Alexandre S. Wilner

The environment-conflict nexus

Developing consensus on theory and methodology

In the spring of 1994—only weeks following the debacle in Mogadishu and only months before a similar event would take place in Haiti—Robert D. Kaplan wrote a stirring article in *The Atlantic Monthly* that seemed to explain the prevalence of such warfare, predicting its continuation in international affairs. Indeed, Kaplan's article, "The coming anarchy," captured Washington's attention and became so popular that President William J. Clinton is reported to have penciled notes on his copy for use during cabinet meetings. Receiving perhaps the most public attention was Kaplan's focus on the environmental and ecological causations of conflict and war. "The environment," explained Kaplan, "is the national-security issue of the early twenty-first century," where developmental-induced environmental scarcity will emerge as the central cause of intra- and inter-state conflict.[1]

While Kaplan's article, later republished as the principal chapter of his best-selling book, *The Coming Anarchy*, is indeed a pleasurable and savvy journalistic read, it is nonetheless political science light. That is, the article did much to elevate the "environment and security" debate within governmental

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1 Robert D.Kaplan, "The coming anarchy," *The Atlantic Monthly* 273, no. 2 (1994): 58.

circles, civil society, the media, and academia, but achieved very little in terms of academic or theoretical advancement. Indeed, Kaplan's most important contribution to the enviro-conflict field was the influence he had on the popularization of the study in western society and the further infusion of its lexicon into everyday political and social parlance. His work, however, had very little influence on furthering knowledge within the subfield, in particular, or within political science/international relations in general. It did not postulate any novel hypotheses, rigorously verify or falsify existing ones, or advance any set of guidelines that could stimulate further research. It was simply a good read.

What was perhaps most overlooked by the excited throngs who flocked to it was the fact that the enviro-conflict debate had not been invented by Kaplan, nor was it a novel area of investigation in general, and nor was the issue quite as simple as it had been presented. In fact, Kaplan took little notice of the nuance that accompanies the enviro-conflict debate or of the complicated nature that exemplifies its academic development. He does not mention, for instance, that the enviro-security approach had been developed in the mid-1980s, already had a rich theoretical history that pitted erudite proponents against equally well-versed critics, and had—perhaps most importantly—evolved into two major oppositional debates: theoretical debate and methodological/practical.

Both areas of research have their advocates and opponents, arguments and counterarguments, rationales, examinations, and testimonies. Put together, these debates form the existential core of the enviro-conflict subfield. Evaluating the arguments set forth by both research agendas and analyzing their specific advancements and shortfalls is therefore central to understanding how the field has evolved within IR, to appraising what scholarly progression has taken place, and to appreciating what measures need to be taken in order to advance analytic development.

To this end, this article will review the enviro-conflict field and evaluate the central tenets of the research subject as they have been forwarded and explored by various academics since the late 1980s. The argument is presented in three sections. Part one will focus on the first of the two debates, the theoretical dilemma, exploring its overarching question: are environmental concerns equivalent to security concerns, or do they fall into a separate subcategory altogether? Advocates of enlarging the definition of "security" to include the natural environment pit themselves against those who espouse the traditional and much more limited Cold War definition. Part two will explore the second debate—the practical/methodological dilemma—and will

explore its overarching question: are there causal links between the two variables (the natural environment and international conflict), and if so, how are we to accurately operationalize their occurrence, measure their strengths, and identify their causal mechanisms? Answering this question involves reviewing the various methods that have been proposed and used by various scholars and evaluating the critiques that have been levied against their basic assumptions and conclusions. Part three of the article will then build upon the lessons of these two evaluations, proposing a set of guidelines for further practical and analytical development within the enviro-conflict field.

ENVIRONMENTAL SECURITY AND THE DEFINITIONAL DILEMMA

The very notion of "environmental security" lacks a comprehensive and clear definition, its meaning conceived in a multitude of ways. Environmental security is a conceptual paradigm that diverges from traditional IR paradigms by ordering and addressing threats in a systemic arena that is increasingly interdependent and environmentally degraded. In this paradigm, environmental concerns from global pollution, regional water scarcity, food shortages, population growth, ecosystem degradation, and other ecological factors are considered the independent variables that cause the dependent variables of political instability, economic volatility, social competition, crisis, conflict, and war. The basic causal chain underpinning the environmental security argument is thus as follows:

> Population growth/high resource consumption per capita ⇨ deteriorated environmental conditions ⇨ increasing resource scarcity ⇨ harsher resource competition ⇨ greater risk of conflict.

Obviously, few scholars use each mechanistic element in their work, but they nevertheless share the view that environmental factors can lead to intra- and inter-state conflict.

