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A View of the Forest: Environmental Stress, Violent Conflict and National Security

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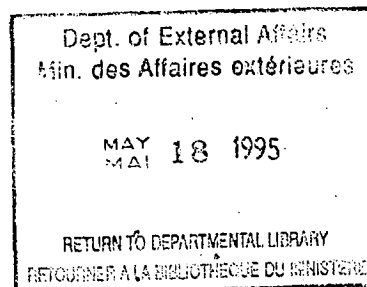**Policy Staff**

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Executive Summary

The relationship between environmental stress and national security is likely to become a more explicit and important foreign, as well as domestic, policy concern for all countries. Linkages between the physical environment and national security issues are not entirely "new"; for example, there has long been a concern with the potential environmental effects of nuclear war. The issue, however, is evolving as environmental damage or stress on ecological systems increases, and as political decision-makers and the public become more aware of such threats.

Understanding this evolution requires that a distinction be made between environmental stress, i.e., negative environmental effects, and the more general, but intricately linked, case of scarcity of resources. There is also a need to clarify the context in which the term national security is being used. <u>The primary purpose of the Paper is to identify and where possible elucidate the linkages between environmental stress and national security. In so doing, the Paper attempts to contribute to our understanding of the forest (environment-national security in its broadest and almost all-encompassing sense), by more narrowly focusing on an individual tree (the environmental stress-violent conflict dimension of national security).</u>

A conceptual framework for facilitating the understanding of how environmental stress may contribute to violent conflict is set out in the Paper. Most importantly, the framework serves to highlight: the case-specific nature of environmental stress-national security linkages; the fact that conflict may be intrastate or interstate; the large number of variables (such as population, technology and social factors) that influence causation; and the anecdotal nature of empirical evidence on causation.

The Paper calls for increased international cooperation on analyzing environmental stress-national security linkages, but suggests that such cooperation will likely be hindered by divergent views surrounding the nature of the problems and their potential solutions. With no international consensus on (1) population growth, (2) how population growth (through what might be called a "technological filter") may contribute to environmental stress, and (3) how environmental stress translates into intrastate or interstate violence, progress will be difficult. Until there is a convergence of views on the various aspects of the environmental stress-national security nexus, it is not likely that adequate collaborative measures and responses will be undertaken. In considering this complex relationship and the appropriate role for international as well as domestic measures, several of the key points raised in this Paper need to be borne in mind. These are:

● For the 21st century and beyond, national security will only be attained through

global security. Such global security is only partly dependent upon military might. Environmental stress is only one element among many political, economic and social factors that contribute to conflict and social instability. Linking a specific cause with a specific outcome is problematic.

- Nonetheless, environmental stress (such as water and food shortages arising from environmental degradation) may in some cases contribute to violence. Such violence may be international or intrastate in nature. Evidence to date suggests that intrastate violence is more likely.

- A key variable is the rate of technological progress and the dissemination of innovation. While over-simplified, the implication of a high level of technological advancement is less environmental stress, and correspondingly less pressure for environmentally motivated conflict. The capacity of social institutions to evolve is also an important factor.

- There are many historical examples of the scarcity of non-renewable resources contributing to interstate conflict. Environmental stress, such as degradation of the global commons, poses new challenges.

- The type of environmental stress, local or global, is likely to influence the nature of potential conflict. National and multilateral mechanisms are needed to identify abusers, to measure abuse and to develop nonviolent mechanisms to address the abuse. Multilateral approaches are likely to be the most lasting, but also the most difficult to achieve.

- Fears of environmental degradation leading to large numbers of emigrants from the developing countries need to be realistically assessed. While large numbers of people from developing countries may seek to enter developed countries, these people are more likely to be economic migrants or refugees rather than environmentally generated migrants.

These points reflect the immense scope of the environmental stress-national security interface, and highlight areas and issues where more analytical work and critical thinking is needed. A practical approach to increasing our understanding of environmental stress-national security linkages, might be through country-specific case studies. Such an approach would essentially attempt to take a country through the conceptual framework presented in the Paper.

Résumé

Pour tous les pays, le rapport entre le stress environnemental et la sécurité nationale deviendra probablement une préoccupation politique plus explicite et plus importante au plan national et international. Les liens entre le milieu physique et la sécurité nationale ne sont pas entièrement « nouveaux »; on s'inquiète en effet depuis longtemps des répercussions d'une guerre nucléaire sur l'environnement. La question gagne toutefois en importance à mesure que se multiplient les répercussions du stress et des dommages environnementaux sur l'écosystème, et que les décideurs et la population sont conscients du danger.

Pour comprendre cette évolution, il faut établir une distinction entre le stress environnemental, c'est-à-dire les effets négatifs sur le milieu, d'une part, et la question, plus générale mais néanmoins intimement liée, de la rareté des ressources, d'autre part. Il convient en outre de préciser le contexte dans lequel on utilise le terme « sécurité nationale ». Le document vise d'abord et avant tout à cerner et, lorsque c'est possible, à préciser les liens entre le stress environnemental et la sécurité nationale. À cette fin, l'auteur tente de nous faire mieux comprendre la forêt (rapport environnement-sécurité nationale, dans son sens le plus large et quasi-global) en concentrant son attention sur l'arbre (aspect stress environnemental - conflit violent) de la sécurité nationale.

On expose dans le document un cadre théorique qui permet de comprendre comment le stress environnemental peut contribuer aux conflits violents et qui, surtout, sert à mettre en lumière les aspects suivants de la question : la nature individuelle des rapports entre le stress environnemental et la sécurité nationale; le fait que le conflit se déroule à l'intérieur d'un pays ou implique plusieurs États; le nombre élevé de variables (comme la population, la technologie et les facteurs sociaux) qui influent sur le rapport de causalité; et la nature anecdotique de l'évidence empirique sur la causalité.

L'auteur invite à une plus grande coopération en matière d'analyse des liens entre le stress environnemental et la sécurité nationale, mais laisse entendre que des vues divergentes de la nature des problèmes et de leurs solutions éventuelles pourraient entraver cette collaboration. Vu l'absence de consensus à l'échelle internationale concernant (1) la croissance démographique, (2) la contribution éventuelle de cette dernière au stress environnemental (par ce qu'on pourrait appeler un « filtre technologique ») et (3) la façon dont le stress environnemental se transforme en violence intraétatique ou interétatique, les progrès seront difficiles. Jusqu'à ce qu'il y ait convergence de vues sur les divers aspects du rapport entre le stress environnemental et la sécurité nationale, il est peu probable que les réactions

et les mesures de collaboration soient suffisantes. En examinant ce rapport complexe et le rôle approprié des mesures à l'échelle aussi bien internationale que nationale, il convient de se rappeler les points importants soulevés dans ce document, à savoir que :

- À compter du XXI⁰ siècle, la sécurité nationale passera par la sécurité mondiale, laquelle dépend, en partie seulement, de la puissance militaire. Le stress environnemental n'est qu'un des nombreux facteurs (politiques, économiques et sociaux) de conflit et d'instabilité sociale. Il est difficile d'établir un lien entre une cause particulière et un résultat précis.

- Néanmoins, le stress environnemental (comme la disette d'eau et de vivres) peut dans certains cas contribuer à la violence, internationale ou intraétatique, mais qui, selon les faits dont nous disposons à l'heure actuelle, serait plutôt intraétatique.

- Le rythme des progrès technologiques et la dissémination de l'innovation sont une variable importante. La conséquence, bien que simpliste, d'un niveau élevé de progrès technologique est la réduction du stress environnemental et, partant, de la pression susceptible d'aboutir à un conflit de nature environnementale. Un autre facteur de taille est la capacité d'évoluer des institutions.

- L'histoire fournit de nombreux exemples de conflits interétatiques, suscités notamment par la pénurie de ressources non renouvelables. Le stress environnemental, comme la dégradation du patrimoine commun, constituent de nouveaux défis.

- Le type de stress environnemental, local ou mondial, influerait sur la nature du conflit potentiel. Il faudra disposer de mécanismes nationaux et multilatéraux pour identifier les coupables, évaluer les dégâts et mettre au point des moyens pacifiques de les réparer. Les approches multilatérales seraient les plus durables, mais aussi les plus difficiles à réaliser.

- Il faut procéder à une évaluation réaliste de la crainte qu'une dégradation environnementale provoque un exode des populations des pays en développement. Ces émigrants, dont un grand nombre se tournerait vers les pays industrialisés, seraient surtout des émigrants économiques ou des réfugiés et non des personnes cherchant à fuir un environnement qui se dégrade.

Ces points témoignent de la portée considérable de l'interface entre le stress environnemental et la sécurité nationale, et font ressortir les domaines et les dossiers exigeant une analyse critique plus poussée. Une solution pratique pour mieux comprendre les rapports entre le stress environnemental et la sécurité nationale consisterait à mener des études de cas portant sur des pays particuliers. Ces études viseraient essentiellement à aider les pays à appliquer le cadre théorique décrit dans le document.

