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NAVAL WAR COLLEGE
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ENVIRONMENTAL CONSIDERATIONS FOR OPERATIONAL WAR PLANNERS

by

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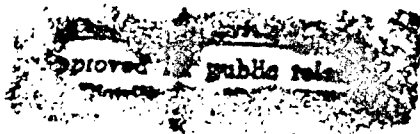
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The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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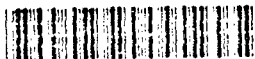
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Abstract of
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Heightened public awareness and growing concern worldwide about the environmental impact of war have mandated that commanders take steps to reduce or eliminate ecological damage caused by their combat operations. The current environmental atmosphere is examined to illustrate the increasing public support and political priority placed on environmental issues. Environmental risks emanating from nuclear, chemical, and hydrological facilities are discussed to provide a sample of the dangerous forces susceptible to release by direct or indirect combat action. International laws and agreements are discussed for their significance in limiting damage to the environment in time of war. Recognizing the political implications of targeting certain objectives and utilizing environment oriented intelligence, ROE, and weaponering will limit damage and enable the commander to promulgate an environmentally sound approach to his methods of war. In future conflicts the commander and his staff must be prepared to address environmental issues in their warfighting plans. Only then can the precarious balance between environmental protection and military success be met.

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ENVIRONMENTAL CONSIDERATIONS FOR OPERATIONAL WAR PLANNERS

CHAPTER I

INTRODUCTION

Heightened public awareness and growing worldwide concern about the impact of war on the environment were demonstrated by the global condemnation of Iraq's ecocidal activities during the 1991 Gulf War. In this increasingly environmentally conscious world, commanders must be aware of the environmental risks associated with their military objectives and take steps to reduce or eliminate the ecological damage caused by their combat operations. To do otherwise could be at the risk of losing popular support for their campaign and possibly incurring legal liabilities for the nation and even the commander himself.

With the dissolution of the Soviet Union and the corresponding reduction in Cold War concerns, a social and political atmosphere has evolved in which environmental issues are taking a more central place on the domestic and international stage. Military security issues have receded to a slightly less dominant place and environmental issues have grown in importance. Within the American military, a growing concern for environmental awareness is reflected in an increasing number of efforts, such as the establishment of environmental offices and staff positions, conferences on environmental issues, and growing attention to the issue by senior level leadership within the Department of Defense.¹

Growing concern for the environmental impact of war is not without merit. The means of war now available have advanced to the point where even conventional (non-nuclear) war could readily obliterate an industrialized area. Given the rapid spread of industrialization throughout the world, with its accompanying storehouse of dangerous forces, commanders must recognize that hostile actions of any sort could unleash this potential for human and environmental devastation. Among these dangerous forces, nuclear, chemical, and hydrological facilities pose significant environmental risks due to their possible value as military objectives and their potential for causing severe, long term, and widespread environmental damage.

International agreements in the form of treaties and conventions have played a major role in attempting to limit the damage and destruction caused by war. While the law of armed conflict does not adequately address protection of the environment, several international conventions contain environmentally sensitive provisions that encompass the release of dangerous forces from sources such as nuclear, chemical, and hydrological facilities. Principal among these agreements are the Hague Conventions of 1899 and 1907, Geneva Conventions of 1949, 1977 Protocol I Additional to the Geneva Conventions of 1949, and the 1977 Environmental Modification Convention. These agreements and some recent environmentally oriented initiatives are discussed in this paper to emphasize the restrictive nature of evolving environmental laws of warfare.

Historically, little guidance has been issued regarding protection of the battlefield ecology during war. However, recent events and growing world criticism have mandated change. By recognizing the political implications of targeting certain objectives and incorporating environmental considerations into the planning of their military operations, commanders will be able to pursue an environmentally sound approach to their methods of war.