Heavy criticism has been levied against this conceptual definition of security. It is not clear whether the causal input is absolute resource scarcity or environmental degradation. As a result, Nils Gleditsch argues that it is possible to assume that "*all* conflicts of interests derive from scarcity" even though "not *all* resource conflicts lead to overt conflict behavior, and even fewer to the use of force."[2] While this particular definitional critique can be

2 Nils Petter Gleditsch, "Armed conflict and environment: A critique of the literature," *Journal of Peace Research* 35, no. 3 (1998): 382-87.

easily remedied by distinguishing environmental conflict as violence caused by *human-induced* disturbances to the natural rate of resource regeneration (competition over degraded farmland for instance), a second and more difficult dilemma involves understanding and delineating the security aspect of the environmental security field. Indeed, much of the theoretical debate centres on this problematique.

The central theme of the first debate, then, involves evaluating how the environmental security field as a whole has struggled to reconceptualize notions of security in order to incorporate aspects of environmental degradation, ecosystem failure, food and water scarcity, soil erosion, pollution, global warming, and population growth into the mainstreams of political science research. The debate pits those who perceive and support a holistic understanding of security against those who do not.

While this conceptual debate continues today, it no longer retains a position of centrality in the enviro-security research agenda. As a "first generation" of research, the definition debate was an interdisciplinary evaluation concerning the proper methods to incorporate emerging environmental issues to security studies.[3] It stemmed principally from Richard H. Ullman's Cold War critique of the narrow understanding of national security and it argued that the traditional understanding of security—the absence of military threat—failed to realize and contend with other non-military threats. In Ullman's broadened proposition, security includes any action that "threatens drastically and over a relatively brief span of time to degrade the quality of life for the inhabitants of a state," or any action that "threatens significantly to narrow the range of policy choices available to the government of a state."[4] Thus, within his broadened definition of security, Ullman allows for the inclusion of environmental stress and ecological degradation (occurring both endogenously and exogenously), along with other non-military threats into the conceptual state-centric paradigm prevalent in IR theory.

A number of observers followed Ullman's lead in championing a comprehensive approach to security. Jessica Tuchman Mathews, for instance, suggests that as environmental degradation begins to tear the boundaries

3 Carsten R. Ronnfeldt, "Three generations of environment and security research," *Journal of Peace Research* 34, no. 4 (1997): 473.

4 Richard H. Ullman, "Redefining security," *International Security* 8, no. 1 (1983): 128-33.

of national sovereignty, the study of IR must develop a more "analogous, broadening definition of national security [that] includes resource, environmental and demographic issues."[5] Norman Myers, focusing on the levels of analysis, calls for a definition of security that incorporates the "level of the citizen" and features individual needs and quality of life as a security paradigm.[6] Gareth Porter suggests that non-military threats to security are not only in need of clarification and identification, but also represent an "incipient transformation of *thinking about*" world politics, conflict, and global affairs—that is, that non-military security is a wholly novel conceptual paradigm for social and political thought.[7] Michael G. Renner adds that the necessarily interdependent nature of ecological degradation demands a new conception of common threats and shared goals between states that requires a new understanding of national interest and shared security.[8]

In each case, these theorists include the protection of human beings against environmental problems into the definition of security. During the 1990s, the broadened security concept developed along multiple dimensions (involving political, economic, societal, military, and environmental issues) and incorporated various levels of analysis (systemic, state, and individual), fostering a more expansive understanding of security within IR literature. However, critics of the holistic approach have responded with a number of points that defend the traditional military definition of security. A few of these are expanded upon below.

CONCEPTUAL CRITIQUES: DEFENDING THE NARROW SECURITY AGENDA

The arguments countering the redefinition of security (and the environmental security approach by association) differ along five principle lines of inquiry. Some observers argue that maintaining a narrow definition of

5 Jessica Tuchman Mathews, "Redefining security," *Foreign Affairs* 68, no. 2 (1989): 162.

6 Norman Myers, *Ultimate Security: The Environmental Basis of Political Stability*, (New York: W.W. Norton, 1993), 31.

7 Gareth Porter, "Post-Cold War global environment and security," *Fletcher Forum of World Affairs* 14, no. 2 (1990): 333.

8 Michael G. Renner, "Shared problems, common security," Charles W. Kegley, Jr. and Eugene R. Wittkopf, eds., *The Global Agenda: Issues and Perspectives* (Toronto: McGraw-Hill, 1992), 335.

security preserves the military as an institution whose purpose is to contend with the military threats that invariably arise in the international arena. Samuel Huntington's work on civil-military relations, for instance, assumes that the military is primarily a warfighting institution, used for coercion, warfare, and to defend the state, its citizens, and its core interests.[9] The military, and the language that is associated with it, is best suited to these principle roles. Accordingly, the military as an institution declines in effectiveness and function when non-military roles (humanitarian intervention, policing, or environmental protection) are bestowed upon it. Thus, the language of environmental security, by broadening the security umbrella, weakens the military's ability to conduct traditional military missions. Geoffrey D. Dabelko and David D. Debelko summarize this critique rather well: "the conflictual basis of national security makes the instruments designed to safeguard the state inappropriate for addressing the many environmental problems that ignore national borders and...require cooperative approaches."[10] Hence, providing the military with a role to contend with environmental issues will not achieve the defence one seeks against environmental degradation and paradoxically inhibits the military's primary role and coercive function.

