

New Issues in Security #5

**CRITICAL ENVIRONMENTAL
SECURITY: RETHINKING THE LINKS
BETWEEN NATURAL RESOURCES
AND POLITICAL VIOLENCE**

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CHAPTER 2

THE EVOLUTION OF ENVIRONMENT- CONFLICT RESEARCH

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The question of whether human-induced environmental change should be considered a security threat has been an important part of the post-Cold War debate about redefining security.¹ Those arguing that security should be redefined to include environmental factors argue that conventional definitions place undue emphasis on the zero-sum character of relative power gain at the expense of potential threats that can have a positive- or negative-sum impact on the welfare of states and of the people in them.² Opponents, on the other hand, argue that such a broad definition of security is conceptually weak – to the extent that it is almost vacuous – and motivated by politics rather than analysis.³

Several researchers chose to side-step this debate and narrow the analytical focus to the possible relationship between human-induced environmental and demographic change and violent conflict. During the 1990s, qualitative research projects in Canada, led by Thomas Homer-Dixon at the University of Toronto (Toronto Group), and in Switzerland, led by Guenter Baechler (Bern-Zurich Group), provided a wealth of case studies and hypotheses for researchers to consider.⁴ This research has been strongly criticized by some scholars.⁵ Others have proposed alternative hypotheses that they feel better explain the linkages advanced by the Toronto Group and the Bern-Zurich Group.⁶ In a few cases, scholars have refined and continued research in the tradition of these 1990s qualitative projects.⁷

Almost two decades after the publication in 1991 of Homer-Dixon's seminal article, "On the Threshold"⁸ and the beginning in earnest of research on environment and conflict, little, if any, consensus exists about qualitative environment-conflict research. Disputes remain unresolved about whether linkages exist, how they operate, which factors and processes should be emphasized, and the direction of future research. Basic ontological, epistemological and methodological disagreements and, in some cases, notably harsh polemics have paralysed discussion.⁹ Qualitative research seeking to build on the 1990s work is largely moribund, with little agreement on fresh questions that will move inquiry forward. The focus in environment-conflict research has shifted away from qualitative studies to quantitative examinations of linkages, econometric studies of high-value resource conflicts and demographic security studies.¹⁰

While study of the original questions addressed by Homer-Dixon and Baechler's projects – that is, of the particular connections between environmental change or environmental scarcity and conflict – has progressed little, the legacy of this research is substantial. Insights have filtered into the

highest levels of national and international peace and security policy-making.¹¹ As well, following the release of the 2007 Intergovernmental Panel on Climate Change (IPCC) report on climate change,¹² a flurry of studies emerged about the security implication of climate change which draw upon many of the hypothesized findings of earlier environment-conflict research.¹³ However, given the unresolved discord about environment-conflict research, there is a danger that once sustained and detailed examination of the climate change-security studies begins, climate change-security research may fall prey to a new round of polemical critiques which mirror past disputes. Qualitative environmental-conflict research needs to acknowledge explicitly the limitations of earlier research and craft the research agenda to build on areas of consensus in previous work. In order to ensure that future research is rigorous, a renewed research agenda is needed on the general relationship between human-induced environmental and demographic change and violent conflict which explicitly builds on the strengths and weaknesses of past efforts.

In the next sections, we examine the findings of the two biggest environmental and conflict research projects over the last 15 years. We identify areas in which consensus can be reached, pinpoint polemical discussions that should be refocused, and isolate fundamental disagreements where a more sophisticated ontology may be necessary. The main conclusion that emerges from this review is the stalled evolution of environment-conflict research can be traced to the polemical approaches of critics and advocates of research in the field who have failed to synthesize areas of agreement, and instead focused on points of clarification and rebuttal. The paper seeks to assess the disagreements among scholars in order to synthesize points of agreement on the conceptual and empirical record of environment-conflict research.

The paper begins with a brief review of the projects of the Toronto Group and the Bern-Zurich Group to highlight areas of agreement and divergence in their models, in light of criticisms about the definition of the independent variable. Disputes about the nature of the independent variable in environment-conflict research provide insights into controversies over the role of inequality, population factors and consumption influences. The independent variable used by Homer-Dixon and Baechler also influences the way in which critics have interpreted the results of their research. This has resulted in polemical and overly simplified interpretations by some, as is evident in debates about Neo-Malthusianism and ‘greed vs. grievance’ discussed below.

The Toronto Group and the Bern-Zurich Group

Concerns about the security implications of human-induced environmental change have a long and contentious history.¹⁴ In the 1990s, a number of scholars examining this relationship chose to focus on those areas where both the local environmental relationships were crucial for people’s survival, and the opportunities and capabilities to forestall negative implications was weakest – in the world’s poorest, developing states.¹⁵ People who are heavily reliant on natural resources for their survival – particularly renewable resources like land, water, and forests – and who are limited in their ability to manage these resources sustainably, are particularly at risk of the impacts of human-induced environmental transformation. Today, almost half of the 6.5 billion people on the planet rely upon local natural resources for a large part of their well-being.¹⁶ Those living in developing countries are

particularly tied to their local natural resources and thus vulnerable to human-induced pressure on these resources. Investigating the material impact of changes in these key resources is thus highly relevant. Both the Toronto Group and the Bern-Zurich Group recognized this reality as they set out to conduct a series of qualitative case studies on environmental change-conflict linkages in the 1990s. Each hypothesized that human pressure on natural resource endowments could affect the material well-being of developing societies and increase the risk of conflict.

Recognizing the methodological problems involved in testing hypotheses related to human-ecological systems, namely the futility of trying to control for confounding variables, the Toronto Group rejected the quasi-experimental methodology that comparativists in political science typically use to produce generalizations.¹⁷ Instead, the group adopted a case study approach wherein cases were selected explicitly on the basis of observed change in both the independent variable *environmental scarcity* and the dependent variable *violent conflict*.¹⁸ Using a process tracing methodology,¹⁹ the group addressed the question ‘Can environmental change cause conflict, and, if so, how?’ This question focused on the hypothesized causal role of a specific independent variable, environmental scarcity. Homer-Dixon defines environmental scarcity as a tripartite variable – a composite of three factors: degradation or depletion of the resource (supply-induced scarcity); increased demand for the resource due to population growth or increased per capita consumption (demand-induced scarcity); and changes in access to the resource due to skewed distribution among social groups (structural scarcity).²⁰ The question driving this project was therefore narrower and more tightly defined than a more general question – of a type commonly asked by researchers – like ‘what causes civil conflict?’²¹

The Toronto Group’s research suggests that environmental scarcities indirectly help to generate various forms of civil conflict, like insurgencies, group-conflict, coup d’etats, etc.²² Their research did not support a link between human-induced environmental and demographic scarcities and interstate conflict. Homer-Dixon hypothesized that environmental scarcities influence the incidence of violent civil conflict through a series of intermediate social effects, like constrained economic productivity, intra- or inter-state migration, the creation and aggravation of group tensions and divisions, and the weakening of institutions and the state’s capacity to respond to public needs and effectively deliver public goods. As well, scarcities often interact in particularly important ways to cause resource capture and ecological marginalization. According to “The Environment and Violent Conflict,”

Resource capture occurs when the degradation and depletion of a renewable resource (a decrease in supply) interacts with population growth (an increase in demand) to encourage powerful groups within a society to shift resource access (that is, to change the resource’s distribution) in their favor. These groups tighten their grip on the increasingly scarce resource and use this control to boost their wealth and power. Resource scarcity intensifies scarcity for poorer and weaker groups in society.²³

Ecological marginalization is often interlinked with resource capture and often a consequence of resource capture. Ecological marginalization

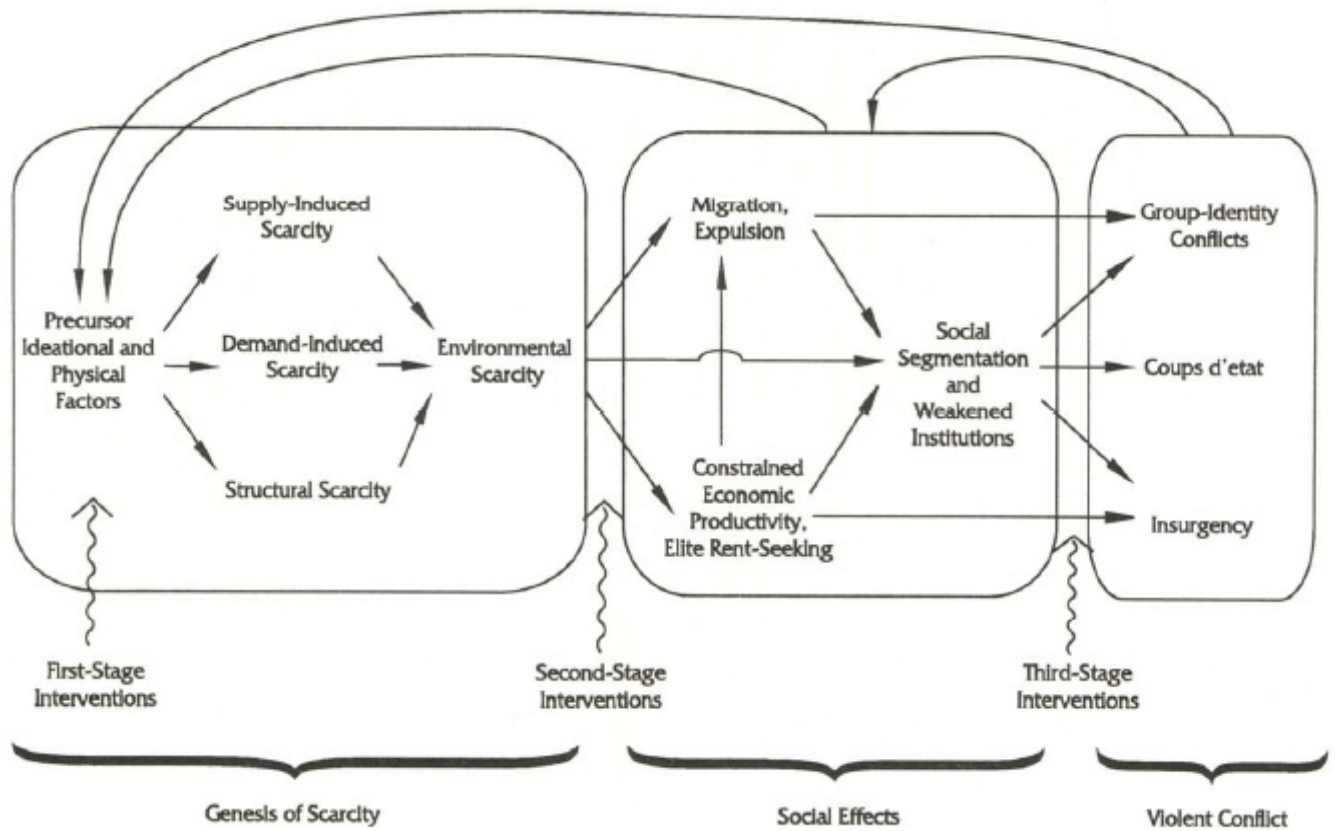
occurs when unequal resource access (skewed distribution) combines with population growth (an

increase in demand) to cause long-term migration of people to ecologically fragile regions such as steep upland slopes, areas at risk of desertification, tropical rain forests, and low-quality public lands within urban areas. High population densities in these regions, combined with a lack of knowledge and capital to protect the local ecosystem, cause severe resource degradation (a decrease in supply).²⁴

In all cases, Homer-Dixon and his colleagues emphasized that scarcities never act alone to cause conflict, but instead interact with a wide range of contextual factors, operating across multiple levels and multiple scales.²⁵ (See Figure 1)

Figure 1.

