Protection of the Natural Environment in Armed Conflict

By ILPI

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Executive Summary _____4 1 Context and background _____8 Introduction ____ 1.1 1.2 Case selection 11 1.3 Causes and effects 12 2 Iraqi Wars (1991–Present)_____14 2.1 The 1991 Gulf War basic facts ______14 2.2 Environmental impact 16 Draining of the Mesopotamian Marshes basic facts ______21 2.3 Environmental impact 2.4 22 Observations 2.5 26 3 The Russo–Georgian War of 2008 ______28 3.1 Basic facts _____ 28 3.2 Environmental consequences______29 _____33 3.3 Observations Democratic Republic of Congo (1996–) ______34 4 Basic facts_____ 4.1 Environmental consequences 35 4.2 4.3 Observations 39 Colombia (1964-) 41 5 5.1 Basic facts______41 Environmental consequences _____ 43 5.2 _____46 53 Observations Planning and execution of military operations _____48 6 6.1 Iraqi engagement rules and the environment – the 1991 Gulf War _____49 US engagement rules and the environment- the 1991 Gulf War _____50 6.2 Engagement rules and the environment in the Russian – Georgian War_____51 6.3 Engagement rules pertaining to Congo (DRC) 6.4 _____52 Engagement rules for Colombia _____53 6.5 Concluding remarks _____54 7

Executive Summary

This report has been written at the request of the Nordic Ministries for Foreign Affairs as part of their pledge from the 31st ICRC Conference to undertake a study "highlighting the relevance of the existing legal framework for the protection of the natural environment in contemporary armed conflicts". In order to enable a study of the legal aspects of the environment and armed conflict, it is necessary to first examine how armed conflicts of our time affect the natural environment. This is the main focus of this report. It reviews four contemporary armed conflicts and outlines the different environmental consequences resulting from these conflicts. The international legal frameworks relevant to the cases analysed. including international humanitarian law, are not discussed.

In addition to providing an empirical review of the effects of four armed conflicts, the report also examines to what extent specific regulatory frameworks for military operations in these conflicts have taken the natural environment into account. This is addressed at the end of the report. It must be noted, however, that most such regulations (rules of engagement and other military instructions) as well as concrete information on their execution, are normally confidential. The material on which the latter discussion is based is therefore rather limited. This report only discusses operational and policy tools of parties involved in the armed conflicts selected for review.

Case studies

The report offers an empirical analysis of the environmental consequences of contemporary armed conflicts based on four case studies. It aims to present the major environmental consequences of these conflicts and to highlight how they in turn have derived humanitarian impacts. The four cases reviewed have been selected on the background of six criteria: (1) region, (2) intensity, (3) type, (4) date, (5) duration, and (6) availability of data.

The armed conflicts selected are the following:

The Iraq Wars (1990 –)

The case study on Iraq consists of two sub-studies. The first concerns the environmental consequences of the largescale use of oil as a weapon of warfare by the Iraqi military against US-led coalitions in 1991. It also assesses the alleged consequences of the use of depleted uranium during these wars. The second sub-study discusses the ensuing internal uprising in Iraq and the environmental and other humanitarian effects of the intentional large-scale destruction of the habitat of the Ma'dan people (Marsh Arabs) in southern Iraq at the hands of the Iraqi military forces.

The case of Iraq offers insight into how massive regular combat operations between state actors can affect the natural environment, and how illustrates environmental damage and derived humanitarian effects may differ between regular (interstate) and irregular armed conflicts.

The Russo–Georgian War (2008)

The 2008 August War was a brief armed conflict involving primarily Russian and Georgian forces, as well as South Ossetian and Abkhazian armed separatists. Despite its short duration, the conflict saw extensive use of aerial and artillery bombardment, and appears to have resulted in а range of adverse environmental consequences, notably in the form of forest fires, oil spillages and air pollution. Contaminations of cultivated and uncultivated lands by unexploded ordnance were also among the reported effects

Wars in the Democratic Republic of Congo (1996–)

The case study on the DRC reveals how protracted armed conflicts involving both governments and various organized armed groups have severe derived effects on the environment The massive conflictinduced displacement of civilian populations associated with protracted conflict may have even more destructive effects the environment than actual combat operations. The conflict in the DRC is taking place in one of the most fragile and important ecosystems in the world, the Congolese rainforest. It is being increasingly destroyed due to the (continuous influx and) presence of large refugee populations with few alternatives but to use the trees for firewood and hunting endangered species for their own sustenance.

The Colombian Civil War (1964 –)

The Colombian civil war between the Colombian government and the FARC guerrilla demonstrates the prevalent link between the economy of armed conflict and environmental degradation. The financing of the Colombian conflict through illicit international drug trade is dependent on extensive cultivation and production of narcotics. This has led to large-scale appropriation of arable land, most of which is claimed from the fragile Amazonian rainforest. Herein lies a major explanation for the destruction of the rainforest in northwestern South America, a deforestation process with implications far beyond the borders of Colombia. In addition, efforts to prevent such cultivation by the authorities also carry detrimental environmental effects.

Findings

The cases reviewed demonstrate a high degree of variation with respect to the nature and origins of environmental damages arising as a consequence of armed conflict. Each of the four cases highlights different aspects of conflictrelated environmental destruction and derived humanitarian and environmental consequences. While some consequences were directly brought about, others were more indirect, derived effects of the armed conflict. The study also notes that some environmental consequences appear to have been intentional, while others were incidental. It was also possible to distinguish between long- term and shortterm effects of the conflict.

Certain observations about commonalities between the reviewed cases may nevertheless be made.

> The direct damage to the environment as a consequence of hostilities was more extensive in the two interstate conflicts (Iraq and Russia - Georgia). Intense, conventional hostilities took an immediate and substantial toll on the natural environment, either because the natural environment was used directly as shield or a weapon of war, or because of widespread incidental effects of massive hostilities. The damages

in the conflicts between state authorities and non-state actors, or between the latter two seem to have had less immediate environmental effects. However, the effects of the armed conflict on the environment in these conflicts (draining of the Marshes, the War on drugs or the very protracted violence in the Congo) seem to have been severe and long-term, occasionally with irreversible effects. The noninternational armed conflicts also caused the most important derived effects in terms of displacement, where challenges of sustenance seemed to put further strain on the natural environment.

- The longevity of the Congolese and Colombian conflict scenes further provides indications on the devastating effects of armed conflicts protracted over decades.
- environmental effects Many following from the noninternational armed conflicts in Colombia, Congo and Iraq may in part be ascribed to the armed conflicts' detrimental impact on the ability (or willingness) of authorities to protect its natural environment. These conflicts have seriously impaired the capacity of the state of law to protect its natural resources in direct and indirect ways by impeding access or by corrupted practices. In turn this exacerbates environmental pressures linked to illegal mining and drug-production, deforestation and the protection of natural reserves.
- A notable common element in all four case studies is the risks and damages suffered in zones of particular ecological interest or protection. Natural parks and reserves have suffered particular negative strain and effects resulting from hostilities in all the reviewed conflicts. This seems to be a prevalent effect of armed conflict irrespective of nature or longevity. In such zones unique ecosystems and endangered species may be at the risk of extinction, and the environmental damage caused as a direct or derived effect of the armed conflict may be irreversible. The heightened level of risk associated with environmental damage to such fragile zones, combined with the fact that many ecological hotspots in the world are located in areas with recurrent armed conflict, makes this an observation of considerable concern. All four studies corroborate case the suggestion that natural parks and reserves are at a high risk from a variety of direct and derived effects associated with armed conflict.

	DIRECT EFFECTS	DERIVED HUMANITARIAN EFFECTS
Gulf War (1991)	 Aerial contamination Terrestrial contamination Marine contamination Wildlife degradation 	 Deteriorated human health Reduction of livestock Reduced livelihood
Iraqi Insurgency	 Marshland modification Aerial modification Marshland degradation Extinction of species Destruction of an ecologically fragile zone Destruction of designated national park 	 Permanent loss of livelihood Massive internal displacement Destruction of ancient culture
Russo- Georgian War	 Deforestation UXO proliferation Degradation of designated national parks and reserves 	Internal displacementReduced livelihood
Colombian Civil War	 Deforestation Wildlife degradation Terrestrial contamination Degradation of designated national parks 	 Reduced livelihood Significant internal displacement Deteriorated human health Proliferation of organized crime Increased pressure on national parks
Democratic Republic of Congo	 Deforestation Wildlife degradation Severe degradation of designated national parks 	 Massive displacement Deteriorated human health Proliferation of conflict resources Food and water scarcity Increased pressure on national parks

This report has been written by ILPI, and its content, including any implicit views on specific issues are only attributable to us. The same applies to any mistakes or factual imprecisions.

1 Context and background

1.1 Introduction

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 ecosystems. Massive defoliation regional campaigns may be used by belligerents to gain strategic advantages, while serious contamination may incidentally result from attacks on industrial sites, oil wells or other infrastructure Derived effects such as displacement may in turn exacerbate the toll on the natural environment. In some situations, the environmental impacts of the armed conflict extend over large areas and continue for years or even decades after hostilities come to an end. Destruction or degradation of the natural environment during armed conflict may have important humanitarian repercussions. It may threaten the well-being, health and survival of entire populations for extended periods of time.¹

Over the past two decades, attention has increasingly been paid to environmental consequences of human activity. This report investigates the direct and derived environmental consequences resulting from four selected armed conflicts, with a particular emphasis on derived humanitarian effects.

The natural environment and civilians are affected by warfare in various ways.

Environmental damage may be an *intended effect* of warfare. Belligerents may deliberately target the environment as a part of military tactics. Deforestation to improve mobility or ease identification of the enemy is well-known practises. Environmental damage may further be an *incidental effect* of hostilities. Destruction of power stations, chemical plants and other industrial sites, drains and sewers, or even the creation of rubble, may result in the contamination of water sources, arable land and air, in turn affecting the health and survival of entire populations.

Environmental effects therefore often *extend* far beyond the zone of hostilities, both in space and time. In particular chemicals and hazardous substances may affect local ecosystems for years, subjecting the local population to various health effects. Damage to the environment may have dire derived effects for the civilian population, such as scarcity of food, lack of clean water, loss of arable land, loss of income and health problems. It may further impair ecosystems and resources for a substantial period after the armed conflict has ended. Such effects often do not stop at the border of the country involved in armed conflict. Conflictinduced damage to the natural environment may also cause people who are dependent on the environment for their sustenance to flee their homes during or even after the conflict has ended in order to find means of sustenance

Ensuing effects may therefore include conflict induced environmental refugees, in turn leading to increased pressure on other natural resources. For the environment, such dynamics can lead to habitat destruction and the erosion of

¹ ICRC, 31st International Conference of the Red Cross and the

conservation policies, although in certain cases, warfare may paradoxically confer ecological benefits through altered settlement patterns.²

A disturbing global pattern

In 1988, a project on global biodiversity identified so-called environmental 'hotspots' of biodiversity that contained at least half the world's species.³ Today, over 30 hotspots are suggested to fit these criteria, predominantly located in tropical areas and distinguished by their unique vegetation. According to a 2009 study most of the world's biodiversity hotspots have been threatened by armed conflict:⁴

Over 90% of the major armed conflicts between 1950 and 2000 occurred within countries containing biodiversity hotspots, and more than 80% took place directly within hotspot areas. Less than one-third of the 34 recognized hotspots escaped significant conflict during this period, and most suffered repeated episodes of violence. This pattern was remarkably consistent over these 5 decades.⁵

Map illustrating biodiversity 'hotspots' across the world (Conservation International).



Map showing all armed conflicts and trouble zones in 2014^6



This correspondence between prevalence of armed conflict and biodiversity hotspots represents a disturbing pattern. It indicates that the environmental degradation associated with armed conflicts under review in this report on a more general note may have detrimental impact presicely in areas of high ecological value and importance, and where environmental protection is of particular global concern.

² T. Hanson et al., 'Warfare in Biodiversity Hotspots', Conservation Biology 23 (3), 2009, pp. 578–87.

³ Norman Myers, 'Threatened Biotas: "Hot Spots" in Tropical Forests', The Environmentalist 8 (3), pp, 187–208 (2005).

⁴ The term 'hotspot' is controversial, and is used here only to give a visual impression of how regions of high levels of biodiversity overlap with regions haunted by armed conflict.

⁵ T. Hanson et al., 'Warfare in Biodiversity Hotspots', Conservation Biology 23 (3), 2009, pp. 578–87.

ConflictMap.org, Conflict Map 2014, 2014.

Different types of conflicts

Armed conflicts are likely to differ in their environmental impacts and derived humanitarian effects depending on the nature of the armed conflict. Wars involving non-state actors typically entail the employment of guerilla tactics. Such conflicts are often drawnout and fought with different types of means of warfare compared to those used during international armed conflicts between two or more states.⁷ Most state actors continue to rely onon so-called Blitzkrieg tactics - involving mechanized machinery used at high speed in coordination with air support, while guerilla movements most often conduct their hostilities at a slower pace, taking shelter in remote mountainous or forested areas.8 These tactics are likely to expose the environment to different types of damage and degradation.⁹

Direct and derived humanitarian effects

Humans depend on the natural environment for their survival also during armed conflict. The natural environment has a crucial role in providing livelihood and prosperity once the conflict has ended, and it is often a precondition of post-conflict reconstruction. Destruction of the environment is thought to negatively impact the prospects for durable peace.¹⁰ Disturbances to ecosystems - whether caused directly, indirectly, deliberately, or incidentally - has the potential to cause problems far beyond the initial damage inflicted by hostilities.¹¹ This reports maps environmental consequences of four recent armed conflicts. It indicates certain direct and derived enrionmental and effects stemming from humanitarian the environmental degradation caused by these conflicts. The objective is to contribute to providing a clearer picture of the humanitarian effects of environmental damage caused by warfare, including ensuing negative effects for the civilian population.

A legal framework dictating environmental protection – its role and impact

International law has since the adoption of Additional Protocol I in 1977 explicitly obliged belligerent parties to armed conflicts to take due care of the natural environment. Still, armed conflicts invariably lead to environmental General principles of civilian damage. protection extend to the natural environment during armed conflict. In addition, specific rules of humanitarian law provide special protection to the environment. The content and scope and applicability of these rules of international law will not be dealt with in this report. The impact and actual effects of these rules on the planning and execution of miliary operations is discussed in Chapter 6, which looks briefly into available documents that may indicate whether and how international obligations have been taken into account in the planning and execution of the four selected conflicts

⁷ Ref. Van Creveld (Transformation of Warfare), Rupert Smith xx. ⁸T.X. Hammes, The Sling and the Stone, St. Paul, MN, Zenith Press, 2008

⁹ While interstate armed conflicts are becoming increasingly rare since the Second World War, the number of armed conflicts involving non-state actors has been largely stable. This report does not assess how changes in conflict patterns influence the risks and prevalence of environmental effects. See generally H. Buhaug, S. Gates, H. Hegre, and H. Strand (PRIO), 'Global Trends in Armed Conflict', 2007, Report to the Norwegian Ministry of Foreign Affairs.

¹⁰ For an overview over how environmental degradation leads to conflict and undermines the prospects for durable peace, see Raleigh, Clionadh, Urdal, Henrik, Climate Change, Environmental Degradation and Armed Conflict, 2007, Journal of Political Geography 26 Vol. 26. See also Bernauer, Thomas, Bohmelt, Tobias, Koubi, Vally, Environmental Changes and Violent Conflict, 2012, Environmental Research Letters, IOP Publishing, Zurich, Switzerland

¹¹ UNEP, Understanding Environment, Conflict and Cooperation, 2004, Nairobi, Kenya.

1.2 Case selection

This report offers an empirical analysis of the environmental effects and derived humanitarian consequences of four armed conflicts. In order to investigate a broad range of environmental consequences of different types of armed conflicts and derived humanitarian effects, the following armed conflicts were selected:

- The international armed conflict involving Iraq, Kuwait and an international coalition led by the US in 1991, and the ensuing insurgency within Iraq
- The conflict between Russia and Georgia in 2008
- The conflict in the Democratic Republic of Congo (DRC)
- The internal conflict in Colombia

In order to ensure variations at several levels the conflicts were selected on the basis of 6 criteria:

CRITERIA	OBJECTIVE
Region	Broad geographical representation ensures effects in different climates and ecosystems. It also provides a certain variation with regard to factors such as religion, ideology, and political and military culture. ¹
Type of conflict	International, non-international and internationalized armed conflicts were selected to represent various legal conflict classifications. It also to some extent reflects different warfare types, i.e. regular and irregular warfare.
Intensity of conflict	Intensity is presumed to impact environmental effects. Only cases coded as intense on UCDP/PRIO's intensity variable in the Armed Conflict Dataset were selected.
Duration	Short, intense conflicts were assumed to display different types of consequences than protected conflicts.
Recentness	To ensure the study's relevance to current challenges, only relatively recent conflicts were selected.
Availability of data	Consequences of many armed conflicts remain underreported. Availability of reliable quantitative and qualitative data from certain conflicts is scarce. Only cases with a satisfactory level of data were selected. The availability of Rules of Engagement and other instructions for military operations is scarce, and was not made a selection criterion.

1.3 Causes and effects

The causal relationship between armed conflict, environmental damage, and adverse humanitarian consequences is complex and intertwined. Most conflicts result in widespread destruction to human life, infrastructure and objects of the natural environment that are deemed military objectives. Armed conflicts also tend to cause substantial incidental damage (direct environmental effects). This may be in the form of incidental harm to civilians and destruction of civilian property and infrastructure. including incidental environmental damage. Other short- and longterm consequences may also result from the armed conflict, creating further pressures on communities and local ecosystems that aggravate existing environmental problems and create ensuing effects of environmental degradation (derived environmental effects).

These causal links between environmental, humanitarian and other consequences may be illustrated in the following model:



This report is primarily concerned with the ways in which armed conflicts impact on the natural environment (effect A - B in figure 1). It further addresses certain derived effects of armed conflicts via the effects on civilians of destruction of the environment (caused by A- B - C). For example, water pollution is very likely to impact the livelihood of civilian populations. The report also explores how humanitarian and environmental consequences produce further derived negative socio-economic and developmental effects. These features feed back into each other. possibly aggravating environmental degradation even further. For example, environmental damage can lead to

displacement, which again may lead to pressures on other local ecosystems. In turn, such dynamics may have long-term developmental consequences that would feed back into every link in the chain, potentially all the way back to its modelled origin, prolonging or even producing armed conflicts. This report adopts the approach that various effects associated with the variables do not flow in one direction, but are mutually dependent and reinforcing.¹²

¹² This entails that theoretically, all links in the causal chain of Model 1 are recursive, see e.g. S. Gates, H. Hegre, H. M. Nygård,

The report does not purport to identify the *average* effect of armed conflicts on the environment in general, for example whether the average conflict causes widespread, long-term, and severe damage to the environment. The report also does not address the related questions of how environmental degradation leads to renewed conflict or undermines the prospects for a durable peace.¹³

Different types of effects

The effects discussed in this report are divided along two lines: First, an environmental effect can be either *directly* or *indirectly* caused by acts of warfare during a given armed conflict. When the natural environment is damaged by belligerents' operational use of force, the environmental damage is considered direct. 'Weaponization' of the environment, for example by causing droughts or setting fire to forested or agricultural areas, so-called scorched earth tactics, is one example. When the environment is damaged resulting from activities related to the use of armed force, but beyond the direct effects of the hostilities, however, the effect is considered indirect. When people loose their housing or livelihoods and displacement thus causes over-exploitation of resources, the environmental effect of armed conflict is indirect.

