

Environment and Security in an International Context

Executive Summary Report

NATO/Committee on The Challenges of Modern Society Pilot Study
Pilot Study Co-Chairs
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Abstract: NATO, its Member States, and other security organizations are increasingly concerned with non-traditional threats to security, including the consequences of environmental change. This report addresses the relationship between environmental change and security at the regional, international and global levels. To support the development of these conclusions and recommendations, the Committee on the Challenges of Modern Society Pilot Study developed methodologies and approaches for analyzing the relationship of environmental change and security and prioritizing its key elements. The interdisciplinary nature of the Pilot Study has provided a multilateral forum for cooperation, exchange and dialogue among the environmental, development, foreign and security policy communities.

PREFACE

In 1969, the North Atlantic Treaty Organization (NATO) established the Committee on the Challenges of Modern Society (CCMS) as a unique forum for cooperation on issues of inter alia transboundary environmental protection and environmental problems in general. Through the CCMS framework, Member States conduct pilot studies and projects on a wide range of topics such as transboundary air and water pollution, marine oil pollution, and environmental problems stemming from the use of modern technology.

NATO, its Member States, and other security organizations are increasingly concerned with non-traditional threats to security, including the consequences of environmental change. The Pilot Study entitled "Environment and Security in an International Context" was launched within the framework of NATO/CCMS on the occasion of the NATO/CCMS Plenary Meeting in Washington, DC on 14 November 1995. This report summarizes the relationship between environmental change and security at the regional, international, and global levels.

The Pilot Study is co-chaired by Germany and the United States. Its main goal is to elaborate conclusions and recommendations to integrate environmental considerations in security deliberations and to integrate security considerations in national and international environmental policies and instruments. These conclusions and recommendations are guided by the principles of sustainable development and a precautionary approach, emphasizing preventive measures and strategies. They will ultimately provide a basis for senior-level decision-making. To support the development of these conclusions and recommendations, the Pilot Study developed methodologies and approaches for analyzing the relationship of environmental change and security and prioritizing its key elements.

The Pilot Study has evolved as a truly unique opportunity for the exchange of information and views from a wide range of experts in the scientific and policy communities. The interdisciplinary nature of the Pilot Study has provided a multilateral forum for co-operation, exchange, and dialogue among the environmental, development, foreign, and security policy communities. The completion of the Pilot Study through a consensus-based process offers the opportunity to continue and expand the spirit of co-operation developed over the course of our work.

The Pilot Study was made possible by the active co-operation of experts from government, academia, private industry, and

Kurt M. Lietzmann, Head of Unit, Federal Ministry for Environment, Nature Conservation, and Nuclear Safety, Federal Republic of Germany and Gary D. Vest, Principal Assistant Deputy Under Secretary of Defense (Environmental Security), Department of Defense, USA. The contents of this Pilot Study Summary Report are the result of a consensus-based collaborative research process undertaken under the auspices of the NATO Committee on the Challenges of Modern Society. It was compiled by Ecologic-Centre for International and European Environmental Research, and Evidence Based Research, Inc. Final responsibility for the Report and the Pilot Study rests with its co-chairs. The findings and views enumerated in this report are those of the participants and contributors. They do not necessarily represent the views of the national governments that participated in the study.

non-governmental organizations (NGO) from the member countries of the NATO Alliance and Euro-Atlantic Partnership Council (EAPC). In addition, experts from other international and regional organizations played a valuable role in providing input on the conclusions and recommendations developed in the Pilot Study. Most importantly, we would like to acknowledge and thank all those who participated in the Pilot Study. We especially would like to commend and recognize all of those responsible parties who provided not only their expertise through actively engaging in research and the delivery of papers and presentations, but also those who contributed their organizational support and planning assistance in making the Pilot Study plenary meetings and subgroup workshops a success.

Overall, we hope that the Pilot Study's Executive Summary Report and Full Technical Report provide a unique and lasting contribution to the recognition, analysis, and response to the relationship between environmental change and security and the impetus for effective co-operation, preventive action and response by institutions at the international, regional, and national level.¹

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INTRODUCTION

Overview of Environment and Security

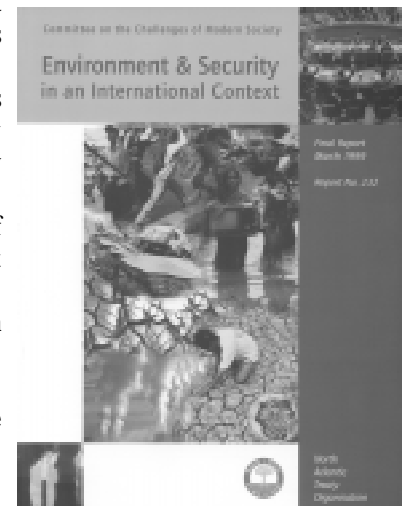
Since the end of the Cold War, traditional security concepts based on national sovereignty and territorial security have increasingly been brought under scrutiny. Instead, a broader definition of security that would incorporate non-traditional threats to security and their underlying causes such as economic decline; social and political instability; ethnic rivalries and territorial disputes; international terrorism; money laundering and drug trafficking; and environmental stress is being advocated. In particular, the relationship between the environment and security has been of increasing importance in recent years in both the scientific and policy communities.

The relationship between environment and security is addressed in a number of research efforts.² Several of these research efforts aim to 'redefine' or broaden the concept of security to include social, economic, and environmental factors. In contrast to the classical narrow concept of security, the broader concept proceeds from a differentiation of levels of analysis (individual, national, regional, and international security).

Other projects approach the debate by making distinctions among the factors which affect security. More conceptual, they address the conditions under which global change and environmental degradation lead to violent conflict. They attempt to establish a causal relationship between environmental factors and conflict through case study based research projects.³ Researchers are also attempting to derive conclusions about the importance of environmental stress to the incidence of conflict.⁴ Additionally there is research focusing on the human dimension and its role in environmental change and security as well as the role of climate change and its socio-economic impacts on violent conflict.⁵ Our Pilot Study builds upon this research.

The growing global concern for the environment over the last 30 years culminated in the United Nations Conference on Environment and Development in Rio de Janeiro in 1992 which made a major contribution to the recognition of environmental issues in the international arena. At this watershed conference, the principle of 'sustainable development' was first endorsed by the global community. There was a general acceptance of the idea that environmental, economic, and social issues are interdependent and cannot be pursued separately. Since then the principle of sustainable development has become an important guideline for action in the field of environmental, economic, and development policy. Moreover, due to the increasing discussion and research about the potential for large-scale environmental changes and the general acknowledgement of the relationship between environmental change and human society (social, economic, and demographic issues), there has been more attention paid to the question of the relationship between environment and security.

