

"Landmines - Challenges to Humanity and Environment"

20 April 2003

organized by

Indian Institute of Peace, Disarmament and Environmental Protection, Nagpur, India and
Global Green Peace, Srinagar, Jammu & Kashmir, India at Srinagar, India

Impact of War and Landmines on Environment

Abdhesh Gangwar

Coordinator

Centre for Environment Education, Himalaya

Introduction

Anti Personnel (AP) Landmines pose a serious threat to environment, livelihood and process of sustainable development, affecting not only present but also future generations. They prejudice economic development by disrupting the biosphere's life support systems and diminishing the capacity of the environment to supply the raw materials and natural resources. Mines deny access to natural resources, promote the rapid and unsustainable exploitation of marginal and ecologically fragile environments, deplete biological diversity by destroying flora and fauna, contaminate the surrounding soil and water with highly toxic substances, and destroy the ecosystem itself by disrupting soil and water processes.

Estimates suggest that over 110 million landmines are still in place. AP landmines were a constant threat even to the faction who laid them. Nobody kept full records of the mines laid and it is almost impossible to do so for the mines dropped from aircraft. Use of landmines constitutes an ecological, economic, and social problem.

In poor countries landmines have denied land to farmers, pastoral communities and returning refugees and have covered large tracts of the earth's surface with non-biodegradable and toxic garbage. Mines are a major contributor to economic and social impoverishment. The use of land mines results in loss of productivity of farmlands, removal of vast tracts of arable land from safe use for decades, and disruption of transportation and agricultural markets.

Services and Supplies

Roads, power lines, electric plants, irrigation systems, water plants, dams, and industrial plants are often mined during civil conflicts. In the aftermath of those conflicts, it is often impossible to attend to such facilities to repair them or to do the needed maintenance. As a consequence, the delivery of electricity and water becomes more sporadic and often ceases in heavily mined areas. Irrigation systems become unusable, with consequent effects on agricultural production. Transportation of goods and services is halted on mined roads and the roads themselves begin to deteriorate. Local businesses, unable to obtain supplies or ship products, cease operation. Unemployment in those areas increases and the prices for scarce goods rise up, increasing the

cycle of misery. In those areas dependent upon outside aid for sustenance, the mining of roads can mean a sentence to death by starvation.

Crops and Vegetation

Mines destroy flora and damage the soil structure, reducing soil productivity. Mines cause irreversible damage to ecosystems, including prolonged direct damage to soil through shattering and displacement, destruction of soil structure, and increased vulnerability of soil to water and wind erosion. In Vietnam landmines have dramatically reduced the soil productivity. There is 50% reduction in rice yield.

Furthermore, the destruction of vegetation cover and topsoil by mines and UXO, coupled with deforestation, resulting from the use of defoliants such as "Agent Orange", has a cumulative effect. Reduced water retention in mountainous regions results in flooding and topsoil erosion on the coastal plains. The disruption to the soil structure further exacerbates the erosion problem, which leads to an increased sediment load in the drainage system. Increased sedimentation in coastal waters can adversely affect fish and prawn habitats. The extensive use of landmines accelerates deforestation. In areas where agricultural and grazing land has been mined, forests often become the only source of fuel and livelihood. Valuable forests and fruit trees are speedily stripped and felled for firewood and building material.

Deforestation affects drainage systems, water tables, wetlands, coastal mangroves and dune systems.

Ecosystem services are disrupted, over both distance and time. Two decades of war and unrest in Cambodia, for instance, have destroyed 35% of its forest cover. In Vietnam, bombs alone are estimated to have consumed over 2 million acres of land. And in Afghanistan, one quarter of the forests were destroyed, leading to the conclusion that the damage to the forests may be the greatest environmental catastrophe that occurred in Afghanistan during the war.

Livestock

Landmines kill livestock and cause serious loss. In Libya between 1940 and 1980, mines and other UXO have killed more than 125,000 camels, sheep, goats, and cattle. There were about 264,000 goats and sheep killed in Afghanistan, at a value of about \$31.6 million dollars. The same holds for cows, horses, camels, and vehicles. The total direct cost of damage caused by mines to animals and vehicles comes to about \$155 million.