Effects can be either *intentional* or *incidental*. Weaponizing the environment is an *intentional* and direct attack on the environment, and indirect environmental consequences resulting from displacement of civilian populations could presumably often be *incidental* from the viewpoint of the belligerents. However, there are variations to the two distinctions. The use of scorched earth tactics will usually cause damage to wildlife and the ecological chain beyond the intentions of the party employing the tactic whose aim will usually be to hamper its enemy's chance of advancing on or using the land, but not necessarily to wipe out endangered species. Incidental damage to flora and fauna resulting from aerial or artillery bombardment targeting enemy positions also fall in this category. Such effects are incidental, but still direct. On the other hand, effects could also be intentional and indirect: Displacement of civilian populations and ensuing indirect environmental damage could be intentional on behalf of one or more of the belligerent parties, without the environment having been directly attacked.

The following report is written with all these distinctions in mind. Its classification of direct effects versus derived humanitarian effects is rough, and made primarily enable a distinction between immediate effects and more derived effects.

and H. Strand, 'Development Consequences of Armed Conflict', World Development 40 (9), 2012, pp. 1713–22; O. Das, 'Environmental Protection in Armed Conflicts: Filling the Gaps With Sustainable Development', Nordic Journal of International Law 82 (1), 2013, pp. 103–28; Q. Li and M. Wen, 'The Immediate and Lingering Effects of Armed Conflict on Adult Mortality: A Time-Series Cross-National Analysis', Journal of Peace Research 42 (4), 2005, pp. 471–92; A. Mossalanejad, 'International Security Through Environmental Challenges', International Journal of Environmental Research 3 (3), 2009, pp. 429–34.

¹³ See footnote 10.

2 Iraqi Wars (1991–Present)



Quick Facts		
Region	Asia / Middle East	
Location	Iraq, Kuwait, Persian Gulf Region	
Туре	Mix of interstate, internal, and	
	internationalized armed conflicts	
Parties	Iraq, United States and	
	Coalition, Kuwait,	
	Ma'dan People, Sunni and	
	Shia insurgents.	
Year(s) of conflict	1990-1991, 1993-1999, 2003-	
	2008	
Intensity	Varying, but high intensity in	
	general	
Duration	18 years	
Deaths (soldiers and	210,000-500,000 ¹⁴	
civilians)		
Internally displaced	4,000,000-5,000,000 ¹⁵	
Availability of data	Good	
Main environmental	Air, soil, and maritime pollution	
consequences	from oil spillages and fires.	
	Destruction of fragile wetland	
	ecosystems due to draining.	
	Drought with implications for	
	wildlife and the natural	
	environment	
Main developmental	Loss of livelihoods, loss of habitat	
consequences		
Controversies	Gulf War Syndrome, Depleted	
	Uranium	

Iraq has been almost constantly embroiled in war since 1980.¹⁶ Vast human suffering has been caused by these wars. A less known casualty of Iraq's wars is its fragile natural environment. Warfare has had severe and longterm effects on Iraq's ecosystems, with repercussions far beyond Iraq's borders. The case of Iraq offers insight into how regular combat operations between two state actors can affect the natural environment, and gives an illustration on whether and how environmental damage and derived humanitarian effects may differ between regular (interstate) and irregular armed conflicts. The longevity of the Iraqi conflicts further provides data on the effects of armed conflicts protracted over decades.

Particular emphasis is placed on the Iraqi military's draining of the Mesopotamian marshes during their counterinsurgency campaign against the Ma'dan people (Marsh Arabs), oil spillages and ensuing destruction of the maritime and costal environment in the Persian Gulf region, and cases of deliberate ignition of oil wells from the 1991- Gulf War.

2.1 The 1991 Gulf War basic facts

Comprised mostly of desert and arid savannahs, life in Mesopotamia has always been dependent on the rivers Euphrates and Tigris for water and sustenance. Iraq also has enormous reserves of hydrocarbon resources. The country currently

¹⁴ This report does not discuss the Iran-Iraq war from 1980-1988, although many serious environmental effects were the result also of these war.

¹⁴British Petroleum, Annual Report, 2013, BP Press, London, UK. ¹⁴See The Utility of Force (2006) by British General Sir Rupert Smith for an in depth analysis of the strategic and military implications of the Gulf War of 1990-91.

¹⁶ This report does not discuss the Iran-Iraq wars from 1980-1988, although many serious environmental effects were the result also of these wars.

has over 120 billion barrels of proven oil reserves, making it the world's fifth largest.¹⁷ Although these natural resources have spurred development in Iraq, they are partially at the root of several of Iraq's recent conflicts. The immediate trigger of the Iran–Iraq war (1980– 1988) was a dispute over one of the Tigris canals, the Shatt-al-Arab. Similarly, Kuwaiti slant drilling of Iraqi oil was a major justification for Saddam Hussein's invasion of the sheikhdom in 1990. The invasion was condemned in multiple UN Security Council resolutions, and a US-led coalition was organized to oust the Iraqi troops from Kuwait.

When the allied ground forces overwhelmed the Iraqi troops through a 40-day air campaign, Saddam Hussein ordered the use of scorched earth tactics.¹⁸ Fire was hence set to Kuwaiti oil wells, releasing millions of barrels of oil into the Persian Gulf.¹⁹ This move denied the use of these resources by the coalition forces and the Kuwaiti government, but it also offered operational advantages: The smoke produced by the destroyed wells hampered allied aerial operations, and the deliberate oil spillage would prevent amphibious operations in the vicinity of the coast and rivers.²⁰

Although fire-fighting teams were deployed immediately after the liberation of Kuwait, some of the fires took over 8 months to extinguish. Combat operations ended after 43 days, with Iraq's surrender in accordance with UNSC Resolutions 686 and 687. Recognizing the unprecedented damage to the environment, paragraph 16 of UNSC Res 687 affirmed Iraq was liable under international law "for any direct loss, damage, including environmental damage and the depletion of natural resources, or injury to foreign Governments, nationals and corporations, as a result of Iraq's unlawful invasion and occupation of Kuwait."21 It stipulated the establishment of the UN Claims Commission (UNCC), which over the next decade awarded US\$4.3 billion to the Governments of the Islamic Republic of Iran, the Hashemite Kingdom of Jordan, the State of Kuwait and the Kingdom of Saudi Arabia in relation to environmental remediation and restoration claims.²²

The environmental impact of the destruction of Kuwaiti oil wells during the 1991 Gulf War has been especially severe. Yet, burning of oil wells is a persistent pattern of combat in Iraq. Confronted with the invading *Coalition of the Willing* in 2003, the Iraqi military repeated their tactics from the 1991 Gulf War, albeit on a smaller scale. 40 Iraqi oil wells were lit on fire after the US invasion began, but due to the smaller scale and fire-fighting experiences from the 1991 Gulf War, these were brought under control much more quickly than the 1991 fires.²³ In August 2014, the Islamic State in Iraq and as-Sham (ISIL) rebels set three oil wells ablaze in Northern Iraq.²⁴

 ¹⁷British Petroleum, Annual Report, 2013, BP Press, London, UK.
 ¹⁸ See The Utility of Force (2006) supra note 18.

¹⁹It should also be noted that an unknown number, probably around 20, of wells were also accidentally destroyed by coalition bombing. See Seacor, Jesica E., Environmental Terrorism: Lessons from the Oil Fires of Kuwait, (1996), American University International Law Review, Vol.10, Issue 1.

²⁰A Saudi C-130 transport aircraft crashed-landed due to the smoke-induced bad visibility on March 21, 1991, two weeks after the end of hostilities. 92 Senegalese soldiers and 6 Saudi aircrew died in the crash. Schmitt, Eric, After the War: 92 Senegalese Soldiers die in Saudi Air Crash, Mar. 22nd, 1991, New York Times.

²¹UNSC Resolution 687, April 3rd, 1991, "Reaffirms that Iraq, without prejudice to the debts and obligations of Iraq arising prior to 2 August 1990, which will be addressed through the normal mechanisms, is liable under international law for any direct loss, damage, including environmental damage and the depletion of natural resources, or injury to foreign Governments, nationals and corporations, as a result of Iraq's unlawful invasion and occupation of Kuwait".

²² See Follow Up Programme for Envrionmental Awards, United Nations Compensation Commission.

²³ UNEP, UNEP in Iraq, Post-Conflict Assessment, Clean-up and Reconstruction, 2007, Nairobi, Kenya

²⁴Mezzofiore, Gianluca "Isis Sets Fire to Oil Wells in Northern Iraq", International Business Times, 28 August 2014.

2.2 Environmental impact

The 1991 Gulf War was the first conflict after the 1970s that really brought international attention to the topic of environmental effects of armed conflict.

2.2.1 Kuwaiti oil fires

During the 1991 Gulf War, 732 Kuwaiti oil wells (85%) were sabotaged by the retreating Iraqi forces.²⁵ Of these, 613 of the wells were ignited, spewing out five million barrels of oil effuse every day. It is estimated that a total of one billion barrels of oil were burned by November 1991 when the last fires were brought under control.²⁶ Plumes of smoke and soot generally rose to about 3 kilometres, although serious pollution was registered at altitudes as high as 6 kilometres.²⁷ During the worst fires (February-April), a continuous blanket of smoke the size of Florida covered Kuwait, Bahrain and parts of Saudi Arabia, Iran and Iraq. This had an adverse short-term effect on local and regional air quality. Oil smoke, particularly the sweet Middle Eastern crude, is full of sulphur dioxide, carbon monoxide and ozone, which are great contributors to global warming. According to a Greenpeace report from 2005, the Kuwaiti oil fires were responsible for 2% of global carbon emissions in 1991.²⁸ Due to its thickness and consistency, the fumes from the oil fires acted as a solar "blanket", preventing sufficient sunlight from reaching the ground and lowering the temperature in affected areas.²⁹ Furthermore, the oil smoke contributed to an increase in acid rain throughout the region.³⁰

Despite the damaging effects of the Kuwaiti oil fires, it should be noted that most of the worstcase scenarios predicted by scientists did not come to pass. A 1993 post-conflict report by the United Nations Environment Programme (UNEP), found little evidence that the Kuwaiti oil fires would seriously affect global air quality, and that the damage to the Persian Gulf region's air quality would be primary short-term.³¹

2.2.2 Oil spillage

43 wells did not ignite, instead gushing out millions of barrels of raw crude, creating "oil lakes" up to 10 kilometres long and several meters deep in the vulnerable desert.³² 5% of Kuwait's territory became covered in oil-induced "tarcrete", killing all local flora and in many places permanently damaging the soil sediments.

The dumping of between 4 and 6 million barrels of oil into the Persian Gulf represents among the largest oil-spill in history.³³ It constitutes ca. 30–40% of all maritime oil spillage to date, being approximately 20–30 times larger than the 1989 Exxon Valdez spill.³⁴ However, due to the high water and air temperatures in the Persian Gulf, approximately 50% of all spilt oil quickly evaporated or dissipated on its own accord. About a million barrels sunk to the bottom of

²⁵Sadiq, Mohammed, McCain, John, The Gulf War aftermath: An environmental tragedy, 1993, Pulwer Academic Press, Norfolk, VA.

²⁶Hirchmann, Kristine, The Kuwaiti Oil Fires, 2005, Greenpeace Publication, Fact-on-File Press, NY, & Sadiq, Mohammed, McCain, John, The Gulf War aftermath: An environmental tragedy, 1993, Pulwer Academic Press, Norfolk, VA.

²⁷ UNEP, Updated Scientific Report on the Environmental Effects of the Conflict Between Iraq and Kuwait, 1993, UNEP/GC.17/Inf.9.

²⁸Hirchmann, Kristine, The Kuwaiti Oil Fires, 2005, Greenpeace Publication, Fact-on-File Press, NY,

²⁹Hirchmann, Kristine, The Kuwaiti Oil Fires, 2005, Greenpeace Publication, Fact-on-File Press, NY,

³⁰Khordagui, Hosny, Al-Ajmi, Dhari, Environmental Impact of the Gulf War: an Integrated Preliminary Analysis, 1993, Environmental Management, Vol.17, Issue 4.

³¹ UNEP, Updated Scientific Report on the Environmental Effects of the Conflict Between Iraq and Kuwait, 1993, UNEP/GC.17/Inf.9.

³²Mannion, A.M., Environmental Impact of War and Terrorism, 2003, Geographical Paper no.169, University of Reading Press, UK.

³³There is some disagreement to the extent of the spill. Some sources claim that over 11,000,000 barrels of oil were released by the Iraqi military from tankers and refineries. The numbers quoted here, 4,000,000 -6,000,000, are quoted in a majority of the literature.

³⁴Baumann, Paul R., Environmental Warfare: 1991 Gulf War, 2001, University of Georgia Press, GA.

the seabed, where it became a kind of tarcrete, or asphalt. Due to the prevalent northern winds in the region, the remaining oil spillage mainly affected the southern rim of the Persian Gulf. According to the "*Oil Spill Intelligence Report*", the oil slick eventually reached 10,880 km², and was at certain points over 13 cm thick.³⁵ At its peak ca. 800 km of Saudi and Kuwaiti coastline was fouled by oil slicks, with the most contaminated area being located along ca. 400 km of coastline, stretching from Kuwait City to the Saudi peninsula of Abu Ali.³⁶

2.2.3 Direct effects

The acid rain throughout the region had a detrimental effect on the local ecosystem, especially by raising PH-values in freshwater lakes and reservoirs, affecting birds, mammals and freshwater fish.³⁷

The smoke caused by the oil wells killed, maimed and confused an unknown number (at least 25,000) of birds, either by asphyxiation, starvation or drowning in the oil and tarcrete.³⁸ Depending on the species of bird, it is assumed that local and overwintering birds suffered mortality rates between 22% and 50% as a result of the oil fires and spills.³⁹ However, by 2003 most avian populations seems to have recovered their pre-war levels.

Perhaps the most environmentally damaging impact of the sabotage of the Kuwaiti oil wells was the destruction of the natural habitats and flight patterns of migrating birds. The Persian Gulf has long been a destination for many species of migrating birds escaping the cold winters of the Northern Hemisphere.

The oil spillages and oil fires are believed to have impacted on the local wildlife in at least four ways:⁴⁰

1. Direct mortality resulting from the toxicity of the oil spill or Kuwaiti oil fires;

2. Detrimental changes in the physical environmental conditions, in this case, decrease in seawater temperature and in sunlight resulting from the smoke plumes from the burning oil wells;

3. Destruction or changes of the habitats used by the species through their life cycle;

4. Limitation of the amount of food available for carnivorous species.

A group of maritime animals that are particularly vulnerable to changes in the ecosystem of the Gulf is marine mammals and turtles. In 1991, there were around 3,000 sea turtles present in the Gulf, all of them belonging to the two endangered species of Loggerhead and Hawksbill.⁴¹ An unknown number of these animals died as a direct result of oil and tar ingestion as well as liver and stomach poisoning, and a large part of the population was reported to have developed lesions.⁴² Two of the sea turtles' most important nesting grounds, Jana and Keren beach, were heavily polluted by the oil spill, affecting hatch rates and the survival rates of juvenile turtles.

Furthermore, temperature reductions due to oil clouds may have affected the gender ratios of turtle hatchlings, which can have repercussions in the future. Marine mammals, notably dolphins and the endangered dugong, have also suffered from the oil slick. Dolphins are usually

 ³⁵Etkin, Dagmar S., Welch, Jeff, Trends in Oil Spill Volumes and Frequency, 1996, Annual Oil Spill Intelligence Report
 ³⁶UNEP, World Conservation Monitoring Centre, Gulf War

³⁰UNEP, World Conservation Monitoring Centre, Gulf War Impact on Marine Environment and Species, 1991,

³⁷Sadiq, Mohammed, McCain, John, The Gulf War aftermath: An environmental tragedy, 1993, Pulwer Academic Press, Norfolk, VA..

³⁸Loretz, John, The Animal Victims of the Gulf War, 1991, Physicians for Social Responsibility Quarterly, Autum Edition.

³⁹Evans, M.I., Symens, P., Pilcher, C.W.T., Short-term damage to coastal bird populations in Saudi Arabia and Kuwait following the 1991 Gulf War, 1993, Marine Pollution Bulletin 27

⁴⁰Ody, Denis, Naud, Matthew, Vine, Mark, Kaiser, Richard, An Environmental Assessment of Kuwait, seven years after the Gulf War, 1999, Green Cross International Report, The Hague, Netherlands.

⁴¹Sadiq, Mohammed, McCain, John, The Gulf War aftermath: An environmental tragedy, 1993, Pulwer Academic Press, Norfolk, VA.

⁴²Sadiq, Mohammed, McCain, John, The Gulf War aftermath: An environmental tragedy, 1993, Pulwer Academic Press, Norfolk, VA.

able to avoid oil slicks, but were indirectly affected through loss of habitat and food.

According to the available data, the local shrimp population appears to have been the most affected by the spill of all maritime species in the Gulf. In a post-war study, the 1991-92 Saudi shrimp stocks showed a decline of spawning biomass of 10%, and a 25% decrease in total shrimp population compared to pre-war levels.43 Furthermore, a comparison between pre- and post-war levels of the density of Penaid shrimp larvae in Saudi Arabian waters, demonstrated that this has fallen from 6,77 individuals/m3 in 1976 to 0,275 individuals/m3 in 1992.⁴⁴As shrimping is the most important maritime industry in Kuwait and Saudi Arabia, it is within this field that most research has been done⁴⁵

Kuwaiti livestock and livestock production also suffered as a result of the environmental destruction caused by the Iraqi invasion and Gulf War. More than 80% of all livestock animals in Kuwait (primarily cattle, sheep, goats and camels) died between the Iraqi occupation in August 1990 and the ceasefire in March 1991.⁴⁶ Although most of these deaths can be attributed to combat and war-related actions such as accidental shooting and bombing, the slaughter of animals for food by soldiers, starvation and dehydration, a number is also believed to have died through ingesting oilinfested vegetation.⁴⁷

2.2.4 Derived humanitarian effects

The best-documented derived health hazard resulting from the Kuwaiti oil fires is reduced air quality in the affected areas. Fumes from the burning oil wells created a metrological effect known as "thermal inversion" over southern Kuwait and northern Saudi Arabia. Thermal inversion entails that thick smog traps cold air close to the ground, preventing it from dispersing naturally.⁴⁸ The trapped air contains the oil fires' noxious fumes, holding them close to the ground where the polluted air can be inhaled by humans and animals.49 Outbreaks of respiratory and skin disorders reinforced the concern about polluted air hovering too close to the ground. The WHO and US health officials issued warnings to residents in at-risk groups, such as the elderly, young children and persons suffering from asthmatic conditions, to stay indoors when large oil clouds were overhead.⁵⁰ Some of these include increased outbreaks of respiratory diseases and syndromes, such as asthma, as well as irritation of the eyes and throat. Another side effect of thermal inversion is general lowering of the ground-level temperature, sometimes as much as 5 degrees Celsius. There is relatively scarce data regarding the consequences of the oil fires on the Kuwaiti and Saudi civilian population, but there exists a large body of literature on the health hazards associated with thermal inversion.⁵¹ Combined with the polluted air,

⁴³Price, A.R.G., Impact of the 1991 Gulf War on the coastal environment and ecosystems: Current status and Future Prospects, 1998, Environment International, Vol.23.

⁴⁴Mathews, C.P., Kedidi, S., Al-Yahya, A., Fita, N.I., Al-Rasheed, K., Preliminary assessment of the effects of the 1991 Gulf War on Saudi Arabian prawn stocks, 1993, Marine Pollution Bulletin, Vol.27.

⁴⁵ Mohammed, Hussain M. A.; Bishop, James M.; Ye, Yimin, Kuwait's Post Gulf-War Shrimp Fishery and Stock Status from 1991/92 Through 1995/96, 1998, Review of Fishery Science, Vol.6 No.3

⁴⁶ Loretz, John, The Animal Victims of the Gulf War, 1991, Physicians for Social Responsibility Quarterly, Autum Edition.