This paper will focus on environmental considerations for operational war planners by addressing the current political atmosphere, identifying environmental risks associated with nuclear, chemical, and hydrological facilities, reviewing international agreements relative to environmental protection during conflict, and discussing political implications associated with environmentally sensitive targets. Finally a recommendation will be made for the use of intelligence, ROE, and weaponeering to limit environmental damage and minimize political costs when conducting conventional offensive combat operations against environmentally hazardous targets.

CHAPTER II
ENVIRONMENTAL ATMOSPHERE

International. Over the past several years, environmental issues have been raised to a much higher level of priority on the world's economic and political agendas. In 1989 the Green Party's spectacular showings in the May European elections together with increased presence in the European Parliaments confirms that "Green" concerns are now on the political agenda. The July 1989 Economic Summit in Paris, attended by the heads of state from seven major industrial nations was dubbed "the environmental summit" and established a significantly higher level of priority for environment among world leaders. In 1991 international legal experts met in Ottawa, Canada to discuss Iraq's wanton acts of environmental destruction during the Gulf War and to determine ways to increase the enforcement power of international law. In 1992, 120 heads of state attended the United Nations Conference on Environment and Development popularly referred to as the "Earth Summit."

The international interest for the environment is briefly demonstrated by the events listed above. There is decreasing tolerance worldwide for environmental abuse by any entity as has been demonstrated by concerned nation's trade embargoes on products manufactured with environmentally sensitive components. It is clear that if the world community is willing to place environmental priorities ahead of or equal to economic

priorities, then military activities should do likewise if they hope to maintain significant popular and political support.

United States. The American "environmental movement" has been organizing pressure groups to lobby legislators for better protection of the natural environment for more than a century. Traditionally these older organizations had a narrow focus on one or two particular issues which formed a very small part of larger political agendas. More recently, through joint cooperation, organization, and campaigns these groups have raised environmental awareness and concern to a new level. The significance of their efforts is illustrated by the success of recycling programs, nationwide Earth Day events, and children's cartoons with environmental themes. Perhaps even more significant is the attention now displayed by legislators at all levels of government, particularly state and national. American environmental attitude has changed from awareness and outcry to regulation and compliance. The environment has become a main issue which politicians oppose at their peril.

US Military. Department of Defense (DoD) activities have traditionally maintained a poor environmental record. This occurred for several reasons beyond the fact that the military by trade tends to be an environment hostile entity. The lack of widespread popular environmental support in the early 1980's did not encourage Congress to make federal facility environmental

compliance an issue of great significance. Instead, traditional national security roles of DoD had much higher priority. The Department of Justice further relieved DoD compliance by arguing that sovereign immunity protected federal agencies from penalties associated with the application of state and federal environmental laws. This is no longer the case.

In 1992 Congress wrote the Federal Facilities Compliance Act (FFCA) which was signed into law by President Bush. The FFCA clarified the language of the Resource Conservation Act, and now allows state and local governments to assess fines and penalties against DoD installations for environmental noncompliance. DoD's recalcitrance cost it public support at a time when it was seeking base expansion, and earned for DoD the image of being a threat to the nation's environmental security.²

The publicity surrounding the cleanup of its toxic waste sites has caused DoD to reexamine its environmental commitments and programs. The 1993 National Security Strategy extended the national security dimensions of the environment and link it decisively to the economic element of power. Both government and DoD recognize the environment as a national security issue and therefore a DoD responsibility.

CHAPTER III
ENVIRONMENTAL THREATS

Throughout the 20th century, many of the nations of the world have become highly developed and heavily industrialized. With the rapid spread of industrialization there has come into existence an accompanying storehouse of dangerous forces which emanate from nuclear, chemical, and hydrological facilities. In time of war, it is highly likely that many of these facilities will find themselves susceptible to combat damage by virtue of their location or function. The following discussion will address the environmental risks associated with these facilities in wartime.

