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IMPACT OF WAR ON ENVIRONMENT: A LEGAL ANALYSIS

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- **INTRODUCTION**

War has direct, immediate and deadly impact on human life and health. The "body counts" and the data on those with war-caused injuries and disabilities, both physical and psychological, while woefully incomplete, document the many people tragically killed and wounded as a direct result of military activities. Through the early twentieth century, up to the start of World War II, the vast preponderance of the direct casualties of war were uniformed combatants, usually members ofnational armed forces. Although noncombatants suffered social, economic, and environmental consequences of war and may have been the victims of what is now termed "collateral damage" of military operations, civilians were generally not directly targeted and largely spared direct death and disability from war. But since then, the proportion of deaths to civilian noncombatants during war has substantially increased – and civilian noncombatants have increasingly been targeted during war, with tactics including abduction, rape, and ethnic cleansing.

Since at least the time of the Roman Empire, scorched earth tactics have been used in war to punish inhabitants or prevent an opponent from gaining a military advantage. These tactics specifically and directly damage the environment, affecting combatants and noncombatants alike. Civilians have, more recently, also been directly targeted by attacking armies. In 1937, Nazi forces bombed the city of Guernica in the Basque region of Spain, signaling a modern start to military operations that have increasingly killed and maimed civilians through purposeful targeting and "carpet bombing," and through the collateral damage of heavy attacks on military targets. The percentage of civilian deaths as a proportion of all deaths directly caused by war has since increased dramatically. Today, armed conflicts largely consist of the civil wars (conflicts

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within countries, to which other countries sometimes contribute military troops) that continue to occur in many parts of the world. During 2002, for example, 21 major armed conflicts occurred in 19 different locations. During the post Cold War period of 1990–2001, there were 57 major armed conflicts in 45 locations – all but three of which were civil wars .

Since the 9/11 terrorist attacks on the World Trade Center and the Pentagon, there has been increasing concern in the United States and other countries about "terrorism," which has been defined as "politically motivated violence or the threat of violence, especially against civilians, with the intent to instill fear." The response of the U.S. Government to these attacks has included a preemptive war in Iraq, which has resulted in a huge number of deaths and other adverse consequences; violation of human rights, including torture and other forms of cruel punishment of detainees; restriction of civil liberties; and an overemphasis on bioterrorism preparedness, with a resultant distortion of public health priorities. We believe that the Iraq War needs to end; that human rights and civil liberties need to be restored and protected; and that there needs to be a balanced approach to strengthening systems and protecting people in response to the threat of terror- ism, which strengthens a broad range of public health capacities and preserves civil liberties.

- **Specific Aspects of War and Its Environmental Consequences**

Nuclear Weapons

Nuclear weapons pose a unique threat to humans and the environment, and an assessment of the potential human health and environmental impacts of such weapons can serve as a good example of the type of assessment necessary to understand the effects of any weapon system or military endeavor.

Nuclear weapons have been increasingly widespread since their development in the 1940s. There are approximately 20,000 nuclear warheads in at least eight nations – the United States, Russia, the United Kingdom, France, China, Israel, India, and Pakistan and possibly also North Korea. The historic high in explosive capacity of the world nuclear weapons stockpiles was reached in 1960 with an explosive capacity equivalent to 20,000 megatons [20 billion tons or 40 trillion pounds] of TNT, equiva- lent to that of 1.4 million of the nuclear bombs dropped on Hiroshima. In the United States in 1967, the nuclear stockpile had reached approximately 32,000 nuclear warheads of

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30 different types. In 2003, the U.S. stockpile was about 10,400 warheads, totaling about 2,000 megatons – equivalent to 140,000 Hiroshima-size bombs. Several thousand of the nuclear weapons in the United States, Russia, and possibly other countries are on "hair-trigger" alert, ready to fire on a few minutes' notice.

The detonation of nuclear bombs over Hiroshima and Nagasaki in August 1945 during World War II led to the immediate deaths of approximately 200,000 people, primarily civilians, as well as lasting injury and later death of many others and mas- sive devastation – and widespread radioactive contamination – of the environment in these two cities. In addition to the potential for the use of nuclear weapons by national armed forces, such as that described in the recent U.S. Nuclear Posture Review, which threatened use of nuclear weapons under a wider range of circum- stances, there is an increasing threat of their use by individuals and groups.