"It is time to understand "the environment" for what it is: *the* national-security issue of the early twenty-first century." Robert D. Kaplan

"The only matter that could take Egypt to war again is water."
President Anwar Sadat

"Environmental threats to security are now beginning to emerge on a global scale. The most worrisome of these stem from the possible consequences of global warming caused by the atmospheric build-up of carbon dioxide and other gases." World Commission on Environment and Development (the Brundtland Commission), <u>Our Common Future</u>

"Mankind's material power has now increased to a degree at which it could make the biosphere uninhabitable and will, in fact, produce this suicidal result within a foreseeable period of time if the human population of the globe does not take prompt and vigorous concerted action to check the pollution and the spoliation that are being inflicted on the biosphere by short-sighted human greed." Arnold Toynbee

1. Introduction

Recent global developments, and higher awareness of the environmental agenda, including issues arising from population growth, are bringing the links between environmental stress and national security issues to the fore.[1] Linkages between the physical environment and national security issues are not entirely "new." Humans have often resorted to violence to gain or maintain control of resources and, during the Cold War period, so-called "strategic studies" were concerned with the ecological implications of nuclear war. The issue, however, is evolving as environmental damage or stress on ecological systems increases, and as political decision-makers and the public become more aware of such threats. Understanding this evolution requires that a distinction be made between environmental stress, i.e., negative environmental effects, and the more general, but intricately linked, case of scarcity of resources. This Paper addresses environmental stress. While perhaps stating the obvious, it is becoming increasingly clear that the environmental stress-national security nexus is likely to become a more explicit and important foreign policy concern for all countries.[2]

The Paper is principally concerned with the environmental stress-national security linkage in the context of a definition of national security that is associated with violent conflict, although where appropriate a broader definition of national security, one not necessarily associated with violent conflict, is referred to. Both definitions of national security incorporate environmental concerns. The Paper also draws a distinction between environmental stress implications <u>for</u> national security, and the reverse causation of national security implications <u>for</u> the environment, i.e., swords into ploughshares. <u>The primary purpose of the Paper is to identify and where possible elucidate the linkages between environmental stress and national security. In so doing, the Paper attempts to contribute to our understanding of the forest (environment-national security in its broadest and almost all-encompassing sense), by more narrowly focusing on an individual tree (the environmental stress-violent conflict dimension of national security).</u> One conclusion of the Paper is that, while it is apparent that the issue is likely to become a major policy concern, it is also evident that the links between environmental stress and national security are complex and far from being understood. The linkages involve many variables, and raise many

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[1] This paper was inspired by earlier work on environmental scarcities and violent conflict undertaken by Thomas F. Homer-Dixon, Director of the Peace and Conflict Studies Program at the University of Toronto.

[2] As will become evident later in the Paper, the environmental stress-national security nexus, in part depending on how national security is defined, is also likely to become a major domestic policy issue.

questions for which there are no easy answers. The issue also appears ripe for rushing toward <u>premature</u> policy conclusions if due caution is not exercised.

2. The Concept of "National Security"

There is no international consensus on the scope of what constitutes a national security issue, and the mention of environmental stress-national security linkages is likely to mean very different things to different people. It is important for users of the term to be conscious of their own understanding of the concept, as well as to seek greater awareness of how others may be interpreting it. Differences in view are also likely to arise because of the lack of transparency surrounding the causation of environmental stress and national security. While most, if not all, would agree that the environment is only one of many factors that contribute to national security, when national security is defined in a broad sense there would likely be disagreement on the extent to which environmental factors contribute or are threats to national security. This is important, as where national security is placed on the definitional continuum (strictly interstate armed military conflict on one end of the continuum, and social-economic well-being at the other) influences the analytical scope of the interface with the environment.

2.1 National Security Broadly Defined

Views of what constitutes "national security" are evolving. A number of people have proposed defining national security in a manner that would take into account a wide range of social and environmental considerations.[3] In so doing, the concept of national security takes account of a wide set of national interests, and embodies the concept of economic security and economic interests. The broad concept of national security encompasses the idea of well-being, and that factors which may have a negative effect on the well-being of a country's citizens may legitimately be considered national security issues. In this context, acid rain in Canada brought about by emissions from factories in the U.S. would be a national security issue. Similarly, and less often recognized, domestic pollution would be a national security issue.

The broad definition of national security is analogous to what the United

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[3]See Richard H. Ullman, "Redefining Security," <u>International Security</u>, Vol. 8, No.1, Summer 1983; Jessica Tuchman Mathews, "Redefining Security", <u>Foreign Affairs</u>, Vol. 68, No.2, 1989: and Ian Rowlands, "The Security Challenges of Global Environmental Change", <u>The Washington Quarterly</u>, Winter 1991.

Nations Development Programme (UNDP) has termed "human security."[4] "Human security" is most easily understood by identifying its component parts. These may be placed under several main categories; economic security, food security, health security, environmental security, personal security, community security and political security. These components are interrelated, and threats to human security are manifest in threats to the component parts. Two key features of the concept are that territorial security is accompanied by the notion of people's security, and security through armaments and military power is accompanied by security through human development. In this concept, security for a nation state - its national security - is dependent upon the common well-being of all countries. Security for a country and its people extends beyond its borders, and it is not necessarily a zero-sum game with a higher level in one country eroding or threatening the security of another. Moreover, the impact of a country's economic activities on its citizens is a part of national security.

In this sense, the impact of trade and investment on the environment become national security concerns. Trade can lessen environmental degradation and may contribute to sustainable development. By efficiently allocating resources, it is also widely recognized that trade increases economic welfare. However, if production is not appropriately priced, i.e., if costs are not internalized, trade may have an adverse environmental impact. The reduction of direct subsidies, while a step toward the internalization of environmental costs, is not full internalization of cost. The concept of environmental internalization implies that market prices fully reflect all environmental costs (i.e., including an activity's contribution to climate change).. When environmental costs are unaccounted for, a market failure, or an "externality" arises. Subsidies, by lowering costs to producers, may contribute to market failure and the accompanying negative environmental effects. For example, the underpricing of water could result in excessive use, which in the long-term could result in the loss or reduced productivity of land due to salinization or waterlogging.

The potential for trade to have a negative environmental impact, however, does not imply that trade or trade liberalization should be avoided. Rather, it implies that the appropriate environmental policy, to internalize environmental costs, is required to avoid negative environmental impacts. This is also true for investment, which will determine where production takes place. Earlier work by the Policy Staff concluded that:

"Trade is rarely the cause of environmental degradation, although there

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[4] United Nations Development Programme, Human Development Report 1994, pp. 22-46.

are circumstances where it may draw attention to an existing environmental problem. Rather, the root cause of environmental degradation lies in the failure of markets fully to reflect environmental costs, often due to inadequate or inappropriate government policies or consumer information. Consequently, the most effective solution lies in implementing measures that will allow markets to reflect these costs more accurately and thus influence the behaviour of producers and consumers away from environmentally hostile decisions."[5]

While an over-simplification, the broad definition of national security may be considered as having a military security component, i.e., violence and the threat of military activities, and an economic/social security component. By broadening the concept of national security, all environmental, as well as economic, and social factors may be brought within its purview. All aspects of human and economic development, including the domestic distribution of income, for example, would fall within the larger national security envelope. From an analytical perspective, such a conceptualization of national security in respect to environmental considerations is not always useful as it increases the scope of the issue to unmanageable proportions.[6] In the extreme, the environment-national security nexus could be conceptualized as including almost all human activities.

2.2 Environmentally Enhanced National Security

A narrower concept of national security, and a more traditional or conventional concept, has required the use, or at least the potential use, of violent measures. The focus of national security has been on interstate activity and violence, but also to a

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[5]Michael Hart and Sushma Gera, "Trade and the Environment: Dialogue of the Deaf or Scope for Cooperation?" Policy Staff Paper No. 92/11, Department of Foreign Affairs and International Trade, p. 15.

[6]Such issues are not, however, being ignored. In June 1992, the UN Conference on Environment and Development (UNCED), i.e., the "Earth Summit", attempted to address a wide range of environment issues. A full understanding of environment-national security linkages, with national security being defined essentially as human security, would require another "Earth Summit" with an analysis of the environment with respect to all the component parts of human security, such as environment-food security, environment-health security and environment-political security. To an extent, work on some of these various elements is being conducted in various organizations of the United Nations, such as the UN Commission on Sustainable Development, the UN Environment Program (UNEP) and the UN Development Program (UNDP).

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lesser extent on intrastate threats and criminal activities.[7] In certain forms, the environment has always been a part of the traditional understanding of national security, such as how military activities influence the environment. The question of whether environmental stress can contribute to or bring about armed conflict, however, has not tended to be a strong traditional element in national security considerations. This question allows us to enlarge our understanding of what constitutes national security, but to a considerably lesser degree than demanded by the very broad definition discussed earlier. It is important to note that in both the broad and what we may call the "environmentally enhanced" narrower definition of national security, the environmental context applies to more than interstate violence. Depending on the nature of the environmental stress, i.e., global or local, the effect of the stress could arise sub-nationally or even more locally. Consequently, the prospect of acute environmental stress in a more restricted locality generating a violent response cannot be excluded. The environmental stress-national security linkage moves the focus of attention away from largely interstate conflict, to a more balanced concern with intrastate/interstate conflicts.

3. The Reversed Role: Violence and the Environment

While environmental stress may contribute to military violence, the reverse is also true. Military violence and the preparation for the use of violence contributes to environmental stress. This is true for both interstate and intrastate armed conflicts. During the twentieth century, military forces in the developed world have principally been maintained for use against external enemies. This is less true for the role of the military in the developing countries. In the developing countries, the military has played a larger role in domestic political activities, including the military takeovers in such countries as Chile, Indonesia and Uganda. From the environmental perspective, military violence may have local as well as potentially global effects.

Military violence and the environment are linked in three major ways.[8] First, national defence requires expenditure on military goods and services. This is the well known "swords into ploughshares" dilemma, the notion that military expenditure could

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[7]The archetype for traditional national security was the Cold War. From the NATO perspective, this meant national security concerns associated with the threat of an expansionist Soviet Union.

