

# War, the Environment and Risk Society\*

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My topic is one which, at first sight, is somewhat obvious: what is the connection between war and the environment? Simply put, throughout human history there have been three historically constant aspects of this relationship: competition for environmental resources (or minimizing environmental disadvantage); environmental change as tool of war; and significant environmental consequences of war. For most of recorded history, all that has varied has been the scale of the relationship, with the level of technology and the degree of social complexity providing the main sources of variation.

It is hardly news to announce that the environmental characteristics of countries – and the distribution of resources available for economic exploitation - have led to armed conflict. To think only of recent history, two of the greatest conflicts the world has seen to date – World War 1 in Europe, and World War 2 in Asia - were clearly the result of competition between states to control the human and physical resources of countries beyond their borders – in short, imperialist competition. These conflicts, while certainly fueled by other motives and more immediate layers of causation (racism, militarist policies, arms races, assassinations of leaders, etc.) were but grander versions of earlier, more localized catastrophes flowing over competition for resources or the desire to maximize environmental advantage. No doubt the very large level of population movement around the time of the last great environmental change prior to recorded human history, the coming and going of the last ice age, was saturated with violence.

For centuries, environmental change on a local or regional scale has been a weapon of war: consider the scorched earth tactics used by Stalin's armies against the German invaders, or the repeated firing of cities throughout Japanese history. To take but one example, half of Kyoto burned in the fighting of 1867. Or the US bombing of Japanese cities in 1944-45. Clausewitz's famous dictum that "war is but the continuation of policy by other means" could be rephrased to state that war is but the alteration of the environment of the enemy to achieve the ends of policy". Whether at the micro-level of creating a killing field surrounding individual enemy soldiers, or the larger but more slow-acting blockading an enemy nation's ports, or creating a firestorm that destroys great cities and consumes the lives of hundreds of thousands of its working civilians, a key aspect of war as a tool of state policy is the manipulation of environments large and small to achieve specified ends of state.

Despite the historical constants, there is no doubt that the last 150 years, and the twentieth century in particular, have been horrific, with an historically unprecedented combination of a scientific approach to weapons development and a diminution of restraint on the scale of violence and its targets. That period opens with the massive fratricidal slaughter of the US Civil War – the first industrial war. Rapid technical advances in weapons development, combined with industrial production brought the rapid firing rifle, the machine gun, and aerial bombing all first deployed specifically for use against "natives" by the European powers in Africa, East Asia and

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the Middle East.<sup>1</sup> The First World War brought rationalized war mobilization of whole industrial societies – and the transformation of the golden fields of Flanders and the forests of northern France into the never to be forgotten image of an environmental of four years of the living hell of trench warfare. And the next world war – the second round of the first in fact – brought the perfection of aerial bombing of cities in the form of the firebombing of Dresden and Tokyo and the first nuclear war. To speak of the environmental implications of these barbarisms is almost grotesque.

Yet, beyond these horrific but well known matters, we must now recognize that both human society and the natural environment have entered into a new historical phase. War – as both cause and effect of environmental change, and as a crucial connector between the environment and the social world, has, as a consequence, also changed profoundly.

This shift has three important characteristics influencing all three constant aspects of the connection between war and the environment:

- (a) war and the preparations for war have become the paradigm of the way in which human action alters the ecology of the earth, with a clear potential for irreversible intervention;
- (b) war and the preparations for war provide the paradigm case that demonstrates that we can no longer separate “society” from “the natural environment”, but rather we live in the “constructed environment” where human activity and its ecological setting are mutually interdependent in a manner that changes the characteristics of both and increases the risks to both; and
- (c) one of the characteristics of the present stage of the global political ecology is a systematic collective inability to recognize the true nature of the threats we face and act accordingly.

Let me say a little about each of these claims.

### 1. War as a paradigmatic transformation of the environment

For ecologists, global warming is significant not only a major threat to the biosphere, but as the first occasion in the long history of the planet on which the intentional behaviour of animals – in this case humans – have modified the global environment. While there remains substantial disagreement amongst scientists about the level of disturbance if present socio-technical systems are unaltered, and about the necessity and effectiveness of various proposed remedies, there is no doubt about the incipient theoretical possibility of climate change as a result of human activity in industrialized societies devoted to an ideal of exponential material growth.

