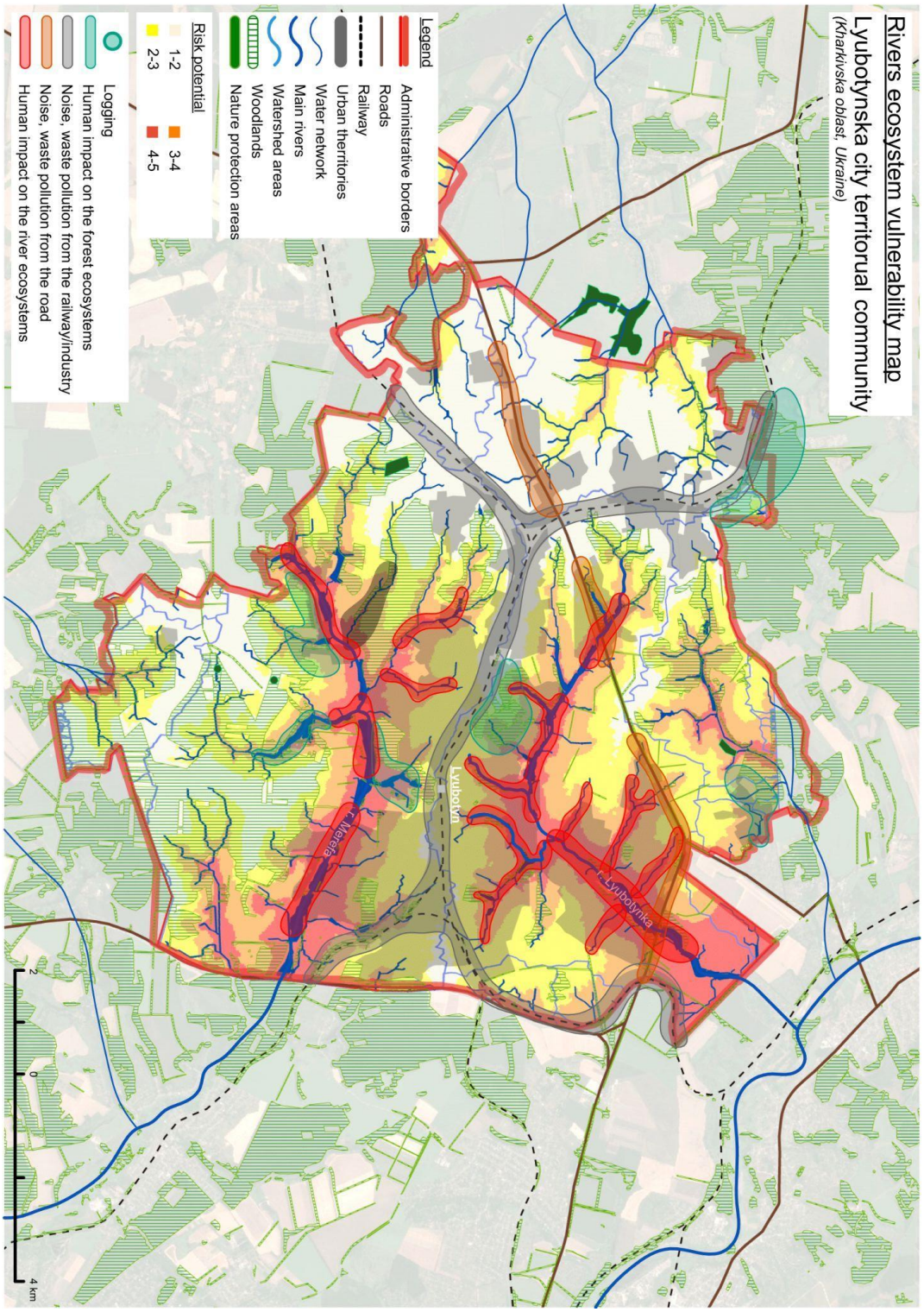


Figure 20. Wind map of the region