[8]See Daniel Deudney, "The Case Against Linking Environmental Degradation and National Security," Millennium: Journal of International Studies, 1990, Vol. 19, No.3.

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be spent in a more benign way.[9]   Decisions on how much to spend on military activities and how much for environmental improvements are already under review in many countries, and will become increasingly scrutinized as environmental considerations become more closely associated with mainstream thinking on what makes up national security.   Too much expenditure on the military could lead to environmental vulnerability; on the other hand, too much emphasis on the environment could lead to a lack of military preparedness and military vulnerability. In this respect, in both cases, objective threat assessments are essential.   An effective mechanism of translating the two very different threat assessments into a common denominator is also needed.[10]

Secondly, the preparation for war contributes to pollution and environmental damage.   The most notable example is the development and testing of nuclear weapons, particularly the above-ground open air testing of such of devices.[11]   Even when not tested in the atmosphere, the production of nuclear arms has produced significant quantities of radioactive waste. Improper storage of fuels and the disposal of wastes are also problems.   For example, the Latvian Environment Minister has estimated that it will cost billions of dollars to clean areas occupied by former Soviet troops.[12]

Thirdly, war is directly responsible for environmental destruction, although the degree of destruction varies tremendously with the type of warfare.   Both conventional and nuclear wars contribute to environmental degradation, but nuclear

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[9]Contrary to the popular view that all developing countries spend a disproportionately large share of their GDP on the military, there is a large degree of variance. According to UNDP, such countries as Ethiopia, Mozambique and Yemen spent over 10 percent of GDP on military expenditures, while others, such as Gambia, Malawi and Zaire spent less than 2 percent. Military expenditure as a percent of GDP 1990-91: United Nations Development Programme, Human Development Report 1994, Table 21, pp. 170-1.

[10]The establishment of such a mechanism is not an easy task. While the environmental and military threats are two aspects of the "human security" concept, to address "human security" fully some measure of the various costs and benefits of each of the component parts would be required. This would be complicated by the subjective nature of measuring the threats to the component parts.

[11]A number of international agreements place constraints on nuclear weapons or the testing of weapons, such as the Nonproliferation Treaty and The Treaty Banning Nuclear Weapon Tests into the Atmosphere, in Outer Space and Under Water.

[12]World Environment Report, "Baltics Optimistic Soviet Damage To Environment Can Be Reversed", Vol.20, No.26, p. 224.

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war, possibly along with biological weapons, has the greatest potential for harming the environment. The end of the Cold War has reduced the risk of the use of nuclear weapons, but the threat has not disappeared. Proliferation of nuclear weapons states continues to be a major concern. Besides the five long-time nuclear powers (China, France, Russia[13], the U.K. and the U.S.), three other countries (India, Israel and Pakistan) are presumed to have nuclear weapons, while several other countries (Algeria, the Democratic Republic of Korea, Iran and Iraq) have a strong interest in nuclear weapons development.[14] The threat of criminal or terrorist organizations gaining control, through sale or theft, of nuclear weapons must also be taken into account. A further type of environmental degradation associated with military activities is the deliberate damaging of the environment, such as Iraq's destruction of oilwells in Kuwait and its pumping of oil into the Persian Gulf during the Gulf Conflict.[15]

In short, although defence policy is seldom directed explicitly towards influencing the environment, it does have an effect on the environment. And it behooves policy makers to understand better the nature and extent of the effects. Nevertheless, the environmental impact of war and the preparation for war should not be overstated. These activities are not the major causes of environmental degradation.[16] Nor is this "reverse" causation, while an important linkage, the principal element of the environment-national security linkage as the issue is now evolving. While military activities pose a threat to the environment and are an ongoing policy concern, it is the issue of environmental stress contributing to a threat to national security that is likely to become increasingly important in policy considerations.

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[13]Belarus, Kazakhstan and the Ukraine are not nuclear powers. The three countries were former Soviet Union states and hold Russian-controlled nuclear weapons on their territory. These weapons are in the process of being decommissioned and returned to Russia.

[14]United Nations Development Programme (UNDP), Human Development Report 1994, p. 49.

[15]See Adam Roberts, "The Laws of War in the 1990-91 Gulf Conflict," International Security, Winter 1993/94, Vol. 18, No. 3, pp. 164-8; James S. Robbins, "War Crimes: The Case of Iraq", The Fletcher Forum of World Affairs, Summer/Fall 1994, Vol. 18, No.2, pp. 53-4. In addition to pumping more than 100 million barrels of oil into the Persian Gulf, Iraq also intentionally ignited oil fires.

[16]A major nuclear war that brought about large scale environmental disruption, such as a "nuclear winter," would, of course, be in a class by itself.

4. Environmental Stress and National Security

4.1 Environmental Stress Component of Resource Scarcity

No one debates the fact that human activity has almost unlimited potential to, alter or damage the environment. Environmental stress is adverse environmental change. Environment stress includes degradation and pollution, loss of ozone shielding the planet's surface from ultraviolet radiation, but is also more, such as the loss of fertile land. A potential area for misunderstanding is confusion that often arises over resource depletion and environmental stress. A distinction needs to be drawn between environmental stress and the strategic dimension of resources. Mineral and fuel resource scarcity or depletion, such as running down oil reserves, is not, at least not directly, an example of environmental stress contributing to national security concerns.

Resource depletion or access to resources in their own right may be a cause of national security apprehension. Throughout history, many wars and mass movements of people may be characterized as being resource inspired. Colonial wars in many instances were wars motivated by a desire to have sovereign control over natural resources. The twentieth century has also seen wars that are, at least in part, resource wars.[17] Germany's aggression during World War II was partly motivated by resource considerations and its quest for Lebensraum (living space). Japanese aggression during the 1930s and 1940s was also resource motivated in part, being directly related to its industrial aspirations and the paucity of domestic resources.

International trading rules, including multilateral and regional trading arrangements, that enshrine rights and obligations upon parties to the arrangement add predictability to a country's commercial transactions. Liberalized trade rules, whether in a bilateral, regional or multilateral context, which establish a secure and predictable trading system should reduce countries' desire to have resources under national control. During the Uruguay Round, Japan had a strong interest in "food security". But Japan interpreted "food security" as essentially a country's domestic ability to meet some degree of food self-sufficiency. With liberalized trade rules, countries have access to global markets as well as sources of supply, and this should reduce any need to bring resources physically under national control. Rules-based free trade contributing to limiting the causes of interstate conflict. But these types of

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[17]See Arthur Westing, ed., Global Resources and International Conflict: Environmental Factors in Strategic Policy and Action, Oxford: New York, 1986, Appendix 2. The appendix reviews the natural resource aspects of a number of wars and violent conflicts in the twentieth century.

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resource considerations, i.e., control and access to resources, are not synonymous with environmental stress.

In considering linkages between the environment and national security, it is therefore not only important to clarify how the term national security is being defined, but also to identify as clearly as possible what type of "environmental factor" (i.e., resource depletion/access to resources; or environmental stress) is being discussed. In the case of fresh water availability issues that may lead to national security threats, resource scarcity as well as environmental stress concerns may arise. Moreover, these factors are interrelated. For example, upstream pollution may reduce downstream access to fresh water and contribute to resource scarcity. In this case, environmental degradation would be contributing to the resource scarcity. But this is intellectually distinct from a case where a country or subnational region faces a water scarcity because of local population, social or economic growth pressures. A region may simply desire to have more water than currently available locally. In this second case, resource scarcity rather than environmental stress defines the situation and often requires different solutions.

4.2 Types of Environmental Stress

Different types of environmental stress are likely to raise different national security issues. Below are three analytical categories of environmental stress: in reality, cases of environmental stress could cut across categories.

● Global Commons

Environmental stress on the global commons refers to environmental damage that has global effects. That is not to say that the causes or the effects of environmental damage are distributed equally globally. Chloroflurocarbons (CFCs) that deplete the ozone layer, and thereby allow higher levels of ultraviolet light to reach the earth is a global commons environmental issue. The "greenhouse effect" brought about by increased concentration of gases, principally carbon dioxide, in the atmosphere is also a global commons issue. Carbon dioxide is produced by the burning of fossil fuels, such as in car engines; consequently, economic development based on hydrocarbons implies continued emission of carbon dioxide. The warming of the earth's surface is expected to give rise to changes in climatic conditions, and this could have negative consequences, such as raising the sea level. Degradation of the oceans, and over-harvesting of fish are also global commons issues.

● Transboundary or Regional

Certain environmental issues, while international in scope, are not global. This would include sulphur dioxide emissions ("acid rain") effects on neighbouring states, and access to bodies of fresh water that crosses national boundaries. Belligerent behaviour and conflict over access to fresh water could arise over differences in views on the level of effluent allowed into a body of water traversing countries. Conflict could also arise from a state limiting the volume of water available to another state, but this would more appropriately be considered a case of direct resource scarcity than environmental stress.

● Local or National

Local environmental stresses include wildlife management, unsustainable land use and local industrial pollution in urban areas. Unsustainable land use includes sedentary farming of marginal lands that are quickly exhausted, degradation of aquifers and watersheds, the waterlogging or salination of irrigated land, and pollution of surface and groundwater. Municipal dumping of commercial and household waste has in a number of localities become an acute environmental problem. This is not to say that local environmental degradation has no transborder or global effects, but that the principal direct impact is on local conditions.

