

The Evolution of Environment-Conflict Research: Toward a Livelihood Framework

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A central question facing students of security in the post-Cold War period has been whether the definition of security should be defined more broadly to incorporate factors that have not traditionally been understood as determinants of security.¹ An important thread of this debate examines the merit of the concept of “environmental security,” which implies a fundamental connection between the pursuit of environmental goals and the pursuit of security.² Partly because this discussion seems ultimately unresolvable, in the early 1990s, several researchers focused on the narrower and more tractable question of whether a causal link exists between environmental change and violent conflict. This focus combined conventional and unconventional determinants of security and largely sidestepped the debate over the merits of the concept of environmental security.³ Multi-year qualitative projects led by Thomas Homer-Dixon in Canada (Toronto Group) and Guenter Baechler in Switzerland (Bern-Zürich Group) gave rise to other research projects examining the relationship between environmental factors and conflict.⁴ Some of this work strongly criticized the approaches of Homer-Dixon and Baechler,⁵ while others have suggested hypotheses that claim to improve the explanatory power of their models.⁶ Still others have continued their approach, adding conceptual clarity and theoretical sophistication to the frameworks laid out by those initial projects.⁷

Almost two decades after the beginning in earnest of research on environment and conflict, little, if any, consensus exists on research priorities, theories, or findings.⁸ The environmental conflict research agenda has splintered into a

1. The author would like to thank Simon Dalby, Nils Petter Gleditsch, and Thomas Homer-Dixon, and three anonymous reviewers from *Global Environmental Politics* for comments on various drafts. Portions of the introduction appeared in Homer-Dixon, Deligiannis, and Druet 2007.
2. Dabelko 2003.
3. Graeger 1996.
4. Homer-Dixon 1999; Homer-Dixon and Blitt 1998; and Baechler 1999.
5. Levy 1995; and Hartmann 2001.
6. Goldstone 2001; Gleditsch 2001; and de Soysa 2002.
7. Kahl 2006; and Ohlsson 2000.
8. Environment-conflict research accelerated with the publication of Homer-Dixon 1991, and the Toronto Group and Bern-Zürich Group research projects. See Dabelko 2003, 66 and 109.

number of research sub-programs, generally following qualitative or quantitative research approaches.⁹ One strand of qualitative research, including projects led by Homer-Dixon, Baechler, and some political ecology scholars, explicitly examines links between conflict and the use of those natural resources directly necessary for survival.¹⁰ A second strand of more recent qualitative research examines the links between the commercial exploitation of valuable commodity resources—usually, high-value, non-renewable resources—and conflict.¹¹ Quantitative research on natural resources and conflict has also been developed, focusing primarily on evaluating claims linking valuable commodity resources and violent conflict.¹² Currently, most attention among both qualitative and quantitative research focuses on extractive sector disputes in poor countries over “abundant” or high-value resources and on quantitative tests of environment-conflict linkages, with somewhat less—but still notable attention—given to links between rapid demographic change and conflict.¹³

Qualitative research on environmental change-conflict linkages has penetrated policy discussions and provided a theoretical foundation to recent research examining climate change and security linkages.¹⁴ However, study of the original questions addressed by Homer-Dixon and Baechler’s projects—that is, of the particular connections between environmental change or scarcity and conflict—has progressed little. Basic ontological, epistemological, and methodological disagreements and, in some cases, harsh polemics appear to have paralyzed research.¹⁵ This line of research is largely moribund, with little agreement on fresh questions to move inquiry forward. This article seeks to reassess this strand of qualitative research to advance this field of inquiry.

The article argues that progress has stalled among qualitative environment-conflict research because the level of analysis adopted by most of this work—the state level—is inadequate to capture the empirical complexity of environment-conflict links on the ground. The paper focuses on the qualitative work of the Toronto Group, the Bern-Zürich Group, and researchers who have followed in these traditions. Much of this work has unconvincingly used a state level of analysis. Although quantitative researchers have begun to disaggregate

9. Distinctions among strands of environment-conflict research are not clear-cut and frequent sources of contention among scholars. The author acknowledges significant overlap in approaches between qualitative researchers, and among qualitative and quantitative researchers, on the causal relationship between natural resources and violent conflict. For example, distinctions are somewhat artificial between qualitative researchers about whether resources are commercially exploited for sale in markets (sometimes global or regional markets) or whether resource use takes place for household survival. In many cases, both dynamics operate, and one type of exploitation impacts the other, and the subsequent forms of conflict that may develop.
10. See Peluso and Watts 2001 on the political ecology of environmental conflict. Durham 1979 provides an early analysis linking human-induced environmental change and violent conflict.
11. Le Billon 2005.
12. Le Billon 2009. Also see Ron 2005.
13. Research linking high-value commodity resources and conflict, quantitative studies on environment-conflict linkages, and demographic security research are beyond the scope of this review.
14. United Nations Environment Programme 2009; German Advisory Council on Global Change 2008; and Global Humanitarian Forum 2009.
15. Homer-Dixon 2003; and Peluso and Watts 2003.

their studies to the sub-state level, qualitative researchers have yet to do so.¹⁶ The article proposes a detailed household-livelihood framework of analysis for future qualitative environment-conflict research that will foster more fine-grained understandings of the complex relationships between human-induced environmental change and violent conflict.

The article begins by reviewing the Toronto Group and Bern-Zürich Group projects. Then, a critique of the state-centric focus of past environment-conflict research projects paves the way for the development of a household-livelihood framework for future research. The final section of the article outlines the essentials of this framework, and offers observations about its use for environment-conflict research.

The Toronto Group and the Bern-Zürich Group

The two major qualitative projects of the 1990s broadly confirmed each other's findings that a positive linkage exists between environmental change and conflict. Conceptual differences in the research focus of each project led to somewhat different causal mechanisms being identified. However, broad areas of agreement on specific causes, and on the complexity of these interactions are apparent in each group's findings.

In the early-to-mid 1990s, studies carried out by the Toronto Group hypothesized that human pressure on natural resource endowments and the patterns of use of those resources could impact on a society's material well-being and thus contribute to the outbreak of violent conflict. They identified linkages and recurring patterns of causation between environmental scarcity and violent civil conflict, but not between environmental scarcity and international or interstate conflict. They developed a preliminary model of the processes by which scarcity contributes to civil violence under certain conditions.¹⁷ Homer-Dixon defines environmental scarcity as a tripartite variable—a composite of three factors: degradation or depletion of resources (supply-induced scarcity), increased demand for resources due to population growth or increased per capita consumption (demand-induced scarcity), and changes in access to resources due to skewed distributions of resources among social groups (structural scarcity).¹⁸ These sources of scarcity can operate independently but often interact with important effects. Homer-Dixon found that two patterns of interaction were particularly common: resource capture and ecological marginalization. Ecological marginalization is often interlinked with resource capture and is often a consequence of resource capture. Scarcity influences the incidence of conflict indi-

16. In the past five years, disaggregated quantitative studies of environment-conflict links have emerged. See Urdal 2008; Raleigh and Urdal 2007; Buhaug 2007; Cederman and Gleditsch 2009, and the project, Disaggregating Civil Wars, <http://www.icr.ethz.ch/research/ecrp>, accessed 3 Oct., 2011.