Most studies and reviews of nuclear weapons and their effects have focused almost exclusively on what would happen if they were used. Notably, though, this represents only one phase in the life cycle of nuclear weapons, which includes: uranium mining, milling, conversion, and enrichment; plutonium production and separation; nuclear fuel transport; other raw material production; and weapon assembly, transport, storage, testing, maintenance and refurbishment, use, and dis-assembly and disposal, including recycling or disposal of all component parts.

Nuclear weapons present hazards in virtually all areas of their life cycle. Production and testing have their own impacts. The U.S. National Cancer Institute estimated that the release of iodine-131 in fallout from U.S. nuclear test explosions was by itself responsible for 49,000 excess cases of thyroid cancer among the U.S. population. A 1991 publication by the International Physicians for the Prevention of Nuclear War estimated that the strontium-90, cesium-137, carbon-14, and polonium-239 released worldwide in all nuclear test explosions would be responsible for 430,000 cancer deaths by 2000. Additional widespread health and environmental effects of nuclear-weapons production include massive contamination of land by radioactive materials and toxic chemicals.

Epidemiological studies in the past 9 years have demonstrated serious health effects as a result of nuclear weapons testing and manufacture. A reevaluation of the relationship between fallout from atmospheric tests conducted in Nevada found a risk ratio for thyroid neoplasms of 7.5 in the highest radiation dose group, and an excess risk ratio for thyroiditis of 4.9 per Gy of radiation exposure [10]. In addition, there were increased mortality and morbidity of United

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Kingdom and New Zealand military personnel involved in nuclear tests in the 1950s and 1960s. Thirty percent of nuclear veterans from the United Kingdom, New Zealand, and Fuji, who were present for atmospheric nuclear tests in the 1950s and 1960s had died by 1997, mostly in their 50s. Radioactive material releases from the Mayak nuclear weapons facility in Russia contaminated the region surrounding the Techa River and led to an additional risk of leukemias (excluding chronic lymphocytic leukemia [CLL]) that was 4.6 times the background risk per Gy of radiation exposure.

A small study of female nuclear weapons workers in the United States found a significantly elevated odds ratio (2.09) of death from dementia associated with total lifetime radiation dose. Other studies have shown an increased risk of developing leukemia (excluding CLL) associated with low doses of ionizing radiation, such as those received by nuclear weapons workers. Noncancer effects of plu- tonium exposure have also been found, with a significantly greater incidence of pulmonary fibrosis among plutonium-exposed workers compared to unexposed workers. Lung doses of 10 Sv or greater of radiation conferred a 5.3-fold risk of having an abnormal chest X-ray consistent with pulmonary fibrosis.

One study of the molecular genetic effects of densely ionizing radiation found that, in contrast to chemical mutagens, X-rays, or endogenous aging processes, alpha particles and neutrons produce much more intrachromosomal rearrangements and deletions, and that these changes tend to be passed to successive cellular generations. More than half of blood cells of healthy former plutonium workers were found to contain large intrachromosomal rearrangements. The health effects of these abnormalities are uncertain.

Impacts are not limited to human health, as the physical environment is also affected by nuclear weapons production. From 1945 to 1990, the United States produced approximately 70,000 nuclear weapons; other nations produced many additional nuclear weapons. Production of nuclear weapons has led to major environmental contamination. For example, the area around Chelyabinsk in Russia has been heavily contaminated with radioactive materials from the nuclear-weapons production facility in that area. The level of ambient radiation in and near the Techa River has been documented as high as 28 times the normal background radiation level. Leakage of radioactive materials from storage of wastes from nuclear-weapons production at Hanford, Washington, along the Columbia River, has led to extensive radioactive contamination. Open-air testing of nuclear weapons by the United States, the Soviet Union, and other countries

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in the 1950s and early 1960s resulted in environmental contamination, with increased rates of leukemia and other cancersamong populations who were downwind from these tests.

Disassembly and disposal of nuclear weapons has also led to environmental contamination. The primary site for the disassembly of U.S. nuclear weapons is the Pantex Plant, located 17 miles northeast of Amarillo in the Texas panhandle. The United States has dismantled about 60,000 nuclear warheads since the 1940s. More than 12,000 plutonium pits (hollow shells of plutonium encased in steel or other metal that are essential components of nuclear weapons) are stored in containers at Pantex. Plutonium, an element first produced in Manhattan Project reactors in 1942, has a half-life of 24,000 years.