4.3 Types of Environmental Stress and their National Security Implications

The typology of environmental stress goes some way to clarifying that the environmental threat to national security is really a set of simultaneous yet diverse threats. In a hypothetical situation where there were no threat of global warming or ozone depletion, other environmental threats would still exist, including unsustainable agricultural practices and production levels and the reduction of biodiversity of plants and animals. This said, the environmental threats are interrelated. For example, changes in climatic conditions could exacerbate regional and national environmental problems, such as soil and water degradation.

With the traditional definition of national security, i.e., military violence, the source of the threat is mainly outside the country. With the traditional definition, the source of the threat, country X or country Y, is also clearly identifiable. The sources of environmental stress are less identifiable. Sources are both inside and outside a country, and many individual agents, firms, people and governments contribute to environmental degradation. This is important, as there is a danger that political thinking may tend to fall into an "us" verses "them" cross-border mentality. This could result in over-emphasizing the "foreign" component of environmental

degradation, with less serious attention given to domestic causes.

The timeframe over which a specific type of environmental degradation occurs, or more correctly has the potential to occur if appropriate policy responses are not taken, influences the relationship between the degradation and national security concerns. While the most potentially devastating environmental problems are global in nature (e.g., ozone depletion, potential climate change), it is not clear that this set of issues is the most important with respect to potential causes of violence over the next decade or two. The most likely candidates for causes of violence over this period are water and local land degradation. Problems related to fresh water, in particular, may contribute to interstate conflict.[18] While climate change may be the most serious threat over the longer term, the most <u>immediate</u> threat to national security may be conflict arising from the degradation of the fresh water supply. Many bodies of fresh water cross international borders. Increased demand for water may add or create tension over upstream pollution control. Moreover, having degraded ones own supply, a country may begin to look elsewhere for the resource.

The difficulty with placing a timeframe on types of environmental degradation is that environmental change is not linear. The environment does not change at some constant incremental rate. Nor does the scientific community have the knowledge to predict accurately how the environment will change. Perhaps ozone depletion can continue for considerable time before any serious effects occur; conversely, depletion levels may reach some critical threshold in the near future and result in radical environmental change. The nonlinear nature of environmental stress means that caution is required in assessing what types of environmental deficiencies are most likely to contribute to national security concerns, and require policy responses, over a given period of time.

4.4 A Conceptual Framework

The following paragraphs will set out a conceptual framework for facilitating and simplifying the understanding of the nature of environmental stress-national security linkages.[19] The intellectual transformation of environmental stress, the
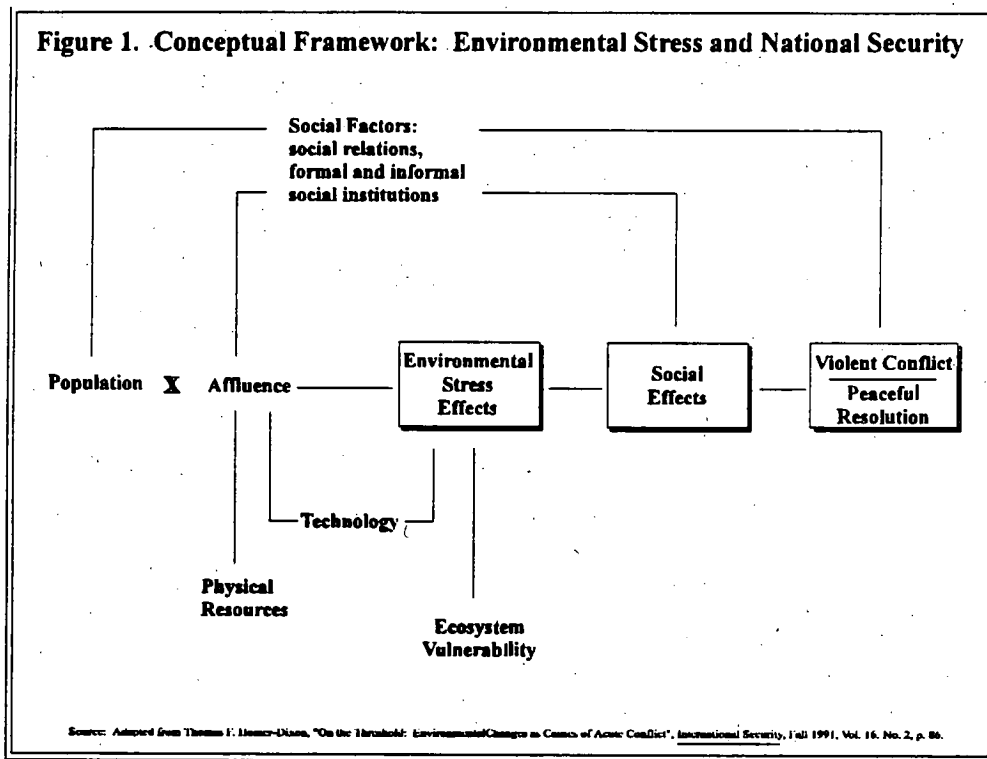
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[18]Conflict over the degradation of fresh water is likely to be intricately linked with more general water scarcity issues.

[19]The conceptual framework draws upon analytical work by Thomas F. Homer-Dixon, "On the Threshold: Environmental Changes as Causes of Acute Conflict", International Security, Fall 1991, Vol. 16, No.2., pp. 76-116.

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measurement of which is difficult in itself, into violent action is not a simple undertaking. Figure 1 is a diagrammatic presentation of the transformation.

The diagram has three sequential components, and two causal and far from completely deterministic links. The two casual links connecting the components are (1) between environmental effects and social effects, and (2) the social effects and violent conflict. Moreover, there are many feedback loops that are not shown. For example, the Paper's discussion of the "reverse role"[20] would be represented by a line

Figure 1. Conceptual Framework: Environmental Stress and National Security

Social Factors:
social relations,
formal and informal
social institutions

Population **X** Affluence

| Environmental Stress Effects | Social Effects | Violent Conflict Peaceful Resolution |

Technology

Physical Resources

Ecosystem Vulnerability

Source: Adapted from Thomas F. Homer-Dixon, "On the Threshold: Environmental Changes as Causes of Acute Conflict", International Security, Fall 1991, Vol. 16, No. 2, p. 86.

from violent conflict to environmental effects. Most important is the manner in which social institutions and technology influence the components. Changes in technology will alter relationships in the framework; for example, new technology will influence the degree of environmental stress resulting from population or economic growth. Similarly, formal and informal institutions, such as the cohesion of families or the strength of local communities, or the willingness of society to accept environmental degradation will influence how environmental stress is dealt with.

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[20]See section 3 above.

● **Environmental Stress Effects**

The first component is environmental stress effects. These effects are physical in nature and the categories or types of environmental degradation (global, national, and local) are manifestations of the effects. Environmental effects could include scarcity of resources more generally, but in this Paper the focus is on the environmental stress aspect. Two variables influencing the environmental effect are total population and per capita environmental stress. Per capita environmental stress in turn is dependent upon affluence, a per capita variable that implicitly takes into account the use of physical resources, and the technology used in the production process. "Affluence" identifies the fact that the average North American and the average African do not have the same level of resource consumption, and thus do not inflict the same level of environmental stress. A third variable influencing the environmental effect is the vulnerability of the ecosystem to human activity (stress absorption capacity varies greatly). Social factors, such as preferences for types of food - meat versus cereals - also influence the affluence variable.

● **Social Effects**

The second component is the social effects that arise in part from or are exacerbated by the environmental stress. The two key potential social effects of environmental stress are population displacement - both internal migrants and emigrants to other countries - and economic decline. For example, land degradation caused by inappropriate irrigation (the environmental stress) could contribute to population migration (the social effect). All of the environmental categories identified earlier have the potential to influence adversely economic activity. Economic decline in turn may be accompanied by several social ills such as unemployment and increased income differences between social groups. This is not to say that all social effects or conflicts necessarily result in violence. On the contrary, social conflict is most often resolved peacefully, being addressed by such means as legislative, regulatory or institutional reform. The willingness of governments to undertake public transit, for example, may be influenced by environmental factors. Conceptually, the point is that environmentally induced social effects have the potential to result in violence.

● **Violent Conflict**

The third component is violent conflict that is induced or contributed to by the social effects. Such conflict could arise as either intrastate or interstate violence, and would vary in intensity and scope. The nature of the conflicts is set out below.

Intrastate violence could arise from environmental stress. In the most simple case, environmental stress would result in living conditions so harsh that the public, or certain elements of the public, would resort to violence in the hope of altering the conditions they face. But there is nothing simple here about the causational links. Political factors, the distribution of income and social-ethnic factors may influence environmental degradation. A dualistic land ownership structure, with resource allocation and control held by a small, possibly different ethnic group or elite may encourage the non-elite to use ecologically vulnerable and marginal lands for agriculture. Moreover, with insecure land tenure, the non-elite farmers have little incentive to conserve the land and this would contribute to a greater rate of environmental degradation. Intrastate violence could also arise indirectly. Internal migrants might move from environmentally exhausted lands to areas that, while also under environmental stress, offer somewhat better living conditions. Again, if different ethnic groups were involved the prospect for violence may increase, and the causal links become more complex.