In similar fashion, the second critique charges that the very language of environmental security is at odds with that of national security. The disjoint is based on the fact that the former involves cooperative and transparent action, while the latter centres on the conflict between state security and international behaviour. The critique is most often based on three general claims: it remains analytically misleading to conceive of ecological degradation as a security threat because international conflict—the traditional focus of national security—has very little in common with environmental degradation or its solutions; efforts to "harness the emotive power of nationalism"—which may be required to mobilize society-wide environmental stewardship—are counterproductive because they undermine the internationalist "political sensibility" that is required to deal effectively with global environmental issues; and ecological degradation is not likely to

9 Samuel P. Huntington, *The Soldier and the State: The Theory and Politics of Civil-Military Relation* (Cambridge: Belknap Press, 1957).

10 Geoffrey D. Dabelko and David D. Dabelko, "Environmental security: Issues of concept and redefinition," *Occasional Paper* 1, Harrison Program on the Future Global Agenda, 1993, 7.

cause interstate wars.[11] What is perhaps most important about this line of critical evaluation is that it challenges not the scientific fact of environmental degradation but the theoretical dependability and usefulness of linking environmental concerns to the language of national security. Daniel Duedney, for instance, concludes with this warning: "the militarist mindsets closely associated with 'national security' thinking directly conflict with the core of the environmentalist world view. Harnessing these sentiments for a 'war on pollution' is a dangerous...and a self-defeating enterprise."[12] Instead, a non-security research agenda would be best suited to deal effectively with problems of global and regional ecological degradation.

The third critique questions the use of the security label in portraying global environmental degradation and its influence on individuals and their communities. Lumping national and environmental security threats together is problematic because the two are fundamentally different. While both conflict and degradation may kill people and diminish human and community welfare, they nevertheless pose very different types of threats and unique security challenges. Accidents, aging, and disease destroy life regularly but are rarely considered threats to security. The fear, then, is that a muddled approach to environmental degradation only creates a broad—and ultimately meaningless—understanding of security in general, that effectively acts as a *de*definition rather than a redefinition of the security concept. The multidimensionality of the environmental security paradigm challenges the very utility of the term itself. What does "environmental security" mean and what can we do about it if it is only an umbrella concept that incorporates various notions of environment and security? Some add that the term itself is far too blunt to generate appropriate policy responses while others question the usefulness of the "metaphorical constructions" imposed by the environmental security label on the policy options available to decision-makers.[13] The challenge for proponents of the field is to establish a clear demarcation of what is and is not an environmental security issue.

11 Daniel Deudney, "The case against linking environmental degradation and national security," *Millennium: Journal of International Studies* 19, no. 3 (1990): 461.

12 Ibid, 474.

13 See Marc A. Levy, "Is the environmental a national security issue?" *International Security* 20, no. 2 (1995): 45; and Simon Dalby, "Ecological metaphors of security: World politics in the biosphere," *Alternatives* 23, no. 3 (1998): 292-93.

The fourth critique is based on an assumption that those who use and support the environmental security term have a hidden bureaucratic agenda. For some environmentalists, the critique suggests, the term "security" is itself a tool that can be wielded to wrest government funding from the military in order to augment environmental protection programs. The claim implies that environmental security is a rhetorical tool designed to catalyze public interest and political action supportive of the environmental cause. By instituting the language of security, the environment is bolstered from the realm of low politics to high politics. This is a crucial development, critics suggest, because political devotion on any given policy issue is strengthened if it can be easily identified as an issue of high politics.[14] Recall the popularity of Kaplan's article and the enormous effectiveness of his work on environmental mobilization and public and political interest. The concomitant outcome of securing and embedding ecological issues in the sphere of high politics is greater political awareness and action—a lesson that has been learned as well by those campaigning for AIDS awareness, global poverty reduction, international development, and international human rights.

Finally, the fifth critique questions the very assumption and likelihood that environmental degradation actually causes interstate conflict and war. Antecedent variables and those derived from the concept of "resource war"—rather than environmental war—are offered to explain conflict, thereby challenging the causal chains linking environmental degradation and conflict.[15] Others suggest that the deeply integrated global economic order counteracts the need to actually fight over resources.[16] These are both damning critiques, because they target the very conceptual notion that the environment has anything to do with security, conflict, or war.