To state the obvious, the nuclear bombing of Hiroshima and Nagasaki, and the test bombings of Bikini, Mururoa, Novaya Zemlya, Almagordo, Maralinga, [and other test sites: viz China, India and Pakistan] all produced substantial environmental transformations – some of which were intended by the designers of the weapons involved, and some of which were surprises.

Though the human consequences were appalling in both number and degree, the first nuclear explosion sites at Hiroshima and Nagasaki were less threatening than what was to come later, in “peace”.

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<sup>1</sup> Stockholm International Peace Research Institute, *Anti-personnel Weapons*, (London: Taylor and Francis, 1978), pp.6-17; Paul Fussell, *The Great War and Modern Memory*, (New York: Oxford University Press, 1989).

At first sight it may seem that the environmental effects of weapons, terrible as they may be, cannot be and should not be compared with the effects of global warming and the depletion of the ozone layer. It might be said that the transformations of the biosphere that will result from an unchecked increase in greenhouse and other gases produced as a result of industrial socio-technical systems would be true ecological system change resulting from human activity. Nuclear bombing may kill millions of people and even lead to the end of certain societies as we know them, but such environmental changes are on a different scale and character from the real threat of global warming.

Firstly, in this view the likely consequences of a nuclear war would be limited, and would not be truly systemic in ecological character. Most likely only limited areas in specific countries would be affected, even allowing for unintended collateral consequences such as radiation drift into neighbouring countries. Secondly, it might be argued that unless there is rapid change in industrial activity, global warming is not just a scientific possibility: it is an historical certainty. By comparison, the use of nuclear weapons in war has only occurred on two occasions in the past six decades of often intense worldwide and regional conflict between nuclear capable countries. Moreover, it may be argued, the Cold War is now over, and as a result, the threat from nuclear weapons has diminished accordingly.

In fact, both key elements of this argument are wrong. Consequently, the threat of war using weapons of mass destruction remains not only serious, but provides the paradigm case for human transformation of the global ecology, possibly irreversibly.

If we leave aside the largely unresearched delayed cumulative effects of large numbers of biological and chemical weapons, the nuclear winter hypothesis provides a highly plausible paradigm of the connection between contemporary war practices and global ecological change. Nuclear explosions yield three types of delayed ecological effects after the initial blast period: long-term radiation distant from the site of the blast; ozone layer damage due to the generation of large amounts of nitrogen oxides likely to be carried to the stratosphere; and the absorption of sunlight when large amounts of soot, dust and smoke are carried into the atmosphere. The last is the nuclear winter effect, which was given its name in the famous TTAPS study published in 1983 (named after the initials of the surnames of authors: Turco, Toon, Ackerman, Pollack and Sagan<sup>2</sup>). While the TTAPS study was subjected to substantial criticism, subsequent research has confirmed and extended the basic hypothesis.

Fireballs in nuclear explosions over urban or industrial areas or on petrochemical targets, fireballs will generate massive firestorms over wide areas. These in turn will generate large volumes of smoke, dust and soot, which will be lifted to high altitudes in the atmosphere. The exact results depend on a variety of contingent factors including the physical characteristics of the targets and the bombs employed, the height of the explosion above the ground, the prevailing and subsequent weather patterns, and the ratios of soot and dust in the plumes that will reach towards the stratosphere. Soot particles tend not to be washed from the atmosphere as rapidly as other matter. More importantly, soot is particularly efficient in absorbing light. Several hundred million tons of soot could coalesce to produce a uniform belt of particles in the northern hemisphere, possibly circling the globe in the mid-latitudes for many months.

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<sup>2</sup> The results of the original TTAPS study are summarized and discussed further by Carl Sagan in his "Nuclear war and Climatic Catastrophe", in Lester Grinspoon (ed.), *The Long Darkness: Psychological and Moral Perspectives on Nuclear War* (New Haven: Yale University Press, 1986), pp. 7-62.