⁴⁷ Loretz, John, The Animal Victims of the Gulf War, 1991, Physicians for Social Responsibility Quarterly, Autum Edition.

⁴⁸Scott, D., Evans, M., Wildlife of the Mesopotamian Marshes, Unpublished report, Wetlands Ecosystem Research Group, University of Exeter, UK.

⁴⁹ A thermal inversion, which is very common in industrial areas situated in mountain valleys, such as Denver, Colorado and Mexico City, is "an atmospheric condition in which a layer of warm air traps cooler air near the surface of the earth, preventing the normal rising of surface air." Seacor, Jesica E. "Environmental Terrorism: Lessons from the Oil Fires of Kuwait." American University International Law Review 10, no. 1 (1996): 481-523

⁵⁰Seacor, Jesica E. "Environmental Terrorism: Lessons from the Oil Fires of Kuwait." American University International Law Review 10, no. 1 (1996): 481-523

⁵¹See i.e. Ostro, Bart D., Eskeland, Gunnar, Sanchez, Jose, Feyzioglu, Tarhan, Air Pollution and Health Effects: A Study of Medical Visits among Children in Santiago, Chile, 1999, Environmental Health Perspectives, Vol. 107, No. 1. See also: Horgan, John, The Danger from Kuwait's Air Pollution: Smoke from Oil Fires Threatens Health 1991, The Scientific American, Oct. issue, 1991.

thermal inversion reportedly led to a sharp, albeit short-term increase in common lung diseases such as pneumonia in the affected area in Kuwait and Saudi Arabia.⁵²

Scientists at the Harvard School of Public Health, in collaboration with an international team of investigators, initiated a project in 2002 to assess the health effects of environmental exposures on the local Kuwaiti population during and after the 1991 oil fires. This project, "Monitoring and Assessment Program of Environmental Consequences of the Iraqi Aggression in Kuwait," was commissioned by the government of Kuwait. The project is on going, but investigators have reported that postwar mortality rates were 20% higher among Kuwaiti adults who remained in Kuwait during the conflict, compared to those who fled the region. Explanations for this mortality excess are unclear, but it has been suggested that noxious oil fumes could be a contributing factor 53

The full extent of the human health hazards attributed to the Kuwaiti oil fires are still subject to debate. Two groups have been particularly exposed to the fires, namely coalition military personnel involved in the liberation of Kuwait, and the firemen involved in the post-war extinguishing efforts of the burning oil wells. Military and fire fighting personnel spent significant amounts of time in the direct vicinity of burning oil wells.

Gulf Syndrome

A controversial and as of yet undetermined aspect of the health implications of the Kuwaiti oil fires is the collection of symptoms suffered by US military personnel after the end of the war. These include fatigue, skin rashes, muscle and joint pain, headaches, memory loss and gastrointestinal problems, which are commonly known as "Gulf War syndrome".⁵⁴ It is estimated that 250,000 of the 700,000 troops who served in the Gulf War are suffering from symptoms associated with the Gulf War syndrome.⁵⁵ There has not yet been identified a definitive cause of the Gulf War syndrome, but one theory is that the ingestion of toxic oil fumes could be a contributing factor. Several official investigations, including two done by the United States Army Centre for Health Promotion and Preventive Medicine, concluded that the oil fires did not in any way affect the physical health of soldiers.⁵⁶ Other studies have reached different conclusions.57 Another suggested reason has been the existence of Depleted Uranium.

Depleted Uranium

The effects of the widespread use of Depleted Uranium (DU) by coalition forces remains a subject of dispute. While both the UK and US governments deny any serious health effects resulting from exposure to DU, several NGOs and international organisations argue the opposite.⁵⁸Depleted uranium is a by-product of

⁵²Horgan, John, The Danger from Kuwait's Air Pollution: Smoke from Oil Fires Threatens Health 1991, The Scientific American, Oct. issue, 1991.

⁵³ Harvard School of Public Health. Report Summary: Public Health Impacts of Iraq's 1990 Invasion and Occupation of Kuwait. Jun 29, 2005.

⁵⁴Stead, Craig F., Oil Fires, Petroleum and Gulf War Illness, 1999, Presentation at the CDC Conference on the health impact of chemical exposures during the Gulf War, 28/2-2/3-1999.

⁵⁵Research Advisory Committee on Gulf War Veteran's Illnesses, Gulf War Illness and Health of Gulf War Veterans, 2008, US Government Printing Office, Washington DC.

⁵⁶See US DoD, US Army Environmental Hygiene Agency, Final Report: Kuwait Oil Fire Health Risk Assessment 5 May-3 December, 1991, 1994, Report No. 39-26-L192., US DoD, Environmental Surveillance Health Risk Assessment, No. 47-EM7121-98 Kuwait Oil Fires, 1 October 1997-15 April 1998, 1998, US Army Centre for Health Promotion and Preventive Medicine, Aberdeen Proving Ground, MD., Presidential Advisory Council Committee, Gulf War Veterans' Illness Final Report, 1996, US Government Printing Office, Washington DC.

⁵⁷Stead, Craig F., Oil Fires, Petroleum and Gulf War Illness, 1999, Presentation at the CDC Conference on the health impact of chemical exposures during the Gulf War, 28/2-2/3-1999.

⁵⁸ For the UK position on DU, see UK MOD, UK Depleted Uranium Munitions Policy and Development, 2012, For the US position, see US DoD, Depleted Uranium for Clinicians, 2006, For two NGO reports on the dangers of DU, see Kellay, Aneaka, Pollution Politics: Power, Accountability and Toxic Remnants of War, 2014, Toxic Remnants of War, Manchester, UK. See also International Coalition to Ban Uranium Weapons, Malignant Effects: Depleted Uranium as a Genotoxin and Carcinogen, 2014, Manchester, UK.

the uranium enrichment process. It is used by a number of states in armour and armour-piercing ammunition. The British Royal Society estimates that around 340 tones of DU were used during Desert Storm, mostly by US forces. Considering that each tank shell consists of only a small fragment of DU, ca. (nine centimetres for each 30 mm round), it can be inferred that a large number of DU shells were used during the relatively short conflict.⁵⁹

DU is a radioactive compound, although it only contains around 60% of the radioactivity found in natural uranium. Radioactive compounds can be dangerous to human through ionizing radiation, which can damage DNA strands and cause cancer. According to the WHO, "depleted uranium has both chemical and radiological toxicity with the two important target organs being the kidneys and the lungs. Health consequences are determined by the physical and chemical nature of the depleted uranium to which an individual is exposed, and to the level and duration of exposure."60 According to the Royal Society, direct ingestion, for example through the swallowing of contaminated water and food, or through the inhaling of DU-laced dust, is the most dangerous method of contact with DU (and other heavy metals).⁶¹

There is still a lack of research determining the short-and long-term health effects stemming from depleted uranium. However, recent surveys of the cancer rates in the areas in Iraq that were most heavily affected by fighting may give an indication. A 2012 survey conducted by several Iraqi and Iranian scientists found that the rates of cancer and congenital birth defects among the newborn infants at several Iraqi hospitals had increased dramatically, (and in once case, in Basra, 17-fold) in the decade since the Coalition invasion in 1991.⁶² Furthermore, many of these maladies are connected to the presence of abnormally high levels of heavy metals and radioactivity, indicating that DU could be the source. However, since the US DoD has refused to release the coordinates of where DU has been used, it is not possible to conduct large-scale surveys of the population potentially affected by DU.

The civilian population were exposed to the burning oil primarily in an indirect way. By and large, it can be claimed that in the 1991 Gulf War it was primarily the Kuwaiti oil fires that had a serious, direct impact on human health. Although the Gulf War oil spill was serious in terms of both the ecological and socio-economic damages it caused, it did not directly endanger human lives, in that nobody is reported to have died from drowning or poisoning by the oil spillage.

One economic sector that has been especially affected by the destruction of the regions environment is Saudi Arabia and Kuwait's fishing industries. Fishing and shrimping combined are Kuwait's second largest industry (after hydrocarbons), and make up an important part of the sheikhdom's indigenous food production.⁶³ Industrial shrimping and fishing in Saudi Arabia was, and remains, less important to its economy, but still employed over 3,500 people in 1991, and shrimp is an important part of the diet of the coastal population on the kingdom's Gulf Rim.⁶⁴ While Kuwait was more dependent on fishing than its Saudi neighbour,

⁵⁹Royal Society, The Health Effects of Depleted Uranium Munitions, 2002, Document 6/02, Royal Society Press, London, UK.

⁶⁰Repacholi, Michael (ed.), Depleted Uranium: Sources Exposure and Health Effects, 2001,World Health Organization, United Nations Press, Geneva, Switzerland.

⁶¹Royal Society, The Health Effects of Depleted Uranium Munitions, 2002, Document 6/02, Royal Society Press, London, UK.

⁶²Al-Sabbak, M., et al., Metal Contamination and the Epidemic of Congenital Birth Defects in Iraqi Cities, 2012, Bulletin of Environmental Contamination and Toxicology, Vo. 89 No.5,

⁶³ Ody, Denis, Naud, Matthew, Vine, Mark, Kaiser, Richard, An Environmental Assessment of Kuwait, seven years after the Gulf War, 1999, Green Cross International Report, The Hague, Netherlands.

⁶⁴Morgan, Gary, United Nations Food and Agricultural Organization, Country Review: Saudi Arabia, 2004.

accentuated by its post-war reconstruction efforts, the shrimp and fish stocks in Kuwaiti waters were less affected than those in Saudi waters. ⁶⁵

The Iraqis destroyed most of Kuwait's fisheries infrastructure during the 1991 invasion. The industrial and artisanal fleet was destroyed or stolen, the Kuwait City harbour was destroyed and mines remained a long-term hazard. The management and control institutions of the fisheries also suffered from the war: buildings, equipment and vessels were destroyed or absconded during the war, and many qualified officials left the country, never to return. Total landings for shrimp immediately following liberation in 1991-92 was 582 tons, compared to 4057 tons in 1989–90.66 While this can partially be explained by the loss of fishing vessels and infrastructure following the invasion, the average catch per unit effort (CPUT) was only 7,5 kg per fishing hour, compared to 17,4 kg/h during the 1989-90 season and 13,2 kg/h during the 1992-93 season. It strongly indicates a depletion of shrimp stocks due to the environmental damages of the Gulf War.

Furthermore, Kuwaiti fishermen and fisheries had to purchase new boats and equipment to replace their losses during the war. To repay their loans and compensate their losses, they were driven to increase their pressure on the already damaged shrimp and fish population, leading to overfishing. Poaching, due to the collapse of official management and enforcement agencies, became a serious issue in the year following liberation. As an example, 28 dhows were granted licenses for shrimping in the immediate aftermath of the war (compared to 25 in 1990), but as many as 80 dhows trawled for shrimp during seasons 1992–96.⁶⁷ During the 1992–93 season, official landings had increased to 2530 tones, about half of the prewar levels. However, the number is almost certainly underreported due to poaching and unreported fishing by indigenous and foreign fleets, and can probably be doubled.⁶⁸ It indicates that shrimp stocks had recovered considerably, and coincided with the removal of the oil clouds.⁶⁹

2.3 Draining of the Mesopotamian Marshes basic facts

To the great disappointment of many Iraqis, Saddam Hussein's regime remained in power. Encouraged by the Iraqi defeat in the Gulf War, several groups revolted against the Baathist party. One of these groups were the predominantly Shia Ma'dan people (also known as the Marsh Arabs). Living in the wetlands and swamplands at the intersection of the Tigris and Euphrates rivers, the Ma'dan claim to be descended from the ancient Sumerians. They have a rich culture heavily associated with the Mesopotamian Marshes.

Due to its many inaccessible canals and islands, the marches have long been a largely isolated part of Iraqi society. As a result of this, the marches have often been used as a safe haven

⁶⁵ Price, A.R.G., Impact of the 1991 Gulf War on the Coastal Environment and Ecosystems: Current Status and Future Prospects, 1998, Environment International, Vol.24, Issue 1-2. See also IUCN, The 1991 Gulf War:Environmental Assessments of IUCN and Collaborators, 1994, SADAC Press, Bellegarde-Valserine, France.

⁶⁶Kuwaiti Public Authority for Assessment of Compensation for Damages Resulting from Iraqi Aggression (*PAAC*) Annual report 1997, in Ody, Denis, Naud, Matthew, Vine, Mark, Kaiser, Richard, An Environmental Assessment of Kuwait, seven years after the Gulf War, 1999, Green Cross International Report, The Hague, Netherlands.

⁶⁷ Ody, Denis, Naud, Matthew, Vine, Mark, Kaiser, Richard, An Environmental Assessment of Kuwait, seven years after the Gulf War, 1999, Green Cross International Report, The Hague, Netherlands.

⁶⁸ Mohammed, Hussain M. A.; Bishop, James M.; Ye, Yimin, Kuwait's Post Gulf-War Shrimp Fishery and Stock Status from 1991/92 Through 1995/96, 1998, Review of Fishery Science, Vol.6 No.3.

⁶⁹ Mohammed, Hussain M. A.; Bishop, James M.; Ye, Yimin, Kuwait's Post Gulf-War Shrimp Fishery and Stock Status from 1991/92 Through 1995/96, 1998, Review of Fishery Science, Vol.6 No.3.

for groups opposed to the central government, ranging from escaped slaves, deserters and rebels fighting the Ottoman, British or Iraqi authorities.⁷⁰ The Ma'dan's main grievances were the discrimination against Shias on the part of the Baathist regime, plans to drain part of the marshes for irrigation purposes and the Iran-Iraq war, when some of the most vicious fighting took place in the marshes, displacing a large number of Ma'dan.⁷¹ As a part of the Iraqi army's counterinsurgency campaign against the Ma'dan, the Euphrates and Tigris were diverted away from the marshes, removing the rebels' ability to operate in the area.⁷² Although this was successful from a military perspective, it had a devastating effect on the local environment.

2.4 Environmental impact

The counterinsurgency continued almost until the second US invasion of 2003. From 1991 to 1993, the Iraqi government built an elaborate network of canals, dikes and dams designed to dry out the Mesopotamian Marshes, depriving the Ma'dan of shelter and sustenance. The swamplands, located where the Euphrates and Tigris' Rivers meet the saltwater current of the Persian Gulf, were host to a diverse and in many ways unique ecosystem. Its' almost complete disappearance has been classified by the UNEP as an 'ecological catastrophe, comparable only to the rapid disappearance of the Amazon rainforest and the draining of the Aral Sea'.⁷³

The Mesopotamian Marshlands are three separate but overlapping swamps, named the

Central, Al-Hammar and Hawr al-Hawizeh/al-Azim. All three were roughly the same size and share basically the same flora and fauna. The Euphrates was diverted through a large canal, while the Tigris was diverted through a series of canals and artificial embankments. Furthermore, the Shatt al-Arab canal was dammed, blocking off the flow of water between the marshlands and the Persian Gulf. This was done extremely rapidly, with the Saddam River being inaugurated in December 1992, just nine months after construction began.⁷⁴ Further construction continued almost until the Second Gulf War in 2003. As a consequence, very little water reached the swamplands, resulting in a massive drying out of the marshes.⁷⁵

⁷⁰Patrow, Hassan, The Mesopotamian Marshlands: Demise of an Ecosystem, 2001, United Nations Environment Programme, Nairobi, Kenya.

⁷¹ Cole, Juan, Marsh Arab Rebellion: Grievance, Mafias and Militias in Iraq, 2008, Fourth Wadie Jwaideh Lecture, University of Indiana, Bloomington, IN.

⁷² UNEP, UNEP in Iraq, 2007, Nairobi, Kenya,

⁷³ Patrow, Hassan, The Mesopotamian Marshlands: Demise of an Ecosystem, 2001, United Nations Environment Programme, Nairobi, Kenya, p.19

⁷⁴Patrow, Hassan, The Mesopotamian Marshlands: Demise of an Ecosystem, 2001, United Nations Environment Programme, Nairobi, Kenya

⁷⁵However, it should be noted that the hydrological levels of the Euphrates and Tigris were already under pressure due to large scale upstream damming projects in Turkey, Iran and Syria. Although the change in the river flow resulting from these projects would not have been sufficient in desiccating the marshes by themselves, it certainly added to the speed in which it occurred, see Adriansen, Hanne Kristine, What happened to the Marsh Arabs and their land?, 2004, Danish Institute for International Studies, Working paper 2004/26.

By comparing satellite photos taken of the marshes in 1973, 1990/1991 and 2001 (see figures 1.1., 1.2. & 1.3), the scale of damage becomes clear.⁷⁶ In 1973, the marshes covered around 20,000km2, creating a continuous stretch of swampland roughly from Basra in the

south to Nasariyya in the west and al-Amara in the north. By 1990, some parts of the swamp had been dried out due to the construction of military causeways during the Iran-Iraq war.



Fig. 1.2. 1973

Fig.1.3 1991

Fig.1.4 2001

However, from 1991, when the Iraqi military's counterinsurgency and draining project began, the marshlands began to diminish at an extremely rapid rate. By 2001, only around 1000km² of scattered marshland remained.⁷⁷ The 2000/2001 images provided by Landsat are unequivocal as to the extent of the disappearance of wetlands. Two of the swamps, Central and al-Hammar, are all but gone, reduced to 3% and 6% of their 1973 sizes respectively.⁷⁸ The third, al-Hawizeh/al-Azim, is down to 33% of its original 1973 size. The al-Hammar Lake, formerly the largest in the area, has completely disappeared, leaving vast plains of salt crusts.

This has had an extremely detrimental impact on local flora and fauna due to the loss of habitat.

2.4.1 Direct effects

Due to the proximity of the Persian Gulf, the water content in the marshes has a high level of salination, giving rise to a unique hybrid wildlife.⁷⁹ In terms of flora, they consist of the large common reed, reed mace and the salt-tolerant vegetation of low sedges and bulrush.⁸⁰ A major haven of regional and global biodiversity, the marshlands support significant populations and species of wildlife. Located on the inter-continental flyway of migratory birds, they are particularly important for migrating avians. The marshlands constitute a key wintering and staging area for waterfowl.

⁷⁶ Patrow, Hassan, The Mesopotamian Marshlands: Demise of an Ecosystem, 2001, United Nations Environment Programme, Nairobi, Kenya

⁷⁷Adriansen, Hanne Kristine, What happened to the Marsh Arabs and their land?, 2004, Danish Institute for International Studies, Working paper 2004/26.

⁷⁸Patrow, Hassan, The Mesopotamian Marshlands: Demise of an Ecosystem, 2001, United Nations Environment Programme, Nairobi, Kenya

⁷⁹Maltby, E., (ed.), An Environmental and Ecological Study of the Marshlands of Mesopotamia, 1994, Wetlands Ecosystems Research Group, University of Exeter, London, UK.

⁸⁰ Maltby, E., (ed.), An Environmental and Ecological Study of the Marshlands of Mesopotamia, 1994, Wetlands Ecosystems Research Group, University of Exeter, London, UK.

Travelling between breeding grounds in the Ob and Irtysh river basins in western Siberia to wintering quarters in the Caspian region, Middle East and northeast Africa. Known as the west Siberian-Caspian-Nile flyway, it represents one of the three major waterfowl migratory routes in the Western Palaearctic Region. Twothirds of West Asia's wintering wildfowl, estimated at several million, were believed to reside in the marshes. Ornithological surveys show that significant numbers of 134 bird species inhabited the area, of which at least 11 are globally endangered. Furthermore, the marshes have been singled out as one of the eleven non-marine wetland areas in the world with Endemic Bird Area status. Further, it was home to several mammals, such as the smothcoat otter, the bandicoot rat and wild boar, as well as to several species of fresh-and saltwater fish.