Toronto Group's Core Model of the Causal Links between Environmental Scarcity and Violence



Source: Figure 7.1 from Toronto Group.

Günther Baechler's Zürich-based Project on Environment and Conflict (Bern-Zürich Group)²⁶ examined a much broader selection of case studies, but came to similar conclusions as the Toronto Group in the end. While sharing a similar concern with the Toronto Group about the impact of environmental change on the material well-being of people in developing countries,²⁷ Baechler's focus on the *transformation* of human-environment relationships as a starting point of analysis results in a much broader independent variable than Homer-Dixon's focus on environmental scarcities. Though environmental transformation encompasses both negative and positive consequences, the Bern-Zurich Group's focus is the negative consequences of human-induced environmental transformation. It can frequently lead to "environmental discrimination," which "occurs when distinct actors – based on their international position and/or their social, ethnic, linguistic, religious, or regional identity experience inequality through systematically restricted access to natural capital (productive renewable resources) relative to other actors."²⁸ Baechler takes a similar multi-causal approach to explaining how human pressure on the natural environment can help to cause conflict. Environmental transformation combines with various factors to result in different types of sub-state conflict, such as ethnopolitical conflicts, centre-periphery conflicts, migration conflicts, or in international environmental conflicts.²⁹

Defining the Independent Variable: Critics and the Role of Inequality

The definition of the independent variable in environment-conflict research has long been a source of dispute among researchers. Homer-Dixon focuses on *environmental scarcity* as the independent variable. This tripartite variable has been criticized for including distributional and demographic dimensions. For those affected, environmental scarcity essentially describes a net decrease in the per capita availability of renewable resources within a system (where the system is usually taken as the whole territory of a given country or a sub-region of that country). By contrast, many ecologists and environmentalists focus on *environmental change*, a term "that refers only to a human-induced decline in the quantity or quality of a resource – that is to worsening supply-induced scarcity."³⁰ Incorporating unequal resource distribution into the independent variable, Homer-Dixon argues, allows for a more complete examination of the causes of change in resource availability.³¹

Homer-Dixon's inclusion of inequitable distribution in the independent variable *environmental scarcity*, however, has been criticized by scholars. The criticisms hinge on conceptual differences, and the belief among some scholars of the primacy of certain causal explanations. Some, like political ecologists James Fairhead, Nancy Lee Peluso and Michael Watts, argue that processes like supply and demand reductions in renewable resources cannot be combined into an umbrella term 'environmental scarcity' with the seemingly different political-economic processes that lead to inequitable distribution of resources.³² Processes of culture, power and political economy that shape inequality are causally prior, Peluso and Watts argue, and are more important than supply and demand changes as the causes of reduced resource availability. In fact, the former often lead to the latter, in their view. Homer-Dixon and Baechler err by starting their analysis at the genesis of scarcity, they argue, instead of examining the processes that created scarcity in the first place, what Homer-Dixon calls the "factors producing scarcity." By doing so, the Toronto Group is "privi-

leging” resource scarcity in its causal framework, and creating “analytical obfuscation.”³³ Similarly, after reviewing the Toronto Group’s cases, Nils Petter Gleditsch and Henrik Urdal argue that “the greater problem [in many of the conflict cases studied by the Toronto Group] ... lies in unequal distribution rather than availability of natural resources,”³⁴ suggesting that the sources of inequality are the key causal variables.³⁵ Gleditsch would instead exclude distributional issues from the independent variable and restrict analysis of “environmental conflicts” to cases of supply and demand scarcity.³⁶ When the links between environmental change and conflict are examined using this definition of scarcity, according to Gleditsch, the relationship is questionable. He points to cross-national research on the relationships between supply and demand scarcities and violent conflict which has found weak influence compared to political and economic factors.³⁷ Although the environmental data used in this work is relatively crude, the fact that minimal evidence can be found to link supply and demand scarcities to conflict suggests in the eyes of critics like Gleditsch and Jack Goldstone that environmental causes of conflict are weak compared to other causes.³⁸

Baechler’s conceptualization of the independent variable largely agrees with the political-ecology critique.³⁹ *Environmental transformation*, according to Baechler, is both broader and often causally prior in his conceptualization to supply, demand and distributional scarcities examined by Homer-Dixon. It encompasses a variety of social and cultural transformations to the environment which affect resource availability, including both supply and demand changes in renewable resources, which are subsumed under the term *environmental degradation* – a consequence of human environmental transformation and disturbance of the environment.⁴⁰ Importantly, the maldistribution of resources is often both a consequence of pre-existing structural inequalities and a consequence of human transformation of the environment, according to Baechler’s model. Scarcities are essentially described as a social effect of human environmental transformation.⁴¹ Structural patterns of socio-ecological inequality and discrimination can lead to negative reinforcing patterns of environmental scarcities and further marginalization for many in developing countries.⁴² Although global structural inequities in markets and between developed and developing countries largely condition patterns of discrimination and inequality around resources, according to Baechler, the impacts of poverty, high population growth rates, and environmental discrimination can have such strong transformative impacts that they should be conceptualized as an exogenous variable.⁴³ Baechler thus accepts the causal importance of inequality as a factor causing scarcity like Homer-Dixon, but would also point scholars to the important underlying structural inequalities in global capitalist economic relationships as well.

Disputes about including ‘inequitable distribution’ in the independent variable underscore a deeper divide, particularly with political ecologists like Peluso and Watts. To these critics, beginning the analysis of environmental change-conflict linkages by examining the impacts of three types of scarcities misdiagnoses the nature of the independent variable. Rather than looking at the discrete and proximate mechanisms that are creating a decrease in available resources in any situation (the three sources of scarcity) as Homer-Dixon would, they would instead focus on the factors behind these mechanisms that are driving the processes of scarcity in the first place. In terms of Homer-Dixon’s causal model, the dispute is essentially whether to locate the independent variable with the supply, demand, or distributional scarcities or within what he calls “precursor ideational factors” (or the causes of structural inequality, according to Baechler’s model). “[T]he emphasis on so-called

scarce resources occludes the real sources of such problems/conflicts and in so doing makes them more difficult to solve,” Peluso and Watts write. “The best example of this point,” they continue, “is perhaps the way Homer-Dixon describes his view of how appropriations of land/resources by elites create scarcity. The focus of his analysis is subsequently on the *scarcities produced* – not on the mechanisms of appropriation and exclusion from access at the heart of that process.”⁴⁴

Political ecologists like Peluso and Watts are correct in criticizing these projects for “theoretical underspecificity” in analysing the deep factors producing scarcity. To be fair, however, the Toronto Group’s case studies did examine, in varying degrees of thoroughness, the historical patterns of “appropriation and exclusion” which form the basis of distributional scarcities.⁴⁵ Homer-Dixon also clearly stresses the importance of “ideational factors” for making up the “broad and complex social and psychological context” for the relationship between societies and environmental change.⁴⁶ The Toronto Group similarly notes in various cases how such inequality is expressed in institutions, laws and social relations in ways that produce scarcities for certain groups.⁴⁷ However, with the exception of resource capture or ecological marginalization, little attempt is made to theorize across cases, patterns or processes among precursor ideational factors, or how they might drive scarcities later in the causal process.⁴⁸ A rich body of political ecological literature exists which suggests the origins and analytical significance of scarcities go beyond invocations of class, colonial legacies, or laws, norms, institutions, or rights, and that patterns exist across contexts and societies.⁴⁹ Political ecological explanations locate the cause of scarcity in the “social relations of production and the social fields of power” and theorize how “various systems of access to and control over resources emerge and are reproduced”, resulting in scarcities.⁵⁰ The brief discussion of the theoretical dimensions of structural scarcity in Homer-Dixon’s 1999 book,⁵¹ by contrast, gives the impression that inequality is a given across societies, rather than a process, pattern and outcome, constantly formed and recreated through the interactions of actors, access and regimes of accumulation in a global capitalist economic system. The Bern-Zurich Group more thoroughly examined the political-ecological footprint in environment-conflict linkages, as outlined above, though still insufficiently for political ecologists like Peluso and Watts.⁵²

In light of this critique, however, future research must take care not to let the pendulum swing too far in the opposite direction. There is a danger that political-ecological analyses of environment-conflict linkages will endogenize the causes of scarcity to political-economic factors, and lose sight of the impact of ‘natural factors’. Scholars from the Toronto Group have argued that political-ecological critiques of environment-conflict research, by suggesting the causal primacy of political-economic factors and their relationship and conditioning of human-natural systems, are downplaying or ignoring the importance of environmental factors or quasi-naturalistic factors like population growth in these systems.⁵³ As well, there are differences among political ecologists on this point, with some political ecologists endogenizing environmental scarcity or environmental factors to political-economic factors and processes,⁵⁴ while others see varying degrees of interactivity between natural and political-economic factors that are difficult to separate.⁵⁵ Even among the latter, however, causal primacy is often accorded to political-economic influences in their accounts, with environmental factors playing some vaguely necessary but often causally undefined role.⁵⁶ Certainly, when scholars such as Homer-Dixon attempt to bridge the divide between political-ecology analysis and neo-Malthusian analysis, they are derided as naive and their work twisted to a simplistic neo-

Malthusian caricature.⁵⁷ The independent causal potential of some factors, such as population growth, are discounted or ignored, as is discussed below. While Peluso and Watts are probably correct in claiming the lack of sophistication of political-ecological analysis in the Toronto Group's work, many in their own field recognize the necessity of integrated natural and political-economic perspectives.