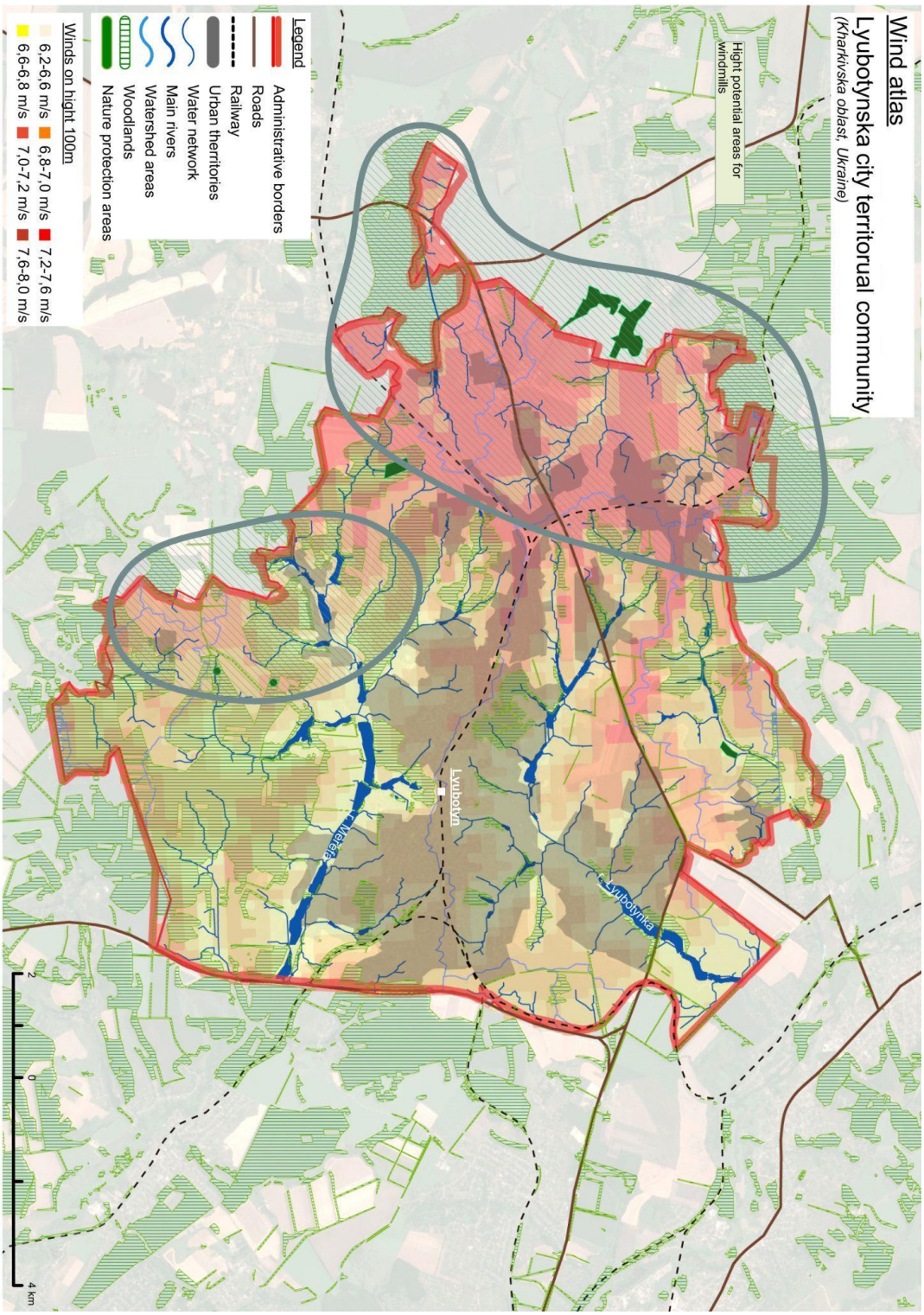


Figure 21. Solar potential map

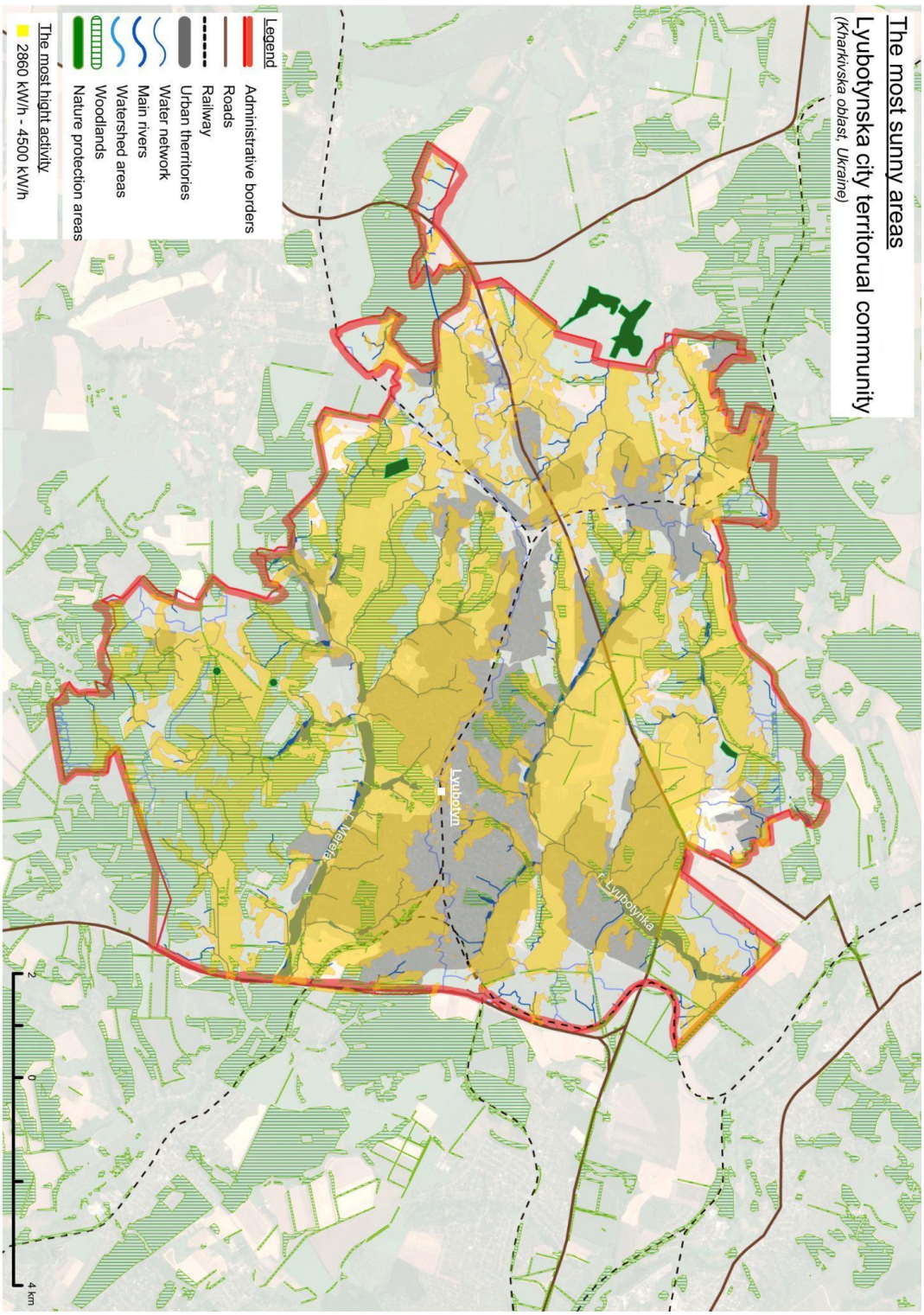


