POLICY STAFF PAPER

No. 96/01

Department of Foreign Affairs and International Trade

Ministère des Affaires étrangères et du Commerce international

CANADA

China: Environmental Stress and National Security

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(February 1996)
SP74A

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China: Environmental Stress and National Security

Executive Summary

This Paper attempts to apply an environmental stress-national security (i.e., violent conflict) analytical framework to China. The linkages between environmental and national security concerns are of increasing interest to decision-makers and members of the public. Understanding the link between the environment and national security 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 distinction is seldom explicitly recognized in the literature. There is also a need to clarify the context in which the term national security is being used.

The first part of the Paper develops a conceptual framework for facilitating the understanding of how environmental stress may contribute to violent conflict. 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 second part identifies and where possible elucidates the linkages between environmental stress and national security in the Chinese context. Because of the multidimensional nature of the linkage and data limitations, such as Chinese peasants' motivation for moving from interior rural regions to coastal urban areas, empirical analysis of how environmental factors in China work through the conceptual framework and how the myriad variables interact is not rigorous. Nevertheless, given these limitations, our analysis does point to a longer term potential for environmental stress to contribute to violent conflict, while reaffirming that such an outcome is not imminent nor inevitable. Moreover, and significantly, violent conflict in China, if it occurs, is likely to be the result of multiple causation.

It is widely recognized that China faces severe environmental problems, including widespread pollution and ecological degradation. But such environmental stress in itself, no matter how severe, does not necessarily imply violent conflict. For the social effects of environmental stress to become violent, certain conditions appear to be needed. First, there must be sustained public dissatisfaction with the environmental conditions. Second, there must be obstacles to the public expressing preferences on environmental issues in a peaceful manner, or a lack of governmental response to environmental problems of interest to the populace. Third, for serious challenges to authority, although not necessarily through violent confrontation, disenchantment needs to be organized.

These conditions are not currently all met in China. Foremost, given the choices the Chinese public needs to make between environmental stress and economic growth, there is little to suggest that there is widespread dissatisfaction with the state of the environment. Certainly, the growing entrepreneurial class of *getihu* (privatized) business people are focused on making money, not broader social causes, such as income redistribution, equity and environmental protection. Many of the most dynamic members of society have focussed their considerable energy and talent where the Chinese system has encouraged greater independence - in growth and wealth creation. In short, there is little evidence that there exists a major government-public disconnect on environmental issues, at least for the time being.

The environmental stress-national security linkage may not immediately nor significantly alter Chinese decision-making priorities. Yet as the public's attitude evolves, raising the prospect of violent conflict and possible political instability, the ruling regime may see that its interest in maintaining a cleaner environment should have higher priority. Although it is not likely that large scale environment-induced violent conflicts will occur before the year 2000, the following fifteen to twenty years may be more challenging.

A serious dilemma is whether China might experience more domestic violence by foregoing or slowing economic growth. While environmental stress may contribute to violence, so may a lack of economic growth. A sharp reduction in economic growth in China could well threaten the legitimacy of the government and spark potentially violent political instability which could in turn have negative environmental impacts. This possibility sets the usual environmental stress-violent conflict paradigm on its head.

This review of the environmental stress-national security linkage suggests that there is no need to reassess fundamentally Canadian foreign policy on China. Political stability, economic reform and sustainable development in China remain major Canadian objectives. The linkage between environmental stress and violent conflict should reinforce Canada's interest in reducing environmental stress and channelling discontent with Chinese environmental conditions toward constructive resolution. In its decision-making, on both bilateral and multilateral initiatives, Canada will need to continue to take into account China's environmental problems and responses. This said, there should be no illusion about Canada's or even the West's capacity to influence the evolution of China. The process in China can be influenced by outsiders, but largely at the margins.

Sommaire

Ce document vise à appliquer à la Chine un cadre analytique fondé sur les liens entre le stress environnemental et la sécurité nationale (par exemple un conflit violent). Ces liens intéressent de plus en plus les décideurs et le public. Pour les comprendre, il faut distinguer entre le stress environnemental, c'est-à-dire les effets environnementaux négatifs, et le phénomène, plus général mais étroitement apparenté, de la rareté des ressources. Cette distinction est rarement faite de manière explicite dans les publications. Il faut également clarifier le contexte dans lequel l'expression « sécurité nationale » est utilisée.

Dans la première partie du document, un cadre conceptuel est développé qui permettra de mieux comprendre comment le stress environnemental peut contribuer à l'avènement d'un conflit violent. Mais ce cadre a une fonction encore plus importante, à savoir mettre en lumière : a) la nature spécifique des liens entre le stress environnemental et la sécurité nationale; b) le fait que le conflit peut se dérouler à l'intérieur d'un État ou entre États; c) le grand nombre de variables (population, technologie et facteurs sociaux, par exemple) qui influent sur la causalité; et d) la nature anecdotique des preuves empiriques de la causalité.

La seconde partie identifie, et explique là où c'est possible, les liens entre le stress environnemental et la sécurité nationale dans le contexte chinois. La nature multidimensionnelle de ces liens ainsi que le caractère fragmentaire des données, par exemple sur les motifs qui amènent les paysans chinois à quitter les régions rurales de l'intérieur pour s'installer dans des zones urbaines côtières, empêchent de procéder à une analyse empirique rigoureuse aussi bien de l'action des facteurs environnementaux en Chine dans le cadre conceptuel retenu, que des modalités de l'interaction entre les multiples variables en cause. Cela dit toutefois, notre analyse montre qu'il est possible, sur le long terme, que le stress environnemental contribue à un conflit violent, tout en précisant qu'une telle issue n'est pas imminente ou inévitable. En fait - et cela est encore plus important - s'il devait y avoir un tel conflit en Chine, celui-ci serait vraisemblablement le résultat d'une multitude de facteurs.

Il est largement reconnu que la Chine vit de graves problèmes environnementaux, parmi lesquels une pollution à grande échelle et la dégradation écologique. Mais ces problèmes, si graves soient-ils, ne sont pas forcément en eux-mêmes précurseurs d'un conflit social violent. Pour qu'il y ait un tel conflit, il semble que d'autres conditions soient également nécessaires. D'abord, il faut que le public soit systématiquement mécontent des conditions environnementales. Ensuite, il faut qu'on l'empêche de faire connaître pacifiquement ses préférences quant à l'environnement, ou encore que le gouvernement reste sourd à ses demandes. Enfin,

ce mécontentement doit être organisé pour que les autorités soient sérieusement contestées, sans que cela soit forcément par la violence.

Or, ces conditions ne sont pas toutes réunies en Chine actuellement. De plus, compte tenu du choix que les citoyens chinois doivent faire entre l'environnement et la croissance économique, rien ou presque n'indique qu'il y ait mécontentement généralisé devant l'état de l'environnement. Il ne fait aucun doute que la classe des *getihu* - entrepreneurs privés - ne cherche qu'à faire de l'argent, et qu'elle n'est mue par aucune grande motivation sociale, comme la redistribution du revenu, l'équité et la protection de l'environnement. Bon nombre des membres les plus dynamiques de la société ont centré leur énergie et leur talent dans les domaines où le régime chinois a encouragé une plus grande indépendance - croissance et création de la richesse. Bref, rien, ou presque, ne donne à penser qu'il y a fissure entre le gouvernement et la population sur les questions environnementales, du moins pour l'instant.

Il se peut que l'équation stress environnemental-sécurité nationale ne change pas immédiatement, ou significativement, les priorités du gouvernement chinois. Mais l'attitude de la population peut changer, ce qui soulèverait la perspective d'un conflit violent et de l'instabilité politique, et le régime en place pourrait alors constater qu'il est de son intérêt d'accorder une priorité plus élevée au dossier environnemental. Il est peu probable qu'un conflit violent à grande échelle se produise avant l'an 2000, mais les quinze à vingt années qui suivront pourraient être plus décisives.

La violence nationale pourrait-elle être plus prononcée si la Chine stoppait ou même ralentissait la croissance économique? Voilà un sérieux dilemme, car si le stress environnemental peut être facteur de violence, il en va de même de l'absence de croissance économique. Une réduction abrupte de cette croissance pourrait menacer la légitimité du gouvernement et entraîner une instabilité politique porteuse de violence, laquelle pourrait à son tour avoir des effets néfastes sur l'environnement. Cette possibilité rend inopérant le paradigme habituel stress environnemental-conflit violent.

L'analyse des liens entre stress environnemental et sécurité nationale montre qu'il n'est pas nécessaire de revoir fondamentalement la politique étrangère du Canada à l'égard de la Chine. Les principaux objectifs du Canada en Chine demeurent la stabilité politique, la réforme de l'économie et le développement durable. La relation entre stress environnemental et violence devrait renforcer la volonté du Canada d'atténuer ce stress et de canaliser le mécontentement des Chinois à l'égard de leur environnement vers une solution constructive. Dans son processus décisionnel, pour les initiatives aussi bien bilatérales que multilatérales, le Canada devra tenir compte des problèmes environnementaux de la Chine et des réponses que celle-ci y apporte.

Cela dit, il ne faut pas se faire d'illusion sur la capacité du Canada, ou même de l'Occident, à infléchir l'évolution de la Chine. L'influence des étrangers sur le processus en Chine ne peut être que très marginale.

"Since environmental problems are the result of the interaction of economic activities and social development, they should be studied in integration with economic and social problems. They are characterized by their comprehensive nature." Qu Geping, Professor and Chair of the Environmental Protection Committee of the Chinese National Peoples Congress.

"... work on the topic of environmental change and violent conflict will therefore both contribute to and draw from a more realistic, more highly differentiated, and increasingly sophisticated theoretical understanding of international politics as a whole." David Dessler, Professor

"Over the past decade, China's economy has swelled rapidly with an average annual growth rate surpassing 8 percent. Such an expansion plus population increase has produced major pressure on efforts for environmental protection. Thanks to more attention being paid to the work, no drastic deterioration has occurred, and favourable turn arounds have even appeared in some regions. Generally speaking, however, a grim environmental situation still faces the country." Xie Zhenhua, Administrator of the Chinese National Environmental Protection Agency

1. Introduction

The linkages between environmental and national security concerns are of increasing interest to decision-makers and members of the public.[1] Earlier work explored a methodological framework for attempting to understand environmental stress-violent conflict linkages.[2] Understanding the link between the environment and national security 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 renewable resources. This distinction is seldom explicitly recognized in the literature. This Paper attempts to apply the environmental stress-violent conflict framework to China, while also taking into account how the scarcity of renewable resources may contribute to violence.

