

A LEGAL ASSESSMENT OF THE ENVIRONMENTAL, HUMANITARIAN, AND ECONOMIC IMPACTS OF THE RUSSIA/UKRAINE ARMED CONFLICT*

Abstract

Armed conflict (war) is always a human tragedy, and the Russia-Ukraine armed conflict is no exception. Armed conflict tends to inflict direct damage on animals, vegetation, soil and water systems, with ensuing effects on local or regional ecosystems. Armed conflicts result in loss of life and other casualties, in destruction of property, and in socio-economic disruption. The author focuses on the environmental, humanitarian and economic impacts of the Russia-Ukraine armed conflict. The Russia-Ukraine armed conflict is compromising the Ukrainian environment and its resources (and by extension, the global environment), lives, livelihoods, and exacerbating the destruction of socio-economic infrastructures in Ukraine. Russia's invasion of Ukraine is devastating Ukraine's environment, killed tens of thousands of Ukrainians and destroyed socio-economic infrastructures such as residential and commercial buildings, educational facilities, medical (hospital) facilities, transportation infrastructure, industrial facilities, etc. In other words, besides the loss of life and widespread destruction of crucial socio-economic infrastructures, Russia's war on Ukraine has also had a profound environmental impact. The author brings out the environmental, humanitarian and economic impacts of the Russia-Ukraine armed conflict on Ukraine. The author further throws light on how the Russia-Ukraine war has impacted Russia economically.

Keywords: Russia, Ukraine, armed conflict, environmental impacts, humanitarian impacts, economic impacts

1. Introduction

The Russian-Ukraine war began with Russia's invasion of Ukraine on 24 February 2022.¹ Russian President Putin, in a televised video speech address to his nation on 24 February 2022, described the armed attack on Ukraine as a special military operation carried out in self defence.² Russia's invasion of Ukraine has had rippling environmental, humanitarian, economic and global food security impacts across the globe.³ War always means human suffering, blood, tears, and the pain of loss-such as the loss of life, destruction of infrastructure and impairment of normal activity.⁴ In fact, the effects of armed conflicts often extend into space and time, namely by overcoming the boundaries of the national territories of the states that led to the armed conflicts and by affecting the next biological generations.⁵ However, not only people are victims of the war, but also the environment. Nature, all living beings, and their habitats are the 'silent victims' of the Russian-Ukrainian armed conflict.⁶ Armed conflict may cause significant harm to the environment and communities that depend on natural resources. Hostilities tend to inflict direct damage on animals, vegetation, soil and water systems, with ensuing effects on local or regional ecosystems.⁷ It is no exaggeration to say that war is a factor of large-scale, complex, and long-lasting environmental threats, risks, and catastrophes that result in the degradation of both the natural and human environment. Military actions disrupt the functioning of all systems of nature services (climate support systems, soil fertility, purification of water and air, pollination, etc.) They have both local and global consequences because of the violation of the integrity of the Biosphere, the state of natural resources and rate of their restoration, etc.⁸

Further, a humanitarian crisis has unfolded in Ukraine since February 24, 2022, when Russia invaded the country after weeks of heightened tensions and escalation of the conflict in eastern Ukraine that began in 2014. As of 14 March 2022, at least 1,761 civilian casualties had been confirmed, including 636 deaths (46 children) and 1,125 injured (62 children), but the real toll is likely higher. Up to 15 March, 2022, approximately 2,969,600 million people have left Ukraine, fleeing the ongoing hostilities.⁹ It is reported that by early May 2022, the Russian invasion of Ukraine which is the largest armed conflict in Europe since World War II, has killed an estimated 3,153 Ukrainian civilians and created 5.5 million Ukrainian refugees. Militarily the Ukrainians have purportedly lost up to 3,000 soldiers killed while recent estimates suggest 15,000 Russian soldiers have been killed, with significantly higher numbers wounded.¹⁰

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¹Olivier J. Blanchard and Jean Pisani-Ferry, 'Fiscal support and monetary vigilance: economic policy implications of the Russia-Ukraine war for the European Union' (Policy Contribution, Bruegel, June 2022) p.3.

²Rachel Martin and Charles Maynes, Putin justifies Ukraine invasion as a 'special military operation' February 24, 2022. <https://www.npr.org/2022/02/24/1082736110/putin-justifies-ukraine-invasion-as-a-special-military-operation>. [accessed: [6.10.2022].

³See Muqsit Ashraf, *The War in Ukraine: A moment of reckoning for the oil and gas industry* (Accenture, 2022) p.4.

⁴Tetiana Gardashuk, 'Environmental Threats of War in Ukraine' *Envigogika: Charles University E-journal for Environmental Education*, Vol. 17(1) (2022) p.2.

⁵Filofteia Repez and Mirela Atanasiu, 'The Environment - a 'Silent Victim' of Armed Conflicts' *AUDRI*, Vol. 12(2) (2019) pp.123, 125.

⁶Tetiana Gardashuk (note 4).

⁷Protection of the Natural Environment in Armed Conflict: An empirical study, Report 12/2014 (International Law and Policy Institute (ILPI), 2014) p.8.

⁸Tetiana Gardashuk (note 4).

⁹World Health Organization, *Ukraine Crisis: Public Health Situation Analysis-Refugee-Hosting Countries* (World Health Organization Regional Office for Europe, 17 March 2022).

¹⁰John B. Gilliam and Ryan C. Van Wie, *Interim security insights and implications from the first 2 months of the Russian-Ukraine War* (Foreign Policy at Brookings, May 2022); Derek Saul, 'Over 3,000 Civilians Killed in Ukraine Since Russia Invaded, U.N. Says' *Forbes*,

Additionally, the Russian-Ukraine armed conflict has negatively impacted both the Russian and Ukrainian economy, especially, the Ukrainian economy. The Russian-Ukraine war has destroyed several Ukrainian economic infrastructures, thus threatening the economic well-being of the country. Vital Ukrainian economic and social infrastructure such as residential and commercial buildings, educational institutions, healthcare facilities, factories and industrial facilities, thermal plants/hydroelectrical power plants, roads, railways, digital infrastructures, airports, bridges, seaports, etc, has been destroyed or rendered unusable. Also, several small and medium-sized enterprises (SMEs) in Ukraine had either completely ceased operations or suspended their operations. In fact, the Russian-Ukrainian armed conflict has forced most Ukrainian businesses to either short down completely or operate well below average.¹¹ More so, the Russian economy is beginning to feel the impacts of the economic sanctions (in the form of financial and trade restrictions) placed on it by several countries like United States and other European countries due to its invasion of Ukraine and its refusal to put an end to the war.

More so, the Russia-Ukraine armed conflict has negatively impacted global food security. The Russian Federation and Ukraine are major players in international trade of food and agricultural products. And, both countries are major world producers and exporters of major grains used in several countries. Several countries, especially those in the Middle East, Asia and Africa depend on Russia and Ukraine for their food supply. However, the Russian-Ukraine armed conflict has placed restrictions on food production and exports of Ukrainian and Russian agricultural commodities resulting in an enormous and further declining food shortage and negatively impacting global food security.

2. Origin of the Russia-Ukraine Crisis

In 2013, Russia increased political and economic pressures on Ukraine. This followed negotiations between Ukraine and the European Union (EU) and progress towards the conclusion of an Association Agreement between the two parties. In November 2013, demonstration and civil unrest began in Ukraine due to the government's suspension of signing an agreement with the EU, instead opting for closer ties with Russia. In February 2014, the demonstration escalated into the Maiden Revolution, leading to the downfall of the Ukrainian president and government. Between February and March 2014 Russian troops entered Crimea and Russian Parliament approves the use of military force in Crimea which led to the temporary occupation of Crimea.¹²

The Russian-Ukraine crisis escalated in early 2014 with the annexation of Crimea and the occupation of key government buildings in the country's east by pro-Russian separatists.¹³ Since the fall of the Soviet Union in 1991, Ukrainians and Russians have been living peacefully in two separate and independent states for nearly a quarter of a century.¹⁴ However, following the removal of pro-Russian President Viktor Yanukovich in February 2014, Russia intervened militarily in Ukraine, first to annex Crimea as a part of Russia and later to support a separatist armed conflict uprising in a region of eastern Ukraine known as the Donbas.¹⁵ Donbas is a large region in Eastern Ukraine, encompassing the Donetsk and Luhansk oblasts. The region has historically been the heart of Ukrainian industry, possessing large coal mines and production centres for industrial goods.¹⁶ Further demonstrations by pro-Russians and anti-government groups emerged in 2015 at the Donetsk and the Luhansk oblasts in Ukraine. These demonstrations escalated into an armed conflict between the pro-Russians and the Ukrainian government. Once again, Russia provided with combatants and crossed the borders without the Ukrainian government's permission.¹⁷ Russia initially denied being directly involved in the conflict in eastern Ukraine, despite the presence of significant Russian paramilitary forces, but abandoned plausible deniability when it overly committed regular Russian military units in August 2014. Fighting between separatists and the Ukrainian military has continued ever since, often with the participation of Russian units and frequently interrupted by temporary ceasefires.¹⁸

May 2, 2022. <https://www.forbes.com/sites/dereksaul/2022/05/02/over-3000-civilians-killed-in-ukraine-since-russia-invaded-un-says/?sh=21b29907649e>. [accessed: [5.8. 2022]]; Samantha Subin, 'Zelenskyy appeals for 'stronger, more destructive' sanctions, says up to 3,000 Ukrainian soldiers are dead,' *CNBC*, April 16, 2022. <https://www.cnbc.com/2022/04/15/russia-ukraine-live-up-dates.html>. [accessed: 5.7.2022]; Derek Saul, 'Russia-Ukraine War's Mounting Death Toll: Latest Estimates Suggest Russian Troops Have Been Hit Harder,' *Forbes*, April 26, 2022. <https://www.forbes.com/sites/dereksaul/2022/04/26/russia-ukraine-wars-mounting-death-toll-latest-estimates-suggest-russian-troops-have-been-hit-harder/?sh=14b742945495>. [accessed: [30.7.2022]].

¹¹See Vasily Astrov, *Russia's Invasion of Ukraine: Assessment of the Humanitarian, Economic and Financial Impact in the Short and Medium Term* Policy Notes and Reports 59, April 2022, p.18; See *The Crisis in Ukraine: Implications of the War for Global Trade and Development* (World Trade Organization, 2022) p.3. https://www.wto.org/english/res_e/booksp_e/impactukraine422_e.pdf. [accessed: [19.9.2022]]; United Nations Development Programme (UNDP), *The Development Impact of the War in Ukraine: Initial Projections* (UNDP, 2022).

¹²Cost to Ukraine of Conflict with Russia (Centre for Economic and Business Research (CEBR) Report, February 2022) p.8.

¹³Lauren Van Metre, Viola G. Gienger and Kathleen Kuehnast, *The Ukraine-Russia Conflict: Signals and Scenarios for the Broader Region* (Special Report 336, United States Institute of Peace, March 2015); See Nataliia Stukalo and Anastasiia Simakhova, 'Social and economic effects of the war conflict in Ukraine for Europe' *Geopolitics under Globalization*, 2(1) (2018) p.12.

¹⁴Olga Onuch, 'Brothers Grimm or Brothers Karamazov: The Myth and the Reality of How Russians and Ukrainians View the Other' in Agnieszka Pikulicka-Wilczewska and Richard Sakwa (Eds), *Ukraine and Russia People, Politics, Propaganda and Perspectives* (E-International Relations, Bristol: England, 2016) p.35.

¹⁵Robert G. Angevine, John K. Warden, Russell Keller and Clark Frye, *Learning Lessons from the Ukraine Conflict* (Institute for Defence Analyses, May 2019) p.3.

¹⁶Cost to Ukraine of Conflict with Russia (note 12), pp.5,7.

¹⁷Anastasia, Avetisova, *The Ukraine crisis: A geopolitical power struggle between Russia and the US* (Linnaeus University, Sweden, 2015 (Bachelor Thesis) pp.21-22; See Olga Shashkina, *Environmental governance in armed conflicts: A case study in eastern Ukraine* (Division of Risk Management and Societal Safety, Lund University, Sweden, 2020) p.31.

¹⁸Robert G. Angevine, John K. Warden, Russell Keller and Clark Frye (note 15).

The Ukrainian Government lost control of part of the territory and ‘Donetsk People’s Republic (DPR)’ and ‘Luhansk People’s Republic (LPR)’ were self-declared and till date remains outside of Ukraine’s government control.¹⁹ The self-proclaimed ‘Donetsk People’s Republic’ and ‘Lugansk People’s Republic’ were created and in May 2014 pro-Russian separatists transformed them into a confederation – the Federative Republic of New Russia. Armed groups that have taken over government buildings in Donetsk and Lugansk hoisted a Russian flag which caused Ukraine, the USA and many European countries to accuse Russia of organizing these activities.²⁰ The Ukrainian government claimed that the attack on the RSA buildings by pro-Russian forces was part of ‘a script...written in the Russian Federation’ carried out by ‘about 1,500 radicals’...who spoke with clear Russian accents.’²¹ According to the Office of the United Nations High Commissioner for Human Rights (OHCHR), 10,225 people were killed between April 2014 and August 2017 in Ukraine, including 2,505 civilians, and 24,542 people were injured.²² In all, 4.4 million people were affected by the war between April 2014 and June 2017, of whom 4 million are estimated to be in need of humanitarian assistance.²³ Since the 16 March referendum in Crimea and the subsequent integration of Crimea into the Russian Federation, there has been an attempt to classify the situation in Ukraine in legal terms. On 20 March the UN General Assembly approved a resolution declaring Russia’s annexation as ‘having no validity’. The Ukrainian parliament has passed a law defining Crimea as ‘occupied territory’ and has referred the case to the European Court of Human Rights. Organisations such as Human Rights Watch have also classified Crimea as under ‘foreign occupation’, making Russia subject to legal obligations under international humanitarian law.²³

3. Environmental Impacts of Russia-Ukraine Armed Conflict

The State Environmental Inspectorate of Ukraine, a government agency, has documented more than 300 cases of what it calls ‘environmental crimes,’ carried out by Russia since its invasion began in late February. The actual number is believed to be closer to 1,500, it says, but many sites are still occupied by Russia or made inaccessible by the fighting.²⁴ This section discusses the various dimensions the Russia-Ukraine armed conflict has impacted the environment of Ukraine.