Figure 22. Map of land use as of 2023

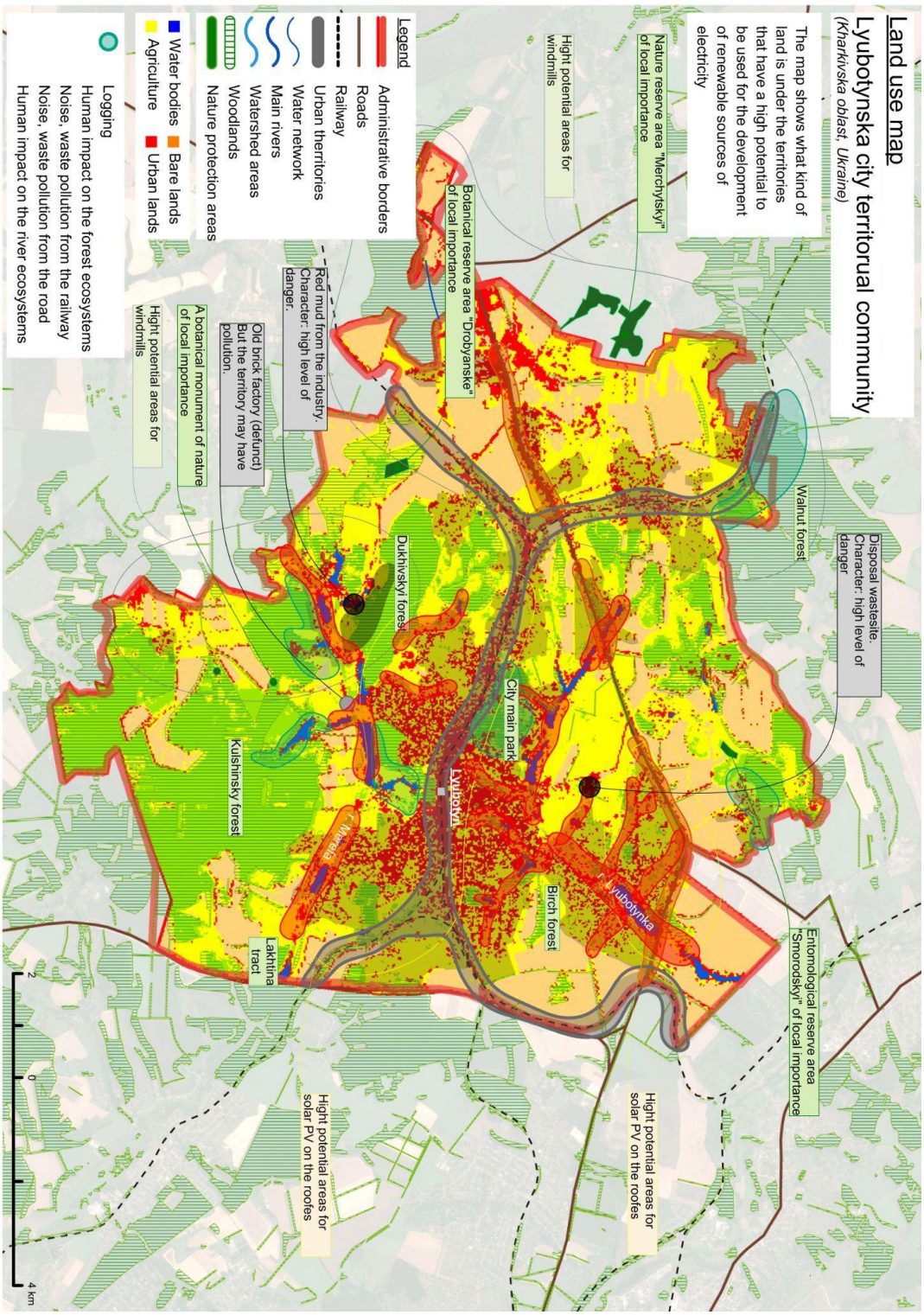