The reduction of sunlight reaching the surface of the earth in the northern temperate and subtropical zones would lead to a sustained average drop in temperature of up to 10 degrees C. Photosynthesis of plants would be immediately interrupted, with severe immediate consequences for plants and animals. The direct effects of sub-freezing temperatures, plus radiation, combined with the damage to social and medical infrastructure, would be supplemented by huge pressure on food production.

The climatic effects of such a phenomenon would be profound. The average level of cooling suggested is far greater than any in recorded history, and has been compared to a full ice-age. Even if the numbers of nuclear explosions were smaller than those assumed in the TTAPS and similar studies, a relatively "nuclear autumn" could produce substantial regional decreases in temperature, with devastating effects on food production.

There is much that is still theoretically unclear about the nuclear winter hypothesis, but the advances in studies of global climate change in the past two decades have served to increase, rather than diminish, the plausibility of the basic model.<sup>3</sup> Even without comparable research on the delayed effects of chemical and biological warfare, nuclear winter is a highly plausible paradigm of the effects of human activity on the global ecology.

Some may take comfort from the fact that the nuclear winter hypothesis emerged in the Cold War era, with an assumption of total nuclear war employing the vast nuclear arsenals of the United States and the Soviet Union. Surely, it might be argued, these old fears should pass with the end of the Cold War, the collapse of the Soviet Union and its armed forces, the reduction of hostility between the United States and Russia, and the very considerable reductions in nuclear arms stockpiles on both sides?

While there is much for which we should be grateful in these historical shifts, the danger of nuclear war remains very high. In addition to the highly publicized testing of nuclear weapons by India and Pakistan, the de facto recognition of Israeli nuclear weapons possession<sup>4</sup>, and the development of advanced neutron weapons by China<sup>5</sup>, most of the Cold War nuclear military-technical infrastructure remains in place in the United States. The Department of Energy is still producing nuclear weapons for the United States, and the Los Alamos and Lawrence Livermore Laboratories are still energetically researching new and more sophisticated nuclear weapons.<sup>6</sup> The former Soviet nuclear facilities are mostly under Russian command, at least nominally. There is in fact great uncertainty as to the actual state of Russian nuclear weapons, increasing the overall level of insecurity. Moreover, in East Asia, for example, it is difficult to argue that the overall level of threat from incipient military confrontation is on balance lower than for most of the Cold War.

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<sup>3</sup> For authoritative scientific reviews of the field see A. Barrie Pittock and Thomas Ackerman, *Environmental Consequences of Nuclear War: Physical and Atmospheric Effects*, second edition, (New York: John Wiley, 1989); and Mark A. Harwell and Thomas C. Hutchinson, *Environmental Consequences of Nuclear War: Ecological and Agricultural Effects*, (second edition, New York: John Wiley, 1989).

<sup>4</sup> Avner Cohen, *Israel and the Bomb*, (New York: Columbia University Press, 1998).

<sup>5</sup> On Chinese neutron bombs, and Chinese nuclear weapons in general see the Monterey Institute of International Studies, Centre for Non-Proliferation Studies, website on *China's Nuclear Stockpile and Deployments*: <http://cns.miis.edu/research/china/nstock.htm>.

<sup>6</sup> For information on the current size and status of US nuclear weapons see the Natural Resources Defense Council, Nuclear Notebook website: <http://www.bullatombsci.org/issues/nukenotes/jf99nukenote.html>, prepared by Robert S. Norris and William A. Arkin.

The possibility of nuclear war has somewhat diminished, but has by no means disappeared. In East Asia for example, scenarios of Japanese acquisitions of nuclear weapons are no longer the sole property of alarmist novelists, but are being widely discussed by respected diplomatic and security specialists<sup>7</sup>. The point, of course, is not so much a matter of the specifically Japanese character of these possibilities, but their nuclear character and their plausibility as a guide to possible near future histories.

Accordingly, we can see that war, in the case of large-scale nuclear conflict, is at least as theoretically powerful as a paradigm of the disturbance of the global ecology by human activity as ozone depletion or global warming, both in terms of scientific possibility and historical contingency. Under certain assumptions, it could be stated more strongly: war is now the primary paradigm of climate change due to human intervention.