Environmental degradation of China is emerging as an important source of disputes, including potentially violent conflict.[3] 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. However, while cases of noise and air pollution have been noted as the cause of urban violence, the number and intensity of such conflicts are not known.[4]

Lack of data on key analytical aspects, such as Chinese peasants' motivation for moving from interior rural regions to coastal urban areas, and the complexity of

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[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 stress or the scarcity of renewable resources are viewed as contributing to violent conflict or threatening national security.

[2]Robert T. Stranks, "A View of the Forest: Environmental Stress, Violent Conflict and National Security", Policy Staff Paper No. 95/05, Department of Foreign Affairs and International Trade, April 1995.

[3]Vaclav 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.

[4]Ibid. p. 11.

multiple factors that may contribute to violence, preclude strong conclusions. Press reports of coming doom and mass levels of environmental migrants in China are unsupported. It appears that the media has latched on to overly simplistic and sensationalizing scenarios. This is unfortunate, as the public and policy makers may jump to quick and incorrect policy conclusions. Environmental degradation in itself does not imply violent conflict. Yet for China two important points can be made. First, environmental stress and scarcity are likely to become increasingly significant for China, which is to say there will be a potential basis, perhaps a growing potential, for violent conflict. In China, it is widely expected that serious environmental challenges will occur over at least the next twenty years. Second, China's environmental problems are very much global problems that are of interest to Canada whether or not they result in a violent intrastate or interstate response.

This Paper attempts to cover a large intellectual territory in fairly short order. The first section sets out to clarify our understanding of the term national security and the context within which it is applied in the Paper. It then distinguishes between the concepts of environmental stress and environmental scarcity. The next section constructs an intellectual framework to help in understanding the linkages between environmental stress and violent conflict. This is followed by a section that applies the framework to China. This consists of identifying population pressures, the most serious environmental problems and Chinese policies to deal with them. Chinese economic growth strategies and the political setting are also brought into the analysis because of the interrelationship between environmental issues and economic development.[5] Lastly, the Paper attempts to draw some conclusions on the environmental stress-violent conflict nexus in China.

2. The Concept of "National Security"

Views of what constitute "national security" are evolving. A number of people have proposed defining national security in a way that would take into account a wide range of social and environmental considerations.[6] In so doing, the concept of

[5]For an insightful analysis of China's economic prospects, 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.

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

national security takes account of a wide set of national interests, and embodies the idea of economic security and economic interests. A broad concept of national security encompasses the idea of well-being, and suggests that factors which may have a negative effect on the well-being of a country's citizens may legitimately be considered national security issues.[7]

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 of environmental considerations is not always useful as it can increase the scope of the issue to unmanageable proportions.[8] In the extreme, the environment-national security nexus could be conceptualized as including almost all human activities.

A narrower understanding of national security, and a more traditional or conventional application of the 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 lesser extent on intrastate threats and criminal

[7]A broad definition of national security is analogous to what the United Nations Development Programme (UNDP) has termed "human security." "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 a 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.

[8]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 environmental 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).

activities.[9] In certain forms, the environment has always been a part of the traditional understanding of national security, e.g., with regard to how military activities may directly influence the environment.[10] The question of whether environmental degradation can contribute to or independently cause armed conflict, however, has not tended to be a strong element in traditional national security considerations. Nevertheless, this approach allows us to enlarge our understanding of what constitutes national security, but to a considerably lesser degree than demanded by the very broad definition, i.e., overall human well-being, discussed earlier. The Paper uses a definition of national security that is mid-way between the narrow conventional and broader definitions. In effect, the Paper uses the narrow concept as regards effect (because of the emphasis on violence) with a broader causal base (the environmental factor). It is also important to note that 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.

3. Environmental Stress, Scarcity and National Security

3.1 Environmental Stress and of Resource Scarcity

No-one contests the fact that human activity has almost unlimited potential to alter or damage the environment. Environmental stress is adverse environmental change. Environment stress includes pollution, or the loss of ozone shielding the planet's surface from ultraviolet radiation, but is also more, such as the loss of fertile land. In this regard, a distinction needs to be drawn between environmental stress and the strategic dimension of resources.

Few would contest that the 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 resource inspired. Colonial wars in many instances were wars motivated by a desire to have sovereign control over natural resources. But these types of resource considerations, i.e., control and

[9]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.

[10]Johan Nordenfelt, "Environmental Destruction as Method of Warfare", in Sverre Lodgaard and Anders H. af Ornäs, eds., The Environment and International Security, 1992, International Peace Research Institute, Oslo (PRIO).

access to resources, are not synonymous with environmental stress. The Spratly Islands dispute is a good example.

A major source of potential conflict in the Asia-Pacific is the competing claims to the Nansha/Spratly and Xisha/Paracel Islands. These groups of islands in the South China Sea have led to China having territorial disputes with Brunei, Malaysia, the Philippines, Taiwan and Vietnam. China's view is that these islands have always been part of Chinese territory, and that sovereignty of the islands has in the past been violated by Japan and Western powers.[11] As well as historic reasons, China's interest in the island groups flows from an interest in the access to resources, including oil and natural gas, which would accompany ownership of the islands. Yet, while a regional security issue with a resource access dimension, in no sense are the current disputes over the islands an environmental stress issue.

In considering linkages between the environment and national security in China, 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., 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 access as well as environmental stress concerns may arise. Moreover, these factors can be 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 (i.e., "we don't have enough water because of degradation of the resource"). But this is intellectually distinct from a case where a country or sub-national region faces a water problem because of local population, social or economic growth pressures (i.e., "we would like to grow high-yield crops but don't have enough water for irrigation"). 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. The bottomline is that it is misleading to cast the net so wide that all conflicts over resources, intrastate or international, are characterized as "environmental stress" conflicts.

3.2 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

[11]Rex Li, "China and Asia-Pacific Security in the Post-Cold War Era", Security Dialogue, Volume 26, Number 3, September 1995, p. 336.

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 cause 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 cross 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.

3.3 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, climate change), it is not clear that this set of issues is the most important with respect to potential environmental 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.[12] While climate change may be the most serious threat over the longer term, the most immediate 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 one's own supply, a country or sub-national region may begin to look elsewhere for the resource.

[12]Conflict over the degradation of fresh water is likely to be intricately linked with more general water scarcity issues.

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 a 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.

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.[13] Understanding how environmental stress, the measurement of which is difficult in itself, may produce violence is not a simple undertaking. Figure 1 is a diagrammatic presentation of the transformation.

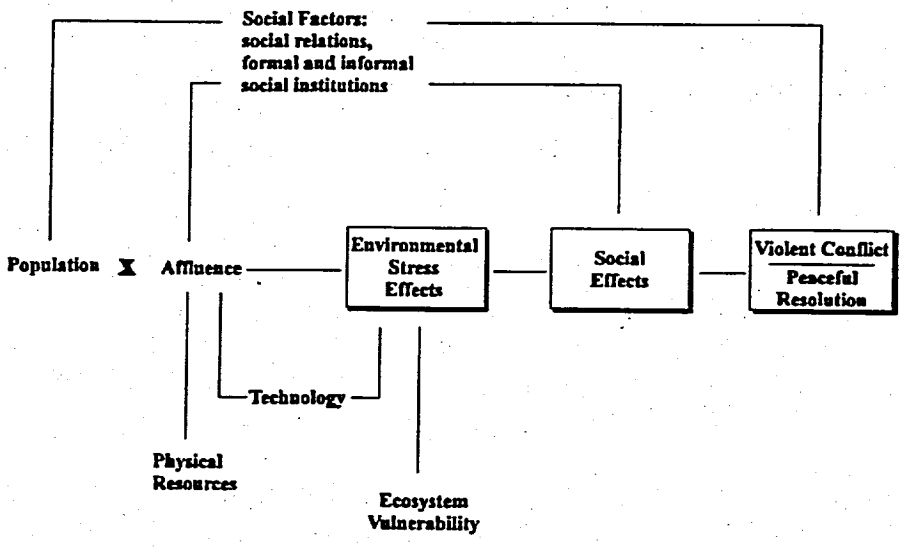
The diagram has three sequential components, and two causal and far from completely deterministic links. The two causal links connecting the components are between: (1) environmental effects and social effects; and (2) the social effects and violent conflict. Moreover, there are many feedback loops that are not shown. For example, the link between military conflict and environmental destruction, such as Iraq's destruction of oilwells in Kuwait and its pumping of oil into the Persian Gulf during the Gulf Conflict,[14] would be represented by a line 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

[13]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.

[14]See Adam Roberts, "The Laws of War in the 1990-1991 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.

communities, or the willingness of society to accept environmental degradation will influence how environmental stress is dealt with.

Figure 1. Conceptual Framework: Environmental Stress and National Security



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

- 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 Chinese 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 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 political 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 are 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 that contributes to 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.[15] 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.[16] The reality that ecosystems and pollutants do not respect national boundaries calls 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

[15]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.

[16]As will be discussed later in the Paper, in the case of China, the medium-term prospect for interstate violent conflict is less than that for intrastate conflict.

to force compliance.[17]

- Environmental Scarcity

The causal links of environmental scarcity are analogous to those of environmental stress. Key variables are demographics, technology, resource availability within a country, social and political institutions, and resource availability outside the country. But there are distinctions. Scarcity does not necessarily imply any degradation of the environment. Furthermore, identifying environmental scarcity is particularly difficult. This occurs as scarcity is partly a sociological response, as a given per capita level of a commodity may be considered low by one individual or group and adequate by another.[18] Moreover, the distribution of goods amongst different groups in society, perhaps on an ethnic basis, can contribute to "scarcity" in one or more of the groups. Environmental scarcity type interstate conflict would include state A not having enough renewable resource Y, perhaps water, and seeking to obtain more resources through conflict. Conflict could also arise over resources not under national control, such as fish stocks. Additionally, environmental scarcity could lead to intrastate conflict. For China, concerns over the future level of per capita food consumption is often raised as an environmental scarcity issue.

5. Model Application to China

5.1 China's Population and Demographics

Population levels, the distribution of the population (rural-urban split), and population growth have a fundamental role in the analysis of Chinese environmental and national security issues. Ironically, many of the current and future population pressures facing China stem from the 1950-1965 period, when Mao Zedong

[17]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.