Each of these conceptual critiques, in challenging the field's rhetorical quality and quasi-academic assumptions, has dogged it since the 1980s. Perhaps even more elementally, existing critiques are a behavioural reaction to the intrusion of environmental issues into the traditional disciplines of

14 Nina Graeger, "Environmental security?" *Journal of Peace Research* 33, no. 1 (1996): 111.

15 James Fairhead, "The conflict over natural and environmental resources," in E. Wayne Nafziger, Francis Stewart, and Raimo Vayryneu, eds., *War, Hunger, and Displacement: The Origins of Humanitarian Emergencies* (Oxford: Oxford University Press, 2000), 172-73.

16 Deudney, "The case against linking environmental degradation and national security," 471.

international relations and strategic studies. Whatever their rationale, each definitional evaluation is an important piece of the conceptual puzzle, worthy of serious theoretical contemplation. However, "environmental security" is no different than any other term prevalent to the study of IR—consider "sovereignty," "power," "sustainable development," or "stability," for instance—that have multiple definitions and knotted meanings. Like environmental security, these terms are not easily defined nor effortlessly employed and are often used by various academics to represent different social or political mechanisms and relationships.

At a certain point, any conceptual or definitional critique reaches a point of diminishing returns; the debate becomes exhausted, a stalemate is declared, and the dilemma is abandoned, ignored, or reluctantly accepted. With little hope for further clarification, theorists rightly focus on other dilemmas. The theoretical debate of the environmental security field has reached such a point, and observers have moved beyond it. Paul F. Diehl argues that it has become "necessary—and possible—to translate the key issues in environmental security into empirically testable questions" and evolves past the "polemic debates" that have dominated the field.[17] The strategy, then, is to avoid the definitional demon altogether—or at least, to put it to rest—and instead legitimatize and thereby strengthen the enviro-security approach by discovering the empirical associations that exist between the environment and social conflict. If observational evidence of the enviro-conflict nexus can be empirically revealed and conflict is illustratively identified with environmental variables, then the aforementioned conceptual debate becomes rather muted and certainly less important. Once a causal relationship becomes evident, the conceptual meaning that precedes it is of little value. Herein rests the second enviro-security debate—the methodological-practical debate.

THE METHODOLOGICAL/PRACTICAL DEBATE: PROVING THE ENVIRO-CONFLICT LINK

In 1998, the *Journal of Peace Research* (JPR) published a special issue that dealt solely with the question of environmental security. While the scope of the ensuing discussion was itself rather unique (no IR journal compilation

17 Paul F. Diehl, "Environmental conflict: An introduction", *Journal of Peace Research* 35, no. 3 (1998): 275.

of such breadth dealing specifically with environmental security had been undertaken), perhaps the most exceptional quality of the publication was the nature of the articles themselves. Each study dealt specifically with empirically testing (both quantitatively and qualitatively) the enviro-conflict nexus and altogether avoided the tired conceptual debate that had plagued earlier scholars. By shifting the focus of the field from the abstract to the concrete, the JPR collection signalled the entrenchment of a second generation of research within the enviro-conflict subfield—a direct response to earlier allegations of a reliance on anecdotal evidence in theoretical evaluation. Empiricism, then, was the next logical step.

Empirical work began in the early years of the 1990s and to a certain degree, continues today. There are perhaps five primary research groups working on the empirical enviro-security agenda. The dominant group is the "project on environment, population and security" at the University of Toronto led by Thomas Homer-Dixon. This research team has conducted three major projects and has produced a dizzying array of qualitative case studies linking the environment to conflict. The other groups that continue to advanced the empirical agenda include the environmental conflict-management and sustainable development group, based in Zurich; the environmental change and security project of the Woodrow Wilson International Centre for Scholars, Washington; The department of peace and conflict research at Uppsala University, Sweden; and the International Peace Research Institute (PRIO), also known as the Oslo group.[18] Each project has, over the past decade and a half, sought to evaluate the link between environmental issues and social conflict by pursuing a general agenda of studying observable cases of environmental conflict. While each research group diverges from the others in terms of focus and methodology—and are thus worthy of systematic comparative review—only the work forwarded by the Toronto group will be reviewed in any great detail. The Toronto group is, after all, the most ambitious project of all those listed: it produces the most frequently cited research within the discipline, is the most criticized of all empirical enviro-conflict studies, and is a Canadian endeavour that should garner Canadian scholarly interest.

18 See Richard A. Matthew and Geoffrey D. Dabelko, "Environment, population, and conflict: Suggesting a few steps forward," *Environmental Change & Security Project Report* 6 (2000): 102-03.