Destruction of Ukrainian Biodiversity (Destruction of Ukrainian Protected Areas/ Territories and Objects of the Nature Reserve Fund)

Despite occupying less than 6% of Europe’s landmass, Ukraine is home to 35% of its biodiversity. The country is home to 70,000 (seventy thousand) plant and animal species,²⁵ many of them rare, relict, and endemic.²⁶ 29 percent of Ukraine’s territory is composed of natural vegetation as well as seminatural vegetation (such as managed grasslands and hedgerows, etc.). 16 percent of Ukraine’s territory is composed of forests and it has about 63,000 rivers. More so, Ukraine occupies 11 percent of the Carpathian Mountain range, which comprises one-third of all plant species in Europe.²⁷ However, the biodiversity of Ukraine has been severely impacted due to the ongoing Russia-Ukraine armed conflict. Protected areas of Ukraine heavily suffer from Russian aggression. According to the estimation of the Ukrainian Parliament Commissioner for Human Rights-Lyudmila Denisova, there are about a third of the territories of the nature reserve fund of Ukraine under threat of destruction. There are Luhansk Nature Reserve, Black Sea Biosphere Reserve, Askania-Nova Biosphere Reserve, National nature parks ‘Azov-Sivasky’ and ‘Dzharilgatsky’, arboretum ‘Trostyanets’, and others. The Kherson hydrobiological station was severely damaged.²⁸ The Ukraine’s Ministry of the Environmental Protection and Natural resources has estimated that due to Russia’s military activities, 900 protected natural areas of Ukraine have been affected and an estimated 1.2 million hectares, or about 30% of all protected areas of Ukraine, suffer from the effects of war.²⁹ According to another report, as at March 30, 2022, about 44% of the areas of objects of the nature reserve fund (nature and biosphere reserves, national nature parks) are in the war zone, or under the temporary occupation of Russian troops. Massive use of artillery and aircraft in battlefields leads to numerous fires and damage to vegetation. Wildlife is even more endangered, because in addition to fires, it is also threatened with poaching by the military, the noise of military vehicles

¹⁹Olga Shashkina (note 17).

²⁰Agnieszka, Szpak, ‘Legal classification of the armed conflict in Ukraine in light of international humanitarian law’ *Hungarian Journal of Legal Studies*, 58(3) (2017) pp.261-280:262; See Charlie D’Agata, ‘Ukrainian City of Donetsk Epitomizes Country’s Crisis’ *CBS News* (6 March 2014). <http://www.cbsnews.com/news/ukrainian-city-of-donetsk-epitomizes-countrys-crisis/>. [accessed: [23.9.2022].

²¹Robert Heinsch, ‘Conflict Classification in Ukraine: The Return of the ‘Proxy War’?’ *International Law Studies*, Vol. 91 (2015) pp.328-329.

²²Humanitarian consequences of the war in Ukraine: Report of the Committee on Migration, Refugees and Displaced Persons. Parliamentary Assembly Doc. 14463, 05 January 2018, p.7; Report on the human rights situation in Ukraine, 16 May to 15 August 2017, Office of the United Nations High Commissioner for Human Rights, p.7; European Union, Humanitarian Aid and Civil protection, ECHO factsheet, Ukraine, June 2017.

²³Christina Bennett, *The humanitarian implications of the crisis in Ukraine* (London, Humanitarian Policy Group (HPG): Overseas Development Institute, 2014) p.2.

²⁴Nathan Rott, Shredded trees, dead dolphins and wildfires-how Russia’s invasion is hurting nature, July 1, 2022. <https://www.npr.org/2022/07/01/1106327585/russia-invasion-ukraine-environment-impacts>. [accessed: [24.9.2022].

²⁵Ibidem.

²⁶Assessing the Environmental Impacts of the War in Ukraine, 13 June 2022. <https://wwfcee.org/news/assessing-the-environmental-impacts-of-the-war-in-ukraine>. [accessed: [20.7.2022].

²⁷Giovana Faria, Scorched Earth: The Catastrophic Environmental Cost of Russia’s Invasion of Ukraine, 28 June 2022. <https://www.rferl.org/a/ukraine-environmental-catastrophe-russia-invasion-ecosystems/31919411.html>. [ac cessed: [26.9.2022].

²⁸Tetiana Gardashuk (note 4) pp.2,4.

²⁹Environmental impacts of the war in Ukraine and prospects for a green reconstruction. OECD Policy responses on the impact of the war in Ukraine, 1 July 2022; Ministry of the Environmental Protection and Natural resources, Damage to natural reserves and protected ecosystems 2022. https://mepr.gov.ua/en/news/3_9144.html. [accessed: [10.7.2022].; War against wildlife: Russia is destroying Ukrainian nature reserves, 7 March 2022. <http://ecopolitic.com.ua/en/news/war-against-wildlife-russia-is-destroying-ukrainian-nature-reserves-2/>. [accessed: [13.8.2022].

and fighting. Small animals (insects, etc.) that are in anabiosis during this period burn together with vegetation. In the occupied reserves and national parks where large numbers of animals are kept (such as Askania-Nova Biosphere Reserve) and zoos, there is a real threat of mass death of these animals due to problems with the purchase and delivery of food, as well as with veterinary care. Construction of fortifications, ammunition explosions and the passage of tanks within protected areas also lead to the destruction of natural ecosystems. Spills of fuel and lubricants from damaged equipment pose a long-term threat to biodiversity. This also applies to rivers and sea water areas where downed planes and helicopters jet and warships sink. In total, at least 3 biosphere reserves, 13 national parks, 4 nature reserves in the south, east and north of Ukraine are currently under temporary occupation.³⁰ The crisis has already impacted high conservation value forests, such as the construction of a wall in the Białowieża Forest World Heritage Site in the Polish-Belarus border due to the influx of asylum seekers. Also, the Russian Federation is considering anti-crisis legislation to allow construction without environmental impact statements in natural parks and protected areas such as Lake Baikal, the oldest (25 million years) and deepest (1,700 m) lake in the world, inscribed by UNESCO as the most outstanding example of a freshwater ecosystem, and including the Selenga Delta (Ramsar site 682).³¹

Soil, Water and Air Pollution

Every military conflict has severe impacts on the environment: soil, water and air are contaminated, leaving behind a toxic legacy, often for generations to come.³² The Environmental Peace Building Association (EnPax)-an organization that promotes the protection of the environment by co-ordinating researchers and policy makers- issued an open letter in March 2022 that collated various incidents of environmental destruction in Ukraine. It noted, for example, that the seizure of the Chernobyl nuclear power plant disaster site by the Russian armed forces on 24 February 2022 which remained under their control until 31 March 2022 ‘mobilized radioactive dust and increased detectable radiation that may spread radioactive material into new areas’³³ with potential negative environmental (soil, water, air pollution) and health impacts. On 9 March, the Ukrainian authorities stated that the only power link to the Chernobyl nuclear power plant site was destroyed during hostilities, leaving the plant without power for several days. Regular staff rotations were interrupted, putting at risk the staff’s wellbeing and ability to maintain the site. The International Atomic Energy Agency and the Ukrainian nuclear regulator lost communications with the Chernobyl site, and off-site and on-site radiological monitoring was entirely absent while the plant was under the control of Russian armed forces. Direct communication with the nuclear site was restored on 19 April.³⁴ Russian armed forces also attacked the area of the Zaporizhzhia nuclear power plant in Enerhodar city, the largest of the four functioning nuclear stations in Ukraine, on 4 March. A facility in close proximity to one of the nuclear reactors was damaged during the attack. Russian forces remained in control of the nuclear plant by mid-May.³⁵ Making nuclear power plants object of hostility or attack as in the case of the Chernobyl nuclear power plant and the Zaporizhzhia nuclear power plant releases radioactive substances that results to soil, water and air pollution. Hundreds of other industrial sites have been targeted, potentially causing severe environmental and health impacts for those living nearby. Since the invasion started, fuel depots and gas lines have been hit, and there have been reports of storage with chemicals burning. Russian attacks on munitions depots have already led to the dispersal of heavy metals and hazardous materials, posing additional human health and environmental risks.³⁶ A steady barrage of strikes on industrial and infrastructural objects like refineries, chemical plants, energy facilities, industrial depots or pipelines, lead to fires that releases toxic substances that has polluted the country’s air, water and soil with longer-term environmental and health threats like the risk of cancer and respiratory ailments.³⁷ For example, On February 27, Russian troops hit an oil depot in the Vasylykiv of Kyiv region with a ballistic rocket resulting in a huge fire that burnt 20,000 cubic meters (5.3 million gallons) of gasoline and diesel-around 200

³⁰Impact of Military Action on the Environment of Ukraine (note 30) http://epl.org.ua/wp-content/uploads/2022/04/War_environmental_impact_ENG_04-04-2022.pdf [accessed: [19.8.2022]]; Karolina Soliar, Russian-Ukrainian war: What happened to protected areas and ecology (European Wilderness Society, 2022). <https://wilderness-society.org/war-in-ukraine-what-happened-to-protected-areas-and-ecology/>. [accessed: [19.9.2022]].

³¹Food and Agriculture Organization (FAO), Impact of the Ukraine-Russia conflict on global food security and related matters under the mandate of the Food and Agriculture Organization of the United Nations (FAO), Hundred and Seventieth Session, 13-17 June 2022, May 2022, p.12.

³²European Environmental Bureau (EEB) Statement Concerning the Russian Invasion of Ukraine-adopted by the EEB Board on 3 March 2022; Assessment of Environmental Damage in Eastern Ukraine and Recovery Priorities (Organization for Security and Co-operation in Europe, 2017) p.16; See generally, Nuclear Safety, Security and Safeguards In Ukraine: 2nd Summary Report by the Director General, 28 April-5th September 2022, International Atomic Energy Agency (IAEA).

³³See Filofteia Repez and Mirela Atanasiu, ‘The Environment - a ‘Silent Victim’ of Armed Conflicts’ *Relaciones Internationales*, Vol. 12(2) (2019) pp.129-130; Environmental damage in Eastern Ukraine and recovery priorities, Ministry of Ecology and Natural Resources of Ukraine, 2018, p. 6. <https://menr.gov.ua/files/images/news/24012018/Environmental%20Damage%20in%20Eastern%20Ukraine%20and%20Recovery%20Priorities.pdf>. [accessed: [30.6.2018]].

³⁴Situation of human rights in Ukraine in the context of the armed attack by the Russian Federation, 24 February – 15 May 2022 (United Nations Human Rights Office of the High Commissioner, 2022) p.21; Update 57–IAEA Director General Statement on Situation in Ukraine, 19 April 2022. www.iaea.org/newscenter/pressreleases/update-57-iaea-director-general-statement-on-situation-in-ukraine. [accessed: [13 August 2022]].

³⁵Ibidem, p.22; See Isabella Kaminski, Could Russia be prosecuted for environmental harm in Ukraine? (Open Democracy, 24 March 2022). <https://www.opendemocracy.net/en/ukraine-nuclear-war-environment/>. [accessed: 27.9.2022].

³⁶European Environmental Bureau (EEB) Statement Concerning the Russian Invasion of Ukraine (note 34); Assessment of Environmental Damage in Eastern Ukraine and Recovery Priorities (note 34).

³⁷Environmental impacts of the war in Ukraine and prospects for a green reconstruction (note 29); Ministry of the Environmental Protection and Natural Resources, ‘Digest of the key consequences of Russian aggression on the Ukrainian environment for June 9-15, 2022’. <https://mepr.gov.ua/news/39320.html>. [accessed: 27.9.2022]; See Barry S. Levy, and Jennifer Leaning, ‘Russia’s War in Ukraine-The Devastation of Health and Human Rights’ *New England Journal of Medicine*, Vol. 387 (2022) pp.102-105.

to 300 gas stations' worth of fuel.³⁸ On the premises near the Kryachky village 10 tanks with 2000 m³ of oil and diesel out-flamed. Similar cases happened in Okhtyrka, Luhansk, Chernihiv, Zhytomyr and Chernyakhiv. On March 3, in the Chaiky village near Kyiv, a missile hit the foam rubber storage causing a fire there and in the nearby office building. Products of rubber foam burning cause poisoning to both humans and animals and may also lead to acidic rains. Such rains may harm the vegetation leading to biomass loss in crops and weakening of wild plants and forests. Pests may destroy such forests faster and the growing amount of dead wood may in turn help forest fires spread wider with its resultant air pollution.³⁹ On March 14, after the Russian military shelled a sewage-treatment facility, water from several districts of Zaporizhzhya began to enter the Dnieper River without any treatment causing serious water pollution.⁴⁰