[18]This is the concept of "relative deprivation". Relative deprivation occurs when people perceive a gap between the level of their well-being, often defined by economic indicators such as per capita calory consumption, and the level they believe they deserve. Deprivation is therefore relative to some individually determined subjective standard. The basis for relative deprivation need not be environmental, as for example ethnic and racial factors may be seen by individuals as the primary cause of their deprivation. For a discussion of the security implications of inequity, see Samuel D. Porteous, "Equity and National Security," Commentary, No. 37, Canadian Security Intelligence Service, 1993.

consciously encouraged population growth. Mao wrote "of all things in the world, people are the most precious. Under the leadership of the Communist Party, as long as there are people, every kind of miracle can be performed."[19] After the failure of the Great Leap Forward and the accompanying famine, Mao thought otherwise. The rate of future Chinese population growth is a matter of speculation. 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.[20] In 1949, the population of China totalled 540 million; it currently has a population of about 1.22 billion, with estimates of 1.39 billion by 2010 and 1.53 billion by 2025.[21] This is an enormous population base, and population stabilization is a pressing concern for the Chinese leadership.[22]

China's family planning policy has had a significant impact on demographics. Since the adoption of a population control policy in the 1970s, it has been estimated that 300 million fewer people than otherwise would be the case have been born.[23] This is more than the current population of the United States. Family planning policy includes access to birth control, encouraging late marriages and child bearing, and since January 1979 the advocacy of one child per couple - the "one-child policy."

Many incentives promote having only one child. These include subsidies and favourable treatment in the provision of housing, child care and schooling. Coercive action, such as forced sterilization or abortions are not advocated by the state. The policy is also flexible and allows for exceptions, such as excluding minority nationalities. However, it is readily admitted that officials in the family planning

[19]Quoted in Vaclav Smil, China's Environmental Crisis: An Inquiry into the Limits of National Development, Armonk: M.E. Sharpe, 1993, p.14.

[20]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.

[21]United Nations, World Urbanization Prospects: The 1994 Revision, ST/ESA/SER.A/150. p.105.

[22]One favourable consideration for China is that unlike some other developing countries, China has moved from the initial demographic stage of high fertility and high mortality, through high fertility and declining mortality rates, to the low fertility and mortality rate stage typically associated with the developed countries.

[23]Wang Xin, "Population vs Development: Challenge of the New Century", Beijing Review, May 1-7, 1995, p.12.

bureaucracy may resort to coercion.[24] China's family planning and "one-child" policies will influence the size of China's population in the future: This policy and other factors have reduced fertility rates, but the government is concerned with the continuing strong cultural desire to have a son[25], and that increased material well-being will encourage couples to have larger families.

It is generally recognized that a large and growing population is a contributor to the three major types of environmental stresses discussed in section 3.2.[26] This is not a biased Western assessment. Chinese scholars echo this view and have stated:[27]

> In short, China's large population has become a heavy burden both to agricultural resources and to the overexploited mineral, forest, grassland, and oceanic resources. High consumer and industrial product demands contribute to the damage and degradation. At the same time, poor population characteristics counteract policy efforts to adjust population levels and environmental quality. Although overpopulation is not the only cause for China's environmental problems, it clearly plays a substantial role.

Precisely how China's future population will influence the environment is dependent upon many variables. Technology will play a key role, both in the creation of environmental threats, such as the increased ownership of motor vehicles and rising emissions from their use, and in the technologies developed and deployed to reduce environmental stress, such as waste management. In light of this, the further in the future population projections are made, such as forecasts of population figures for China in the years 2100 and 2150, the less reliable they become as indicators of potential contributors to environmental stress. The reason for this is technological

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[24]Wu Naitao, "How China Handles Population And Family Planning", Beijing Review, August 1-8, 1994, p.11.

[25]The desire to have a son may contribute to other non-environmentally related social problems. See Jonathan Manthorpe, "Shortage of Women Feeds Female Slave Trade in China," Ottawa Citizen, November 18, 1995, p.B1.

[26]See World Resources Institute, World Resources, 1994-95: A Guide to the Global Environment, New York, N.Y.: Oxford University Press, Chapter 2, "Population and the Environment", for some case studies (Philippines, Costa Rica and others) on the environmental impact of population growth.

[27]Qu Geping and Li Jinchang, translated by Jiang Baozhong and Gu Ran, Population and the Environment in China, Boulder: Lynne Reinner Publishers, 1994, p.2.

change. The potential environmental impact of a future population becomes more uncertain as more assumptions on possible new technologies are made. It also becomes increasingly difficult to generalize on how Chinese population growth will contribute to specific domestic or international national security concerns.

In addition to total population, the distribution of population will influence the environment, as well as generating other potentially serious results. 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.[28] This is particularly true for China, which already has an overtaxed socioeconomic infrastructure. China is expected to become substantially more urbanized, increasing from a current 30 percent to nearly 55 percent by 2025.[29] A prominent feature of future population growth will be the continued expansion of "megacities." Beijing, Shanghai and Tianjin each currently have in excess of ten million inhabitants and by the year 2010 each city is expected to have an additional five million.[30] In the early part of the next century, 2015, these three cities could easily have over sixty million inhabitants, or more than twice the total population of Canada. China, then, not only faces a significant increase in absolute population, but also stress related to the rural-urban mix. The combination of population growth, rapid urbanization and local and possibly global environmental decay could prove to be a volatile mix.

5.2 Environmental Stress and Population Migration

Arguably the mass movement of population, both domestically and internationally, may create a national security concern. Immigration, by increasing the number of people, whatever 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

[28]The developed countries' populations are currently about 75 per cent urban, and are projected to be near 85 per cent by 2025. The developing countries' populations are about 38 per cent urban and are projected to be near 57 per cent by 2025. See United Nations Population Division, World Urbanization Prospects: The 1994 Revision, New York: United Nations, 1995, ST/ESA/SER.A/150, pp. 78-9.

[29]Ibid., pp. 80-1.

[30]Ibid. , pp.4-5

also a second potential national security concern.[31] The mass 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 own national security. Whether such social change is really a national security issue is controversial, and accusations of racism and xenophobia often arise when immigration issues are presented in a national security context.

This Paper has identified but will not directly address whether the international migration of Chinese people is a national security concern, nor will it analyze the degree to which migration may contribute to violent responses. It does, however, recognize that, given the right social conditions in the migrant-receiving country, intrastate violence could arise. While immigration may contribute to conflict, 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 migrant-receiving country 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 Chinese migration is caused by environmental stress pressures.

Looking back over the past one hundred years, there is some evidence that environmental factors have contributed to the movement of people within and between countries.[32] The Chernobyl nuclear accident, for example, displaced many residents. This is a discreet event with direct cause and effect. In China, the Three

[31]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.

[32]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.

Gorges project may be considered a discreet event with a major migratory impact.[33] These movements may be called "environmentally motivated population movements",[34] as the term "environmental refugee" has no internationally accepted definition. But other examples are less clear with regard to the cause of the population movement.

Even when there is a bona fide case of environmentally motivated population movement, which is rare, an explicit linkage with violent conflict does not necessarily follow. China has a comprehensive policy for the resettlement of displaced populations, relocated due to projects such as hydroelectric development. The framework of policy guidelines includes providing for the social and economic reestablishment of affected communities, compensation and resumption of original employment, or training for alternatives.[35] A World Bank assessment concluded that China paid more attention to compensation measures and resettlement planning than most developing countries.[36] Thus, the incidence of environmentally motivated population movement in and of itself in the Chinese context is a poor indicator of how the displaced population will react.

More generally during this century, it appears that people generally have not undertaken domestic migrations or emigrated because of environmental degradation. This also appears to be the case for China. Political and social oppression, as well as militarily induced movements, clearly have played a role in domestic migration and

[33]See The China Letter, Number 260, December 1993, p.2 and Tang Shubiao, "Three Gorges Project: Relocating People", China Today North American Edition, Vol. XLIV, No.3, March 1995, p.25. For a through assessment of the Three Gorges Project, see Shiu-Hung Luk and Joseph Whitney, eds., Megaproject: A Case Study of China's Three Gorges Project, New York: M.E. Sharpe, Inc., 1993.

[34]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.

[35]According to Shubiao: "The government subsidizes this exodus and quality of individual houses left behind. For the farmland taken over by the state, the farmers get compensation for their crops and similar patches of earth in their new village. All of the relocated people receive, in addition, a subsidy from the government every month. Every migrant is given 10,000 yuan to find a new job, and this money is allocated to enterprises which provide employment. Anyone over 50 enjoys a pension as well." Tang Shubiao, "Three Gorges Project: Relocating People", China Today North American Edition, Vol. XLIV, No.3, March 1995, pp. 26-7.

[36]World Bank, "China Environmental Strategy Paper," Report No. 9669-CHA, 1992, p.9.

emigration from China. But the principal motivator appears to be the prospect of increased material well-being elsewhere, with "pull" factors predominating over "push" factors. Like elsewhere, Chinese people migrate domestically or emigrate because they want and expect to attain higher levels of personal consumption. Recent Chinese migration patterns do not suggest that environmental "push" factors are the most significant.[37] The recent mass migration of rural workers to urban centres has been caused by rapid economic growth in the coastal region.

Lack of new agricultural lands and demand for agricultural workers are "push" factors. The hope of a better life in a major urban centre is the "pull" factor. Coupling population growth with these push and pull factors, millions of rural labourers will continue to be drawn to the economically vibrant cities in the next decade. This has caused social tensions. In 1993, Guangdong tried to restrict the numbers of workers from outside the province.[38] With a "floating population" of rural migrant workers currently estimated at 80-120 million people, it is extremely unlikely that this surplus labour will soon be fully absorbed into China's more industrialized areas given even the most optimistic economic growth forecast. Income inequalities between the coastal regions and the interior will likely continue to widen, increasing social tensions and leading to further west-east migration.

Anecdotal evidence suggests that domestic Chinese migrants do pose some threat to security. It has been reported that "a survey in 1993 showed that outsiders were responsible for 80 percent of criminal offenses in the capital. Similarly, it was found that 80 percent of the people arrested in the southern Pearl River Delta and other coastal regions came from other provinces."[39] But the social tensions that arise from an inflow of large numbers of migrants should be attributed, inter alia, to population growth and uneven economic development. In an environmental context, the most that can be said is that potential Chinese migrants may now be more willing to move on the basis of environmental hardships. But the migration is essentially an economic phenomenon and to represent the movement of Chinese labour as being environmentally motivated is a gross distortion.

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[37]Robert Livernash, "The Future of Populous Economies: China and India Shape Their Destinies," Environment, Vol. 37, Number 6, July/August 1995, pp. 25-6. On the broader issue of environmental degradation and migration, see Astri Suhrke, "Environmental Degradation and Population Flows," Journal of International Affairs, Winter 1994, Vol. 47, No. 2, pp. 473-96.

[38]Gerald Segal, "China Changes Shape: Regionalism and Foreign Policy", Adelphi Paper 287, March 1994, p.17.