Figure 23. Map of territories in need of protection

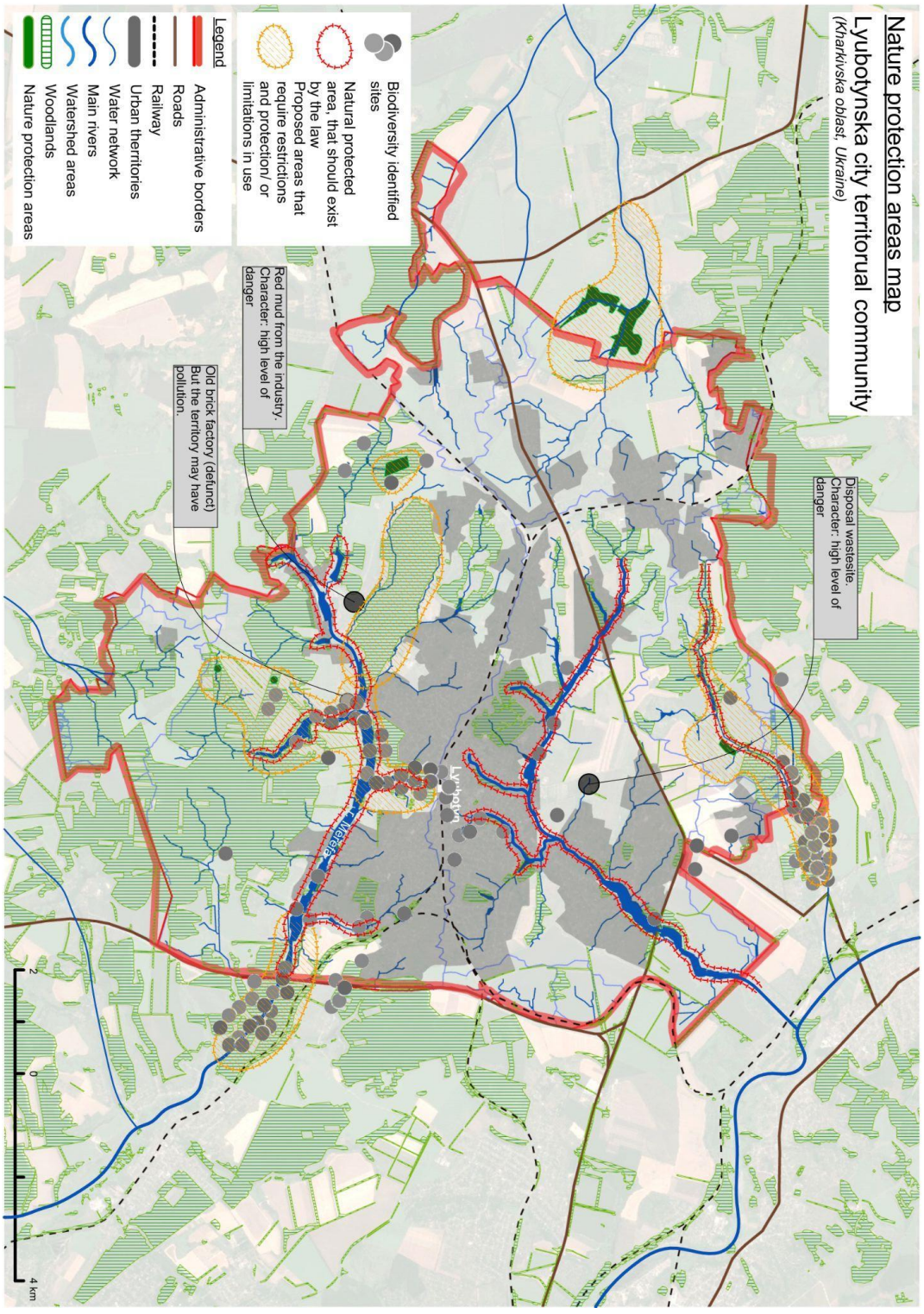


Figure 24. Map of recreational potential

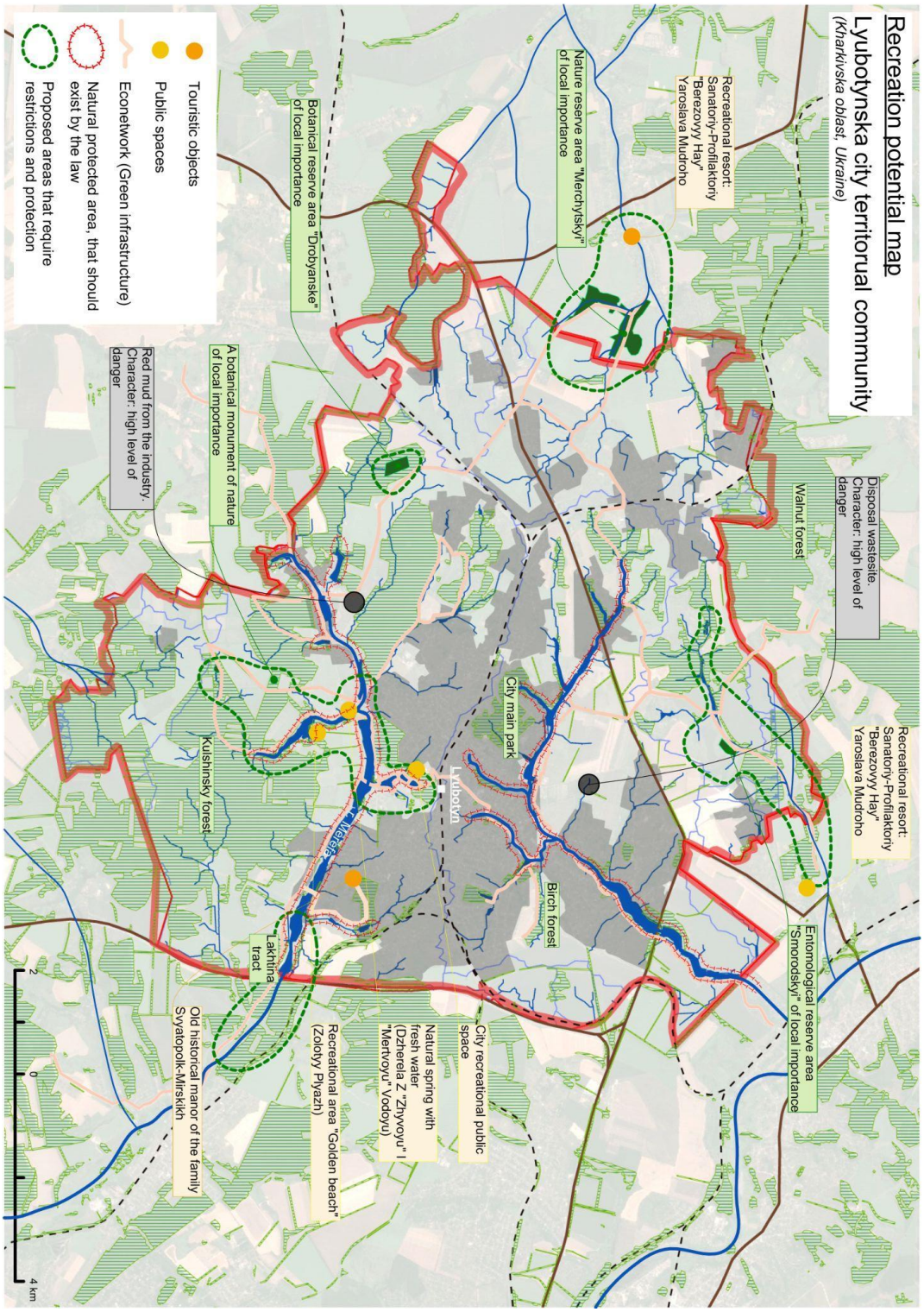