According to preliminary estimates, since the beginning of the full-fledged Russian invasion of Ukraine, the shelling has caused large-scale fires in at least 10 oil depots, more than ten large warehouses of flammable and fuel materials, at least 6 construction hypermarkets in various cities (thousands of tons of construction materials including plastics) have burnt down and several gas pipelines have been damaged. Open air combustion of petroleum products causes release of carbon monoxide, oxides of sulfur and nitrogen resulting in air pollution. The latter are acid gases, which when in reaction with water produce acids that can irritate the mucous membranes when inhaled. In addition, a large number of aromatic compounds, aldehydes, ketones, which are harmful to the human body, are released. Also, typical black smoke during fires at oil depots and warehouses is a sign of significant emissions of soot micro-particles, which is the most dangerous carcinogen of all that can be found in everyday life.⁴¹ Further, Russian troops attacks on ports infrastructures alongside the Black and Azov sea shores, as well as the anchored ships, is causing water pollution and spreading of poisonous substances into the sea. Oil products harm marine biocenosis forming pellicles on the water surface and breaking energy, heat, humidity and gas exchange between sea and atmosphere. Moreover, oil impacts directly the physical chemistry and hydrologic condition killing fish, marine birds and microorganisms. All the components of oil are toxic to marine life and its hydrocarbons can dissolve other pollutants such as pesticides or heavy metals, which alongside oil concentrate in the upper layer and the marine environment even more. Soil pollution with fuels and oil materials and other petroleum products is due to the movement and damage of military machinery. In this case, soil water permeability is reduced, oxygen is displaced, biochemical and microbiological processes are disrupted. As a result, water, air and nutrient cycles deteriorate, root nutrition is disrupted, and their growth and development are inhibited, leading to death.⁴² Additionally, the use of warships and submarines by the Russian forces is causing marine wildlife decline. Thousands of dolphins have been found dead in the Black Sea, which could be a consequence of increased shipping noise and the use of powerful sonar systems⁴³ by navies, according to data collected by Ukraine's Tuzla Estuaries National Nature Park.⁴⁴

Also, it is reported that as forests and fallow lands in the exclusion zone accumulated a significant amount of radionuclides in the period after the 1986 catastrophe, fires in this area carry substantial risk of increasing radioactive air pollution.⁴⁵ EnPAX also observed that attacks against cities such as Kharkiv 'have caused major fires in fuel storage areas threatening serious air, ground, and water pollution'.⁴⁶ Environmental reports by specialists showed that the armed conflict has resulted to disruptions in the operation of water supply and wastewater systems and installations and highlighted increased nitrogen and phosphorus concentrations in the rivers Siverskiy Donets, Kleban-Byk, Kalmius and Kalchyk.⁴⁷ Also, rivers across the Donbas conflict zone in the east are being polluted by wrecked industrial facilities, sewage works, and overflowing coal mines.⁴⁸ More so, massive use of various types of weapons such as the explosions of missiles, air bombs and artillery shells not only leads to large casualties among civilians but also causes emissions of toxic substances during explosions of ammunition and burning of rocket fuel, as well as leads to soil pollution.⁴⁹ Russian attacks on munitions depots have already led to the dispersal of military-origin heavy metals and toxic hazardous energetic materials, posing additional human health and environmental risks.⁵⁰ Ukraine's fertile soil is becoming contaminated with heavy metals and other potentially

³⁸Rachel Teng Ruiqi, Amid war, Ukrainians are tracking Russia's crimes against the environment (Mongabay, 5 May 2022).

³⁹Oksana Omelchuk and Sofia Sadohurska, Nature and War: How Russian Invasion Destroys Ukrainian Wildlife (The Northcoast Environmental Centre, 2 March 2022).

⁴⁰Giovana Faria (note 27).

⁴¹Impact of Military Action on the Environment of Ukraine (note 30).

⁴²Oksana Omelchuk and Sofia Sadohurska (note 41).

⁴³A system using transmitted and reflected underwater sound waves to detect and locate submerged objects or measure the distance to the floor of a body of water. See Sonar Definition. <https://www.yourdictionary.com/sonar>. [accessed: [15.9.2022].

⁴⁴Giovana Faria (note 27).

⁴⁵Food and Agriculture Organization (FAO) (note 33).

⁴⁶The Role of the Environmental War Crime in the Russian Invasion of Ukraine. https://eprints.ncl.ac.uk/file_st ore/production/281576/D137FE5E-3159-4A79-9AA1-7FD7D166B538.pdf. [accessed: [21.9.2022]; Environmental Peacebuilding Association, 'Open Letter on the Environmental Dimensions of the Russian Invasion of Ukraine' (Environmental Peacebuilding, 3 March 2022). <https://bit.ly/3JTy0bp>. [accessed: [18.4.2022]; See Stefano Mallia, Oliver Röpke and Séamus Boland, The war in Ukraine and its economic, social and environmental impact (European Economic and Social Committee (EESC) Resolution, Brussels: European Union, 24 March 2022).

⁴⁷Filofteia Repez and Mirela Atanasiu (note 35); Environmental damage in Eastern Ukraine and recovery priorities, Ministry of Ecology and Natural Resources of Ukraine, 2018, p.6. <https://menr.gov.ua/files/images/news/24012018/Environmental%20Damage%20in%20Eastern%20Ukraine%20and%20Recovery%20Priorities.pdf>, accessed on 30 June 2018. [accessed: [14.9.2022].

⁴⁸Fred Pearce, Collateral Damage: The Environmental Cost of the Ukraine War (YaleEnvironment 360, Yale School of the Environment, 29 August 2022).

⁴⁹Impact of Military Action on the Environment of Ukraine (note 30).

⁵⁰Joint Statement by Global Civil Society Organizations to UNEA 5.2 on Ukraine. 1 March 2022. <https://reliefweb.int/report/ukraine/joint-statement-global-civil-society-organizations-unea-52-ukraine>. [accessed: [21.9.2022].

poisonous substances leaking from missiles, military equipment and spent ammunition. Spilled fuel is polluting ground waters and ecosystems are being hammered by tanks and other heavy technology.⁵¹ According to the European Environment Agency, depending on the extent of the destruction caused by the war and the type of arsenal deployed, toxic chemicals in water, soil and the air might persist for decades to come, harming human health, habitats and species.⁵² The widespread destruction caused by the Russian invasion is likely to lead to the contamination of land, water, and inhabited environments, where they can persist with a lifespan likely much longer than this conflict'.⁵³

Deforestation through Russia's Hostility-Induced Forest Fires

The Russian Federation and Ukraine account for more than 20 percent of the global forest area and about 16 percent of the total certified forest area.⁵⁴ However, the most immediate wartime threat facing Ukraine's forests is posed by wildfires which are resulting to severe deforestation. Between the start of the Russian invasion on February 24 and the end of May, more than 160,000 hectares of Ukrainian forest burned down in regions affected by hostilities. With battle raging along a frontline stretching for more than a thousand miles across the country and Russian forces seeking to systematically destroy Ukraine's natural and industrial resource base, this grim trend looks set to continue.⁵⁵ The Ukraine Nature Conservation Group (UNCG), a non-profit coalition of the country's scientists and activists, has noted that satellite monitors has spotted more than 37,000 fires in the first four months of the invasion, affecting approximately a quarter-million acres of forests and other natural ecosystems. Most were started by shelling, and a third were in protected areas.⁵⁶ Since the Russian forces took control of the Chernobyl nuclear exclusion zone, there have been 31 large fires, covering an area of 10 287 ha, according to the Ukrainian Ministry of Ecology and Natural Resources.⁵⁷ Reports show that extensive forest areas were lost due to forest fires, mechanical damage and illegal deforestation.⁵⁸ Active use of artillery and aircraft during the hostilities causes mass fires in natural ecosystems, particularly in forests. Analysis of recent satellite images shows that the total area of the radiation-contaminated area that has been burning or has recently been covered by fire is more than 7,600 hectares. More so, fires and secondary releases of radionuclides in forests in the most polluted parts of the Chornobyl Nuclear Exclusion Zone can be another cause of radioactive contamination.⁵⁹

Ukraine hosts 35 percent of European biodiversity. The native forests and older plantations of Scots pine (*Pinus sylvestris*) in Belarus and Ukraine have been suffering from dieback and associated outbreaks of bark beetles. Due to the war, pest monitoring and control activities have been restricted, increasing the risk of a severe bark beetle outbreak that could damage approximately 80 000 ha of pine forests in Ukraine and across borders.⁶⁰ Also, some ancient woodland has been torn apart by modern weapons used by the Russian forces.⁶¹ Davit has noted that many trees had been burned or split open in the forests in the Irpin, Bucha, Borodyanka, and Hostomel areas, along with the surrounding villages in the Kyiv region.⁶² The March 27 attack against Moscow forces in a forest camp near Bucha destroyed nearly everything within a 300-meter radius.⁶³ The Ukrainian Nature Conservation Group (UNCG) has stated that 36,154 hectares of forests and 10,250 hectares of grass ecosystems have been destroyed by fire. According to the UNCG, the areas with the greatest concentration of fire-affected forests are the outskirts of the cities of Severodonetsk, Lyman, Izyum, Sviatohirsk in the Luhansk and Donetsk regions, as well as the northern outskirts of Irpen, Buchi, Borodyanka and Makarov in the Kyiv region. The vast majority of all the forests burned during the first 4 months of the war are concentrated in the foregoing mentioned areas.⁶⁴

4. Humanitarian Impacts of the Russia-Ukraine Armed Conflict

Armed conflict is a cause of, or contributor to nearly every humanitarian emergency the international system responds to each year⁶⁵ and the Russia-Ukraine armed conflict is not an exception. This section of the paper discusses the multidimensional humanitarian impacts of the Russia-Ukraine armed conflict on the Ukrainian people and the international community, especially with regards to global food security.

⁵¹Ivana Kottasová, 'Ukraine's natural environment is another casualty of war. The damage could be felt for decades' CNN, 22 May 2022.

⁵²World Water Day: water in times of war – the case of Ukraine. https://euneighbourseast.eu/wp-content/uploads/2022/03/ukraine-war-damage-water_20220322_vfab-mh-1.pdf. [accessed: [23.9.2022].

⁵³Kristina Hook, Richard 'Drew' Marcantonio, 'Grappling with environmental risks in the fog of war', *Bulletin of the Atomic Scientists*, 10 March 2022. <https://thebulletin.org/2022/03/grappling-with-environmental-risks-in-the-fog-of-war/>. [accessed: [19.9.2022].

⁵⁴Food and Agriculture Organization (FAO) (note 33) p.12.

⁵⁵Yehor Hrynyk, Russia's invasion is putting the future of Ukraine's forests at risk (UkraineAlert: Atlantic Council, August 5, 2022).

⁵⁶Fred Pearce (note 50).

⁵⁷Food and Agriculture Organization (FAO) (note 33).

⁵⁸Filofteia Repez and Mirela Atanasiu (note 35); Environmental damage in Eastern Ukraine and recovery priorities (note 49); Victoria Masterson, How has the war impacted Ukraine environment (World Economic Forum, 25 July 2022).

⁵⁹Impact of Military Action on the Environment of Ukraine (note 30).

⁶⁰Food and Agriculture Organization (FAO) (note 33).

⁶¹Emma Graham-Harrison, Toxins in soil, blasted forests – Ukraine counts cost of Putin's 'ecocide', *The Guardian* (27 August 2022). <https://www.theguardian.com/world/2022/aug/27/destroyed-nature-ukrainians-race-to-gather-evidence-of-putins-ecocide>. [accessed: [27 September 2022].

⁶²Davit Kachkachishvili, Heavy Conflict scares nature in Ukraine: Trees in forests of Irpin, Bucha, Borodyanka, Hostomel areas burned, split open as Russia's war on Ukraine enters 53rd day (Anadolu Agency, 18 April 2022).

⁶³Luis De Vega, Ground zero of one of the Russian army's greatest defeats in Ukraine. <https://english.elpais.com/international/2022-05-23/ground-zero-of-one-of-the-russian-armys-greatest-defeats-in-ukraine.html>. [accessed: [27.9.2022].

⁶⁴Months of War: 100,000 Ha of Ukraine Burnt Up (Ukrainian Nature Conservation Group, 30 June 2022). <https://uncg.org.ua/en/4-months-of-war-100000-ha-of-ukraine-burnt-up/>. [accessed: [27.9.2022]; See Ivana Kottasová (note 53).

⁶⁵Abby Stoddard et. al., Collateral Violence: Managing risks for aid operations in major conflict, Aid Worker Security Report 2022, (Humanitarian Outcomes, October 2022) p.3.

Refugee Crisis

The war in Ukraine is causing an enormous refugee crisis of immense proportions. More than 12 million people are estimated to have been displaced as of mid-April and more than 13 million need urgent humanitarian assistance. Trauma suffered by the population will have enduring consequences⁶⁶ as the impact of the war on civilians is reaching terrifying proportions. As of 20 March 2022, according to the United Nations Refugee Agency, 10 million Ukrainians fled their homes because of the war, of which around 3.4 million have crossed into neighbouring countries.⁶⁷ The war has led to a large refugee crisis. Another report has it that over 7 million people have been displaced within Ukraine, while UNHCR is reporting the number of refugees (to neighbouring countries) at 4.7 million as of the 15th of April. Large shares of the refugees are women and children. Of the estimated 7.5 million children in Ukraine, 4.3 million (57 percent of the totals) have been displaced: 1.8 million (24 percent of total) are estimated to have fled to neighbouring countries as refugees, and another 2.5 million (33 percent of total) are internally displaced.⁶⁸ According to Food and Agriculture Organization, 'the war has caused extensive damage and loss of life in major cities in Ukraine, spread across rural areas and sparked massive population displacement. More than 3.6 million people had been forced to abandon their homes and flee across borders to safety. Millions more are internally displaced'.⁶⁹

Loss of Access to Safe Drinking Water, Sanitation and Electricity Supply

In areas of Ukraine directly troubled by military action, access to water supply and sanitation is among key concerns. Ukrainian cities under siege are suffering an extreme humanitarian crisis: the Red Cross described the situation in Mariupol as 'apocalyptic'. Hundreds of thousands of civilians lost access to drinking water. According to media reports, people in Mariupol were forced to melt snow for drinking water and cook on open fires with food, water and power supplies cut off. In such conditions, the risk of waterborne infectious diseases is maximal. One of such infectious diseases is cholera. Since the 1960s, the Southern part of Ukraine has been exposed to several epidemics of cholera.⁷⁰ The last cholera outbreak in Europe happened in 2011 in Mariupol. The United Nations Children's Fund (UNICEF) pinpointed in a 2019 report that during conflicts, unsafe water can be just as deadly as bullets. On average, children under the age of 15 who are living in conflict are nearly three times more likely to die from diseases linked to unsafe water and sanitation than from direct violence. For younger children, the situation is worse. Children under five years old are more than 20 times more likely to die from diseases linked to unsafe water and sanitation than from direct violence.⁷¹ As of the end of March, nearly 6 million Ukrainians had little or no access to safe water. It is likely to have a particularly acute impact on children by increasing malnutrition and stunting, reducing years of schooling, and worsening labour market outcomes.⁷² After three weeks of fighting, the Russian armed forces, was unable to cut the Ukraine armed forces off from the major Ukrainian cities, except Kherson. With defending positions being set up inside the cities, the Russian armed forces started to engage in urban warfare, which is resulting to massive collateral damage to critical civilian infrastructure: water and heat supply systems, electricity grids and sewerage. With this damage to the infrastructure, the urban population faces a high risk of starvation, the spread of disease and a rapid deterioration in its physical and mental health. Prior to the war, 70% of the Ukrainian population lived in urban areas in the government-controlled zone.⁷³ It is likely to have a particularly acute impact on children by increasing malnutrition and stunting, reducing years of schooling, and worsening labour market outcomes.⁷⁴ The battle around Mariupol provides a classic example of what happens when the bulk of the population is trapped in a city. As at 18 March 2022, about a quarter of the population of that city of 400,000 are awaiting evacuation while living with limited access to electricity, water, sewerage and heating for over three weeks. This implies a high probability of death from starvation, frostbite and disease.⁷⁵

⁶⁶Justin Damien Guénette, Philip Kenworthy, and Collette Wheeler, Implications of the War in Ukraine for the Global Economy' Equitable Growth, Finance, and Institutions Policy Notes (EFI Policy Note 3) (The World Bank Group, April 2022); 'Operational Data Portal: Ukraine Refugee Situation (UNHCR Data Portal, 2022). <https://data2.unhcr.org/en/situations/ukraine>. [accessed: [5.4.2022].