Threats from nuclear facilities. Throughout the industrialized world the presence of radioactive materials is widespread. They are found in hospitals for research, diagnosis, and treatment; in industry and in laboratories. They are present in nuclear weapons plants and throughout the commercial nuclear fuel cycle. It is therefore conceivable that some releases of radioactive materials would occur in many nations in a time of war. Except for nuclear reactors and reprocessing plants, these releases would be small and pose no significant or widespread hazard to human health or the environment.³

The vast majority of radioactive material in the world is found in nuclear power plants, spent-fuel reprocessing plants,

and waste storage sites. There are approximately 20 reprocessing plants in the world located in less than a dozen countries compared to 466 nuclear power reactors in 26 countries.⁴ Although substantial amounts of radioactivity are present in the spent fuel pool, the danger of high-level wartime releases from reprocessing plants and waste storage facilities is considerably less important than that from nuclear power plants.⁵

Until Operation Desert Storm, no military attack against an operating nuclear facility had ever occurred.⁶ Hence there is little historical basis on which to analyze the direct impact of war on nuclear facilities. There are however, peacetime nuclear power plant accidents which provide good insight into what may be expected from catastrophic failures.

While the impact of a direct attack on an operating nuclear reactor is somewhat speculative, it is reasonable to assume that some release of radioactive material into the environment will occur. A successful direct attack on a power plant would damage or destroy the containment structure and the integral cooling and control systems. In addition to the external contamination caused by the blast effect of the munitions, if left uncontrolled, the core could reach critical mass. The resulting internal explosions would eventually breach the reactor outer containment releasing even larger amounts of radioactive material into the environment.

Reprocessing plants pose a similar problem. Most plants

contain large amounts of radioactive material, mostly in liquid form; and most of the high level wastes are stored in tanks near the reprocessing plants.⁷ Direct attacks on reprocessing facilities would probably rupture the large storage tanks and contaminate a significant area with high level radioactivity. Whether absorbed into the ground or carried away by water, the environmental devastation would be severe, long lasting, and widespread.

An indirect attack on a nuclear power plant using special forces or precision guided munitions which target control or electrical distribution centers has advantages and disadvantages. While the nuclear fuel elements are contained, " an advantage," there still exists the potential for high-level radioactive releases by other means. Some recent peacetime nuclear accidents illustrate this.

Three Mile Island in Pennsylvania, a normal routine combined with operator error led to a full-scale loss-of-coolant accident. Core meltdown was averted when cooling was finally restored but there was still a small radioactive release into the environment.

Chernobyl in the USSR, a safety experiment combined with operator error led to an exponential increase in the reactor power level. In effect a slow nuclear explosion took place which triggered a steam explosion that dispersed radioactive material into the atmosphere to a height of 1500 meters. Ensuing fires dispersed even more radioactive material from the reactor for several days. One of the major lessons learned of Chernobyl has

been that a reactor meltdown in the Ukraine can cause death and economic hardship from Scandinavia to Greece, and from Italy to Kazakhstan.⁸

These accidents occurred in peacetime, not under the stresses of war. Authorities were able to readily respond with medical, technical, fire, and logistical resources. In time of war, the breakdown of public services would certainly exacerbate the consequences of a catastrophic failure of a nuclear reactor. The possibility exists that a destroyed nuclear facility will contaminate a large surrounding area with lethal radioactive debris, an area that would be measured in hundreds or thousands of hectares. The most heavily contaminated inner zone would become life threatening; an outer zone of lesser contamination would become health threatening; and a still greater zone beyond that would become agriculturally unusable. Such a radioactively polluted area would defy effective decontamination, its degraded status recovering only slowly, over a period of years or decades, as has been the case with the Pacific test islands.⁹

Threats from chemical facilities. There are over 900 chemical facilities spread throughout the world which produce insecticides, manufacturing and cleaning compounds, as well as chemical weapons. By virtue of its diverse inventory and widespread presence, the chemical industry poses a greater risk to the environment than does the nuclear industry.¹⁰ Chemicals involve relatively low technology to produce and even the most

hazardous can be found in large quantities in heavily industrialized and populated areas.