Numerous species and sub-species of mammals and fish found only in the marshes, such as the endemic sub-species of the smooth-coated otter, bandicoot rat and the endemic babel fish are now believed to be extinct. Several species of bird were disproportionally hard hit by the destruction of the marches. The African Darter and Sacred Ibis are believed to be extinct in the Middle East as a consequence of the draining of the marshes and Pygmy Comorant and Goliath Heron have probably been removed from Iraq.⁸¹ Furthermore, in light of its importance as an important flyway for migrating birds, the effects of marshland desiccation is being felt across thousands of miles from the Arctic to the Southern Africa. Combined with the 1990-91 Kuwaiti Oil Fires and Oil Spill, the consequences on migrating avians have been particularly severe. It is estimated that the global population of Harrison's Gerbil (a subspecies of the little Grebe) and the Marbled

⁸¹Scott, D., Evans, M., Wildlife of the Mesopotamian Marshes, Unpublished report, Wetlands Ecosystem Research Group, University of Exeter, UK. Teal decreased by 50% as a cumulative result of the Gulf War oil fires and spillage, and the draining of the Mesopotamian Marshes. The regional population of several other avian species, such as the Eastern White Pelican and Purple Heron, are believed to have suffered 25– 50% mortality.⁸² The sudden disappearance of such a large and important wetlands area has also had a significant impact on the local and regional climate.

This kind of environmental modification has caused rainfall patterns to change. and evapotranspiration and humidity has rapidly increased. The infamous desert winds, which were previously mitigated by the presences of large-scale wetlands, now blow unhindered, reaching temperatures of over 40 degrees Celsius. This wind carries salt and other damaging and irritating minerals from the salt crusts left by the dried out lakes for thousands of kilometres. Furthermore, the fragile arable land bordering the former marshland suffer from degradation due to wind erosion and sand encroachment from the dried marsh bed and surrounding desert.⁸³

Since the US-led invasion in 2003, there has been a concentrated, international effort to rejuvenate the marshland. Much of the hydrological infrastructure aimed at drying the marshes was destroyed through combat operations and neglect in 2003, leading to a massive, unintentional flooding of much of the marshlands. Due to the high levels of salinity and other toxic elements in the dried-out marshes, this has not yet led to a natural rejuvenation of the flora and fauna.⁸⁴ It has led

⁸² Scott, D., Evans, M., Wildlife of the Mesopotamian Marshes, Unpublished report, Wetlands Ecosystem Research Group, University of Exeter, UK.

⁸³Patrow, Hassan, The Mesopotamian Marshlands: Demise of an Ecosystem, 2001, United Nations Environment Programme, Nairobi, Kenya.

⁸⁴ Richardson, Curtis J., Hussain, Najah A., Restoring the Garden of Eden: An Ecological Assessment of the Marshes of Iraq, 2006, Journal of Environment: Science and Policy for Sustainable Development, Vol.56, No.6.

to a limited expansion in the sections of the marshlands which were the least affected by the draining, namely the al-Hawirzeh/al-Azim marshes. A USAID-led project, along with several Iraqi NGOs, is attempting to rejuvenate the marshes through desalination and the careful reintroduction of natural species into the ecosystem.⁸⁵ According to a recent publication, it is believed that 70-75% of the original marshlands can be restored, but this will require sustained support from the international community, and the future prospects for the marshlands are uncertain.⁸⁶

2.4.2 Derived humanitarian effects

The draining of the Marshes in Southern Iraq have had devastating ramifications for the civilian population, particularly by forcing a large number of people to flee their homes and by destroying their livelihoods.⁸⁷

In 1991, just prior to the draining of the marshes, they covered approximately 20,000m² of wetlands and swamps at the confluence of the Euphrates and Tigris rivers. By 2000, this had been reduced to 1,000km². The area hosted between 250,000 Ma'dan as recently as January 1991. By 2003, it had been reduced to between 20,000-40,000, with tens of thousands killed, detained or "disappeared", and well over 100,000 displaced.⁸⁸ This represents both humanitarian as well as an ecological disaster, as the Ma'dan's economy, culture and way of

life has traditionally been almost completely oriented around their marshland home.

The Mesopotamian Marshes have long been an important agricultural and fishery area. Prior to 1991, fish caught in the marshland area constituted over 60% of Iraq's total seafood production. Its destruction has led to a reduction in the production of especially fish, rice and, as in Kuwait, shrimp.⁸⁹ Not only have livelihoods and jobs been destroyed, but Iraq's dependency on food imports has also increased. The elevated level of dry, hot and mildly noxious desert winds resulting from the removal of the coolant effect of the marshes has further damaged agriculture in the rest of Iraq, as well as in neighbouring states, especially Iran and Kuwait.⁹⁰

The direct and intentional destruction of their homeland forced a large number of Ma'dan to flee, either to other areas of Iraq, becoming Internally Displaced Persons (IDPs), or to Iran and other states in the Middle East. An estimated 100,000-200,000 Ma'dan are still counted as IDPs, while 80 to 100 thousand fled to Iran.⁹¹ It is difficult to determine the exact reason behind each case of displacement. Many Ma'dan were directly evicted and resettled by the Iraqi military during the main part of the 1991-2002 counterinsurgency. Other fled due to attacks by the military, guerrillas and bandits. However, what is certain is that the Iraqi draining of the Mesopotamian Marshes completely destroyed the economic and cultural basis for the Ma'dan people's way of life,

⁸⁵ USAID, Iraq Marshlands Restoration Project, See also Alwash, Suzanne, Eden Again: Hope in the Marshes of Iraq, 2013, Tablat House Publishing, NY.

⁸⁶ Al-Ansari, Nadhir Knutsson, Sven, Ali, Ammar, Restoring the Garden of Eden, 2012, Journal of Earth Sciences and Geotechnical Engineering, University of Luleå, Sweden.

 ⁸⁷ For a relatively recent and thorough investigation of the environmental and humanitarian effects of the draining of the Mesopotamian Marshes, see Waleij, Annica et al., Miljøkonsekvenser av krig och konflikter, 2006, Totalforsvarets Forskningsinstiutt, Umeå, Sweden.
 ⁸⁸ Patrow, Hassan, The Mesopotamian Marshlands: Demise of an

⁸⁸ Patrow, Hassan, The Mesopotamian Marshlands: Demise of an Ecosystem, 2001, United Nations Environment Programme, Nairobi, Kenya p.19, see also: Human Rights Watch, The Iraqi Government's Assault on the Marsh Arabs, 2003, Washington DC.

⁸⁹ Patrow, Hassan, The Mesopotamian Marshlands: Demise of an Ecosystem, 2001, United Nations Environment Programme, Nairobi, Kenya.

⁹⁰ Patrow, Hassan, The Mesopotamian Marshlands: Demise of an Ecosystem, 2001, United Nations Environment Programme, Nairobi, Kenya

⁹¹ However, due to the lack of any thorough and effective census, it is all but impossible to determine the exact number and location of Ma'dan. The numbers offered here are a combination of the most reliable sources, see Coast, E., Marsh Arab Demography, in Nicholson, E., Clark, P., (eds.) The Iraqi Marshlands: A Human and Environmental Study, Politico Press, London, UK. See also Human Rights Watch, Supra note 24.

making it all but impossible to return to their homeland.⁹² Many Ma'dan IDPs resettled in large Iraqi cities, such as Basra, Nasariyya and Baghdad where many, lacking jobs or any kind of welfare arrangements, turned to organized crime.⁹³ Others, particularly younger males, have been recruited by militias and sectarian Shia movements and are participating in the current political instability.⁹⁴

2.5 Observations

The Iraqi conflicts in the early 1990s illustrate how intentional use of the environment as a means of warfare in both interstate and insurgency warfare may cause severe environmental damage in the form of aerial, terrestrial and marine contamination. Combatinduced environmental degradation often exacerbates civilian suffering in wartime and frequently has serious long-term effects on socio-economic recovery efforts. The Iraq Wars represent an illustrative case in this regard.

There have been several documented, adverse humanitarian effects stemming from the Gulf War oil fires and spills. These can be divided into direct and indirect consequences. Direct consequences consisted of aerial, terrestrial and marine contamination. Hazardous side effects have directly damaged human health, such as reduced quality or air and drinking water, while other indirect consequences include the loss of livelihoods and welfare opportunities.

The use of the natural environment in hostilities in the interstate armed conflict in Iraq has had multiple incidental effects. In addition to immediate damage to the civilian population and livestock, the oil-fires and spills have had an adverse short-term effect on local and regional environmental conditions. Certain effects have also extended beyond the zone of hostilities. There are indications of long-term health consequences for those directly affected by hostilities (Gulf-syndrome and depleted uranium, increased mortality of Kuwaiti population). Local ecosystems and livelihoods have been severely affected, both in Iraq and beyond its borders.

The blocking of water entry into an ecosystem as a way to combat an insurgency in the Ma'dan has had devastating direct and derived environmental effects. It destroyed an ecological fragile zone and ecosystem, with devastating and partly irreversible environmental effects. Further, the degradation and destruction of the Marshes completely undermined the economic and cultural basis for the Ma'dan people's way of life, causing widespread displacement, degradation of Iraq's food self-sufficiency, and with adverse effects to the local climate, causing multiple ensuing environmental effects. The Marshlands importance in supporting significant populations and species of wildlife has caused derived environmental impacts of local, regional and even global repercussions.

⁹² Waleij, Annica et al., Miljøkonsekvenser av krig och konflikter, 2006, Totalforsvarets Forskningsinstiutt, Umeå, Sweden.

⁹³ Cole, Juan, Marsh Arab Rebellion: Grievance, Mafias and Militias in Iraq, 2008, Fourth Wadie Jwaideh Lecture, University of Indiana, Bloomington, IN..

⁹⁴ Cole, Juan, Marsh Arab Rebellion: Grievance, Mafias and Militias in Iraq, 2008, Fourth Wadie Jwaideh Lecture, University of Indiana, Bloomington, IN.

	DIRECT EFFECTS	DERIVED HUMANITARIAN EFFECTS
Gulf War (1991)	 Aerial contamination Terrestrial contamination Marine contamination Wildlife degradation 	 Deteriorated human health Reduction of livestock Reduced livelihood
Iraqi Insurgency	 Marshland modification Aerial modification Marshland degradation Extinction of species Destruction of an ecologically fragile zone Destruction of designated national park 	 Permanent loss of livelihood Massive internal displacement Destruction of ancient culture

3 The Russo–Georgian War of 2008



Quick Facts	
Region	Europe
Location	South Ossetia and undisputed
	Georgian territory
Туре	Internationalized internal conflict ⁹⁵
Parties	Russia, Georgia, South
	Ossetian and Abkhazian
	Separatists
Intensity	High
Year(s) of conflict	2008
Duration	5 days ⁹⁶
Deaths (soldiers and civilians)	500–900
Internally displaced	134 000
Availability of data	Average
Main environmental	Forest fires, contamination by
consequences	unexploded ordnance, oil
	spillages
Main developmental	Loss of agricultural
consequences	production, loss of timber,
	socioeconomic retardation
	resulting from displacement
Controversies	Forest fires and use of cluster
	munitions

The Russo–Georgian War of 2008 (also known as the Five Day War or the August War) was a brief armed conflict involving primarily Russian and Georgian forces, as well as South Ossetian and Abkhazian armed separatists. Around 45.000 troops were involved in the conflict, and, depending on the source, between about 500 and 900 people, of which the majority were civilians, lost their lives as a result of the hostilities.⁹⁷

Despite its short duration, the conflict saw extensive use of aerial and artillerv bombardment, and appears to have resulted in a range of adverse environmental consequences. Forest fires, oil spillages, air pollution, and both contamination of cultivated and uncultivated lands by unexploded ordnance were among the reported effects.

3.1 Basic facts

Since the 1991–92 South Ossetia War between ethnic Georgian and Ossetians, South Ossetia had effectively been governed by a largely Russian-backed Ossetian unrecognized government. Violence between Ossetians and Georgians flared up following two bomb attacks on 3 July 2008, and continued over the next few weeks, as hostilities between separatist and government forces commenced. On the night of August 7, Georgian forces launched a ground offensive into South Ossetia, to which the Russian government, historically and ethnically close to the Ossetians, responded by 'large-scale air attacks' against Georgian targets and a

⁹⁵ The conflict is coded as an 'internationalized internal conflict' because it originated in the conflict between the Georgian government and South Ossetian separatists. The hostilities between Georgia and Russia should undoubtedly be considered an international armed conflict (IAC).

⁹⁶ Russia commenced hostilities on 8 August 2008, and agreed terms brokered by the EU on 12 August. According to the Georgian government, however, hostile acts were carried out for a week after the official end of the war. See Caucasus Institute for Peace, Democracy and Development (CIPDD), 'After August 2008: Consequences of the Russian–Georgian War', Tbilisi, September 2008, p. 33.

⁹⁷ See Nichol, J., 'Russia–Georgia Conflict in August 2008: Context and Implications for US Interests', Congressional Research Service, 3 March 2009, p. 19; Lacina, B. and N.P. Gleditsch, 'Monitoring Trends in Global Combat: A New Dataset of Battle Deaths', European Journal of Population 21 (2–3), 2005 (dataset updated October 2009), pp. 145–166.

ground invasion of South Ossetia.⁹⁸Then Russian president Medvedev vowed to 'punish' Georgia.⁹⁹

The fighting between Georgian forces and Russian and Ossetian forces was hardest in and near the South Ossetian capital, Tskhinvali, which was severely damaged by the artillery barrage. The Russian 58th Army and airborne troops quickly gained the upper hand in South Ossetia. While Russian naval forces blocked the Georgian coast, the Russian forces bombarded areas in Georgian territory and temporarily occupied the Georgian cities of Gori, Poti, Senaki, and Zugudi.¹⁰⁰ The War ended on August 12, when the Russian President Dmitry Medvedev ordered his troop to end the hostilities. A peace plan brokered by the French president Nicolas Sarkozy was reached the same day, and the Georgian president Mikheil Saakashvili signed a ceasefire. The Russian troops withdrew from Georgian territory during the first half of September 2008, but maintains a military presence in South Ossetia and Abkhazia.¹⁰¹

Despite its short duration, the conflict saw extensive use of aerial and artillery bombardment. On August 12, president Medvedev exclaimed that '[t]he aggressor has been punished and suffered very heavy losses.'¹⁰² Thousands of soldiers had been assembled in short time, and both sides had drawn heavily on their armoured units and artilleries.¹⁰³

3.2 Environmental consequences

The Caucasus Region, in which Georgia and South Ossetia are located, lies on the border between moderate and subtropical climate belts.¹⁰⁴ Among the affected areas were the protected 5300 square kilometers Borjomi-Kharagauli National Park, known for its mountainous geography and distinctive flora. The Park, which was the first to be established in the Caucasus Region, is also the location of about 250 cultural and historical monuments.¹⁰⁵ environmental This section maps the consequences of the Russo-Georgian War and humanitarian and other derived consequences attributable to the environmental damage.

3.2.1 Forest fires

According to the Georgian Government and the Georgian think-tank Caucasus Institute for Peace, Democracy and Development (CIPDD), 'hundreds of hectares of unique forests in various regions of Georgia have been purposefully destroyed by the Russian military forces'.¹⁰⁶ Eyewitnesses stated that Russian helicopters dropped incendiary bombs on the Borjomi-Tsemi forest on August 15, three days after the hostilities officially ended. Further forest fires, lasting for a few weeks, were supposedly ignited in the following days, and the total destruction of forest allegedly amounted to close to 10 km² (areas where 70 per cent or more of the trees were destroyed).¹⁰⁷

⁹⁸ Nichol, J., 'Russia–Georgia Conflict in August 2008: Context and Implications for US Interests', Congressional Research Service, 3 March 2009, p. 5.

⁹⁹Nichol, J. 'Russia–Georgia Conflict in August 2008: Context and Implications for US Interests', Congressional Research Service, 3 March 2009, p. 12.

¹⁰⁰ M. Barabanov, 'The August War Between Russia and Georgia', Moscow Defense Brief, 4 April 2009.

¹⁰¹ David Klion, 'Moldova's EU Association Agreement Is No Panacea', World Politics Review, 3 July 2014.

¹⁰² Nichol, J., 'Russia–Georgia Conflict in August 2008: Context and Implications for US Interests', Congressional Research Service, 3 March 2009, p. 7.

¹⁰³ Tuathail, G., 'Russia's Kosovo: Critical Geopolitics of the August 2008 War over South Ossetia', Eurasian Geography and Economics 49 (6), 2008, pp. 670–705.

¹⁰⁴ Georigan Geographic Bureau, 'Climate in the Caucasus, 2008.

 ¹⁰⁵ Wildlife Extra, Borjomi Kharagauli National Park (Georgia),
 ¹⁰⁶ Caucasus Institute for Peace, Democracy and Development (CIPDD), 'After August 2008: Consequences of the Russian–Georgian War', Tbilisi, September 2008, p. 33.

¹⁰⁷ Caucasus Institute for Peace, Democracy and Development (CIPDD), 'After August 2008: Consequences of the Russian– Georgian War', Tbilisi, September 2008, pp. 33–4; BBC News, Russia Blamed for Forest Fires, 18 August 2008,

Other accounts corroborate this estimate.¹⁰⁸ According to UN and World Bank, the forest fires broke out 'almost simultaneously at several sites in Georgia around August 14. While some have called the allegations 'bizarre'¹⁰⁹ others have drawn conclusions similar to that of the Georgian government.¹¹⁰ International Forest Fire News content themselves to reporting the fires as 'a consequence of military activities'.¹¹¹ They stipulate that wildfires in areas that have previously experienced conflict - as Georgia and South Ossetia have - result in 'secondary damage damages, such as [...] air pollution and explosion of unexploded ordnance'.¹¹²

3.2.2 **Oil spillages**

According to the joint UN and World Bank reports, multiple oil spillages resulted from the fighting. The spillages were both marine and terrestrial.¹¹³ In one case reported by the Georgian authorities, the Russian forces occupied the Georgian naval base in the costal city of Poti on 12 August 2008. The following days, the Russian armed forces allegedly blew up and sank 12 Georgian vessels, resulting in the release of about 50 tons of fuel oil into the sea and an 'unknown mix of chemicals into the air.'114 While the environmental damage was both direct and intentional, it was not a result of 'weaponizing' the environment or as part of a hostile act either against soldiers or civilians.

3.2.3 Air and soil pollution

Release of hazardous materials into the earth and atmosphere resulting from the destruction of infrastructure also occurred.¹¹⁵On 24 August, a train was hit by a missile fragment between Gori and Khashuri as a result of the Russian forces' demolition of the Georgian Skra military base. The train, which was stood 300 metres away from the Skra base, was loaded with unrefined oil, and according to CIPDD, its partial destruction lead to about 650 tons of oil being burned, and some of the oil being spilled into the soil. Supposedly, large amounts of carbons were released into the atmosphere.¹¹⁶ The incident appears to have been an accident.

3.2.4 **Unexploded ordnances**

Cluster munitions were to some extent used in the conflict, and unexploded ordnance spread out over large areas.¹¹⁷ While the use was considerable, it was not on the scale of the wars in Lebanon (2006) or Iraq (2003). Yet, cultivated and uncultivated land alike were obviously damaged and contaminated by the use of cluster munitions in South Ossetia and Georgia.¹¹⁸ Russia has not admitted to the practice, but independent investigations by Human Rights Watch and the Dutch Ministry of Foreign Affairs seemed to confirm such use.¹¹⁹ Eventually, Georgian officials later confirmed having used cluster munitions, but in 'fairly

¹⁰⁸ The United Nations and the World Bank, 'Georgia: Summary of Joint Needs Assessment Findings', Prepared for the Donor's Conference of October 22, 2008 in Brussels; T. Bahrampour, 'Georgians Blame Russia for Fires in Beloved Preserve', Washington Post, 16 September 2008.