⁶⁷World Water Day: water in times of war (note 54); See Cockbain Ella and Sidebottom Aiden, *The war in Ukraine and associated risks of human trafficking and exploitation: Insights from an evidence-gathering roundtable* (London: Office of the Independent Anti-Slavery Commissioner, 29 April 2022) p.13.

⁶⁸Justin Damien Guénette, Philip Kenworthy and Collette Wheeler (note 68) p.10; Ukraine Internal Displacement Report: General Population Survey (International Organization for Migration, Ukraine, 2022); See Olivier J Blanchard and Jean Pisani-Ferry (note 1) p.5; See Nataliia Stukalo and Anastasiia Simakhova (note 13) p.13.

⁶⁹Food and Agriculture Organization (FAO), Impact of the Ukraine-Russia conflict on global food security and related matters under the mandate of the Food and Agriculture Organization of the United Nations (FAO), Hundred and Seventieth Session, 13-17 June 2022, May 2022. <https://www.fao.org/3/nj164en/nj164en.pdf>. [accessed: [23.9.2022].

⁷⁰World Water Day: water in times of war (note 54); Clark, C. G., et al., 'Microbiological and Epidemiological Investigation of Cholera Epidemic in Ukraine during 1994 and 1995' *Epidemiology and Infection*, Vol. 121(1) (1998) pp.1-13.

⁷¹Ibidem; See Fast facts: WASH in conflict-Why water, sanitation and hygiene are critical for children in fragile and conflict-affected areas. <https://www.unicef.org/stories/fast-facts-water-sanitation-hygiene-conflict>. [accessed : [25.9.2022].

⁷²Justin Damien Guénette, Philip Kenworthy and Collette Wheeler (note 68) p.7; Akresh, R., G.D. Caruso, and H. Thirumurthy, 'Detailed Geographic Information, Conflict Exposure, and Health Impacts.' *World Development*, Vol. 155 (2022), 105890; Acosta, P., J. E. Baez, G. Caruso, and C. Carcach, 'The Scars of Civil War: The Long-Term Welfare Effects of the Salvadoran Armed Conflict.' Policy Research Working Paper 9430, World Bank, 2020).

⁷³Vasily Astrov (note 11) p.14.

⁷⁴Justin Damien Guénette, Philip Kenworthy and Collette Wheeler (note 68) p.7; Akresh R., G.D. Caruso and H. Thirumurthy (note 74); Acosta P., J.E. Baez, G. Caruso and C. Carcach (note 74).

⁷⁵Vasily Astrov (note 11) p.15; United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA), Ukraine: Humanitarian impact situation report as of 3:00 p.m. (EET) on 18 March 2022. https://reliefweb.int/sites/reliefweb.int/files/resources/2022-0318_Ukraine%20Humanitarian%20Impact%20Sit%20Rep.pdf. [accessed: [13. 8.2022].

Civilian Casualties (Lost of Human Lives)

The Russia-Ukraine war has led to the death of countless innocent people-including women and children. Providing an exact count of the number of people killed and injured in the course of a raging war is impossible. However, estimated figures have been made available by the Office of the United Nations High Commissioner for Human Rights (OHCHR), based on information collected by the HRMMU, present in Ukraine since 2014. According to the HRMMU, between 24 February and 3 July 2022, 4,889 people were killed and 6,263 more were injured in Ukraine. The actual casualty figures are reportedly considerably higher than those documented, which are regularly revised. Most of the deaths and injuries recorded by the HRMMU were reportedly caused by the use of explosive weapons with a wide impact area, including shelling from heavy artillery, multiple launch rocket systems (MLRS), missiles and airstrikes.⁷⁶ From 24 February to 15 May 2022, OHCHR verified 8,368 civilian casualties, with 3,924 persons killed (47% of casualties) and 4,444 persons injured (53% of casualties) as a direct result of the hostilities. Among them, 1,519 men, 985 women, 95 girls, and 98 boys, as well as 68 children and 1,159 adults whose sex is still unknown were killed, and 907 men, 604 women, 104 girls, and 126 boys, as well as 161 children and 2,542 adults whose sex is still unknown, were injured.⁷⁷ While most of the deaths were reportedly caused by the use of wide-impact explosive weapons, cluster munitions or unguided rockets in densely populated areas, Russian troops reportedly also engaged in extrajudicial killings by targeting or firing randomly on civilians. Some of the victims were allegedly tortured or ill-treated prior to being executed.⁷⁸ The brutal siege laid by Russian forces to Ukraine's south-eastern city of Mariupol has become perhaps the most vivid symbol of a modern-time humanitarian catastrophe and a particularly haunting illustration of Russian forces' apparent disdain for human life.⁷⁹ The city's authorities have estimated the civilian death toll to be at least 20,000 to 22,000.⁸⁰ Many Ukrainian cities and villages have suffered a similar fate. As of 15 May 2022, over 1,200 civilian bodies have been recovered in Kyiv region alone. These included not only civilian casualties, but others unlawfully killed, including summarily executed, and those who died because of new stresses on their health due to hostilities and unavailability of medical aid after spending days and weeks in basements or their house. They experienced restricted access to necessary services and sometimes faced threats to life and health from Russian soldiers if they tried to leave.⁸¹ Hundreds of civilians were allegedly killed by Russian armed forces in situations that were not linked to active fighting. As of 15 May, OHCHR is working to corroborate over 300 allegations of such killings. This figure may increase as new evidence becomes available.⁸² In Bucha, a small city located northwest of Kyiv with a pre-war population of 36,000, 416 were killed, of which the majority were reportedly extrajudicial executions.⁸³ Most victims were men, but there were also women and children. Civilians were shot while trying to leave the area in their vehicles; Russian soldiers summarily executed unarmed local civilian men suspected of providing support to Ukrainian forces or otherwise considered to pose a possible future threat; others were shot by soldiers in the streets or snipers as they tried to cross the road or otherwise gather essentials for life; some civilians seemed to have been killed completely arbitrarily. Those perceived as providing support to Ukrainian forces were sometimes tortured before being killed.⁸⁴ Also, the fierce hostilities in Irpin, Kyiv's residential suburb, caused at least 267 civilian deaths.⁸⁵ Investigation by Amnesty International found that Russian soldiers' indiscriminate strikes killed at least over 40 people in the city of Borodyanka, northwest of Kyiv.⁸⁶ Some estimates suggest that the conflict in Donbas region of Ukraine has claimed the lives of over 13,000 Ukrainians and the displacement of a further 1.5 million.⁸⁷ According to the World Health Organization, Regional Office for Europe, as of 14 March 2022, at least 1,761 civilian casualties had been confirmed in Donetsk and Luhansk oblasts (regions), including 636 deaths (46 children) and 1,125 injured (62 children), but the real toll is likely higher.⁸⁸ Also, it is estimated that by early May 2022, the Russian offensive has killed an estimated 3,153 Ukrainian civilians. Militarily the Ukrainians have purportedly lost up to 3,000 soldiers killed while recent estimates suggest 15,000 Russian soldiers have been killed, with significantly higher numbers wounded.⁸⁹

⁷⁶Memorandum on the human rights consequences of the war in Ukraine, Strasbourg, 8 July 2022, p.4. <https://r.m.coe.int/memorandum-on-the-human-rights-consequences-of-the-war-in-ukraine/1680a72bd4>. [accessed: [21.9. 2022]]; Ukraine: civilian casualty update by the Office of the UN High Commissioner for Human Rights, 4 July 2022.

⁷⁷Situation of human rights in Ukraine in the context of the armed attack by the Russian Federation (note 34) p.16.

⁷⁸Memorandum on the human rights consequences of the war in Ukraine (note 76) p.1.

⁷⁹Ibidem, p.4; 'Report on Violations of International Humanitarian and Human Rights Law, War Crimes and Crimes Against Humanity Committed in Ukraine since 24 February 2022', OSCE Moscow Mechanism's mission of experts, Organization for Security and Co-operation in Europe, 13 April 2022, pp.46-8; See 'AP evidence points to 600 dead in Mariupol theater airstrike', *Associated Press*, 4 May 2022.

⁸⁰Memorandum on the human rights consequences of the war in Ukraine (note 78) p.4; 'Mariupol Civilian Death Count Could Surpass 20,000, Mayor Says', *Newsweek*, 12 April 2022, p.4.

⁸¹Situation of human rights in Ukraine in the context of the armed attack by the Russian Federation (note 34).

⁸²Ibidem.

⁸³Memorandum on the human rights consequences of the war in Ukraine (note 78) p.5; See 'Ukraine: Russian Forces' Trail of Death in Bucha. Preserving Evidence Critical for War Crimes Prosecutions', report, *Human Rights Watch*, 21 April 2022; 'He's Not Coming Back': War Crimes in Northwest Areas of Kyiv Oblast', briefing, Amnesty International, 6 May 2022.

⁸⁴Situation of human rights in Ukraine in the context of the armed attack by the Russian Federation (note 34).

⁸⁵Memorandum on the human rights consequences of the war in Ukraine (note 78) p.6.

⁸⁶'He's Not Coming Back': War Crimes in Northwest Areas of Kyiv Oblast' (note 85).

⁸⁷Institute for Economics & Peace, *The Ukraine Russia Crisis: Terrorism Briefing*, Sydney, March 2022. <http://visionofhumanity.org/resources>. [accessed: [12.8.2022]].

⁸⁸Ukraine Crisis: Public Health Situation Analysis-Refugee-Hosting Countries, 17 March 2022 (World Health Organization, Regional Office for Europe).

⁸⁹John B. Gilliam and Ryan C. Van Wie (note 10); Derek Saul (note 10); Samantha Subin (note 10).

Restrictions on Food Production and Exports which is Negatively Impacting Global Food Security

The Russia-Ukraine armed conflict has placed restrictions on food production and exports of Ukrainian and Russian agricultural commodities resulting in a massive and more deteriorating food shortage and negatively impacting global food security.⁹⁰ This situation has increased global hunger.⁹¹ Destruction of agricultural production capacity in Ukraine and the halt of much of the grain and fertilizer trade with the Russian Federation raise the prospect of a global food crisis.⁹² The Russian Federation and Ukraine are prominent players in global trade of food and agricultural products as both countries are major world producers and exporters of major grains such as wheat, barley, corn, and vegetable oils used in many countries. According to the Food and Agriculture Organization (FAO), in 2021, wheat exports by the Russian Federation and Ukraine accounted for about 30 percent of the global market. Combined, sunflower oil exports from both countries represented 78 percent of global supply. Combined, the two countries, on average, accounted for 19 and 4 percent, respectively, of global output of barley, wheat and maize between 2016/17 and 2020/21.⁹³ However, the FAO has noted that one third of crops and agricultural land in Ukraine will be un-harvestable and uncultivable in 2022. As a result, about 26.4 million tons of wheat, corn and barley could disappear from markets.⁹⁴

Nearly 50 countries depend on Russian Federation and Ukraine for at least 30 percent of their wheat import needs. Of these, 26 countries source over 50 percent of their wheat imports from these two countries. In that context, the Russian-Ukraine war will have multiple implications for global markets and food supplies, representing a challenge for food security for many countries, and especially for low-income food import dependent countries and vulnerable population groups.⁹⁵ The armed conflict directly reduces food exports from both countries disrupting and affecting global food supplies. The impacts of the Russia-Ukraine armed conflict are already threatening food availability in countries that depend on grains and other food exports from these two countries.⁹⁶

Limiting Ukrainian exports of food and agricultural commodities is affecting millions of people in Ukraine and around the world. In addition, in response to the Russian invasion of Ukraine, the United States and other countries have imposed financial and trade sanctions on Russia, further affecting international trade patterns. Because Ukraine and Russia are among the world's leading exporters of certain food staples used in many countries, the effects of such disruptions on global food security are becoming apparent. In March 2022, to help meet domestic food needs, Ukraine banned exports of grain and other food products. Although the United Nations World Food Program (WFP) and other humanitarian organizations are scaling up emergency food assistance operations in Ukraine and the region, access is limited within the country and food shortages are becoming evident with an estimated 18 million people suffering food insecurity.⁹⁷ Food production in Ukraine is more directly impacted by the war, with farming activities disrupted. Although farming activities in Russia are not directly disrupted by the war, the sanctions imposed on the country are already affecting the economy and will also impact food exports. An additional risk is if Russia restricts exports to keep domestic food prices low. This could further impact global food supplies and prices.⁹⁸ Further, in the short term, the disruptions in food production and exports from the Russia-Ukraine armed conflict are anticipated to extend most acutely to countries in the Middle East (such as Ethiopia, Lebanon,

⁹⁰Food and Agriculture Organization (FAO) (note 33) pp.1,3; See Global Impact of War in Ukraine on Food, Energy and Finance Systems: A three dimensional crisis, Brief No. 1, 13 April 2022 (United Nations, 2022) p.3; UNCTAD, The Impact on Trade and Development of the War in Ukraine. https://unctad.org/system/files/official-document/sginf2022d1_en.pdf. [accessed: [7.9.2022]]; See Russia-Ukraine Conflict: Implications For European Corporate and Infrastructure Sectors, March 16, 2022 (Standard & Poor's Financial Services LLC, 2022) p.8.