Interstate violence could stem from internal social instability. From one point of view, if negative environmental effects do not extend beyond the local community or state (i.e., no spillovers or transborder externalities), there is no pressing need for international action. But this erroneous conclusion is reached on the basis of the environmental effects themselves, not the possible social conflict arising from the environmental effects. There are a number of ways domestic environmental stress contributing to internal social instability could also contribute to interstate conflict. First, the international system could become more prone to conflict due to domestic instability. Should environmental stress result in a shift in the relative strength of states, the use of violence could be considered a more attractive option by the party gaining in strength. Secondly, conflict could conceivably arise from an increased flow of emigrants, or from political elites channelling public dissatisfaction on to a foreign country, or even from the country experiencing the environmental stress attempting to gain new resources to compensate for its losses.[21] Therefore, what may be considered domestic environmental problems are of interest to the international community from a national security perspective.

Interstate violence could also result from transboundary pollution and global commons issues. The reality that ecosystems and pollutants do not respect national

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[21]This last point is an example of how environmental stress and the more general case of resource scarcity are linked. While it cannot be categorically stated, it is not outlandish to suggest that chronic scarcities of renewable and non-renewable resources will occur over the next century. Whether such scarcity will be acute enough to promote violence, or whether the scarcity is caused by environmental stress, is difficult to say.

boundaries call into question the current concept of national sovereignty. As currently understood, countries have the sovereign "right" to pursue their national interests, including environmental resource usage and protection. However, as part of a larger whole, it is possible that the pursuit of what a country considers its national interest is a national security threat to other countries. Such an event could occur with respect to upstream air or water pollution. In a multilateral context, it also raises the possibility of "free riders" to international environmental agreements (IEAs). While some or most countries may agree to a course of action to reduce environmental degradation, other countries may consider it in their interest not to accept international practices. If such non-compliance were to pose a global environmental threat, countries could contemplate the use of violence as a last resort to force compliance.[22]

4.5 Empirical Evidence of Causation

Because of the multidimensional nature of the linkage and data limitations, empirical analysis of how environmental stress works through the conceptual framework and how the myriad variables interact is not rigorous. This is true for both causal links.[23] In regard to the first, Thomas Homer-Dixon has observed that environmental-social systems analyses are difficult because "they are characterized by multiple causes and effects and by a host of intervening variables, often linked by interactive, synergistic, and nonlinear casual relations. Empirical data about these variables and relations are rarely abundant. Although the underlying influence of environmental factors on conflict may be great, the complex and indirect causation in these systems means that the scanty evidence available is always open to many interpretations."[24] As for the second casual link, he notes: "At present, we can bring only limited empirical evidence to bear on this question. This may be partly because environmental and population pressures have not yet passed a critical threshold of severity in many developing countries: also, there has been little case-study research on environment-conflict linkages."[25] Reflecting this, much work is anecdotal in

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[22]With respect to resource scarcities, international conflict could also arise over access to resources, such as how natural resources in Antarctica are to be distributed.

[23]That is, environmental stress effects (i.e., physical effects) to social effects, and social effects to violent conflict.

[24]Thomas F. Homer-Dixon, "On the Threshold: Environmental Changes as Causes of Acute Conflict", International Security, Fall 1991, Vol. 16, No.2., p. 84.

[25]Ibid. p. 104.

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nature, which in turn is often selective and impressionistic. Given these limitations, such work nonetheless does point to a potential for environmental stress to contribute to violent conflict. Yet it is certainly not the stuff for drawing strong conclusions.

A case study of China concluded that environmental degradation of the country was emerging as an important source of disputes, including potentially violent conflict.[26] Contributing factors to environmental deterioration in China, which extends over the full gamut of environmental problems such as deforestation and soil erosion, have been large absolute increases in population and, during the Mao Zedong years, a Stalinist type, heavy industry development strategy that took little account of environmental concerns. Moreover, the post 1978 reform period has seen economic growth outpace implementation of effective environmental policies. The study notes that noise and air pollution have both been the cause of urban conflict. In one case, coal-handling equipment was smashed, as its operation generated dust clouds that prevented local residents from opening their windows.[27] Examples of violent clashes over access to water are also given.[28] But while the causes of specific incidents, such as the coal incident, are not unique, the number and intensity of such conflicts are not known. The point that environmental stress has contributed to conflict nonetheless makes it difficult to dismiss the possibility that, should environmental stress intensify further, conflict could be expected. In China, it is widely expected that serious environmental challenges will occur over at least the next twenty years.[29]

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[26]Václav Smil, "Environmental Change as a Source of Conflict and Economic Losses in China," Occasional Paper No. 2, Project on Environmental Change and Acute Conflict, A Joint Project of the University of Toronto and the American Academy of Arts and Sciences, December 1992.

[27]Ibid. p. 11.

[28]Ibid. p. 16.

[29]For an insightful analysis of China's economic prospects and environmental challenges, see Stephen Lavergne, "China 2000: The Nature of Growth and Canada's Economic Interests," Policy Staff Paper No. 94/10, Department of Foreign Affairs and International Trade, May 1994. The Paper concludes that environmental problems will pose "a significant challenge to sustainable development in China in the future. Environmental problems in China are more severe than at comparable periods of economic development in most industrialized countries, primarily because of the size of the country's population, and natural resource constraints. They could impair China's potential for economic growth, unless action is taken soon to address both the direct and indirect or underlying causes. Chinese reformers must come to view environmental management as part of the larger process of economic reform and industrial restructuring. Moreover, the continued increase in emissions which generate acid rain and produce greenhouse gases, for example, will increasingly internationalize China's environmental problems." Indeed, from the environmental stress-national security perspective it would appear prudent for China to take a serious look at a non-conventional definition of national security.

Haiti is another example. A multitude of factors have contributed to social tension and violent conflict, including environmental stress which appears to have played some causal role. Nonetheless, hard empirical evidence is lacking on the relative importance of the variables. Over recent decades, Haiti has experienced substantive deforestation and soil erosion. One author has concluded that "while many of the boat people who fled to the United States left because of the brutality of the Duvalier regimes, there is no question that -and this is not widely recognized- many Haitians were forced into boats by the impossible task of farming bare rock. Until Haiti is reforested, it will never be politically stable."[30] Unfortunately, there are no data to give any indication of what precisely motivated Haitians to emigrate, or to the extent environmental stress contributed to a rise in domestic violence directed toward political regimes.

5. The Demographic Time Bomb

Population levels, distribution and growth have a fundamental role in the analysis of environmental stress and national security issues. Unfortunately, a high degree of uncertainty surrounds the translation of demographic factors, particularly population growth, into some understanding of the environmental, let alone social, impact of the factors. Malthusian and counter Malthusian reasoning on the effects of demographic change are not on solid ground; there are many unknowns. Malthusian thinking argues that population growth will outstrip human sustenance. Counter Malthusian thinking points to the fact that, for the past two hundred years, technical change and other factors, such as new agricultural lands and the functioning of markets, has allowed humankind to provide for itself. The past, however, cannot be simply extrapolated into the future. For example, the "green revolution", which lasted from the 1960s to the 1980s and brought about increased agricultural yields, is largely over. Toss in some unknown global climate change in part contributed to by global warming and, while the Malthusian prediction does not become inevitable, there is cause for serious reflection on the significant size of potential desirable levels of future production to sustain mankind at a "comfortable" standard of living and the limitations on reaching such levels of production.[31]

With a reduction in external military threats, resources deployed to the military might more wisely be deployed elsewhere.

[30]Jessica Tuchman Mathews, "Redefining Security", Foreign Affairs, Vol. 68, No.2, 1989, p.168.

[31]Indeed, with current technology it may well be that the world does not have enough resources to provide the current global population with a 1995 middle class OECD country-type lifestyle.

It is generally accepted that population growth is a contributor to most of the three major types of environmental stresses discussed above.[32] Precisely how a given population or changes in a population influence the environment is case-specific and dependent upon many variables. Technology will play a key role, both in the creation of environmental threats, such as the invention of motor vehicles and emissions from their use, and in the technologies developed and deployed to reduce environmental stress, such as waste management or even reproductive technology. In light of this, the further in the future population projections are made, such as forecasts of global figures for the years 2100 and 2150, the less reliable they become as indicators of potential contributors to environmental stress. The reason for this is technological change. The potential environmental impact of a future population becomes more uncertain as more assumptions on possible new technologies are made. Moreover, population growth may also contribute to demographic and social tensions which influence national security concerns directly, and not through any environmental effect. Changes in ethnic composition, such as Israeli settlements in the West Bank, even without taking account of possible environmental influences, have sparked violent actions. All these complex factors make it difficult to generalize on how population growth will contribute to specific national security concerns.

A related uncertainty is the rate of population growth itself. Depending on assumptions made, such as contraceptive use and the average age of marriage, a wide range of potential populations may be generated for any future date.[33] The mid 1994 world population is estimated to be 5.63 billion.[34] Whether the current global population will treble or quadruple, before it levels out, is a matter of speculation. The 1994 U.N. population projections for the year 2025 range from a low of 7.6 billion to a high of 9.0 billion.[35] The U.N. population projection for 2050 has a range of 7.9

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[32]See World Resources Institute, World Resources 1994-95, Chapter 2, "Population and the Environment" for some case studies (Philippines, Costa Rica and others) on the environmental impact of population growth.

[33]The International Conference on Population and Development (ICPD) held in Cairo, September 1994, considered many factors that have traditionally not been taken into account, such as women's access to education and political rights, and the potential relationships between these factors and demographic change.

[34]Population Reference Bureau, Inc., Population Today, Vol. 22, No.11, November 1994, p. 2.