In subsistence pastoral and agricultural societies where livestock possession is an important wealth, the economic and social impacts of livestock losses can be devastating. Mines also threaten rare and endangered species. Mines have killed elephants in Africa and Sri Lanka, eradicated gazelles from parts of Libya, pushed snow leopard to the brink of extinction in Afghanistan, and killed one of the few remaining male silver-backed mountain gorillas in Rwanda.

Wildlife

Landmines often kill wildlife. In Croatia brown bears are regular victims. In India, landmines have killed barking deer, clouded leopard, snow leopards, and Royal Bengal tigers. In Libya, gazelles have disappeared from sites that were mined during World War II. Landmines have a direct and immediate impact and they will continue to haunt the native people and the indigenous wildlife. Even the retrieval of landmines has a detrimental effect on the environment. In the process of clearing Iraqi minefields, bomb disposal units ploughed up large areas of the desert, tearing up and damaging fragile and slow-growing vegetation and destroying habitat for numerous animal species.

Indiscriminate land mining leads to an environment hostile towards many forms of life. Entire species may be wiped out. Kuwait lost 30,000 marine birds as a result of burning of oil fields by the departing Iraqi troops in 1991. Similarly, the use of defoliants in Vietnam and Afghanistan has caused dramatic loss of habitat.

Critical natural habitat and its associated biodiversity have been steadily diminishing in wars around the world. By 1991, decades of civil war in Angola had left the nation's parks and reserves with only 10% of their 1975 wildlife population levels. In Sri Lanka, a six-year civil war has led to the felling of over 5 million trees, a crucial resource for the farmers and villagers of the island. Bombing and defoliants in Vietnam and Afghanistan resulted in dramatic habitat loss.

Snow Leopard: A Case Study from Afghanistan

Snow leopards are an "indicator" species and the condition of their populations gives an insight into the health of the big cat's ecosystem. The total number of animals has fallen in recent years, primarily because of poaching and killing of their prey species by human beings. It is now estimated that there may be as few as 3,500 left in the world. While no good data exists on exact population numbers in Afghanistan, it is estimated that no more than 200 and probably fewer than 100 animals still exist there.

Air strikes disturb and even kill animals. Bombing and ground fighting affects other species, such as migratory birds that travel down from northern and central Russia through the Afghanistan highlands to their wintering grounds in India. Endangered species such as cranes and pelicans depend upon staging areas in Afghanistan to rest and find food during the long migration. Disturbance from bombing, aircraft flyovers, and troop activities can drive the birds from these staging areas so that they face possible death from exhaustion and starvation.

Troops on the ground hunt wild goats and sheep, the snow leopard's main prey species. In order to maintain an income for weapons and arms, poaching may become a realistic option for the guerrilla fighters. This was the case in war-torn regions of Africa: in Somalia, guerilla forces were frequently behind poaching of elephants for their ivory, while in Rwanda guerilla activity in the 1990s resulted in the deaths of a number of mountain gorillas. Snow leopards, because of the high price of their skins on the black market, will be an obvious target. In a country with almost no economic structure, where household income only averages the equivalent of a few hundred dollars or less a year, and where environmental policing is essentially nonexistent, this kind of potential income is a huge incentive for both troops and local villagers.

Another important but less obvious impact of the presence of military forces in the snow leopard's habitat is the introduction of landmines. It is thought that about 10 million mines have been laid in Afghanistan over the last two decades. They have not only injured human beings and wildlife, but have destroyed hundreds of irrigation systems in Afghanistan. Landmines accelerate environmental damage through their explosions and the fear of mines will drive herders, villagers, and others from areas thought to be mined into more marginal and fragile environments and speed the depletion of resources and destruction of biological diversity.