⁹¹Global Impact of the War in Ukraine: Billions of people face the greatest cost-of-living crisis in a generation: UN Global crisis response group on food, energy and finance, Brief No. 2 (United Nations, 8 June 2022) p.10.

⁹²United Nations ECLAC, Repercussions in Latin America and the Caribbean of the War in Ukraine: How should the region face this new crisis? (United Nations Economic Commission for Latin America and the Caribbean (ECLAC), 6 June 2022) p.13.

⁹³Food and Agriculture Organization (FAO) (note 33) pp.1,3; See Global Impact of War in Ukraine on Food, Energy and Finance Systems (note 92) p.3; UNCTAD, The Impact on Trade and Development of the War in Ukraine (note 92); Russia-Ukraine Conflict: Implications For European Corporate and Infrastructure Sectors (note 92) p.8; The Socio-Economic Repercussions of the Russia-Ukraine War on Yemen, Analytical Paper (3), (Ministry of Planning & International Cooperation: Economic Studies & Forecasting Sector, Republic of Yemen) June 2022, p.7; See Abdelaaziz Ait Ali, The Economic Implications of the War in Ukraine for Africa and Morocco, Policy Brief (Policy Centre for the New South, February 2022) pp.2-3; See Shlomo Maital and Ella Barzani, The Global Economic Impact of the Russia-Ukraine War: A Survey (Samuel Neaman Institute for National Policy Research, 2022) p.4; See Manjusha Goel, 'A Study of Impact of Russia-Ukraine War on the Indian Economy' *International Journal of Scientific Engineering and Research (IJSER)*, Vol. 10(5) (2022) p.12.

⁹⁴United Nations ECLAC (note 94) p.13; Food and Agriculture Organization (FAO), 'The importance of Ukraine and the Russian Federation for global agricultural markets and the risks associated with the current conflict. 25 March 2022 Update', *Information Note*, 2022. <https://www.fao.org/3/cb9236en/cb9236en.pdf>. [accessed: 11.9.2022].

⁹⁵Food and Agriculture Organization (FAO) (note 33) pp.1,3; See The Crisis in Ukraine: Implications of the War for Global Trade and Development (World Trade Organization, 2022) p.2; See Secondary Impacts of the Conflict in Ukraine: Case Studies in the Middle East, June 2022 p.3; The economic setting following the invasion of Ukraine and the economic policy response working breakfast with the business sector organized by Hill & Knowlton Pablo Hernandez de Cos, 15 March 2022, p.2.

⁹⁶Russian-Ukraine Conflict: Implications of Disruptions in global food supply chains for food trade in Africa, Policy Briefs-Regional Food Trade, March 2022, p.3; Puma M. and Konar M., 'What the War in Ukraine Means for the World's Food Supply' *The New York Times* (1 March 2022).

⁹⁷Rhoda Margesson et. al., Russia's Invasion of Ukraine: Implications for Global Food Prices and Food Security. Congressional Research Service, May 2, 2022, p.1.

⁹⁸Nhemachena C. et. al., Russian-Ukraine Conflict: Implications of Disruptions in global food supply chains for food trade in Africa, AGRA Policy Brief-Regional Food Trade, 22 March, p.3. <https://agra.org/wp-content/uploads/2022/04/The-impacts-of-the-Russia-Ukraine-conflict-on-food-prices-food-and-nutrition-security-in-Africa-2.pdf>. [accessed: [19.9.2022]]; Horner W., MacDonald A. and Deng C., 'Russia's Ukraine Invasion Chokes Food Exports from Global Breadbasket' *Wall Street Journal* (25 February 2022). <https://www.proquest.com/newspapers/russiasukraine-invasion-chokes-foodexports/>. [accessed: [23.9.2022]].

Syria, and Yemen) and Africa (such as Algeria, Egypt, Libya, Morocco, Tunisia, Sudan, Benin, Cabo Verde, Mauritania, Senegal, Guinea, Sierra Leone, Ghana, Cameroon, Ivory Coast, Mali, and Liberia, Uganda, Kenya, South Africa and Nigeria) which rely heavily on food imports from Ukraine and Russia, and where WFP has reduced rations as part of its cost-cutting measures.⁹⁹ This situation may have a huge impact on the populations of these countries which are some of the largest importers of Russian and Ukrainian food staples.¹⁰⁰ Thus, the war in Ukraine could have devastating humanitarian consequences on these countries, including increased hunger and poverty, given their high dependency on food imports, rising global food prices, and low agricultural productivity.¹⁰¹

African countries are particularly vulnerable due to their heavy reliance on imports from Russia and Ukraine. Egypt, for example, is the world's largest importer of wheat, with 80% of its wheat imports from Russia and Ukraine. It also spends USD 955 million on wheat subsidies. In 2020, African countries imported USD 4 billion worth of agricultural products from Russia, 90% of which was wheat.¹⁰² Russia is the largest and Ukraine the third largest supplier of wheat to Africa. Russia and Ukraine account for 40.4% of Africa's wheat imports. In 2019, almost all wheat imported to Benin Republic (99.8%) was of Russian origin, while over half of all wheat imports were Russian in Sudan (76.9%), Madagascar (61.7%), Republic of Congo (57.6%) and Tanzania (52.1%). In 2019, Ukrainian wheat accounted for over one fifth of imported wheat in Egypt (25.1%), Libya (35.2%), Mauritania (23.9%), Morocco (21.1%), and almost half of all imported wheat in Tunisia (48.6%).¹⁰³ Already, prior to the war in Ukraine, international food commodity prices had reached an all-time high. This was mostly due to market conditions, but also high prices of energy, fertilizers and all other agricultural services. The Russia-Ukraine war has aggravated the situation. In March 2022, the FAO Food Price Index reached a new historical record high, up 12.6 percent from February and 33.6 percent from its level a year earlier, and 15.8 percent higher than the peak reached in February 2011.¹⁰⁴ Stefano, Oliver & Séamus stresses that Ukraine and Russia are significant exporters of several agricultural products, such as grain and oilseeds; notes that the disruption of exports from these countries has already led to huge global increases in the prices of agricultural commodities and that the consequences are felt especially in the world's poorest countries and the poorest people are the ones who will suffer the most.¹⁰⁵ The market price of wheat has already increased nearly 50 percent from \$7.70 a bushel before the war to \$11, a level last seen for only a few days in 2008.¹⁰⁶ As insecurity persists and both local and national food supply chains are disrupted, people are likely to fall deeper into hunger and malnutrition resulting from damage to crops due to military activity, the disruption of logistics and all elements of the food supply chains, and the destruction of agrifood system assets and infrastructure.¹⁰⁷ Given the interconnectedness of global food markets, shocks in Russia and Ukraine, both major world food producers and exporters, has impacted food supplies and food systems. Furthermore, the importance of the Black Sea region which is an important hub for global food production and trade of major staples (such as wheat, barley, corn, maize, oilseeds and sunflower) implies that the impact of the Russia-Ukraine war on food trade, food prices and food security transcends beyond the borders of the two countries. With most of Russia and Ukraine grain exports in the Black Sea region mainly transported by sea, which is at the heart of the military conflict, the disruptions of marine logistics pose a significant risk to global food supplies and prices. The instability in food production and trade (especially exports) has far-reaching consequences on food supplies, prices, and food security in import-dependent countries such as those in Africa and Asia.¹⁰⁸ Export deliveries will either be cancelled or delayed. The disruptions of the normal functioning of the Black Sea ports and grain exports from the region have a significant impact on global food supplies, and tight global supplies would further fuel food price increases around the world¹⁰⁹ with the resultant effects of severe global food insecurity.

⁹⁹Rhoda Margesson et. al. (note 99) p.2; See generally, Christopher M. Blanchard et. al., Middle East and North Africa: Implications of 2022 Russia-Ukraine War (Congressional Research Service Report, June 15, 2022) pp.11-15;

¹⁰⁰The geopolitical impact of the conflict in Ukraine: Five Trends to help businesses manage the potential risks to global security and prosperity. <https://assets.kpmg/content/dam/kpmg/xx/pdf/2022/03/russia-ukraine-geopolitical-impact.pdf>. [accessed: [25.9.2022].

¹⁰¹The Impact of the War in Ukraine on Sustainable Development in Africa: Rapid Assessment by the Regional Bureau for Africa, UNDP, May 2022, p.9; See Hisham Aidi, The Russia-Ukraine War: Implications for Africa, Policy Brief, No 22/22, March 2022 (Policy Centre for the New South, 2022) p.5; See How bad is the Ukraine war for the European recovery? (Economic Department: European Investment Bank, 2022) p.3.

¹⁰²The Impact of the War in Ukraine on Sustainable Development in Africa (note 103); See generally, Raga S. and Pettinotti L., Economic Vulnerability to the Russia-Ukraine War. ODI Emerging Analysis (London: ODI, 2022) p.16. <https://odi.org/en/publications/economic-vulnerability-to-the-russiaukraine-war-which-low-and-mid-dle-income-countries-are-most-vulnerable/>. [accessed: [9.9.2022]; See UNCTAD-United Nations Conference on Trade and Development, 'The impact on trade and development of the war in Ukraine' Rapid Assessment. (Geneva: UNCTAD, 2022).

¹⁰³Ben Chandler, Russia-Ukraine crisis: Impact on Africa (Mo Ibrahim Foundation, April 2022) p.6.

¹⁰⁴Food and Agriculture Organization (FAO) (note 33); See Food and Agriculture Organization (FAO), March 2022 FAO Food Price Index. <https://www.fao.org/worldfoodsituation/foodpricesindex/en/>. [accessed: [18.9.2022].

¹⁰⁵Stefano Mallia, Oliver Ropke and Séamus Boland, The war in Ukraine and its economic, social and environmental impact (European Economic and Social Committee (EESC) Resolution, 24 March 2022).

¹⁰⁶Olivier J. Blanchard and Jean Pisani-Ferry (note 1) p.5; Macrotrends, 'Wheat prices – 40 year historical chart', 19 April, 2022. <https://www.macrotrends.net/2534/wheat-prices-historical-chart-data>. [accessed: [19.9.2022].

¹⁰⁷Food and Agriculture Organization (FAO) (note 33) p.4; Fact Sheet: Preserving Agricultural Trade, Access to Communication, and Other Support to Those Impacted by Russia's War Against Ukraine, April 19, 2022.

¹⁰⁸Nhemachena C. et. al. (note 98) p.2; See Prohorovs, Anatolijs, 'Russia's War in Ukraine: Consequences for European Countries' Businesses and Economies' *Journal of Risk and Financial Management*, Vol. 15:295 (2022) p.2; See Puma M. and Konar M. (note 98); See Horner W., MacDonald A. and Deng C. (note 100); See Devitt P., Stolyarov G., and Zinets N., 'Ukraine shuts ports as conflict threatens grain supplies' *Reuters* (24, February 2022). <https://www.reuters.com/world/europe/russia-halts-vessel-movement-azov-sea-black-sea-open-2022-02-24/>. [accessed: [27.8.2022].

¹⁰⁹Nhemachena C. et. al., *Ibidem*, pp.2-3.

5. Economic Impacts of the Russia-Ukraine Armed Conflict

The Russia-Ukraine armed conflict has also severely impacted the economy of both nations, especially, that of Ukraine.