The degree to which environmental stress actually contributes to the incidence and escalation of conflict depends on the relationship between the consequences of environmental stress and on a number of socio-economic, political, and other contextual factors. Environmental problems can have a serious and long lasting negative influence on peoples' living conditions and can



lead to economic and social problems such as poverty, food insecurity, poor health conditions, and migration, within as well as between countries.⁶ Even so they seldom directly cause or trigger crisis and conflict. Political and economic stability and capacities, cultural and ethnic factors, or the existence of non-violent mechanisms of conflict resolution have a large impact on how environmental stress is dealt with by individuals and political stakeholders. If these contextual factors are unfavorable, the incidence of conflict due to the consequences of environmental stress is likely. If the contextual factors are favorable, the probability of a peaceful solution is improved.

As these environmental challenges continue, their impact on the potential incidence or escalation of tension and conflict are becoming a key concern for policymakers. However up to now—despite the recognition of the sustainability principle—the potentially unfavorable effects of unsustainable action, environmental degradation and resource scarcity have not gained the necessary recognition by political actors at the various levels.

For example, the consequences of global climate change have effects at the regional and local level in areas such as small island states, coastal zones and low-lying countries, and drought stricken regions. In this case, standards of economic growth, rising standards of living in the developing world and high living standards in industrialized countries contribute to global environmental problems such as climate change. The transboundary effect of these changes exceeds the capabilities of individual nations to deal with them in a comprehensive manner. Furthermore, the more indirect relationship between causes and effects and between those who caused and those who suffer from environmental change and its effects also impedes political action. Political action at the international level is crucial in order to deal with the issue of environment and security.

Research has indicated that global environmental change and its socio-economic effects are likely to intensify in the future. The intensity as well as the interdependence of these problems will have effects on an international scale and also begin to impact industrialized countries more directly. Therefore, these challenges call for an enhanced co-operative action at the international level, integrating actors from different policy areas including environmental, development, foreign and security policy.

Origins and Working Program of the Pilot Study

Despite lacking scientific consensus on the interlinkages between environmental change and security, NATO/CCMS took up the subject during the Washington DC, NATO/CCMS Round-Table in November 1995. The participants agreed that it would be useful to summarize the existing knowledge on the links between environment and security and to develop appropriate policy approaches for preventive action. It highlighted that man-made environmental degradation, resource depletion and natural disasters may have direct implications for the security of the international community and that a comprehensive threat assessment, a risk analysis, as well as a prioritization of risks to international security was needed to address these challenges. The Pilot Study

“Environment and Security in an International Context” which was initiated at this meeting, should address these tasks.

At an early stage of the study, participants identified several gaps in the existing knowledge base on the relationship between environment and security which should be addressed primarily in the analysis. First there were basic methodological and conceptual issues of approaching the relationship between environment and security. Secondly, there were questions of data availability and a lack of generally accepted indicators of environment and security as a base for decision-making. Finally, there were policy-orientated issues concerning threat assessment of environmental problems and the development of policy responses.

To prepare for a Pilot Study and to develop a proposal for its terms of reference to be submitted to CCMS, the German Federal Ministry for Environment, Nature Conservation, and Nuclear Safety hosted the initial workshop in Aachen, Germany in January 1996. In March 1996 the CCMS adopted the terms of reference for the study developed in Aachen and appointed Mr. Kurt M. Lietzmann (German Federal Ministry for Environment, Nature Conservation and Nuclear Safety) and Mr. Gary D. Vest (Principal Assistant Deputy Under Secretary for Environmental Security, USDoD) as Pilot Study Co-Directors. The study was then opened to participants from partner countries. As a first step in the working schedule, representatives from the Alliance and EAPC countries attended the first Plenary Meeting in Waldbröl in April 1996, hosted by the Federal Armed Forces Office for Studies and Exercises (FAFORSE), Germany, and co-chaired by the Pilot Study Directors. At this first Pilot Study Plenary Meeting, the mandate to elaborate an outline for the Pilot Study (including the overall methodology and terms of reference) was developed. At the same time and throughout the whole Pilot Study, the NATO/CCMS National Coordinators and Secretaries were frequently informed and updated as to the progress of the study.

The second Pilot Study Plenary Meeting took place in Ankara, Turkey in November 1996 and was hosted by the Scientific and Technical Research Council of Turkey (TÜBİTAK). Before this Plenary Meeting, Ecologic and Evidence Based Research (EBR) prepared an Interim Report entitled “Environment and Security in an International Context: State of the Art and Perspectives,” describing the conceptual framework for the future framework of the Pilot Study.⁷ During this second Plenary Meeting, this Interim Report was presented and accepted. Based on the Interim Report, the outline of the Pilot Study was adopted and three subgroups which reflect the structure of the study, were established. The three subgroups of the Pilot Study were structured according to topic areas and conducted under the leadership of a subgroup chair. The subgroups are as follows:

- Subgroup 1: “Definition and Modeling” dealt in particular with the development of a concept for the issues of environment and security. The overall aim of Subgroup 1 was to clarify the non-linear relationship between environmental stress, the consequences of environmental stress, contextual factors, and security as well as to develop a typology of cases.

- Subgroup 2: "Definition and Development of a Database and a Decision Support System," looked at providing decision support for policymakers by compiling relevant data on environment and security which can serve as a knowledge base for policy making. Subgroup 2 also compiled information on developing environmental indicators to be integrated into early warning systems.
- Subgroup 3: "Policy Responses," examined the potential contribution to the incidence or escalation of conflict from different environmental stresses and identified in different geographic regions of importance which may be at risk and developed preventive and remedial policy responses in the

Pilot Study Proceedings

During Subgroup Workshops, papers were provided by both participants and external experts as a contribution to the Pilot Study. The first Subgroup 1 meeting was held in Washington DC in January 1997 hosted by Mr. Gary Vest and Dr. Brian Shaw (Center for Environmental Security, Pacific Northwest National Laboratory), where the working plan for this subgroup was developed.

All three subgroups met at a third Plenary Meeting held in Carlisle, PA, USA in May 1997, which was hosted by Mr. Gary Vest, Dr. Kent Butts (Center for Strategic Studies, US Army War College), Dr. Brian Shaw (Center for Environmental Security, Pacific Northwest National Laboratory), and co-chaired by the Pilot Study Directors. The purpose of the meeting was to review the working results of the subgroups, approve a structure for the final report of the study, and develop the schedule for continuing work on the Pilot Study. On this basis, the following expert meetings were held to further discuss the topics areas of each subgroups.

From 16-17 October 1997, a workshop for Subgroup 2 entitled "Definition and Development of a Database and a Decision Support System" was hosted by Mr. Petr Kozel (Ministry of Defence of the Czech Republic) in Prague, Czech Republic and directed by Professor Dr. Bedrich Moldan (Director of the Environmental Center, Charles University, Prague). This workshop focussed on the discussion of indicators for environment and security as well as databases and decision support systems.

