

*Review paper (SS-2)***WAR AND ENVIRONMENT : AN OVERVIEW****Anusha Dubey\* and Priyanka Dwadash Shreni**

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: priyankashreni@gmail.com*Received October 13, 2007**Accepted March 25, 2008***ABSTRACT**

Wars can never be probono for humans but the researchers strongly want to recommend for the states a proper legal regulation for testing and use of chemical or nuclear weapon so that environment can be protected globally. Globalization is a complicated process due to which the epidemic starts spreading which is the conflict of interest, resulting in war. In this research paper the researchers made an effort to correlate war and environment as ultimately the scene of environment is unimaginable and mortifying. The death and destruction is not only of humans but of the ecology, the trauma is only the effect which is realized by the people who initially felt the triumph. The damage and deterioration caused to the environment is irreversible during a war. United Nations has undertaken many studies and conferences for the environmental situation after a war. The findings indicate that the suffering continues.

The researchers hope that the international donor community will assist in eradicating the severe contamination in the environmental hot spots, which threatens human health, keeps drinking water resources at risk and extends potential transboundary hazards along the rivers. The international community must discuss and decide whether the rules of modern warfare are up to date with regard to all the risks to human health and the environment. Suggestions for remedies, rehabilitation and protection are also pleaded on the basis of various international summits, conferences and conventions. Findings of various organisations and the role of United Nations Organisation is also aimed at the ultimate solution of the problem.

**Key Words :** Classification of damages, Damage to environment, Impact of war, Constituents of environment, Globalization.

**INTRODUCTION**

The application of weapons, the destruction of structures and oil fields, fires, military transport movements and chemical spraying are all examples of the destroying impact war may have on the environment. Air, water and soil are polluted, man and animal

are killed, and numerous health affects occur among those still living. This paper is about the environmental effects of wars and incidents leading to war that have been traumatising the world since the concept of war was born.

Images of Devastated battlefields are all too familiar. A German officer in 1918 described 'dumb, black stumps of shattered

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trees which still stick up where there used to be villages. Flayed by splinters of bursting shells, they stand like corpses upright. Not a blade of grass anywhere. Just miles of flat, empty, broken and tumbled stone.'

Since the Second Indochina War (1961-1975) the topic of conflict and environment has spawned an extensive literature. Among human activities, by far the most damage to the natural environment is wrought by war, and preparing for war. Increasingly, also, it appears that natural resources are unsustainably exploited for personal gain, payment of troops, and to finance arms shipments.<sup>1</sup>

This paper does not deal with the effect of preparing for war (i.e., military activities apart from war). Thus, the paper does not deal with issues such as resource absorption, toxic spills, waste cleanup, reclamation, and remediation associated with weapons production and military exercises.<sup>2</sup> Neither does this paper deal with the humanitarian side of war – such as deaths and injuries, refugee streams, and the short and long term effects of land mines – nor with the question of whether or not environmental stresses themselves might be a cause of war. Instead, this paper primarily deals with the direct and induced effects of war itself on the natural, nonhuman environment.

#### **AIMS AND OBJECTIVES**

Primary aim of this paper was to gain a comprehensive understanding of the impact of wars on the environment. For this purpose, the researchers have attempted to analyze: (a) the classifying environmental effects of war, (b) the various effects on the various constituents of the environment, (c) problems of damage repair and (d) and conclusion with solutions involving various reforms are needed.

The research was not intended to prescribe a policy solution, but instead made an attempt to identify the strengths and weaknesses as well as the missing links in the existing policy mechanism of the saving of the

environment from ill effect of wars.

#### **METHODOLOGY**

The researchers have adopted a descriptive, analytical and critical style of writing. There is a critical analysis of the different provisions in law and short descriptive but explanative style of writing that deals with the subject section wise, etc. and have drawn their conclusions based on the same. The whole paper is formulated on secondary data. Although some primary data base work has also been carried out.

#### **Various environmental effects of war Scientific classification**

From a taxonomic point of view, systematic thinking about the direct and indirect effects of war on the natural environment is rare to find. One approach categorizes the natural environment into its physical, chemical, biological components.<sup>3</sup> The *physical environment* includes topics such as weather and climate, soil conditions and vegetation, water sources, and human infrastructure such as water supply and sanitation, transportation and communication networks. The chemical environment refers to components affecting air, land, and water quality, and the *biological environment* refers to micro and macro organisms and their ecological interaction in and over time and space. Thus, specialist scientists from marine biologists to atmospheric climate researchers, ornithologists, organic chemists, geochemists and geophysicists – could in principle make valuable contributions to the assessment of war-related damage to the natural environment. In practice and for various reasons discussed below, few do and relatively few solid studies are available, in part because of the unavailability of pre-war baseline data. A useful way to incorporate physical, chemical, and biological aspects to assess war-related environmental damage in this paper can be assessed in the case of the Persian Gulf war of 1991 and its effect in Kuwait, for this annexure 1 and 2 can be referred to.