The Toronto group's principle project attempts to build a "causal-path analysis" of the relationship between environmental change and conflict. Accordingly, it focuses on two questions: Does environmental scarcity contribute to violence? If yes, then how does it contribute? To approximate a reliable answer, the Toronto group focuses primarily on studying the relationship between specific environmental variables and the most traditional indicators of insecurity, conflict, and war. Having established various plausible causal links, the group tested its hypotheses with in-depth analysis of 16 cases of suspected environmental conflict.[19]

Prominent characteristics of its research include a general focus on quantifiable environmental problems, notably environmental scarcity—farmland, water, forests, etc—rather than on the broader environmental measures of global climate change, pollution, or ozone depletion. Likewise, the group focuses on acute national and international violence as a means of avoiding the slippery concepts of security and stability that plagued earlier scholarship. Finally, the group uses process tracing as a methodological and analytical approach to studying causal relations. The technique is an approach that:

> aims at mapping relevant independent, intervening and dependent variables on the causal... [enviro-conflict] pathway. The criterion for selecting cases is that *both variables of interest appear in the case to be scrutinized.* The independent variable is then considered to be environmental scarcity, the dependent variable to be violent conflict. The task for scholars is to identify other relevant factors and determine how they are causally linked.[20]

What the technique does, then, is allow for a general inductive process whereby a common pattern of causality is discerned by understanding the various key intermediate variables that link the independent variable (scarcity) and the dependent variable (conflict). These intervening variables are

19 These cases include Mauritania-Senegal, Rwanda, South Africa, Bangladesh-Assam, Bihar, Indonesia, Pakistan, Philippines, Mexico, China, Haiti, Nicaragua, Peru, Gaza, the Jordan River Basin, and the Nile River Basin. See Thomas F. Homer-Dixon, *Environment, Scarcity, and Violence* (Princeton: Princeton University Press, 1999).

20 Ronnfeldt, "Three generations of environment and security research," 475 (italics added); Thomas Homer-Dixon, "On the threshold: Environmental changes as causes of acute conflict," *International Security* 16, no. 2 (1991): 85-88.

then traced and examined as they are identified from the various cases under scrutiny. The cases are selected on both the independent and dependent variables (in order that both a quantifiable environmental factor such as environmental scarcity, and social violence are present), so that the link between the two can be identified and eventually compared to those identified in the other cases. The key model, then, is that environmental scarcity leads to the social effects that lead to social conflict. By comparing the "social effects" category of the different case studies, a general pattern can be established that explains how environmental degradation and conflict are related. From there, a predictive model is eventually surmised, established, and retested.

From their model, the Toronto group proposes three general hypotheses. Each is an assumption of the overarching intervening variables—the "social effects"—that link scarcity with conflict. The hypotheses are: 1) decreasing supplies of environmental resources will provoke "simple-scarcity" conflicts or resource wars such as conflict between territorial groups over the control of remaining resources; 2) large population movements (ecological migration) caused by environmental degradation will create "group-identity" conflicts such as ethnic clashes between groups not unusually in contact; 3) severe environmental scarcity will simultaneously increase "economic deprivation" and disrupt "key social institutions" that in turn will cause "deprivation" conflict such as civil strife between have and have-not groups.[21]

The group's findings pertaining directly to these three primary hypotheses are as follows: there is little empirical support for simple-scarcity conflict, so that interstate wars are themselves rarely caused by environmental scarcity; environmental scarcity can contribute to population movements and economic decline that can, in turn, cause internal destabilization; and without readily available societal "adaptive mechanisms," environmental scarcity can contribute to a sharpening of domestic cleavages that can lead to civil unrest and collective violence.[22] Arguably, environmental conflict can lead to organized and widespread violence, but

21 Thomas Homer-Dixon, "Environmental scarcities and violent conflict: Evidence from case," *International Security* 19, no. 1 (1994): 6-15; Val Percival and Thomas Homer-Dixon, "Environmental scarcity and violent conflict: The case of South Africa," *Journal of Peace Research* 35, no. 3 (1998).

22 Homer-Dixon, "Environmental scarcities and violent conflict: Evidence," 18-31.

does so only very rarely between states, an interesting conclusion that has had resounding consequences for the field.

Several other findings indirectly associated with the hypotheses are also evident: generally speaking, scarcities of renewable resources cause conflict and instability, yet only do so in a very complex, obscure, and indirect manner; environmental scarcity is caused by a consociation of resource depletion, increased consumption, and uneven distribution; powerful groups at the domestic level practice resource capture during periods of scarcity, forcing marginal group migration to other territorial areas, both of which can destabilize domestic political relations; technical ingenuity and domestic adaptability can mitigate environmental scarcity and lessen the likelihood of conflict; a lack of adaptive qualities under resource scarcity weakens states; and domestic or regional cases of scarcity-induced conflict can have an indirect effect on neighbouring actors and the international community in general. In each case, these findings have helped dissuade sceptics who argue, as noted above, that environmental variables have little to do with violent conflict. Intrastate instability and conflict are causally linked, under certain conditions, to ecological degradation and environmental scarcity.