In Warsaw on 20-22 October 1997, a workshop for Subgroup 1 entitled "Security Implications on Environmental Issues" dealing with the analytical relationship between environment and security was hosted and directed jointly by Dr. Gunnar Arbman (National Defence Research Establishment, Sweden) and Mr. Stanislaw Wilczkowiak (Ministry of Environmental Protection, Poland) in Poland.

In Geneva from 9-11 February 1998, a workshop for Subgroup 1 entitled "Highlighting the Relationship Between Serious Conflicts and Environmental Transformation" focusing on developing mechanisms for a threat assessment of environment and security was hosted by Mrs. Eva Affolter Svenonius (Swiss Agency for the Environment, Forests, and Landscape) in Switzerland.

In Vienna on 23-24 March 1998, a workshop for Subgroup 3 entitled "Environment and Security in an International Context: Environmental and Developmental Policy Responses" was hosted by the Federal Ministry for the Environment, Youth, and Family Affairs, Republic of Austria and co-chaired by Ambassador Irene Freudenschuss-Reichl and Professor Gerhard Loibl. Back to back with this meeting, Austria hosted the fourth Plenary meeting, where the interim results from the subgroups were discussed and the editing process for the draft final report was coordinated.

In Paris from 27-28 April 1998, a workshop for Subgroup 3 entitled "Selected Foreign and Security Policy Responses" focussing on the development of foreign and security policy responses was hosted by the Secretariat General for National Defence (SGDN) in co-operation with the Ministry of Foreign Affairs and with the support of CREST and directed by Ambassador Berengere Quincy, (formerly representing the French Secretariat General for National Defence (SGDN)).

The results of these workshops were compiled into a draft Pilot Study Full Technical Report by Ecologic in June 1998. An editing meeting was held in Washington DC in July 1998 and hosted by EBR. Detailed editing work was completed by the editing group which resulted not only in changes in terminology, but clarified the concepts and terms used. The draft Full Technical Report was then distributed to participants of the Pilot Study and to selected peer reviewers and external experts.

The second and final editing meeting took place in November 1998 in Berlin, Germany hosted by Ecologic and chaired by Pilot Study Director, Kurt Lietzmann. During this second editing meeting, detailed comments received from both the Pilot Study participants and the selected peer reviewers were discussed in full as to how the Pilot Study Full Technical Report could be enhanced or improved. The editing group diligently worked on the draft of the Executive Summary Report as well. The remaining editing schedule was finalized and it was agreed that Ecologic would provide the final analysis and editing for the Full Technical Report and Executive Summary.

The Final Pilot Study Plenary meeting was held on 13-14 January 1999 in Vancouver, Canada and hosted by Mr. Anthony T. Downs, Director-General Environment, Department of National Defence, Canada. The final meeting was attended by a large number of participants where the final comments and recommendations were discussed in-depth. Following this discussion, an approval by consensus was reached on the Full Technical Report and the Executive Summary.

areas of environmental, development, foreign, and security policy.

Importance of the Pilot Study

The Pilot Study's final product compiles existing state of the art research on the relationship between environmental change and security. At the same time, a large part of the Pilot Study's work is dedicated to developing parameters for response mechanisms directed towards political stakeholders from different policy sectors. The focus of these responses is on reducing the potential incidence or escalation of conflict, inter alia, enhancing security at the earliest possible stage. The structure of the pilot study reflects this orientation towards framing practical action. Another characteristic of this Pilot Study is that it deals with a broad social science issue discussing innovative policy responses for dealing with environmental stress and its potential effects on security.

Starting from Article 2 of the North Atlantic Treaty, which provides that parties will contribute towards the further development of peaceful and friendly international relations by promoting conditions of stability and well-being, this Pilot Study responds to the aim evolving from the 1991 Declaration on Peace and Co-operation, which defined its tasks to further evolve its partnership with countries in Central and Eastern Europe. Its results need to be interpreted under the umbrella of the Strategic Concept for the 21st Century which will be

adopted at the Washington DC NATO Summit in April 1999.

Today's broadened security challenges differ from the traditional ones in their expanded geographical reach. Therefore the results of the study are relevant for a larger audience, including other international organizations. As a result, this Pilot Study integrated other international organizations in its work with participation by representatives of the United Nations Development Programme and Environmental Programme, UN Economic Commission for Europe (UNECE), Organization for Security and Cooperation in Europe (OSCE), Organization for Economic Cooperation and Development (OECD) and the World Bank. This new approach follows the principle of integrating different policy sectors at the international level.

The Pilot Study also involved a wide range of experts from different fields and institutes. Policymakers, researchers, diplomats, and representatives of NGOs covering various policy areas, participated in the study by adding their respective expertise to address the topic of environment and security. The study benefited from the different insights drawn from the fields of environmental policy and research, conflict research and security studies, and development and foreign policy.

PILOT STUDY FINDINGS

Presented in this section are the Pilot Study's main findings

Key Findings: NATO Security Context

- * Although nations continue to be central actors in international politics, they increasingly participate in a multitude of international regimes and institutions. Nations are engaging in co-operation with international and regional organizations to respond to non-traditional security concerns including the environment.
- * The North Atlantic Treaty recognized from its beginning that security is not entirely a function of military power or geopolitical strength. It recognizes the need to include an economic, and to a lesser extent, a social dimension to its conception of security (see Art. 2 of the Treaty). This civil security dimension is given an institutional framework through the NATO Committee on the Challenges of Modern Society (CCMS).
- * Since the end of the Cold War, NATO looks increasingly at threats from non-traditional sources and addresses Alliance security in an expanded regional and global context. This new and broader security concept—the Strategic Concept of 1991—complements the emphasis on the defense dimension of security and recognizes that security and stability have political, economic, social and environmental elements.
- * The broad approach to security is reflected in three mutually reinforcing elements of Alliance security policy: dialogue, co-operation and collective defense. These elements should support NATO in remaining flexible and responsive to changing security conditions, so that its important role in the new security context can be guaranteed for the future.
- * The most serious impacts of environmental stress, due to transboundary effects, are likely to emerge in regions other than the Euro-Atlantic region, such as developing countries and countries in transition. Preventing the breakdown of global systems is a high policy priority for a number of states and the environment is understood as one of these global systems.
- * With reference to Article 4 of the North Atlantic Treaty, any issue can be brought before the Alliance for the purpose of consultation with other Member States when one Member State perceives the territorial integrity, political independence or security of any of the Member States is threatened. This could conceivably include an environmental issue.
- * As NATO provides the available fora for consultation and co-operation, to include EAPC and the PfP, environmental issues with security implications for Member States and Partner Countries can be addressed or resolved in the same fashion. This includes the development and co-ordination of data sharing and exchange arrangements for regional monitoring networks. Beyond data collection and monitoring, NATO will have to rely on co-operation with other respective organizations for preventive action.
- * The broad understanding of security increases the need for more co-operation among regional and international security institutions, such as WEU, OSCE, and UN as well as between security institutions and institutions in other policy areas such as environment, development and foreign and security policy.