The environmental threats posed by conventional strikes on chemical facilities emanate from releases of harmful chemicals from destroyed or damaged production, storage, and transport equipment, and burning chemicals from exploded or ignited equipment and tanks. Many of the dangerous forces released from chemical facilities have predominately acute or short term effects. This is because the chemicals released become dispersed by air or water currents, and also because they usually decompose more or less rapidly through physical or microbiological reaction."

Two important properties of potentially dangerous industrial chemicals is their toxicity and ability to flash. Dangerous gases are generally handled in liquid form because it is safer, but liquid gases that can flash are dangerous even if they are not highly toxic. After a chemical agent flashes, as it would from a storage vessel ruptured during an attack, the resulting cloud of vapor will form a plume moving downwind. The effective length of the plume will depend on the amount and physical properties of the agent released and to a greater extent the wind velocity and other atmospheric conditions. In the event inflammable chemicals are released, the fires which are likely to ensue will release toxic fumes.

Non-flammable unpressurized chemicals pose similar problems. Whether dispersed over the ground or carried by water, their

stress on the environment is measured by the bio-specificity of their toxic action. The immediate danger is to living organisms which the chemical comes into contact with after dissemination. There will also be a longer term threat whose magnitude is dependent upon the persistence and mobility of the chemical.

Past accidents at chemical facilities can provide some insight as to what might be expected from an attack during wartime. In 1943, mustard gas escaped from a plant in Bari, Italy killing over 100 people. In 1968 over 400 sheep were killed from an inadvertent release of VX gas in Skull Valley, Utah.¹² Perhaps the most significant accident in recent times is the December 1984 catastrophe in Bhopal, India where the release of methyl isocyanate from an insecticide plant near a densely populated area resulted in some 2300 early fatalities plus 30,000 to 40,000 serious injuries.¹³

The potentially most dangerous triggering mechanism for the release of dangerous forces from chemical facilities is via military attack. Whether attacked intentionally or not, conventional weapons have become sufficiently destructive to be able to cause major leakages, fires, and explosions.¹⁴

It appears certain that without the close scrutiny of the commander, the destruction of a chemical facility in an industrialized and densely populated area would be characterized by an amplification of injurious effects on humans and the environment. Thus the damage from a major war could approach

that which would result from a war in which chemical or nuclear weapons were used.

Before leaving the topic of chemicals, the use of herbicides warrants mentioning. Although not prohibited by international law, the environmental devastation they can cause is considered severe, long term, and widespread. Herbicides were last used as a weapon by the US in Vietnam. Over 17,000KM² of forests were damaged including 1,510KM² of mangrove forests.¹⁵ The public outcry over this resulted in Presidential Executive Order 11850 which prohibits first use of herbicides and riot control agents as a method of war by US forces.

Threats from hydrological facilities. Dams, dikes and levees have been built for many centuries to provide drinking water, flood control, and irrigation. More recently they have been constructed for hydro-electric power and recreational purposes. As dam technology progressed so did their size and frequency. There are currently more than 777 dams in the world that are at least 15 meters in height and impound at least 500 million cubic meters of water.¹⁶ These structures in themselves do not pose a serious risk but, because of the devastation which results from their catastrophic rupture by natural or man-made causes, they warrant discussion as an environmental threat.

The importance of dams and dikes to society, as well as the enormous forces that could be released if they were destroyed, makes them potential targets in wartime.¹⁷ The impact of their

destruction is not only based on their size and impoundment but also on the regional topography and demography below the dam. The environmental devastation realized from the collapse of a dam is quantified by factors such as the extent of the area flooded, number of casualties, loss of topsoil, and regional non-habitability.