Pollution

Landmines also introduce poisonous substances into the environment as their casing corrode and decay. Mines commonly use 2,4,6-trinitrotoluene (TNT), hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX, or "Cyclonite"); and these substances can leach into the surrounding soil and water as the metal or timber casings disintegrate. These substances, and the compounds derived from them as they decompose, are soluble in water, long-lived, carcinogenic, and quite toxic, even in small quantities. TNT and RDX are lethal to mammals, aquatic microorganisms, and fish. RDX is particularly toxic to mammals.

The devastation to the environment and civilian population caused by cluster bombs and by the use of Depleted Uranium artillery (contained in Tomahawk missiles) will be a lingering and insidious nightmare against the environment and Afghanistan's people. Depleted uranium is a nuclear waste. It is a by-product of the enrichment of natural uranium for use in nuclear power and nuclear weapons. Depleted uranium is twice as dense as lead, making it effective as an armour piercing weapon. It is also pyrophoric, meaning it has a tendency to ignite spontaneously, or with a target on impact. Its fine particles can spread over a large area, and are easily ingested. Reportedly, exposure to depleted uranium can result in a staggering increase in cancer.

The bombs detonated have chemical by-products. Chemicals supporting war activities, such as herbicides or chemical weapons, have effects that are seen for generations.

The U.S. used around 19 million gallons of "Agent Orange" in South Vietnam during the war, between 1962 and 1971. Agent Orange defoliated jungles to enable American troops to spot Communist troops. Agent Orange contained dioxin. Recent studies have shown that high concentrations of dioxin persist in Vietnam today, irreversibly altering ecosystems and causing serious health effects. Dioxins cause cancer, birth defects and genetic mutations. High levels of dioxin persist in the blood of Vietnamese people even today. In addition, the rapid loss of vegetation caused serious soil erosion, soil nutrient depletion and a major drop in animal populations due to the loss of habitats.

The Soviet Union, now Russia, was dumping radioactive waste in the Sea of Japan since 1950s. Even after this was reported the Russian navy audaciously dumped 900 tons of low-level liquid nuclear waste directly in the Sea of Japan in October 1993. In the face of strong resentment by Japan, the United States and other countries, the Russian government reluctantly announced that it would suspend the dumping. Since the Sea of Japan is a fertile fishing ground for surrounding countries such as, South Korea, North Korea, Japan and Russia itself, it is feared that those radioactive materials may contaminate fish and sea plants. Moreover, there may be possibility

that such dangerous substances spread out of the Sea of Japan. In such a case, countries facing the Pacific Ocean might be threatened by the radioactive contamination through seafood.

Pollution caused by landmines lead to environmental degradation and ecological disruption. The degraded environments threaten human health and well being. Landmine may be the most toxic and widespread pollution mankind facing today. Un cleared landmines are a malignant threat. Land mines cause long-lived pollution that requires physical cleansing of the earth to eliminate it.

Climate Change

In 1991 Iraqi forces had destroyed over 700 oil wells and spilled ten million gallons of crude oil, the largest human facilitated discharge of oil ever, into the tiny nation's waterways and deserts. The Iraqi army laid an estimated nine million mines in Kuwait. Iraq used the environment itself as a weapon of mass destruction. Though the war is long over still the environmental damage is still being felt.

The recovery of Kuwait's economy appears optimistic, given the increased productive capacity of the oil industry. However, it may be years, if not generations, before the full extent of the damage to the physical integrity of the region and to human, animal, and plant life, is fully assessed. These environmental costs may have repercussions not only for the region, but also for other countries in central and south Asia. For example, some scientists have speculated that a 1994 cyclone in Bangladesh that killed 100,000 people was precipitated due to climactic changes from the Kuwait oil fires. Environment has a large boundary. The cause of an environmental problem may be somewhere but the effect can be at a far off place. The black smoke from gulf during Gulf War got deposited on the high snow peaks of Himalayas and affected the water supply downstream in the Hindu-Kush Himalaya.