Destruction of Socio-Economic Infrastructures with Special Focus on Educational, Healthcare, Housing, Religious (Places of Worship) Facilities

The indiscriminate bombardment of residential areas by the Russian armed forces has led to the destruction of large parts of the socio-economic infrastructures in those regions of Ukraine that have come under attack. According to estimates by the Kyiv School of Economics' (KSE) Institute, at least 411 educational institutions, 36 healthcare facilities, 1,600 residential buildings, 26 factories, 6 thermal power plants/hydroelectric power plants were damaged during the first three weeks of the war. In addition, there was damage to more than 15,000 km of roads, 5,000 km of railways, 15 airports, and 350 bridges and overpasses. The total value of damaged/destroyed objects is estimated to be about USD 62.6bn. However, the cost of repairs is likely to be much higher, as it will be necessary to knock down the destroyed buildings/ structures and rebuild a significant number of them from scratch.¹¹⁰ In Ukraine, a database collecting data on destroyed healthcare facilities counts 52 affected facilities between 24 February 2022 and 22 March 2022. The United Nations Human Rights Monitoring Mission in Ukraine (HRMMU), present in the field, has verified 74 incidents in which medical facilities were affected with various degrees of damage, including 46 hospitals, seven psycho-neurological facilities and 21 other medical facilities. As a result, 54 medical establishments were damaged, 10 destroyed, and two were looted.¹¹¹ According to UN HRMMU, during the reporting period, OHCHR verified damage or destruction to 182 medical facilities in Chernihiv, Donetsk, Kharkiv, Kyiv, Luhansk, Mykolaiv, Sumy, Zaporizhzhia, and Zhytomyr regions, mostly caused by explosive weapons in populated areas, such as heavy artillery, MLRS, missiles and airstrikes: 111 hospitals (including 10 perinatal centres and maternity hospitals, and 17 children's hospitals), 11 psycho-neurological facilities and 60 other medical facilities. Of them, 159 were damaged, 15 were destroyed, 3 were looted and 5 were allegedly used for military purposes. The actual number of affected medical facilities is considerably higher. According to the Minister of Health of Ukraine, between 24 February and 7 May 2022, Russian armed forces destroyed 40 and damaged some 500 medical facilities.¹¹² The OHCHR has verified that hostilities damaged or destroyed 230 educational facilities (155 schools, 38 kindergartens, 20 specialized schools, 16 universities and 1 scientific centre). In total, 32 education facilities were destroyed, 186 were damaged, and 12 allegedly used for military purposes. At least some of the attacks on educational facilities are likely due to the fact that both sides have used schools for military purposes. The actual number of affected education facilities is considerably higher. The Ministry of Education and Science of Ukraine reported 1,837 education facilities damaged or destroyed in the country since 24 February.¹¹³ On 26 March 2022, The Prosecutor general of Ukraine reported that 570 educational institutions and 40 institutions for children have been damaged by attacks. On the same date, the HRMMU had verified attacks on 35 educational facilities, including three universities, eight kindergartens, 23 schools, and one scientific centre. A specialized NGO reported that by 21 March 2022 bombs and intense shelling had damaged more than 460 schools across the country and that over 60 were totally destroyed.¹¹⁴

Further, several housing infrastructures has also been destroyed. In the towns of Bucha, Irpin and Hostomel to the west-north of Kyiv, OHCHR verified that at least 482 residential buildings (multi-storey residential buildings and private houses) were damaged or destroyed between 24 February and 31 March, when Russian armed forces left these towns. In the city of Kharkiv, which was heavily shelled by Russian armed forces until mid-May, OHCHR verified that at least 388 residential buildings were damaged or destroyed. OHCHR notes that local authorities have estimated over 3,000 residential buildings as being damaged or destroyed. According to the Ministry of Territorial Development, in total, 12,300 multi storey residential buildings (12 million square meters) and 104,100 private houses (1.7 million square meters) were damaged or destroyed in Government-controlled territory. In parts of Donetsk region controlled by Russian armed forces and affiliated armed groups, OHCHR documented 806 civilian buildings damaged by hostilities, including 402 residential buildings damaged or destroyed in the city of Donetsk (mostly private houses in suburbs of the city).¹¹⁵ According to media reports, UNESCO confirms the damaging of at least 53 culturally important sites. This includes Christian orthodox churches, a mosque and a Jewish cemetery. The shelling and damaging on 12 March 2022 of Holy Dormition Svyatogirsk Lavra, a major Christian Orthodox monastery near the town of Svyatogorsk in Donetsk, where nearly 1,000 civilians, including 200 children, were

¹¹⁰Vasily Astrov, *Russia's Invasion of Ukraine: Assessment of the Humanitarian, Economic and Financial Impact in the Short and Medium Term* Policy Notes and Reports 59, April 2022, p.18.

¹¹¹Wolfgang Benedek, Veronika Bilkova and Marco Sassoli, *Report on Violations of International Humanitarian and Human Rights Law, War Crimes and Crimes Against Humanity Committed in Ukraine Since 24 February 2022* (Organization for Security and Co-operation in Europe Office for Democratic Institutions and Human Rights, ODIHR.GAL/26/22/Rev.113 April 2022) p.36; Department of Population Health Science and Policy, The Icahn School of Medicine at Mount Sinai, *Timeline of Attacks on Healthcare & Vital Civilian Infrastructure in Ukraine*. <https://cdn.knightlab.com/libs/timeline3/latest/embed/index.html?source=1b83yp199f> FCNYB-__8zsFUa9-zbbDl3Hoj5ZM75rkFo&font=Default&lang=en&initial_zoom=2&height=650. [accessed: 25.9.2022]; Yale School of Public Health, Humanitarian Research Lab, *Evidence of Wide-spread and Systematic Bombardment of Ukrainian Healthcare Facilities* (Yale School of Medicine, 1 April 2022). <https://medicine.yale.edu/lab/khoshnood/projects/conflict-observatory/>. [accessed: [6.10.2022].

¹¹²Situation of human rights in Ukraine in the context of the armed attack by the Russian Federation (note 34) p.19.

¹¹³Ibidem.

¹¹⁴Wolfgang Benedek, Veronika Bilkova and Marco Sassoli (note 111) p.40-41; United Nations, Office of the High Commissioner for Human Rights, 'Update on the Human Rights Situation in Ukraine', Reporting period: 24 February–26 March 2022, para 16 https://www.ohchr.org/sites/default/files/2022-03/HRMMU_Update_2022-03-26_EN.pdf. [accessed: [17.8.2022]; Six Million Children Trapped in Ukraine Face Grave Danger as Attacks on Schools and Hospitals Soar, *Save the Children*, 21 March 2022. <https://www.savethechildren.net/news/six-million-children-trapped-ukraineface-grave-danger-attacks-schools-and-hospitals-soar>. [accessed: 16.8.2022].

¹¹⁵Situation of human rights in Ukraine in the context of the armed attack by the Russian Federation (note 34) p.20.

sheltering deserves a special mention. Allegedly, more than 30 people were injured.¹¹⁶ It is reported that almost all the windows were broken and church buildings were destroyed to varying degrees.¹¹⁷ OHCHR documented that 34 Christian, Jewish and Muslim places of worship were destroyed and 40 damaged due to hostilities.¹¹⁸

Disruption of Economic Activities in Ukraine

Several economic activities have been disrupted in Ukraine as a result of the Russia-Ukraine armed conflict. Maritime, road and rail transit have been severely disrupted, and vital economic and social service infrastructure including power generation, digital infrastructure, bridges, and ports has been destroyed or rendered unusable.¹¹⁹ For instance, the Black Sea ports in the south of the country have been brought to a virtual standstill by the Russian assault; Ukraine has lost the ability to sell more than half of its exports—primarily agricultural commodities and metals. Merchandise exports accounted for more than a third of the country's GDP in 2021.¹²⁰ Economic activity has practically ceased in most regions of Ukraine, apart from the maintenance of public utilities, basic retail trade and medical services, where possible. Finance Minister Serhiy Marchenko estimates that by mid-March 2022, the Russian invasion had forced 30% of the economy to stop working. According to a survey conducted by the European Business Association in Ukraine on 14 March 2022, 42% of small and medium-sized enterprises (SMEs) had completely ceased operations and 31% had suspended their operations, but intended to resume them as soon as possible. Only 14% of those enterprises surveyed had enough financial resources to survive for more than three months; and about half of the SMEs had already applied for monthly state aid of UAH 6,500 (USD 222) per person/SME. According to the Ministry of Economy, the losses from the armed conflict (war) so far could amount to between a third and a half of the country's GDP.¹²¹ For Ukraine, the human and economic costs associated with the war are enormous and growing. According to a report by the United Nations Development Programme (UNDP), the Ukraine Government estimates physical assets worth at least US\$ 100 billion have been destroyed. The UNDP estimates that the war has caused 50 per cent of Ukrainian businesses to shut down completely, while the remaining 50 per cent are forced to operate well below capacity. The UNDP further estimates that should the war deepen and endure, up to 90 per cent of the population of Ukraine could be facing poverty and vulnerability to poverty.¹²²

Long before hostilities broke out, the coal-producing Donbas region was among the heaviest industrialised areas of imperial Russia, the former USSR and later independent Ukraine. By the beginning of the conflict the area was home to thousands of industrial facilities, including 130 heavy ones such as metal smelting or chemical production. Heavy industry in the Donbas region is severely impacted by the armed conflict. Factors including the fighting itself, difficulties with the supply of raw materials, water, and energy, and severe logistical challenges combined to make the working environment utterly unsafe. Enterprises were shelled, and in times of heavy fighting, certain staff had to live on the premises. Production at almost 250 enterprises was compromised in one way or another. Today many Donbas industries no longer work at full capacity or at all.¹²³ Peter Havlik has clearly noted that Ukraine has been the main victim of the conflict. According to him, in Donbas, which used to account for 16% of Ukraine's GDP and a quarter of its exports, the war-related damage is currently estimated at some EUR 6 billion (or 6% of GDP), and industrial production has nearly come to a standstill, largely as a result of power cuts and railway disruptions.¹²⁴

Imposition of Sanctions on the Russian Federation with Potential Negative Impacts on Its Economy

In response to Russia's invasion of Ukraine and subsequent actions, a number of countries including the EU and the US, as well as Australia, Canada, Japan, New Zealand, the Republic of Korea, Singapore, Switzerland, Taipei, China and the United Kingdom (UK) have imposed a wide range of sanctions on Russia. These sanctions fall into three categories: sanctions on financial institutions (financial sanctions), on trade transactions (trade sanctions), and on individuals (other sanctions).¹²⁵ These three categories of sanctions that will definitely affect the Russian economy will be briefly examined.

Financial Sanctions on the Russian Federation

The United States, the European Union (EU), and other countries have imposed blocking sanctions on the Central Bank of the Russian Federation (CBR). These prevent the Russian authorities from accessing foreign exchange reserves in the custody of institutions in sanctioning countries, or the liquidation of which would require access to financial systems in sanctioning countries. In other words, the Central Bank of the Russian Federation is banned from trading assets in euros, US

¹¹⁶Wolfgang Benedek, Veronika Bilkova and Marco Sassoli (note 111) p.40.

¹¹⁷Ibidem; See Andrew E. Kramer, 'Shelling damages a reverted monastery and injures some seeking shelter there' *New York Times* (13 March 2022). <https://www.nytimes.com/2022/03/13/world/europe/monastery-shelling-ukraine.html>. [accessed: [19.19.2022]].

¹¹⁸Situation of human rights in Ukraine in the context of the armed attack by the Russian Federation (note 79) p.20.

¹¹⁹Justin Damien Guénette, Philip Kenworthy and Collette Wheeler (note 68) p.7; Akresh R., G.D. Caruso and H. Thirumurthy (note 72); Acosta P., J.E. Baez, G. Caruso, and C. Carcach (note 72).

¹²⁰Vasily Astrov (note 11).

¹²¹Ibidem.

¹²²The Crisis in Ukraine: Implications of the War for Global Trade and Development (World Trade Organization, 2022) p.3. https://www.wto.org/english/res_e/booksp_e/impactukraine422_e.pdf. [accessed: 29.9.2022]; United Nations Development Programme (UNDP), *The Development Impact of the War in Ukraine: Initial Projections*, (UNDP, 2022).

¹²³Nickolai Denisov, 'Toxic Industries in War-time Donbas' in *Witnessing the environmental impacts of war: Environmental Case studies from conflict zones around the world*. p.19. <https://paxforpeace.nl/media/download/witnessing-the-environmental-impacts-of-war.pdf>. [accessed: [1.10.2022]].

¹²⁴Peter Havlik, *Economic Consequences of the Ukraine Conflict* (Policy Notes and Reports 14, The Vienna Institute for International Economic Studies, 2014) p.12.

¹²⁵See generally, Kristin Archick, *Russia's Invasion of Ukraine: European Union Responses and Implications for U.S.-EU Relations* (Congressional Research Service, July 28, 2022) pp.1-3.

dollars, pound sterling, Swiss francs, and yen, either to prop up the ruble or to settle a bilateral trade deficit. This likely amounted to freezing roughly half of the \$643 billion in international (foreign exchange) reserves that Russia held in mid-February 2022. Transactions with Russia's National Wealth Fund and Ministry of Finance have similarly been blocked. On 24 March 2022 leaders of the G7 also banned gold transactions with the Central Bank of Russia, with gold accounting for another 24% of prewar reserves.¹²⁶ Seven Russian banks-including state-owned VTB Bank, the country's second largest bank-have been cut off from the Society for Worldwide Interbank Financial Telecommunication (SWIFT) financial messaging system. SWIFT provides an international network for financial institutions to communicate about cross-border transactions (i.e., SWIFT enables exchanges of cross-border payment orders), so cut-offs impede international banking business operations. Other prominent banks-including Sberbank, Russia's largest-are subject to direct sanctions ranging from restricted access to correspondent banking networks to outright blocking of all transactions with entities in sanctioning countries. The United States and the United Kingdom have also implemented a ban on new investment in Russia, widening prohibitions on investing in the Russian energy sector and some other entities.¹²⁷

Trade Sanctions on the Russian Federation

The United States, the European Union, and other countries have enacted a growing list of export bans, import restrictions, and other trade sanctions on Russia. Restrictions on exports to Russia have focused on 'dual-use' technologies, including semiconductors, goods and services related to aviation (civilian aircraft and spare aircraft parts), aerospace and oil and gas production (equipment for oil refineries), telecommunications, and luxury goods. Measures to curtail imports from Russia include plans to reduce energy purchases, alongside a wide array of tariffs, import bans and restrictions on other Russian goods and services.¹²⁸ Regarding energy, the United States has ended all imports of Russian fossil fuels and Canada has banned Russian oil imports, the United Kingdom is phasing out Russian coal and oil imports, and Japan and the European Union are phasing out Russian coal imports. The EU is also actively considering sanctions on Russian oil, the European Commission has endorsed an EU-wide reduction to Russian gas imports by two-thirds by the end of 2022, while Lithuania has become the first European country to cease Russian gas purchases. In addition, as of 25 March 2022, 36 countries including EU countries, the US and the UK have closed their airspace to Russian flights. As well as limiting commercial air connections, this will further impede Russia's trade connections by reducing air freight options.¹²⁹

Other Sanctions on the Russian Federation

A large number of asset freezes and travel bans have been introduced targeting the personal wealth and activities of specific Russian officials, politicians, and business people.¹³⁰ Asset freezes can have implications beyond the targeted individuals when they also result in blocking sanctions against companies majority-owned by sanctioned persons and entities. The sanctions placed on Russia has further induce self-sanctioning as many foreign companies are also exiting Russia, including car manufacturers, oil majors, retailers, and service providers.¹³¹ In addition, more than 150 multinational companies have announced complete withdrawals from Russia, while a further 250-plus have suspended operations or new investments.¹³² This will depress foreign investment and may directly cause about a million job losses in the Russian Federation. As well as adding to the reduction of economic activities in the short-term, the almost total cessation of foreign direct investment (FDI) will curtail Russia's longer-term economic prospects. In fact, the sanctions could trigger a financial and economic crisis in Russia.¹³³

6. International Legal Frameworks with Environmental, Humanitarian, and Socio-Economic Infrastructural Protection Mandates During Armed Conflicts

The current situation in Ukraine is characterised as an international armed conflict between the Russian Federation and Ukraine. Both parties are bound by international humanitarian law (IHL) treaties and rules of customary international humanitarian law (IHL) applicable to international armed conflicts. However, for the purpose of this paper, the author's focus is limited primarily to the Fourth Geneva Conventions of 1949, the Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts (Additional Protocol I to the Geneva Convention), 8 June 1977, the 1907 Hague Convention IV with its annexed Regulations concerning the Laws

¹²⁶Jules Hugot, Russia's invasion of Ukraine: Implications for developing Asia-Special Topic of the Asian Development Outlook (Asian Development Bank, 2022) p.39; Jules Hugot (note 129); See Economic repercussions of Russia's war on Ukraine – Weekly Digest (European Union, 18 March 2022) p.3; Justin Damien Guenette, Philip Kenworthy and Collette Wheeler (note 68) p.6.