Future research needs to build on past environment-conflict research and strike a balance between sophisticated political-ecological analysis that also integrates insights from environmental-conflict research. There are at least two reasons why the political-ecology critique fails to convince researchers to abandon the focus on environmental scarcities as the independent variable. First, political ecologists have never been able to resolve the argument from scholars like Homer-Dixon that some sources of environmental scarcities are independent of political-economic factors, and that causal interactivity makes it extremely difficult to separate out political-economic factors as more important than other natural factors in many situations.⁵⁸ Both Homer-Dixon and Baechler argue that environmental scarcities are never sufficient to cause conflict, but that they interact with multiple causes and often multiple forms of scarcity in many cases.⁵⁹ The agreement from some political ecologists about the role of natural factors⁶⁰ in helping to cause conflicts suggests a certain degree of consensus with the views of Homer-Dixon and Baechler which needs to be built upon in future research. In fact, there is now widespread recognition that the long history of human interaction with natural systems requires a new integrated framework to study "coupled human and natural systems."⁶¹ New research needs to move beyond debates about whether social or natural factors are more important and instead develop comprehensive explanations that also grapple with the difficult analytical problem of determining the relative importance of various interacting causes and processes. This may require a new approach to model the complex interactive systems.⁶²

Second, despite criticisms by political ecologists that environment-conflict research mistakenly examines the immediate circumstances (or proximate drivers) producing scarcity and their social effects, rather than distant drivers behind such processes, there are sound reasons to continue exploring how scarcity-induced social effects help to cause conflict.⁶³ For those interested in the downstream violent conflict processes of human-environmental interactions, a research strategy that focuses on the causal effects is exceptionally important because these outcomes need to be thoroughly examined to understand how they help cause violent conflict.⁶⁴ In many political-ecology analyses of human-environmental change interactions, by contrast, violent conflict is treated less as the object of analysis, and more as an unfortunate outcome – an indicator of the political-ecological consequences of processes of exclusion, control and appropriation. The analytical bias of such accounts – both in terms of focus and policy intervention – is on the political-economic drivers and processes believed to be at the start of the causal process, and less on possible violent conflict outcomes. As Peluso and Watts conclude, "to say that environmental scarcity can contribute to civil violence is to state the obvious."⁶⁵ But in claiming that such an outcome is obvious, they also imply that the relationship between environmental transformation and violent conflict is simple, well understood and unimportant. However, this is not the case, and many political-ecology accounts of the genesis of violent conflict lack sophisticated analyses sensitive to social science work on the causes of civil conflict and revolution. As well, given the tendency to employ an expansive definition of 'violence' by many political ecologists, their accounts complicate efforts to understand how

particular patterns of human-environmental interaction cause different conflict outcomes. As Colin Kahl has noted in reference to the cases in the book *Violent Environments*, “the causal logic whereby political, economic, and discursive practices and structures constitute particular environments and patterns of violence is underspecified.”⁶⁶ Future research needs to examine more closely the relationship between the social effects of environmental transformation and violent conflict, both to test and refine existing hypotheses, and to integrate better social science research on violent conflict with more sophisticated analyses of environmental transformation and scarcity. This approach may also yield important insights into where policy interventions can forestall or prevent violent conflict, and complement the policy interventions suggested by political-ecology analysis of deep processes and regimes of accumulation, power and access to essential human environments. A research strategy that locates policy interventions only in underlying social, political and economic processes is unnecessarily restrictive.

There are thus sound reasons for keeping inequality as a fundamental part of the independent variable, as Homer-Dixon and Baechler do, but also broadening the analysis in order understand the broader processes, patterns, regimes and actors that condition and create inequality and help cause conflict. A comprehensive, tripartite independent variable acknowledges that the inequitable distribution of resources rarely acts alone to help cause conflict; its impact is frequently “a function of its interaction with resource supply and demand.”⁶⁷ While there may be cases of strictly distributional conflicts or conflicts based only on demand-induced scarcity, the possibility of multiple sources of scarcity should lead analysts to investigate the resource’s supply *relative* to, first, demand on the resource and, second, the social distribution and control of the resource. As Peluso and Watts argue, “[t]he relationships between supply and demand and between supply and distribution determine people’s actual experience of scarcity, and it is these relationships that ... influence the probability of violence.”⁶⁸ Such a focus is reasonable for any research program interested in environmental change-conflict links.

Defining the Independent Variable and Characterizing Outcomes in Environment-Conflict Research: Debates About Population and Consumption, Neo-Malthusianism

Another source of dispute over the definition of the independent variable by the Toronto Group and the Bern-Zurich Group revolves around the inclusion of demographic factors such as population growth as a source of environmental scarcity. Some critics and even some supportive commentators now commonly apply the label ‘neo-Malthusian’ to the research programs, models and empirical findings of the Toronto Group and Bern-Zurich Group.⁶⁹ Once thus labelled, critiques of neo-Malthusianism are employed to discredit the empirical findings of the Toronto Group and the Bern-Zurich Group.⁷⁰ Is there some validity to labelling the Toronto Group and Bern-Zurich Group findings as neo-Malthusian?

A careful examination of these critiques reveals that many of these arguments employ straw-man neo-Malthusian arguments. Painting the findings of the Toronto Group and Bern-Zurich Group as neo-Malthusian hinders attempts to deepen our understanding of environment-conflict linkages. It has led to a failure to recognize that multiple pathways of human-environment interactions exist

in the real world – both local or national scarcity-induced social effects *and/or* the forestalling of these effects through the intervention of institutions, the state, or ingenuity. This emphasis on discursive labelling has retarded progress in identifying useful interventions to forestall or alleviate the impacts of scarcities, and obscures our understanding of when and why these interventions sometimes fail.

Some critics claim that the research programs of Homer-Dixon and Baechler are neo-Malthusian because they adhere to deterministic single-factor explanations of the role of environmental scarcity – population factors, in particular - as a cause of violence. Betsy Hartmann, for instance, claims that population growth is the “single largest causal factor of environmental scarcity” in the Toronto Group’s work, blamed “disproportionately for environmental degradation, poverty, migration, and ultimately political instability.”⁷¹ She argues that the group’s link between population growth and resource demand betrays the group’s determinism, because “[i]t does not necessarily follow that if there are more people, they will consume more – per capita consumption could fall for a variety of reasons.”⁷²

Yet Homer-Dixon and his co-authors go out of their way to eschew deterministic single-factor explanations. Their key independent variable, environmental scarcity, incorporates three factors – supply, demand and distributional scarcities. At every subsequent stage in their model, their research showed that intervening socio-economic variables act to create causal contingencies. Indeed, the group concluded that socio-economic factors can intervene at any stage to mitigate the effect of scarcity on conflict or to move the pathway away from conflict altogether. The group also identified numerous examples of the interaction of multiple causes as well as feedback loops that cycle back to affect earlier variables, including the causes of scarcity.

Baechler similarly argues that population and environmental factors always operate with important intervening variables to produce conflictual outcomes. According to Baechler, “[t]he environmental conflict program does not lead to mono-causal explanations of violent conflicts or war. Instead, environmental disruption is embedded in a syndrome of factors complicating any conflict analysis.”⁷³ Population dynamics, according to Baechler, combine with other factors like “poverty, inadequate land-use and land-tenure systems, environmental transformation, and poor state performance” to stimulate local conflicts and migration – migration which can be cross border migration or rural-urban migration, possibly leading to “conflicts in the area of destination.”⁷⁴ Hartmann is therefore incorrect to assert that these projects put great – if not primary – weight on the population factor (or any single factor) in their theoretical frameworks.⁷⁵

The Toronto Group and Bern-Zurich Group models can be criticized, however, for not sufficiently emphasizing that demand-induced scarcities are strongly influenced by changes in consumption patterns in local, national, or international markets. As Hartmann notes, increased resource consumption may have “little to do with demographic factors but instead with increased demand in external markets for a particular product.”⁷⁶ These consumption changes may be far removed from the location of the resource, with economic changes or cultural changes thousands of kilometres away triggering market signals that increase the rate of use of a resource, even if the population levels remain stable or decline in the areas under study. Under-emphasizing consumption, could appear to some critical scholars as over-emphasizing population factors.

Homer-Dixon and Baechler do recognize that the consumption of resources is a crucial part of

demand-induced pressure on resources. As Homer-Dixon notes, “[d]emand-induced scarcity is a function of population size multiplied by per capita demand for a given resource; an increase in either population or per capita demand increases total resource demand.”⁷⁷ Because demand-induced scarcity is a product of such an interaction, it is impossible to say that one component factor is more important than another. Consumption and population change thus always make up the determination of demand-induced scarcity.⁷⁸ Furthermore, Homer-Dixon notes that population growth and consumption are influenced by a range of “ideational factors” and “economic preferences,” which account for how and what people use and consume.⁷⁹

However, the influence and causes of consumption are not always adequately expressed in the Toronto Group’s causal frameworks and case studies alongside population factors, and its influence is not adequately explained in scarcity interactions like resource capture or ecological marginalization. Nor are the influences of consumption changes outlined in Baechler’s conception of environmental discrimination, which is surprising, given the prominent political-ecological footprint in Baechler’s work. For example, Homer-Dixon explains that resource capture often happens when population growth combines with a fall in the supply and demand of a resource. This shift, Homer-Dixon argues, “can produce dire environmental scarcity for poorer and weaker groups in the society.”⁸⁰ While this pattern of interaction is certainly plausible, consumption changes can trigger demand-induced scarcity and elite resource capture irrespective of any demographic changes.

There is ample evidence that resource capture happens without population growth-led demand changes, but through consumption-led demand-induced scarcity. For example, in Latin America in the mid-1800s and in the early part of the 20th century, international wool booms led to rising prices for wool exports. In Peru, powerful elites and petty elites reacted to these international price signals by seeking to expand domestic wool production.⁸¹ In the southern Peruvian altiplano, elites expanded their holdings “by a mixture of volition and coercion” – purchasing land outright, manipulating laws and institutions to capture the pasture land, entrapping peasants through debt, or using sheer force to gain control of the grazing lands of indigenous smallholders and communities.⁸² The social impacts of this resource capture were aggravated by the slowly expanding highland populations at the time. But it was the international price signals and the consumption changes driving them that were at the start of the causal process leading to the resource capture of the wool-producing lands – especially after the outbreak of World War I stoked the demand for wool uniforms. Similar patterns were evident with cattle production in Central America between the 1950s and 1970s, as a result of demand for the US and domestic markets in the region.⁸³

A close reading of the research of Homer-Dixon and Baechler demonstrates that population growth is more frequently cited as a source of demand-induced scarcity than consumption-driven demand changes in their models. While possibly a function of the cases they examined, emphasizing demographic trends without also focusing on consumption influences could appear to give preference to population as the key variable for demand-induced scarcity. Consumption-driven demand signals must be recognized as important sources of demand-induced market impacts on scarcity in many areas. Corrections are needed to their models to highlight the negative impacts of consumption, as Figures 2 and 3 do in correcting Homer-Dixon’s resource capture and ecological marginalization models. Similarly, consumption influences must be recognized as important drivers of environmental discrimination patterns described by Baechler. Modern markets often spread into

new production areas as a result of consumption – or demand-induced – signals, at the expense of the more traditional or small-scale agriculturalists in those areas.