## 2. Power talk: the cooption of the discourse of “environmental security”

Of course, security managers, academic and military, have not ignored the environment. On the contrary, “environmental security” is now a hot topic, not only in academic security studies circles, but also amongst the world’s military. Two main notions of “environmental security” are involved – the impact of the military on the environment in the conduct of peacetime and combat activities, and the environmental sources of conflict. However, if we look at some examples of state thinking on this topic, we will see that there is a distinctive pattern of uneven, inconstant, and distorted perception of the connection between military activities and the environment, a pattern of “misrecognition” familiar to students of politics and of psychoanalysis.

More than a decade ago, a professor at the Royal Military Academy at Sandhurst, Gwyn Prins, was lecturing to young British officers on the difficulties specialists in the use of violence face in dealing with environmental security threats. These dilemmas were neatly summarized in the title of Prins’ subsequent book with Robbie Stamp, Top Guns and Toxic Whales<sup>8</sup>: an F-15 fighter is a superb piece of technology dedicated to the delivery of a certain type of violence, piloted by a highly trained professional, which assisted by space and sonar surveillance systems so accurate they can even distinguish species of dolphins. But using a fighter to shoot a toxic whale does nothing to solve the problem that generated the environmental toxicity in question. Moreover, there is no military technology relevant to repairing the damage to the ozone layer.

Despite these difficulties, the world’s military forces, led by the United States, have taken up the topic of “environmental security” enthusiastically. President Clinton recognized the key characteristic of environmental threats: their endemic character and their capacity to generate transborder effects from a distance. In his 1996 State of the Union Address he enumerated the threats to US leadership:

The threats we face today as Americans respect no nation’s borders. Think of them: terrorism, the spread of weapons of mass destruction, organized crime, drug trafficking, ethnic and religious hatred, aggression by rogue states, environmental degradation.

The United States now has a Deputy Undersecretary of Defence for Environmental Security; the Congress receives an annual Report on Environmental Security from the Secretary of Defense;

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<sup>7</sup> Morton H. Halperin, *The Nuclear Dimension of the U.S. - Japan Alliance*, (Berkeley: Nautilus Institute, East Asia Policy Paper, July 1999), with replies: <http://www.nautilus.org/nukepolicy/Halperin/index.html>.

<sup>8</sup> Gwyn Prins and Robbie Stamp, *Top Guns and Toxic Whales: The Environment and Global Security*, (London: Earthscan, 1990).

and the State Department publishes an annual report on the Environment and U.S. Foreign Policy<sup>9</sup>; and the Office of National Security Policy Analysis of the Department of Energy (which is the key US nuclear agency) maintains a “Center for Environmental Security to provide a venue for debate and evaluation of environmental issues that impact on national security.”<sup>10</sup> “In short”, wrote former Secretary of Defense William J. Perry, “environmental security is now an essential part of the U.S. defense mission and a high priority for DOD [the Department of Defense].”<sup>11</sup>

In practice, environmental security issues for Secretary Perry turn out to be commendable, but mostly somewhat inward looking: repairing the environmental and health damage caused by the military in the past, and improving the environmental and health and occupational health and safety practices of the military itself from now on. Whatever may have been the failing of the military in the past, Perry promised a commitment in “U.S. defense planning to responsible performance in defense operations.”<sup>12</sup>

In fact, leaving aside the massive intentional devastation of the environment inherent in war, the record of unintentional and ignored environmental damage caused by the U.S. military is appalling. A quarter of a century after the end of the Vietnam War, the U.S. government as still provided minimal recognition of the toxic effects of widely used defoliants on US soldiers of the time, and virtually none for Vietnamese and Cambodian civilians.<sup>13</sup> The Pentagon’s protracted and vicious campaign to resist the claims of Agent Orange-affected Vietnam veterans from the 1960s onwards was repeated almost exactly in the 1990s to deal with claims by thousands of U.S. Gulf War veterans suffering from “Gulf War Syndrome”. This syndrome or syndromes seems to have result from either exposure to gases from destroyed Iraqi chemical weapons arsenals, or from side effects of untested medicines the US military rushed to the war zone to provide soldiers with a degree of immunity from expected Iraqi chemical and biological weapons attacks, in particular anthrax.<sup>14</sup> Needless to say, there has been no assistance to Iraqi victims of Gulf War Syndrome.