**Dahl's classification**

Arne Willy Dahl<sup>4</sup>, classifies war related environmental damage into six groups :

- (1) destruction of the human environment
  - (2) destruction of the cultivated environment;
  - (3) destruction of the natural environment of economic importance
  - (4) destruction of the natural environment of non-economic value;
  - (5) general environmental degradation and
  - (6) environmental manipulation as a tool in warfare.
- For the purpose of this paper the discussion shall be around classifications (2) to (6).

**Lanier-Graham's classification**

A simple alternative classification is provided by Lanier-Graham<sup>5</sup>, namely (1) intentional direct destruction of the environment during war; (2) incidental direct destruction<sup>3</sup>; and (3) indirect or induced destruction as a medium- or long-term consequence of war but still attributable to war. "Intentional direct destruction" for instance refers to the deliberate bombing of cultivated and uncultivated lands. An example of an "incidental direct destruction" would be soil disturbance by battle tanks moving from one location to another. Finally, "indirect or induced destruction" may occur as a result of human population shifts on account of war that, in turn, may exert undue environmental stresses.

**Brauer's classification**

Without any attempt at clarification, one regularly encounters in the literature synonymously used descriptors such as "damage," "depletion," and "degradation." Based on these descriptions he has classified the environmental effects of war as :

1. Environmental disturbance (environmental differences)
2. Environmental damage
  - 2.1 Environmental degradation
  - 2.2 Environmental depletion
  - 2.3 Environmental destruction

If full reconstitution can be expected, we might refer to this damage as environmental degradation. Partial reconstitution might be

referred to as environmental depletion, and the absence of any possible reconstitution as environmental destruction. Environmental degradation, depletion, and destruction need be viewed in the ecological context of the affected physical entity. For example, a war-degraded coral reef may take thousands of years of regrowth.

**RESULTS AND DISCUSSION**

Most wars are a result of the liberation of countries after decades of colonialization. Countries fight over artificial borders drawn by former colonial rulers. Wars mainly occur in densely populated regions, over the division of scarce resources such as fertile farmland. It is very hard to estimate the exact environmental impact of each of these wars. Here, a summary of some of the most striking environmental effects, including biodiversity loss, famine and over fishing is given for different countries.

**Congo war (II)**

Since August 1998 a civil war is fought in former Zaire, now known as the Democratic Republic of the Congo (DRC). The war eventually ended in 2003 when a Transitional Government took power. A number of reasons are given for the conflict, including access and control of water resources and rich minerals and political agendas. The war had a devastating effect on the environment; National parks housing endangered species were affected due to exploitation of minerals and other resources. Refugees hunted wildlife for bush meat, either to consume or sell it. Elephant populations in Africa had seriously declined as a result of *ivory poaching*. Farmers burnt parts of the forest to apply as farmland, and corporate logging contributed to the access of poachers to bush meat. A survey by the WWF showed that the hippopotamus population in one national park decreased from 29,000 thirty years previously, to only 900 in 2005. The United Nations Educational, Scientific and Cultural Organization (UNESCO) listed all five parks as 'world heritage in danger'.

**Rwanda civil war**

Between April and July 1994 extremist military Hutu groups murdered about 80,000-1,000,000 Tutsis<sup>6</sup> and moderate Hutus<sup>7</sup> in Rwanda. Rwanda has a very rich environment; however, it has a particularly limited resource base. Many refugees from the 1994 combat caused a biodiversity problem. When they returned to the already overpopulated country after the war, they inhabited forest reserves in the mountains where endangered gorillas lived. Conservation of gorilla populations was no longer effective, and refuges destroyed part of their habitat. Despite the difficulties still present in Rwanda particularly concerning security and resource provision, an international gorilla protection group is now working on better conditions for the gorillas in Rwanda.