These studies do not even minimally address the remaining life-cycle aspects of nuclear weapons, including raw materials acquisition, transport in the supply chain, and storage. These aspects probably account for additional environmental and human-health impacts that are not fully quantified.

Conventional Weapons

Conventional weapons consist of explosives, incendiaries, and weapons of various sizes, ranging from small arms and light weapons to heavy artillery and bombs. These weapons, the most widely used in conflicts, have accounted for the over- whelming majority of adverse environmental consequences due to war. During World War II, for example, extensive carpet bombing of cities in Europe and Japanaccounted not only for many deaths and injuries, but also widespread devastation of urban environments. As another example, the more than 600 oil fires in Kuwait during the Persian Gulf War accounted for widespread environmental devastation as well as acute, and possibly chronic, respiratory ailments among people who were exposed to the smoke from these fires. As a further example, bombing of mangrove forests during the Vietnam War led to destruction of these forests, and the resultant bomb craters remain several decades afterward, often filling with stagnant water that is a breeding ground for mosquitoes that transmit malaria and other diseases.

Radiologic Weapons

"Dirty bombs," consisting of conventional explosive devices mixed with radioactive materials, or attacks on nuclear power plants with explosive weapons could widely scatter highly radioactive materials. Another example of a radioactive weapon is shells hardened with depleted uranium (DU), uranium from which uranium-235, the uranium isotope usable for

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nuclear weapons or as fuel rods for nuclear power plants, has been removed. An extremely dense toxic and radio-active material, DU used as a casing increases the ability of the shell to penetrate the armor of tanks; DU is also pyrophoric and bursts into flame on impact. DU-encased shells were used by the United States during the Persian Gulf War andthe Iraq War, and the war in Kosovo; similar shells were used by the United Kingdom in the Iraq War. DU can cause contamination of the soil and groundwater.DU presents less of a radioactive threat outside of the body than naturally occurring uranium. A review in 2001 concluded "that at any conceivable level of uptake depleted uranium will have no appreciable radiological or chemical carcinogenic potential" and that "the only chemical toxic effect expected would be reversible damage to the kidney". Others, however, have pointed to the inhalation of gaseous DU and the lodging of particles in the lungs and other tissues as unique hazardsrelated to DU weapons that have been inadequately studied. Use of DU is considered legal by the nations using it, but its use is considered by others to be illegal under some international treati.

Chemicals

A variety of chemical weapons and related materials have the potential for contaminating the environment during war and the preparation for war. The potential for exposure exists not only for military and civilian populations who may be exposeddur ing the use of chemical weapons in wartime, but also for workers involved in thedevelopment, production, transport, and storage of these weapons and community residents living near facilities where these weapons are developed, produced, trans-ported, and stored. In addition, disposal of these weapons, including their disassembly and incineration can be hazardous.

During the Vietnam War, the United States military used defoliants on mangrove forests and other vegetation, which not only defoliated and killed trees and other plants, but may also have led to excessive numbers of birth defects and cases of cancer among nearby residents in Vietnam. In addition, development and pro-duction of conventional weapons involve the use of many chemicals that are toxic and can contaminate the environment. Furthermore, there is now a plausible threatof nonstate agents using chemical weapons. A Japanese cult, Aum Shinrikyo, used sarin in the subway system of two Japanese cities in the mid-1990s, accounting for the death of 19 people and injuries to thousands. More recently, the toxin ricinwas found in a hotel room in Las Vegas, and an individual was arrested for possessing the substance. While

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investigators do not believe he was planning to release the toxin, the case demonstrates the relative ease with which such chemicals can be obtained and potentially used as weapons.

The Chemical Weapons Convention (CWC), which entered into effect in 1997, prohibits all development, production, acquisition, stockpiling, transfer, and use of chemical weapons. It requires each state party to destroy its chemical weapons and chemical weapons production facilities, and any chemical weapons it may have abandoned on the territory of another state party. The verification provisions of the CWC affect not only the military sector but also the civilian chemical industry worldwide through certain restrictions and obligations regarding the production, processing, and consumption of chemicals that are considered relevant to the objectives of the convention. These provisions are to be verified through a combination of reporting requirements, routine onsite inspection of declared sites, and short-notice challenge inspections. The Organization for the Prohibition of Chemical Weapons (OPCW) in The Hague, established by the CWC, ensures the implementation of the provisions of the CWC. The disposal of chemical weapons required by the CWC has raised controversy about the safety of two different methods of disposal: incineration and chemical neutralization. The controversy about safety and protection of the environment has delayed completion of the disposal by the date required by the CWC .