17. Homer-Dixon and Blitt 1998; and Homer-Dixon 1999.

18. Homer-Dixon 1999, 47–52.

rectly, by way of a series of intervening social effects, including constrained economic productivity, intra or inter-state migration, the creation or aggravation of identity-based tensions, and the weakening of a state's capacity to respond to demands. These changes, in turn, can lead to several types of violent conflict, including group-identity conflicts, coups d'état, and insurgencies (see Figure 1). Thus, according to this model, environmental scarcity is an indirect cause of intrastate conflict.¹⁹

The Zürich-based Project on Environment and Conflict (Bern-Zürich Group), led by Günther Baechler, produced similar findings. They created a typology of environmental conflicts after conducting almost 40 case studies. Their independent variable, however, is broader than Homer-Dixon's focus on changes in the availability of resources. Baechler is concerned with the *transformation* of human-nature relationships, in particular the negative consequences of human transformation of the natural environment or "degradation" in Baechler's terminology.²⁰ He argues that transformation frequently leads 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."²¹ Environmental discrimination, in combination with other factors, can result in various types of sub-state conflict, such as ethno-political conflicts, center-periphery conflicts, migration conflicts, or international environmental conflicts.²²

Environmental Change and the Role of the State—Mediating Scarcity, Undermining Capacity, or Actively Exploiting

Both the Bern-Zürich Group and the Toronto Group recognize the intermediary role played by the state and institutions to forestall or mitigate negative social consequences before they contribute to conflict-generating processes such as grievance formation or collective mobilization. The lack of such "social ingenuity" interventions, they argue, can significantly increase the probability that scarcities will lead to violent conflict.²³ As well, regions marginalized by the central state may lack the administrative and law-enforcing apparatus of the state and "institutions founded on the rule of law, legitimized and accepted by local actors," Baechler notes, thus making them more vulnerable to the impacts of resource scarcity and less capable of resolving environmental conflicts.²⁴ In other cases, well-functioning, traditional social institutions that regulate access and

19. Schwartz, Deligiannis, and Homer-Dixon 2001, 295–297; and Homer-Dixon 1999, 177.

20. Baechler 1999, 5–6.

21. Baechler 1999, 87.

22. Baechler 1999, 87. See Fig. 6.1.

23. Homer-Dixon 1999, 107–109; and Baechler 1999, 101–104.

24. Baechler 1999, 103.

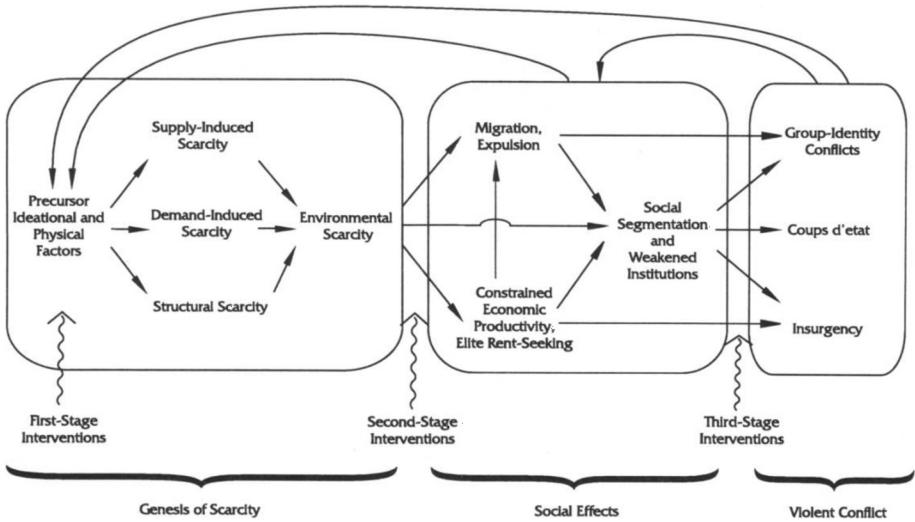


Figure 1.

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

Source: Homer-Dixon 1999, 134 (reproduced with permission from Princeton University Press).

use of resources may be disrupted by central state actions.²⁵ Research indicates that when the role of traditional institutions is disrupted without adequately replacing these institutions through an effective state presence, worsening scarcity and an increased potential for conflict develops—a pattern that is particularly unsettling in areas marginal to the central state.²⁶ The consequences of a weak, ineffective, or non-existent state presence are magnified, according to Baechler, in states with a weak civil society and a lack of political pluralism.²⁷

The Toronto Group also argues that environmental scarcities can weaken the state by directly impacting state elites, by altering their relationship with the state, or by strengthening groups of elites that can challenge the state's power. Scarcities provide economic and political opportunities for predatory elites to capture resource rents, ignore state dictates or laws like taxation, or "to penetrate the state to make it do their bidding."²⁸ The consequences of predatory behavior by elites can provoke defensive reactions from those who rely upon resources for their survival, eroding trust in the state, worsening social segmentation like class and ethnic divisions, and making it easier for challenger groups to de-

25. Baechler 1999, 101.

26. See Trawick 2002 for an example of this pattern in Peru. See also, Ostrom 1999.

27. Baechler 1999, 103–104.

28. Homer-Dixon 1999, 101–102.

velop.²⁹ Thus, for this group, scarcities may not only lead to greater immiseration, but also stoke patterns of blame among groups and break bonds of trust within states and society.

Since the publication of the findings of the Toronto Group and the Bern-Zürich Group, little research has been done to refine their findings, in spite of calls from scholars to address controversial or under-explored dimensions of environment-conflict research.³⁰ Colin Kahl's work stands as a notable exception, making two advances. First, Kahl argues that demographic and environmental stress (DES) can aggravate and deepen the inherent insecurity of weak states, possibly triggering or aggravating the "security dilemma" between groups—where actions taken by groups to ensure their security, perhaps in the face of the impacts of demographic or environmental stress, "can set off an action-reaction spiral that leaves all parties worse off and less secure."³¹ Second, Kahl argues that DES provides state elites with opportunities to "engineer and direct violence downward toward social groups."³² These "top-down" dynamics are in contrast to the "bottom-up" dynamics of much of the Toronto Group or Bern-Zürich Group's hypotheses, where environmental scarcities, among other factors, weaken states and societies, opening "political space for social groups to direct violence upward toward the state or sideways toward one another."³³ Kahl's "state exploitation" hypothesis recognizes that the social segmentation and increasing grievances arising from DES provides both "incentives and opportunities to instigate violence."³⁴ Rising grievances or growing numbers of aggrieved citizens threaten to undermine stability and control by state elites, providing an incentive to rulers to find a way to stabilize their base of support, "mobilize new supporters, and co-opt or crush political opponents" to remain in power.³⁵

Shifting the Focus from the State to Household Livelihoods: A Household-Livelihood Framework for Environment-Conflict Research

The centrality of the state to this strand of environment-conflict research is both inherent in the causal models and forms the referent object for many research efforts. The state and its stability are the essential focus. The descent of the state into anarchy, the rise of violent groups that threaten to overturn state order, or the rise of groups which threaten the integrity of the state form the dependent variables of the environment-conflict research done by the Toronto Group, the

29. Homer-Dixon 1999, 102.

30. Matthew and Dabelko 2000; Gleditsch 2001; Schwartz, Deligiannis, and Homer-Dixon 2001; and Matthew, Brklacich, and McDonald 2004.

31. Kahl 2006, 47; and Homer-Dixon 1999, 96.

32. Kahl 2006, 12; and Peluso and Watts, 2001, 22–23.

33. Kahl 2006, 12.

34. Kahl 2006, 50.

35. Kahl 2006, 50.

Bern-Zürich Group, and those who have followed their approach.³⁶ Similarly, the social effects of scarcity, and the variables identified by scholars as interacting with and mediating these impacts, are frequently explained in terms of their broad societal impacts—general agricultural decline, the increasing division of groups or elites in states, etc. Much of this research focuses almost exclusively on the state and societal level.