Before turning to a critical review of the Toronto group's research agenda, methodology, and findings, it is important to stress, once again, the role Homer-Dixon and his team have had on the progression and evolution of the enviro-conflict school. Most fundamentally, the group has single-handedly advanced the basic assumptions proposed by the enviro-conflict conceptual idea with empirical evidence. As such, their work has contributed to an improved empirical basis from which future academic development might follow. Having done so, the Toronto group's work has made it more difficult for sceptics to deny the existence of a casual link between environmental variables and social conflict.

Furthermore, their research has catalyzed other projects, while also forewarning proponents against blindly accepting the assumption that environmental scarcity alone is a necessary and sufficient cause of conflict. As a result, future research must bear in mind that environmental variables are themselves tightly interwoven to and interact with other political, economic, developmental, and social variables in causing conflict. And finally, Homer-Dixon's work has contributed to a higher degree of awareness, both within academia and government, concerning the role environmental factors have on social conflict.

CHALLENGING THE LINKS: CRITIQUING THE TORONTO GROUP STUDY

On a whole, critiques levied against the Toronto group primarily target their methodological assumptions, analytical practices, and research agenda. The counter-Homer-Dixon critiques are so numerous that, if considered in their totality, they amount to an entire third generation of enviro-security scholarship. That is, while the first generation dealt singularly with conceptual ideals and the second generation focused on methodological practices, the third generation has broadened the horizon of theory and practice by arguing for a more varied methodological approach to the enviro-security field. The critiques themselves come from various sources, but the bulk of them originate, interestingly, from other proponents of the environmental security school, most fervently from scholars associated with the Oslo group. The simple fact that much of the second/third generation critique stems from *within* the school as opposed to *outside* (as had been the historical case), is confirmation—and even validation—of the field's scholastic maturity and significance within the broader study of IR. Indeed, the fact that a sufficient number of enviro-conflict theorists and practitioners exist to allow for a substantive in-field debate is proof alone of the impressive growth that has accompanied the discipline since its inception. Nonetheless, second/third generation critiques offer important and often damaging evaluations of the Homer-Dixon school, and are thus fundamental for advancing greater appreciation on the subject and forwarding the means with which the field can continue to evolve. There are a number of methodological/practical critiques that frame the second debate. Six of these challenges will be evaluated below.

The first major critique is a reaction to Homer-Dixon's concentration of environmental variables into definable and specified scarcities—water, land, forests, etc. Critics argue that compartmentalizing environmental variables restricts "big picture" research, limiting the scope and field of vision offered by the research agenda. There is, within the third generation of enviro-conflict scholarship, then, an underlining interest in expanding the range, breadth, and variety of the independent variable within the enviro-conflict causal relation and a desire to better understand what auxiliary forces influence these interactions. Levy, for instance, outlines two "direct physical threats" (ozone depletion and global climate change) that directly threaten the security of the United States, both of which were generally

missing from the Toronto group's research.[23] Other critics have argued that the "big picture" mentality is a necessary guide for understanding the role poverty has on exacerbating environmental scarcity. That is, poverty, as a possible antecedent variable to environmental scarcity, must be included into the causal chain if the entire enviro-conflict web is to be properly understood. To this end, Wenche Hauge and Tanja Ellingsen, in their quantitative analysis of several of the Toronto group's hypotheses, do control for poverty. One of their many conclusions—several of which happily corroborate Homer-Dixon's work—suggest that gross national product (GNP) per capita has a "negative effect on civil war," so that the higher GNP per capita, the less likely the advent civil war, even under conditions of environmental scarcity.[24]

Population is another auxiliary variable critics have suggested be included into the enviro-conflict discourse. In the context of the "big picture" critique, the question of population is a direct assault on Homer-Dixon's model, which neglects to deal sufficiently with population variables. This is, in fact, not an altogether novel suggestion, and scholars have since rigorously included population dynamics into the broader research agenda. Findings suggest that population growth and density influence the probability of conflict initiation and that population growth, when coupled with uneven or limited development, negatively influences the state's institutional capacity to function as an efficient actor—both conclusions offer credence to the assumption that high rates of population growth can be politically destabilizing under conditions of scarcity.[25] By concentrating variables into specific scarcities while simultaneously neglecting to more fully incorporate poverty and population dynamics into the analytical fold, the Toronto group has potentially invalidated its principle research design and severely limited the applicability of its findings.

23 Marc A. Levy, "Is the environmental a national security issue?"

24 Wenche Hauge and Tanja Ellingsen, "Beyond environmental scarcity: Causal pathways to conflict," *Journal of Peace Research* 35, no. 3 (1998): 312.

25 See Jaroslav Tir and Paul F. Diehl, "Demographic pressure and interstate conflict: Linking population growth and density to militarized disputes and war, 1930-89," *Journal of Peace Research* 35, no. 3 (1998); See also Jack A. Goldstone, "Demography, domestic conflict, and the international order," in T.V. Paul and John A. Hall, eds., *International Order and the Future of World Politics* (Cambridge: Cambridge University Press, 2000).