Biological Agents

Biological agents are bacteria, viruses, other microorganisms, and their toxins that not only produce human illness but can also lead to long-term contamination of the environment – not only affecting humans, but potentially also other animals and plants. Biological agents have been used, although infrequently, during wars over many centuries. For example, in the sixth century BCE, Greece, Rome, and Persia used diseased corpses to attempt to contaminate sources of drinking water. In 1346, Mongols besieging the Crimean seaport Kaffa, placed cadavers of plague victims on hurling machines and threw them into the city. During the French and Indian War between 1754 and 1767, the British commander Sir Jeffrey Amherst sent blankets infected with smallpox to Native Americans. During World War I, Germany dropped bombs that contained plague bacteria over British positions and used cholera bacteria as a biological weapon in Italy. Gruinard Island, off the coast of Scotland, was contaminated by a test use of anthrax spores by the United Kingdomand the United States. During the 1950s and 1960s, secret large-scale open-air tests at the U.S. Army Dugway Proving Ground may have introduced the

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microorganisms that cause Q fever and Venezuelan equine encephalitis into the deserts of western Utah. In 1979, the accidental release of anthrax spores near Sverdlovsk in the Soviet Union resulted in at least 77 cases of inhalation anthrax and at least 66 deaths.

Antipersonnel Landmines

There are now approximately 80 million landmines still deployed worldwide in approximately 78 countries. These landmines have been termed "weapons of mass destruction, one person at a time." They have often been placed in rural areas, posing a threat to residents of these areas and often disrupting farming and other activities. Civilians are the most likely to be injured or killed by landmines, which continue to injure and kill 15,000–20,000 people annually. Since the entry into force of the Anti Personnel Landmine Convention (Mine Ban Treaty) in 1997, production of landmines has been markedly reduced and many of those that had been implanted have been removed. Many additional resources will be required to continue unearthing and destroying landmines, tasks that pose inherent risks to demining personnel.

Hazardous Wastes

Hazardous wastes from military operations represent potential contaminants of air, water, and soil. For example, groundwater was contaminated with trichloroethylene (TCE), a probable human carcinogen, and other toxins at the Otis Air Force Base in Massachusetts; 125 chemicals were dumped over 30 years at the Rocky Mountain Arsenal in Colorado; and benzene, a definite human carcinogen, was found in extremely high concentrations at the McChord Air Force Base in the State of Washington.

- **Use of Nonrenewable Fuels and Other Materialsby the Military**

Both during war and the preparation for war, the military of many nations consumes huge amounts of fossil fuels and other nonrenewable materials. Energy consumption by military equipment can be substantial. For example, an armored division of348 battle tanks operating for one day consumes more than 2.2 million l of fuel, anda carrier battle group operating for one day consumes more than 1.5 million l of fuel. In the late 1980s, the United States military annually consumed 18.6 million tons of fuel (more than 44 percent of the world's total), and emitted

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381,000 tons of carbon monoxide, 157,000 tons of oxides of nitrogen, 78,000 tons of hydrocarbons, and 17,900 tons of sulfur dioxide.

- **Forced Migration**

As armed conflict forces people to leave from their homes, a need arises for temporary shelter. Camps for internally displaced persons and refugees can have significant environmental impacts on agricultural land, forests, and other ecosystems. Refugees and internally displaced persons also require safe water and food, sanitation systems, medical-care and public health services, all of which could have direct or indirect environmental consequences.

- **Public Health Approaches to Prevention of War and Its Environmental Consequences**

Those concerned with the promotion and protection of health classify preventive measures into three basic categories: primordial prevention, primary prevention, and secondary prevention. Primordial prevention consists of measures to prevent illness or injury by removing the conditions that lead to them. Primary prevention consists of measures to prevent the health consequences of a specific illness or injury in a specific individual or group. Secondary prevention consists of meas- ures to prevent, or minimize the health consequences, of illness or injury (such as preventing the spread of an infectious disease to others) after the disease or injury has begun.