[39]Li Tan, "Population Flow Into Big Cities", Beijing Review, August 1-8, 1994. p.17.

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 foster 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 a massive scale, do not make large population movements inevitable or even likely, except on a limited regional basis. The general view that environmental stress will result in emigrants from the developing countries, specifically China, that could overwhelm the developed countries is unwarranted at this time.

It is worth restating that this does not mean that emigration from China and all the international security fears this may raise are of little concern.[40] In China, worsening economic conditions, social unrest and political instability could encourage potentially destabilizing out-migration. More plausible than the "Mad Max" scenario, however, is a lesser degree of environmental degradation, coupled with economic dissatisfaction and a political crisis that could produce a wave of emigrants. Large - scale migration would likely seek to move to Southeast Asia, Japan and the western countries with sizeable ethnic Chinese communities, such as the United States and Canada. Yet, while Chinese emigrants may seek admittance to these countries, it does not mean that they would be willingly accepted, as countries such as Japan have not traditionally welcomed newcomers.[41]

5.3 China's Economic Reform and Growth Strategy[42]

In 1981, the Chinese leadership set the goal of quadrupling China's 1980 per capita GNP by the year 2000 in order to raise the people's standard of living to a

[40]A case in point is the smuggling of people into developed countries by organized Chinese gangs.

[41]Takashi Sugimoto's view is that China has the potential for large-scale emigration that might threaten the stability of other countries.

[42]Parts of this section draw from 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,

"relatively comfortable level".[43] By 1978, China's leadership had reached the conclusion that more extensive use of productive factors was not the best means of achieving rapid, and sustainable, economic growth and development. While the "extensive" growth model had generated overall growth, there had been little improvement in productivity. Personal consumption growth had been limited because of the need to devote increasing levels of resources to investment. Chinese decision-makers concluded that rapid growth and development would require that the economy be restructured so as to enhance the productivity and the efficient use of resources. To achieve this objective, it was decided to adopt market-oriented reforms.[44] No blueprint for the structure of the economic system on which the reform process would converge was established. Instead, the leadership adopted a cautious and pragmatic approach.

Prior to 1978, there were no large privately owned enterprises in China. All industrial enterprises were owned by the state, either at the national or local government level. State owned enterprises (SOEs) were predominantly located in urban areas, and collectively owned enterprises in rural areas. But in late 1978, China's leadership announced a program to reshape its economy. Since then, economic reform has involved the relaxation of direct planning controls, the decentralization of economic decision-making, increased reliance on markets to set prices and output, the development of non state-owned economic entities and an opening of China's economy to the outside world.

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[43]This goal later was formally adopted by the Chinese Communist Party. Zhao Zhiyang, "Advance along the road towards socialism with Chinese characteristics," People's Daily, 4 November 1987, p.2.

While the average Chinese citizen remains poor, the typical standard of living is substantially higher than that suggested by a per capita income in the vicinity of US $350-400. The use of purchasing power parity (PPP) exchange rates to make conversions for use in cross-country comparisons is an attempt to account for differences in relative prices. PPP exchange rates are simply the ratio of prices of a product or bundle of products in China relative to the price of the same product(s) in another country. But the calculation of PPP exchange rates for bundles of products is complex. Systems have to be devised to weigh each product in the bundle and to ensure that the average price for each product represents regional variations, important in the case of a country such as China. Variations in quality should also be taken into account. Based on World Bank PPP figures (about US $1900 per capita in 1993), China ranks as the third largest economy in the world. Given the differentials in most growth projections for China and the industrialized economies, it would appear that China could overtake Japan to become the second largest economy in the world early in the next century. See Stephen Lavergne, "China 2000", p.46.

[44]For narratives on China's economic reform experience and prospects, see World Bank Country Study, "China: Reform and the Role of the Plan in the 1990s", World Bank; Washington, 1992; or World Bank Country Study, "China: Between Plan and Market", World Bank: Washington, 1992.

In the agricultural sector, where reforms began, responsibility for production was transferred from collectives to households, and the mandatory government procurement program for key agricultural products was replaced by a system of contracted purchases which allowed farmers to sell above-quota output in local markets. In the industrial sector, state enterprises were given increased, albeit not complete, autonomy over operational decisions as well as more responsibility for their financial position. Also, external sector reforms raised incentives for exporters and allowed increased access to foreign resources through direct investment and foreign borrowing. Privately owned enterprises, either domestically owned or foreign funded, were allowed to develop until they now generate a moderate share of China's industrial output.

During the reform period, the Chinese economy has undergone substantial changes. China has not developed a reform master blueprint and timetable. The development of a comprehensive reform program may be as unachievable as a workable central planning system because of the volume of information that must be assembled and processed. China's reformers appear to push reforms when the economic, political and social conditions allow or require action.

The November 1993 Third Plenum of the 14th Party Congress set out, for the first time, details indicating the path that China will take to establish a "Socialist Market Economy" by the year 2000. State enterprises will increasingly operate on a commercial basis and, while the government will maintain holdings in many enterprises, it plans to withdraw from managing their operations. The remaining components of the dual-track pricing system will be eliminated. Wages will be determined by market conditions. A social security system that is not delivered by state enterprises will also be created. Banks will operate on a strictly commercial basis, and the People's Bank will eventually function autonomously. Finally, it is planned that government activities focus on the creation of an overall policy framework conducive to economic development.

The current leadership will continue to struggle with the issue of how best to maintain social and political stability. Realizing that political legitimacy and stability depends on increasing living standards, they will continue to debate (a discussion that will heat up in the immediate post-Deng era) whether to try to maintain growth rates as high as possible while running the risk of having to brake suddenly, or to try to moderate growth rates. Policy differences will therefore focus not on the need for reform, but rather on the pace and extent of economic reforms.

Much has been made of China's shortages of skilled labour, infrastructure, energy and housing, and the restrictive impact they will have on China's growth. By

using price reform, by utilizing more fully the capacity created in the prereform era, and by successfully expanding investment, China has sustained growth rates that exceeded expectations. Despite ambitious infrastructure upgrading and development plans, ongoing industrialization, scarce resources, advancing urbanization and the extent of the task at hand, suggest that infrastructure bottlenecks will worsen in the near term. The lack of infrastructure in the inland provinces may also dampen the interior's ability to boost economic activity and to attract much-needed direct investments. This is likely to stimulate migratory pressures.

Economic reform in China has altered the structure of the economy significantly, and has had a very positive impact on production and consumption. But much remains to be done. Widening and deepening reform of the state enterprise sector and the modernization of the social support system probably will pose the biggest obstacles for Chinese reformers for the balance of this decade. In many cases, SOEs provide community services including schools, hospitals and recreation facilities. These service employees are on the enterprises' payroll. The community service and employment burden of state enterprises is a major reason why the government continues to subsidize enterprises.[45]

Environmental problems will also 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.

The Ninth Five Year Plan (1996-2000) was approved in principle at the Fifth Plenum of the 14th Party Central Committee in September 1995. Details of the plan, however, will not be made public until March 1996 when the final revised version is to be adopted by the National People's Congress. A summary of the plan was published in the "China Daily" on October 5 and 6, 1995. The sections on the environment read confidently as follows:

[45]United States International Trade Commission, "Reform of China's Industrial Enterprises", International Economic Review, November 1995, p.31.

> We should step up protection of the environment, ecology and resources. It is necessary to adhere to the principle of conducting overall planning, simultaneous enforcement and common development of economic construction, urban and rural construction and environmental construction. Special attention should be paid to control and treatment of industrial pollution. Efforts should be made to spread knowledge of environmental protection so as to further enhance people's awareness.
>
> Energetic support will be given to the development of economical agriculture and protection of the ecological environment for farming. The country will speed up comprehensive treatment of soil erosion and loss of water in the concerned areas and the establishment of the shelter-forest network. The coverage rate of forest and the acreage of green space in urban areas should be increased. Natural resources such as land, water, forests, grasslands and mineral products should be protected and rationally made use of according to law. Rational overall planning should be made with regard to both urban and rural construction, and the use of land must be strictly controlled.
>
> Monitoring and forecasting of disastrous weather, climate and earthquakes should be stepped up in order to reduce losses. By the end of the century, the country will try to reach the goal of putting environmental pollution and ecological deterioration under basic control and gaining marked results in improving environmental quality in certain cities and regions. And by 2010, an end will be basically put to the deterioration of the ecological environment and there will be a remarkable improvement in urban and rural environments.

The Plan is a guideline, rather than a detailed blueprint for China during the 1996-2000 period. The Plan contains few policy changes, but signals a desire by the leadership to moderate the reform process. The Plan stresses co-ordination: in particular co-ordination among regions to assist the interior's economic development and to lessen the income gap with the coastal areas, and coordination between the country's economic and social growth, i.e., economic growth must not lead to social or political instability. Agriculture is to be the top priority, with water conservation, energy, communications, telecommunications, science, technology and education also being emphasized. Yet there are contradictions in the summary of the plan. For example, in contrast to the quest for ecologically sound agricultural practices, it also states:

> ... the development of farm-related industries should be stepped up, concentrating on construction and renovation of a number of chemical fertilizer plants and expanding the supply of farming plastic sheeting, pesticides and machinery.

Despite the rhetoric, both the economic and environmental objectives are clearly ambitious.

5.4 Overview of Environmental Concerns

> A vast land, a large population, varied climatic conditions, and uneven economic development characterize China. Hence, the country's environmental problems are complex and varied: water pollution, atmospheric contamination, solid waste disposal problems, noise pollution, excessive deforestation, grasslands degradation, soil erosion, and habitat destruction. The problems are commonly interrelated and always complex.[46]

It is widely recognized that China faces severe environmental degradation problems. It is beyond the scope of this Paper to attempt to address the full range of environmental problems and challenges facing China.[47] The aim of this section is limited to sketching out briefly the nature of the most significant environmental pressures that could contribute to a violent conflict response in the Chinese population. While interrelated, these environmental pressures have been categorized into pollution oriented or ecologically oriented.

Pollution is a major and widespread environmental threat in China. Advancing

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[46]Qu Geping and Li Jinchang, translated by Jiang Baozhomg and Gu Ran, Population and the Environment in China, 1994, p.34.