and policy responses. The findings from the Full Technical Report will be presented in this section according to the structure of the relevant chapters from the Pilot Study. In the Full Technical Report, the study is divided into the following chapters:

- Chapter 1: NATO Security Context (provides an overview of the North Atlantic Treaty, CCMS, and the Changing Security Context);
- Chapter 2: Assessing the Links between Environment and Security (clarifies the concepts between environmental stress and security; examines the consequences of environmental stress and their potential impact on the incidence or escalation of conflict; discusses contextual factors which may impact the consequences of environmental stress);
- Chapter 3: Typology of Environmental Conflict Cases (describes further the relevance of environmental stress, socio-economic conditions, contextual factors, and conflict; exhibits the results of empirical research including historical cases and inductively derived case studies);
- Chapter 4: Integrated Risk Assessment (analyses and compares the conflict potential or security risk of specific unfavorable socio-ecological patterns; identifies regions that are affected by environmental stress factors or syndromes);
- Chapter 5: Indicators, Data and Decision Support Systems (presents a set of practical options to support policymakers for the development of early warning indicator systems, data bases, and decision support systems);
- Chapter 6: Policy Responses (presents an integrated approach of all policy areas and policy responses for environmental, development, foreign and security policy).

Chapter 1: NATO Security Context

At the threshold of the 21st Century, societies are facing non-traditional threats to security such as economic decline, social and political instability, ethnic rivalries and territorial disputes, international terrorism, money laundering, drug trafficking, and environmental stress. The regions most likely to experience the potential incidence or escalation of conflict fall outside of the Euro-Atlantic region in developing countries or countries in transition. Preventing the breakdown of global systems is a high policy priority for a number of states and the environment is understood as one of these global systems.

These security concerns are redefining the traditional missions of security organizations including NATO. The North Atlantic Treaty recognized from the beginning that security is not entirely a function of military power or geopolitical strength. It recognizes the need to include an economic, and to a lesser extent, a social dimension to its conception of security (see Article 2 of North Atlantic Treaty). This civil security dimension is given an institutional framework through the NATO Committee on the Challenges of Modern Society (CCMS).

Since the end of the Cold War, NATO looks increasingly at threats from non-traditional sources and addresses Alliance security in a broader context. This context is expanded by the Strategic Concept of 1991 which complements the emphasis on the defense dimension of security and recognizes that security and stability have political, economic, social, and environmental

elements. Part of this changing security context is that nations, although still central actors in international politics, increasingly participate in a multitude of international regimes and institutions. Nations are engaging in co-operation with international and regional organizations to respond to non-traditional security concerns including the environment. With reference to Article 4 of the North Atlantic Treaty, any issue can be brought before the Alliance for the purpose of consultation with other Member States when one Member State perceives the territorial integrity, political independence or security of any of the Member States is threatened. This could conceivably include an environmental issue.

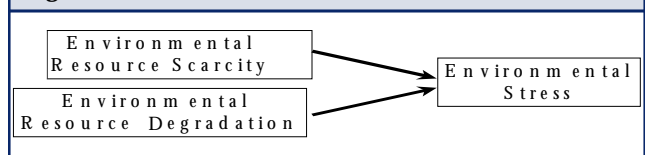
Within the NATO Framework, the broad approach to security is reflected in three mutually reinforcing elements of Alliance security policy: dialogue, co-operation, and collective defense. These elements should support NATO's flexibility and responsiveness to changing security conditions, so that its important role in the new security context can be guaranteed for the future. As NATO provides the available fora for consultation and co-operation, to include the Euro-Atlantic Partnership Council (EAPC) and the Partnership for Peace (PfP) countries, environmental issues with security implications for Member States and Partner Countries can be addressed or resolved in the same fashion. This includes the development and co-ordination of data sharing and exchange arrangements for regional monitoring networks. Beyond data collection and monitoring, NATO will have to rely on co-operation with other organizations for preventive action. This will call for more co-operation among regional and international security institutions, such as the Western European Union (WEU), Organization for Security and Co-operation in Europe (OSCE), and the United Nations (UN) as well as between security institutions and institutions in other policy areas such as environmental, development, foreign and security policy.

Chapter 2: Assessing the Links between Environment and Security

The relationship between environmental change and security has been of increasing importance in recent years in both the scientific and policy communities as new challenges to security emerge in the post-Cold War context. In consideration of the complexity of the causal pathways of the relationship between environmental change and security, this section lays the foundation, elaborating on the relationship between environmental stress, its political, economic, social, and demographic consequences and their impact on security by interpreting the current available literature.

We conceive of environmental change in terms of the nature and extent of environmental stress. We define the independent variable, environmental stress, as the scarcity and

Figure 2.1 - Environmental Stress



environmental degradation of natural, renewable resources (quantitative and qualitative resource degradation). As both factors are closely interconnected - environmental degradation can increase scarcity and scarcity can further degrade a resource by overexploitation - they are considered as one variable in the context of the Pilot Study (see figure 2. 1 on previous page).

The understanding of security in our Pilot Study analysis generally includes the integrity of national territory, protection of political independence and national sovereignty, and stability at the international political level. The inverse of these conditions can be characterized by our operationalized dependent variable, the potential incidence or escalation of conflict. Conflicts are understood as dynamic processes with different levels of intensity along a continuum ranging from highly co-operative to highly conflictual situations (durable peace, stable peace, unstable peace, crisis, war) (see figure 2. 2).

This conflict dynamic suggests that issues can be resolved before conflict develops into a security threat. Countless issues of conflict, particularly at the local or regional level, are resolved co-operatively; only a limited number of conflicts reach a higher conflict intensity. The figure also depicts the notion that violence is by no means the automatic outcome of conflict.