[35]The United Nations, The Sex and Age Distribution of the World Populations, The 1994 Revision, New York, 1994. An earlier publication, The United Nations, World Population Prospects, The 1992 Revision, New York, 1993, had global population estimates for 2025 ranging from 7.8 billion to 9.1 billion.

billion to 11.9 billion.[36] In all projections, regional trends are very uneven. Most of the absolute increases will be in the developing countries, with Africa's growth rate the fastest, followed by Central and South America, Asia, Oceania, North America and Europe. The consequence of this will be a greater percentage of the global population living in developing countries. Yet, while there is no consensus on precise numbers, there is global recognition that demographic factors pose serious environmental challenges and that the planet has a finite population capacity.

The growth rate of population is not the only factor. There is also a need to consider the resources used and the environmental stress on a per capita basis. One person in the developed world will consume many more resources than one in the developing world. Differences in countries' per capita GDP are a crude indicator of relative levels of resource consumption. Other indicators could be per capita energy consumption or daily calorie supply per capita.[37] The relationship between per capita consumption of resources and environmental stress is not, however, clear or simple, as the level of technology as well as environmental standards and different environmental assimilative capacities influence the level of environmental stress.

In addition to total population, the distribution of population will influence the environment, as well as generating other potentially serious results. A prominent feature of future population growth will be increased levels of urbanization and the continuing growth of "megacities", with some cities such as Mexico City already exceeding twenty million inhabitants. Growth rates, and the rise in relative percentages of urban dwellers in the developed countries and even more so in developing countries, will place increasing pressure on the economic infrastructure. It has been reported that in Calcutta, Dhaka and Mexico City, more than 25% of the population is essentially homeless.[38] Urban population growth could exacerbate urban pollution problems, as well as contributing to social tensions. Addressing the

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[36]Population Reference Bureau, Inc., Population Today, Vol. 22, No.11, November 1994, p. 2.

[37]For example, for rough illustrative purposes, energy consumption per capita (expressed in kilograms of oil equivalent) varies greatly, with Canada reaching over 10,000 and a number of developing countries, such as Bangladesh, Ethiopia and Togo reaching less than 100. The oil equivalent comprises the annual consumption of commercial primary energy (coal, lignite, petroleum, natural gas and hydro, nuclear and geothermal electricity) in kilograms of oil equivalent per capita. The use of firewood, dried animal excrement and other traditional fuels, although substantial in some developing countries, is not taken into account in these figures because reliable and comprehensive data are not available. World Bank, World Development Report (1992), Table 5, p. 226. For figures on daily calorie supply, see Table 28, p. 272.

[38]United Nations Development Programme (UNDP), Human Development Report 1994, p. 26.

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problems of urban development could exacerbate tensions between urban and rural populations, if the rural population sees itself as footing more than its fair share of the bill. In countries with meagre safety nets and a large degree of polarization in incomes, political and social stability could erode or even totally collapse. It is unlikely that such events would have positive spillovers for the environment.

Population growth, rapid urbanization and local and possibly global environmental decay could prove to be a volatile mix. But how this pressure will appear in the future is highly speculative. This is so for three reasons. First, there is no scientific consensus on how environments respond to degradation; no widely accepted forecast of the environmental effects of global warming. Second, as mentioned earlier, population forecasts are prone to uncertainty. Third, assumptions on the advancement and deployment of technology can greatly change any forecast of future environmental stress. In short, there is little certainty on how some unknown future population will contribute to environmental stress. Nevertheless, to the degree that environmental stress is caused by population growth, and to the degree environmental stress contributes to violence, family planning programs may have a role in lessening the potential for violence.

6. Environmental Stress and Population Migration

Arguably the mass movement of population may create a national security concern. Immigration, by increasing the number of people, regardless of race or ethnicity, may be seen as contributing to environmental problems in the receiving country. As described in the analytical framework, environmental stress has the potential to generate violence. But there is also a second potential national security concern.[39] The movement of people is sometimes alleged to contribute to the change or instability of existing social institutions, cultural norms, etc., and some members of the receiving society consider such a development a threat to their national security. Whether such social change is really a national security issue is

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[39] Gil Loescher has made two important observations. First: "Refugees and migrants present political and security problems for the domestic politics of the receiving state. The host populations will be on the watch for any threat to its own interests or, more generally, to the impact of immigrants on the political and social complexion of their country." Second: "Refugees can also be sources of international conflict. Offering sanctuary and support to migrants and refugees frequently incurs military retaliation and draws asylum countries into the turmoil. In many Third World regions of conflict, fighters often mingle with refugee populations, using their camps for rest and medical treatment, and sometimes for recruitment." Gil Loescher, "Refugee Movements and International Security", Adelphi Papers, 268, Summer 1992, pp. 48 and 50.

controversial, and accusations of racism and xenophobia often arise when immigration issues are presented in a national security context.

Such cultural anxiety and security concerns are often expressed in the Western press with respect to movements of people from developing to developed countries. The movement of people within the OECD and from developed to developing countries do not usually have such overtones. With respect to the United States, James Clad has concluded: "We can either acknowledge, reluctantly, that immigration on the scale of the last three decades increasingly conflicts with other national priorities, or we can persist on our laissez entrer course and run a high risk of incurring a nasty nativist reaction to immigration. That sort of reaction would bring profound and unpleasant consequences for our society, our civil liberties, and not least, our foreign relations."[40] But it is not just a North-South issue. Migration or the movement of workers between developing countries by different ethnic or national groups may create tension. Palestinian people in Lebanon, for example, have created security concerns for Lebanon, Syria, Jordan and Israel.[41]

This Paper has identified but will not directly address whether immigration is a national security concern, nor analyze the degree to which immigration may contribute to violent responses. The Paper does, however, recognize that, given the right social conditions in the country receiving the migrants, intrastate violence could arise. Periodic violence against ethnic Turks in Germany by neo-Nazis and German nationalists, and ethnic Turks' reprisals, is one example of such conflict. It is fair to say that immigration may contribute to conflict, but that such an outcome is not an inevitable result of immigration. The Paper also accepts the premise that migratory movements can contribute to additional environmental stress in the receiving country in the context of population growth, as discussed earlier. The key question for environmental stress linkages is, however, not simply that of migrants sparking violent incidents and contributing to alleged national security concerns. One must first ask to what extent migration is caused by environmental pressures.

Looking back over the past one hundred years, there is some evidence that environmental factors have contributed to emigration or the movement of people

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[40]James C. Clad, "Slowing the Wave", Foreign Policy, Number 95, Summer 1994, p. 139.

[41]Gil Loescher, "Refugee Movements and International Security", Adelphi Papers, 268, Summer 1992, p. 51.

within and between countries.[42]   The Chernobyl nuclear accident, for example, displaced thousands of the city's and the surrounding area's residents. This is a discreet event with direct cause and effect. More generally, land degradation and desertification have been identified as sources of what may be termed "environmentally motivated population movements."[43] "Throughout the Third World, land degradation has been the main factor in the migration of subsistence farmers into the slums and shantytowns of major cities, producing desperate populations vulnerable to disease and natural disasters and prone to participate in crime and civil strife", according to the United Nations Environment Program.[44] In particular, desertification in the Sahel, in part due to overgrazing of animals and inappropriate farming methods, has been seen as contributing to population movements.

But other examples are less clear with regard to the cause of the population movement. Large numbers of people have emigrated from Bangladesh to the Indian state of Assam, but caution is required in determining motivation. Population growth and not environmental stress per se appears to be the major factor contributing to the movement. Looking to the future, environmental stress may play a greater role. With the expectation that Bangladesh's population will grow significantly, at least doubling from its current population of 115 million in the next fifty years, a combination of population growth, and the resource scarcity this implies, and environmental stress factors are likely to result in continued pressure for emigration.[45]

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[42]An historic example of environmental factors playing a significant part in population migration and conflict is the movement of the Norse peoples (centred in what are now Norway, Sweden and Denmark) for a number of centuries before and after 900 A.D. The Norsemen pillaged and eventually settled in a number of regions in Europe, including Normandy, northern England and Sicily. It is less clear, however, to what degree environmental stress as opposed to a more general scarcity of resources contributed to the movement of these people.

[43]The term "environmental refugee", while often used, is misleading. The 1951 UN Convention Relating to the Status of Refugees defines refugees as "persons who are outside their country because of a well founded fear of persecution for reasons of race, religion, nationality, membership of a particular social group or political opinion." Emigrants motivated by environmental concerns are by definition not refugees.

[44]Quoted in Jodi L. Jacobson, Environmental Refugees: A Yardstick of Habitability, Worldwatch Paper 86, November 1988, p. 10.

[45]For a discussion on population growth and resource scarcity as motivators of Bangladesh-Assam population movements, see Sanjoy Hazarika, "Bangladesh and Assam: Land Pressures, Migration, and Ethnic Conflict", Occasional Paper No. 3, Project on Environmental Change and Acute Conflict, A Joint Project of the University of Toronto and the American Academy of Arts and Sciences, March 1993.

During this century, it appears that people generally have not emigrated because of environmental degradation. Political and social oppression, as well as militarily induced movements, clearly have played a role in emigration. But the principal motivator appears to be the prospect of increased material well-being elsewhere, with "pull" factors predominating over "push" factors. People emigrate because they want and expect to attain a higher level of personal consumption. In the future, there is no denying that acute environmental degradation could cause substantial, environmentally motivated population movements. Beyond concerns over land degradation, there is a fear that global warming will cause a rise in sea levels and that this would force millions to flee coastal cities and low-lying agricultural land. But the extreme degree of degradation required to spark such massive shifts, the assumption that countries would be willing and able to take action to mitigate pressures for emigration at the source, and the potential recipient countries' unwillingness to accept immigrants on such an explosive scale, do not make large population movements inevitable or even likely, except on a limited regional basis. The conclusion that environmental stress will result in emigrants from the developing countries that could overwhelm the developed countries is at this time an unfounded assertion. This, however, should not detract from the importance of understanding the implications of the declining habitability of certain regions or perhaps the world as a whole.