[47]For a more comprehensive overview of the state of China's environment, interested readers may find the following books helpful: Vaclav Smil, China's Environmental Crisis: An Inquiry into the Limits of National Development, Armonk: M.E. Sharpe, 1993; World Resources Institute, World Resources, 1994-95: A Guide to the Global Environment, New York, N.Y.: Oxford University Press, Chapter 4; Lester R.Brown et al., State of the World, New York: W.W. Norton, 1995, Chapter 7; Qu Geping and Li Jinchang, Population and the Environment in China, Boulder: Lynne Reinner Publishers, 1994; Editorial Board, China Conservation Strategy, Beijing: China Environmental Science Press, 1990; Qu Geping, Environmental Management in China, Beijing: China Environmental Press, 1991; and World Bank, "China Environmental Strategy Paper," Report No. 9669-CHA, 1992.

urbanization, rapid industrialization, use of outdated technologies and poor sanitation nationwide have resulted in serious air, land and water pollution. The most serious are: urban water quality, rural industrial pollution and urban air quality. Other pollution issues, such as industrial and domestic solid waste disposal and hazardous and toxic wastes also figure prominently.

Lack of fresh water in urban areas may prove to have the most immediate potential for eco-militancy. Increasingly, the quality of drinking water in China's cities appears to be at risk. Much of China's coastal waters and many rivers are polluted, and both surface and ground waters in many areas are contaminated.[48] The predominant source of pollution in urban areas is industrial wastewater. Main pollutants include nitrates, sulfates, phenols, arsenic, cyanide and chromium.[49] Only about one-third of industrial waste water is treated, and even after treatment some of the water fails to meet effluent discharge standards. The share of municipal sewage receiving treatment is even lower.[50] This, in conjunction with industrial waste, has led to high levels of colibacillus bacteria and oxygen-consuming substances.[51]

Pollution problems are also acute in rural areas. Estimates from China's Ministry of Public Health suggest that only one in seven rural Chinese has access to safe drinking water. Fertilizer use contributes to poor water quality through the leaching of nitrates into groundwater and runoff into streams. Yet, it is the township and village enterprises (TVEs) that receive much of the blame for rural industrial pollution. These enterprises are typically small, widely scattered and employ out-dated technology. Per ton of paper, for example, rural paper mills generate twice the amount of wastewater of state-run mills. The concentration of pollutants in the rural mills' wastewater is also three times that from state-run mills. Moreover, in general,

[48]Pollution of coastal water in northern China has been implicated in a sharp drop in prawn and shellfish harvests. World Bank, World Development Report 1992: Development and the Environment, p.49.

[49]Qu Geping and Li Jinchang, translated by Jiang Baozhong and Gu Ran, Population and the Environment in China, 1994, p.34.

[50]World Bank, "China Environmental Strategy Paper," Report No. 9669-CHA, 1992, p.ix.

[51]Research on 99 water sources in 44 cities found that water quality at 51 sources failed to meet Chinese standards. Qu Geping and Li Jinchang, translated by Jiang Baozhong and Gu Ran, Population and the Environment in China, 1994, p.35.

waste from township and village enterprises is rarely treated.[52]

The combination of township enterprise pollution activities and the leadership's interest in economic growth has some clear environmental implications. First, township enterprises have helped absorb excess rural labour, thus preventing an even larger number of otherwise unemployed workers from moving into urban areas. As urban centres will be unable to absorb China's expanding labour supply, TVEs will play an increasingly important role in maintaining social stability. Furthermore, TVEs contribute heavily to local tax revenue. Thus, there is strong local pressure for these enterprises to prosper, even if engaged in polluting activities.[53] Second, as the Chinese leadership would like less of a gap between incomes in internal and coastal areas, in order to contribute to social stability, it is likely that growth of township enterprises will be encouraged. Such growth is likely to exacerbate rural environmental problems and add to what has been described as "tremendous damage to rural environments and general public health."[54]

Air quality in China varies greatly, but in many cities it is poor. Energy use, vehicular emissions and industrial production, as well as natural sources, contribute to atmospheric pollution. Significant health risks arise from exposure to suspended particulate matter (SPM), lead and sulfer dioxide. Poor health, such as heart disease in older people, and inadequate nutrition are also likely to make populations more vulnerable to the effects of air pollution.[55] Data from Chinese official sources and the United Nations' Global Environmental Monitoring System (GEMS) frequently report air quality to be significantly lower than Chinese and World Health Organization (WHO) standards.[56]

Air quality is directly related to China's energy consumption patterns.

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[52]Ibid. p.161

[53]World Bank, "China Environmental Strategy Paper," Report No. 9669-CHA, 1992, p.20.

[54]Qu Geping and Li Jinchang, translated by Jiang Baozhong and Gu Ran, Population and the Environment in China, 1994, p. 161.

[55]World Bank, World Development Report 1992, p. 51.

[56]For example, the annual average total suspended particles have recently been 526 micrograms/m^3 in the north of China and 318 micrograms/m^3 in the south, compared with WHO guidelines of 60-90 micrograms/m^3. Sulfur dioxide levels of 93 micrograms/m^3 in the north and 119 micrograms/m^3 in the south are about twice the WHO guidelines of 40-60 micrograms/m^3. World Bank, "China Environmental Strategy Paper," Report No. 9669-CHA, 1992, p.16.

Population growth, rapid industrialization, urbanization and higher per capita incomes will ensure domestic energy demand will grow. The composition of China's existing and expected supply of energy have significant implications for the environment. Coal accounts for roughly three-quarters of China's total energy consumption and production. With enormous recoverable and estimated coal reserves, and limited oil and gas reserves, it is unlikely this percentage will significantly change in the near future.[57] In the case of China, economic growth means the continued burning of large, and cheap, quantities of coal. Moreover, in comparison with the West, the per unit burning of coal in China is more environmentally stressful. Most coal in China, perhaps up to 80 percent, is not cleaned before combustion and consequently has higher emission levels.

The environmental impact of burning coal, that is particle and carbon dioxide emissions, and acid deposition, have local, regional and global effects. In the long run, such effects have the potential to contribute to heightened international tensions. Locally, particle emissions contribute to respiratory health problems. The effects of acid rain, due to sulfur dioxide and nitrogen oxide emissions from coal, are both local and regional in scope. According to an analysis of rainwater in 23 provinces, regions, and municipalities, 44.5 per cent of the samples detected acid rain.[58] To some extent, acid precipitation in northern China due to the sulfate concentration of rainwater is tempered by alkaline and saline dust from the central Asian desert. However, in areas south of the Yangtze river, very acidic rain-falls have been recorded.

China is a party to the Framework Convention on Climate Change (FCCC). The objective of the FCCC is the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."[59] The Climate Convention calls for the developed countries to reduce their greenhouse gas emissions to 1990 levels by the turn of the century. The first Conference of the Parties to the FCCC, held in Berlin in April 1995, did not result in any new targets for the reduction in greenhouse gas emissions. Nor did the conference extend targets to the developing countries. The developing countries flatly reject the extension of emission targets and timetables to themselves. This two-track approach could fuel international tension, since China's coal-based energy

[57]Robert Livernash, "China and India Shape Their Destines," Environment, July/August 1995, p.27.

[58]Qu Geping and Li Jinchang, translated by Jiang Baozhong and Gu Ran, Population and the Environment in China, 1994, p.35.

[59]United Nations, Framework Convention on Climate Change, Article 2.

strategy could significantly influence the overall effect of the Climate Convention. While particulars of China's future greenhouse gas emissions are uncertain, demographic pressures and continued economic growth indicate that emissions will rise. In Vaclav Smil's considered opinion:

> The combination of large absolute population increases, and the necessities of feeding huge populations and supplying quantities of fossil fuels and electricity in order to energize the much needed modernization will lead inexorably to higher emissions of CO_2, CH_4 and N_2O ... . [60]

At present, China does not have a great deal of scope for fuel diversification. Substitution of coal with less polluting fuels is not an economically viable option on a large scale. Greater use of natural gas could reduce environmental stress. Currently, however, natural gas represents only 2 percent of commercial consumption, and proven reserves are low. Hydroelectric and nuclear power have potential promise, but their development requires large amounts of capital and long construction periods. They are also not without their own environmental considerations, as illustrated by international concerns over the disposal of nuclear waste and the controversy over the Three Gorges dam. Geothermal, wind, solar and other renewable sources are also currently costly, and at best can have only a marginal impact on supplying China's total energy needs in the foreseeable future.

5.5 Ecological Troubles

Aside from pollution problems, China faces severe ecological problems. Foremost, the Chinese government is aware that agricultural practices have created a number of environmental problems. Excessive use of irrigation, misuse of fertilizers, over-intensified use of marginal lands and inappropriate use of pesticides have all played a contributing role.

The international press and some foreign scholars have expressed concerns with the constraints on increasing China's cropland and the pressure of a growing population. The implicit reasoning is that large numbers of Chinese may go hungry, and that in the environmental-national security context this would lead to violent conflict. While this reasoning cannot be dismissed as incorrect, there are a number of considerations that need to be raised to understand the assertion.

First, how serious is the absolute change in cropland area. The United Nations'

[60] Vaclav Smil, Global Ecology: Environmental Change and Social Flexibility, pp.175-6.

Food and Agriculture Organization has estimated that China's total available cropland declined from 105.2 million hectares in 1961 to 96.6 in 1990.[61] Nonetheless, there are significant uncertainties, largely due to incentives for farmers and local officials to understate cultivated areas, surrounding these numbers, and they could be understated by as much as 30 percent.[62]

Yet the trend is fairly clear. Beijing officials accept that the official statistics on total cultivated area are understated, but argue that "since there is no overwhelming reason to assume that the overall extent of inaccuracy has changed significantly during the last 30 years, the trends are not affected by this problem".[63] The Chinese Academy of Sciences has estimated that the net cultivated area is declining by 333,000 hectares per year.[64] The State Planning Commission and the State Science and Technology Commission estimate that arable land is being reduced at a rate of 200-300,000 hectares per year.[65] While the precise extent of decline is uncertain, there is little doubt that China is experiencing a continuous loss of cultivated area.

The trend of net cultivated area loss needs to be interpreted cautiously. Does a loss in cultivated area translate into less production? The answer to this is: not necessarily. Since the 1961 FAO base mentioned above, Chinese agricultural production has increased. The growth in Chinese production has been brought about by changes in productivity, which in turn arose from a combination of technological and policy changes. Yet we should register reservations on the optimistic forecast made by Chinese scientists.[66] A three year study co-sponsored by the Development and Research Center of the State Council, the Ministry of Agriculture and the State Science and Technology Commission:

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[61]World Resources Institute, World Resources 1994-95, p.71.

[62]Vaclav Smil, China's Environmental Crisis: An Inquiry into the Limits of National Development, Armonk: M.E. Sharpe, 1993, p. 55.

[63]Ibid., p. 55.

[64]World Resources Institute, World Resources 1994-95, p.71.