The figures below modify Homer-Dixon's diagrammatic representation of resource capture and ecological marginalization to take into account possible consumption influences:

Figure 2

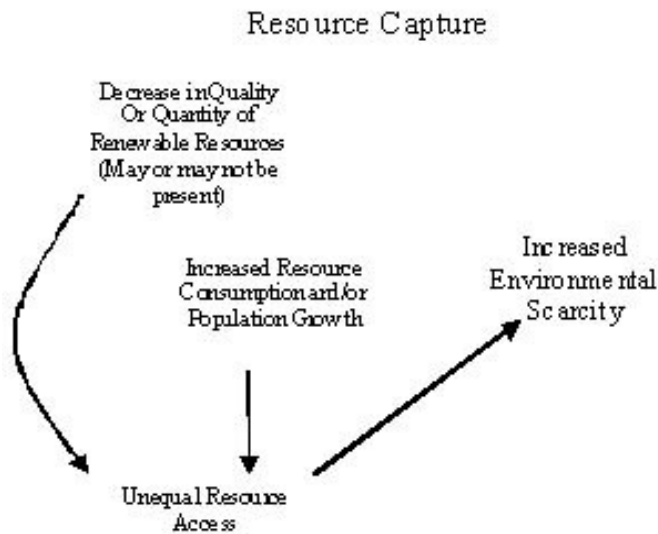
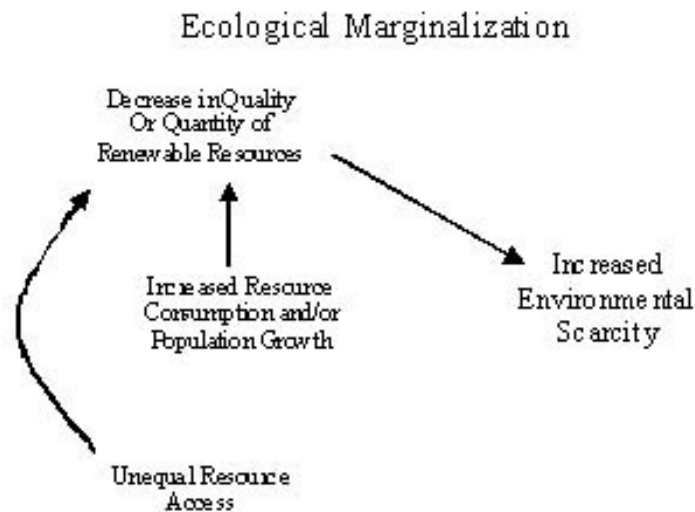


Figure 3



Other critiques of the work of the Toronto Group and the Bern-Zurich Group have set out to discredit their findings by categorizing them as part of widely critiqued neo-Malthusian arguments on the consequences of population growth for environmental change. Homer-Dixon's use of the term 'scarcity' (a buzzword for neo-Malthusians) for his independent variable encourages the impression among some that his model is neo-Malthusian.⁸⁴ Gleditsch and Urdal's critique of the Toronto Group's work, for example, emphasizes repeatedly that Homer-Dixon's thinking is neo-Malthusian.⁸⁵ They support this characterization by noting similarities with neo-Malthusian thinking and by selectively choosing elements in Homer-Dixon's theoretical model that correspond to neo-Malthusian thought. For example, they argue that Homer-Dixon's pessimism about the relationship between population change and natural resource availability demonstrates his neo-Malthusian providence.⁸⁶ They strip his model to its core and describe it in strikingly similar terms to Paul Ehrlich's IPAT equation, one of the cornerstones of neo-Malthusian thought.⁸⁷

In spite of explicit attempts to differentiate the research of the Toronto Group and the Bern-Zurich Group from Neo-Malthusianism⁸⁸ and its "focus on the absolute physical limits to growth in a society,"⁸⁹ Gleditsch and Urdal classify these models as slight variants of this approach. In their models, both Homer-Dixon and Baechler emphasize the crucially important mediating role played by the state, to intervene to disrupt scarcity-conflict processes, or to alleviate the social consequences of human-induced environmental scarcity.⁹⁰ Their emphasis on the intervening role played by a society's social and technical capacity to overcome scarcities – its "ingenuity," to use Homer-Dixon's term – appears to differentiate clearly their positions from neo-Malthusian positions, because the application of human ingenuity to overcome scarcity is a central position of the Cornucopian response to neo-Malthusianism. However, to Gleditsch and Urdal, these arguments merely distinguish traditional neo-Malthusian thought from Homer-Dixon's neo-Malthusian thought.⁹¹ They conclude that Homer-Dixon's pessimism about the ability of developing countries to come up with the necessary ingenuity to overcome the consequences of resource scarcities betrays a simplistic understanding of how societies throughout history have eventually overcome their negative impacts on the natural environment through economic development.⁹²

Gleditsch and Urdal's critique raises important questions about whether the focus on population variables and the impact of reduced resource availability in the models of the Toronto Group and the Bern-Zurich Group, at a basic level, necessitates grouping their work with neo-Malthusians. More importantly, is there some analytical relevance for those interested in environmental change-conflict research to deciding whether their models are neo-Malthusian?

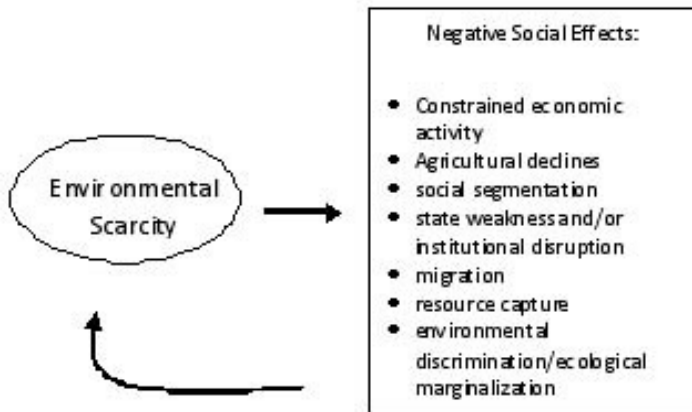
Painting the work of the Toronto Group and the Bern-Zurich Group as neo-Malthusian is useful to critics because abundant evidence exists to discredit many general neo-Malthusian claims.⁹³ This work can help to undermine credibility in the research of these two groups if the neo-Malthusian label can be hung on their findings. Many analysts acknowledge that institutions, the state, or "the human ability to [apply] technology and ... knowledge"⁹⁴ can interrupt environmental scarcity causal outcomes to alleviate the impacts of scarcity and eliminate or lessen the social effects of scarcity, thereby forestalling or heading off conflict further down the hypothesized causal chain. This is true, but not the complete explanation. Scholars also admit that in the absence of these interventions, certain environmental scarcity-induced social effects can and do happen. As John Pender's careful analysis of research on population growth and agriculture concludes:

Population growth may stimulate a wide variety of responses at the household and collective level. Many of these responses are strongly conditioned by the nature of technology, infrastructure, institutions and organizations. *In the absence of development of these factors, population growth is likely to lead to declining labor productivity and human welfare, as a result of diminishing returns.*⁹⁵ (Emphasis added.)

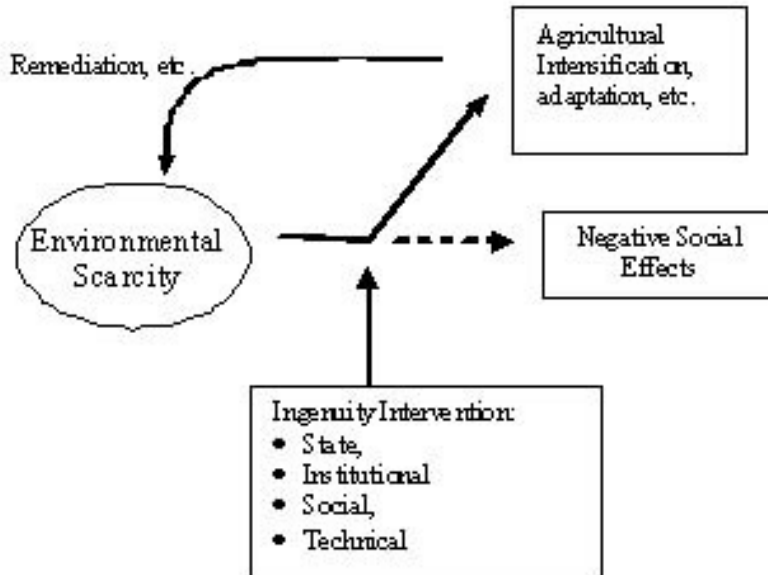
We must recognize that there are, in fact, two possible idealized causal outcomes of the impacts of environmental change and population growth. (See Figure 4.) One pathway describes how environmental scarcities can lead to negative social effects like those described by Homer-Dixon and Baechler, with outcomes consistent with certain neo-Malthusian claims. A large body of detailed empirical and case study research informs these linkages, such as the ‘vicious circle model’ and its descendants.⁹⁶ The second possible pathway describes how the impacts of institutional, state, or social ingenuity interventions forestall or mitigate negative social consequences before they contribute to other conflict-generating processes like grievance formation or collective mobilization. This work is descended from Boserupian hypotheses about agricultural intensification patterns and Cornucopian hypotheses about the application of ingenuity.⁹⁷ In both cases, the context of particular situations is crucially important and highly variable – feedback loops operate, and causal interactivity make the relationships complex. Importantly, recognizing one possible pathway does not preclude the other pathway from also operating, particularly because they could be operating at different scales.⁹⁸ Between these two poles (where the variety of real world cases probably lie) is a range of outcomes depending upon the constellation of factors at play – the degree of state or institutional intervention, the degree of supply, demand, or distributional scarcities, etc. Once we appreciate the variety of contextual situations and the different pathways of impacts of environmental scarcity or ingenuity, we begin to account for the wide variation in real world cases, which have been fodder for competing scholarly positions on human-environmental change impacts. These contrasting positions can and should be unified into one theoretical model, and both are possible outcomes depending upon the particular circumstances, as represented in Figures 4 and 5.

Figures 4 and 5

Neo-Malthusian Outcomes of Scarcity



Ingenuity Interrupts for a Different Causal Pathway



Most cases probably exhibit some combination of scarcity-induced social effects, negative feedbacks and interventions of varying effectiveness. States or other powerful actors are making their presence felt, although perhaps not in ways sufficient to ameliorate negative consequences, or in ways which outright exacerbate negative impacts. Contextual and scale factors unique to each case add a dizzying layer of complexity to attempts to discover common causal patterns across time and space, and between cases. Of particular interest to researchers is identifying how and why scarcities arise in the first place, what particular interventions are effective, how and why the conditions for effective interventions are created, and the intervening variables and processes which are required to translate detrimental social effects from environmental scarcities into different kinds of violent and non-violent conflict. Answers to these questions will guide choices about effective interventions. An impressive body of research already exists in various disciplines to provide answers to some of these questions. But researchers must resist the temptation of constructing simplistic, polemical comparisons, and focus on identifying and verifying commonalities in each other's findings.