However, the impacts of scarcities are not inherently or exclusively felt at the state level. Scarcities initially affect individuals, families, and communities personally and directly, before being translated into broader state or societal effects. Localized immiseration or social impacts may result in little or no national impacts. Conflicts may happen at levels far below the level needed to pull a state into anarchy, or to threaten the integrity of the state or its rulers. Researchers should not assume that impacts automatically scale upwards to affect the state, though in some cases they may.

The state-level bias in case-study research leads to local processes of environmental scarcities and their local social effects being understudied and inadequately understood by most qualitative environment-conflict research to date.³⁷ Scholars have not begun with an explicit focus on the livelihoods of those studied or those who are impacted by changing demographic and environmental conditions. Instead, the research offers underspecified generalizations or incomplete accounts of the impact of environmental change. There is, in fact, an unspecified black box in the causal chain of much environmental conflict research between the generation of environmental scarcities and the social effects that they cause. Within this black box are specific impacts on people's livelihoods of environmental scarcities and people's adaptations to them. These dynamics have yet to be adequately theorized.³⁸ As a result, the models have sought to assess the aggregate impact of individual or small-scale environmental scarcity-social effects without a clear understanding of the local dynamics that generate them. They have sought to understand the sum of societal impacts without understanding the individual processes that generate them. A closer look at those livelihood processes shows a more complex picture.

The critique presented here has three important implications for the validity of existing qualitative environment-conflict research. First, the state level of analysis has led researchers to ignore the impacts of environmental scarcities on a variety of local conflicts and their implications for societal and state stability. State-focused research uses a limited set of dependent variables, emphasizing conflicts that appear to pose the greatest threat to the state. Yet this overlooks how environmental change influences the extent and consequences of small-

36. Homer-Dixon 1999, chapter 7; Baechler 1999, chapter 4; and Kahl 2006, 30.

37. Quantitative studies of environment-conflict links faced similar problems in the past; however, in the past five years such research is increasingly disaggregated to the sub-state level. See criticisms by O'Lear and Diehl 2007; and responses by Buhaug 2007.

38. Peluso and Watts 2001, 20 offer a similar criticism of Baechler and Homer-Dixon's work.

scale local conflicts.³⁹ These conflicts may only kill or injure handfuls of people and are rarely reported accurately. They also may be difficult to document because they are often widely dispersed and occur over many years. Over time, however, their local impacts may undermine the fabric of society, alter migration patterns, and affect social and ethnic group solidarity and cohesion in certain areas of states. The grievances spawned can stimulate social unrest, and violence from local conflicts can exacerbate or condition patterns of violence during insurgencies and civil war in ways not readily apparent to those examining the conflict from the state level.⁴⁰

The patterns of interaction in many of these small-scale local conflicts can be characterized as *simple scarcity conflicts* involving distributional conflicts between local groups over crucially important renewable resources, worsened by supply and demand changes in resource availability.⁴¹ These simple scarcity conflicts are exemplified by conflicts among cultivators, among fishers, or between herders and cultivators. In many cases, resource scarcities may have social effects like those identified by Homer-Dixon at the state level, but at the individual, household, or group level. This can include household economic decline or immiseration, various forms of migration, or local social segmentation. Baechler also noted the possibility for local transformational conflicts—what many also label as “modernization,” “developmental,” or “market-penetration” conflicts—where the transformation of resource use or resource exploitation shifts from one type of human-nature relationships to another type. It is possible to trace how various simple scarcity conflicts lead to violent conflict, such as changes in land use between herders and cultivators, upheaval resulting from the introduction of export agricultural crops, conservation enclosure conflicts, or the impacts of subtle changes brought about by long-term patterns of market penetration into areas with little or no previous market-based relationships.

Second, the analytical concentration on the state level among many researchers, without an adequate understanding or examination of local processes, suggests that many of the hypotheses in qualitative environment-conflict research are built upon shaky empirical ground. Local studies were not aggregated to the state or societal level to determine social effects in state-level studies. Detailed examination of data for state or societal level impacts reveals significant uncertainties about local processes, raising questions about the validity of environment-conflict hypotheses. The Toronto Group’s study of rebellion in Chiapas, for example, marshaled a variety of data that demonstrated linkages between environmental scarcities and conflict.⁴² Data limitations ultimately

39. Quantitative environment-conflict researchers have used conflict databases with a violence threshold of 25 or more battle deaths since the late 1990s. However, even this threshold probably fails to capture a significant number of local conflicts that kill or injure a handful of people at a time.

40. See Deligiannis forthcoming; André and Platteau 1998; and Kalyvas 2006, 390.

41. I adapt a term here from Homer-Dixon 1999, 106–108.

42. Howard and Homer-Dixon 1995.

forced the authors to rely mostly on aggregate state level data and episodic local data to prove their thesis,⁴³ a point some critics have seized upon to question their conclusions.⁴⁴ Although space limitations preclude a detailed examination of the limitations of the Chiapas case, the lack of local data in the study raises questions about the validity of the analysis. The Chiapas study merely *suggests* that environmental scarcities played an important role. It fails, however, to make a convincing case supporting the hypothesized causal mechanisms. As with other cases by the Toronto Group, the Bern-Zürich Group, and scholars such as Colin Kahl, the extensive use of broad-scale or episodic data provides strong indications that scarcities both cause negative social effects and contribute to social violence.⁴⁵ However, data gaps and assumptions of trends weaken the analysis; the hypotheses would be more convincingly evaluated with sustained and detailed examination at lower levels of analysis. By contrast, many qualitative studies on environmental conflict by political ecologists do a better job of outlining local social effects of human pressure on the environment, due to extensive use of local field studies, ethnographic methodologies, and concerns about social justice. Although much of the political ecology tradition significantly under-theorizes processes of violent conflict,⁴⁶ future qualitative work on environmental change-conflict linkages could benefit from their methodological approaches.

A third implication of the livelihood critique made here is that it may have led some environment-conflict researchers to over-predict the likelihood of environmental scarcities causing conflict. A state level of analysis underestimates the myriad ways in which local stakeholders respond to and adapt to the impacts of environmental scarcities on their livelihoods, often in ways that ameliorate negative impacts. State-level models have underestimated local level agency. Broad Neo-Malthusian accounts are particularly vulnerable to this criticism because they are excessively linear in their presentation of how scarcities can lead to conflict, and because they accept as generalizable causal models that more likely describe special conditions.⁴⁷ Robert Ford notes that numerous observers of agro-ecological and demographic trends in Rwanda predicted imminent collapse for over forty years, "but it never happened when and like they predicted," although "others were able to show that considerable coping was possible and actually achieved."⁴⁸ Assumptions of linear relationships between scarcity and negative social effects made it seem that Rwanda was always on the

43. Howard and Homer-Dixon 1995, 8 and footnote 17.

44. See the critique by Hartmann 2001; and Bobrow-Strain 2001. Both seize on data gaps in the Toronto Group's Chiapas case. But a careful reading of Bobrow-Strain 2001 fails to refute Howard and Homer-Dixon's 1995 analysis.

45. Examinations of the Bern-Zürich Group's case studies and Kahl's cases are beyond the scope of this paper; however, a state-frame of analysis generally prevails in their work as well. See Benjaminson 2008 for a critique of Baechler 1999 and Kahl 2006.