King, G., The Five-Day War: Managing Moscow After the Georgia Crisis, Foreign Affairs 87 (2), 2008, pp. 2-11, p. 8.

⁹ Bahrampour, T., 'Georgians Blame Russia for Fires in Beloved Preserve', Washington Post, 16 September 2008.

¹¹¹ International Forest Fire News, 'Wildfires and Human Security: Fire Management on terrain Contaminated by Radioactivity, Unexploded Ordnance (UCO) and Land Mines', no 40, 2009.

International Forest Fire News, 'Wildfires and Human Security: Fire Management on terrain Contaminated by Radioactivity, Unexploded Ordnance (UCO) and Land Mines', no 40, 2009. ¹¹³ The United Nations and the World Bank, 'Supra note 103, p.

¹¹⁴ Caucasus Institute for Peace, Democracy and Development (CIPDD), 'After August 2008: Consequences of the Russian-Georgian War', Tbilisi, September 2008, p. 34.

¹¹⁵ The United Nations and the World Bank, Supra note 103, p. 28. ¹¹⁶ Caucasus Institute for Peace, Democracy and Development (CIPDD), 'After August 2008: Consequences of the Russian-Georgian War', Tbilisi, September 2008,

¹¹⁷ Human Rights Watch, 2009, 'Un in Flames: Humanitarian Law Violations and Civilian Victims in the Conflict over South Ossetia', see also International Forest Fire News, 'Wildfires and Human Security: Fire Management on terrain Contaminated by Radioactivity, Unexploded Ordnance (UCO) and Land Mines', no 40, 2009.

¹¹⁸ Human Rights Watch, 2009, 'Un in Flames: Humanitarian Law Violations and Civilian Victims in the Conflict over South Ossetia', p. 1.

¹¹⁹ Human Rights Watch, 2009, 'Un in Flames: Humanitarian Law Violations and Civilian Victims in the Conflict over South Ossetia', p. 53.

unpopulated areas'.¹²⁰ While use in unpopulated areas alleviates the direct humanitarian consequences of the use of cluster munitions, the consequences for the natural environment become larger. The environment does not appear to have been the object of attack by cluster munitions or other shells, but was nonetheless directly affected.

3.2.5 Direct effects

The damage affected two national parks and one nature reserve.¹²¹ The Georgian Environment Minister, Irakly Gvaladze, labelled the fires an 'ecological catastrophe'.¹²² The World Bank likewise expressed its 'grave concern' about the forest fires in the Borjomi area.¹²³

The Borjomi-Kharagauli National Park avoided the brunt of the forest fires in Georgia in August–September 2008, but was not unscathed. According to one account, about 370 acres of forest were destroyed.¹²⁴ The fires had consequences for animal populations of black bear, reindeer, lynx, and other species. The fires also reached the habitat of endangered species such as Caucasian spruce, Caucasian squirrel, Caucasian salamander, and Caucasian viper, in addition to species of bat and other animals.¹²⁵

Forest fires can easily lead to further environmental and humanitarian harm. For example, insect infestation, which can have long-term consequences for the forest sector, soil erosion, flooding, and increased likelihood of further fires are among the dangers associated.¹²⁶ The extent to which this has happened in Georgia and South Ossetia does not appear to have been extensively studied.

The artillery bombardment by all parties caused significant destruction of civilian property, infrastructure, and agricultural land. In the words of Human Rights Watch, the conflict saw 'lives, livelihoods, homes, and communities devastated in South Ossetia and bordering districts of Georgia.'¹²⁷ The insecurity of the war left about 134,000 people displaced from their homes.¹²⁸ Two years after the hostilities ended, about 30,000 people were still internally displaced. Those numbers added to the 220,000 people who had been displaced long-term since the civil war in the 1990s.¹²⁹ In 2012, this number had seemingly not declined, some having been displaced twice.¹³⁰

For many ordinary people, unexploded ordnance posed a formidable obstacle either to resettle to their homes or to farm their land. According to Human Rights Watch,

> M85 [cluster munitions] duds have not only cost lives but also interfered with livelihoods. Local civilians, who in the Gori District depend heavily on agriculture, have been forced to choose between going to their farms and risking injury or death from an unexploded dud, and staying at home and having little with which to feed their families. Most of those Human Rights Watch spoke to chose the latter option.

The use of cluster munitions and other weapons prone to leave sub-munitions or bomblets

¹²⁰ Human Rights Watch, 2009, 'Un in Flames: Humanitarian Law Violations and Civilian Victims in the Conflict over South Ossetia', p. 65–66.

¹²¹ The United Nations and the World Bank, Georgia: Summary of Joint Needs Assessment Findings, Prepared for the Donor's Conference of October 22, 2008 in Brussels, p. 8.

¹²² ABC News, 'Burnt Georgian Forest Show Costs of Russia War', 10 September 2008.

¹²³World Bank, 'Statement on Georgia', 21 August 2008,

¹²⁴ Bahrampour, T., 'Georgians Blame Russia for Fires in Beloved Preserve', Washington Post, 16 September 2008.

¹²⁵ World Conservation Congress, Resolution 4,071, 5–14 October 2008,

¹²⁶ The United Nations and the World Bank, Georgia: Summary of Joint Needs Assessment Findings, Prepared for the Donor's Conference of October 22, 2008 in Brussels, p. 28.

¹²⁷ Human Rights Watch, Human Rights Watch, 2009, 'Un in Flames: Humanitarian Law Violations and Civilian Victims in the Conflict over South Ossetia' p. 32.

 ¹²⁸UNHCR, 'Georgia', UNHCR Global Report 2008, p. 234.
 ¹²⁹ ICRC, 'Georgia/South Ossetia: Two Years After Conflict,

Daily Life Still a Struggle', 6 August 2010,

¹³⁰ Acketoft, T., 'Georgia and Russia: the Humanitarian Situation in the Conflict- and War-Affected Areas', Report to the Council of Europe, Doc. 13083, 20 December 2012.

behind lead to 'a long-term impediment to rural post-war reconstruction.'¹³¹

Timber can be savaged, and forests secured and replanted. One effort was to secure downstream villages against flooding resulting from the fires, the trees in the forests having lost their function of containing water.¹³²All in all, however, the direct economic cost of the environmental reconstruction was small compared to the cost of rebuilding civilian infrastructure.¹³³

3.2.6 Derived humanitarian effects

According to the World Bank and UN, the Georgian economy was on 'a strong growth track' prior to the 2008 conflict.¹³⁴ Yet, the conflict dealt a shock to the key pillars of economic growth. There occurred a weakening of investor, lender and consumer confidence, a contraction of liquidity in the banking system, stress on public finances, damage to physical infrastructure, and increased numbers of internally displaced persons.¹³⁵

Georgia's economy contracted by 3,8 percent in 2009, but was quickly back on its feet, growing by 6,3 per cent the year after and by 7 per cent in 2011.¹³⁶

The conflict upset the economic growth of the region, and the contamination of farmlands – fields and pasture – caused agricultural lands to loose their value. 'The conflict separated people

from their land which for most had been the main source of income and food. Having been able to nourish themselves independently, all of a sudden the displaced not only could not attend to their crops but also had to rely on food aid.¹³⁷ In their report, the UN and World Bank argued that losses to agricultural production in the Gori plain are large, 'borne largely by the area's 40,000 smallholder families. Without resumption of irrigation, not only will this year's fruit crops be lost but the trees themselves may eventually die.¹³⁸

In addition to the lost agricultural production, the commercial value of the burnt forest was lost. Commercial logging was hampered, as well as ordinary people's ability to collect firewood. According to CIPDD, the majority of the people living in the regions where the forests they allege the Russians set fire to occurred used firewood collected from the forest for heating.¹³⁹

In terms of wider developmental impact, it is hard to give an accurate assessment. For the people still being displaced, social stigma and lack of opportunities continue to pose obstacles for their integration into society, but the wider Georgian development trends appear to be positive.

The long-term economic impact of the environmental degradation seems to have been substantial.

One obstacle to resettlement is the fact that *new* families now habit many of the homes that were abandoned in August 2008.¹⁴⁰ The

¹³¹ Westing, A.H., Environmental and Ecological Consequences of War, Conflict Resolution

 ¹³² The United Nations and the World Bank, Georgia: Summary of Joint Needs Assessment Findings, Prepared for the Donor's Conference of October 22, 2008 in Brussels
 ¹³³ The United Nations and the World Bank, Georgia: Summary of

 ¹³³ The United Nations and the World Bank, Georgia: Summary of Joint Needs Assessment Findings, Prepared for the Donor's Conference of October 22, 2008 in Brussels
 ¹³⁴ The United Nations and the World Bank, Georgia: Summary of

¹³⁴ The United Nations and the World Bank, Georgia: Summary of Joint Needs Assessment Findings, Prepared for the Donor's Conference of October 22, 2008 in Brussels, p. i.

¹³⁵ The United Nations and the World Bank, Georgia: Summary of Joint Needs Assessment Findings, Prepared for the Donor's Conference of October 22, 2008 in Brussels.

¹³⁶World Bank, Georgian GDP Growth (Annual %),

¹³⁷ The United Nations and the World Bank, Georgia: Summary of Joint Needs Assessment Findings, Prepared for the Donor's Conference of October 22, 2008 in Brussels, p. 7.

¹³⁸ The United Nations and the World Bank, Georgia: Summary of Joint Needs Assessment Findings, Prepared for the Donor's Conference of October 22, 2008 in Brussels, p. 7.

¹³⁹ Caucasus Institute for Peace, Democracy and Development (CIPDD), 'After August 2008: Consequences of the Russian–Georgian War', Tbilisi, September 2008.

¹⁴⁰ Abrahamson, J., 'Living with the Aftermath of War', BBC News, 6 August 2009,

environmental consequences mapped out above do not appear to have caused significant humanitarian consequences beyond the challenges associated with resettlement. Nor do the humanitarian consequences appear to have aggravated existing or created new environmental problems. However, the difficulties farmers face in returning to their land means that agricultural lands lie fallow. The internally displaced 'complicated the country's economic and social problems', and are forced to endure 'unfavourable living conditions'.¹⁴¹ Displacement, moreover, 'results cultural and political marginalization, in exacerbates illness, creates new forms of infirmity, and disrupts social support networks.'142 Lack of adequate sanitation especially increases the susceptibility to disease.143

3.3 Observations

The brief interstate conflict between Russia and Georgia in 2008 saw extensive use of aerial and artillery bombardment. Multiple direct incidental effects for the environment resulted from the war, notably fires, oil spillages, air pollution. Contamination of both cultivated and uncultivated lands by unexploded ordnance caused more derived environmental impact. The risks and damages to the national parks in Georgia were substantial, although the precise extent of these damages remains uncertain.

	DIRECT EFFECTS	DERIVED HUMANITARIAN EFFECTS
Russo- Georgian War	 Deforestation UXO proliferation Degradation of designated national parks and reserves 	Internal displacementReduced livelihood

¹⁴¹ Lilia, 'IDPs in Georgia: Still Waiting for a Better Life', Caucasus Edition: Journal of Conflict Transformation, 1 November 2013

¹⁴²E. Koch, 'Health Effects of Displacement in Post-War Georgia', IREX, November 2009,

¹⁴³E. Koch, 'Health Effects of Displacement in Post-War Georgia', IREX, November 2009,

4 Democratic Republic of Congo (1996–)



Quick Facts		
Region	Africa	
Location	The Democratic Republic of	
	Congo (DRC), eastern	
	provinces and Virunga region	
Туре	Inter- and intrastate	
Parties	States and non-state actors	
Intensity	High and low intensity, protracted	
Year(s) of conflict	1996 - 2014	
Duration	Long	
Deaths (soldiers and 5.4 millions		
civilians)		
Internally displaced	2.6 millions	
Availability of data	of data Average	
Main environmental	Deforestation, wildlife loss	
consequences		
Main developmental	Loss of agricultural	
consequences	production, loss of timber,	
	socioeconomic retardation	
	resulting from displacement	
Controversies	Conflict minerals,	
	deforestation, wildlife,	
	biodiversity	

Since the mid 1990s, the Democratic Republic of Congo (DRC) has been embroiled in a complex mosaic of drawn-out conflicts. The conflicts in the DRC have been termed 'Africa's World War' due to the immense humanitarian consequences and the involvement of large numbers of states, both directly and by proxy. The total loss of human lives was estimated to have reached 5.4 million in 2011, and the number of internally displaced is currently estimated to about 2.6 million.¹⁴⁴The conflict has had a devastating effect on the environment and on the DRC's natural resources.

The case study on the DRC reveals how perpetual armed conflicts involving both governments and various organized armed groups have severe indirect effects on the environment. The massive displacement of refugees associated with protracted conflict may have even more destructive effects the environment than actual combat operations.

4.1 Basic facts

The DRC ranks fifth in the world for animal and plant diversity, and has the highest level of biodiversity in Africa. Its forests are home to a number of large mammals found nowhere else, such as the okapi, eastern lowland gorilla, mountain gorilla, and bonobo.¹⁴⁵ Endangered species such as the northern white rhinoceros and the mountain gorilla are now close to extinction, while elephants and the bonobo are increasingly under pressure from unregulated hunting.¹⁴⁶

The Rwandan genocide and civil war is by many believed to have been an important cause of both the First and Second Congo wars in 1996 and 1998 respectively.¹⁴⁷ The Second

¹⁴⁴UNEP The Democratic Republic of the Congo, 2011, p. 24; UNHCR, 2014 UNHCR Country Operations Profile – Democratic Republic of the Congo, 2014

¹⁴⁵ UNEP The Democratic Republic of the Congo, 2011.

¹⁴⁶ UNEP The Democratic Republic of the Congo, 2011, p. 40–1.

¹⁴⁷ UN, Report of the Panel of Experts on the Illegal Exploitation of Natural Resources and Other Forms of Wealth of the Democratic Republic of the Congo', Letter Dated 12 April 2001

Congo war was officially brought to an end in 2003, but the fighting has continued - and provoked new conflicts and grievances - in the eastern regions of the country. Around 20 armed groups continue to operate in eastern DRC.¹⁴⁸ The Democratic Forces for the Liberation of Rwanda (FDLR), the Allied Democratic Forces/National Army for the Liberation of (ADF/NALU), Uganda the March 23 Movement (M23), and Joseph Kony's Lord's Resistance Army (LRA) are some of the most active and well known.¹⁴⁹ Clashes between Congolese and Rwandan government forces occurred as late as the summer of 2014.¹⁵⁰

4.2 Environmental consequences

The Congolese conflict has deeply influenced the extraction industry. Natural resources in the DRC are tightly associated with ethnic and cultural identities, political power, economic livelihoods, territories, and national and regional rivalries. Many armed groups lack a reliable source of income, and depend on exploiting natural resources such as timber, charcoal, ivory, fisheries, and minerals (tin, gold, coltan, diamonds, and tungsten).¹⁵¹ A major "conflict generator" in the DRC is mining, particularly of gold, diamonds, and gemstones. Oil extraction has also helped finance insurgents. Enforcement of safeguards and protective measures for the environment in extractive industries are virtually nonexistent 152

4.2.1 Deforestation

One of the major environmental consequences of the wars in the DRC is the rapid and uncontrolled deforestation. There have been occasions of direct deforestation by the warring parties for military purposes. In order to deny cover to enemies from the woods, forests have on several occasions been cleared.¹⁵³ Illegal logging for both private and commercial purposes is also being carried out or controlled by belligerent parties, refugees, and people taking advantage of the absence of rule of law. Commercial exploitation of timber and game has also been widely practiced by the FDLR and Mai-Mai militia.¹⁵⁴

4.2.2 Bushmeat

The recurring conflicts in the DRC have increased the consumption of *bushmeat*.¹⁵⁵ Due to the destruction of infrastructure and difficult security situation in rural areas, bushmeat often provides the only available source of protein.¹⁵⁶ In other cases, however, eating bushmeat is not compelled by necessity, but is a cultural preference associated with status.¹⁵⁷ The breaking down of the rule of law and destruction of the infrastructure many places make regulation and enforcement of the wildlife protection regime difficult or impossible. In the folk taxonomy of the Bonoganda people, bonobos (pygmy chimpanzee) are not viewed as

from the Secretary-General to the President of the Security Council. ¹⁴⁸ The provinces of North and South Kivu, Eastern Orientale, and

¹⁴⁸ The provinces of North and South Kivu, Eastern Orientale, and Ituri have been particularly affected. See UNEP (2011) Supra note140, p. 24.

 ¹⁴⁹CIA, Congo, Democratic Republic of the, The World Factbook.
 ¹⁵⁰ Nicholas Bariyo, 'Congolese, Rwandan Forces Fight at

Boarder for Second Day', Wall Street Journal, 12 June 2014. ¹⁵¹ UNEP, Republique Democratique du Congo: Environnmentale

Post-Conflit, 2012, Nairobi, Kenya. ¹⁵² Vircoulon, Thierry, Behind the Problem of Conflict Minerals in

DR Congo: Governance, 2011, International Crisis Group,

¹⁵³ Benz, Sophia and Benz-Schwartzburg, Judith (2010) Great Apes and New Wars, Civil Wars 12(4), Anne Hammill and Charles Besanc, (2007) Measuring Peace Park Performance: Definitions and Experiences in Saleem H. Ali (ed) Peace Parks: Conservation and Conflict Resolution, Cambridge, MA: MIT Press, p.47; Sarah De Weerdt, War and the Environment, Worldwatch Institute

¹⁵⁴ SSRC Conflict Prevention and Peace Forum (2014) FDLR: Past, Present, and Policies, p. 5.

¹⁵⁵ Lingomo Bongoli and Daiji Kimura, Taboo of Eating Bonobo Among the Bongando People in the Wamba Region, Democratic Republic of Congo, 2009, African Study Monograph 30(4), Kyoto University, p. 211.

¹⁵⁶ Draulans Dirk and Krunkelsven, Ellen Van (2002) 'The impact of war on forest areas in the Democratic Republic of Congo', Oryx 36(1), p. 37.

¹⁵⁷ Benz, Sophia and Benz-Schwartzburg, Judith, Great Apes and New Wars, Civil Wars, 2010, 12(4), p. 410.

animals but as human beings.¹⁵⁸ Pre-war cultural norms and taboos on eating (the now endangered) bonobo (pan paniscus)¹⁵⁹ are now reported to have been obliterated.

The influx of coltan miners into the Okapi Wildlife Reserve was allegedly especially disastrous for the Grauer's gorilla.¹⁶⁰ Joseph Kony's Lords Resistance Army have also been heavily involved in illegal ivory trade and poaching of elephants. The DRC's elephant population dropped from about 62 000 in 2002 to about 23 000 in 2006.¹⁶¹

The critically endangered mountain gorillas have also been targeted for reasons other than mere subsistence. In 2007, an illegal charcoal mafia murdered a family of mountain gorillas. 'Their motivation was simple: kill the mountain gorillas and there will no longer be a reason to protect the park.¹⁶² According to one account, 'great ape survival in the Virunga region is directly and severely threatened by new and conventional armed conflicts in or near Great Ape habitats. Violent actors repeatedly turned the Virunga National Park into a battlefield.¹⁶³

4.2.3 **Coltan extraction**

The country – in particular the Okapi Wildlife Reserve - is extremely rich in coltan, a black metallic ore from which the chemical element tantalum (Ta) is extracted. Tantalum is used for the production of electronic components used in cell-phones and laptops. When the price of coltan exploded in 2000 (from about USD 30 to over 300 per lb), a 'coltan rush' occurred in eastern DRC. About 10 000 people are reported to have moved into Okapi Wildlife Reserve. The DRC's coltan trade was quickly monopolised by the Rwandan army and Hutu militia, exporting coltan worth millions of US Dollar, most of which was reinvested in the war.¹⁶⁴ The ecological effects of coltan mining have been severe, for example the influx of miners into national parks and reserves entailed illegal logging and poaching of animals.¹⁶⁵

4.2.4 Natural reservoirs

The DRC is an ecological hotspot: it boasts five natural World Heritage Sites and endangered species. In total, the DRC hosts 7 per cent of the world's tropical forest areas. Dense forests cover more than half of the country, which amounts to 115 million hectares, an area twice the size of France. This rich ecological lounge is of both local and global significance.