Characterizing Outcomes in Environment-Conflict Research: Greed vs. Grievance

Greed versus grievance debates over the findings of the Toronto Group and the Bern-Zurich Group similarly result in simplistic polemical analysis, which creates a false dichotomy around the state of abundance or scarcity of resources and their connections to civil conflict.⁹⁹ The Toronto Group and the Bern-Zurich Group are often said to employ a "grievance" hypothesis of conflict.¹⁰⁰ Real or perceived deprivation produces a psychological state of grievance that leads people to "want to engage in violent protest."¹⁰¹ Some economists studying civil violence in poor countries, on the other hand, argue that conflict is motivated by greed: people engage in violence when they rationally estimate that such behaviour will allow them to seize or exploit a "lootable" source of wealth – that is, when the expected benefits of such behaviour outweigh the expected costs.¹⁰² The expectation of benefits from violence thus conditions the opportunities available for actors.

According to these researchers, a number of variables in a given society affect the relative balance of benefits and costs, including low economic growth, low educational attainment, large proportions of unemployed male youth in the population and heavy dependence on primary resource exports.¹⁰³ Lootable resources are usually extractive, non-renewable resources like minerals that have a high value-to-volume ratio and are easily seized and converted into currency in the absence of a strong state. Diffuse renewable resources like pulp timber (as opposed to valuable hardwoods), on the other hand, offer less opportunity for large-scale harvesting and sale in the absence of a functioning state.¹⁰⁴

Empirical evidence supports the hypothesis that some poor countries suffer from a 'resource curse': those that have high concentrations of lootable resources, measured as a function of their primary resource exports, are more likely to experience conflict.¹⁰⁵ Also, an abundance of valuable extractive resources helps create a domestic economic structure that shifts the balance of benefits and costs in favour of greed-motivated rebellion.¹⁰⁶ Richard Auty points out, however, that the resource curse hypothesis is not deterministic: even when all the economic and resource precursors

are in place, in most cases greed-motivated violence does not occur.¹⁰⁷ Instead, many variables intervene, such as the geographical proximity of the lootable resource to the centre of political power and the would-be rebels.¹⁰⁸

Advocates of the resource curse perspective often argue that the abundance/greed hypothesis and the scarcity/grievance hypothesis of civil conflict are mutually exclusive. Either one or the other has to be right, but not both. Thus Indra de Soysa compares Paul Collier and Anke Hoeffler's resource-curse model with the Toronto Group's environmental scarcity model.¹⁰⁹ He concludes that the empirical evidence supports the hypothesis that state dependence on natural resources is the main explanation of civil conflict and that greed is the main motive of violent behaviour. To the extent that grievance motivates some actors to violence, these actors are generally the victims of the greedy behaviour of others and are acting against them. De Soysa concludes that scarcity, if it plays any role at all, is wholly subordinated to resource abundance and the greed that this abundance evokes.

De Soysa's arguments – and those of like-minded researchers – are wrong in three important ways. First, these researchers set up a misleading contrast between abundance and scarcity. They say they are investigating violence that arises from resource abundance, while others are investigating violence that arises from scarcity. This is a false dichotomy. Both groups of researchers are, in fact, investigating violence that arises from scarcity. The lootable resources that de Soysa and others study only stimulate greed because they are valuable, and they are valuable only because they are *scarce* relative to demand. They may be locally abundant in one region or part of a country – a phenomenon sometimes labelled a “honey pot” – but they are globally scarce. If they were truly abundant, they would not be valuable, and people would not have a powerful incentive to loot them.

Baechler and Homer-Dixon actually make a very similar point regarding the consequences of certain kinds of environmental scarcity. As cropland, forest and fresh water resources become more scarce relative to demand in a poor country, as Homer-Dixon argues, powerful elites often find it easier – and more profitable – to seize the remaining pools of these resources in order to extract enormous resource rents, the ‘resource capture’ process. Such relationships can also operate across borders, as the scarcity of renewable resources such as productive cropland in one area of the globe, can stimulate powerful investors to purchase or gain control of land in developing countries where land is more abundant.¹¹⁰ In these circumstances environmental resources are locally abundant within a more general situation of scarcity – a situation that stimulates greed and can provoke violence among elite groups competing for rents or among elites, investors and non-elites seeking to retain traditional access to these resources.

Second, resource curse researchers also often conflate the issues of resource dependence and resource scarcity and in doing so create a false divide between themselves and ‘scarcity’ researchers. De Soysa writes that “proponents of both sides of the debate have assumed that resource dependence signifies objective abundance or scarcity.”¹¹¹ This is clearly incorrect, at least when it comes to the Toronto Group. The Toronto Group's researchers have never argued that resource dependence signifies scarcity. They argue, instead, that resource dependence affects *vulnerability* to scarcity – an entirely different proposition.

For the Toronto Group, high resource dependence occurs when a large proportion of a given population depends on local renewable resources like cropland, forests, or fresh water to survive. Proponents of the resource curse hypothesis, in contrast, focus on the dependence of a national econ-

omy on revenues from the export of non-renewable resources. This kind of resource dependence, which is hypothesized to encourage greed-motivated violence, can exist in a given country at the same time that a large proportion of that country's population is heavily dependent on local renewable resources. There is no fundamental contradiction between the two research camps here.

Third and finally, de Soysa and others misrepresent the position of the Toronto Group and Bern-Zurich Group when they reduce their thesis to simplistic linear links among scarcity, grievance and violence. In the process they create a straw man that is easily demolished. As discussed above, both the Toronto Group and ENCOP models incorporate at multiple points grievance, greed, opportunity and mobilization processes. Homer-Dixon argues, for example, that environmental scarcity can erode social capital and thereby deepen identity cleavages, raising the risk of grievance-motivated inter-group conflict. Simultaneously, the erosion of social capital can weaken a state's legitimacy and increase the opportunity of powerful groups, often motivated by greed, to challenge the state or capture valuable environmental resources.

Recently, scholars have begun to erase these false dichotomies. They are studying how the variables of greed, grievance, scarcity and abundance can interact within the same conflict system. Benedikt Korf, for instance, examines these four variables in the context of the relationship between the war economy of combatants (or potential combatants) and the survival economy of civilians. He suggests that greed-motivated conflict can create or reinforce local resource control patterns that lead to grievance-driven social, political and economic processes that in turn perpetuate conflict – eventually even replacing greed as the main cause.¹¹² Many extractive industry conflicts – around mining or oil exploration, for example – display similar patterns. Scholars have usefully begun to distinguish between different types of lootable resources and the different types of conflict dynamics resulting from exploitation of these resources.¹¹³ Lootable resources are much more easily transmitted into cash for rebel groups and to aid recruitment. But valuable minerals that require heavy industrial operations to remove them result in much longer term, slow-acting conflict dynamics – either through corruption, temporally slow resource-capture processes, or in conflicts over the distribution of rents or with nearby communities as a result of secondary environmental effects (from toxic pollution, for instance) on livelihoods. These combined greed and grievance dynamics in extractive disputes have not been sufficiently highlighted by many environmental conflict researchers, although other scholars of extractive industry disputes have outlined the deleterious impacts on local livelihoods.¹¹⁴

Conclusion

A detailed review of environment-conflict research since the early 1990s finds a great deal of consensus on hypothesized linkages between human-induced transformation of the natural environment, social effects of these changes, and linkages to various forms of violent conflict. While debates will continue about how to specify the independent variable and the role of demographic change, there is agreement among many that, at times, political-economic and social factors combine with other forms of human-induced scarcity, including demand-induced scarcities, to immiserate people in ways that can undermine social stability. The pathways from these social effects to the outbreak of

violent conflict of various forms are complicated and multi-causal, and a great deal of additional work needs to be done to understand both bottom-up and top-down expressions of violence.

Certainly, there are also significant points of controversy around these findings, as has been outlined above. Many of the hypothesized linkages remain just that – hypotheses in need of further refinement and testing by a new generation of research with more detailed and comprehensive approaches. However, future research needs to abandon the polemical debates of the past around environment-conflict research projects, and strive to deepen the areas of consensus among many divergent approaches to studying human-environmental change linkages, including political-ecological research, abundance/scarcity studies, demographic change studies, etc. Constructive criticism is absolutely crucial to moving our understanding of these linkages forward, but not at the expense of simplifying or distorting competing approaches. This paper has also emphasized that scholars need to be careful about specifying what their research does and does not seek to explain – that the dependent variable needs to be clearly defined in order to eliminate criticisms of explanatory overreach. Similarly, critics need to assess carefully+ what conflict processes and types of violence environment-conflict research is seeking to explain, and resist the temptation to criticize studies for not explaining every form of violence associated with human environmental transformation.

Notes

1. Michael Renner, *National Security: The Economic and Environmental Dimensions*, Worldwatch Paper 89 (Washington DC: Worldwatch Institute, 1989); Norman Myers, “Environment and Security,” *Foreign Policy*, Vol. 74 (1989), pp. 23-41. Jessica Tuchman Mathews, “Redefining Security,” *Foreign Affairs*, Vol. 68 (1989), pp. 162-77. The debate is covered extensively in Geoffrey David Dabelko, “Tactical Victories and Strategic Losses: The Evolution of Environmental Security,” unpublished PhD thesis, University of Maryland, College Park, 2003.
2. Mathews, “Redefining Security.”
3. Daniel Deudney, “The Case Against Linking Environmental Degradation and National Security,” *Millennium*, Vol. 19 (1990), pp. 461-76; Marc Levy, “Is the Environment a National Security Issue?,” *International Security*, Vol. 20 (Fall 1995), pp. 35-62; Daniel Deudney, “Environmental Security: A Critique,” in Daniel H. Deudney and Richard A. Matthew (eds), *Contested Grounds: Security and Conflict in the New Environmental Politics* (Albany: State University of New York Press, 1999), pp. 187-222.
4. The ‘Toronto Group’ refers to the team of researchers from institutions in four continents that participated in three research projects headed by Thomas Homer-Dixon of the University of Toronto and carried out in collaboration with several American research groups. Projects focused on: environmental change and acute conflict; environmental scarcities, state capacity, and civil violence; and on environment, population and security. See Thomas Homer-Dixon, *Environment, Scarcity, and Violence* (Princeton: Princeton University Press, 1999); and Thomas Homer-Dixon and Jessica Blitt, *Eco-violence: Links Among Environment, Population, and Security* (Lanham, MD and Oxford: Rowman and Littlefield, 1998). The ‘Bern-Zürich Group’ refers to the Zürich-based Project on Environment and Conflict, led by Günter Bächler, and other scholars from the Swiss Peace Foundation and the Centre for Security Studies and Conflict Research. For publications produced by the Bern-Zurich group, see Günter Bächler, *Violence Through Environmental Discrimination: Causes, Rwanda Arena, and*