46. Kahl 2006, 25.

47. See, for example, Kaplan 1994.

48. Ford 1995, 212.

edge of abyss, obscuring the fact that predicting the outbreak of violence in Rwanda required focusing on the interaction between the local social effects of environmental scarcities and particular economic, political, and cultural variables.⁴⁹ Elinor Ostrom, in critiquing how similar “tragedy of the commons” arguments over-predict resource destruction, also notes that such broad-level models essentially accept “extreme assumptions” as general theories.⁵⁰ Broad-level Neo-Malthusian models may accurately describe reality in those few cases when the conditions are right. However, a better understanding of local level empirical reality demonstrates that the predictive utility of state-level models of environment-conflict is probably less frequent than many believe.

The final section of this article seeks to correct the shortcomings in past environmental change-conflict research by arguing for the use of a household-livelihood framework as an initial level of analysis needed to understand the impact of environmental change on rural populations and, thereby, to conflict. The state of livelihoods over time and the factors that influence livelihood adaptation and change then become the analytical starting points for research on environmental change and conflict. Local, regional, national, and international levels of analysis are then integrated into this initial analysis of household-livelihood change to understand how and when conflict will emerge. This allows for a finer appreciation of how influences on rural livelihoods change over time. This approach also helps disentangle the underappreciated possibilities of human agency among those confronting the impacts of environmental change.

Over the past ten years, household-livelihood analysis has entered the mainstream with development practitioners, population-environment researchers, and climate change adaptation researchers.⁵¹ However, only limited steps have been taken to integrate a household-livelihood framework into environment-conflict research. Early work in this area can be traced to Indra de Soysa and Nils Petter Gleditsch, who argued that *poverty* stimulates rural conflict, hurting rural livelihoods and entitlements, and further aggravating the poverty and immiseration cycle.⁵² Facing livelihood loss, subsistence crises, or “the hopelessness of surviving at the margins,” many turn to criminality, banditry, or forms of collective violence like rural rebellions.⁵³ Lief Ohlsson argued that, although poverty can generate conflict, it is the processes that lead to the rapid loss of rural dwellers’ livelihoods or their inability to attain or maintain adequate livelihoods that prove key. These forces directly cause poverty for many rural dwell-

49. Baechler 1999.

50. Ostrom 1990, 183–184. I would like to thank Ronald Mitchell for pointing out how my argument here parallels aspects of Ostrom’s critique about the tragedy of the commons.

51. See “Livelihoods Connect,” Institute of Development Studies, Sussex, UK: <http://www.eldis.org/go/topics/dossiers/livelihoods>; de Sherbinin et al 2008; and International Institute for Sustainable Development, International Union for Conservation of Nature and Natural Resources, and Stockholm Environment Institute 2003.

52. de Soysa and Gleditsch 1999, 16 and 32.

53. de Soysa and Gleditsch 1999, 35–36.

ers.⁵⁴ To Ohlsson, the loss of livelihood is the “missing link” in describing “causal mechanisms linking both poverty and environmental factors to conflict.”⁵⁵ Researchers must detail those processes that lead to increasing inequalities and rapidly cause people to lose their livelihoods, leaving deprivation and marginalization in their wake. Since many rural livelihoods depend on agriculture, Ohlsson argued, the failure of agriculture to sustain rural livelihoods is crucial. Environmental and demographic factors such as the degradation of arable land and population growth—particularly youth bulges—are important causes of livelihood loss, poverty, and, hence, conflict.⁵⁶ Ohlsson returned the focus to the causes of environmental scarcities as the sources of livelihood loss, compared to de Soysa and Gleditsch’s political-economic arguments. Importantly, though, both perspectives focus on the rapid loss of livelihoods as a key causal process.

Following Ohlsson, a joint International Institute for Sustainable Development and International Union for the Conservation of Nature (IISD/IUCN) Task Force expanded on the ways in which livelihood changes affect the security of local communities. They define livelihoods as the “activities undertaken to translate resources—whether natural or human—into a means for living at the group or individual level, including the protection of goods and services.”⁵⁷ Access to natural resources is crucial, they write, because it underpins all livelihoods. Environmental scarcity trends or sudden environmental shocks imperil livelihoods, according to the Task Force. The impact of these trends or shocks on livelihoods depends upon the degree of *vulnerability* of those affected, which is partly a function of their “exposure to harm, and capacity to endure and recover.”⁵⁸ Groups and individuals respond to trends and shocks to their livelihoods by adopting various *coping strategies*, including “development of new livelihoods, increased demand for productivity from the remaining livelihoods, conflict or migration in search of additional resources, or cooperation and trading with other groups.”⁵⁹

The Task Force report’s distinction between shocks and changing trends extended Ohlsson’s focus on sudden shocks to livelihoods. Shocks resulting from natural disasters are certainly important causes of livelihood loss, but so are more subtle, long-term changes in the natural resource base upon which many rural livelihoods depend, such as degradation and depletion of natural resources, gradual reduction in resource availability due to increasing consumption or population growth, and changes in resource availability for specific groups due to distributional changes. People use various strategies to adapt to livelihood changes, and the ability to adapt is partly a function of the underlying

54. Ohlsson 2000, 6–7.

55. Ohlsson 2000, 3.

56. Ohlsson 2000, 6–7.

57. Matthew, Halle, and Switzer 2002, 15–16.

58. Matthew, Halle, and Switzer 2002, 16–17.

59. Matthew, Halle, and Switzer 2002, 17.

ing vulnerability of the livelihoods in question. Finally, the Task Force recognized that a linear relationship does not exist between environmental scarcities, their impact on livelihoods, and negative livelihood outcomes.

A deeper examination of the livelihood literature and recent research on resilience, vulnerability, and adaptation allows the development of a more comprehensive framework involving rural household livelihoods as an important component of environment-conflict research.⁶⁰ At the core of this framework are the livelihood resources that make up household assets, capabilities, and entitlements—the dimensions of vulnerability which influence how households use those assets to respond to external pressures, and the strategies employed by households to reallocate land, labor, and capital resources in response to change, opportunities, and limitations (see Figure 2).⁶¹ A household is essentially a “social group which resides in the same place, shares the same meals, and makes joint or coordinated decisions over resource allocation and income pooling.”⁶² The people and activities in a household encompass the capabilities of the household, drawing upon the portfolio of assets available to the household and its community.⁶³ Scholars recognize five primary asset categories for households: human assets, social assets, physical assets, financial assets, and natural assets.⁶⁴ Traditional environment-conflict research has mostly focused on describing natural and physical assets, and looked to the state or institutions for an accounting of financial or human assets. Ethnographic research and micro-studies in development research have been effective in pointing to the importance of social assets for household livelihood efforts.⁶⁵ Households draw upon a range of assets and capabilities as they strive to meet their various consumption and economic necessities.⁶⁶

In developing a livelihood strategy, household decision makers are influenced by contextual and structural factors. Contextual conditions and trends include history, climate, agro-ecology, seasonality, demographic change, etc. These factors often operate over long temporal periods. They are often exogenous to the household or national context and can have transformative impacts on household-livelihood resources. For example, the steep slopes and easily eroded soils of mountain ecosystems condition the livelihood opportunities of those living in mountainous regions.⁶⁷ Structural and process factors also influence household-livelihood resources. This refers to some of the familiar structural and process dimensions discussed by Homer-Dixon and Baechler where state or institutional capacities alter or transform the impacts of environmental scarcities. In this case, structural and process factors can include a wide range of man-

60. Vogel 2006 and other authors in that special issue.

61. Zoomers 2001, 15.

62. Ellis 1998, 6.

63. Chambers and Conway 1991, 7.

64. de Sherbinin et al. 2008, 40.