¹²⁷Justin Damien Guenette, Philip Kenworthy and Collette Wheeler (note 68); Gaurav Ganguly et. al., The Russia-Ukraine Military Conflict: Two Possible Scenarios, Moody's Analytics: Analysis, March 3, 2022, p.3; See Aashish Tank, 'Economic Impact of Russia-Ukraine War' *International Journal of Innovative Research in Science, Engineering and Technology (IJIRSET)*, Vol. 11(4) (2022) p.3346; Iana Liadze, The Economic Costs of the Russia-Ukraine Conflict, (Policy Paper No. 32, National Institute of Economic and Social Research 2022) p.5.

¹²⁸Jules Hugot (note 129) p.38; Justin Damien Guenette, Philip Kenworthy and Collette Wheeler (note 68) pp.6-7,21; IATA Factsheet: The impact of the war in Ukraine on the aviation industry, 25 March 2022.

¹²⁹ Justin Damien Guenette, Philip Kenworthy & Collette Wheeler, pp.6-7,21; World Bank, 'War in the Region.' Europe and Central Asia Economic Update, World Bank, Washington, DC., 2022; IATA Factsheet: The impact of the war in Ukraine on the aviation industry, 25 March 2022;

¹³⁰For example, Canada has imposed diplomatic and economic sanctions against 123 Russian individuals and over 60 Russian organizations in response to the crisis in Ukraine. See Canada's Support to Ukraine in Crisis and Armed Conflict: Report of the Standing Committee on National Defence, December 2017 42nd Parliament, 1st Session, p.1.

¹³¹Jules Hugot (note 129) p.39; Justin Damien Guenette, Philip Kenworthy & Collette Wheeler (note 68) pp.7,21.

¹³²See Robert-Paul Berben et. al., Consequences of the war in Ukraine for the economy of the Netherlands, (De Nederlandsche Bank N.V.: Amsterdam, 2022) p.3; Justin Damien Guenette, Philip Kenworthy & Collette Wheeler (note 68) pp.7,21; See War in Ukraine – New realities, Economics: Focus Germany, (Deutsche Bank AG, 4 March 2022, p.4.

¹³³Jules Hugot (note 129) p.39; Justin Damien Guenette, Philip Kenworthy and Collette Wheeler (note 68) pp.7,21.

and Customs of War on Land (the 1907 Fourth Hague Convention) and the Rome Statute of the International Criminal Court (ICC) 1998.¹³⁴

Geneva Conventions of 1949 and their Additional Protocols of 1977

The Geneva Conventions and their Additional Protocols are international treaties at the core of international humanitarian law, the body of international law that regulates the conduct of armed conflict and seeks to limit its effects. They are designed under humanitarian law for human protection and contain the most important rules limiting the barbarity of war. They specifically protect people who are not taking part in the hostilities (civilians, health workers and aid workers) and those who are no longer participating in the hostilities, such as wounded, sick and shipwrecked soldiers and prisoners of war. The Conventions and their Protocols call for measures to be taken to prevent or put an end to all breaches. They contain stringent rules to deal with what are known as 'grave breaches'. Those responsible for grave breaches must be sought, tried or extradited, whatever nationality they may hold.¹³⁵ The Geneva Conventions includes four distinct Conventions. First, the Convention for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field-this Convention protects wounded and sick soldiers on land during war. Second, the Convention for the Amelioration of the Condition of the Wounded, Sick, and Shipwrecked Members of Armed Forces at Sea-this Convention which replaced Hague Convention of 1907 for the Adaptation to Maritime Warfare of the Principles of the Geneva Convention, protects wounded, sick and shipwrecked military personnel at sea during war. Third, the Convention Relative to the Treatment of Prisoners of War-this Convention which replaced the Prisoners of War Convention of 1929 applies to prisoners of war. Fourth, the Convention Relative to the Protection of Civilian Persons in Time of War-this Convention protects civilians, including those in occupied territory. The two Protocols Additional to the four 1949 Geneva Conventions were adopted in 1977. They strengthen the protection of victims of international (Protocol I) and non-international (Protocol II) armed conflicts and place limits on the way wars are fought.¹³⁶ In 2005, a third Additional Protocol was adopted creating an additional emblem, the Red Crystal, to the list of emblems used to identify neutral humanitarian aid workers¹³⁷ and has the same international status as the Red Cross and Red Crescent emblems.¹³⁸ However, for the purpose of this paper, the author shall focus on the Fourth Geneva Convention Relative to the Protection of Civilian Persons in Time of War 1949 and the Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts (Additional Protocol I to the Geneva Convention), 8 June 1977.

Fourth Geneva Convention Relative to the Protection of Civilian Persons in Time of War 1949 (The Fourth Geneva Convention 1949)

As noted earlier, the Fourth Geneva Convention protects civilians, including those in occupied territory.¹³⁹ The Fourth Geneva Convention does not protect the environment directly, while it indirectly protects the environment by prohibiting the destruction of the occupied property, which may impliedly include the natural environment. Under Article 147 of the Fourth Geneva Convention, destruction of the occupied property is considered as a grave breach of the conventions and might lead to severe consequences and penalties.¹⁴⁰ Article 147 expressly includes the 'extensive destruction and appropriation of property not justified by military necessity and carried out unlawfully and wantonly' among the acts constituting grave breaches of the Fourth Geneva Convention.¹⁴¹ Additionally, in the circumstances of occupation, Article 53 of the Fourth Geneva Convention of 1949 prohibits the destruction of property by the Occupying Power. Article 53 states that 'any destruction by the Occupying Power of real or personal property belonging to the individual or collectively to private persons, or to the State, or to other public authorities, or to social or co-operative organizations, is prohibited, except where such destruction is rendered absolutely necessary by military operations'.¹⁴² Both Article 147 and Article 53 also offers protection to socio-economic infrastructural facilities such as medical, educational, housing, religious, etc infrastructural facilities. In fact, Article 18 of the Fourth Geneva Convention of 1949 specifically provides that Civilian hospitals organized to give care to the wounded and sick, the infirm and maternity cases, may in no circumstances be the object of attack, but shall at all times be respected and protected by the Parties to the conflict. To ensure the protection of civilian hospitals, Article 18 further provides that States which are Parties to a conflict shall provide all civilian hospitals with certificates showing that they are civilian hospitals and that the buildings which they occupy are not used for any purpose which would deprive these hospitals of protection in accordance with Article 19. Article 18 further requires Civilian hospitals to be marked by means of the emblem provided for in Article 38 of the Geneva Convention for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field of August 12, 1949, but only if so authorized by the State. More so, Article 18 requires the Parties to the conflict to, in so far as military considerations permit, take the necessary steps to make the distinctive emblems indicating civilian hospitals clearly visible to the enemy land, air and naval forces in order to

¹³⁴See Situation of human rights in Ukraine in the context of the armed attack by the Russian Federation, 24 February – 15 May 2022, United Nations Human Rights Office of the High Commissioner, 29 June 2022, p.8.

¹³⁵ICRC, The Geneva Conventions of 1949 and their Additional Protocols, (International Committee of the Red Cross, 1 January, 2014). <https://www.icrc.org/en/document/geneva-conventions-1949-additional-protocols>. accessed 24 September 2022.

¹³⁶Ibid.

¹³⁷Geneva Conventions and their additional protocols (Legal Information Institute, Cornell Law School). https://www.law.cornell.edu/wex/geneva_conventions_and_their_additional_protocols. [accessed: 24.9.2022].

¹³⁸ICRC, The Geneva Conventions of 1949 and their Additional Protocols,

¹³⁹ICRC, The Geneva Conventions of 1949 and their Additional Protocols; See Geneva Conventions and their additional protocols (Legal Information Institute, Cornell Law School).

¹⁴⁰Smith Tara, 'Criminal Accountability or Civil Liability: Which Approach Most Effectively Redresses the Negative Environmental Consequences of Armed Conflict?' *International Law and Armed Conflict: Challenges in the 21st Century*, (2009) 95-114.

¹⁴¹Article 147 of the Fourth Geneva Convention 1949.

¹⁴²Article 53 of the Fourth Geneva Convention of 1949; Letetia van der Poll and Ashraf Booley, 'In Our Common Interest: Liability and Redress for Damage Caused to the Natural Environment During Armed Conflict' *Law, Democracy & Development*, Vol. 15 (2011) p.24.

obviate the possibility of any hostile action.¹⁴³ Also, Article 147 of the Fourth Geneva Convention prohibits the reckless killing of civilians by specifically including the wilful killing, torture or inhuman treatment of persons during armed conflicts among the acts constituting grave breaches of the Fourth Geneva Convention.¹⁴⁴

Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts (Additional Protocol I to the Geneva Convention), 8 June 1977

The Additional Protocol I contain provisions that protects the environment, humans (civilian population and civilians), and socio-economic infrastructures (which are part of civilian objects) during international armed conflicts.¹⁴⁵ Under this Protocol the use of explosive weapons which leaves a long term environmental impact are strictly prohibited.¹⁴⁶ The two provisions in the Additional Protocol I that explicitly protects the environment against damage are Article 35(3) and Article 55. Article 35(3) expressly states that: ‘It is prohibited to employ methods or means of warfare which are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment’.¹⁴⁷ While Article 55(1) & (2) provides that: ‘Care shall be taken in warfare to protect the natural environment against widespread, long-term and severe damage. This protection includes a prohibition of the use of methods or means of warfare which are intended or may be expected to cause such damage to the natural environment and thereby to prejudice the health or survival of the population. Attacks against the natural environment by way of reprisals are prohibited’.¹⁴⁸ Article 57 of Additional Protocol I obliges States to be precautionary in their attacks in order to protect the civilian population, civilians and civilian objects-including socio-economic infrastructural objects. Article 57(1) of Additional Protocol I states that ‘in the conduct of military operations, constant care shall be taken to spare the civilian population, civilians and civilian objects.’¹⁴⁹ Article 57(2) of Additional Protocol I further states that in the event of deciding an attacks, all feasible precautions should be taken in the choice of means and methods of attack in order to avoid or minimize incidental damage to civilian objects and no attack should be launched in case it may be expected to cause incidental damage to civilian objects, which would be excessive in relation to the concrete and direct military advantage anticipated.¹⁵⁰ Article 52 of Additional Protocol I gives general protection to civilian objects. Article 52(1) provides that ‘Civilian objects shall not be the object of attack or of reprisals. Civilian objects are all objects which are not military objectives as defined in paragraph 2. Article 52(2) further provides that ‘Attacks shall be limited strictly to military objectives. In so far as objects are concerned, military objectives are limited to those objects which by their nature, location, purpose or use make an effective contribution to military action and whose total or partial destruction, capture or neutralization, in the circumstances ruling at the time, offers a definite military advantage.’¹⁵¹ Article 12 of Additional Protocol I offer protection to medical units by providing that medical units shall be respected and protected at all times and shall not be the object of attack.¹⁵² Sub section 2 of Article 12 further provides that Paragraph 1 shall apply to civilian medical units, provided that they belong to one of the Parties to the conflict and are recognized and authorized by the competent authority of one of the Parties to the conflict.¹⁵³ Article 56 of Additional Protocol I prohibits ‘works or installations containing dangerous forces’ including ‘dams, dykes and nuclear electrical generating stations’ as objects of attack, even where these objects are military objectives, if such attack may cause the release of dangerous forces and consequent severe losses among the civilian population. Other military objectives located at or in the vicinity of these works or installations shall not be made the object of attack if such attack may cause the release of dangerous forces from the works or installations and consequent severe losses among the civilian population.¹⁵⁴ Also, Article 85(3)(b) of Additional Protocol I prohibits the ‘launching of an indiscriminate attack affecting civilian objects in the knowledge that such attack will cause excessive loss of life, injury to civilians or damage to civilian objects’.¹⁵⁵ Article 85(3)(c) of Additional Protocol I also prohibits ‘launching an attack against works or installations containing dangerous forces in the knowledge that such attack will cause excessive loss of life, injury to civilians or damage to civilian objects.’¹⁵⁶ Article 53 of Additional Protocol I gives protection to cultural objects and places of worship in times of armed conflict and provides that without prejudice to the provisions of the Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict of 14 May 1954, and of other relevant international instruments, it is prohibited: to commit any acts of hostility directed against the historic monuments, works of art or places of worship which constitute the cultural or spiritual heritage of peoples; and to make such objects the object of reprisals.¹⁵⁷

¹⁴³Article 18 of the Fourth Geneva Convention of 1949.