- Conflict Model* (London: Kluwer Academic Publishing, 1999); Gunther Baechler and Kurt R. Spillman (eds), *Kriegsursache Umweltzerstörung. Band I. Ökologische Konflikte in der Dritten Welt und Wege ihrer friedlichen Bearbeitung* (Chur/Zurich: Verlag Ruediger, 1996); Gunther Baechler and Kurt R. Spillman (eds), *Kriegsursache Umweltzerstörung/Environmental Degradation as a Cause of War. Vol. II. Regional – und Landerstudien von Projektmitarbeitern/Regional and Country Studies of Research Fellows* (Chur/Zurich: Verlag Ruediger, 1996); and Gunther Baechler and Kurt R. Spillman (eds), *Kriegsursache Umweltzerstörung/Environmental Degradation as a Cause of War, Vol. III, Landerstudien von externen Experten/Country Studies of Outside Experts* (Chur/Zurich: Verlag Ruediger, 1996).
5. Mark A. Levy, “Is the Environment a National Security Issue?,” *International Security*, Vol. 20, No. 2 (Fall 1995), pp. 35-62. Betsy Hartmann, “Will the Circle be Unbroken? A Critique of the Project on Environment, Population, and Security,” in Nancy Lee Peluso and Michael Watts (eds), *Violent Environments* (Ithaca: Cornell University Press, 2001), pp. 39-64.
 6. Jack Goldstone, “Demography, Environment, and Security,” in Paul F. Diehl and Nils Petter Gleditsch (eds), *Environmental Conflict* (Boulder: Westview Press, 2001), pp. 84-108. Nils Petter Gleditsch, “Armed Conflict and the Environment,” in Diehl and Gleditsch (eds), *Environmental Conflict*, pp. 251-272. Indra de Soysa, “Paradise is a Bazaar? Greed, Creed, and Governance in Civil War, 1989-99,” *Journal of Peace Research*, Vol. 39 (2002), pp. 395-416.
 7. Colin Kahl, *States, Scarcity and Civil Strife in the Developing World* (Princeton: Princeton University Press, 2006).
 8. Thomas Homer-Dixon, “On the Threshold: Environmental Changes as Causes of Acute Conflict,” *International Security*, Vol. 16 (1991), pp. 76-116.
 9. Thomas Homer-Dixon, “Debating Violent Environments,” *Environmental Change and Security Project Review*, Vol. 9 (2003), pp. 89-92; Nancy Peluso and Michael Watts, “Violent Environments: Responses,” *Environmental Change and Security Project Review*, Vol. 9 (2003), pp. 93-96.
 10. See special section, “New Directions in Demographic Security,” in *Environmental Change and Security Program Report*, Issue 13 (2008-09), pp. 2-47, available at www.wilsoncenter.org/topics/pubs/ECSPReport13_DemographicSecurity.pdf.
 11. United Nations Environment Program (UNEP), *From Conflict to Peacebuilding: The Role of Natural Resources and the Environment* (Nairobi: UNEP, 2009); United Nations, *A More Secure World: Our Shared Responsibility*, “Report of the Secretary-General’s High-Level Panel on Threats, Challenges and Change” (New York: United Nations General Assembly, 2004); Geoffrey D. Dabelko, “Planning for Climate Change: The Security Community’s Precautionary Principle,” *Climatic Change*, Vol. 96, No. 1-2 (2009), pp. 13-21.
 12. United Nations Intergovernmental Panel on Climate Change (IPCC), “Climate Change 2007: Synthesis Report,” Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, R.K. Pachauri and A. Reisinger (eds) (Geneva: IPCC, 2007).
 13. See, for example, German Advisory Council on Global Change, *Climate Change as a Security Risk* (London: Earthscan, 2008); Dan Smith and Janani Vivekananda, *A Climate of Conflict: The Links Between Climate Change, Peace, and War* (London: International Alert, 2007); and Global Humanitarian Forum, *Human Impact Report: Climate Change – The Anatomy of a Silent Crisis* (Geneva: Global Humanitarian Forum, 2009).
 14. Simon Dalby, *Security and Environmental Change* (Cambridge: Polity Press, 2009), chapter 1.
 15. Homer-Dixon, *Environment, Scarcity, and Violence*, pp. 4-5.
 16. Millennium Ecosystem Assessment, *Eco-Systems and Human Well-Being: Synthesis* (Washington DC: Island Press, 2005), p. 49. The report is available at: www.millenniumassessment.org/documents/

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- document.356.aspx.pdf.
17. Homer-Dixon, "On the Threshold"; Thomas Homer-Dixon, "Environmental Scarcities and Violent Conflict: Evidence from Cases," *International Security*, Vol. 19 (1994), pp. 144-179; Thomas Homer-Dixon, "Strategies for Studying Complex Ecological-Political Systems," *Journal of Environment and Development*, Vol. 5 (1996), pp. 132-148; Homer-Dixon, *Environment, Scarcity, and Violence*.
 18. Homer-Dixon, "Strategies for Studying Complex Ecological-Political Systems." The results of several of these case studies are collected in Homer-Dixon and Blitt, *Eco-violence: Links Among Environment, Population, and Security*; and in Homer-Dixon, *Environment, Scarcity, and Violence*.
 19. Alexander L. George and Timothy McKeown, "Case Studies and Theories of Organizational Decision Making," in Robert Coulam and Richard Smith (eds), *Advances in Information Processing in Organizations* (London: JAI Press, 1985), pp. 21-58.
 20. Homer-Dixon, *Environment, Scarcity, and Violence*, pp. 47-52.
 21. The Toronto Group recognized that a process-tracing methodology produces different findings than a traditional quasi-experimental methodology; this approach has limited capacity to make causal power claims, but excels in discovering causal mechanisms. Many critics have failed to note that the group explicitly acknowledged this limitation. Critics have incorrectly implied that the Toronto Group asserted general causal power claims in its research, and that its findings would have predictive power equivalent to those of large-N quantitative studies. See Daniel Schwartz, Tom Deligiannis and Thomas Homer-Dixon, "The Environment and Violent Conflict," in Paul F. Diehl and Nils Petter Gleditsch (eds), *Environmental Conflict* (Boulder: Westview Press, 2001), pp. 273-94.
 22. Homer-Dixon, *Environment, Scarcity and Violence*, p. 177.
 23. Schwartz, Deligiannis and Homer-Dixon, "The Environment and Violent Conflict," p. 295.
 24. *Ibid.*, p. 275; Homer-Dixon, *Environment, Scarcity and Violence*, p. 177.
 25. Homer-Dixon, *Environment, Scarcity and Violence*, pp.104-106 and pp. 169-176.
 26. The Bern-Zürich Group's was initially known as the Environment and Conflicts Project (ENCOP). I refer to their work as the Bern-Zürich Group because there were additional projects after ENCOP.
 27. Baechler *Violence Through Environmental Discrimination*, p. xi.
 28. *Ibid.*, p. 87.
 29. *Ibid.*, p. 87. See Figure 6.1, p. 180. The two projects differ somewhat in their findings about interstate conflict, especially war over water resources. The Toronto Group found little evidence to support common post-Cold War predictions that the 21st century would be characterized by widespread war over freshwater. The group concluded that their model was most relevant to intrastate-level behaviour. Homer-Dixon's pronounced skepticism about the links between environmental scarcity and inter-state war have been almost entirely ignored in later discussion of his work. Baechler, by contrast, included interstate water wars in a typology of environment-related conflicts that ranges from the domestic to the global levels of analysis. But he and Homer-Dixon agree that water-related conflicts are generally limited to disputes between upper and lower riparian states and will turn violent only when certain specific power asymmetries exist between states.
 30. Homer-Dixon, *Environment, Scarcity and Violence*, p. 48.
 31. *Ibid.*, p. 48.
 32. James Fairhead, "International Dimensions of Conflict over Natural and Environmental Resources," in Peluso and Watts (eds), *Violent Environments*, p. 215; Nancy Lee Peluso and Michael Watts, "Violent Environments," in Peluso and Watts (eds), *Violent Environments*, pp. 18-19; Nils Petter Gleditsch and Henrik Urdal, "Ecoviolence? Links Between Population Growth, Environmental Scarcity and Violent Conflict in Thomas Homer-Dixon's Work," *Journal of International Affairs*, Vol. 56, No. 1 (2002), pp. 288-89.

33. Peluso and Watts, 'Violent Environments', in Peluso and Watts (eds), *Violent Environments*, p. 18. The latter quotation is from Fairhead, 'International Dimensions of Conflict over Natural and Environmental Resources,' in Peluso and Watts (eds), *Violent Environments*, p. 217.
34. Gleditsch and Urdal, "Ecoviolence?," p. 289.
35. Gleditsch and Urdal's conclusion about the role of inequality does not come from research into the Toronto Group's cases, but instead appears to be drawn from their reading of the cases.
36. Gleditsch's views can be found in Gleditsch, "Armed Conflict and the Environment," in Diehl and Gleditsch (eds), *Environmental Conflict*, p. 258. Stephen Libiszewski's definition of environmental conflicts, which separates conflicts that erupt over the distribution of resources like land – what he calls *socio-economic scarcity* conflicts – from conflicts that result from processes of supply and demand scarcity, seems to have been influential in convincing some critics of the Toronto Group like Gleditsch to exclude distributional issues from the independent variable. Supply and demand scarcities must be operating for an incident to be called an environmental conflict, in Libiszewski's view: "Conflicts over agricultural land, for example, which we defined as a renewable resource, have to be seen as *environmental* only if the land becomes an object of contention as a result of soil erosion, climate change, changes of river flows or any other environmental degradation. They are not environmental conflicts in the case of simply territorial conflicts like both World Wars and most colonial and decolonization wars. And they are neither necessarily environmental conflicts in the case of an anti-regime war with the goal of a more equal land distribution. This does not diminish the importance and the gravity of the conflict. And such a war can even be an environmental conflict, if unequal land distribution becomes for example a source of soil overuse. But it does not have to in every case." Stephan Libiszewski, "What Is an Environmental Conflict?," *Occasional Paper* (Bern: Swiss Peace Foundation and Zurich: Centre for Security Studies and Conflict Research, Swiss Federal Institute of Technology, 1992), pp. 6-7. However, Libiszewski does acknowledge that inequitable distribution frequently interacts with supply and demand scarcities, and that conflicts that appear to be based on distributional disputes may actually be rooted in supply and demand-side changes.
37. Gleditsch "Armed Conflict and the Environment," in Diehl and Gleditsch (eds), *Environmental Conflict*, p. 256. Wenche Hauge and Tanja Ellingsen, "Beyond Environmental Scarcity: Causal Pathways to Conflict," *Journal of Peace Research*, Vol. 35, No. 3 (1998), pp. 299-317.
38. Goldstone, "Demography, Environment, and Security," in Diehl and Gleditsch (eds), *Environmental Conflict*, pp. 88-91.
39. Baechler, *Violence Through Environmental Discrimination*, pp. 5-6.
40. "Degradation is used exclusively as an indicator of the degree of environmental transformation," Baechler writes. Baechler, *Violence Through Environmental Discrimination*, p. 5.
41. Baechler, *Violence Through Environmental Discrimination*, pp. 179-80.
42. *Ibid.*, p. 11.
43. *Ibid.*, p. 11.
44. Peluso and Watts, "Violent Environments: Responses," in Peluso and Watts (eds), *Violent Environments*, p. 94. Emphasis added.
45. See, for example, Homer-Dixon and Howard's Chiapas case study.
46. Homer-Dixon, *Environment, Scarcity, and Violence*, p. 51.
47. In addition to the discussion in the Chiapas case, examples from other case studies of the Toronto Group's include the discussion of Apartheid in South Africa, the structural scarcity around water allocation in Gaza, and discussion of political, economic, and military structures of authority and political-economic control in Pakistan. See Homer-Dixon and Blitt, *Ecoviolence*.
48. Baechler has a somewhat longer examination of deep-rooted structural patterns of socio-economic