65. See, for example, Mayer 2002, chapter 4.

66. Zoomers 2001, 14.

67. Homer-Dixon 1999, 105.

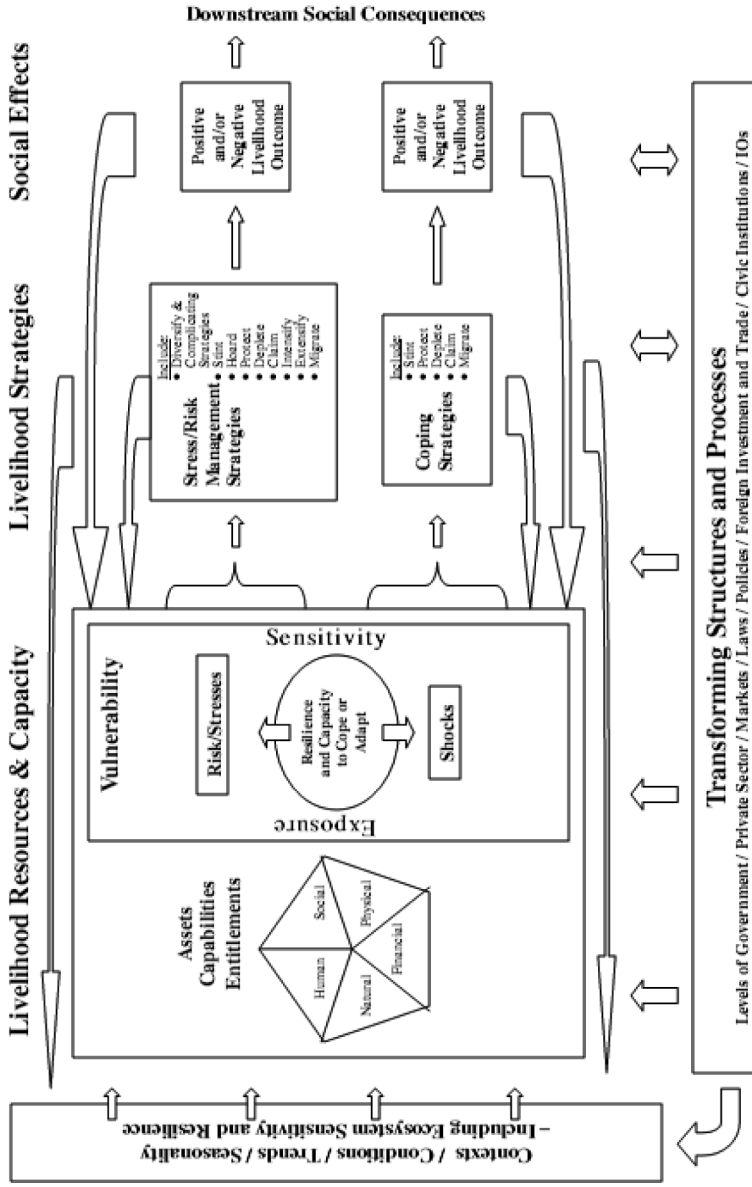


Figure 2. Rural Household Livelihood Framework for Environment-Conflict Research

Sources: Adger 2006; Chambers and Conway 1991; Collinson 2003; DFID 1999; and Scoones 1998.

made influences from governments, markets, laws, policies, investment and trade relationships, and civil society or international organizations. These forces can affect and condition the ways in which households use and develop their livelihood assets and can mediate the types of livelihood strategies employed. They also operate at various scales, from the local to the international, complicating attempts to disentangle their roles and impacts.

The assets, capabilities, and entitlements of rural households, as influenced by contextual and structural factors, determine the sensitivity of households to hazardous conditions and the household's capacity to respond to risk, shocks, and stress—in essence, the household's vulnerability and resilience to change.⁶⁸ The impacts of resource scarcities remain important in determining vulnerabilities. However, such scarcities affect only part of a household's endowments. The impact of scarcities on livelihoods must be examined in the context of other factors. Livelihood vulnerability thus has two crucial aspects that must be considered in any analysis: the *external* dimensions involving contextual or structural factors and the stresses and shocks to which livelihoods are subject, and the *internal* dimensions involving their ability to cope or adapt.⁶⁹ The likelihood of a household experiencing a particular stress or shock, combined with the particular assets and attributes of the household determines the degree of *exposure* and *sensitivity* of that household to the risk of a given environmental change. The specific strategies and abilities of a household to adapt or cope are determined by various drivers that include both the household's attributes and broader conditions, processes, and institutions.⁷⁰ In particular, because the interaction of political and economic processes in societies helps determine the distribution of power and wealth between groups and individuals, and "the processes that create, sustain and transform these relationships over time," a close relationship exists between vulnerability and power.⁷¹ Political-economic processes that disempower households can greatly affect their vulnerability and condition the "space of vulnerability" for households.⁷² Finally, determining livelihood vulnerability requires that we examine how household assets and capabilities change over time, both as a result of the changing circumstances of household activities, and as a result of the ever-changing influences of contexts and transforming structures.

Ellis' work on how households diversify in the face of change provides important insights into how the nature of external environmental change influences the type of livelihood strategy households adopt in response. He distinguishes "ex-ante risk management from ex-post coping with crisis."⁷³ In the face of natural disasters or sudden, unexpected environmental events, households

68. Ellis 1998, 14; Smit and Wandel 2006, 286; and Adger 2006.

69. Chambers and Conway 1991, 10; and Adger 2006, 270.

70. Smit and Wandel 2006, 286–287; and Pender 2003, 355.

71. Collinson 2003, 3; and Adger 2006, 270.

72. Collinson 2003, 3; and Watts and Bohle 1993, 52–53.

73. Ellis 1998, 13–14; and Smit and Wandel 2006, 287.

turn to *coping strategies* to deal with the shocks to their livelihoods.⁷⁴ Coping happens during or after the event, and is oriented towards preserving existing livelihoods in the face of unexpected disruptions.⁷⁵ A variety of specific coping strategies are employed by households to deal with shocks, including migrating, depleting assets, making claims on other assets, protecting existing assets, reducing current consumption, or shifting to lower quality consumption. Some, like Ohlsson, note that livelihood shocks can drive members of households to cope by joining criminal networks or insurgency groups. Household responses to slow stresses or risks, by contrast, differ from after-the-fact shock coping strategies. “Stresses are pressures which are typically continuous and cumulative, predictable and distressing,” writes Ellis, “such as seasonal shortages, rising populations, or declining resources.”⁷⁶ In this case, households take the deliberate decision to adapt in the face of the on-going risks or stresses to make permanent changes to their livelihoods.⁷⁷ Households or individuals may use one or more *adaptation strategies*, including temporary or seasonal migration, intensification or extensification of agricultural production, making claims on other assets, depleting assets, hoarding or protecting existing assets, stinting, or the use of diversification or complicating strategies.⁷⁸ In both cases, the capacity to adapt or cope is not static, but is “flexible and respond[s] to changes in economic, social, political and institutional conditions over time.”⁷⁹

Finally—and perhaps most importantly for environment-conflict research—adaptation and coping strategies can have a range of positive and negative outcomes for household livelihoods: “positive if it is by choice, reversible, and increases security; negative if it is of necessity, irreversible, and fails to reduce vulnerability.”⁸⁰ Households seek a low-risk framework in which to operate. But risk adaptation strategies can reduce some risks while increasing others. An adaptation strategy might reduce the risk of starvation or declining agricultural yields by increasing agricultural intensification on household plots or by extending household production to marginal lands in and around the household’s community. But this may increase the risk of shocks like landslides, as steep marginal lands are put into production or land cover that preserves vulnerable land is cleared. Or, such an approach may increase gradual land erosion and nutrient loss in existing holdings. A risk adaptation strategy might respond adequately to short-term risks or stresses, while at the same time reducing the natural resilience of the natural assets necessary for long-term, sustainable household livelihoods. Thus, there are feedback loops from coping strategies and stress/risk management strategies to underlying contexts or conditions.