Most of the DRC's parks are situated in the east of the country, an area that faces significant population pressure and armed conflict. Virunga National Park - 'Africa's oldest and most spectacular game sanctuary^{,166} – was founded in 1925, primarily to protect the mountain gorillas, and was UNESCO-designated World Heritage Site in 1979. Today, it is gravely threatened by the consequences of armed conflict, and has been so for close to two decades.¹⁶⁷

It has been estimated that at the peak of the crisis, the Virunga National Park was losing

¹⁵⁸ Lingomo Bongoli and Daiji Kimura, Taboo of Eating Bonobo Among the Bongando People in the Wamba Region, Democratic Republic of Congo, 2009, African Study Monograph 30(4), Kyoto University, p. 211.

¹⁵⁹ Dirk Draulans and Ellen Van Krunkelsven, The impact of war on forest areas in the Democratic Republic of Congo, 2002, Oryx 36(1), p. 37.

¹⁶⁰ Benz, Sophia and Benz-Schwartzburg, Judith, Great Apes and New Wars, Civil Wars, 2010, 12(4), p. 410.

¹⁶¹ Agger, Kasper and Hutson, Jonathan, Kony's Ivory: How Elephant Poaching in Congo Helps Support the Lord's Resistance Army, Enough, 3rd June 2013. 162Virunga National Park official website, History, 2014.

¹⁶³Benz, Sophia and Benz-Schwartzburg, Judith, Great Apes and New Wars, Civil Wars, 2010, 12(4), p. 410.

¹⁶⁴ Vircoulon, Thierry, Behind the Problem of Conflict Minerals in DR Congo: Governance, 2011, International Crisis Group,

Benz, Sophia and Benz-Schwartzburg, Judith, Great Apes and New Wars, Civil Wars, 2010, 12(4), p. 410.

⁵⁶ Tesi, Peter, The Environmental Perspectives of the Rwandan Genocide of 1994, 2000, in Moses K. Tesi (ed.) The Environment and Development in Africa, Boston, MD: Lexington Books, p.

^{211.} ¹⁶⁷ Virunga National Park official website; UN, Report of the Panel of Experts on the Illegal Exploitation of Natural Resources and Other Forms of Wealth of the Democratic Republic of the Congo, Letter Dated 12 April 2001 from the Secretary-General to the President of the Security Council,

about 89 hectares of forest every day due to illegal harvesting of fuelwood and housing materials.¹⁶⁸ The illegal charcoal industry in Virunga National Park (worth about USD 30 million in 2008is controlled by armed groups.¹⁶⁹ Already by 2001, more than 150 km² of forest had been cut down.¹⁷⁰ Both Government forces, groups such as CNDP, FDLR and Mai-Mai militia are all reported to have established bases within and around Virunga National Park, and to be engaged in illegal logging activities.

In 2006, the Rwandan authorities across the boarder issued a complete ban on charcoal production in their part of the Virunga National Park. That caused much of the production to shift into neighbouring DRC, aggravating the existing problems there.¹⁷¹ Forest rangers trying to do their jobs have on several occasions been threatened, and have in some cases been revealed to have been involved in illegal activities themselves.¹⁷²

4.2.5 Direct effects

The environmental impacts of deforestation are many. It contributes to habitat destruction and loss of biodiversity. Considering that the DRC has the largest tropical forest in Africa, extensive forest destruction could have negative impacts on global warming.¹⁷³ It is estimated that owing to the fast-paced deforestation, the carbon emissions of the DRC will double by 2030.¹⁷⁴ Deforestation furthermore increases the probability and magnitude of floods and landslides, thus enhancing displacement and all

its associated costs in a negative, and seemingly endless, spiral.¹⁷⁵

International corporations are also alleged to be involved in the environmental and humanitarian impact of the Congo Wars. According to Sophia Benz and Judith Benz-Schwartzburg:

> Large, transnational corporations such as Shell, DeBeers, H.C. Starck, Eagles Wings Resources or the Danzer Group were and are still engaged in the production and trade of conflict resources such as oil, diamonds, coltan or timber in war-torn countries such as Nigeria, the DRC, Angola or Sierra Leone. [...] Especially, transnational logging companies directly contribute to the extinction of Great Apes through overexploitation and the destruction of habitats. In addition, logging leads to 'chains of extinction' or triggers 'secondary threats' because logging trails increase access to forest interiors that facilitates the now-rampant bushmeat trade in Central Africa.176

4.2.6 Derived humanitarian effects

The turmoil in the DRC has produced several large waves of population displacements. Many persons and groups have been displaced multiple times. Despite the formal end of the Second Congo War in 2003, it is estimated that more than 2.4 million people have been displaced from their homes since then.¹⁷⁷ Deforestation carried out by refugees has been an indirect effect of hostilities. Refugee camps have proven extremely difficult to manage, especially as the majority of IDPs (over 90%) camp in informal settlements and host communities.¹⁷⁸ During the course of just three

¹⁶⁸ UNEP The Democratic Republic of the Congo, 2011, p. 26.

¹⁶⁹ Lea Hazard, Charcoal, Corruption, and the DRC's Gorillas, Global Envision, 31 July 2008

¹⁷⁰ SSRC Conflict Prevention and Peace Forum, FDLR: Past, Present, and Policies, 2014, p. 5 p. 5.

¹⁷¹National Geographic News, 'Congo Gorilla Killings Fueled by Illegal Charcoal Trade, 28 October 2010,

¹⁷²National Geographic News, 'Congo Gorilla Killings Fueled by Illegal Charcoal Trade, 28 October 2010,

¹⁷³ Friends of the Congo, Democratic Republic of the Congo: Rainforests and Climate Change, UNEP, 'The Democratic Republic of the Congo.

¹⁷⁴UNEP The Democratic Republic of the Congo, 2011 p. 36..

¹⁷⁵ILPI interviews with local stakeholders.

¹⁷⁶Benz, Sophia and Benz-Schwartzburg, Judith, Great Apes and New Wars, Civil Wars, 2010, 12(4),

 ¹⁷⁷UNEP The Democratic Republic of the Congo, 2011, p. 26.
 ¹⁷⁸Refugees International, DR Congo.

days in 1994, Mount Goma was completely deforested.¹⁷⁹

Initially, refugees collected fuel wood primarily for their own use, but large-scale commercial activities soon commenced.¹⁸⁰ Due to the high level of violence in many places, the logging sector is very difficult to regulate.¹⁸¹ In an attempt to bring the artisanal logging sector under control, the Congolese authorities have issued an increasing number of logging permits, but most such permits have been issued illegally to companies and used for industrial-scale logging. According to Sam Lawson at Chatham House, the failure of the Congolese government in managing their forest resources due to the unstable security environment has created a situation where the scope of illegal logging is immense, and regulation virtually non-existent:

> Less than 10% of the DRC's area of active industrial logging is independently verified legal and/or sustainable, a much lower proportion than in most other tropical forest countries. A confused regulatory environment and lack of rule of law make reliable independent verification almost impossible.¹⁸²

One of the greatest humanitarian consequences of the environmental destruction caused by the Congolese wars is disease caused by lack of clean water. In fact, 'most Congolese have not died from violence, but rather from malaria, diarrhea, and malnutrition, all problems associated with the lack of water'.¹⁸³ As forests typically bind water, water supplies are often undermined as a result of deforestation.

Disposal of human waste is a serious problem in many refugee settlements. Failure to manage defecation has resulted in contamination of groundwater and soil in many of the camps and surrounding areas, causing great risk of disease for humans and animals.¹⁸⁴ Consumption of bushmeat can also have detrimental effects on human health. In 2012, for example, bushmeat consumption was reported as the origins of the Ebola outbreak in Orientale in eastern DRC.¹⁸⁵ Rape and sexual violence abounds in eastern DRC. Many women are attacked while collecting firewood near refugee camps. Due to deforestation they are forced to move further and further away from their camps each time they forage.¹⁸⁶

Economic and social development in eastern DRC is hampered by insecurity. As noted above, the absence of rule of law and consistent outbreaks of violence has forced new patterns of commercial activities in place. Before the wars broke out in the mid-1990s, eco-tourism was blooming. Now, illegal logging, poaching, and mining of coltan, gold, and diamonds are massive – and much better paid – industries in the region.

Conflict-induced migrations have also been an important driver of the DRC's rapid and unplanned urbanisation.¹⁸⁷ According to UNEP, urbanization caused by insecurity in rural areas

¹⁷⁹Asit K. Biswas and H. Cecilia Tortajada-Quiroz Environmental Impacts of the Rwandan Refugees on Zaire, 1996, Ambio 25(6), p. 405

p. 405 ¹⁸⁰Asit K. Biswas and H. Cecilia Tortajada-Quiroz Environmental Impacts of the Rwandan Refugees on Zaire, 1996, Ambio 25(6), p. 405.

p. 405. ¹⁸¹ Lawson, Sam, Illegal Logging in the Democratic Republic of the Congo, Energy, Environment and Resources, 2014, Chatham House; UN, Report of the Panel of Experts on the Illegal Exploitation of Natural Resources and Other Forms of Wealth of the Democratic Republic of the Congo, Letter Dated 12 April 2001 from the Secretary-General to the President of the Security Council, De Weerdt, War and the Environment.

¹⁸²Lawson, Sam, Illegal Logging in the Democratic Republic of the Congo, Energy, Environment and Resources, 2014, Chatham House

 ¹⁸³ Shore, Rebecca, Water in Crisis – Democratic Republic of Congo, The Water Project.
 ¹⁸⁴Asit K. Biswas and H. Cecilia Tortajada-Quiroz Environmental

¹⁸⁴Asit K. Biswas and H. Cecilia Tortajada-Quiroz Environmental Impacts of the Rwandan Refugees on Zaire, 1996, Ambio 25(6),p. 406–7.

¹⁸⁵ IRIN, DRC: Bushmeat Blamed for Ebola Outbreak, 2010.

¹⁸⁶Refugees International, DR Congo: Outdated Approach, Misplaced Priorities, 26 March 2014; Rape and sexual violance does not only affect women. Due to stigmatization and underreporting, sexual offences against men is an undercommunicated aspect of the Congolese wars.

¹⁸⁷UNEP The Democratic Republic of the Congo, 2011

is responsible for further environmental problems and conflict:

It is estimated that 75 percent of the DRC's urban population live in slums. As a result, large cities such as Mbuji-Mayi and Kananga resemble agglomerations of unintegrated villages. Furthermore, given their intense energy needs, rapidly growing urban centres become major consumer centres of wood and charcoal, leading to considerable deforestation in the surrounding areas.¹⁸⁸

The infrastructure in the new urban centres is way below standard. Industrial and commercial wastes are burnt openly. Indeed, the entire country does not have any engineered landfill sites.¹⁸⁹ This contributes significantly to air pollution.

Government officials are often unable or unwilling to enforce international agreements, such as the Convention of International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the Convention on the Conservation of Migratory Species of Wild Animals (CMS), and national legislation on logging, charcoal production, poaching, and pet trade.¹⁹⁰

In general, it is the immediate needs for survival of millions of displaced civilians that has caused the most dramatic indirect environmental impacts.¹⁹¹ The displacement has led to destruction of social structures, which again have had negative effects for the natural environment.¹⁹²

4.3 Observations

Some of the richest biodiversity areas in Africa are found in the Congo. The armed conflict and accompanying chronic violence have had numerous direct and indirect consequences for its natural environment. Species are endangered, habitats have been destroyed, and various effects of the armed conflict have in combination severely impacted the conditions of local population, with ensuing further negative impact for the natural environment.

While deforestation has been a direct effect of hostilities in Congo, a more widespread effect of the armed conflict has been deforestation as a derived effect. This has had multiple ensuing consequences which in combination have seriously impacted the natural environment and had dire humanitarian effects.

Fragile or ecologically important zones in natural reserves seem to be particularly impacted by the armed conflict in the Congo. They have been used as hiding ground by belligerent parties, increasing (the risk of) hostilities entailing direct environmental effects. The national parks have also been used directly or indirectly by the belligerent parties to sustain their war efforts. Belligerent parties seem even to have tried to deliberately destroy the ecosystems in order to improve access to resources in the ground, exposing the natural reserves to numerous direct and derived effects of the armed conflict.

Hostilities and the insecurity resulting from the armed conflict is preventing Congolese authorities from taking appropriate steps to protect the natural environment, a situation which in particular is affecting zones of major ecological importance such as the natural reserves.

¹⁸⁸UNEP The Democratic Republic of the Congo, 2011, p. 45.

 ¹⁸⁹UNEP The Democratic Republic of the Congo, 2011p. 44.
 ¹⁹⁰Benz, Sophia and Benz-Schwartzburg, Judith, Great Apes and

Benz, Sopnia and Benz-Schwartzburg, Judith, Great Apes and New Wars, Civil Wars, 2010, 12(4), p. 410..

¹⁹¹ UNEP, Republique Democratique du Congo: Environnmentale Post-Conflit, 2012, Nairobi, Kenya.

¹⁹² UNEP, Republique Democratique du Congo: Environnmentale Post-Conflit, 2012, Nairobi, Kenya, p. 53

In sum, it seems that the environmental, humanitarian, and developmental problems caused by the conflict in eastern DRC are intimately tied together in a complex pattern of mutual reinforcement.

	DIRECT EFFECTS	DERIVED HUMANITARIAN EFFECTS
Democratic Republic of Congo	 Deforestation Wildlife degradation Severe degradation of designated national parks 	 Massive displacement Deteriorated human health Proliferation of conflict resources Food and water scarcity Increased pressure on national parks

5 Colombia (1964-)



Quick Facts		
Region	Latin America	
Location	Colombia and Northern	
	Ecuador	
Туре	Intra-state	
Parties	Colombia, USA, Assorted	
	armed groups, notably	
	FARC, Colombian drug	
	cartels	
Intensity	Medium, low	
Year(s) of conflict	1964-	
Duration	50 years	
Deaths (soldiers and	nd 220,000	
civilians)		
Availability of data		
Internally displaced	Ca. 2 million	
Main environmental	Deforestation, wildlife loss,	
consequences	soil degradation	
Main developmental	Loss of agricultural and	
consequences	livestock production,	
	developmental	
	consequences, human health	
	problems	
Controversies	Aerial Fumigation,	
	Colombian and US	
	Counterinsurgency/Counter-	
	narcotics policies	

The case of Colombia offers insight into indirect effects of armed conflict. The Colombian civil war between the Colombian government and the FARC guerrilla demonstrates the prevalent link between the economy of armed conflict and environmental degradation. The financing of the Colombian conflict through illicit international drug trade is dependent on extensive cultivation and production of narcotics. Destruction of these arable lands by chemical substances is a way to combat the insurgency, albeit with dubious sideeffects. The conflict has led to large-scale appropriation of arable land, most of which is claimed from the fragile Amazonian rainforest. Herein lies a major explanation for the destruction of the rainforest in north-western South America, a deforestation process with implications far beyond the borders of Colombia.

5.1 Basic facts

Colombia's natural environment is highly diversified. Around 50% of the country is covered by the Amazonian rainforest. The rest is made up of mountains, coastal savannahs (where the majority of the population resides) and deserts. It is home to a huge mosaic of unique flora and fauna, with some of the most diverse ecosystems in the world. Despite covering 0.7% of the globe's surface, Colombia hosts around 10% all global animal and plant species.¹⁹³

The on-going conflict in Colombia has roots that stretch back almost a century. Violent competition for resources, political power and economic opportunity between different groups has been a feature of Colombian life at least since 1920. Since then, different leftist and rightist guerilla movements, as well as criminal gangs and local self-defense communities, have been fighting the government and each other, often with the direct or indirect support of foreign powers such as the US, the Soviet

¹⁹³Slunge, Daniel, Conflict, Environment and Climate Change in Colombia, 2008, Department of Economics, University of Gothenburg, Sweden.

Union and Venezuela. The notorious Colombian illicit drug trade has become a main driver for the conflict. This business is extremely lucrative, and has become the main source of financing for many groups. For some, control of the drug trade has become both the main reason and means for continuing the conflict, with politics and greed often having a mutually reinforcing dichotomy.

Reliable statistics on the casualties of the Colombian Civil War are hard to come by. Estimates are that 220,000 people have been killed since 1958 (40,000 combatants and 180,000 civilians). Furthermore, an estimated five million Colombians have been displaced.¹⁹⁴ The Colombian conflict has taken a devastating toll on the civilian population, which often face kidnapping, extortion and expropriation of their property by the belligerents.

Plants involved in industrial drug production, notably coca, opium and marijuana, require highly fertile soil and tender care to thrive. Land is often made available through deforestation of the Colombian section of the Amazonian rainforest, leading to the destruction of indigenous animal and plant species. Furthermore, the local population living in the area is affected. Indigenous peoples relying on sustainable hunting and fishing, as well as the nascent eco-tourism sector are often in danger of losing their livelihoods, further retarding the region's socio-economic development.

Although Colombia has a consistently high economic growth (around 4,5% the last five years), the country's economic and social development has been severely retarded due to the civil war.¹⁹⁵ The conflict has prevented the lawful extracting of Colombia's plentiful natural resources, including its hydrocarbons,

and destroyed much of its infrastructure. Although drugs have constituted a large part of the country's total GDP, most of this revenue has gone to a small, often corrupt, elite.¹⁹⁶ The production, transportation and distribution of these illegal drugs pose huge societal, developmental and health challenges. As of 2013, Colombia remains the world's largest or second largest cocaine producer (potentially after Peru), and is among the top five exporters of both heroin and marijuana.¹⁹⁷ Income from the illicit production is the most important source of income for FARC and other organizations opposed to the government. In fact, a US military report from 2009 suggested that "without the income from drugs, it is highly unlikely that FARC would be able to continue its struggle against the government".¹⁹⁸

However, it should be noted that FARC isn't a drug cartel the same way that, for example the former Cali and Medellin Cartels. Rather than directly cultivating coca and opium, FARC makes money of the *gramaje*, and in return protects the coca farmers and occasionally transports harvested coca to the new drug cartels that have sprung up in Colombia, Peru and Mexico. This has led most contemporary scholar to suggest that it would be difficult and counterproductive to solely try to eradicate the supply-side of the Colombian drug trade.¹⁹⁹

¹⁹⁴ Centro Nacional de Memoria Historica, Estadísticas del conflicto armado en Colombia 198-2013

¹⁹⁵ World Bank, Country Profile: Colombia, 2014,

¹⁹⁶Angrist, Joshua D., Kugler, Adriana D., 2007, Rural Windfall or a new Resource Curse? Coca, income and Civil Conflict in Colombia, IZA Discussion Paper no. 2790, Leibniz Information Centre for Economics, Germany. ¹⁹⁷The Descent of Will of the Constant State of St

¹⁹⁷ The Economist, Why is less cocaine coming from Colombia?, 2013, See also United Nations Office on Drugs and Crime (UNODC) (a), Annual World Drug Report 2014, 2014, Vienna, Austria.

Austria. ¹⁹⁸Maddaloni, J., An Analysis of FARC in Colombia: Breaking the Frame of FM 3-24, 2009, School of Advanced Military Studies, United States Army Command and General Staff College, Fort Leavensworth, KA., p.26.