The discussion of poverty and population leads nicely to the second critique: the Toronto group's research model does not include third factor variables (political, economic, or cultural) into its methodological design. That is, environmental degradation and scarcity do not exist in a vacuum, but are rather embedded within a distinctive political, economic, social, cultural, and ideological setting. For instance, the oft-cited fact that 214 shared river basins exist globally and are each potential zones of environmentally-induced conflict is less important than knowing how many of these river systems run through underdeveloped, undemocratic, and unstable regions riddled with ethnic divisions, and how many of them run through more stable and affluent regions.[26] Homer-Dixon, among several others, is guilty of neglecting to appreciate and incorporate the environment's environmental setting. If, for instance, democracies rarely go to war with one another (Bruce Russett's *Democratic Peace Theory*, a contentious and hotly debated thesis offered here only to serve a point), why should enviro-conflict theorists assume that they will fight when facing resource depletion and environmental degradation? Critiques suggest that a state's internal setting—its judicial system and political culture—does have an impact on its ability and willingness to mitigate environmental crisis and stave off conditions that lead to conflict and war. Furthermore, global economic interdependence and the robust nature of the international monetary and trading systems might also decrease conflict over resources by eliminating the benefits associated with a policy of resource capture.[27] Then again, these factors may not mitigate the rationale for conflict. The point, however, is that the model employed and supported by the Toronto group does not account for these third factor variables and is rather myopic as a result.

The third critique levied against the Toronto group is a charge of bias in case selection. As described above, Homer-Dixon selected cases studies—from the developing world alone—concerning both the independent and dependent variables, in order to assess how environmental factors contributed to each conflict case. Homer-Dixon explains that "by selecting cases that appeared, *prima facie*, to show a link between environmental change and conflict, we sought to falsify the null hypothesis that environmental scarcity does not cause violent conflict."[28] While perhaps accurate, it

26 Gleditsch, "Armed conflict and environment," 389-98.

27 Daniel Deudney, "Environment and security: Muddied thinking," *Bulletin of the Atomic Scientists* 47 (1991): 26.

28 Homer-Dixon, "On the threshold," 7.

is easy to understand why some critics have nevertheless cried foul on methodological grounds. It has been suggested, for instance, that Homer-Dixon's methodology—not offering variation on the dependent variables—violates the logic of inference in research design and thus fails to provide empirical basis for comparison.[29] By examining only cases of conflict, it is indeed very likely that the Toronto group would find *some* evidence to support their enviro-conflict assumptions. In essence, the charge is that by comparing cases where conflict is expected, *ipso facto*, the Toronto group's research agenda lacks the comparative edge that would help predict why and how conflict over resources begin, under what conditions, and to what degree. Instead, the group concludes quite simply that "environmental scarcity causes violent conflict." A more useful approach would be to study both conditions of conflict and cooperation (diverging dependent variables) that nevertheless share similar (or common) environmental conditions of scarcity (comparable independent variables).

The remaining three critiques are altogether less damaging, generally speaking, and might be better considered as comments. First, the Toronto group's model is itself far too complex and comprehensive to allow for accurate and general empirical analysis. The Gaza case, for instance, involves eight independent and intervening variables, which draw on a six-variable scheme for explaining three kinds of water scarcity and a 10-variable scheme for explaining increasing levels of regional grievance. While a complex model is not itself a problem per se, it does however complicate efforts to test, at a general level, the significance and validity of a suspected causal pathway.[30] A more rigorous technique might involve gradual growth from simpler modules to more comprehensive analytical systems that evolve over long periods of time. Second, Homer-Dixon has been criticized for "reverse causality." Just as environmental factors may cause conflict, conflict itself may also cause environment degradation, stress, and scarcity. Thus, an interesting causal loop exists, where the antecedent variable behind environmental scarcity is in fact conflict itself; existing conflict degrades access to, or the amount of, a specific environment resource, leading to further conflict. Fairhead, for instance, concludes that "considering conflicts to be 'environmental' in origin can obscure the political and political-economic origins of

29 Gleditsch, "Armed conflict and environment," 391.

30 Ronnfeldt, "Three generations of environment and security research," 478.

what we have noted are definitively political events."[31] It is, as yet, unclear how proponents of environmental security will successfully refute this causal impasse. Finally, Homer-Dixon has been criticized for relying on future proofs to validate his present assumptions. That is, his research agenda stresses the potential for conflict in the future rather than explaining its actual occurrence in the present or past.[32] The problem is that much of Homer-Dixon's work is based on necessarily controversial theories rather than on hard data that might confirm his assumptions.