74. Ellis 1998, 10.

75. Zoomers 2001, 15.

76. Ellis 1998, 10–11.

77. Zoomers 2001, 15.

78. Ellis 1998, 11.

79. Smit and Wandel 2006, 287.

80. Ellis 1998, 14–15.

Over time, risk adaptation strategies can have significant detrimental consequences on the underlying natural environment which households rely upon, as has happened in many parts of Haiti because of extensive deforestation on steep hillsides. Similarly, following Homer-Dixon, livelihood coping or adaptation strategies can also have an impact on transforming structures and processes, increasing the costs of government or policy activities, or providing opportunities for powerful sectors of a society to manipulate the consequences of these livelihood strategies for their own purposes, and thereby undermine markets and other social institutions in their wake. Scholars need to begin to disentangle the range of outcomes of adaptation and coping strategies for environment-conflict research, including both positive and negative consequences.

Although some environment-conflict scholars like Ohlsson have noted the implications of coping strategies in the face of livelihood shocks, the consequences of strategies of household adaptation to environmental and demographic change for environment-conflict analysis have not been adequately analyzed. In fact, it is likely that rural household livelihoods more often adapt to stresses and risks—particularly those emerging from developing environmental scarcities—than cope with shocks. Yet, the implications of household adaptation strategies and the social effects of positive or negative livelihood outcomes that emerge from these adaptations deserve more careful examination by environment-conflict scholars.

Understanding household diversification strategies, for example, helps illustrate how a more fine-grained understanding of livelihood adaptations enriches environmental change-conflict research. Diversification adaptations are widespread among rural people as a way of dealing with environmental and demographic stresses and risks.⁸¹ When employing a diversification strategy, households combine various production activities to reduce risk, such as simultaneously diversifying their cropping, engaging in non-farm income-generating activities, and receiving remittances from migration.⁸² However, such multi-pronged approaches complicate the ability of researchers to determine the social effects of environmental scarcities in at least three ways.

First, when households facing environmental scarcities adopt diversification strategies, outcomes may differ from those expected by environment-conflict scholars. When changes in a household's assets are traced over time, we often see that gradually building environmental scarcities stimulate diversification responses by rural households, leading to economic activities that forestall immiseration—undercutting the linear relationship between scarcities and household immiseration that much of the literature proposes.⁸³ Or, diversification may only temporarily forestall immiseration until the impacts of environmental scarcities are impossible to alleviate by other adaptations. Scholars must

81. Chambers and Conway 1991, 16.

82. Ellis 1998, 14–15.

83. Brush 1989.

be aware of these multiple possible outcomes and avoid assuming any direct linear relationship between scarcities and negative social effects.

Second, diversification by households experiencing environmental scarcities may generate unanticipated negative social effects, often far removed geographically or temporally from where the scarcity-household interactions took place. Different types of migration (temporary, permanent, return, repeat, circular), for example, have long been a key part of diversification strategies employed by rural households facing environmental and demographic change.⁸⁴ Homer-Dixon and Baechler have noted how environmental scarcity-induced migration can lead to social stresses and contribute to group-identity conflicts.⁸⁵ These accounts emphasize, however, how environmental scarcity-induced permanent migration is leading to conflicts in receiving areas. This is only one of many possible types of scarcity-migration relationships. From the household-livelihood perspective, it is evident that households use a variety of migration diversification strategies to deal with scarcities. The negative social effects of these strategies can be found in both receiving areas and areas of origin. Temporary or semi-permanent migration to urban or frontier areas, for example, may expose migrants to radical ideologies and mobilizing influences. Upon return, migrants may bring these influences back with them to their areas of origin, reducing subsequent social stability in these areas.⁸⁶ Similarly, families often send members to urban areas for education opportunities or to find wage employment to return remittances. Such rural-urban migrants are possible targets for radical groups or radical ideologies spread through urban educational institutions, unions, or social groups. In Peru in the 1970s and 1980s, many youths targeted for recruitment by the Sendero Luminoso guerrilla group were young rural migrants to urban areas seeking educational or employment opportunities. Once radicalized, these recruits returned to their rural homes to prepare the groundwork for insurgency.⁸⁷ Negative impacts on the natural resource base in the areas of origin of many migrants are also evident as a result of migration diversification strategies. Studies have shown that migration can increase environmental scarcities in some areas, because migration-induced labor shortages make it impossible for households to maintain natural assets like farm terraces, speeding soil erosion while increasing livelihood vulnerability for households.⁸⁸ The empirical consequences of diversification strategies like migration are considerable. Scholars must examine each case in detail from the house-

84. Ellis 2000, 70–73; de Sherbinin et al. 2008, 45–46; Bilsborrow 2002, 16–22; and McLeman and Smit 2006.

85. Homer-Dixon 1999, 93–96; and Baechler 1999, 92–96.

86. See Benjaminsen 2008, 829–830.

87. Degregori 1998; and Palmer 1994.

88. Bilsborrow 2002, 37. de Sherbinin et al. note that “remittances may have negative impacts on the environment by increasing investment in environmentally detrimental practices such as extensive pasturage or the transformation of agricultural lands into peri-urban real estate.” de Sherbinin et al. 2008, 46.

hold-livelihood perspective to untangle the consequences of livelihood adaptation to environmental scarcities.

Finally, a detailed examination of patterns of livelihood diversification in the face of environmental scarcities can shed light on the attributes of households that use these strategies, which households are vulnerable to the impact of environmental scarcities, and how differences in patterns of environmental scarcity help condition household diversification strategies. The impacts of scarcities are not felt equally by all rural households, given the large variations in assets, capabilities, and entitlements. However, existing environment-conflict research has done little to differentiate its analysis of the impacts of environmental scarcities on rural households. Livelihood scholars recognize that patterns of differentiation vary globally and by asset holdings.⁸⁹ Some have argued that diversification in Asia and Latin America displays a U-shaped association between level of income diversification and level of income:⁹⁰

households with little land have become integrated into labor markets as wage workers, and agriculture is now a small component of income, being mainly for self-consumption; medium peasants are less reliant on off-farm income; and better-off households are diversified, but in a variety of activities ranging from wage-work to self-employment and investment in small business.⁹¹

Patterns in Africa, by contrast, are somewhat different, with overall levels of diversification lower than in Asia, though non-farm income sources like remittances are higher in parts of Sub-Saharan Africa bordering South Africa. These patterns suggest that the impact of environmental scarcities on diversification is also strongly affected by variation in access to markets and the degree of household access to infrastructure, services, and institutional assistance, like roads, market services, supplies, agricultural extension services, power, etc.⁹² Where land is abundant or adequate for household livelihoods, the limits to diversification may be markets and services for rural households.

Detailed analysis of household diversification in the face of scarcities offers one way to shape policy to alleviate poverty while helping avoid conflict. Recognizing, for example, that the poorest households, with the least access to natural resources such as land, are more likely to diversify their farms and their off-farm activities could stimulate policymakers to support policies and infrastructure services that build upon and enhance diversity, such as technology distribution, co-operation services, etc. Conversely, recognizing that larger landowners, less vulnerable by virtue of larger asset holdings, seek to diversify to accumulate wealth,⁹³ suggests different policies and state strategies are

89. Ellis 1998, 10.

90. Ellis 1998, 10; and Appendini 2001, 34, footnote 11.

91. Appendini 2001, 27.

92. Ellis 1998, 10.

93. Ellis 1998, 15–16.

necessary—perhaps enhancing access to national or international markets, enabling adequate credit services, etc. The precise policy intervention varies according to context, actors, and location. But not all approaches are equally valuable. Although many policies may help alleviate poverty, we need to differentiate which policies alleviate poverty *and* reduce the potential for conflict and social instability.