**World Trade Centre explosion in United States of America**

The so-called 'War on Terrorism' the United States are fighting in Asia currently all started with the event we recall so well from the shocking images projected on news bulletins.<sup>8</sup> On September 11, 2001, terrorists flew airplanes into the buildings of the World Trade Centre. It is now claimed that the attack and simultaneous collapse of the Twin Towers caused a serious and acute environmental disaster.<sup>9</sup> As the planes hit the Twin Towers more than 90.000 litres of jet fuel burned at temperatures above 1000C. An atmospheric plume formed, consisting of toxic materials such as metals, furans, asbestos, dioxins, PAH, PCB and hydrochloric acid. Most of the materials were fibres from the structure of the building.<sup>10</sup> At the site now called Ground Zero, a large pile of smoking rubble burned intermittently for more than 3 months. Gaseous and particulate particles kept forming long after the towers had collapsed.

**Afghanistan war**

During the war, extensive damage was done to the environment, Safe drinking water declined, because of a destruction of water

infrastructure and resulting leaks, bacterial contamination and water theft. Rivers and groundwater were contaminated by poorly constructed landfills located near the sources. Afghanistan once consisted of major forests watered by monsoons. During the war, Taliban members illegally trading timber in Pakistan destroyed much of the forest cover. US bombings and refugees in need of firewood destroyed much of what remained. Less than 2% of the country still contains a forest cover today.<sup>12</sup> Bombs threaten much of the country's wildlife the number of birds now flying this route has dropped by 85%. In the mountains many large animals such as leopards found refuge, but much of the habitat is applied as refuge for military forces now. Additionally, refugees capture leopards and other large animals are and trade them for safe passage across the border. One example of pollution is cyclonite, a toxic substance that may cause cancer.

**Hiroshima and Nagasaki nuclear explosions**

Atomic bombs are based on the principle of nuclear fission, which was discovered in Nazi Germany in 1938 by two radio chemists.<sup>10</sup> During the process, atoms are split and energy is released in the form of heat. Controlled reactions are applied in nuclear power plants for production of electricity, whereas unchecked reactions occur during nuclear bombings. In 1945, at the end of World War II and the beginning of the Cold War, nuclear weapons were applied to kill for the first time in Japan. On August 6, a uranium bomb by the name of Little Boy was dropped on Hiroshima, followed by a plutonium bomb by the name of Fat Man on Nagasaki on August 9. The hills and the geographical location of the bombing site caused the eventual impact to be smaller than days earlier in Hiroshima.

The first impact of the atomic bombings was a blinding light, accompanied by a giant wave of heat. Dry flammable materials caught fire, and all men and animals within half a mile

from the explosion sites died instantly. Many structures collapsed, in Nagasaki even the structures designed to survive earthquakes were blasted away. Many water lines broke. Fires could not be extinguished because of the water shortage, and six weeks after the blast the city still suffered from a lack of water. In Hiroshima a number of small fires combined with wind formed a firestorm, killing those who did not die before but were left immobile for some reason. Within days after the blasts, radiation sickness started rearing its ugly head, and many more people and along with them the flora and fauna would die from it within the next 5 years.

The events of August 6 and August 9 can be translated into environmental effects more literally. The blasts caused air pollution from dust particles and radioactive debris flying around, and from the fires burning everywhere. Many plants and animals were killed in the blast, or died moments to months later from radioactive precipitation. Radioactive sand clogged wells used for drinking water winning, thereby causing a drinking water problem that could not easily be solved. Surface water sources were polluted, particularly by radioactive waste. Agricultural production was damaged; dead stalks of rice could be found up to seven miles from ground zero.

#### **Iraq and the United States**

The war in Iraq started by the United States in 2003 as part of the War on Terrorism caused poverty, resulting in environmental problems. Some weapons are applied that were damaged the environment, such as white phosphorus ammunition. People around the world protested the application of such armory. Damage to sanitation structures by frequent bombing, and damage to sewage treatment systems by power blackouts caused pollution of the River Tigris. Two hundred blue plastic containers containing uranium were stolen from a nuclear power plant located at the south of Baghdad. The radioactive content of the barrels was dumped in rivers and the barrels were

rinsed out. Oil trenches were burned, as was the case in the Gulf War of 1991, which resulted in air pollution. In Northern Iraq, a sulphur plant burned for one month, contributing to air pollution. The destruction of military and industrial machinery released heavy metals and other harmful substances and caused land degradation.

#### **World War I : Trench Warfare**

In 1914, the assassination of Archduke Franz Ferdinand of Austria-Hungary resulted in the First World War. The war was fought from trenches, dug from the North Sea to the border of Switzerland. In terms of environmental impact, World War I was most damaging, because of landscape changes caused by trench warfare. Digging trenches caused trampling of grassland, crushing of plants and animals, and churning of soil. Erosion resulted from forest logging to expand the network of trenches. Soil structures were altered severely, and if the war was never fought, in all likelihood the landscape would have looked very differently today.