The Gulf War was also the occasion of the first large scale use of a new weapon by the U.S.: depleted uranium (uranium-238). As a result of almost fifty years of nuclear weapons production and nuclear power production, the U.S. has a large supply of depleted uranium as a waste-product. Being extremely dense and heavy, depleted uranium [D.U.] antitank shells have much greater penetrating power than conventional types. Vast quantities of depleted uranium shells and shrapnel were used to destroy the Iraqi armoured forces – and much still lies scattered

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<sup>9</sup> President Clinton’s statement can be found in “The Environment and National Security”, a speech to the National Defense University by Sherri Wasserman Goodman, Deputy Under Secretary of Defense (Environmental Security), August 8, 1996. This and other US government environmental security documents can be found on the website of the Center for Environmental Security: <http://www.pnl.gov/ces>.

<sup>10</sup> Center for Environmental Security website, “CES: Overview” <http://www.pnl.gov/ces/overview.htm>.

<sup>11</sup> William J. Perry, An Annual Report from the DOD to the President and the Congress of the U.S. on Environmental Security, February 1995, p.1.

<sup>12</sup> Ibid., p.9.

<sup>13</sup> The other great unintended environmental damage of the Vietnam War was the disruption of rural ecology caused by craters in rice-growing areas resulting from US bombing, which was in total greater than the amount of bombs dropped by the US in the Second World War two decades earlier. See Arthur H. Westing, *Explosive Remnants of War: Mitigating the Environmental Effects*, (London: Taylor and Francis, for the Stockholm International Peace Research Institute, 1986).

<sup>14</sup> On Gulf War Syndrome and the Pentagon pattern of denial, see Seymour Hersh, *Against All Enemies : Gulf War Syndrome : The War Between America's Ailing Veterans and Their Government*, (New York: Ballantine Books, 1998). On the environmental and health consequences of the Gulf War generally see Saul Bloom et al (eds.), *Hidden Casualties: Environmental, Health and Political Consequences of the Gulf War*, (New York: North Atlantic Books, 1994).

throughout southern Iraq. The problem is that depleted uranium retains a low level of radioactivity, sufficient it is suspected by scientists to be a contributor to both Gulf War Syndrome amongst US veterans, and according to scientists who have spent time working in Iraq, to account for clearly identifiable epidemiological patterns of cancers and birth abnormalities now observable in Iraq.<sup>15</sup>

Yet in a wider approach to environmental security, President Clinton's speech spoke of "environmental degradation" as a transborder threat to the security of the United States. Sherri Wasserman Goodman, Deputy Under Secretary of Defense for Environmental Security, provided an example of the Pentagon's thinking about such a threat. One of the key factors in the "societal decay" that "compelled" US military intervention in Haiti in 1994, Goodman argued, was environmental degradation.

Haiti's deforestation is its most severe environmental concern, one that world relief agencies have explicitly tied to the country's refugee crisis which brought in American troops. One need only look at satellite photos of Haiti and its island neighbour, the Dominican Republic: on the Dominican side lie vast, forested areas; on the Haiti side, the land has been stripped bare by rampant clear-cutting. The disappearance of Haiti's forests and its consequent soil erosion are so extreme that coral reefs have been damaged, resulting in devastating reductions in fish stock. Economic deprivation has driven people from their land, which in turn has deepened the country's political crisis and intensified the outpouring of people seeking refuge in the United States.<sup>16</sup>

Goodman's environmental concerns for Haiti are commendable, and there is no doubt about the pressures resulting from deforestation. What is omitted from her analysis is the fact that for decades successive U.S. administrations supported the dictatorships of Papa Doc Duvalier and his son Baby Doc Duvalier, under whom the deforestation took place. Yet even four years after the 20,000 Special Forces and other US troops used in Operation Restore Democracy, environmental pressures in Haiti have if anything worsened due to the severity of the economic and social crisis resulting from austerity programme imposed on the country by the International Monetary Fund.<sup>17</sup>

In short, these US examples demonstrate the ease with which a necessary and understandable concern for environmental security can be co-opted, sliding back (to paraphrase David Harvey<sup>18</sup>) into another discursive representation of state power, shifting from "a knowledge of opposition to a knowledge of domination".<sup>19</sup> Consequently, not only is there no free scientific discussion in such circles of the environmental consequences of the Gulf War, or the NATO assault on Bosnia, but more importantly, there is not even a hint of the nuclear winter hypothesis or its biological and chemical warfare parallels.