In modern warfare dams have been targeted primarily for their electrical power generating capabilities but on several occasions in World War II they demonstrated their potential for targets in other ways.

The destruction which beset the Ruhr Valley in Germany following the Allied bombing of two major dams is indicative of the devastation which can be expected. Following their attack, waters breaching the Mohne and Eder dams sent a 10 meter high flood wave into the valley. Many coal mines were flooded, 125 factories and 12 power stations were destroyed, more than 1300 people were killed, 120,000 left homeless, and some 3,000 hectares of arable land were ruined. In addition, 7 flood control dams, 11 highway bridges, 4 railway bridges, and 30 kilometers of railway were destroyed.¹⁸

It is not hard to see why dams now receive special protection under international law. The disruption of electrical power if seen as a necessary military objective can be accomplished by attacking distribution grids and transformer stations. This would certainly be more in line with the principle of proportionality under the current laws of war.

CHAPTER IV
LAWS AND CONVENTIONS

Efforts to reduce the destructiveness of war, motivated by humanitarian, religious, and above all, practical considerations, have a long history. A body of restrictions and limitations upon what states might do when at war initially developed as customary international law. During the second half of the 19th century, this customary law began to be supplemented by conventional (treaty) law in the form of international multilateral agreements. Among these, the Declaration of St. Petersburg of 1868 was of special significance. It proclaimed that the only legitimate objective of states during war is to weaken the military forces of the enemy. Since then, international law of armed conflict has developed in two broad streams: (a) humanitarian rules relating to targets - those according protection to persons, places, objects, or the human environment in general - and (b) rules regulating the means and methods of warfare, including regulation of specific weapons.¹⁹

Largely as a result of the massive destruction and loss of life brought about by the American Civil War, the Crimean War, and the Wars of German Unification, an international effort was made to limit war's destructiveness through the Hague Conventions of 1899 and 1907. The primary theme of the Hague peace conferences focused on agreement among the participants that the right of belligerents in an armed conflict to choose means and

methods of warfare is not without limit, and that wanton destruction, superfluous injury, and unnecessary suffering should be eliminated by regulation from warfare.²⁰

Surveys conducted following World War II revealed severe environmental devastation from artillery fire, dam destruction, chemical and petroleum releases, and fire bombing. As a result, the subsequent Geneva Conventions of 1949 restated the general protections for the environment seen in the Hague Rules and also placed significant requirements upon an occupying power. Article 53 provides that any destruction by the Occupying Power of real or personal property belonging individually or collectively to private organizations, is prohibited, except when such destruction is rendered absolutely necessary by military operations.²¹

It is significant to note that the importance of the Geneva Conventions of 1949 extends beyond the provisions of the articles themselves. Each of the four conventions contains an enforcement regime which requires that grave breaches by contracting parties be identified and addressed. Another article which forms the cornerstone of the enforcement system requires penal sanctions and obligates each contracting party to enact implementing legislation; search for persons alleged to have committed breaches of the Conventions; and bring such persons before its own courts or, if it prefers, hand them over for trial to another state party concerned.²²

The 1977 Protocol I Additional to the 1949 Geneva Conventions carried forward earlier general directives on environmental protection against military activities. Two articles in the Protocol, 35(3) and 55(1), combine to prohibit the use of methods and means of warfare that are intended or may be expected to cause widespread, long term, and severe damage to the natural environment.²³ Battlefield damage resulting from combat operations is further addressed by this provision where under Article 56, dams, dikes, and nuclear electric power generating stations have been placed under special protection and shall not be attacked if the result could be the release of dangerous forces causing severe losses among the civilian population. Even military objectives located in the vicinity of these installations must not be attacked if the same effects could result.²⁴ According to Protocol I of 1977, an attack against works and installations containing dangerous forces with previous knowledge that such an attack would cause excessive loss of life, injury to civilians, or damage to civilian objects will be considered a grave breach of the Conventions and consequently a war crime.