The relationship between environmental stress and conflict is characterized by:

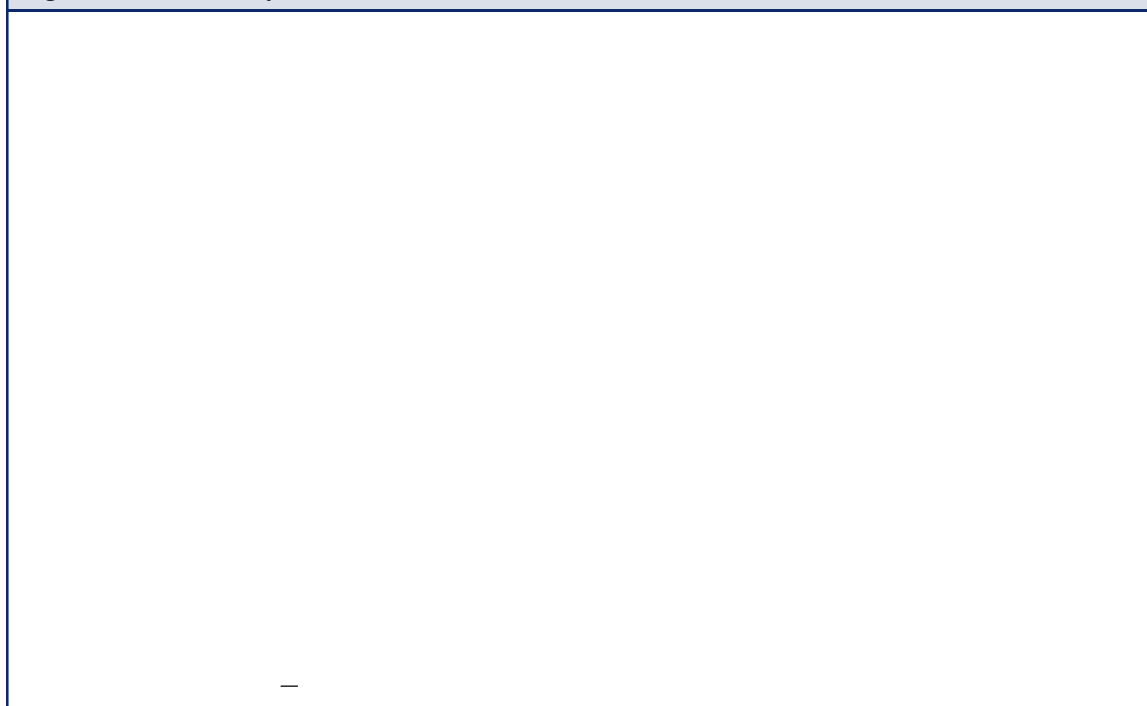
- Multi-causality: environmental stress contributing to conflict almost always interacts with other political, social, and economic factors and evolves through various stages before it results in conflict;
- Reciprocity and feedback loops: the relationship between environmental stress and conflict is recursive; just as environmental stress can lead to conflict under unfavorable contextual factors, conflict can lead to more environmental stress;

Key Findings: *Assessing the Links between Environment and Security*

- Environmental stress comprises scarcity of natural, renewable resources (quantitative degradation) as well as qualitative resource degradation. As both factors are closely interconnected—environmental degradation can increase scarcity as well as scarcity can further degrade a resource by overexploitation—they are considered as one variable in the context of the Pilot Study.
- Conflict is understood as a dynamic process with different levels of intensity along a continuum ranging from highly co-operative to highly conflicted situations (durable peace, stable peace, unstable peace, crisis, war).
- Violence is by no means the automatic outcome of conflict. Countless issues of conflict, particularly at the local or regional level are resolved co-operatively; only a limited number of conflicts reach a higher conflict intensity.
- The relationship between environmental stress and conflict is characterized by:
 - Multi-causality: environmental stress contributing to conflict almost always interact with other political, social, and economic factors and evolves through various multi-stages before it results in conflict;
 - Reciprocity and feedback loops: the relationship between environmental stress and conflict is recursive, because just as

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Figure 2.2 - Conflict Dynamic



- Consequences of environmental stress: poverty, food insecurity, poor health conditions, displacement, migration or refugee movements, and disruption of the social and political institutions are regarded as the most important consequences of environmental stress, which then contribute to conflict under a certain set of unfavorable contextual factors.

Environmental stress can also play different roles along the conflict dynamic. It can be a:

- Structural source of conflict: environmental stress is perceived as a permanent factor affecting the interests and preferences of the actors involved;
- Catalyst for conflict: environmental stress is further exacerbated by an existing unstable socio-economic situation and the resulting impacts are the increase in the potential incidence or escalation of conflict;
- Trigger for conflict: environmental stress instigates conflict when underlying causes for conflict are perceived as acute threats to a group's interests due to an unfavorable, sudden change in the environmental sphere.

Similar types of environmental stress may have different effects on security. Therefore the socio-economic and political context in which environmental stress occurs has to be taken into consideration when assessing the conflict potential of different types of environmental stress. Figure 2. 3 shows that contextual factors influence whether environmental change causes social, economic, and political and demographic consequences, which in turn impact on security. The contextual factors influence the process at a very early stage and vary accordingly to the different environmental stress conditions characterized within a country. Contextual factors have either a facilitating or inhibiting effect on the relationship between environmental stress and conflict. Relating back to our original hypothesis on the relationship between environmental change and security we have developed the

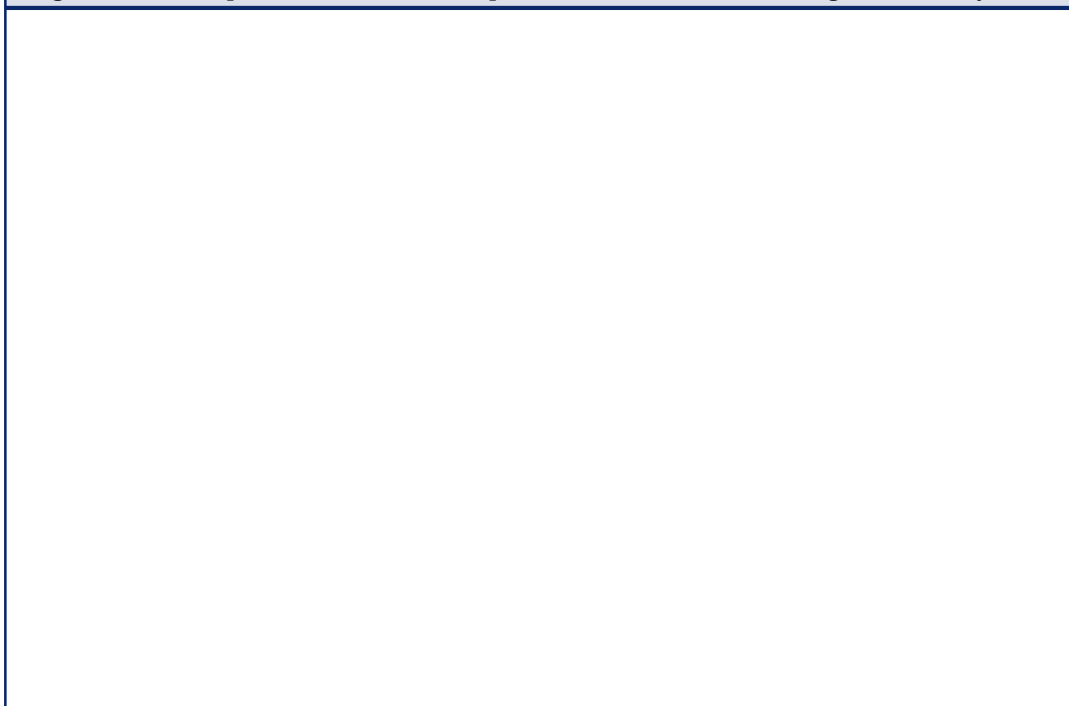
Key Findings: *Assessing the Links between Environment and Security*