Another damaging impact was the application of poison gas. Gases were spread throughout the trenches to kill soldiers of the opposite front. Examples of gases applied during WWI are tear gas (aerosols causing eye irritation), mustard gas (cell toxic gas causing blistering and bleeding), and carbonyl chloride (carcinogenic gas). The gases caused a total of 100,000 deaths, most caused by carbonyl chloride (phosgene). Battlefields were polluted, and most of the gas evaporated into the atmosphere. After the war, unexploded ammunition caused major problems in former battle areas. In 1925, most WWI participants signed a treaty banning the application of gaseous chemical weapons.

#### **Impact on the various constituents of the environment**

##### **Depleted Uranium**

Since the 1991 Gulf War, concern over the health and environmental effects of depleted uranium (DU) weapons has continued to grow.

An extremely dense metal made from low-level radioactive waste, DU is principally used by the United States, but also by other countries such as Britain, in defensive military armor, conventional munitions, and some missiles.<sup>11</sup> Its ability to penetrate the armor of enemy tanks and other targets more readily than similar weapons made of other materials has made DU extremely valuable to the US military. In many cases, current scientific studies have yet to substantiate links between reported health problems and the intensive use of DU weapons.<sup>15</sup> The evidence is piling up that DU is not benign at all.

### **Infrastructure**

The degradation of infrastructure and basic services brought on by war can wreak havoc on the local environment and public health. Countries' water supply systems, for example, can be contaminated or shut down by bomb blasts or bullet damage to pipes.<sup>12</sup> In Afghanistan, destruction to water infrastructure combined with weakened public service during the war resulted in bacterial contamination, water loss through leaks and illegal use. The consequence was an overall decline in safe drinking water throughout the country. Water shortages can also lead to inadequate irrigation of cropland. Agricultural production may also be impaired by intensive bombing and heavy military vehicles traveling over farm soil. The presence of landmines can also render vast areas of productive land unusable.<sup>13</sup> Additional war-related problems which compound degradation of the natural and human environment include shortages in cooking fuel and waste mismanagement during and after military conflicts. During the most recent warfare in Iraq, individuals were forced to cut down city trees to use as cooking fuel.

### **Forests/Biodiversity**

Throughout history, war has invariably resulted in environmental destruction. However, advancements in military technology used by combatants have resulted in increasingly severe

environmental impacts. This is well illustrated by the devastation to forests and biodiversity caused by modern warfare. Military machinery and explosives have caused unprecedented levels of deforestation and habitat destruction. This has resulted in a serious disruption of ecosystem services, including erosion control, water quality, and food production. A telling example is the destruction of 35% of Cambodia's intact forests due to two decades of civil conflict. In Vietnam, bombs alone destroyed over 2 million acres of land.<sup>14</sup> These environmental catastrophes are aggravated by the fact that ecological protection and restoration become a low priority during and after war.

The threat to biodiversity from combat can also be illustrated by the Rwanda genocide of 1994. The risk to the already endangered population of mountain gorillas from the violence was of minimal concern to combatants and victims during the 90-day massacre. The threat to the gorillas increased after the war as thousands of refugees, some displaced for decades, returned to the already overpopulated country. Faced with no space to live, they had little option but to inhabit the forest reserves, home to the gorilla population. As a result of this human crisis, conservation attempts were impeded. Currently, the International Gorilla Programme Group is working with authorities to protect the gorillas and their habitats. This has proven to be a challenging task, given the complexities Rwandan leaders face, including security, education, disease, epidemics, and famine.

Of the most striking examples of military disregard for environmental and human health is the use of chemical and biological agents in warfare. The American military's use of Agent Orange during the Vietnam War is one of the most widely known examples of using environmental destruction as a military tactic. Agent Orange is a herbicide that was sprayed in millions of litres over approximately 10% of Vietnam between 1962 and 1971. It was used

to defoliate tropical forests to expose combatants, and destroy crops to deprive peasants of their food supply.<sup>15</sup> The environmental and health effects were devastating. The spraying destroyed 14% of South Vietnam's forests, including 50% of the mangrove forests. Few, if any, have recovered to their natural state. In 2001, scientists documented extremely high levels of dioxin in blood samples taken from residents born years after the end of the Vietnam War. Studies attribute such high levels to food chain contamination: Soil contaminated with dioxin becomes river sediment, which is then passed to fish, a staple of the Vietnamese diet.<sup>16</sup> This is a clear reminder that poisoning our environments is akin to poisoning ourselves.