[65]State Planning Commission and the State Science and Technology Commission. "Priority Programme for China's Agenda 21", p.2-1-1

[66]The MInistry of Agriculture also insists that the long-run prospect for securing grain self-sufficiency in China remains favourable. The China Quarterly, Quarterly Chronicle and Documentation, 1995, p. 929.

> predicted that future per-unit harvests of corn, wheat and paddy rice, three major staple grains, are expected to be three times as large as current levels. Therefore, the per-unit capacity of grain products will be sufficient to meet China's domestic need for at least the next 50 years, without the necessity to expand farmland.[67]

But even if this is true, one cannot confidently say that at some point in the future a net loss of cultivated area will not translate into decreased production. This is, in essence, the never-ending neo-Malthusian "catastrophist" versus the "cornucopiaist" debate. How much faith can China put into future technological innovation?[68] Because of the trend to net land loss, and the large absolute increase in population in China, how technology and policy reform influence productivity (aside from the question of how policy directly affects the level of land loss) is extremely important.[69]

If China experiences net cultivated land losses and declines in agricultural production must we conclude that large numbers of Chinese people will starve? The answer to this is no. Food security and food self-sufficiency are not synonymous. Declines in food self-sufficiency may be met by imports from foreign producers. The international trading system, a rules-based system, may enhance food security. Consequently, there is a need to be sceptical of the assertion that land loss and population growth will soon translate into large numbers of Chinese starving to death, or resorting to violence to improve their daily calorie intake.

Forests have are also subject to degradation and deterioration. Only remnants of Chinese old growth forests remain. The total forested area of China may be in the

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[67]Jiang Wandt, "Research Unveils China's Agricultural Potential", Beijing Review, June 19-25, 1995. p.7.

[68]There is an important question here, and just not for China. Are prevailing agronomic practices sustainable in the long term? If not, and no viable alternative methods are available that have comparable yields, and no new lands are suitable for cultivation, agricultural production would decline.

[69]For example, production could be enhanced if the number of parcels of land cultivated by each farmer were reduced. Land reform granted land based on its quality; in order to give each farmer an egalitarian share, each farmer was given an average of 9 plots of various grades of land to manage. While there has been some reorganization and the average number of plots held by a farmer has been reduced, there is still room for rationalization of land distribution. Source Takashi Sugimoto, "Mass Migration Pressures in China", North Pacific Cooperative Security Dialogue: Research Programme Working Paper Number 5, February 1992, p.21. There is also scope for storage and transportation improvements to reduce wastage.

area of 100-120 million hectares, or 10-12 percent of its territory.[70] Yet these figures are questionable due to a history of false afforestation claims both with respect to total acreage and the survival rate of new plantings. More important than the absolute figures for forestry areas (which do not take into account differences in phytomass), is that wood harvests are above the sustainable rate. It has been estimated that commercial timber and wood for heating and cooking in rural areas are being harvested at a rate of nearly 40 per cent greater than new stock is grown. During the 1980s, it has been estimated that such over harvesting resulted in a loss of forest of nearly 13 million hectares.[71] The low combustion efficiency of rural stoves and inefficient mill operations have contributed to the demand for wood.

Two other nonagricultural ecological systems have also been subject to abuse. Degradation of grasslands, such as by overgrazing and improper use for grain production, has been a significant cause of desertification and soil erosion. Erosion has several negative effects, including reducing the soil's organic matter, removing nutrients, diminishing water-retention capacity and reducing plant rooting depth.[72] The Chinese tend to view wetlands as wasteland, and China's coastal wetlands are under relentless pressure. This pressure stems from urban development as well as the desire to convert wetlands into arable land for agricultural production.

Table 1 summarizes the major causes and consequences of environmental stress on natural ecosystems.

[70]China's Ministry of Forestry officials put total forest area at 131 million hectares in 1992. World Resources Institute, World Resources 1994-95, p. 79.

[71]Vaclav Smil, China's Environmental Crisis: An Inquiry into the Limits of National Development, Armonk: M.E. Sharpe, 1993, p. 63.

[72]Vaclav Smil, Global Ecology: Environmental Change and Social Flexibility, London; Routledge, 1993, p.71.

TABLE: 1

Natural Ecosystems: Summary of Major Causes and Consequences of Ecosystem Change

Natural Ecosystem	Causes	Consequences
Forests	• Increasing population • Conversion to farmland • Conversion to higher yield monoculture • Excessive felling • Low success rate of reforestation	• Flooding, siltation of rivers • Loss of biodiversity • Long-term shortages of forest products • Soil erosion
Grasslands/Steppe	• Conversion to farmland • Overgrazing • Increasing population • Poor use of water resources	• Desertification • Loss of biodiversity • Increase in soil erosion, siltation • Increase in floods and droughts • Salinization
Rivers/Lakes	• Untreated urban industrial effluent • Growth of TVEs • Increase in agricultural runoff • Untreated disposal of domestic waste water • Dam construction	• Pollution of fresh water supply • Health hazard • Decreasing aquatic resources • Siltation
Coastal Wetlands/ Marshlands	• Seen as "wastelands" • Reclamation for agricultural use • Drainage for disease control • Conversion to fish ponds • Drained and filled for industrial use or urban sprawl • Pollution from industry or agricultural runoff	• Decreasing wetlands area • Siltation • Increased flooding • Decreased water quality • Loss of biodiversity and wildlife resources

Source: Editorial Board, China Conversation Strategy, Boulder: Lynne Reimer Publishers, 1994 and the World Bank, "China Environmental Strategy Paper," Report No. 9669-CHA, 1992.

5.6 Chinese Environmental Strategy[73]

Environmental problems will pose a significant challenge to sustainable development in China in the future. Rapid economic growth and development and environmental issues are inextricably linked. The structure of the economy and general economic policies and management largely determine the nature of environmental problems and the framework for environmental policies and programmes in any country.[74]

While Chinese efforts to date have slightly reduced pollution per unit of output, these improvements have been offset by the rapid economic and population growth that China has experienced.[75] 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. As a result, they are more likely to impede economic growth seriously if action is not taken soon to address both the direct and indirect or underlying causes. In general, until price and enterprise reforms are undertaken more extensively, neither pollution fees nor fines nor administrative regulations are likely to carry sufficient force or be systematically applied to encourage the most cost-effective means of reducing environmental degradation.[76]

Unlike many developing countries, China has a comprehensive legal basis to guide the development of environmental policy.[77] The Constitution, the highest law in China, provides for environmental quality. The basic law governing environmental issues is the Environmental Protection Law (EPL), first implemented in 1979 and amended in 1989. Three specific laws, the Water Pollution Prevention and Control Law, the Air Pollution Prevention and Control Law, and the Marine Environmental Protection Law govern specific subjects that are addressed more generally in the EPL. Other statutes, such as those governing wildlife protection, land management,

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[73]I would like to thank Donica Pottie, Second Secretary at the Canadian Embassy in Beijing, for her assistance in obtaining information for this section, and the first-hand views of Chinese officials on environmental policy.

[74]World Bank, "China Environmental Strategy Paper," Report No. 9669-CHA, 1992, p. 2.

[75]Harry G. Broadman, "Meeting the Challenge of Chinese Enterprise Reform," World Bank Discussion Papers, Number 283, April 1995, p.17.

[76]Ibid., p. 47.

[77]Ibid., pp.5-6.

fisheries, and water and soil conservation also serve to protect the environment.

The national laws are supplemented by State Council regulations. There are over 20 such regulations, which generally are more technical and specific than the statutes. These regulations apply to a diverse range of areas, such as noise control, environmental pollution in offshore oil exploration and the prevention of vessel-induced sea pollution. Some of the regulations, for example the Implementing Regulations for the Water Pollution and Control Law, clarify the administration of environmental statutes.

The national laws and State Council regulations are supported by regional implementing regulations. Chinese laws still tend to emphasis basic principles and provide only broad administrative guidelines. It is the responsibility of provincial governments (and in the case of Beijing, Shanghai and Tianjin, the municipal governments) to implement regulations that take into account their respective "special circumstances". Consequently, while China has national environmental laws, there are in effect regional variations throughout the country.

Environmental decision-making in China is neither transparent nor easily understood.[78] The State Environmental Protection Commission (SEPC), which includes the heads of ministries and agencies, is the highest national level consultative body for environmental issues. Other commissions, notably the State Planning Commission (SPC), which coordinates China's economic policies, and the State Science and Technology Commission (SSTC) also actively participate in the formulation of environmental policy.[79] China's principal environmental organization

[78]Drafting environmental legislation is a painstaking task. The National Environmental Protection Agency (NEPA) circulates a first draft to all the relevant line ministries. China has a large number of such ministries, as its government structure is still traditionally that of a communist government. These ministries include: the Ministry of Light Industry; the Ministry of Geology and Mineral Resources; the Ministry of Construction; the Ministry of Power Industry; the Ministry of Coal Industry; the Ministry of Machine-Building Industry; the Ministry of Electronic Industry; the Ministry of Metallurgical Industry; the Ministry of Chemical Industry; the Ministry of Water Resources; the Ministry of Forestry; and the Ministry of Agriculture, in addition to SSTC and SPC. Each of these ministries must provide their comments to NEPA and the proposed legislation is revised until there is a basic consensus on the language. Then, it is passed to the SEPC for review. Once the draft legislation has completed this stage, it goes to the State Council for approval. It does not, however, become law until the National People's Congress votes on its acceptance at its annual three-week session (usually in March), although this is, in fact, nothing more than a rubber-stamp of the State Council's decision. This process is cumbersome and slow.

[79]World Resources Institute, World Resources 1994-95, p. 64.

is the National Environmental Protection Agency (NEPA). It became an independent agency in 1988, but does not have full status as a ministry. The NEPA reports to both the State Council and the SEPC, for which it acts as a secretariat. In practice, the SPC likely plays a dominant role in "balancing" environmental and economic development plans.

The NEPA is responsible for all aspects of environmental policy and management of environmental protection, although it shares authority for certain specific natural resources with other agencies. For example, marine environment affairs are managed primarily by the State Oceanographic Administration and the Ministry of Agriculture and Fisheries. Authority in conservation issues rests primarily with the natural resources ministries, such as the Ministry of Forestry and the Ministry of Energy. The NEPA has a small staff of about 300 at the national level. But this number is misleading, as several institutions report to NEPA.[80] Moreover, most environmental protection policy is implemented at the subnational level. Below the national level, the environmental protection network includes provincial, municipal and county environmental protection agencies. Collectively, these bureaus employ about 60,000 people. Additional staff employed in specific ministries would further increase the total number of people engaged in environmental activities. All told, China has a substantial bureaucracy to address environmental issues.