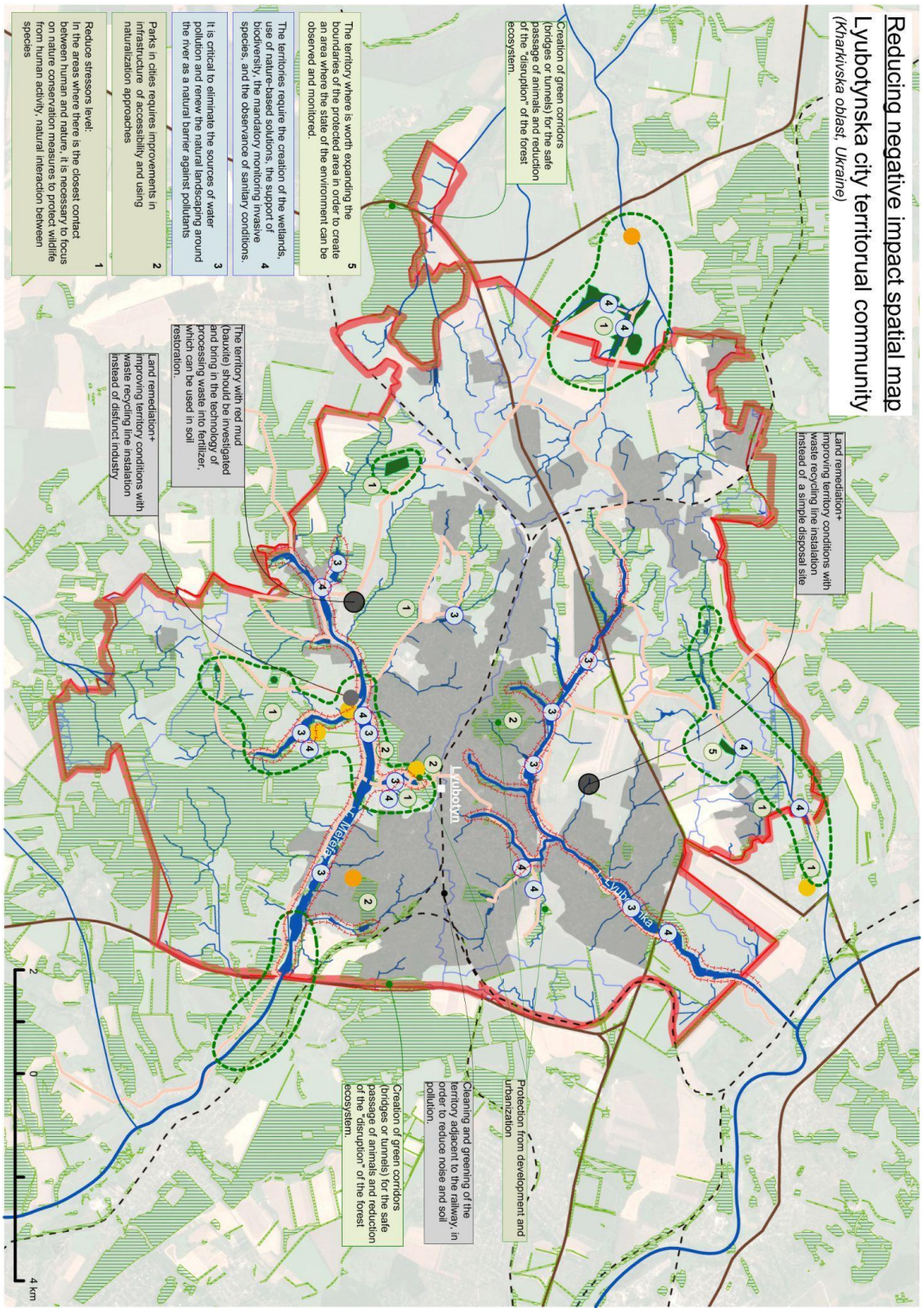


Figure 25. Integrated map for reducing the negative impact



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