Does this brief account of cooption of the theme of "environmental security" by the Pentagon does not mean that all military approaches to environmental issues by the military are inherently flawed? Is it impossible to expect any useful or rational approach to the minimization of

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<sup>15</sup> Robert Fisk, "The evidence is there: we caused cancer in the Gulf", *The Independent*, October 18, 1998. Useful resources on depleted uranium issues are available at the World Information Service on Energy [WISE], Uranium Project website: <http://antenna.nl/~wise/uranium/#MILDU>.

<sup>16</sup> Goodman, "The Environment and National Security", *op.cit.*

<sup>17</sup> Dan Coughlin, "Haitian Lament: Killing Me Softly", *The Nation*, March 1, 1999.

<sup>18</sup> David Harvey, *Justice, Nature and the Geography of Difference*, (Oxford: Basil Blackwell, 1996), p.382.

<sup>19</sup> I. Sachs cited in Harvey, *op.cit.*, p.383.

environmental damage by military forces? The answer to this very definitely “no”, on the understanding that what can be expected will be limited by both the degree of pressure that can be exerted on military policy from non-state political forces (NGOs, social movements, the mass media, particular sectors of capital – e.g. insurance and health) and other parts of the state (especially health and environment sectors). The facility with which the Pentagon coopted the theme of “environmental security” demonstrates the vulnerability of naïve and unreflective versions of the concept. Yet properly grounded in a critique of all forms of power and the intellectual representations of power in discourses on the environment, environmental security is a concept capable of becoming an emancipatory tool.

### 3. Interpretive diversions: systemic sources of misrecognition of environmental risk

Cooption of the vital concept of environmental security by the militarized state is intended to reassure citizens that the state is responsive to their concerns about the vulnerability of contemporary society to environmental degradation resulting from both changes in the global environment and from the military’s own activities. Yet cooption is in fact but one example of the German sociologist Ulrich Beck has usefully termed “interpretive diversions” that are a systemic necessity in contemporary society – a new stage of human society that Beck terms “risk society”.<sup>20</sup>

Risk society for Beck, arises in the twentieth century when two conditions are met. Firstly, genuine material need can be met and reduced through both technological development and through appropriate forms of social and political relations. Secondly, this is dependent on a system of production that generates risks and hazards at a level and frequency previously unknown. The key intellectual problems for the present, argues Beck, is not so much the social production of wealth which preoccupied thinkers of the nineteenth century, but the social production of risk that results from exponential industrial growth.

Global warming, the damaging of the ozone layer, or the theoretical possibility of nuclear winter provide examples of the epochal shift in level and type of risk resulting from human productive activity. Yet these are but the most gross indicators of a deeper change that can be seen in contemporary societies. Globalization is for the most part only the working out of the network of abstracted commodity relationships that Marx analyzed over a century ago. What is new is that those networks of social relation at a distance are accompanied by equally dense networks of abstracted trust and habitually accepted risk. It is this production of socially distributed risk that interests Beck.

Social systems preoccupied with the production of risk have quite different approaches to solving their difficulties from those preoccupied by the social distribution of material production. The remedy for hunger is food, satisfaction of material need – or more generally speaking, wealth. Denial is not sufficient to satisfy hunger. Risk and hazard, however, are different: risks can be eliminated, or if not eliminated, diminished in psychological significance. We are aware of this in our personal lives from time to time: we cannot solve problem, we ignore it, hoping it will go away. The risk is not eliminated, but our minds are at ease.