Ultimately, environment-conflict research should do more than diagnose how and why environmental and demographic change contributes to conflict. It should offer scholars and policymakers insights into what interventions would be most effective at mitigating the negative social effects of scarcities. Integrating and exploring the implications of a livelihood framework to environment-conflict analysis offers a crucial first step toward this goal.

Effectively integrating a livelihood framework into environment-conflict research, however, requires researchers to surmount several obstacles. First, data problems abound at the local level, in the collection of local agro-ecological and livelihood data and in the distribution and use of this data by researchers and policymakers. Second, local studies need to work across level of analyses and be scaled-up to assess whether there are wider impacts on stability and scarcity. Assessing impacts across scales poses significant analytic challenges. Finally, the high degree of interactivity and multi-causality in analyzing the impact of environmental scarcities on household livelihoods makes it difficult to assess the relative influence of different factors and processes.⁹⁴ Considerable ink has been spilled over the past fifteen years on methodological debates in environment-conflict research.⁹⁵ Yet, beyond agreement that diversity in research methods can help map causal mechanisms and test hypothesized relationships, no solution has been found for the difficult problem of differentiating causal primacy among diverse processes, factors, and drivers. A new methodology or ontology for researchers may be needed, perhaps based upon complexity theory and complex modeling of the type used by social-ecological systems research.⁹⁶

Conclusion

This review of qualitative environment-conflict research since the early 1990s finds that the state level of analysis that has dominated this research appears to have generated considerable uncertainty about the validity of hypothesized connections and considerable under-specification about the myriad pathways that exist in human-environmental change interactions. This article has proposed a household-livelihood framework for future research to correct some of these problems. Such an approach will also lead to a better appreciation of the many previously-ignored local violent conflicts that have their roots in human-environmental change interactions.

94. See Schwartz, Deligiannis, and Homer-Dixon, 1999.

95. Levy 1995; Homer-Dixon 1999; Gleditsch 2001; and Schwartz, Deligiannis, and Homer-Dixon, 1999.

96. See Folke 2006.

References

- Adger, W. Neil. 2006. Vulnerability. *Global Environmental Change* 16 (3): 268–281.
- André, Catherine, and Jean P. Platteau. 1998. Land Relations under Unbearable Stress: Rwanda Caught in the Malthusian trap. *Journal of Economic Behavior and Organization* 34 (1): 1–47.
- Appendini, Kirsten. 2001. Land and Livelihood: What Do We Know, And What Are The Issues? In *Land and Sustainable Livelihood in Latin America*, edited by Annelies Zoomers, 23–38. Amsterdam: KIT Publishers.
- Baechler, Günter. 1999. *Violence Through Environmental Discrimination: Causes, Rwanda Arena, and Conflict Model*. London: Kluwer Academic Publishing.
- Benjaminsen, Tor A. 2008. Does Supply-Induced Scarcity Drive Violent Conflicts in the African Sahel? The Case of the Tuareg Rebellion in Northern Mali. *Journal of Peace Research* 45 (6): 819–836.
- Bilsborrow, Richard. 2002. Migration, Population Change, and the Rural Environment, Population, Environmental Change, and Security Working Paper Series 2, University of Michigan Populations Fellows Program, Ann Arbor. Available online at http://pdf.usaid.gov/pdf_docs/PNADC450.pdf, accessed 19 October 2011.
- Bobrow-Strain, Aaron. 2001. Between a Ranch and a Hard Place: Violence, Scarcity, and Meaning in Chiapas, Mexico. In *Violent Environments*, edited by Nancy Lee Peluso and Michael Watts, 155–188. Ithaca, NY: Cornell University Press.
- Brush, Stephen B. 1989. Diversity and Change in Andean Agriculture. In *Lands at Risk in the Third World: Local Level Perspectives*, edited by Peter D. Little and Michael M. Horowitz, 271–289. Boulder, CO: Westview Press.
- Buhaug, Halvard. 2007. The Future is More than Scale: A Reply to Diehl and O’Lear. *Geopolitics* 12 (1): 192–199.
- Cederman, Lars-Erik, and Kristian S. Gleditsch. 2009. Introduction to Special Issue on Disaggregating Civil War. *Journal of Conflict Resolution* 53 (4): 487–495.
- Chambers, Robert, and Gordon R. Conway. 1991. *Sustainable Rural Livelihoods: Practical Concepts for the 21st Century*. Discussion Paper 296, Institute of Development Studies. Available online at <http://www.ids.ac.uk/ids/bookshop/dp/dp296.pdf>, accessed 2 April 2009.
- Collinson, Sarah. 2003. Introduction. In *Power, Livelihoods and Conflict: Case Studies in Political Economy Analysis For Humanitarian Action*, edited by Sarah Collinson, 7–20. Humanitarian Policy Group Report 13. London: Overseas Development Institute.
- Dabelko, Geoffrey D. 2003. Tactical Victories and Strategic Losses: The Evolution of Environmental Security. Unpublished PhD Thesis. University of Maryland, College Park, MD.
- Deligiannis, Tom. Forthcoming. The Impact of Environmental Stress and Demographic Change on Rural Unrest in Peru: A Case Study of Cangallo, Ayacucho. Unpublished PhD thesis, University of Toronto, Toronto, ON.
- Degregori, Carlos I. 1998. Harvesting Storms: Peasant Rondas and the Defeat of Sendero Luminoso in Ayacucho. In *Shining and Other Paths: War and Society in Peru, 1980–1995*, edited by Steve J. Stern, 128–157. Durham, NC: Duke University Press.
- de Sherbinin, Alex et al. 2008. Rural household Demographics, Livelihoods and the Environment. *Global Environmental Change* 18 (1): 38–53.
- de Soysa, Indra. 2002. Paradise is a Bazaar? Greed, Creed, and Governance in Civil War, 1989–99. *Journal of Peace Research* 39 (4): 395–416.