War and Environment

Warfare also affect environment in many ways. Land use, water supply, air quality, biological resources, and the functioning of ecosystem services are often disrupted by war. Military impact on natural capital is global, ongoing and persistent. It can result from the actual physical destruction of landscape, the release of pollution during or in preparation for combat, or from the social disruption that leads to refugee populations, resource depletion and subsistence living.

Another characteristic of war is a breakdown of infrastructure. Physical facilities for transportation, health care, water supply, sewage disposal, electricity and communication, to name a few, can all be significantly compromised. Key people in various service positions, including environmental protection, may have been casualties of the conflict. Traditional methods of farming and conservation are often eliminated. Systems for environmental protection may have been deactivated, and resources for such services may have been diverted to military assets.

War can lead to a breakdown in ecological infrastructure, impairing important ecosystem services. In Persian Gulf not only did the oil spills endanger the arid region's water supplies, the

thick clouds of smoke from the nine months of oil fires had notable impact on local and regional climate. Studies show that the temperature of the region dropped a full ten degrees Centigrade during the period the fires were burning.

Military activities during a war can cause severe disruption to the landscape. The supporting activities of war, such as temporary fortifications, roads, and the waste produced by armies are done without any consideration for the environment. Personnel carriers, especially tanks, destroy vegetation, loosen and disrupt the soil surface and compact the underlying layers of soil, rendering soil less fertile. Landmines make land unsuitable for agriculture by creating giant craters or imminent danger.

Warfare today uses explosives and machinery to subdue enemies and territories. The intensity of environmental damage resulting from wars has been remarkably parallel to the technological 'advancement' in warfare. Use of more advanced arms and ammunition means more damage to environment.

There are currently some 40 armed conflicts going on in the world involving tens of millions of people. Many of these are taking place in locations that are critical to maintain biodiversity, such as, Africa, South Asia and Latin America. Because these are often in highly populated, lower income nations, they also tend to be regions that are already suffering severe environmental stresses.

During Indo-Pak wars, 1947-48 and 1965-71 minefields were well mapped and well marked. These short wars did not leave hazardous mines behind and there are no reports of civilian casualties caused by landmines. During India-China war, 1962, landmines were laid only in mountainous country. This was a lost cause because of the fact that the landmines could not be triggered in the snow and they slid down the mountainsides even when anchored, on account of the snow drifts. Mapping was futile. Afghanistan has the third largest number of mines in their country. Most of the land is mined, especially heavily along borders with Iran and Pakistan.

Environmental refugees

Because mines are often laid in areas of human occupation, landmine pollution has the effect of pushing people from their traditional lands into refugee camps. Refugees, unable to return to their contaminated lands, are often forced out into otherwise unused or marginal land, placing additional pressure on already fragile environments. Mine contamination disrupts traditional subsistence agriculture and forces societies to move into urban environments, contributing to overcrowded housing, congested traffic, unemployment, air and noise pollution, and problems with water supply, sanitation, and waste disposal.

Perhaps the greatest environmental impact in Afghanistan will be from the displacement of people and the large number of refugees. The arrival of large numbers of refugees in an area previously containing few or no people creates intense pressure on the environment. The dependency that each refugee camp has on the natural resources in the immediate area will greatly outweigh the available resources in Afghanistan's already depleted environment.

Deforestation, soil erosion from overgrazing of refugee livestock and water contamination all has an impact on wildlife and on the refugees themselves.

A secondary effect of refugees is that mobile species will be driven from suitable habitat into less habitable areas. Refugees are forced to use minor roads in more mountainous country to reach border areas where security is weak. There is then a sudden influx of people into regions that otherwise have low human pressure, regions which are now the only remaining habitat for wild goat, sheep, and snow leopards. Refugees also naturally congregate around the few water sources in this arid land, sealing them off from wildlife.

The conflict in Afghanistan has dramatically exacerbated this situation, and the damage will continue if environmental considerations are not taken into account. There is a clear link between environmental health, human health, and political stability.

Now it is estimated that more than seven million people in Afghanistan are at risk of malnutrition or starvation. In Afghanistan, 90 per cent of people do not have access to proper sanitation and less than 25 per cent have access to safe water.