¹⁴⁴Article 147 of the Fourth Geneva Convention 1949.

¹⁴⁵See for instance Article 51(2) of the 1977 Additional Protocol I to the Geneva Convention 1977.

¹⁴⁶See for instance, Article 35(3) of the Additional Protocol I to the Geneva Convention 1977.

¹⁴⁷Article 35(3) of the Additional Protocol I to the Geneva Convention 1977.

¹⁴⁸Article 55(1)&(2) of the Additional Protocol I to the Geneva Convention 1977; Desy Churul Aini1 and Desia Rakhma Banjarani, ‘Environmental Protection in Armed Conflict According to International Humanitarian Law’ *Tadulako Law Review*, Vol. 3(1) (2018) p.18.

¹⁴⁹Article 57(1) of Additional Protocol I to the Geneva Convention 1977.

¹⁵⁰Article 57 (2)(a)(i)(ii)(iii)&(b) of the Additional Protocol I to the Geneva Convention 1977.

¹⁵¹Article 52(1)&(2) of the Additional Protocol I to the Geneva Convention 1977.

¹⁵²Article 12(1) of the Additional Protocol I to the Geneva Convention 1977.

¹⁵³Article 12(2)(a)&(b) of the Additional Protocol I to the Geneva Convention 1977.

¹⁵⁴See, in particular, Article 56(1) of the Additional Protocol I to the Geneva Convention 1977; Article 85(3)(c) of the Additional Protocol I to the Geneva Convention 1977; See ICRC, *Treaties, State Parties and Commentaries (International Committee of the Red Cross)*. <https://ihl-databases.icrc.org/ihl/WebART/470-750071>. [accessed: [8.9.2022].

¹⁵⁵Article 85(3)(b) of the Additional Protocol I to the Geneva Convention 1977.

¹⁵⁶Article 85(3)(c) of the Additional Protocol I to the Geneva Convention 1977.

¹⁵⁷Article 53(a)&(c) of the Additional Protocol I to the Geneva Convention 1977.

Hague Convention IV 1907 with Its Annexed Regulations Concerning the Laws and Customs of War on Land (the 1907 Fourth Hague Convention)¹⁵⁸

The 1907 Hague Convention IV and its regulations do not specifically address environmental destruction as such. However, article 22 of the regulations confirms that ‘the right of belligerents to adopt means of injuring the enemy is not unlimited’. Some commentators have interpreted this provision as a basis for restrictions on the destruction of the environment during the conduct of warfare. In addition, article 23(a) relates indirectly to the protection of the environment during the conduct of hostilities by prohibiting the use of ‘poison or poisoned weapons’.¹⁵⁹ Article 23(b) of the Fourth Hague Convention also prohibits the killing or wounding treacherously individuals belonging to the hostile nation or army.¹⁶⁰ This provision implies that the deceitful, unfaithful, dangerous and treacherous killing of civilians during armed conflict is prohibited. Article 23(g) of the Fourth Hague Convention also calls for the protection of the enemy property and stipulates that it is forbidden ‘to destroy or seize the enemy’s property, unless such destruction or seizure be imperatively demanded by necessities of war’. Further, Article 25 of the Fourth Hague Convention provides that the attack or bombardment, by whatever means, of towns, villages, dwellings, or buildings which are undefended is prohibited.¹⁶¹ While Article 27 of the Fourth Hague Convention provides that in sieges and bombardments all necessary steps must be taken to spare, as far as possible, buildings dedicated to religion, art, science, or charitable purposes, historic monuments, hospitals, and places where the sick and wounded are collected, provided they are not being used at the time for military purposes.¹⁶² The provisions of Articles 23(g), 25 and 27 are of particular relevance to the protection of socio-economic infrastructures as ‘enemy property’ also includes medical/healthcare, educational, housing and religious (places of worship) facilities. These facilities could thus be granted *indirect* protection through the provision of Article 23(g), 25 and 27 of the Fourth Hague Convention.¹⁶³ A more general protection is afforded by article 23(e), which proscribes the use of ‘arms, projectiles, or material calculated to cause unnecessary suffering’. This could possibly be applied to actions that damage socio-economic infrastructures.¹⁶⁴

Rome Statute of the International Criminal Court 1998 (Rome Statute of the ICC 1998)

The Rome Statute which was adopted in 1998 established the International Criminal Court (ICC) and gives the court subject matter jurisdiction over four core crimes of genocide, crimes against humanity, war crimes and the crime of aggression.¹⁶⁵ The Rome Statute offers protection to the environment, the lives of civilians and the safety of civilian objects-including socio-economic infrastructures, during armed conflicts by making environmental destruction, killing of civilians and destruction of civilian objects during armed conflict a war crime.¹⁶⁶ Article 8(1) of the Rome Statute of the ICC provides that the Court shall have jurisdiction in respect of war crimes in particular when committed as part of a plan or policy or as part of a large-scale commission of such crimes. Article 8(2)(a)(i)(iii)(iv) of the Rome Statute provides that for the purpose of this Statute, ‘war crimes’ means: (a) Grave breaches of the Geneva Conventions of 12 August 1949, namely, any of the following acts against persons or property protected under the provisions of the relevant Geneva Convention:

(i) Wilful killing;¹⁶⁷

(iii) Wilfully causing great suffering, or serious injury to body or health;¹⁶⁸

(iv) Extensive destruction and appropriation of property not justified by military necessity and carried out unlawfully and wantonly.¹⁶⁹

Article 8(2)(b)(i)(ii)(iv)(v)(ix)(xi)&(xiii) of the Rome Statute provides Other serious violations of the laws and customs applicable in international armed conflict, within the established framework of international law, namely, any of the following acts:

(i) Intentionally directing attacks against the civilian population as such or against individual civilians not taking direct part in hostilities;¹⁷⁰

(ii) Intentionally directing attacks against civilian objects, that is, objects which are not military objectives;¹⁷¹

(iv) Intentionally launching an attack in the knowledge that such attack will cause incidental loss of life or injury to civilians or damage to civilian objects or widespread, long-term and severe damage to the natural environment which would be clearly excessive in relation to the concrete and direct overall military advantage anticipated;¹⁷²

¹⁵⁸Opened for signature 18 October 1907, 3 Martens (3rd) 461 (entered into force 26 January 1910) (1907 Hague Convention IV).

¹⁵⁹Freeland S, Addressing the intentional destruction of the environment during warfare under the Rome statute of the international criminal court (Doctoral Thesis, Maastricht University, 2015) p.62; Michael N. Schmitt, ‘Humanitarian Law and the Environment’ Vol. 28 (2000) *Denver Journal of International Law and Policy*, 265,294; Anthony Leibler, ‘Deliberate Wartime Environmental Damage: New Challenges for International Law’ *California Western International Law Journal*, Vol. 23 (1992) 67, 105-6.

¹⁶⁰Article 23(b) of the 1907 Fourth Hague Convention.

¹⁶¹Article 25 of the 1907 Fourth Hague Convention; Convention (IV) respecting the Laws and Customs of War on Land and its annex: Regulations concerning the Laws and Customs of War on Land. The Hague, 18 October 1907.

¹⁶²Article 27 of the 1907 Fourth Hague Convention.

¹⁶³See Letetia van der Poll and Ashraf Booley (note 144) p.3.

¹⁶⁴Freeland S (note 159) p.64; Marcos A. Orellana, ‘Criminal Punishment for Environmental Damage: Individual and State Responsibility at a Crossroad’ *Georgetown International Environmental Law Review*, Vol. 17 (2005) pp.673,679; Major Walter G. Sharp, Sr., ‘The Effective Deterrence of Environmental Damage During Armed Conflict: A Case Analysis of the Persian Gulf War’ *Military Law Review*, Vol. 137 (1992) pp.1,10.

¹⁶⁵Article 5 of the Rome Statute of the ICC.

¹⁶⁶See for example, International Criminal Court, *Policy Paper on Case Selection and Prioritisation* 14 (15 Sept. 2016). https://www.icc-cpi.int/itemsDocuments/20160915_OTP-Policy_Case-Selection_Eng.pdf. [accessed: 28 September 2022].

¹⁶⁷Article 8(2)(a)(i) of the Rome Statute of the ICC.

¹⁶⁸Article 8(2)(a)(iii) of the Rome Statute of the ICC.

¹⁶⁹Article 8(2)(a)(i)(iii)(iv) of the Rome Statute of the ICC.

¹⁷⁰Article 8(2)(b)(i) of the Rome Statute of the ICC.

¹⁷¹Article 8(2)(b)(ii) of the Rome Statute of the ICC.

- (v) Attacking or bombarding, by whatever means, towns, villages, dwellings or buildings which are undefended and which are not military objectives;¹⁷³
- (ix) Intentionally directing attacks against buildings dedicated to religion, education, art, science or charitable purposes, historic monuments, hospitals and places where the sick and wounded are collected, provided they are not military objectives;¹⁷⁴
- (xi) Killing or wounding treacherously individuals belonging to the hostile nation or army;¹⁷⁵
- (xiii) Destroying or seizing the enemy's property unless such destruction or seizure be imperatively demanded by the necessities of war;¹⁷⁶

From the above provisions, it is obvious that Article 8 of the Rome Statute of the ICC explicitly protects the natural environment, civilian lives and civilian objects-including socio-economic infrastructures during armed conflict by prohibiting armed conflict (war) strategies or operations that will cause destruction of the environment, unjustified killing of civilian and the destruction of civilian objects-including socio-economic infrastructures.

7. Conclusion and Recommendations

It is obvious that the Russia-Ukraine armed conflict has had devastating environmental, humanitarian and economic impacts to the Ukrainian nation. The armed conflict has also impacted the Russian Federation, especially, as it relates to the Russian economy. This paper has made it obviously glaring that the Russia-Ukraine armed conflict has severely degraded the Ukrainian environment through the destruction of the Ukrainian biodiversity. Also, the Ukrainian soil, water and air have been greatly polluted due to the armed conflict. More so, Ukraine is currently experiencing an alarming environmental issue of deforestation through Russia's hostility-induced wild fires. Further, the paper has portrayed the multidimensional humanitarian challenges caused by the Russia-Ukraine armed conflict in Ukraine. The war has caused several humanitarian problems for Ukraine, ranging from refugee crisis (displacement of people) to loss of access to safe drinking water, sanitation and electricity supply to loss of human lives (civilian casualties)-including children, the elderly, the physically challenged etc. Additionally, the Russia-Ukraine armed conflict has placed restrictions on food production and exports which is negatively affecting national food security in Ukraine and global food security. More so, this paper has x-rayed how the Russia-Ukraine armed conflict has impacted the Ukrainian economy, with also, the potential of greatly impacting the Russian economy. The author makes evident that the Russia-Ukraine armed conflict has severely impacted the Ukrainian economy through the destruction socio-economic infrastructures such as education, healthcare (medical), housing, transportation, etc facilities. The paper also shows that the Russia-Ukraine armed conflict has greatly disrupted economic activities in Ukraine. Further, the paper brings to light the potential negative economic impacts the armed conflict is likely to have on the Russian Federation due to the several economic sanctions imposed on Russia-ranging from financial sanctions, trade sanctions, and other sanctions such as asset freezes and travel bans targeting the personal wealth and activities of specific Russian officials, politicians and business people. The paper also brought to light and discussed the international legal frameworks with environmental, humanitarian, and socio-economic infrastructural protection mandates during armed conflicts with special focus on the Fourth Geneva Conventions of 1949, the 1907 Hague Convention IV with its annexed Regulations concerning the Laws and Customs of War on Land (the 1907 Fourth Hague Convention) and the Rome Statute of the International Criminal Court (ICC) 1998. It is however, obvious that the provisions of these international laws which offer protection to the environment, human lives and socio-economic infrastructures during armed conflict have not been fully obeyed in the ongoing Russia-Ukraine armed conflict.

In the light of the above, the paper recommends the following: The Russian Federation should immediately cease the armed attack that commenced on 24 February 2022 in the territory of Ukraine. And, where it fails to do so, the international community should continue demanding an immediate end to the armed conflict launched by Russia against Ukraine. This may also require the support and assistance of the international community, which must impose tougher sanctions on Russia and supply Ukraine with adequate weapons to conquer Putin's invaders on the battleground. Anything below a Ukrainian military victory will result to a compromise peace which would simply set the stage for a fresh war in future. Should the Russia-Ukraine armed conflict come to an end, the international community should be ready to assist Ukraine in the restoration of its environment. For example, the thousands of hectares of Ukrainian forests that have been lost to the armed conflict can be restored through reforestation. More so, the armed conflict induced heavily polluted Ukrainian soils and waters can be and should, with the assistance of the international community, be restored through environmentally-friendly best remediation techniques. The international community should increase and improve the humanitarian assistance given to the Ukrainian nation to help cushion the effects of the humanitarian crisis caused by the armed conflict. It is needful that the humanitarian assistance offered to the people of Ukraine address the needs of women, men, girls and boys in vulnerable conditions and from diverse marginalized groups. Particular consideration should also be given to precise necessities of older persons and persons with disabilities. The international community should be ready to assist Ukraine in the re-building of its socio-economic infrastructures, such as educational, healthcare (medical), industrial, transportation, etc infrastructural facilities, that were destroyed as a result of the armed conflict.

¹⁷²Article 8(2)(b)(iv) of the Rome Statute of the ICC; Christina Voigt, An International Crime Of 'Ecocide' *The Guardian* (30 November 2020).

¹⁷³Article 8(2)(b)(v) of the Rome Statute of the ICC.

¹⁷⁴Article 8(2)(b)(ix) of the Rome Statute of the ICC.

¹⁷⁵Article 8(2)(b)(xi) of the Rome Statute of the ICC.

¹⁷⁶Article 8(2)(b)(xiii) of the Rome Statute of the ICC.