¹⁹⁹ Maddaloni, J., An Analysis of FARC in Colombia: Breaking the Frame of FM 3-24, 2009, School of Advanced Military Studies, United States Army Command and General Staff College, Fort Leavensworth, KA., Preston IV, C.P., 2004, Drugs and Conflict in Colombia: A Policy Framework Analysis of Plan Colombia, Virginia Polytechnic.

In Colombia, traditional "army versus army" confrontations have gradually been supplanted by complex combinations of law enforcement, peacekeeping, economic and military measures. kinds of technology, New including biotechnology, have been adopted by militaries seeking to adapt to the changing face of conflict. The War on Drugs has included the massive spraying of broad spectrum herbicides in ecologically fragile areas. In a single twoweek period in 2000, approximately 25,000 hectares were fumigated from the air with a glyphosate-based chemical agent.200 Plant eradication efforts have intended to squelch narcotics production and to assist in regaining state control over rebel-held land. In addition to chemicals, biological crop eradication agents (mycoherbicides) have been developed for use in the Drug War. Like chemical herbicides, use of these biological agents is meant to accomplish both law enforcement and politicomilitary objectives.²⁰¹

5.2 Environmental consequences

Most of the fighting and drug production is taking place in relatively inaccessible interior provinces. It is therefore difficult to determine the full extent of the long-term environmental damage. The armed conflict is contributing to a very poor control and surveillance system.²⁰²

However, it is possible to broadly identify two main trends behind the conflict/drug-related environmental damage in Colombia. Firstly, coca, opium and marijuana plantations lead to deforestation and the introduction of dangerous chemicals, especially in vulnerable areas such as national parks. Furthermore, the surrounding infrastructure (roads, airstrips, housing and food production) also requires space through deforestation, and has several knock-on effects such as the hunting of bushmeat and the disposal of hazardous waste. Secondly, many of the Colombian government's counterinsurgency measure are environmentally damaging in turn. Aerial fumigation of coca crops with damaging chemicals has been a common tactic to curb drug production, but has also had severe consequences for the environment. This tactic further has serious unintended humanitarian consequences in that herbicides used in aerial fumigation have been shown to have serious adverse effects on the local population. In addition, the government's counterinsurgency campaign has focused on eradicating drug production area by area- this leads to drug producers often relocating into protected national parks, where the government forces are able conduct counterinsurgency less to operations. 203

Although cocaine is the most important drug produce exported from Colombia, constituting around 80-90% all drug exports, heroin and marijuana have been important products as well. Furthermore, it is worth noting that the different plants used for drug production (coca, opium poppy and marijuana) are optimally grown at different altitudes, causing environmental damage widespread even in more elevated environments. Coca is generally grown in lowland and lower-montane areas, from sea level to 2,000 meters. Opium is a relatively hardy plant, and is usually cultivated at altitudes from 1,500-3,500 meters above sea level, altitudes.²⁰⁴ One important aspect of especially

²⁰⁰ See Statement of Rand Beers, US Assistant Secretary of State for International Narcotics and Law Enforcement Affairs, given at the Senate Caucus on International Narcotics Control, 28 February 2001.

²⁰¹ See overview at http://www.sunshine-project.org.

²⁰² OECD/ECLAC (2014), OECD Environmental Performance Reviews: Colombia 2014, OECD Publishing, Paris, France p 141.

²⁰³ Maddaloni, J., An Analysis of FARC in Colombia: Breaking the Frame of FM 3-24, 2009, School of Advanced Military Studies, United States Army Command and General Staff College, Fort Leavensworth, KA.

²⁰⁴UNODC(b), The Environmental Effects of Illicit Drug Cultivation and Processing, 2008, Vienna, Austria. It should be noted that opium production had decreased exponentially in Colombia since 2001. This coincides with the massive increase in opium production in Afghanistan following the US-led invasion that same year, which has had the effect of squeezing the

coca planting in Colombia is that only around 30% of coca comes from permanent plantations.²⁰⁵ These are also the largest and most sophisticated, often hosting the processing facilities necessary to refine coca into cocaine.

The remaining 70% is made up of either semipermanent (often seasonal) plantations or "disposable" plantations used to harvest a few crops before moving to a new location.²⁰⁶ The reason for this is twofold: Firstly, the government's counterinsurgency campaign, especially aerial fumigation, often forces coca farmers into relocating their operations. Secondly, coca cultivation is an intensive process, leading to deforested soil used for coca production becoming easily exhausted. The use of short-term plantations is facilitated by coca's relatively short cultivation cycle, needing only a few months to reach maturity.²⁰⁷ This makes it possible to harvest several crop in different locations over the course of a single season, but also causes ever-larger areas of deforestation to occur.

5.2.1 Deforestation

Accurate statistics of deforestation due to drug production are challenging to come by. Furthermore, drug production only accounts for an unknown percentage of deforestation in Colombia- illegal logging, urban spread and the conversion of forest to agricultural land are also important contributing factor to deforestation. According to several sources, illicit drug production has caused the deforestation of around 50,000 hectares (ha) per year, from 1974-2007.²⁰⁸ An environmental country review by the OECD in 2014 suggests that between 30-50% of the natural ecosystems in Colombia have suffered some type of transformation or impact. ²⁰⁹

The efforts to reduce export of illegal exotic trees in danger of extinction for commercial purposes are impeded by the armed conflict, and it is estimated that 40-50 % of all trees are logged unlawfully.²¹⁰ In early 2012 the Colombian military intercepted 450 tonnes of exotic trees bound for export in Buenaventura.²¹¹

The level of deforestation varies from year to year, reflecting a number of factors including market demands in the USA and Europe, counterinsurgency efforts and changes in rainfall and climate.²¹² It has been calculated by several authors that for each hectare of forest cleared for coca cultivation, between one and four additional hectares are cleared for surrounding infrastructure, such as housing, processing plants, roads and airstrips.²¹³ This makes it hard to accurately assess the full, long-term extent of drug- related deforestation.

Deforestation in the Amazon rainforest is a serious global environmental issue. The Amazon is known as one of the "lungs of the world", being one of the most important natural carbon- capturing areas worldwide. As an example of the carbon emissions caused by deforestation due to drug production in

Colombian market share. See UNODC(c), Annual World Drug Report, 2010, Vienna, Austria.

²⁰⁵ UNODC(b), The Environmental Effects of Illicit Drug Cultivation and Processing, 2008, Vienna, Austria

²⁰⁶ UNODC(b), The Environmental Effects of Illicit Drug Cultivation and Processing, 2008, Vienna, Austria see also Thoumi, Francisco E., Coca Farming Dynamics: The Colombian Case, 2011.

²⁰⁷ Alvarez, Maria D., 2007, Environmental Damage from Illicit Drug Crops in Colombia, in Extreme Conflict and Tropical Forests, eds De Jong, W., Springer Press, NY.

²⁰⁸ Authors calculations based on figures from: Alvarez, Maria D., 2007, Environmental Damage from Illicit Drug Crops in Colombia, in Extreme Conflict and Tropical Forests, eds De Jong,

W., Springer Press, NY., Slunge, Daniel, Conflict, Environment and Climate Change in Colombia, 2008, Department of Economics, University of Gothenburg, Sweden and UNODC(b), The Environmental Effects of Illicit Drug Cultivation and Processing, 2008, Vienna, Austria. Note that this number fluctuates, sometimes significantly, and there ahs been a general trend towards less deforestation since 2000.

²⁰⁹ OECD/ECLAC (2014), OECD Environmental Performance Reviews: Colombia 2014, OECD Publishing, Paris, France p. 15
²¹⁰ OECD/ECLAC (2014), OECD Environmental Performance

²¹⁰ OECD/ECLAC (2014), OECD Environmental Performance Reviews: Colombia 2014, OECD Publishing, Paris, France p.114

²¹¹ Maximum penalty in Colombia for illegal export of endangered trees are 13 years of imprisonment. OECD/ECLAC (2014), OECD Environmental Performance Reviews: Colombia 2014, OECD Publishing, Paris, France, p 141

²¹² OECD/ECLAC (2014), OECD Environmental Performance Reviews: Colombia 2014, OECD Publishing, Paris, France

²¹³Thoumi, Francisco E., Coca Farming Dynamics: The Colombian Case, 2011.

Colombia, one author estimated that around two million tons of C02 were released into the atmosphere due to drug-related activities in 2008, equating the annual emissions of 300,000 Spaniards, 250,000 Brits or 120,000 Americans (or 1,3 million Colombians).²¹⁴

Deforestation destroys the natural habitat of several indigenous species. It is estimated that 52 species of birds and mammals and over 700 species of plants and birds are endangered in Colombia, primarily due to deforestation, including the only big cat in Latin America, the jaguar.²¹⁵

The following graph shows the rate of deforestation in the most afflicted provinces in Colombia (Hectares and Percentages).²¹⁶



5.2.2 Aerial fumigation

Many of Colombia's rural farmers live with little access to government services or jobs, and have little choice but to produce coca for organizations such as FARC. This is not only due to pressure from these groups, but also due to the profitability of coca as a cash crop over

 ²¹⁴Botero, Elise, Coca Production and Climate Change in Colombia, 2010, Earth Center, Columbia University, NY.
 ²¹⁵ Botero, Elise, Coca Production and Climate Change in

Colombia, 2010, Earth Center, Columbia University, NY.

other legal produce.²¹⁷ Entire communities have grown around the Colombian coca production, and farmers are often forced to turn to armed groups, such as FARC, for basic services, including medical, educational and recreational opportunities. By spraying their coca crops, the government is often taking away farmers' best, and often only, source of income with large consequences for the wider community.²¹⁸

It is often difficult to accurately determine the type of crops grown in a field located in remote jungle areas. Furthermore, farmers sometimes grow coca among legal crops, both to disguise illegal activities, but also as "protection", knowing that the government will be less inclined to fumigate legitimate crops. Even through the use of aerial and satellite surveillance, distinguishing coca from food crops can be difficult. This often causes the fumigation of legal crops, with disastrous consequences for the local communities. For example, farmers in the Putumayo district reported:

> indiscriminate. "fumigations are destroying both licit and illicit crops and even killing livestock, thereby threating food security. (...) Putumayo's population faces a serious food crisis as a result of the aerial fumigations' indiscriminate killing of food and livestock. According to the province's secretary of education, between November 2006 and June 2007, at least 59 schools in southern Putumayo were hit by indiscriminate fumigation".219

The herbicides used in aerial fumigation have severe consequences for the natural regrowth of the rainforest. The main chemical compound in herbicides in Colombia is the substance

OECD/ECLAC (2014), OECD Environmental Performance Reviews: Colombia 2014, OECD Publishing, Paris, France

²¹⁷Thoumi, Francisco E., Coca Farming Dynamics: The Colombian Case, 2011.

²¹⁸ Witnesses for Peace, An Exercise in Futility: Nine Years of Fumigation in Colombia, 2010

²¹⁹Witnesses for Peace, An Exercise in Futility: Nine Years of Fumigation in Colombia, 2010, p.6.

glyphosate (C3H8NO5P). According to the WHO and FAO, glyphosate is moderately toxic to humans, plants, insects and animals, especially if ingested.²²⁰ Although fumigation is often effective in destroying coca and opium crops, it also poisons the soil, prolonging the natural recovery of the local flora and fauna.²²¹ For this reason, aerial fumigation of drug crops in forbidden in every relevant state, except Colombia.²²² Colombia is also not a signatory to the ENMOD convention.

5.2.3 Direct effects

The herbicides used in the fumigation have proven to be dangerous to humans. The main chemical compound in herbicides in Colombia is the substance *glyphosate* (C3H8NO5P). According to the WHO and FAO, glyphosate is moderately toxic to humans, plants, insects and animals, especially if ingested.²²³ There are widespread reports of human health issues from contact with stemming glyphosate. include Common complaints respiratory problems, skin rashes, eye problems, diarrhea and, in cases where humans have drunk water contaminated with herbicides, miscarriages.²²⁴

5.2.4 Derived humanitarian impact

The estimated 8 % of the population (3.7 million) has been displaced due to the armed conflict in Colombia, leading to one of the highest concentrations of land ownership in the world. About 70 % of the displaced did not have

ownership to the land they were cultivating. ²²⁵ The conflict induced displacements in Colombia have caused important derived environmental effects of the armed conflict. It has substantially increased deforestation, as displaced populations have been seeking means of sustenance.²²⁶ In 2011 Colombia introduced a law for the restitution of land to be implemented over the next 10 year-period in order to mitigate some of these effects. ²²⁷

5.3 Observations

The Colombian conflict has had a number of important environmental impacts. It has seriously impaired the capacity of the state of law, it has exacerbated environmental pressures, mostly linked to illegal mining, illegal drug-production and deforestation, it has impeded access to protected zones, influencing management of natural resources.²²⁸

The armed conflict in Colombia demonstrates the prevalent link between the economy of armed conflict, environmental degradation and derived humanitarian effects. The financing of Colombian conflict through the illicit international drug trade is dependent on extensive cultivation and production of narcotics. This has led to large-scale appropriation of arable land, most of which is claimed from the fragile Amazonian rainforest. The Colombian conflict also illustrates how substances used to impede the enemy belligerents from taking economic advantage of

²²⁰ FAO/WHO, FAO Specifications and Evaluations for Plant Protection Products, 2001, Rome, Italy.

²²¹Witnesses for Peace, An Exercise in Futility: Nine Years of Fumigation in Colombia, 2010.

²²² Witnesses for Peace, An Exercise in Futility: Nine Years of Fumigation in Colombia, 2010.

²²³ FAO/WHO, FAO Specifications and Evaluations for Plant Protection Products, 2001, Rome, Italy.

²²⁴ Witnesses for Peace, An Exercise in Futility: Nine Years of Fumigation in Colombia, 2010., see also Solomon, Keith, R., Anadon, Arturo, Cerdeira, Antonio Luiz, Marshall, Jon, Sanin, Luz-Helena, Environmental and Human Health Assessment of the Aerial Spray Program for Coca and Poppy Control in Colombia, 2005, Report Prepared for the Inter-American Drug Abuse Control Commission, Organization of American States, Washington DC.

²²⁵ USAID (Agencia de los Estados Unidos para el Desarrollo Internacional) (2010), USAID Program Brief: Land tenure and property rights Colombia, Washington, D.C

 ²²⁶ OECD/ECLAC (2014), OECD Environmental Performance Reviews: Colombia 2014, OECD Publishing, Paris, France p.45.
 ²²⁷ La Ley Orgánica de Ordenamiento Territorial de 2011, OCDE

La Ley Orgánica de Ordenamiento Territorial de 2011, OCDE (2013c), Integrating climate resilience into development planning: country case study – Colombia, Working Party on Climate, Investment and Development (ENV/EPOC/WPCID(2013)16), París, OECD Publishing.

²²⁸ OECD/ECLAC (2014), OECD Environmental Performance Reviews: Colombia 2014, OECD Publishing, Paris, France

the natural environment may affect local ecosystems for years. These environmental pressures are subjecting the local population to various derived effects linked to health, displacement and deprivation of means of sustenance.

A general challenge in Colombia refers to the reduced ability of governmental authorities to perform in preventive and reparatory environmental work as a derived effect of the armed conflict. Colombia suffers from illegal mining activities, in great part attributed to the armed conflict. This has had a negative impact on the prospects of success in measures to improve the environmental record of Colombia.229

	DIRECT EFFECTS	DERIVED HUMANITARIAN EFFECTS
Colombian Civil War	 Deforestation Wildlife degradation Terrestrial contamination Degradation of designated national parks 	 Reduced livelihood Significant internal displacement Deteriorated human health Proliferation of organized crime Increased pressure on national parks

²²⁹ OECD/ECLAC (2014), OECD Environmental Performance Reviews: Colombia 2014, OECD Publishing, Paris, France 65, 113

6 Planning and execution of military operations

The present chapter discusses whether belligerent parties to the four conflicts have taken protection of the natural environment into account in planning and, to the extent known, execution of armed conflicts. This report does not therefore, discuss operational and policy tools of other States than those involved in the conflicts discussed here, or indeed, of UN peacekeeping operations.

The adverse consequences of armed conflict have been sought curbed through the development of in particular international humanitarian law (IHL). The core rules on the protection of the natural environment during armed conflict are partly to be found in Additional Protocol I to the Geneva Conventions²³⁰ and partly in other treaties, as well as in international customary law. $^{\rm 231}$ The natural environment is protected by the general rules on conduct of hostilities. The rules protecting animated and inanimated civilian items extends to the natural environment, for example air, water, soil, flora and fauna, unless a part of the natural environment makes an effective contribution to military action and its destruction а definite offers military advantage.²³² In addition. the natural environment is bestowed with a certain specialized protection. Article 35(3) of AP I states that "it is prohibited to employ methods or means of warfare which are intended or may

be excepted to cause widespread, long-term and severe damage to the natural environment".²³³ Article 55 of AP I specifies that "care shall be taken to protect the environment against widespread, long-term and severe damage..". The Convention on Environmental Modification Techniques (ENMOD)²³⁴ is specifically directed at prohibiting means of warfare that targets the environment. Several other treaties prohibits means of warfare because of their inability to observe the rule on distinction, but that may also be expected to have environmental damage as a side-effect, such as the Biological Weapons Convention,²³⁵ the Chemical Weapons Convention,²³⁶ the Cluster Munitions Convention.²³⁷ The ICRC Study on Customary Law²³⁸ asserts that the prohibition against deploying means of warfare that cause widespread, long-term and severe damage to the environment is a customary norm.²³⁹

²³⁰ Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I), 8 June 1977. See notably articles 48, 51 and 57

²³¹ The UN International Law Commission is currently conducting a study on the protection of the environment under IHL.

² See Article 52 (2) of Additional Protocol I.

²³³ The ICRC regards Article 35 (3) an expression of customary international law. See ICRC, 'Rule 45. Causing Serious Damage to the Natural Environment'

²³⁴The United Nations Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (ENMOD) (1978) ²³⁵ The United Notes

The United Nations Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction (commonly known as the Biological Weapons Convention (BWC) or Biological and Toxin Weapons Convention (BTWC)) (1975)

²³⁶The United Nations Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction (CWC) (1997)

²³⁷The United Nations Convention Cluster on Munitions (CCM) (2008)

²³⁸ICRC (2005): International Review of the Red Cross -Customary Law²³⁹Rule 45. Causing Serious Damage to the Natural Environment.

The use of methods or means of warfare that are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment is prohibited. Destruction of the natural environment may not be used as a weapon.

A key question is naturally to what extent these international rules on the protection of the environment during armed conflict are taken into account during military operations. A discussion of the scope and content and applicability of these rules, however, falls outside the scope of this study, but it should be noted that he term "widespread, long-term and severe damage" sets a high threshold and is moreover not very precise.²⁴⁰

States

The impact and actual effect of rules under international humanitarian law on protection of the environment during armed conflict on the planning and execution of miliary operations is not well known. States do have various planning documents for their military operations. Some states have Military Manuals providing general guidance to the planning of specific operations. Many such national Military Manuals are publicly available. Planning documents for specific military operations, such as Rules of Engagement (ROE), Standing Rules of Engagement (SROE), Standard Operating Procedure (SOP) etc., are not generally publicly available, but some information on specific military planning documents can be found in the public domain. The actual execution of military operations and to what extent one has carried out military action according to the panning documents is normally not public knowledge. The opposite; when military operations have been carried out in violation of national or international guidelines, is more likely to reach the public domain, although armed conflict is, as has been mentioned in this study, underreported.²⁴¹

Non-state armed groups

The point of departure is that States are obliged, under IHL, to take protection of the natural environment into account when engaging in warfare. The extent to which these international norms may apply to non-state armed groups is a complex question, and will not be discussed here.²⁴² Whether the non-state armed groups that are discussed in this study have planning documents for their military operations is largely unknown. Such documents are generally not publicly available.²⁴³ It is therefore hard to assert whether any of these groups have planned or indeed executed any of their military operations attempting to protect the natural environment.²⁴⁴ The general assumption seems to be that they have not.²⁴⁵ The rest of this chapter will thus look mainly at States.