The largest bomb being used in Afghanistan is the BLU-82 bomb. Nicknamed "Big Blue" or "Daisy Cutter," it leaves a daisy-shaped crater, a three-mile long path and incinerates an area the size of five football fields. It is the largest non-nuclear weapon in the world, and several have already been dropped on Afghanistan, causing giant mushroom clouds in the area where they land.

Cruise missiles have been used extensively by the US military in several previous conflicts, often containing depleted uranium. The U.S. and Britain have already launched many cruise missiles, especially "Tomahawk", against Afghanistan. The Taliban and several other non-allied countries have accused U.S. and U.K. of using depleted uranium as a warhead in this conflict, a charge the U.S. and Britain both deny. Depleted uranium was previously used in several conflicts, including the Gulf War.

Use of depleted uranium is responsible for an expected increase of 20,000 to 100,000 fatal cancers in US Gulf War veterans and Iraqi citizens. Kidney disease and reproductive failure are also expected effects of depleted uranium exposure. Depleted uranium has a half-life of 4.5 billion years. As it forms easily dispersed particles, it can quickly contaminate soil, air and water, rendering them toxic and radioactive indefinitely.

Financial Implications

The financial cost of a global mine clearance is prohibitively high. Using current equipment and techniques, the time, cost, and danger involved in de-mining are staggering: mine clearance experts estimate that adequately trained and equipped personnel can clear 20 - 50 m sq per person per day, while the ratio of time taken to lay a mine against the time it takes to locate and destroy the mine in situ is around 1:100.

The UN states that the costs associated with clearance, including training, support, and logistics, are estimated at between US\$ 300 and US\$ 1,000 per mine. Thus it would require, at a minimum, US\$ 33,000,000,000 - US\$ 110,000,000,000 to clear the 110,000,000 mines already polluting the globe, assuming no more were laid. The costs associated with landmine pollution are prohibitive. The UN estimated that it would require US\$ 153,000,000 to run all of its de-mining programmes and projects in 1995, and stated that as significant as this global budget is for assistance in mine clearance, this figure is miniscule when compared with the estimated \$57 billion it will cost to remove the 110 million estimated land-mines currently in place.

Landmines continue to maim and kill civilians long after hostilities have officially ceased. Mine blast injuries place a tremendous immediate burden on health care resources. This burden is further compounded by the costs of rehabilitative support for mine victims.

Remediation

Despite the best care war will inevitably damage key natural ecosystem services. During post war, timely and effective remediation is a key to minimize the damage to the environment. Environmental remediation is a familiar concept, applied in settings such as superfund sites and wetland restoration. In essence, remediation consists of evaluating the amount of damage done to the environment in a location, determining what level of correction is needed to remove hazards to humans in the area, and re-establishing environmental quality for a location.

In the case of the Persian Gulf, remediation has been going on since the war ended. By quick action, 95% of the spilled oil was retrieved and exported. Though the remaining spills continue to threaten the environment, the catastrophe would have been compounded significantly without such remediation. International community should provide environmental assistance as part of humanitarian aid packages, thus avoiding further harm to human health and the environment.

In dealing with the effects of war, remediation can take many forms. It may borrow techniques from waste management, erosion control or public health, to name a few. It may involve rapid, crisis-based responses, as in the Kuwait fires, or like a re-forestation effort in El Salvador, it may be part of a long-term environmental sustainability plan.

Refugee relief efforts can also be thought of as a form of remediation. Organizations like the International Red Cross and the UNHCR have begun to incorporate environmental management into their strategies. In some cases the remediation may consist of very concrete, commonsense steps to lessen the impact refugee populations can have on fragile ecosystems.

CARE International found that for the Rwandans fleeing to Tanzania, details as simple as grain milling techniques and lids for cooking pots could achieve a 75% reduction in the amount of fuel wood needed. Considering that over 200,000 refugees fled Rwanda in a single day, reduced wood requirements can save entire forests. This underscores the fact that information and management skills may be the most important factors in reducing and mitigating the environmental effects of warfare. Science-based understanding of environmental damage and remediation will be a necessity in carrying this out.