- de Soysa, Indra, and Nils Petter Gleditsch. 1999. *To Cultivate Peace: Agriculture in a World of Conflict*. Oslo: International Peace Research Institute.
- Durham, William H. 1979. *Scarcity and Survival in Central America*. Stanford, CA: Stanford University Press.
- Ellis, Frank. 1998. Household Strategies and Rural Livelihood Diversification. *Journal of Development Studies* 35 (1): 1–38.
- . 2000. *Rural Livelihoods and Diversity in Developing Countries*. Oxford: Oxford University Press.
- Folke, Carl. 2006. Resilience: The Emergence of a Perspective for Social-Ecological Systems Analysis. *Global Environmental Change* 16 (3): 253–267.
- Ford, Robert. 1995. The Population-Environment Nexus and Vulnerability Assessment in Africa. *Geojournal*. 35 (2): 207–216.
- German Advisory Council on Global Change. 2008. *Climate Change as a Security Risk*. London: Earthscan. Available at http://www.wbgu.de/wbgu_jg2007_engl.html, accessed 20 April 2010.
- Gleditsch, Nils Petter. 2001. Armed Conflict and the Environment. In *Environmental Conflict*, edited by Paul F. Diehl and Nils Petter Gleditsch, 251–272. Boulder, CO: Westview Press.
- Global Humanitarian Forum. 2009. *Human Impact Report: Climate Change—The Anatomy of a Silent Crisis*. Geneva: Global Humanitarian Forum.
- Goldstone, Jack. 2001. Demography, Environment, and Security. In *Environmental Conflict*, edited by Paul F. Diehl and Nils Petter Gleditsch, 84–108. Boulder, CO: Westview Press.
- Graeger, Nina. 1996. Environmental Security? *Journal of Peace Research* 33 (1): 109–116.
- Hartmann, Betsy. 2001. Will the Circle be Unbroken? A Critique of the Project on Environment, Population, and Security. In *Violent Environments*, edited by Nancy Lee Peluso and Michael Watts, 39–64. Ithaca, NY: Cornell University Press.
- Homer-Dixon, Thomas. 1991. On the Threshold: Environmental Changes as Causes of Acute Conflict. *International Security* 16 (2): 76–116.
- . 1999. *Environment, Scarcity, and Violence*. Princeton, NJ: Princeton University Press.
- . 2003. Debating Violent Environments. *Environmental Change and Security Project Report* 9: 89–92.
- Homer-Dixon, Thomas, and Jessica Blitt. 1998. *Eco-violence: Links among Environment, Population, and Security*. Lanham, MD, and Oxford: Rowman and Littlefield.
- Homer-Dixon, Thomas, Tom Deligiannis, and Dirk Druet. 2007. The Necessity of Complexity: Taking Environmental-conflict Research beyond Mechanism. Unpublished paper presented at the Annual meeting of the International Studies Association 48th Annual Convention, Chicago, IL. Available online at http://www.allacademic.com/meta/p181088_index.html, accessed 20 April 2010.
- Howard, Philip, and Thomas Homer-Dixon. 1995. *Environmental Scarcity and Violent Conflict: The Case of Chiapas, Mexico*. Toronto: The Project on Environment, Population, and Security, University of Toronto/American Association for the Advancement of Science.
- International Institute for Sustainable Development, International Union for Conservation of Nature and Natural Resources, and Stockholm Environment Institute. 2003. *Livelihoods and Climate Change*. Winnipeg: International Institute for Sustain-

- able Development, Task Force on Climate Change, Vulnerable Communities and Adaptation.
- Kahl, Colin. 2006. *States, Scarcity and Civil Strife in the Developing World*. Princeton, NJ: Princeton University Press.
- Kalyvas, Stathis N. 2006. *The Logic of Violence in Civil War*. Cambridge, UK: Cambridge University Press.
- Kaplan, Robert D. 1994. The Coming Anarchy. *The Atlantic Monthly* 273 (February): 44–76.
- Le Billon, Philippe. 2005. *Fueling War: Natural Resources and Armed Conflicts*. Adelphi Paper 373. London: Routledge.
- . 2009. Economic and Resource Causes of Conflicts. In *The Sage Handbook of Conflict Resolution*, edited by Jacob Bercovitch, Victor Kremenyuk, and I. William Zartman, 210–224. London: Sage Publications Inc.
- Levy, Marc A. 1995. Is the Environment a National Security Issue? *International Security* 20 (2): 35–62.
- Matthew, Richard A., and Geoffrey D. Dabelko. 2000. Environment, Population, and Conflict: Suggesting a Few Steps Forward. *Environmental Change and Security Project Report 6*: 99–103.
- Matthew, Richard, Mark Halle, and Jason Switzer. 2002. Introduction. In *Conserving the Peace: Resources, Livelihoods and Security*, edited by Richard Matthew, Mark Halle and Jason Switzer, 1–28. Winnipeg, MB: International Institute for Sustainable Development and IUCN—The World Conservation Union.
- Matthew, Richard, A. Michael Brklacich, and Bryan McDonald. 2004. Analyzing Environment, Conflict, and Cooperation. In *Understanding Environment, Conflict, and Cooperation*, edited by UNEP, 5–15. Nairobi: Division of Early Warning and Assessment.
- Mayer, Enrique. 2002. *The Articulated Peasant: Household Economies in the Andes*. Boulder, CO: Westview Press.
- McLeman, Robert, and Barry Smit. 2006. Migration as an Adaptation to Climate Change. *Climatic Change* 76 (1–2): 31–53.
- Ohlsson, Lief. 2000. *Livelihood Conflicts: Linking Poverty and Environment As Causes of Conflict*. Stockholm: SIDA Environmental Policy Unit.
- O’Lear, Shannon, and Paul F. Diehl. 2007. Not Drawn to Scale: Research on Resource and Environmental Conflict. *Geopolitics* 12 (1): 166–182.
- Ostrom, Elinor. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge: Cambridge University Press.
- . 1999. Coping with Tragedies of the Commons. *Annual Review of Political Science* 2: 493–595.
- Palmer, David S., ed. 1994. *Shining Path of Peru*. 2nd Edition. New York: St. Martin’s.
- Peluso, Nancy L., and Michael Watts. 2001. Violent Environments. In *Violent Environments*, edited by Nancy Lee Peluso and Michael Watts, 3–38. Ithaca, NY: Cornell University Press.
- . 2003. Violent Environments: Responses. *Environmental Change and Security Project Report 9*: 93–96.
- Pender, John. 2003. Rural Population Growth, Agricultural Change, and Natural Resource Management in Developing Countries: A Review of Hypotheses and some Evidence from Honduras. In *Population Matters: Demographic Change, Economic*

- Growth, And Poverty in the Developing World*, edited by Nancy Birdsall, Allen C. Kelley and Steven W. Sinding. Oxford: Oxford University Press.
- Raleigh, Clionadh, and Henrik Urdal. 2007. Climate Change, Environmental Degradation and Armed Conflict. *Political Geography* 26 (6): 674–694.
- Ron, James. 2005. Paradigm in Distress?: Primary Commodities and Civil War. *Journal of Conflict Resolution* 49 (4): 443–450.
- Schwartz, Daniel, Tom Deligiannis, and Thomas Homer-Dixon. 2001. The Environment and Violent Conflict. In *Environmental Conflict*, edited by Paul F. Diehl and Nils Petter Gleditsch, 273–294. Boulder, CO: Westview Press.
- Smit, Barry and Johanna Wandel. 2006. Adaptation, Adaptive Capacity, and Vulnerability. *Global Environmental Change* 16 (3): 282–292.
- Trawick, Paul. 2002. Comedy and Tragedy in the Andean Commons. *Journal of Political Ecology* 9 (1): 35–68.
- United Nations Environment Programme. 2009. *From Conflict to Peacebuilding: The Role of Natural Resources and the Environment*. Nairobi: UNEP.
- Urdal, Henrik. 2008. Population, Resources, and Political Violence: A Subnational Study of India, 1956–2002. *Journal of Conflict Resolution* 52 (4): 590–617.
- Vogel, Coleen. 2006. Foreword: Resilience, Vulnerability and Adaptation: A Cross-Cutting Theme of the International Human Dimensions Programme on Global Environmental Change Adaptation, Adaptive Capacity, and Vulnerability. *Global Environmental Change* 16 (3): 235–236.
- Watts, Michael J., and Hans G. Bohle. 1993. The Space of Vulnerability: The Causal Structure of Hunger and Famine. *Progress in Human Geography* 17 (1): 43–67.
- Zoomers, Annelies. 2001. Introduction: Linking Land to Livelihood. In *Land and Sustainable Livelihood in Latin America*, edited by Annelies Zoomers, 13–22. Amsterdam: KIT Publishers.