#### **Water, air and land**

Present in the plants are ethylene-dichloride, ethylene, chlorine, chlorine-hydrogen, propylene and vinyl chloride monomers. These fluids have been released into the atmosphere, water and soil due to bomb damage and now pose a serious threat to ecological systems locally and in the broader region. The soil at the Petrochemical Complex was soaked with ethylene-dichloride.<sup>29</sup> All chemicals that had been released in water were found to be present in the surface waters, as well as the compounds resulting from their reactions. Huge quantities of Ethylene-dichloride, hydrogen-chloride solution and sodium hydroxyde were released into the Danube River, as were ammonia, and chlorine, along with undetermined quantities of mercury. Large quantities of dead fish were observed and the Danube turned black as a result of the bombings.<sup>17</sup>

The bombing of a Refinery produced a cloud of smoke 1.5 kilometres wide, three kilometres high and 20 kilometres long. The cloud persisted for a 10-day period, moving to the ground 15 kilometres from the plant. The chemical clouds blocked out the sun the day following the bombing. NATO bombing of

power stations and transformers released the highly dangerous pollutant, PCB Pyralene. But the pollution of ground water is more serious, because ground water has a limited capacity for self-purification. Ground water supplies 90 percent of Serbia's domestic and industrial needs.

Due to precipitation, much of the air pollution described above will eventually reach the soil and become part of the further biochemical cycle. Bombing has also created deep and numerous craters in the humus layer. Not only are the craters unusable, but so is the land around the craters. The destruction of the upper layers of the soil means the destruction of its flora and fauna. The natural regeneration of this layer could last thousands of years. It is difficult to decide which the more chilling thought is. That those who selected these targets calculated the potential effects on human health and the environment for decades to come and proceeded in any case. Or that they are so reckless, ignorant and indifferent to the lives of millions of people that the potential results never entered their calculations.

#### **RESULTS AND DISCUSSION**

Disposal of debris (from destroyed buildings, bridges, etc) poses a major problem. Available technologies make it possible to recycle up to 80% of it (though processing will inevitably involve hazardous discharges into air and water). For the other 20%, burial is the only option. Accumulation of rubbish and household waste is becoming a serious environmental problem. The countries hit do not have the equipment, financial and institutional capability to carry out long-term monitoring and implement the measures needed to localise the consequences of the conflict. Unfortunately, environmental problems are not a priority in plans for restoration actions in war torn areas and programmes of international technical and financial aid to the country. The approach underestimates the environmental

implications of military conflicts. For objective reasons the authorities of the war torn countries cannot, on their own, carry out the necessary measures.

Health monitoring in regions affected by the adverse factors we have described, requires special attention, specialized equipment, organization and additional funding. Unfortunately monitoring, treatment and prevention in the effected areas are a major problem because of the many health care facilities destroyed by military action. The environmental impact of the crisis is transboundary: there have been environmental consequences in adjacent areas of neighboring countries; transboundary waterways and groundwater have always been affected.

That the military action would have grave environmental consequences was highly predictable and the consequences were fairly evident right from the start of the strikes, so the militarily inflicted environmental damage can be presumed to have been deliberate. There is therefore no avoiding the conclusion that the military operations violate the environmental-protection rule laid down in the First Additional Protocol to the Geneva Convention. In particular, bombing environmentally hazardous installations is a flagrant breach of that protocol. The military operations masterminded and conducted by NATO in Yugoslavia contravened Principle 24 of the 1992 Rio Declaration on Environment and Development, as well as the spirit and letter of resolutions, conventions and declarations which conferences of the United Nations and other international organizations have adopted over several decades in order to develop international co-operation on questions of environment protection and liability for environmental damage.

### CONCLUSION

Despite the long legacy of environmental destruction caused by warfare, the standards set by most conventions and protocols have proven inadequate in preventing and redressing

environmental degradation brought on by war. A "Fifth Geneva Convention" must be brought in to replace existing international norms. While only a fraction of the armed conflicts in the world are international in scope, there is a lack of domestic regulations pre-empting war's ecological harm. The focus of Law of War is primarily on human needs. Enforcement has also been an issue of serious debate.

The growing realization that national security and ecological conservation are inextricably linked has made environmental security an issue worthy of consideration and protection. Laws that have a mitigating potential can only change the face of combat and possibly discourage it from ever starting. The times, let's hope, are a changing and that the people apart from the government will become more conscious and active. The point is that the environmental impact of war is often nothing more than a newspaper headline or title of a scholarly piece when, in fact, the content of the article primarily addresses disruptions to human activities – war or peace – that unsustainably denude nature.

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