Practices like the use of weapons containing depleted uranium, placement of AP landmines, bombing of factories and storage facilities, the burning of oil refineries have devastating effects on the environment and must not be legitimized as acts of war in the international legal framework. Humankind has always counted its war casualties in terms of dead and wounded soldiers and civilians, destroyed cities and livelihood. The environment has always remained an unpublicized, unnoticed victim of war. United Nations and environmental activists are demanding that nations stop using environmental destruction as a weapon of war. The UNEP is studying the environmental impact of the recent U.S.-led bombings in Afghanistan and is preparing a report on the Palestinian territories occupied by Israel to identify the priorities for environmental rehabilitation.

UN Secretary-General, Kofi Annan, to mark the first observance, on 6 November 2002, of the International Day for Preventing the Exploitation of the Environment in War and Armed Conflict said that damage to the environment in war is also an impediment to the restoration of peace and rebuilding. The lesson to be drawn is that modern warfare needs environmental rules, just as earlier wars highlighted the need to regulate the impact of war on civilians and prisoners of war. Every effort must be made to limit the environmental destruction caused by conflict. While environmental damage is a common consequence of war, it should never be a deliberate aim. The international community must all out condemn all deliberate destruction of the environment during conflict.

On 7 September 2000, the Nobel Peace Prize for 1997 winning International Campaign to Ban Landmines (ICBL), released the second annual report of its Landmine Monitor initiative: a 1,115 page book, titled "Landmine Monitor Report 2000: Towards a Mine-Free World". The report, based on data collected from 95 countries, is the most comprehensive book to date on the global landmine situation, containing information on every country in the world with respect to mine use, production, trade, stockpiling, humanitarian de mining and mine survivor assistance.

Landmine Monitor estimates that there are more than 250 million antipersonnel mines in the arsenals of 105 nations, with the biggest estimated to be China (110 million), Russia (60-70 million), Belarus (10-15 million), United States (11 million), Ukraine (10 million), Pakistan (6 million), and India (4-5 million). According to the report there is a positive change and the situation is improving, though lot more needs to be done.

The report observes that there has been reduced use of the weapon in recent years; a dramatic drop in production of landmines (from 54 known producers to 16); an almost complete halt in trade (not a single significant shipment identified in 1999/2000); increased destruction of stockpiled antipersonnel mines (more than 22 million destroyed by over 50 nations, including some 10 million since March 1999); increased funding for humanitarian mine action (more than \$211 million in 1999 alone, an increase of about one-third over 1998); fewer mine victims in key affected countries including Afghanistan, Bosnia-Herzegovina, Cambodia and Mozambique; more land de mined (in 1999 seven of the largest humanitarian mine/UXO clearance programs cleared a combined total of more than 168 million square meters of land).

For more than 25 years, the United Nations Environment Programme (UNEP) has been in the forefront of that effort, reporting on the state of the world's forests, oceans and atmosphere,

cataloguing the fragility of the ozone layer and freshwater resources, forging a response to these and other crises. We face a major challenge in the areas of climate change and biodiversity. The loss of species persists and greenhouse gases are still being emitted at higher levels than internationally agreed targets.

International Campaign to Ban Landmines helped turn a growing awareness by ordinary people into a grass-roots movement of conviction and then into a truly global cause. And, it made governments acknowledge that the cost of landmines far outweighed the need to use them. How did they do it? One thousand non-governmental organizations in 60 countries were linked together by weapons that would ultimately prove more powerful than the landmine.

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Browsing Classification: Sociology and Demography: Warfare and Refugees: Global
Sociologie et démographie: Guerres et réfugiés
Sociología y demografía: Guerras y refugiados

Citation: Gangwar, Abdhesh. 2003. Impact of War and Landmines on Environment. Centre for Environment Education, Himalaya.

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