7. Policy Implications

At its greatest level of aggregation, the policy implication for decision-makers is that they should take into account the links between environmental stress and national security to enhance policy decisions. But it must also be recognized that our understanding of the issue is severely limited. Public policy involves making choices. It is apparent, by the number of issues touched upon in this Paper and identified in the conceptual framework, that to address effectively environmental stress-national security linkages a high degree of policy integration will be required. This implication applies whether national security is considered in its "broad" or less encompassing "environmentally enhanced" definition. The scope and types of linkages will, however, vary as decision-makers revise their understanding of what constitutes national security.

The environmental stress-national security linkage is one dimension of a larger trend in global change. The two fundamental parameters of global change are that the world is organized politically into states; and that these same states are becoming increasingly interdependent. Interdependence is most readily seen in terms of increasing economic integration. But, as this Paper discusses, environmental

interdependence and the security concerns flowing from it are also increasing. The concept of national security is no longer confined to national political sovereignty. Nationally and internationally, there is a need for governments to take a more systematic approach to addressing environmental stress-national security issues. This includes problem identification, the requirement to anticipate emerging environmental stresses, and the analysis of how such stress may become factored into national security interests.

In Canada, at the political level, recent attention has been directed at the concept of national security. The Special Joint Committee of Parliament reviewing Canadian foreign policy reached some conclusions that recognized that not only is domestic and foreign policy becoming increasing blurred, but that the various elements of foreign policy are interdependent, and that interdisciplinary approaches are required if national security policy making is to be effective.[46]

> "The Committee is convinced of the need to adopt a broader concept of security, encompassing both military and non-military factors. The Committee further recommends that this concept be reflected both in the establishment of a high-level government mechanism, such as a Cabinet committee, and in a restructuring of the relevant Standing Committees of Parliament, in order to ensure that the various elements of security are addressed in an integrated manner."[47]

At the national level, the myriad issues encompassed by the environment-national security interface may pose bureaucratic management problems in many countries. The various facets of the issue, political, environment, social, military (only touched upon in this Paper), are truly mind-boggling. The issue of national security always raises the question of the role of national intelligence services, and the environment-security nexus is no exception. In theory, it would appear that there is a legitimate role for intelligence organizations. Environmental factors clearly may generate security concerns. Yet, in practice, intelligence organizations may not possess the appropriate skills, and face institutional barriers (such as restricted mandates or interdepartmental rivalry) to develop,or acquire the appropriate resources, inhibiting their capacity to address the linkage between environmental and security issues. Moreover, political-decision makers may be slow to accept, or may even

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[46]Report of the Special Joint Committee of the Senate and the House of Commons Reviewing Canadian Foreign Policy, CANADA'S FOREIGN POLICY: Principles and Priorities for the Future, November 1994, Chapter 2, pp. 11-26.

[47]Ibid. p. 13.

reject, the evolution of intelligence and security organizations into untraditional areas. This said, an effective national mechanism, even coordination by existing institutions within existing mandates, is needed to develop coherent policy.

The national security linkage is not a classic case of environmental spillovers, where one or a number of countries' actions affect the environment of other countries. The ability of environmental stress to generate or add to violent conflict adds a new dimension to thinking on the use of unilateral extrajurisdictional trade measures. Canada and many other countries oppose the use of unilateral extrajurisdictional trade measures. The basis of this position is that an individual country has the right to set environmental standards within its domestic jurisdiction. Collectively, countries may agree to environmental policies or practices within international environmental agreements. Allowing foreign countries to dictate domestic environmental practices, with the threat of trade sanctions to enforce the foreign country's view, is unlikely to be in Canada's best interest. Unilateral trade action that places an economic penalty on a foreign country is likely to add to economic/social hardships, and add to negative developments arising from the environmental stress. For global or transboundary environmental problems, the best approach is through international cooperation, not power politics. This position has traditionally been based on environmental degradation as a discrete policy concern. The ability of environmental stress to contribute to violence raises the stakes further and reinforces the need for international cooperation and solutions.

The linkage also suggests that the governments of developing countries will need to reassess the importance of the environment in broad terms for their countries. It has been suggested that developing countries may consider that the developed countries are the "demandeurs" on the environment file, and that this gives the developing countries some bargaining leverage.[48] With this logic, certain developing counties may hold the view that, if the developed countries want a clean environment, then the latter should pay for it, while all countries would to some extent benefit. The environmental stress-national security linkage weakens this argument. With the prospect of conflict and possible political instability, developing countries may see that their direct contribution to the maintenance of a clean environment must have a higher priority.

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[48]Richard N. Cooper, Environment and Resource Policies for the World Economy, The Brookings Institution, Washington, D.C., 1994, p. 57.

7.1 International Cooperation

The threat of environment stress leading to violence, in addition to the negative implications of environmental degradation itself, makes a strong case for increasing international cooperation on environmental issues. Environmental problems, resource depletion or environmental stress do not require violent conflict to influence the human condition. For example, air pollution that stimulates respiratory illness directly endangers human health. Renewable and non-renewable resource scarcities will affect human well-being, regardless of whether there is a violent response to the shortages. Environmental problems in themselves, i.e., the direct environmental impact, necessitate cooperation in tackling them. The potential for violence derived from environmental stress reinforces the need for cooperation. Such cooperation is essential for resolving global and regional environmental problems.

The multidimensional nature of how environmental stress translates into violent conflict requires that an integrated multilateral approach be taken to reduce the risk of such violence occurring. Social, demographic, political and economic issues are all inherent factors contributing to the threat. The conceptual framework discussed earlier in the Paper and presented in Figure 1 illustrates the large number of potential policy responses. The three components: environment, social conflict, and violence, as well as the two causal linkages, and the important outside influences not explicitly captured by the framework, such as technology, allow for some increased understanding of the interdependency between environmental stress and national security. Peacekeeping or peacemaking is one potential policy response. This response, which would be costly, would be directed at restoring social stability once environmental stress had resulted in a violent conflict. A more fundamental policy response would be directed at reducing environmental stress in the first instance.

By reducing environmental stress, violent conflict that may arise from it is also affected. Efforts to date on generating global cooperation on environmental issues and reducing environmental stress in general have had moderate success. At the United Nations Conference on Environment and Development (UNCED), a Framework Convention on Climate Change was adopted. Article 2 states that the Convention's objective is to stabilize atmospheric gas concentrations at a level that would prevent dangerous interference with the climate. In addition, many countries, mainly the developed countries, have undertaken to adopt national policies to limit greenhouse gas emissions.[49] Other examples of international cooperation are the well-known Montreal Protocol on Substances that Deplete the Ozone Layer, the Convention on

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[49]Ibid. p. 42.

International Trade in Endangered Species of Wild Fauna and Flora (CITIES) and the Basel Convention on the Transboundary Movement of Hazardous Wastes. Yet UNCED cannot claim great success in terms of concrete results, although it was a start and raised awareness.[50] The comprehensive program for action, Agenda 21, agreed to by governments, for example, lacks the force of law and the implementation of Agenda 21 is dependent upon best endeavours and not contractual obligations. There remains ample scope for countries unilaterally or collectively to make firm commitments for reducing environmental stress.

With respect to reducing environmental stress, the maintenance of an open international trading system and investment climate is beneficial. Michael Hart and Sushma Gera have concluded that:

- economic prosperity is one of the most important determinants leading to a more sustainable environment;

- promoting economic development in developing countries through trade and investment is one of the most efficient ways to raise environmental conditions on a global basis;

- trade-restricting measures are often the least efficient way of ensuring that prices reflect environmental costs and thus rarely achieve environmental goals and may even retard them;

- achieving environmental objectives by means of trade measures lends itself to protectionist abuse; and

- there is no fundamental conflict between environmental objectives and the

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[50] "The sad fact is that governments did not commit themselves, individually or collectively, to implement any concrete measures to reduce catastrophic rates of population growth, or to alter certain consumption patterns, say in fossil fuels. Nor did governments agree on any measures to roll back mass poverty, reduce the debt of poor countries - some voluntary announcements were made, but no collective agreement to increase poor-country access to rich country markets. There is nothing in the conventions on climate change and biodiversity that binds governments to concrete measures, with targets and timetables, to reduce emissions of carbon dioxide and other greenhouse gases or to reduce high rates of deforestation or species loss...So, the sad bottom line is that governments did not agree to implement any measures that would alter the dismal trends that brought them to Rio...Our leaders left almost nothing unsaid and almost everything undone." Jim MacNeil, the former Secretary General of the Brundtland Commission, statement before the Canadian Parliament's Standing Committee on the Environment. Quoted in Thomas Homer-Dixon, "Environmental and Demographic Threats to Canadian Security", Canadian Foreign Policy, Vol. 2, No.2, Fall 1994, pp. 27-8.