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environmental stress can lead to conflict under unfavorable contextual factors, conflict can lead to more environmental stress;

- Consequences of environmental stress: poverty, food insecurity, poor health conditions, displacement, (migration or refugee movements), and disruption of the social and political institutions are regarded as the most important consequences from environmental stress, which then contribute to conflict under a certain set of unfavorable contextual factors.
- Environmental stress can play different roles along the conflict dynamic. It can be a: structural source as well as a catalyst for conflict or a trigger for conflict.
- Similar types of environmental stress may have different effects on the incidence of violence. Therefore the socio-economic and political context, in which environmental stress occurs, has to be taken into consideration while assessing the conflict potential of different environmental stress. These contextual factors identified comprise patterns of perception, economic vulnerability and resource dependency, institutional, socio-economic and technological capacity, cultural and ethno-political factors, violence-potential, and internal security structures, political stability, participation, international interaction, and mechanisms of conflict resolution.

Figure 2.3 - Conceptual Model: Relationship Between Environmental Change and Security



following conceptual model (see figure 2. 3).

The contextual factors identified are as follows:

- **Patterns of perception:** Whether or not environmental stress contributes to the potential incidence or escalation of conflict depends heavily upon the perceptions of the actors. For example, if environmental stress is perceived as directly impacting on an actor's interests and priorities, including threats to their physical or economic well-being, actors are more willing to escalate the conflict.
- **Economic vulnerability and resource dependency:** Economic vulnerability and resource dependency differ enormously among countries, but also among regions or social groups. The vulnerability caused by dependence on a degrading resource—such as fresh water—may enhance the probability of the incidence of conflict. Migration or flight are often the result of extreme dependence on a degrading resource, causing socio-economic and political stress in the receiving nation or state.
- **Institutional, socio-economic and technological capacity:** Institutional capacity of a government is a precondition for co-operative action on environmental stresses and their consequences. Socio-economic and technological capacities of a society and a government are further requirements for the reduction of environmental stress and the amelioration of its negative consequences.
- **Cultural and ethno-political factors:** The existence of ethnic, cultural or religious differences do not in themselves lead to conflict, but they can contribute to the incidence or escalation of conflict if they develop into a political problem. These differences may be exacerbated by an inequitable distribution of wealth, services or access.
- **Violence-potential and internal security structures:** The incidence of conflict or the escalation to violence may be determined in part by the degree of civilian control of the military, the internal security services and law enforcement agencies. If these democratic structures do not exist, and these institutions are dominated and potentially instrumentalized by a certain group in the society, they might be used as a tool to resolve potential conflicts by force.
- **Political stability:** Social and economic factors are closely inter-linked with the political dimension of the state.

Instability exists when the political system and the government are unable to effectively control tensions between different groups in the society or between the government and the opposition.

- **Participation:** Empirical research on cases of environmental stress has shown that in many instances local groups who were directly affected by the decision, for example the exploitation of a resource, and who were not involved in the decision-making process, had a low acceptance rate of the decision itself. Participation can be realized through mechanisms such as free and fair elections, petitions, or it can be realized through traditional or culturally specific mechanisms.
- **International interaction:** The constructive engagement of a country in international interactions enhances co-operative resolution of the negative consequences of environmental stress. It encourages a state to adhere to international environmental treaties and encourages it at the same time to comply to international regimes, to adjust to international standards.
- **Mechanisms of conflict resolution:** The presence of effective and legitimate legal, political and social mechanisms of conflict resolution enhances the possibility of resolving conflict within a state or between states. In participatory societies countless and sometimes serious environmental conflicts are resolved by legal, political, and social mechanisms, where negotiation, compromise and mediation play a central role.

Chapter 3: Typology of Environmental Conflict Cases

To further illustrate the relevance of the conceptual framework presented in Chapter 2, the results of empirical research, including historical case studies in which environmental stress influenced the onset of conflict, are presented in this chapter. These cases are categorized and placed into a typology to further assist decision makers and policy analysts in understanding the relationship between environmental stress and security. A typology of environmental conflict developed in the context of this Pilot Study reflects the complexity of the relationship between environmental stress and its consequences, contextual factors and actors. This

Key Findings: *Typology of Environmental Conflict Cases*

A typology of environmental conflict developed in the context of the Pilot Study reflects the complexity of the relationship between environmental stress, its consequences and contextual factors as well as actors. This typology can be understood as a research hypothesis, subject to further testing since the grouping of cases used were derived inductively.

- Cases where environmental stress heightens the potential incidence of conflict generally manifest themselves in developing or transitional societies in socio-economic crisis. These conflicts can typically occur at the local or regional levels where marginalization or discrimination of one or more actors is common.
- Four general types of environmental conflict can be identified which fulfil the complexity requirements of a typology: ethno-political conflicts; migration conflicts (internal, cross border, demographically caused migration); international resource conflicts; and environmental conflicts due to global environmental change.
- According to this typology of environmental conflicts, there are many cases that have been solved without violence, demonstrating that there is a large potential for local, regional and international co-operation in the various policy arenas.

typology [based primarily on the Environmental Conflicts Project (ENCOP)] can be understood as a research hypothesis, subject to further testing since the grouping of cases used were derived inductively.

According to the ENCOP categories and typology, it has been found that cases where environmental stress heightens the potential incidence of conflict were generally manifest in developing or transitional societies in socio-economic crisis. These conflicts can typically occur at the local or regional levels where commonly there is a marginalization or discrimination of one or more actors. Four general types of environmental conflict can be identified which fulfil the complexity requirements of a typology:

- Ethno-political conflicts are characterized by a coincidence of environmental and ethnic discrimination. Conflicts may emerge when two or more ethnic groups share one eco-region suffering from environmental stress and have limited access to the needed natural resources. Conflicts may also emerge when ethnic groups depend on neighboring eco-regions with highly distinct degrees of productivity. Violence may occur if and when the environmentally discriminated group invades another territory.
- Migration conflicts are either based on internal migration, cross-border migration or have a strong demographic component.
 - Internal migration conflicts are triggered by voluntary migration or forced displacement of inhabitants from one region to another within one country. The geographic origin of migrants or displaced persons is the primary criterion for conflicting social and political relationships between the actors. Migration is induced by structural changes such as persistent drought, flood, and soil erosion (desertification) or forced displacement and expulsion in connection with large unsustainable industrial projects, mineral extraction, dam projects and forestry.
 - Cross border migration conflicts are in general characterized by the same causes as internal migration conflict. When migrants or refugees cross national borders voluntarily, resettle in rural border areas or resettle in cities of a third country, they represent socially and at times a

source of political conflict potential.