The United States is a signatory to the 1977 Protocol I but has not yet ratified it because some provisions were considered militarily unacceptable. The US does however, consider many of the provisions reflective of existing customary international law and provides commanders with appropriate guidance in NWP-9, The Commanders Handbook on the Law of Naval Operations, chapter 8.

Distinct from the prohibitions of Protocol I of 1977, provisions of the Environmental Modification Convention (ENMOD) of 1977 ban military or any other hostile use of environmental modification techniques as the means of destruction, damage, or injury. Whereas, the relevant provisions of Protocol I of 1977 are applicable only when all three of the criteria - widespread, long term, and severe - are met and the effects are cumulative, the ENMOD Convention of 1977 requires the presence of only one of these criteria - widespread, long term, or severe - for the environmental technique to be outlawed.²⁵ Another significant ENMOD provision is that these three criteria are not subject to any exemption by way of military necessity nor is the prohibition directed only at tactics that have environmental destruction as their objective. The United States became a party to the ENMOD Convention in 1980. As of 1989, fifty-three of one hundred-seventy states including the United Kingdom and USSR were also parties.

Efforts to reduce the environmental impact of war are ongoing. In March of 1991 a proposal was made to the Governing Council of the United Nations Environmental Program (UNEP) that a declaration of principals be adopted to prevent the kind of environmental destruction observed in the Gulf War from occurring again. At the UNEP convention held in Nairobi, Kenya in May of 1991, international concerns about the impact of the Gulf War on the environment were further deliberated. At that time, Canada announced its intention to host international conferences of

legal experts to explore means of strengthening international environmental protection laws. A one day conference in London on 3 June 1991, a sort of Geneva Convention on the Protection of the Environment in Time of Armed Conflict, encouraged participants from 24 governments and environmental agencies to create a new convention which would state the environment may not be used as a weapon, that weapons aimed at the environment must be banned, and that indirect damage to the environment be forbidden.²⁶ One of the most significant conferences on the subject was the July 1991 meeting of legal experts in Ottawa, Canada to review international law regulating the use of the environment as a weapon as was done in the Gulf War by Iraq. US participants underscored the merits of existing regulatory regimes which are based on the principle of necessity and proportionality under the law of armed conflict. The US concern being that more restrictive environmental provisions could only be implemented at the expense of otherwise legal military operations.

International law did not regard environmental protection as a distinct goal of the law of war until the upsurge of specific environmental concerns in the 1970's. Since then the trend is clear, the world is becoming ever less tolerant of deliberate or indiscriminate destruction of the environment in peace or war. As international laws become more complex and enforcement regimes strengthen, it will be incumbent upon the operational commander to ensure that the environmental impact of his warfighting decisions are carefully examined.

CHAPTER V
POLITICAL RISKS

Destruction or damage to nuclear, chemical, or hydrological facilities generally involve severe, long term, and widespread damage and therefore present significant political risks which should be addressed during the war planning process.

Nuclear political risks. Aside from the environmental and social impacts of targeting nuclear facilities, the political ramifications must be assessed. International law does not prohibit attacks on such facilities if it can be determined that they are in some way directly supporting military activities. However, attacks on the nuclear infrastructure could lead hostile governments and terrorists to consider the nuclear industry a legitimate target and endanger friendly nuclear facilities. Any special considerations a country places on its nuclear facilities must be considered also. What if a country considered an attack on its nuclear facilities as a first use of weapons of mass destruction and stated its intention to respond accordingly? Current Russian policy is to consider any attack on its "dirty" nuclear facilities a first use of nuclear weapons. This policy is not based on any military considerations for the importance of the facilities but rather on the projections of the environmental damage that would result from such an attack.²⁷

An intentional attack on a nuclear reactor, the purpose of which is to release large quantities of radioactivity would be an unprecedented and highly unlikely scenario for the US commander. However, the conventional methods of war now available have advanced to the point where they could readily obliterate the theater of operations in an industrialized area. That being given, without careful attention by the commander, the accidental destruction of nuclear reactors as a side effect of combat is ever more likely.