6.1 Iraqi engagement rules and the environment – the 1991 Gulf War

Iraq is a signatory to the ENMOD, and Iraq ratified API in 2010, but has not ratified APII.

There appears to be few, if any, available official military documents from the Saddam-

 ²⁴⁰ The UN International Law Commission is currently conducting a study on the protection of the natural environment under IHL.
 ²⁴¹ One recent report from the Swedish military highlights the

²⁴¹ One recent report from the Swedish military highlights the necessity of continuing to integrate environmental consequences when planning international military operations. It further demonstrates how this is being conducted within the Swedish armed forces.

 ²⁴² Hellestveit, Cecilie, Conduct of Hostilities under the International Humanitarian Law of Non-International Armed Conflict, Faculty of law, 2014, University of Oslo
 ²⁴³ Famously, the non-state actor LRA 2006 commitment relating

²⁴³ Famously, the non-state actor LRA 2006 commitment relating to the protection of certain endangered species located in the Garamba National Park (Congo), assuring to cooperate with the rangers of the Park, proivded they "properly identify themselves and did not attack the LRA". Sivakumaran, Sandesh, The Law of Non-International Armed Conflict, 2012, Oxford University Press, UK. p. 528.

²⁴⁴ But see below, point 6.5.2 on FARC.

²⁴⁵ See documents recently released by the US DOD Conflict Records Research Center, Saddam Collection Summary, Released 2013. An example of Saddam-era Iraqi Military Manuals include:. Manual regarding Standard Operating Procedures for Battalions and Battle Groups, 1986, Iraqi Military Manual on the Tactical use of Weapons of Mass Destruction, Vol.2. Part 2., 1987. See also Meeting between Saddam Hussein and his Military Commanders after the First Gulf War, Undated, CRRC Record Number SH-SHTP-V-001-237.

era that elaborate on the protection of the environment in armed conflict. No available Iraqi military manuals produced previously to 2003 mention protecting the environment in armed conflict in any capacity.²⁴⁶ However, several recently declassified documents released by the US DOD Conflict Records Research Center reveal transcripts where Saddam Hussein and his inner cabinet discusses the intention and effect of sabotaging Kuwait's oilfields. It is clear that they expected that these actions would provide a decisive military advantage for Iraqi military forces, and that this order had been relayed to the relevant Iraqi field commanders.²⁴⁷ After the war, the ad hoc United Nations Compensation Commission, established by UNSC resolution 687, stipulated that Iraq pay a large war indemnity of \$53 billion dollars to Kuwait.²⁴⁸ Of this, \$3,8 billion was awarded due to the environmental damages inflicted by Iraqi forces during their scorched earth campaign in Kuwait.²⁴⁹ Interestingly, the Iraqi government actually refuted that they were behind the destruction of the Kuwaiti oil facilities, blaming the US instead.²⁵⁰ In August 1991, in a letter to the UN Secretary-General, Iraq affirmed that it was willing "to do everything to protect the environment and natural resources and not to exploit them as a weapon in times of armed conflict" and drew attention to the "appalling environmental

damage caused by coalition forces in Kuwait and Iraq" (Emphasis added).²⁵¹ After the 2003 attack on Iraq, the US Coalition Provisional Authority completely replaced the Iraqi military's personnel and doctrine. Iraq's Law of the Supreme Iraqi Criminal Tribunal (2005) identifies the following as a serious violation of the laws and customs of war applicable in international armed conflicts: "Intentionally launching an attack in the knowledge that such attack will cause 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".252

6.2 US engagement rules and the environment- the 1991 Gulf War

The US has not ratified API, and is therefore bound only by its provisions that are declaratory of customary law. US Army's Judge Advocate's office regularly updates the basic ROEs for all branches of the US military, most recently in 2013. This document does contain an entire chapter dedicated to the protection of the environment, but its chapter on the US military's basic ROEs does not, however, contain any mention of environmental protection.²⁵³

Specific ROEs for each operational theatre (known as Standing ROEs, SROE) are classified NATO SECRET, and are unavailable to the general public. The only official document published by the US military that deals with environmental damage as a consequence of war prior to the Gulf War is the official USAF commander's handbook from

²⁴⁶ See documents recently released by the US DOD Conflict Records Research Center, Saddam Collection Summary, Released 2013. An example of Saddam-era Iraqi Military Manuals include:.. Manual regarding Standard Operating Procedures for Battalions and Battle Groups, 1986, Iraqi Military Manual on the Tactical use of Weapons of Mass Destruction, Vol.2. Part 2., 1987.. See also Meeting between Saddam Hussein and his Military Commanders after the First Gulf War, Undated, CRRC Record Number SH-SHTP-V-001-237

²⁴⁷ US DOD Conflict Records Research Center, Saddam Hussein Meeting with Advisors Regarding the American Ground Attack During First Gulf War, Garnering Arab and Iraqi Support, and a Letter to Gorbachev, Feb. 24th, 1991, CRRC Document SH-SHTP-A-000-931. ²⁴⁸UNSC Resolution 687, UNSC Resolution 687, April 3rd, 1991,

See also Seacor, Jesica E. "Environmental Terrorism: Lessons from the Oil Fires of Kuwait." American University International Law Review 10, no. 1 (1996): 481-523. ²⁴⁹United Nations Compensation Commission, Homepage, 2014.

²⁵⁰ The Spokesman Review, Iraq Official says US burned oil wells in '91, Nov. 16th, 1996.

²⁵¹ ICRC Customary Law Database, Iraq, 2014

²⁵² ICRC Customary Law Database, Iraq, 2014

²⁵³ US Army Judge Advocate's Office, Law of War Handbook, Chapter 5: Rules of Engagement, 2013, International and Operational Law Department, US Army Press, Charlottesville, VA.

1980. This handbook specifies that: "Weapons that may be expected to cause widespread, longterm and severe damage to the natural environment are prohibited. This is a new principle, established by the 1977 Additional Protocol I to the Geneva Convention. Its exact scope is not clear, though the United States does not regard it as applying to nuclear weapons. It is not believed that any presently employed weapon would violate this rule".²⁵⁴

Soldier's cards and operational SROEs from the 1991 Gulf War are unavailable, and there is no indication in any US or international publications that the US military issued specific directions to its troops pertaining to the protection of the environment during this war. Furthermore, US forces were not responsible for any large-scale environmental destruction during the Gulf War (with the possible exception of the accidental bombing of 20 Kuwaiti oil wells),²⁵⁵ and were not held liable for any environmental destruction during or after the war.

6.3 Engagement rules and the environment in the Russian – Georgian War

According to Human Rights Watch, South Ossetian, Georgian, and Russian forces all used indiscriminate means and methods during this war, particularly with regard to their use of artillery. Both Russia and Georgia parties used cluster munitions.²⁵⁶ Russia has ratified API and

APII, and Georgia likewise. Georgia is not a ratifying member to ENMOD, while Russia is..

6.3.1 Russian engagement rules

Two of the pre-eminent sources for the legal conduct of the Russian military, the USSR-era Russian Federation Military Manual²⁵⁷ (1990) and the Russian Federation's Regulations on the Applications of IHL²⁵⁸ do list certain "Laws of War",²⁵⁹ of which two articles relate to the protection of the environment. The 1990 Military Manual states that "Substances which have widespread, long-term and severe consequences on the environment are prohibited means of warfare"²⁶⁰- which appears to allude to the use of specific weapons rather than tactics. The Russian 2001 Regulations on IHL states that "The following shall be prohibited to use in the course of combat operations: [...] environmental modification techniques having widespread, long-lasting or severe effects as the means of destruction, damage or injury".²⁶¹

Russian national legislation also contains an article on "Ecocide", stating that "massive destruction of the fauna and flora, contamination of the atmosphere or water resources, as well as other acts capable of causing an ecological catastrophe", constitutes a crime against the peace and security of humanity".²⁶² Whether Russian forces complied with these regulations during the 2008 war is subject to debate.

 ²⁵⁴United States Air Force, Air Force Pamphlet 110-34,
 Commander's Handbook on the Law of Armed Conflict, Judge Advocate's Office, 1980, US Department of the Air Force.
 ²⁵⁵ Seacor, Jesica E. "Environmental Terrorism: Lessons from the

²⁵⁵ Seacor, Jesica E. "Environmental Terrorism: Lessons from the Oil Fires of Kuwait." American University International Law Review 10, no. 1 (1996): 481-523

²⁵⁶ Cluster Munitions were banned under the Convention on Cluster Munitions later in 2008, but neither Russia or Georgia are parties.

²⁵⁷ Ru: Военная Руководство России Федерации

²⁵⁸ Ru: Федерация Правила российские поприменению международно гогуманитарногоправа

²⁵⁹ Ru: Законы войны

²⁶⁰Ministry of Defence of the Russian Federation, Instructions on the Application of the Rules of International Humanitarian Law by the Armed Forces of the United Soviet Socialist Republics, 1990, Appendix to the Order of the Minister of Defence of the USSR No. 75, §6 (g) (Author's Translation).

²⁶¹Ministry of Defence of the Russian Federation, Regulations on the Application of International Humanitarian Law of the Armed Forces of the Russian Federation, 2001, §9, Moscow, Russian Federation.

²⁶²Criminal Code of the Russian Federation, Article 358 "Ecocide", 1996, Moscow, Russian Federation (ILPI's translation)

There is no definition in the term "widespread, long-lasting and severe" in the 1990 Military Manual. Similarly to the US military, the Russian Armed Forces do not make public its SROEs. It is thus difficult to assess whether the environmental damage (most notably the largescale forest fires in the Borjomi-Kharagauli National Park) inflicted during the war would be a violation of engagement rules. The legal provision that would be the most relevant for this kind of crime would be the "ecocide clause" in the Russian national legislation. It is, however, unclear whether this applies to Russian forces abroad during wartime. The question of which party was responsible for the fires is moreover debated.²⁶³

6.3.2 Georgian engagement rules

Georgian ROEs also is unavailable to the general public. Furthermore, there appears to be no guidelines in any official English language sources stipulating the protection of the environment for the Georgian military.²⁶⁴ However, Georgia's Criminal Code from 1999 stipulates that "any war crime provided for by the 1998 ICC Statute which is not explicitly mentioned in the Code is a crime, including "intentionally launching an attack in the knowledge that such attack will cause [...] 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" in

international armed conflict".²⁶⁵ This provision thus appears to apply to Georgian forces abroad.

6.4 Engagement rules pertaining to Congo (DRC)

Congo is a party to API and APII. Congo has signed but not ratified ENMOD. There appears to be no available Congolese military planning documents.²⁶⁶

The UN Security Council established the UN Mission in the Democratic Republic of the Congo (MONUC) in 1999.²⁶⁷ In 2010, this operation was replaced by UN Organization Stabilization Mission in the Democratic Republic of the Congo (MONUSCO).²⁶⁸ The protection of the natural environment as such is not mentioned in the Security Council Resolutions specifying the mandate of these missions aimed at stabilizing the DCR.

The UN has launched an environmental initiative, dubbed "Greening the Blue Helmets", which involves implementing a series of best practices from different missions in order to reduce their environmental footprint.²⁶⁹ The DRC is a focus area in this regard, both due to the heavy presence of UN peacekeepers and the environmentally damaging nature of the conflict.²⁷⁰ Given the linkages between natural resources and conflict in the DRC, the UN peacekeeping DRC mission in the (MONUSCO) has not only adopted an

²⁶³ See Chapter 3.

²⁶⁴See Ministry of Defence of Georgia, National Military Strategy, 2014. Available at http://www.mod.gov.ge/documents/samxedro%20strategia%20EN <u>G.pdf</u> (17/10-2014), Ministry of Defence of Georgia, Minister's Vision 2013-2014, 2014. Available at http://www.mod.gov.ge/documents/Ministers%20Vision%20Eng. pdf (17/10-2014), Ministry of Defence of Georgia, Strategic DefenceReview2013-2016, 2013, Available at http://www.mod.gov.ge/documents/yzqhgsgsreeng.pdf (17/10 -2014).

²⁶⁵ICRC Database on Customary Law, Georgia, 2014, Available at <u>https://www.icrc.org/customary-ihl/eng/docs/v2_cou_ge_rule43</u> (17/10-2014).

²⁶⁶ International Court of Justice Armed Activities on the Territory of the Congo (Democratic Republic of the Congo v. Uganda), 19 December 2005, J.C.J. Reports 2005, § 223, 229.

²⁶⁷ UNSC Resolution 1279 (1999)

²⁶⁸ UNSC Resolution 1925 (2010)

²⁶⁹ UNEP, Greening the Blue Helmets: Environment, Natural Resources and UN Peacekeeping Operations, 2012, Nairobi, Kenya.

Kenya. ²⁷⁰ UNEP, Greening the Blue Helmets: Environment, Natural Resources and UN Peacekeeping Operations, 2012, Nairobi, Kenya.

environmental policy, based around renewable energy and recycling, but also organized and conducted a series of training events on environmental and natural resource management across all mission components during 2009-2011. "The Special Representative of the Secretary-General for the UN peacekeeping the DRC mission in (MONUSCO) has instructed all mission locations to avoid the use of firewood for cooking in order to prevent illegal deforestation. MONUSCO also cooperates with the Environmental Crime Programme at INTERPOL to tackle gorilla smuggling in the greater Congo basin. On an exceptional basis, the peacekeeping mission also carried out a series of emergency airlifts for eastern lowland baby gorillas that had been rescued from poachers. The gorillas, one of the most endangered species in the world, were flown to a sanctuary centre established by the Diane Gorilla Fossev Fund International in Kasughu".271

Engagement rules for Colombia 6.5

Colombia has ratified AP I and II. It has ratified all major conventions on weaponry,²⁷² including the amendment extending the CCW to noninternational armed conflicts.²⁷³ Colombia is not a party or signatory to ENMOD.

6.5.1 Colombian engagement rules

As opposed to its US, Georgian and Russian counterparts, the Colombian military has made publically available its soldier cards and SROEs, detailing the conduct of its soldiers.²⁷⁴ There no provisions regulating are environmental degradation in these, although

Colombia's Basic Military Manual from 1995 states that "the use of weapons which cause unnecessary and indiscriminate, widespread, long-term and severe damage to persons and the environment is prohibited".²⁷⁵ Colombia's Penal Code from 2000 imposes penal sanctions on "anyone who, during an armed conflict, uses methods or means of warfare which are intended to cause widespread, long-term and severe damage to the natural environment".²⁷⁶ Furthermore, the ICRC's Study on International Customary Law (Report on the Practice of Colombia) states that it is Colombia's opinio *juris* that "the parties to the conflict must protect the environment, endeavouring to prevent the damage to the natural environment caused by war operations".²⁷⁷ The Colombian government has "denounced guerrilla attacks on oil pipelines as a violation of IHL insofar as oil spills inflicted damage on the environment, which affected both natural water sources and the productivity of the land".

Although several FARC military manuals are available online,²⁷⁸ these contain no guidelines pertaining to the protection of the environment in armed conflict.

²⁷¹ UNEP, Greening the Blue Helmets: Environment, Natural Resources and UN Peacekeeping Operations- Executive Summary, 2012, Nairobi, Kenya, p.12-13.

BWC, CWC, MBC, CMC and CCW.

²⁷³ Ratified in 20. May 2009.

²⁷⁴Ministry of Defence of the Republic of Colombia, Reglas de Encuentro Para Las FFMM Directiva 17 Del 22 de Mayo de 2009

²⁷⁵ Ministry of Defence of the Republic of Colombia, Derecho Internacional Humanitario, Manual Basico para las Personarias y las Fuerzas Armadas de Colombia, 1995, Bogota, Colombia.

²⁷⁶ICRC Database onCustomary IHL, Colombia, 2014, ²⁷⁷ICRC Database onCustomary IHL, Colombia, 2014

²⁷⁸ FARC, Molina Military Manual, 2008.

7 Concluding remarks

The selected cases demonstrate a high degree of variation with respect to the nature and origins of environmental damages resulting from armed conflict. Each of the four cases highlights different aspects of conflict-related environmental destruction and derived humanitarian and environmental consequences. Certain observations about commonalities and differences may nevertheless be made.

The direct damages to the environment as a consequence of hostilities were more extensive in the two interstate conflicts (1991 Gulf War and Russia – Georgia). Intense, conventional hostilities took an immediate and substantial toll on the natural environment, either because it was used directly as shield or a means of warfare, or because of widespread incidental effects of massive hostilities.

The damage caused in the conflicts between state authorities and non-state actors, or between the latter two, (non-international armed conflicts) seem to have had less immediate environmental effects. However, the long-term effects of the use of the natural environment as a means of warfare (draining of the Marshes, the War on drugs or the very protracted violence in the Congo) seem to have caused substantial consequences for the natural environment, occasionally with more long-term and irreversible effects. These conflicts were also those where important derived effects in terms of displacement and challenges of sustenance put further strain on the natural environment.

The non-international armed conflicts in Colombia, Congo and Iraq seems to have caused additional environmental strain due to the armed conflicts' impact on the ability (or willingness) of authorities to protect its natural environment. These conflicts have seriously impaired the capacity of the state of law to protect its natural resources, impeding access to protected zones, thereby exacerbating environmental pressures, linked to illegal mining, illegal drug-production and deforestation.

One notable common element in all four casestudies is the risks and damages suffered by zones of particular ecological interest or protection. Natural parks and reserves have suffered particular strain and negative effects resulting from hostilities in all conflicts. These are zones where unique ecosystems and endangered species may be at the risk of extinction, and where the environmental damage caused as a direct or derived effect of the conflict may be irreversible. The high level of risk associated with environmental damage to such fragile zones, combined with the fact many ecological hotspots in the world are located in areas with recurrent armed conflict, makes this an observation of considerable concern. All four case studies indicate that these zones are very much at risk from both direct and derived effects of armed conflicts.

	DIRECT EFFECTS	DERIVED HUMANITARIAN EFFECTS
Gulf War (1991)	 Aerial contamination Terrestrial contamination Marine contamination Wildlife degradation 	 Deteriorated human health Reduction of livestock Reduced livelihood
Iraqi Insurgency	 Marshland modification Aerial modification Marshland degradation Extinction of species Destruction of an ecologically fragile zone Destruction of designated national park 	 Permanent loss of livelihood Massive internal displacement Destruction of ancient culture
Russo- Georgian War	 Deforestation UXO proliferation Degradation of designated national parks and reserves 	Internal displacementReduced livelihood
Democratic Republic of Congo	 Deforestation Wildlife degradation Severe degradation of designated national parks 	 Massive displacement Deteriorated human health Proliferation of conflict resources Food and water scarcity Increased pressure on national parks
Colombian Civil War	 Deforestation Wildlife degradation Terrestrial contamination Degradation of designated national parks 	 Reduced livelihood Significant internal displacement Deteriorated human health Proliferation of organized crime Increased pressure on national parks

Abbreviations and Acronyms

CDC - Center for Disease Control (USA) CIPDD - Caucasus Institute for Peace, Democracy and Development DoD - Department of Defense (USA) DRC - Democratic Republic of Congo DU - Depleted Uranium ICL - International Criminal Law ICRC - International Committee of the Red Cross IDP - Internally Displaced Persons IEL - International Environmental Law IHL - International Humanitarian Law IHRL - International Human Rights Law MoD - Ministry of Defence (UK) PRIO - Peace Research Institute Oslo UCDP - Uppsala Conflict Database Programme UNDP - United Nations Development Programme UNHCR - United Nations High Commission for Refugees UNSC - United Nations Security Council USAID - United States Agency for International Aid

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