In response to the United Nations Conference on Environment and Development's call for all countries to develop sustainable development policies, the Chinese government tasked the State Planning Commission and the State Science and Technology Commission in consultation with appropriate ministries and agencies to formulate such policies. This work concluded with State Council approval in March 1994 of the "White Paper on China's Population, Environment, and Development in the 21st Century", otherwise known as "China's Agenda 21". A Priority Programme document sets out initial work to support the implementation of China's Agenda 21. The governments intent is that China's Agenda 21 will "function as a guide document for drawing up medium and long-term plans on economic and social development."[81]

The White Paper and the Priority Programme are extensive. China's Agenda 21 is set out in 20 chapters which the Chinese have grouped into four major sections. The first section deals with overall strategies for sustainable development, including

[80] Ibid., p.64.

[81] Government of China, White Paper on China's Population, Environment, and Development in the 21st Century, Beijing, 1994, p.3.

enhanced public participation. The second discusses aspects of the sustainable development of society, with an emphasis on population control and family planning. The third focuses on sustainable development of the economy, including challenges in the coal-based energy sector. And the last section is concerned with resource conservation. The Priority Programme contains sixty-two projects, such as environmental water treatment in northern Jiangsu province and the conservation of dinosaur egg fossils in Xixia, under nine priority areas. It is planned that these projects will be executed in a "rolling and flexible way" and new projects will gradually be incorporated.

China's Agenda 21 contains the right rhetoric and good intentions.[82] Like UNCED, it recognizes environmental problems, but is short on practical approaches. The objectives of China's Agenda 21 are more of a wish list, than a long-term vision to guide sustainable development. A key short-coming is the lack of real public participation. China's Agenda 21 highlights public participation in the policy process, but it is really stressing the continuation of existing mechanisms and not the development of autonomous views on environmental stewardship or sustainability. A notable absence in China Agenda 21's Chapter 20 on Public Participation in Sustainable Development, is public participation through development or environmental non-governmental organizations. Chapter 20 proposes enhanced participation through government-affiliated, arguably controlled, entities such as the All-China Women's Federation, the All-China Federation of Trade Unions, the Communist Youth League of China, and the China Science and Technology Association.

In theory, China's pollution levy system provides an incentive for companies to reduce pollution. Under the system, violators pay a fine for failing to meet emission standards, and if violations continue companies may face additional fines. But in practice, fees and fines can be low, and do not provide enough incentive for firms to

[82]An ambitious plan called the "Cross-Century Green Engineering Program" has also been approved by the State Council. The plan promises that China will not only hold the line at 1995 pollution levels, but will also invest 150 billion yuan (approx Cdn $25 billion) in more than 1,000 projects during the five-year plan, in addition to funds China hopes to raise from donors and IFIs to implement its Agenda 21 plans.

Implementation of the "Cross-Century Green Engineering Program" will not be easy. Chinese officials have acknowledged that many of the enterprises in the rich coastal cities and towns will resist implementing pollution controls because of capital costs and its impact on profits and many provincial governments, unconvinced that environmental degradation is an issue that should concern them at their level of development, might avoid compliance either through inadequate enforcement or through slap-on-the-wrist penalties in provincial implementing regulations.

operate their pollution control equipment. In Shenyang, for example, there have been reports that firms routinely pay a RMB300,000 a year fine for polluting, rather than install and operate new pollution abatement equipment. Another problem is that part of the fees collected by local environmental agencies goes into their budget, thus creating an incentive to tolerate pollution to maintain the budget. With these problems and with an eye to reform, in June 1994 the NEPA began a two-year study of the pollution levy system.[83]

Most environmental protection policy is implemented at the subnational level. Unfortunately, under the current system in many situations the government is both the principal polluter and the environmental manager/regulator. As a result, it is often difficult for regulators to carry out objective reviews or assessments of the actions of state entities, or to take contrary positions. It has also been reported that Chinese environmental officials place a high priority on the large-scale polluter, which are often large state-run enterprises. Lack of staff and resources hinder action on smaller enterprises, which may use older, less environmentally sound equipment and often lack pollution control equipment.[84] In practice, China does not have a strong, consistent and effective environmental enforcement agency.[85]

5.7 Political Succession and Stability

The future political path of China is unclear. For many westerners, the political disintegration of the USSR and the collapse of communist regimes in Eastern Europe have raised the spectre of when, not if, a similar upheaval would end Communist Party rule in China. This is an overly simplistic scenario, although the decline or rethinking of traditional socialism, increased political pluralism and liberalization, and

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[83]Robert Livernash, "The Future of Populous Economies: China and India Shape Their Destines", Environment, Vol., 37, Number 6, July/August 1995, p.26.

[84]Ibid., p.26.

[85]A short story illustrates the vagaries of environmental enforcement in China. When residents near a large American-Chinese joint venture, a building materials manufacturing plant, complained of noise levels exceeding set standards, the firm not only paid the requisite fines, but followed the environment officials' suggestion to hire the bureau's consulting firm to help build a sound barrier. A year later, when the environment officials declared that the barrier was ineffective, the firm once again employed the consulting firm to help find a solution. Throughout the period, a steel-rolling factory located beside the building materials plant "spewed out so much smoke that it left a thick layer of black dust" on the joint venture's general manager's desk. Source: "Green Rules", China Trade Report, December 1995, p.5.

succession questions all contribute to uncertainty about how China will be governed and what China is becoming. Given the heightened uncertainty involving the coherence and direction of the social mediation factors illustrated in Figure 1, it is even more difficult than normal to draw firm conclusions on how environmental stress or non-renewable resource scarcity will be addressed.

While a significant policy reversal of economic reforms is highly unlikely, China is undergoing a major change in leadership. With the succession, leadership will pass to a post-revolutionary generation. It is highly doubtful that with Deng Xiaoping's death a more powerful leader will initially emerge. The unanswerable leadership questions are whether serious political and social upheaval will occur, and if so how long it will last. A complete collapse or disintegration of China into regional fiefdoms is an unlikely outcome. More realistically, China may well find itself in a state of policy uncertainty and paralysis, until a dominant faction in the communist party emerges. Should a prolonged power struggle ensue, the economy and environment would inevitably suffer negative consequences.

The cohesiveness, ability and willingness of the People's Liberation Army (PLA) to respond to domestic and international crisis is also a factor to consider in environmental stress-national security linkages. Even if China is a major contributor to global warming or depletion of fishery resources in the future, a powerful military coupled with the lack of international precedent involving intervention related to global commons "policing" will certainly deter foreign countries from taking actions that would lead to interstate violent conflict.

For intrastate conflict, however, the story is more complicated. The transfer of military expenditures into more benign activities, "swords into ploughshares", is universally held as a noble objective. But there are practical difficulties, and not just those related to the massive transfer of funds from one to another portfolio over the likely protests of an entrenched military bureaucracy. In China's case, the role of the military in maintaining political stability is apparent. On the one hand, increased funding for environmental protection would be desirable. But if such funding came at the expense of the PLA's ability to contribute to maintaining political stability, ironically the long-run environmental returns could be greatest from a robust level of military expenditure.[86]

[86]In practice, as the PLA has considerable political leverage and has been successful in creating a number of enterprises to finance part of its activities, it is unlikely that increased funding for environmental concerns would threaten the military.

5.8 Social Considerations

It is not possible to make a credible prediction of China's future social development. During the reform era, China has seen significant social change (such as increased labour mobility) and in the future may see even more dramatic social changes in the relationship between the state and its citizens. Yet social change in general, and specifically social change related to environmental pressure, need not result in violence. For the social effects of environmental stress to become violent, certain conditions appear to be needed.

First, there must be sustained dissatisfaction with the environmental conditions. Given the choices the Chinese public need to make between environmental stress and economic growth, there is little to suggest that there is widespread dissatisfaction with the state of the environment. Chinese peasants and urban workers are not altruistic consumers concerned with intergenerational equity. Applying the typography of environmental stress (global commons, regional or local), it is also likely that where environmental discontent exists, or may most readily develop, it is with local conditions and not global commons issues. It is highly unlikely that biodiversity in the Amazon basin or longer term global warming contributed in part by coal-use in China are of significant interest to the average Chinese peasant.

Second, there must be obstacles to the public expressing preferences on environmental issues in a peaceful manner, or a lack of governmental response to environmental problems of interest to the populace. On the first part of this point, obstacles to the public expression of concern, the Chinese government has a poor record. On the latter part on government responsiveness, while the Chinese government could do more for the environment, it has taken some action to address environmental degradation. The question is whether the Chinese government's actions to date are in keeping with the public's view of appropriate environmental responses given competing priorities. There is little evidence that there exists a major government-public disconnect in this regard, at least for the time being.

Moreover, for serious challenges to authority, although not necessarily through violent confrontation, disenchantment needs to be organized. Interest groups may stem from a number of origins, such as specific issues, ethnicity, religion, politics or social class. In Western countries, the interaction of such groups and the authorities is considered a normal part of the policy dialogue, and differences in views rarely result in violence. In China, there is currently no strong, well-organized interest group

supportive of environmental issues.[87] Nor does it appear that the entrepreneurial class, at any level, including those associated with TVEs or state enterprises, is eager to become environmental activists and assume a leadership role. Certainly, the growing entrepreneurial class of *getihu* (privatized) business people are focused on making money, not broader social causes, such as income redistribution, equity and environmental protection. Foreign firms and managers often have a tough time convincing Chinese joint venture partners that environmental protection measures should be taken.[88] This part of the entrepreneurial class is also absorbing cadre and intellectuals who might otherwise take leadership roles.[89] Many of the most dynamic members of society have focussed their considerable energy and talent where the Chinese system has encouraged greater independence - in growth and wealth creation.

An illustrative case of how the Chinese regime has recently responded to public or nonofficial views on environmental issues is the Three Gorge dam construction project.[90] The Three Gorge project, which will take until 2009 to complete, will result in a reservoir stretching 385 miles up the Yangtze River. The government's view is that the megadam will provide electricity, improve river navigation, contribute to economic growth and control potential floods. The government has also noted that by providing hydroelectric power, there is less need for alternative sources, i.e., coal, and that this provides an environmental benefit of less air pollution and global warming than would otherwise be the case.

Critics of the project contend that it will disrupt the lives of nearly 1.4 million people, submerge archeological and historic treasures, create the risk of a giant flood, destroy ecosystems and cultivated farm land, endanger biodiversity and alter the

[87]In April 1994, the Chinese government permitted the first real, independent environmental organization, "Friends of Nature", to register formally in Beijing as a body affiliated to the Academy of Chinese Culture. Stephen M. Young, "Post-Tiananmen Chinese Politics and the Prospects for Democratization," Asian Survey, Vol. XXXV, No. 7, July 1995, pp.664-5.