The more that people cannot actually eliminate risk from their lives, the more necessary “interpretive diversions” become. These diversions, this process of interpreting danger away, take many different form. An extreme form is outright denial of the existence of the problem: “nuclear war is an impossibility”. A common form is acknowledgement of the problem tinged

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<sup>20</sup> Ulrich Beck, *Risk Society: Towards a New Modernity*, (London: Sage, 1992), p.75.

with what appears to be rational skepticism: "I wonder if scientists aren't just exaggerating a bit about global warming and the need to change our ways". Another approach is the familiar psychological process of projection: "the real source of environmental danger isn't us in the overdeveloped industrial world; it is all those people in poor countries breeding irresponsibly". Scapegoating is particularly effective as a form of interpretive diversion: "The destruction of the ozone layer is all because of capitalist greed – or lazy bureaucrats/people who use hairsprays/overfed auto-holics – or whichever social group is best fitted for the victim role. And of course, as the example of military thinking about environmental security shows, cooption of potentially radical forms of thought has the capacity to present the appearance of political concern about a problem, while ignoring or minimizing attention to the real threats involved.

Threats from military violence and from the environment are perhaps the two areas of threat most liable to bring interpretive diversions into play, for two reasons. Firstly, in each case the level of powerlessness involved for individuals is very great, and the potential effect of the threat is very high. Secondly, environmental threats and threats of physical destruction each call into play the most elemental of psychological processes. For example, the fear of literal annihilation and the death and obliteration of all that one loves in the case of nuclear war. Or in the case of (actual or suspected) pollution of food resources – say, from nuclear power plant leakage, or from contamination in the food production process – absolutely fundamental psychic assumptions which are literally imbibed at the mother's breast about the equivalence of the good and the ingestible [food = good] are profoundly threatened. It is hardly surprising that food pollution fears (for example, in relation to genetically-modified foods) often produces either extreme denial or great paranoia, with the discovery of state and corporate duplicity worsening the latter.

Fear of nuclear war has been constant since the first nuclear attacks of August 1945. Yet the public and open expression of that fear in political comment and social movements has varied in intensity and visibility.<sup>21</sup> In part this variability is accounted for by the campaign by the nuclear states to diminish public concern by either restriction of information on the effects of nuclear weapons, starting within days of the first US attacks on Hiroshima and Nagasaki<sup>22</sup>, and continuing through outright suppression of information or through diversionary campaigns – e.g. the US Atoms for Peace Programme.

But the most fundamental response to nuclear weapons has been the form of psychological denial that Robert Lifton describes as "psychic numbing".<sup>23</sup> This can be seen in the black humour of Stanley Kubrick's "Dr Strangelove", with its subtitle of "How I Learned to Stop worrying and Love the Bomb"; in the positive embracing of nuclear weapons ("Buy your child Atomic Chewing Gum today!"); through to simple denial "What nuclear threat? Lighten up! Take it easy!"). Yet these are all forms of managing the fundamental terror involved for the populations of the core states whose governments have relied for strategic nuclear deterrence for five decades.

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<sup>21</sup> Spencer R. Weart, *Nuclear Fear: A History of Images*, (Cambridge, Mass.: Harvard University Press, 1988).

<sup>22</sup> See Richard Tanter, "Voice and Silence in the First Nuclear War: Wilfred Burchett and Hiroshima", in Ben Kiernan (ed.), *Reporting the Other Side of the World*, (London: Quartet, 1987), pp. 13-40.

<sup>23</sup> Robert J. Lifton and Greg Mitchell, "Hiroshima no shinjitsu wo saihou suru", in Sakamoto Yoshikazu, "Kaku to Ningen: I", (Tokyo: Iwanami Shoten, 1999), pp. 65-86; Robert J. Lifton and Greg Mitchell, *Hiroshima: Fifty Years of American Denial*, (New York: 1995), and Michael J. Hogan (ed.), *Hiroshima in History and Memory*, (New York: Cambridge University Press, 1996), Robert J. Lifton and Greg Mitchell, "Hiroshima no shinjitsu wo saihou suru", in Sakamoto Yoshikazu, "Kaku to Ningen: I", (Tokyo: Iwanami Shoten, 1999), pp. 65-86.

These examples, which could easily be multiplied, suggest that the combination of environmental and military dangers in contemporary society not only have reached the unprecedented stage where they can alter the character of the earth's ecology, but do so in the context of a type of human society where the management of risk must take place in a social, political and psychological context that itself generates unique dangers.