Chemical political risks. In many respects the political impact of attacking a chemical facility is similar to that of a nuclear facility. Although the environmental impact is typically less widespread and of shorter duration, it can be just as severe. The commander must assess risks such as; could an attack on a chemical facility which killed surrounding civilians be considered the first use of chemical weapons and lead to reprisal? Also to be considered are the transboundary effects of chemical releases through the atmosphere or water to neighboring states. Since environmental issues are becoming recognized as national security issues this could seriously impede popular support for a military effort and even generate a new adversary.

Hydrological political risks. Even though dams may be legally attacked if used in direct support of military activities, the political implications might not justify this course of action

under any circumstance. Aside from the fact that these structures are to some extent protected by international law, a successful attack would certainly erode the principle of proportionality to the military benefit gained currently recognized by the law of war. This could easily lead to an escalation of methods employed by an adversary to include the use of weapons of mass destruction if they were available. It would further provide motivation for retaliation attacks on friendly dams necessitating increased assets directed toward their protection.

CHAPTER VI
RECOMMENDATIONS

Target intelligence, ROE, and weaponeering can reduce the risk of environmental damage associated with military activities if properly formulated and promulgated to subordinates. It is the commanders responsibility to ensure that his staff and subordinates understand his position with respect to environmental damage and the constraints that position will place on weapons selection, targets, and operations.

Intelligence and precision targeting are increasingly important as the demand for minimizing casualties and decreasing environmental damage gains priority. Environment oriented intelligence can reduce or eliminate unintentional collateral damage to environmentally hazardous facilities by distinguishing targets with a military function from those without. If there is a risk of collateral damage which could lead to an environmental catastrophe, commanders need to be provided this information. Elements such as plant location and safeguards, wind direction, and emergency equipment availability might reduce the environmental risks if intelligence to that effect is available. Intelligence experts will need to include environmental risk assessments along with their other intel products so that an informed decision can be made on how to strike a target or whether to strike it at all. Battle damage assessment following a strike should also include an evaluation of environmental

collateral damage. This information could be vitally important to friendly ground troops in the vicinity or even to counter negative political implications. Environment oriented intelligence will certainly have difficulty competing with other priorities for scarce intelligence resources but failure to obtain this information could result in an environmental disaster which sways public opinion in favor of an adversary.

Rules of engagement (ROE) are a means for ensuring subordinate's actions stay within the bounds of national policies and international laws. Focusing on the environment, ROE is one method for ensuring compliance with national concerns for the environment and international legal restrictions against indiscriminate destruction of the environment.¹⁸ In future conflicts, the commander will prepare a war plan which includes ROE consistent with the objectives and guidelines received from the NCA. In some instances, ROE can rely on the "principal of discrimination" and allow subordinates to determine their methods of war. In the case of environmentally hazardous targets, the commander is best advised to retain the authority for determining what methods, if any, are to be utilized. While criteria are required to limit environmental damage, ROE must not be so restrictive to prevent the accomplishment of military objectives, prolong hostilities, or result in defeat.

Precision guided munitions (PGM) and special forces would seem the ideal weapons for attacking environmentally hazardous targets. As demonstrated in Desert Storm, Coalition leaders

emphasized the ability of the military to conduct surgical strikes using smart weapons to hit the nail on the head.²⁹ Special forces can infiltrate a target facility and with even greater precision destroy only those elements required to render an objective inoperative. As opposed to the relatively indiscriminate damage inflicted by conventional strikes, either of these would seem to be an appropriate course of action.

However, PGM's used on or in the vicinity of environmentally hazardous facilities can produce substantial collateral damage effects resulting in the release of dangerous forces previously described. The case for using special forces must also be tempered with the fact that they are generally reserved for targets such as command and control nodes or air defenses and are not routinely available for missions of an environmental nature.³⁰ The commander must also determine if the priority for minimizing potential damage to the environment is worth the political consequences of placing personnel directly in harms way.