- Demographically caused migration conflicts are characterized by high population pressure in eco-regions of low productivity leading to migration either to more favorable economic or to remote natural areas. They are likely to escalate when migrants compete with other groups for scarce resources.
- International resource conflicts are characterized by distribution problems. They are caused by an asymmetrical dependence on the quantity and quality of a resource, for example fresh water or fish stocks. The likelihood of violent escalation of international resource conflicts depends heavily on the specific constellation of contextual factors. Under favorable contextual factors, these conflicts may be resolved co-operatively.
- Consequences of global environmental change have not resulted in violent conflict thus far. However, the implementation of specific international environmental agreements has led to tensions between nations in a number of areas.

According to this typology of environmental conflicts, there are many cases that have been resolved without violence, demonstrating that there is a large potential for local, regional and international co-operation in the various policy areas.

Chapter 4: Integrated Risk Assessment

This section on integrated risk assessment establishes guidelines for assessing and prioritizing the potential impact of different types of environmental change on security. Here, we assess the risk of increasing the potential incidence or escalation of conflict. The assessment is termed integrated because of the broad range of factors that are considered (political, economic, social, demographic, and environmental factors). Chapter 2 established that environmental stress may generate a series of consequences (political, economic, social and demographic) and that those consequences impact on the potential incidence or escalation of conflict. This relationship might be further influenced by a series of structural or contextual factors.

The nature of the relationship between environmental stress and security is indirect and multi-causal. Environmental stress

Key Findings: *Integrated Risk Assessment*

- The nature of the relationship between environmental stress and security is indirect and multi-causal. Environmental stress can be prioritized according to time of impact, geographic area effected and magnitude of stress.
- The consequences of environmental stress (political, economic, social, and demographic) tend to be highly inter-related and the integrated risk assessment needs to address those relationships in assessing them.
- The complexity of the relationship between the consequences of environmental stress and the potential incidence or escalation of conflict is best controlled through the use of pattern matching; The Syndrome Approach of the German Government's Advisory Council on Global Change provides a set of experimental hypotheses as templates for pattern matching.
- The syndrome-based risk assessment is one approach that can help in identifying priorities for the development of early warning indicators and preventive action.
- Some preliminary research findings suggest that certain syndromes are more prone than others to the onset or escalation of conflict.
- Further development of the syndrome approach is also required to enable researchers, development practitioners and politicians alike, to more effectively concentrate on critical regions and critical interdependencies in the future.

can be prioritized according to time of impact, geographic area affected and magnitude of stress. The integrated risk assessment needs to control or manage the complexity in the relationship between the consequences of stress and contextual factors in order to determine which factors have the most potential impact on the incidence or escalation of conflict. The complexity of this relationship is best controlled through the use of pattern matching. The Syndrome Approach developed by the German Government's Advisory Council on Global Change (WBGU) and the Potsdam-Institute for Climate Impact Research (PIK), provides a set of experimental hypotheses as templates for pattern matching which help to control for complexity in the integrated risk assessment.

The Syndrome Approach provides a number of identifiable patterns of environmental stress. Identifying the potential set of consequences and their pattern of interaction in the context of a specific set of variables may allow for a broader set of potential responses for policymakers. The syndrome-based concept starts from the assumption that environmental stress is part of a dynamic human-nature interaction. The Syndrome Approach identifies different types of these interactions which occur in various environmental, administrative or geopolitical regions of the world. The overall importance of the syndrome-based approach for policymakers is that it may serve as a promising starting point for the development of indicators for early intervention in the conflict dynamic and may provide the opportunity to reduce the potential incidence of conflict or its escalation in specific cases. There are sixteen syndromes (see

Table 4. 1) almost all of which are experimental hypotheses and are divided into the three subgroups 'resource use', 'development', and 'sinks'.

A fully functional integrated risk assessment approach must correlate these syndromes with the potential for conflict. Some preliminary research findings suggest that certain syndromes are more prone than others to the onset or escalation of conflict. Additional empirical testing in this area is likely to confirm meaningful relationships between particular syndromes and conflict potential. This can be translated into a practical integrated risk assessment tool for policymakers to let them know when, where and how a syndrome might lead to conflict. Further development of the Syndrome Approach is also required to enable researchers, development practitioners and politicians alike, to more effectively concentrate on critical regions and interdependencies in the future.

Chapter 5: Indicators, Data, and Decision Support Systems

Much of the research findings in this Pilot Study suggest that the development of early warning indicator systems, data bases and decision support systems are feasible and warranted. Although the development of practical approaches could not be finalized in this Pilot Study, further research is required to specify, focus and simplify research results so that they can be useful directly for policymakers. This chapter presents a set of options, grounded in existing research, that offer practical solutions to support policymakers.

Table 4.1 Overview of Global Change Syndromes

Utilization Syndromes	
1. <i>Sahel Syndrome</i>	Over-cultivation of marginal land
2. <i>Overexploitation Syndrome</i>	Overexploitation of natural resources
3. <i>Rural Exodus Syndrome</i>	Environmental degradation through agricultural practices
4. <i>Dust Bowl Syndrome</i>	Non-sustainable agro-industrial practices
5. <i>Katanga Syndrome</i>	Environmental degradation due to non-renewable resources
6. <i>Mass Tourism Syndrome</i>	Development and destruction of natural resources
7. <i>Scorched Earth Syndrome</i>	Environmental destruction through war
Development Syndromes	
8. <i>Aral Sea Syndrome</i>	Environmental damage of natural resources through large-scale projects
9. <i>Green Revolution Syndrome</i>	Environmental degradation through inappropriate farming methods
10. <i>Asian Tigers Syndrome</i>	Disregard for environmental standards due to rapid economic growth
11. <i>Favela Syndrome</i>	Environmental degradation through urban sprawl
12. <i>Urban Sprawl Syndrome</i>	Destruction of landscapes through urban infrastructures
13. <i>Major Accident Syndrome</i>	Anthropogenic environmental damage
Sink Syndromes	
14. <i>Smokestack Syndrome</i>	Environmental degradation through diffusion of long-living substances
15. <i>Waste Dumping Syndrome</i>	Environmental degradation through uncontrolled disposal of waste
16. <i>Contaminated Land Syndrome</i>	Local contamination of environment