- inequality in the global capitalist system and its relationship to environmental conflict, though these relationships are not a key focus in his model. See Baechler, *Violence Through Environmental Discrimination*, pp. 11-14.
49. Simon Dalby, *Environmental Security* (Minneapolis: University of Minnesota Press, 2002), p. 88.
 50. Peluso and Watts (eds), *Violent Environments*, p. 29 and p. 19.
 51. Homer-Dixon, *Environment, Scarcity, and Violence*, p. 52.
 52. Peluso and Watts (eds), *Violent Environments*, p. 18. cursory research may explain why Peluso and Watts are equally dismissive of Baechler's approach, in spite of his obvious use of similar theoretical insights to frame his concept of environmental transformation. The critique of the Bern-Zurich Group's work by Peluso and Watts fails to examine his 1999 book, where he offers a much richer discussion of the political-ecological roots of his conception of the independent variable, environmental transformation, as described above.
 53. Homer-Dixon, "Debating Violent Environments," p. 92; Schwartz, Deligiannis and Homer-Dixon, "The Environment and Violent Conflict," p. 277; Kahl, *States, Scarcity, or Civil Strife in the Developing World*, p. 24. See also Daniel H. Deudney, "Bringing Nature Back in: Geopolitical Theory from the Greeks to the Global Era," in Deudney and Matthew (eds), *Contested Grounds*, pp.25-60. I label population growth a 'quasi-naturalistic variable' because demographic change has historically been a function of ecological conditions, epidemiological changes *and* societal transformations. Explanations for population growth do not solely rest on cultural or political-economic processes of accumulation, transformation, power formation and control.
 54. See, for example, Hartmann, "Will the Circle Be Unbroken?" in Peluso and Watts (eds), *Violent Environments*; Aaron Bobrow-Strain's critique of the Toronto Group's Chiapas study; and Dalby, *Environmental Security*, p. 88. Aaron Bobrow-Stain, "Between a Ranch and a Hard Place: Violence, Scarcity, and Meaning in Chiapas, Mexico," in Peluso and Watts (eds), *Violent Environments*, pp. 155-85. Bobrow-Stain argues that land conflicts in Chiapas are not a result of environmental scarcities, but "arise from the confluence of national economic reforms, changes in international commodity markets, and local histories of violence and insecurity that reduce *both* ranchers and peasants' capacity to use land intensively and effectively" (p. 157). However, there is a logical fallacy at the basis of Bobrow-Stain's denial of the importance of environmental factors in Chiapas which undermines his "social-social" political-ecology position. He claims that the real scarcity in Chiapas was the lack of resources from the Mexican state to make better use of existing lands. But, there would be no need for state resources if there was enough land in Chiapas of sufficient quality in the first place, or if the confluence of demand-induced and structural scarcities had not exacerbated the land poor status of households.
 55. Peluso and Watts, 'Violent Environments,' in Peluso and Watts (eds), *Violent Environments*, pp. 25-6 and p. 27, p. 95. Other political ecologists similarly integrate 'natural' factors into their political-ecological analyses, and some of this work was influential on Homer-Dixon's work. See Susan Stonich, *I Am Destroying the Land!': The Political Ecology of Poverty and Environmental Destruction in Honduras* (Boulder: Westview Press, 1993), p. 165; William H. Durham, "Political Ecology and Environmental Destruction in Latin America," in Michael Painter and William H. Durham (eds), *The Social Causes of Environmental Destruction in Latin America* (Ann Arbor: The University of Michigan Press, 1995), pp. 252-256; Kees Jansen, *Political Ecology, Mountain Agriculture, and Knowledge in Honduras* (Amsterdam: Thela Publishers, 1998).
 56. Peluso and Watts write: "Nature itself is an important actor in the transformative or metabolic process [of the appropriation of nature]. The properties of natural resources and environmental processes shape, in complex ways, both the transformation process and the social relations of production. Nature enters in an active way into the production process just as soil degradation demands a human response and

- reaction to the production process. Forests and minerals and water are, in ways that have to be demonstrated, co-constitutive of the forms of use and disposition of resources.” Peluso and Watts, “Violent Environments,” in Peluso and Watts (eds), *Violent Environments*, p. 27.
57. Kahl notes Homer-Dixon’s attempt to bridge both schools. Kahl, *States, Scarcity, and Civil Strife in the Developing World*, p. 22.
 58. Schwartz, Deligiannis and Homer-Dixon, “The Environment and Violent Conflict,” pp. 277-8; Homer-Dixon, *Environment, Scarcity, and Violence*, pp. 104-6.
 59. Homer-Dixon, *Environment, Scarcity, and Violence*, pp. 178-9; Baechler, *Violence Through Environmental Discrimination*, p. 167.
 60. Peluso and Watts, “Violent Environments: Responses,” in Peluso and Watts (eds), *Violent Environments*, p. 95.
 61. Jianguo Liu et. al., “Coupled Human and Natural Systems,” *Ambio*, Vol. 36 (December 2007), pp. 639-648; see also Lance H. Gunderson and C.S. Holling, *Panarchy: Understanding Transformations in Human and Natural Systems* (Washington DC: Island Press, 2002). Interestingly, among many of these scholars, the pendulum is swinging from the other direction, as natural scientists recognize the importance of a more thorough integration of social analysis in human-environmental management studies.
 62. Many political ecologists reject this type of ‘systems’ analysis, however, certainly complicating attempts on reaching consensus on next steps.
 63. Peluso and Watts do not use the term ‘proximate’ or ‘distant’ in their critique, but the usage is consistent with their charge that Homer-Dixon is focused on the scarcities produced, and the immediate causes of these, rather than longstanding political-economic impacts and processes.
 64. Political ecologists also object to a focus on physical violent conflict, because their dependent variable defines ‘violence’ much more expansively, with many including a variety of structural and discursive forms of violence. Peluso and Watts, “Violent Environments,” in Peluso and Watts (eds), *Violent Environments*, p. 23.
 65. Peluso and Watts, “Violent Environments,” in Peluso and Watts (eds), *Violent Environments*, p. 23.
 66. Kahl, *States, Scarcity, and Civil Violence in the Developing World*, p. 25.
 67. Schwartz, Deligiannis and Homer-Dixon, “The Environment and Violent Conflict,” p. 275.
 68. *Ibid.*, p. 275.
 69. Peluso and Watts (eds), *Violent Environments*; Gleditsch and Urdal, “Ecoviolence?,” pp. 283-302; Kahl, *States, Scarcity and Civil Strife in the Developing World*.
 70. Gleditsch and Urdal, “Ecoviolence?,” p. 287.
 71. Hartmann, “Will the Circle be Unbroken?,” in Peluso and Watts (eds), *Violent Environments*, pp. 45-6. Similarly, Peluso and Watts, in describing Homer-Dixon’s model, write that, “[p]opulation growth appears centrally as *the* driving force in all of these causal claims.” Peluso and Watts, “Violent Environments,” in Peluso and Watts (eds), *Violent Environments*, p. 13. Emphasis in original.
 72. Hartmann, “Will the Circle be Unbroken?,” in Peluso and Watts (eds), *Violent Environments*, p. 45.
 73. Baechler, *Violence Through Environmental Discrimination*, p. 167.
 74. *Ibid.*, p. 96.
 75. The related question of weighing causal variables in environmental conflict research has been a source of significant debate since the mid-1990s. See Gleditsch, “Armed Conflict and the Environment,” in Diehl and Gleditsch (eds), *Environmental Conflict*, pp. 251-272; and Schwartz, Deligiannis and Homer-Dixon, “The Environment and Violent Conflict,” pp. 273-94.
 76. Hartmann, “Will the Circle be Unbroken?,” in Peluso and Watts (eds), *Violent Environments*, p. 45; Fairhead, “International Dimensions of Conflict over Natural and Environmental Resources,” in Peluso