CHAPTER VII

CONCLUSION

In future conflicts, operational commanders will develop war plans to support the attainment of strategic objectives as determined by the National Command Authority (NCA). These plans must accurately reflect the NCA stated mission as well as appropriate international laws and national policies or politics applicable to the current conflict and war in general.

Historically, operational war planners have concentrated on the application of methods and means of war with little regard for the environment. This is no longer acceptable. The political and ecological costs of environmentally disruptive military operations have risen to the point where they could seriously erode the popular support so vital to military success. Environmental groups will continue to grow in size and political strength within domestic and international arenas. The general public within the developed world and to a lesser extent the developing world will continue to become more respondent to environmental issues. The environmental risks associated with industrialization will become more widespread and the methods of war will become more lethal. In response to the above, international law will become more restrictive and compulsory.

It will be up to the commander to address the challenges and constraints of environmental issues in his operational war plans. Rules of engagement will provide guidance on how to conduct

operations within the limits of law and policy. Intelligence can identify targets which pose significant environmental risks and assess the environmental impact of their damage or destruction. Precision guided munitions and special forces can be used to reduce collateral damage.

This paper has presented just a few of the environmental considerations which must be addressed by the commander and his war planning staff. Ultimately it will be the commander's responsibility to ensure that the proper balance between environmental protection constraints and mission accomplishment are maintained. Just as minimizing casualties has become a critical mission objective in almost every operation, it can be expected that environmental concerns will eventually gain the same importance.

NOTES

1. Dana P. Eyre, ed. The Army: Geostrategic Concerns and Environmental Considerations," (Carlisle Barracks, PA: U.S. Army War College, March 1992), p. 2.

2. Kent H. Butts, The Army and the Environment: National Security Implications. Strategic Studies Institute, U.S. Army War College: 1991, p. 5.

3. Arthur H. Westing, ed. Environmental Hazards of War: Releasing Dangerous Forces in War (London: Sage, 1990) p. 11.

4. Westing, Environmental Hazards, p. 2.

5. Ibid., pp. 11-12.

6. Robert S. Warner, "Environmental Terrorism," Unpublished Research Paper, U.S. Naval War College, Newport, RI: 1992, p. 17.

7. Westing, Environmental Hazards, p. 11.

8. Ibid., p. 20.

9. Ibid., p. 4.

10. Richard O. Gamble, "Anti-Environmental Warfare: Protecting the Environment During Wartime," Unpublished Research Paper, U.S. Naval War College, Newport, RI: 1992, p. 11.

11. Westing, Environmental Hazards, p. 32.

12. Stockholm International Peace Research Institute, Weapons of Mass Destruction and the Environment (London: Taylor and Francis, 1977), p. 45.

13. Westing, p. 33.

14. Ibid., p.35.

15. Gamble, p. 14.

16. Westing, p. 39.

17. Ibid., p. 39.

18. Ibid.

19. Ibid., p. 48.

20. James P. Terry, "The Environment and the Laws of War: The Impact of Desert Storm," Naval War College Review, Winter 1992, p. 62.

21. Arthur H. Westing, Environmental Warfare: A Technical, Legal, and Policy Appraisal (London: Taylor and Francis, 1984), p. 36.

22. Terry, p.63

23. Terry, p. 64.

24. Westing, Environmental Hazards, p. 51.

25. Ibid.

26. Terry, p. 65.

27. Shawn B. Morrissey, "The Impact of Environmental Protection on the Operational Commander's Warfighting Decisions," Unpublished Research Paper, U.S. Naval War College, Newport, RI: 1993, p. 18.

28. Warner, p. 11.

29. Gamble, p. 21.

30. Warner, p. 28.

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