[88]China Trade Report, December 1995, Volume 33, p.3.

[89]Young, "Post-Tiananmen Chinese Politics," p.656.

[90]In April 1992, the National People's Congress (NPC) approved the Three Gorges project. It is noteworthy, however, that about one third of the NPC voted against authorizing the project or abstained. Votes in the NPC are normally unanimous. Source: World Resources Institute, World Resources 1994-95, p.68.

Yangtze's distribution of silt both upstream and down stream.[91] The lot of scattered domestic critics of the dam project has not been a good one. In May 1992, members of the Democratic Youth Party in Kai Country were arrested and "charged with counterrevolutionary activities aimed at sabotaging the progress of the Three Gorges project."[92] The fate of the youth members is unknown. Critics in the Chinese scientific community have also been accused of disloyalty: books have been banned, and publishers imprisoned.[93] Clearly, the Chinese regime has not sought an open dialogue on the project, nor welcomed unsolicited interventions or views on the project's environmental effects. Yet, it must also be said that the Three Gorges protests have largely been predictably unarticulated and isolated and easily "managed" by the regime.

6. Conclusions - Uncertainties Abound

Given the complexity of the ecological, social, economic and political forces at work, predicting what amounts to the China of the 21st century is highly speculative. Because of the multidimensional nature of the linkage and data limitations, empirical analysis of how environmental factors in China work through the conceptual framework (Figure 1) and how the myriad variables interact is not rigorous. Given these limitations, our analysis nonetheless does point to a longer-term potential for environmental stress to contribute to violent conflict. But let us reassert the fundamental point that such an outcome is not imminent nor inevitable. Moreover, and significantly, violent conflict in China, if it occurs, is likely to be the result of multiple causation. We should always keep in mind that while environmental stress may result in conflict, environmental sustainability does not ensure peace.

The analysis suggests that Chinese decision-makers need to take into account the links between environmental stress and national security to enhance policy making. The concept of national security is no longer confined to military activities and national political sovereignty. The government would be prudent to take a more systematic and committed 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

[91]Audrey R. Topping, "Ecological Roulette: Damming the Yangtze", Foreign Affairs, Volume 74, No. 5, September/October 1995, pp. 139-42.

[92]Ibid., p. 134.

[93]Ibid,. p.143.

factored into national security interests. In all fairness, it must also be said the China's Agenda 21 is a step in the right direction.

This Paper goes some way in illustrating that it is misleading to emphasize environmental stress as a single cause of violent conflict. To avoid misunderstanding, environmental stress must be placed in a specific social, economic and political context: conversely, social, economic and political issues require that the environment be taken into account. The environmental stress-national security linkage may not immediately or significantly alter Chinese decision-making priorities. It should, however, cause decision-makers to reassess the relative merits of economic development and the environment in broad terms. With the prospect of conflict and possible political instability, China may see that its interest in maintaining a clean environment should have a higher priority.[94] Although it is not likely that large-scale environmentally-induced violent conflicts will occur before the year 2000, the following fifteen to twenty years may be challenging.

The prospects for violent interstate conflict with China are considerably less than for intrastate domestic conflict within China. Brock suggests that "countries or international organizations may resort to military action in order to enforce certain environmental standards or to ward off dangers to the environment."[95] On reflection, this policy is probably at best only viable toward countries with relatively weak military forces. It is certainly not a viable course of action to take toward China, which is a nuclear power with considerable conventional military forces. Moreover, for environmental degradation to reach such a state in China that countries would resort to military action, we must ask what would the environmental conditions in other developing countries be like, and would we not be speaking of a complete breakdown of international relations and some general north-south military confrontation or serious threat of confrontation. This scenario is so remote as to be discardable.

[94]This also has an international dimension. 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. With this logic, certain developing counties, including China, 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, by emphasizing the domestic destabilizing potential.

[95]Lothar Brock, "Peace Through Parks: The Environment on the Peace Research Agenda", Journal of Peace Research, Vol.28, No.4, 1991, p.408.

A more interesting issue is whether, ironically, China might experience more domestic violence by foregoing or slowing economic growth that adversely affects the environment. This formulation sets the usual environmental stress - violent conflict paradigm on its head. Without growth, even growth with negative environmental impacts, the social and political centre of a developing country might not hold over the short to medium term. Not unnaturally, nor incorrectly, leaders must manage the immediate as well as the longer term, which often means making unhappy but unavoidable choices. This dilemma is not unique to China, but given contextual factors such as population size, environmental conditions and economic development strategies, it may have a prominent position in Chinese thinking on environment-national security linkages. Rapid industrialization and modernization may increase environmental degradation. Yet economic growth by making people better off in a material sense may also constrain their dissatisfaction with their lot in life or the policies of the ruling regime, thereby providing sufficient stability to implement longer-term policies. This dilemma is seldom, if ever, recognized in the literature on environment-conflict linkages. While environmental stress may contribute to violence, so may a lack of economic growth. A sharp reduction in economic growth in China could well threaten the legitimacy of the government and spark potentially violent political instability which could in turn have negative environmental impacts.

This said, Chinese reformers must come to view environmental management as part of the larger process of economic reform and industrial restructuring.[96] In the short term, the objective of promoting economic growth, alleviating poverty and protecting the environment are not always easily compatible, and governments often confront difficult choices in pursuing them simultaneously. Nevertheless, in the long term they are mutually supportive objectives. Systemic economic reform should be linked to better environmental management. It should improve efficiency, such as by using modern technology, to reduce pressures on the environment; make the enforcement of environmental policies more effective by strengthening the operational independence of regulatory authorities; and promote a pricing system that reflects the

[96]There is some good news on this front. President Jiang Zemin recently spoke about the importance of the environment, as well as its interdependence with other factors. Jiang's remarks have been viewed by environmentalists at both the Administrative Centre for China's Agenda 21 and NEPA as demonstrating a new political will to grapple with China's environmental challenges. A Chinese official with the Administrative Centre thought that Jiang's comments "show a heightening of the political will by Chinese leaders to address the issues of environment and sustainable development."

marginal cost of resources.[87] Moreover, a longer-range, more holistic focus would link the adjustment of environmental priorities with the vagaries and necessities of political immediacy.

6.1 International Aspects

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 such trade measures. The environmental basis of this position is that an individual country has the right to set environmental standards within its domestic jurisdiction. Collectively, of course, countries may freely agree to certain environmental policies or practices pursuant to international environmental agreements. But allowing foreign countries to dictate domestic environmental practices unilaterally, with the threat of trade sanctions to enforce the foreign country's view, is unlikely to be in Canada's best interest. The larger, less trade dependent economies can wield the sanctions stick more effectively than relatively small, open economies such as Canada, with negative implications for the latter's capacity to establish appropriate domestic economic and environmental policies. Moreover, unilateral trade action that places an economic penalty on a foreign country is likely to add to local economic and social hardships. For global or transboundary environmental problems, the best approach is through international cooperation, not power politics. This position has traditionally been based on the view that environmental degradation is a discrete policy concern. The ability of environmental stress to contribute to violence now raises the stakes further and reinforces the need for international cooperation and solutions.

Multilateral encouragement of the political will to address domestic environmental degradation is a prudent approach. A case can be made for greater cooperation with and assistance to China. 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

[87]Harry G. Broadman, "Meeting the Challenge of Chinese Enterprise Reform," World Bank Discussion Papers, Number 283, April 1995, p 37. Elimination of subsidies for electric power, coal and irrigation water would provide environmental benefits. See World Bank, World Development Report 1992, p.51.

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.

One potential policy response is financial assistance provided for reducing environmental stress or improving social conditions, such as poverty alleviation, that work to reduce social tensions that could turn into violent conflict. This assistance could consist of direct bilateral project 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 seriously undermined by increased emissions from China. 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.[98] 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 recipient country.

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 programmes to stabilize population might be warranted.

Technology transfer is also an important mechanism. Such transfers could include outward direct investment from Canada, the direct sale of technology or the export of goods that embody up-to-date, efficient "clean" technologies. Priorities for China could include renewable energy generation, waste management and methods

[98]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 China, 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.

for reducing material and energy intensity in manufacturing.[99] A key variable for China is the rate of technological progress, from both domestic and foreign sources, and the dissemination of innovation throughout the economy. On both these points, it is important to note that certain types of economic reform, such as allowing enterprises to fail if inappropriately managed, encourage innovation. While over-simplified, the implication of a higher level of technological advancement is less environmental stress, and correspondingly less pressure for environmentally motivated conflict.

This review of the environmental stress-national security linkage suggests that there is no need to reassess fundamentally Canadian foreign policy on China. Political stability, economic reform and sustainable development in China remain major Canadian objectives. The linkage between environmental stress and violent conflict should reinforce Canada's interest in reducing environmental stress and channelling discontent with Chinese environmental conditions toward constructive resolution. In its decision-making, on both bilateral and multilateral initiatives, Canada will need to continue to take into account China's environmental problems and responses.

Canada is involved in a number of bilateral activities that address China's environmental and development problems. For example, Environment Canada and China's State Science and Technology Commission have jointly conducted a study on greenhouse gas emissions in the Beijing area. More broadly, a Canada-China Memorandum of Understanding on Environmental Cooperation was signed by Environment Canada and China's National Environmental Protection Agency in April 1993. This MOU offers a wide range of possibilities for Canadian initiatives including cooperation with China on issues related to the global environmental, economy and the environment, and public awareness and education. The Canadian International Development Agency (CIDA) has also been actively involved in assistance programmes. This work includes involvement in China's Agenda 21 projects, such as an ecological study of the Tarim River Basin in Xinjiang Province, and a project in support of energy-efficient buildings.

While a more aggressive bilateral posture has some appeal, such as promoting the establishment of nongovernmental Chinese organizations advocating sustainable development, in practice it poses innumerable practical obstacles. If Chinese decision-makers view a policy initiative as adversely influencing short-term economic growth or encouraging types of public participation that are not "desirable", such an initiative would be ineffective. Perhaps efforts to increase Chinese decision-makers' interest

[99]The development of natural gas facilities, for example, could present a opportunity for Canadian expertise.

in and understanding of environmental stress-national security issues is an appropriate starting point. In 1997, Canada will host the Leaders' summit of the Asia Pacific Economic Cooperation (APEC) forum. This could provide an opportunity to raise the theme of environmental stress-national security in the Asia-Pacific region. Yet there should be no illusion about Canada's or even the West's capacity to influence the evolution of China. The process in China can be influenced by outsiders, but largely at the margins.

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