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- and Watts (eds), *Violent Environments*, p. 218.
77. Homer-Dixon, *Environment, Scarcity, and Violence*, p. 51. Baechler addresses the issue of consumption indirectly in various places, such as pp. 32-3, often in terms of the impacts of modernization and market penetration. He is far less explicit in noting the causal role of consumption than Homer-Dixon, however.
 78. Homer-Dixon speaks of “per capita demand-induced changes,” rather than using the term “consumption.” His research largely pre-dates the growing body of research on the normative and empirical consequences of consumption. See, for example, Ken Conca, Thomas Princen and Michael F. Maniates, “Confronting Consumption,” *Global Environmental Politics*, Vol. 1, No. 3 (August 2001), pp. 1-10.
 79. *Ibid.*
 80. Homer-Dixon, *Environment, Scarcity, and Violence*, p. 73.
 81. Nils Jacobsen, *Mirages of Transition: The Peruvian Altiplano, 1780-1930* (Berkeley: University of California Press, 1993), especially chapters 5 and 6.
 82. *Ibid.*, p. 227; pp. 226-241.
 83. Stonich, ‘*I Am Destroying the Land!*’, pp.67-73; and Marc Edelman, “Rethinking the Hamburger Thesis: Deforestation and the Crisis of Central America’s Beef Exports,” in Painter and Durham (eds), *The Social Causes of Environmental Destruction in Latin America*, pp. 25-62. Stonich and Vandergeest’s chapter on shrimp farming in Honduras in the book *Violent Environment* offers another more recent example of this pattern. Susan Stonich and Peter Vandergeest, “Violence, Environment, and Industrial Shrimp Farming,” in Peluso and Watts (eds), *Violent Environments*, pp. 261-286.
 84. Peluso and Watts, “Violent Environments,” in Peluso and Watts (eds), *Violent Environments*, p. 13.
 85. Gleditsch and Urdal, “Ecoviolence?.” Elsewhere, Gleditsch has been similarly explicit in branding Homer-Dixon a neo-Malthusian: “The Neo-Malthusian model of scarcity-driven conflict envisions population pressures and a high level of resource consumption combining to overexploit, degrade, and deplete resources, leading to competition and eventually to violent conflict. Thomas Homer-Dixon (1999), a prominent advocate of this school of thought, asserts that environmental scarcity is more likely to provoke internal conflict than interstate war.” Nils Petter Gleditsch, “Beyond Scarcity vs. Abundance: A Policy Research Agenda for Natural Resources and Conflict,” in United Nations Environment Programme, *Understanding Environment, Conflict, and Cooperation* (Nairobi: UNEP, 2004), p. 16.
 86. Gleditsch and Urdal, “Ecoviolence?,” p. 287.
 87. *Ibid.*, pp. 292-3. On IPAT, see Marian R. Chertow, “The IPAT Equation and Its Variants,” *The Journal of Industrial Ecology*, Vol. 4, No. 4 (2001), pp. 13-29.
 88. See, for example, Homer-Dixon, *Environment, Scarcity, and Violence*, chapter 3.
 89. Gleditsch and Urdal, “Ecoviolence?,” p. 287.
 90. See the role of the state section below.
 91. They write: “While most Neo-Malthusians focus on the absolute physical limits to growth in a society, Homer-Dixon is more concerned about those societies that are “locked into a race between a rising requirement for ingenuity and their capacity to supply it.”” Gleditsch and Urdal, “Ecoviolence?,” p. 287.
 92. *Ibid.*, p. 293.
 93. A useful introduction to critiques of general neo-Malthusian thought can be found in Homer-Dixon, *Environment, Scarcity, and Violence*, chapter 3.
 94. Gleditsch and Urdal, “Ecoviolence?,” p. 288.
 95. Emphasis added. John Pender, “Rural Population Growth, Agricultural Change, and Natural Resource

- Management in Developing Countries: A Review of Hypotheses and some Evidence from Honduras,” in Nancy Birdsall, Allen C. Kelley and Steven W. Sinding (eds), *Population Matters: Demographic Change, Economic Growth, and Poverty in the Developing World* (Oxford: Oxford University Press, 2003), p. 355.
96. Alex de Sherbinin, et al., “Population and Environment,” *Annual Review of Environment and Resources*, Vol. 32 (2007), pp. 349-350. See also the Population, Environment, Development, Agriculture model (PEDA). Wolfgang Lutz et. al., “Population, Natural Resources, and Food Security: Lessons from Comparing Full and Reduced Form Models,” *Population and Environment: Methods of Analysis. Special Supplement to the Population and Development Review*, Vol. 28 (2002), pp. 199-224.
97. See Pender, “Rural Population Growth, Agricultural Change, and Natural Resource Management in Developing Countries,” in Birdsall, Kelley and Sinding (eds), *Population Matters*, p. 325.
98. de Sherbinin, et al., “Population and Environment,” p. 350; Scott R. Templeton and Sara J. Scherr, “Effects of Demographic and Related Microeconomic Change on Land Quality in Hills and Mountains of Developing Countries,” *World Development*, Vol. 27 (1999), pp. 903-918. Templeton and Scherr argue that both processes are not only possible, but that processes of demographic change and human-induced land degradation may be followed by productivity investments that later ameliorate degradation. Some critics of environment-conflict research, such as de Soysa, argue that governance factors or state intervention is *always* intermediate between environmental scarcity and negative social effects, and as a result focusing on the causes of scarcity mistakenly focuses attention away from the real causal mechanism at work in such cases – inadequate governance. Indra de Soysa, “Ecoviolence: Shrinking Pie or Honey Pot?,” *Global Environmental*, Vol. 2 (November 2002), p. 11. However, it is important to recognize that a vicious circle dynamic can happen regardless of whether institutions or social interventions are available, as is evident in isolated or impoverished regions where the state’s presence is either non-existent or extremely limited. Some paleo-historical studies of declining island societies in the South Pacific demonstrate similar dynamics. In these cases, little if any ‘state’ or ‘governance’ capacity ever existed. Yet, environmental scarcities led to a vicious circle of poverty, civil decline and violence. Patrick V. Kirch, “Microcosmic Histories: Island Perspectives on ‘Global Change,” *American Anthropologist*, Vol. 99 (March 1997), pp. 30-42. Thus, the causes and effects of environmental scarcities cannot be endogenized into state governance capacity. These dynamics exist independent of state governance capacity, but can certainly be ameliorated by state governance interventions.
99. The discussion below on greed vs. grievance debates appeared in a slightly different form in Thomas Homer-Dixon, Tom Deligiannis and Dirk Druet, “The Necessity of Complexity: Taking Environmental Conflict Research beyond Mechanism,” paper presented at 2007 International Studies Association Annual Conference, Chicago, 28 February 2007.
100. Goldstone, “Demography, Environment, and Security,” in Diehl and Gleditsch (eds), *Environmental Conflict*, pp. 88-9.
101. Paul Collier and Anke Hoeffler, “Greed and Grievance in Civil War,” *Oxford Economic Papers*, Vol. 56 (2004), p. 564; Peluso and Watts, “Violent Environments,” in Peluso and Watts (eds), *Violent Environments*, p. 22.
102. Collier and Hoeffler, “Greed and Grievance in Civil War,” pp. 587-89. See also Paul Collier, “Doing Well Out of War: An Economic Perspective.” In the context of environment-conflict research, Mark Levy’s Willy Sutton analogy offered an early criticism of Homer-Dixon’s work that specifically offered greed as an alternative explanation to explain many of the environment-conflict links in Homer-Dixon’s work. See Levy, “Is the Environment a National Security Issue?,” pp. 56-57.

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103. Collier and Hoeffler, "Greed and Grievance in Civil War"; Paul Collier and Anke Hoeffler, "Resource Rents, Governance, and Conflict," *The Journal of Conflict Resolution*, Vol. 49 (August 2005), pp. 625-633. Recent research by Collier, Hoeffler and Roehner has refined their conclusions further to stress that "the primacy of feasibility over motivation" in order to explain civil war. They write that "[t]he feasibility hypothesis proposes that where rebellion is feasible it will occur: motivation is indeterminate, being supplied by whatever agenda happens to be adopted by the first social entrepreneur to occupy the viable niche, or itself endogenous to the opportunities thereby opened for illegal income." These conclusions tilt their findings into the camp of conflict scholars who elevate the role of "opportunity structure" as key to explaining civil war. Paul Collier, Anke Hoeffler, and Dominic Roehner, "Beyond Greed and Grievance: Feasibility and Civil War," *Oxford Economic Papers*, Vol. 61 (2008), p. 24. On the issue of 'youth bulges,' some researchers argue that the presence of a 'youth bulge' – a high proportion of the population made up of 19 to 29-year-olds – increases the likelihood of civil conflict, especially when it is combined with high urban growth rates and low employment rates. For a recent discussion, see Henrik Urdal, "A Clash of Generations? Youth Bulges and Political Violence," *International Studies Quarterly*, Vol. 50 (2006), pp. 607-629.
104. Philippe Le Billon, "The Political Ecology of War: Natural Resources and Armed Conflicts," *Political Geography*, Vol. 20 (2001), pp. 561-584. Michael Ross also distinguishes between non-renewable resources that are easily lootable like gemstones and those that are similarly valuable but unlootable, requiring extensive investment and technological investment to harvest like gold. These characteristics have important implications for the types of conflict that may emerge, as discussed below. Michael Ross, "Oil, Drugs, and Diamonds: The Varying Roles of Natural Resources in Civil War," in Karen Ballentine and Jake Sherman (eds), *The Political Economy of Armed Conflict : Beyond Greed and Grievance* (Boulder: Lynne Rienner Publishers, 2003), pp. 47-70.
105. Collier, "Doing Well Out of War." James Fearon challenges the statistical analysis in Collier and Hoeffler's work. After reworking their data, he proposes narrowing the significance of their findings to cases where oil production is a major component of primary commodity exports. High oil production as a component of primary commodity exports results in a greater risk of civil war, in his view, because of the influence of weak states relative to level of per capita income and the greater 'prize' oil production provides for state or secessionist capture. See James D. Fearon, "Primary Commodity Exports and Civil War," *Journal of Conflict Resolution*, Vol. 49, No. 4 (August 2005), pp. 483-507.
106. Jeffrey D. Sachs and Andrew M. Warner, "Natural Resources and Economic Development: The Curse of Natural Resources," *European Economic Review*, Vol. 45 (2000), pp. 827-838.
107. Richard M. Auty, "Natural Resources and Civil Strife: A Two Stage Process," *Geopolitics*, Vol. 9 (2004), pp. 29-49.
108. Le Billon, "The Political Ecology of War: Natural Resources and Armed Conflicts."
109. de Soysa, "Paradise Is a Bazaar?"
110. Joachim von Braun and Ruth Meinzen-Dick, "Land Grabbing by Foreign Investors in Developing Countries: Risks and Opportunities," IFPRI Policy Brief 13 (Washington DC: International Food Policy Research Institute, April 2009).
111. de Soysa, "Paradise Is a Bazaar?," p. 405.
112. Benedikt Korf, "Rethinking the Greed-Grievance Nexus: Property Rights and the Political Economy of War in Sri Lanka," *Journal of Peace Research*, Vol. 42 (2005), pp. 201-217.
113. Ross, "Oil, Drugs, and Diamonds," in Ballentine and Sherman (eds), *The Political Economy of Armed Conflict*.
114. An exception among environment-conflict researchers is Volker Boge, "Mining, Environmental Degradation and War: The Bougainville Case," in Mohamid Suliman (ed.), *Ecology, Politics & Violent*

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Conflict (New York: Zed Books, 1999), pp. 211-227. See also Michael Ross, *Extractive Sectors and the Poor* (Oxfam America, 2001); Gary McMahon and Felix Remy (eds), *Socioeconomic and Environmental Effects in Latin America, Canada, and Spain* (Washington and Ottawa: World Bank/International Development Research Corporation, 2001); Chris Ballard and Glenn Banks, "Resource Wars: The Anthropology of Mining," *Annual Review of Anthropology*, Vol. 32 (2003), pp. 287-313; United States Agency for International Development (USAID), Office of Conflict Management and Mitigation (CMM), *Minerals and Conflict: A Toolkit for Intervention* (Washington DC, 2005).