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goals and provisions of the GATT-based trade relations system, although there is room for clarification to remove any ambiguities and to strengthen the basis upon which the trade and environment issues can be made more overtly complementary.[51]

Another potential policy response is financial assistance provided for reducing environmental stress or promoting social conditions, such as poverty alleviation, that work to reduce social tensions that could turn into violent conflict. This assistance could consist of aid, but might also involve debt forgiveness. For the greatest impact, aid would need to provide new and additional resources. This was agreed to in principle at UNCED, but has proven to be politically difficult for the developed countries. Yet, there are good reasons for seriously considering further aid reorientation. Developed country reductions in emissions of greenhouse gases could be more than offset by increases in emissions by developing countries. This would not bode well for the objective of reducing climate change. Awareness of environmental stress-national security linkages may, and should, also give a shot of adrenalin to countries experiencing "donor fatigue." Taxpayers in the developed countries are more likely to support development assistance if they can draw an intellectual linkage between the assistance and their own private interest and well-being.[52]

The composition of foreign assistance also needs to be reviewed. If a country cannot increase its foreign assistance budget, realignment of existing funding might be warranted in light of broader national security concerns. In particular, while an extremely sensitive political issue, emphasis on population programs might be warranted. It has been estimated that global population planning assistance amounts to only 1.4 per cent of all aid.[53] Public scepticism of aid to developing countries may remain high if aid cannot be clearly identified with a particular objective in the donor country's interest, or be shown to result in a globally desirable policy change in the

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[51]Michael Hart and Sushma Gera, "Trade and the Environment: Dialogue of the Deaf or Scope for Cooperation?" Policy Staff Paper No. 92/11, Department of Foreign Affairs and International Trade, p. 9.

[52]Without reference to environmental stress contributing to violent conflict, environmentally motivated aid fits nicely into the broad definition of national security. For example, to reduce sulphur emissions from the use of high-sulphur coal, Japan has financed several stack scrubbers in the PRC, since the pollution moves eastward to Japan. Richard N. Cooper, Environment and Resource Policies for the World Economy, The Brookings Institution, Washington, D.C., 1994, p. 38.

[53]Cited in James C. Clad, "Slowing the Wave", Foreign Policy, Number 95, Summer 1994, p. 147.

recipient's country.

But international cooperation is more than "carrots" and "sticks" applied by the developed countries. The linkages of environmental stress are not just relevant for developing countries, where environmental stress may be the most acute at this time. Another conclusion is that the developed countries will need to encourage their citizens to change their lifestyle. There are two aspects to this. First, the developed countries, with their high rate of per capita consumption, contribute to environmental degradation. In the long term, the developed countries are also not immune to population pressures and more general resource scarcity. But secondly, the developed country's environmental effects, such as their contribution to climate change, have a spillover impact on the developing countries. Thus, in part, the environmental stress in the developing countries is a result of activities in the developed countries, and in a round-about way there is a theoretical linkage between policies and practices in the developed countries and the prospect of conflict in the developing countries.

Nevertheless, with all of this said, international cooperation on environmental stress-national security linkages will likely be hindered by uncertainties and divergent views surrounding the nature of the problems and their potential solutions. With no international consensus on (1) population growth, (2) how population growth (through what might be called a "technological filter") may contribute to environmental stress, and (3) how environmental stress translates into intrastate or interstate violence, progress will be difficult. Until there is a convergence of views on the various aspects of the environmental stress-national security nexus, it is not likely that adequate collaborative measures and responses will be undertaken. In considering this complex nexus and an appropriate role for international as well as domestic measures, several of the key points raised in this Paper need to be borne in mind. These are:

- For the 21st century and beyond, national security will only be attained through global security. Such global security is only partly dependent upon military might.

- Environmental stress is only one factor of many political, economic and social factors that contribute to conflict and social instability. Linking a specific cause with a specific outcome is problematic.

- Nonetheless, environmental stress (such as water and food shortages arising from environmental degradation) may in some cases contribute to violence. Such violence may be international or intrastate in nature. Evidence to date suggests that intrastate violence is more likely.

- A key variable is the rate of technological progress and the dissemination of innovation. While over-simplified, the implication of a high level of technological advancement is less environmental stress, and correspondingly less pressure for environmentally motivated conflict. The capacity of social institutions to evolve is also an important factor.

- There are many historical examples of the scarcity of non-renewable resources contributing to interstate conflict. Environmental stress, such as degradation of the global commons, poses new challenges.

- The type of environmental stress, local or global, is likely to influence the nature of potential conflict. National and multilateral mechanisms are needed to identify abusers, to measure abuse, and to develop nonviolent mechanisms to address the abuse. Multilateral encouragement of the political will to address domestic environmental degradation, and, in the case of developing countries, assistance to enhance the domestic capacity to do so effectively is a prudent approach. Multilateral approaches are likely to be the most lasting, but also the most difficult to achieve.

- Fears of environmental degradation leading to large numbers of emigrants from the developing countries need to be realistically assessed. While large numbers of people from developing countries may seek to enter developed countries, these people are more likely to be economic migrants or refugees rather than environmentally generated migrants.

These points reflect the immense scope of the environmental stress-national security interface, and highlight areas and issues where more analytical work and critical thinking is needed. They also reflect inherent data limitations problems, and that the research agenda does not lend itself to quick conclusions. In particular more empirical work on the various elements of the conceptual framework, and how the elements interrelate, is needed. This is not, however, a simple or strait forward undertaking. Given the theoretical linkages set out in this Paper a multidisciplinary approach, including analysis by country specialist, will be required. Databases that included motivational factors for emigrants, or the degree to which indigenous people consider immigrants a threat to their "national security", would for example be useful, but may not be possible to establish. The lack of databases on technology and how different technologies are employed, and how such technologies contribute to sustainable development and affect the environment, leaving aside the question of how future technology may develop, also poses a problem.

A practical approach to increasing our understanding of environmental stress-

national security linkages, might be country-specific case studies.[54] Such an approach would essentially attempt to take a country through the conceptual framework presented in the Paper. This would involve identifying population and "affluence" pressures, and the level and type of environmental stress being placed upon the country. It would also involve analyzing how a country's institutions address environmental stress, and how society reacts to the institutional responses. Hopefully, such case study work would eventually lead to some forecasting ability where certain types or levels of environmental stress or overall resource scarcities, in conjunction with specific institutional structures, could be identified as elements contributing to a violent outcome.

8. Epilogue

Returning to the four quotations set out in the beginning of the Paper what can be said? The first is probably an overstatement -- national security as human security extends beyond the environment; moreover the empirical evidence does not, at this time, support an inevitable, "catastrophic" conclusion. The second could be true and is consistent with the observation that scarcity may lead to conflict. The third is potentially true in the long run, but does not appear so for the near term. The fourth could be an understatement. The fourth quotation by Toynbee suggests that environmental stress in itself may make the biosphere uninhabitable. To this we must now add that environmental stress potentially contributes to a range of intrastate and interstate violence.

Given the prominence it has received, a few further words need to be said on Robert Kaplan's article for The Atlantic Monthly, "The Coming Anarchy". This cover story served to both inform and confuse. The article informs in that it has raised the issue of "human security", and a new definition of national security. It also served to raise political attention.

But "The Coming Anarchy" also confuses and seriously misrepresents linkages between environmental stress and national security. The article is centred on West Africa as a region of political-social-economic dysfunction. The article does not clearly distinguish between the interrelated causes of violence in West Africa. Scarcity of

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[54]The Peace and Conflict Studies Program at the University of Toronto and the American Academy of Arts and Sciences are currently undertaking a joint research project on "Environmental Scarcities, State Capacity, and Civil Violence." The project will seek to determine if scarcities of renewable resources (i.e., a more general condition than environmental stress) are decreasing the capabilities of developing countries' governments and, if so, whether this raises the probability of violent civil conflict.

resources, government corruption, crime, tyranny, overpopulation, tribalism, disease and poverty are all identified as contributing factors. A reference is made to stick-and-gun wielding guards in Abidjan walking restaurant customers to their cars, and that this gives "you an eerie taste of what American cities might be like in the future."[55] This is a hugh leap in logic, and certainly says nothing directly about environmental stress-national security linkages. Environmental stress may well have some role to play in generating intrastate violence in West Africa, but statements such as this are essentially assertions based on unclear causation, and do nothing to increase our understanding of how the transition from environmental stress to violence works.

Moreover, the article over-extrapolates. Kaplan sees the article as his "report on what the political character of our planet is likely to be in the twenty-first century"[56];and "West Africa's future, eventually, will also be that of most of the rest of the world."[57] This Paper's discussion of the conceptual framework for understanding environmental stress-national security linkages, and the case specific nature of the linkages, must cast grave doubt on this view. Moreover, Kaplan offers no empirical evidence to support his conclusion that "in the developing world environmental stress will present people with a choice that is increasingly among totalitarianism (as in Iraq), fascist-tending mini-states (as in Serb-held Bosnia), and road-warrior cultures (as in Somalia)."[58] On the contrary, it is more likely that few would support the assertion that Saddam Hussein's rise to power and rule, the fragmentation of Yugoslavia, or the long history of Somalia's warlords were principally brought about by environmental stress, or that these examples are typical of a developing world that has become increasingly diversified, including many countries in Asia and Latin America which have achieved some notable successes in economic, political and social development over the past ten to twenty years. In short, we should be thankful for Mr. Kaplan bringing public and political attention to the environmental stress-national security issue, but be sceptical of the extreme conclusions he draws.

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[55]Robert D. Kaplan, "The Coming Anarchy", The Atlantic Monthly, February 1994, p. 45.

[56]Ibid. p. 45.

[57]Ibid. p. 48.

[58]Ibid. p. 59.

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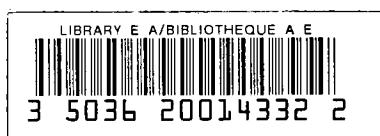
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