Prevention of scurvy (vitamin C deficiency) provides examples. Assurancethat a population has access to and information about an adequate diet that includes vitamin C is an example of primordial prevention. Provision of vitamin C-containing foods to ensure an adequate intake of vitamin C among a group that does not have access to vitamin C is an example of primary prevention. To use prevention of smallpox as another example, elimination of smallpox virus is primordial prevention and vaccination against smallpox is primary prevention. Vaccination may also be used after exposure to smallpox virus has occurred to prevent the disease and its spread to others, an example of secondaryprevention.

In general, primordial prevention requires political and social will. Primary prevention may be difficult to accomplish because the causes of the disease or injury may be unknown and, when they are known, the preventive methods may be difficult to implement technically or

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politically. Since measures for primordial or primary prevention are usually more effective and rarely have negative consequences, they are generally considered preferable to secondary prevention even when implementation is difficult or expensive. Secondary prevention is usually easier to implement politically and technically, but, since such methods are often ineffective or only partially effective, they may create a false sense of security and encourage risk-taking, can be more expensive than primary prevention, and are more likely than primordial or primary prevention methods to have adverse consequences.

Prevention of the environmental consequences of war through removal of the causes of war is an example of primordial prevention. Prevention of environmental consequences through prevention of specific wars or of use of specific weapons systems is primary prevention. Secondary prevention requires prevention of spe- cific environmental consequences of specific weapons or specific military operations.

The environmental problems created by war and the preparation for war can appear to be overwhelming. However, standard public-health principles and implementation measures can be successfully applied in addressing these problems. This section highlights these public-health approaches.

- ***Surveillance and Documentation***

Much can be accomplished by undertaking surveillance and other activities to document these environmental problems. Surveillance can consist of both technical and nontechnical reports that help to identify potential environmental problems. Technical approaches to surveillance can include environmental monitoring as well as biological monitoring, the latter to document and assess the human burden of environmental contaminants and their adverse health consequences. Nontechnical approaches can include information from physician reports, reports in the mass media, and assessments by government agencies.

- ***Education and Awareness-Raising***

Much can also be accomplished by educating and raising the awareness of health professionals, policy-makers, and the general public about these environmental problems. A multifaceted approach that incorporates publications by citizens' groups and professional organizations, communications by the mass media, and personal communication is often valuable. In addition,

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efforts should be made to assist people in distinguishing between accurate and inaccurate information and in setting priorities.

- ***Advocacy for Sound Policies and Programs***

Finally, much can also be accomplished by advocating for improved policies and programs to minimize the impact of war on the environment and to help prevent war itself.

CONCLUSION

The Indian culture has passed through many phases, invaded by many rulers but it has retained its love for nature which is imbibed in its culture. In the Pre-Vedic period, Vedic period and late Vedic period people were much more concerned about the preservation and conservation of nature. The forest policy of the Mauryan Empire had made a remarkable contribution to the development of environmental jurisprudence in India. First-time legal provisions were made to maintain sanitation, conservation of forest, and protecting water resources in this period. The forest policy of the Mauryan Empire is appreciable. The rule of law was prevailing during that period. Ashoka's compassion for animals and birds had led to the conservation of biodiversity in that period. The boundaries of the Mauryan Empire were extended to a major part of present India, Afghanistan, and Bangladesh, etc. As a result of this, the environmental policy was implemented effectively throughout India. The Gupta period, i.e. the rule of the Gupta dynasty was the next remarkable period after Mauryan Empire. After the Gupta age, Harshvardhana and other kings ruled India but at that time India was divided into small kingdoms. But all of them had retained the environmental policy of Mauryan.

The history of India took a sharp turn with the invasion of Muslim Kings in India. Ghors, Khilji, Lodi, Mughal dynasties ruled India from the tenth century to the eighteenth century. Among all these, the Mughal dynasty ruled for the longest period. They had not contributed much except the development of gardens, orchards, etc. Hunting was their favorite pastime.

Next to Mughal, was the period of the British Raj. It was an era of plundering the forest resources of India. The British were much more interested in earning revenue and plundering forest resources this policy had adversely affected the Indian environment. But their remarkable contribution was in the field of development of different laws to manage ecological resources in India. Though these laws were reactive, formulated to meet the requirement of a specific

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situation or emergency, they contributed positively in setting a new trend in India. Forest officer was appointed first time during the British period. In 1947, India became independent. In 1950 the Indian Constitution came into force and it marked a new beginning in India. In the first two decades after independence, the major area of focus was the economic development of the country. The forest policy was framed to support the development of industries, forest as a resource to supply raw materials to forest-dependent industries. No remarkable contribution was made during this period.

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