Arguably, while theoretical progression within environmental security studies has certainly developed over the past two decades, it has done so under constant academic assault. However, lest we abandon the subject *in toto* under the continued pessimistic onslaught, it is important to note the value of these tit-for-tat debates. Every leading field within the study of IR has come under some form of critique in its developmental history. It is this process alone that allows for the rigorous examination and refinement of theory and the eventual culmination of political knowledge. Progress is ongoing and interactive: theory guides research, leading to a reworking of existing assumptions, an identification of future research needs, and a repetition of this evolutionary process. Critique and debate are the necessary stimulus for this process and will eventual lead to more satisfactory results.

STRENGTHENING THE ENVIRO-CONFLICT NEXUS: THE WAY FORWARD

To conclude, then, is a brief discussion of the lessons that are provided by our analysis. The following is a list of research recommendations that might guide the coming wave of environmental conflict investigation.

Different methodological preferences continue to stymie constructive intra-field dialogue. Some research teams, like the Oslo group, focus on quantitative analysis while others, like the Toronto group, conduct in-depth qualitative work. While both approaches are valuable, the former is necessarily dependent on the latter's agenda. Mathews and Dabelko note that "large-N quantitative...studies may have reached points of diminishing returns, at least until a new wave of in-depth case studies can be conducted."[33] As a result, extensive fieldwork should be conducted in order to both

31 Fairhead, "The conflict over natural and environmental resources," 174.

32 Gleditsch, "Armed conflict and environment," 393.

33 Matthew and Dabelko, "Environment, population, and conflict," 100.

refine existing environmental security theories and augment the data available for quantitative analysis. Furthermore, methodological pluralism should be encouraged to allow for collaboration between groups.[34]

Stemming from the above recommendation, the environmental data that is available is both lacking in quality and quantity. For instance, it is exceedingly difficult to accurately discern exactly how much fresh water is available to states, how much soil erosion has actually taken place, how much urban pollution exists, or what energy reserves remain. Extensive data gaps and incommensurable measurements result in rather crude analysis and only uncertain projections. As a remedy, a collective database of environmental statistics, based on extensive and acute scientific fieldwork, would improve the quality of environmental security research.

Research in the field has been restricted to western institutions of academic scholarship. Because many of the world's environmental conflicts are occurring (and are predicted to occur) in the developing world, a more inclusive agenda must be forwarded that includes academics and political practitioners from these areas. More frequent participation of developing country scholars is therefore critical to the health of the field and extensive academic and scientific collaboration should be sought.

Null cases—those where the predictive environmental factors exist but conflict does not—must be studied. Such work has yet to reach critical mass. As aforementioned, an extensive case study analysis of why conflict does *not* develop under conditions of environmental stress would be a fundamental next step for the field. Not only would such a development retort some of the most damaging critiques, but it would help refine existing theories of enviro-conflict by focusing on "why" and "when" conflict occurs over environmental factors.

Future studies must include non-environmental variables into the folds of existing theories on environmental conflict. The classics of political science research—regime type and strength, political institutions and structure, economic growth, development, stability, alliance patterns, hard power, state interest, technological ingenuity, and law—must find their way

34 Daniel M. Schwartz, Tom Deligiannis, and Thomas F. Homer-Dixon, "The environment and violent conflict: A response to Gleditsch's critique and some suggestions for future research," *Environmental Change & Security Project Report* 6 (2000): 89

into the enviro-conflict discourse.[35] It is axiomatic, for instance, that states must first have the military capabilities to fight their neighbours before they engage in a war to wrest scarce resources from them. Power variables must enter the equation. Furthermore, population (especially demographic variance and ethnic distribution) must also be included, because a burgeoning youthful population or heterogeneity may have a greater impact on conflict than simple population growth.

Interdisciplinary research that stretches out not only within the social sciences, but towards the pure sciences, must develop in earnest. Environmental issues are perhaps best discussed by environmental scientists, biologists, chemists, ecologists, engineers, anthropologists, and physicians. As such, conflict theorists must build lasting academic ties with their colleagues in other fields if an accurate representation of the enviro-security link is to be established.

As unfortunate as it may seem, there are few remaining questions as to the impact environmental degradation and acute resource scarcity are having on our political, social, and economic systems. While detractors continue to scorn the legitimacy of the connection, environmental variables have penetrated the field of security studies, taking the discipline to new and uncharted territories. It is unlikely that a reversal of this trend will develop in the coming decades, and thus the fledging environmental security field will play a pivotal role in future debates. It is perhaps fitting, then, to offer Kaplan the final word on the issue: "Man is challenging nature far beyond its limits, and nature is now beginning to take its revenge."[36] How we learn to deal with these developments will be of critical importance to our future selves.

35 Alex S. Wilner, "Freshwater scarcity and hydropolitical conflict: Between the science of freshwater and the politics of conflict," *Journal of Military and Strategic Studies* 8, no. 1 (2005): 11-19.

36 Kaplan, "The coming anarchy," 54.