Key Findings: *Indicators, Data, and Decision Support Systems*

- Existing research findings in the environment and security field can provide useful direction for the design of early warning indicator systems and decision support systems. Further research is required to specify, focus and simplify research results so that they can be useful directly for policymakers.
- It is recommended that tracking and monitoring environmental and contextual indicators are essential in order to assist analysts in forecasting the potential incidence of conflict and to determine the potential of existing conflicts to escalate along the conflict continuum. The contextual indicators are critical in forecasting which environmental stresses are likely to produce conflictual outcomes.
- To be useful for early warning, indicator systems must provide indication of critical problems and thresholds at very early stages, when it is still possible to avert future instability. Warning indicators generally refer to anticipated environmental stress; contextual factors associated with environmental stress; and, consequences of environmental stress.
- It is preferable to focus on indicators that reveal levels of anticipated environmental stress.
- When sustainable development indicators are stressed beyond certain thresholds or reference values, they are likely to lead to unsustainable policies and practices and be potential contributors to conflict. Reference values identify the thresholds at which changes over time in environmental indicators are transformed from being beneficial or neutral to being negative or risk-provoking along some dimension. These values are regionally or systemically specific and they may change over time.
- Reference values can be conceived in three ways: based entirely on scientific evidence; based on policy targets, usually scientific evidence in the context of national economic capability, technological capacity, or political will; and based in terms of public perception.
- Due to the large number of indicators available, more research is needed to reduce these indicators to a number more manageable for policy support. In order to be useful for policy makers, indicators should be readily understandable and interpretable. There are two approaches to controlling for indicator complexity: development of a single index by statistically or mathematically aggregating multiple indicators; and development of "marker indicators" through the selection of a small number of indicators from a much larger pool which correlate strongly with particular concepts.
- Simple and practical decision support systems can be developed to provide early warning to policymakers using existing data resources. They should be oriented toward providing early warning of the potential for conflict.
- Decision support systems should be capable of evaluating how particular environmental problems are affected by contextual factors that may facilitate or exacerbate their potential impact on the incidence or escalation of conflict. They should be able to provide useful analysis and recommended responses at different stages of the conflict dynamic.

First, it is recommended that tracking and monitoring a large number of environmental and contextual indicators are essential in order to assist analysts in forecasting the potential incidence of conflict and to determine the potential of existing conflicts escalating along the conflict continuum. The contextual indicators are critical in forecasting which environmental stresses are likely to produce conflictual outcomes.

Second, to be useful for early warning, indicator systems must provide an indication of critical problems and thresholds at very early stages, when it is still possible to avert future instability. It is preferable to focus on indicators that reveal levels of anticipated environmental stress. Warning indicators generally refer to anticipated environmental stress, contextual factors associated with environmental stress, and consequences of environmental stress.

Third, when sustainable development indicators are stressed beyond certain thresholds or reference values, they are likely to lead to unsustainability and be potential contributors to conflict. Reference values identify the thresholds at which changes over time in environmental indicators are transformed from being beneficial or neutral to being negative or risk-provoking along some dimension. These values are regionally or systematically specific and they may change over time. Reference values can be conceived in three ways: based entirely on scientific evidence, based on policy targets, usually scientific evidence in the context of national economic capability, technological capacity, or political will, and based in terms of public perception.

Fourth, due to the large number of indicators available, more research is needed to reduce these indicators to a more manageable number for policy support. In order to be useful for policymakers, indicators should be readily understandable and interpretable. There are two approaches for controlling indicator complexity: development of a single index by statistically or mathematically aggregating multiple indicators, and development of "marker indicators" through the selection of a small number of indicators from a much larger pool which correlate strongly with particular concepts.

Finally, simple and practical decision support systems can be developed to provide early warning to policy makers using existing data resources. They should be oriented toward providing early warning of the potential for conflict. Decision support systems should be capable of evaluating how particular environmental problems are affected by contextual factors that may facilitate or exacerbate their potential impact on the incidence or escalation of conflict. They should be able to provide useful analysis and recommend responses at different stages of the conflict dynamic.

Chapter 6: Policy Responses

The previous chapters identified the complex inter-linkages between environmental stress and the potential

incidence or escalation of conflict. The multitude of socio-economic and political factors influencing environmental conflict and the different manifestations of conflict call for a co-operative and integrative approach towards the prevention of environmental conflict and its peaceful resolution. This approach must integrate response mechanisms from the environment and development policy and from the foreign and security policy sector. Within this section, policy recommendations which share the principles of sustainable development, precaution, integration, and co-operation are suggested for further action.

Based on their comparative advantages, each policy sector can contribute, with its specific problem-solving mechanisms and instruments, to the prevention or management of the incidence or escalation of conflict at different geographic levels and different stages of the conflict dynamic. Since environmental stress often contains the seeds for both conflict and co-operation, it is suggested that all actors integrate the conflict dimension into their thinking and policy mechanisms and to mutually co-ordinate their response mechanisms. Co-operation on shared environmental issues can establish lines of communication that may be valuable in reducing regional tensions on non-environmental problems. As the global commons cannot be managed by any nation state alone, co-operation of governmental and non-governmental actors at the different levels has to be enhanced in preventing and managing environmental conflict.

ENVIRONMENTAL POLICY KEY FINDINGS

- Environmental stress poses a potential threat to security at all geographic levels, and can have consequences across a range of levels, such as global environmental stresses which may raise the potential incidence and escalation of conflict at the local and regional levels. Taking preventive action on environmental stress thus is the most appropriate approach to preventing environmental conflicts. Such preventive action is needed at all levels, but given that environmental stresses tend to be rooted in transboundary, regional and global environmental problems, international and regional environmental agreements play a particularly important role in preventing environmental conflict.
- Environmental policy at the national level and through international institutions has achieved a remarkable record of progress in the last two decades (e. g. air pollution abatement, protection of the ozone layer). In addition to their role in promoting a better environment, co-operative environmental institutions have contributed to confidence building and to avoiding conflict escalation between countries (e. g. management of river basins). However, a number of environmental challenges have grown in importance and the security relevance of environmental stress has increased. Efforts to address environmental stress, its consequences, and their impact on the potential incidence or escalation of conflict thus need to be intensified.
- In addition to improving the common knowledge base of policy-making on the relationship between environment and security, comprehensive assessment mechanisms need to be developed which take the environmental impacts of policies into account. They should also be extended to assess socio-economic impacts of environmental stresses on social, political, and economic conditions and on security. These comprehensive assessment mechanisms should be institutionalized and used at all levels of decision-making as a standard operating procedure for integrating environmental considerations and security concerns of environmental change that will include the modification or abandonment of projects, programs or policies. Other policy areas such as transport, agriculture, energy, social, and security policies need to make further progress in taking a long-term perspective and internalize external costs.
- There is great need for strengthening, re-examining, and reforming the international institutional framework, especially in a regional context. This relates in particular to natural resource regimes, international environmental law, and the role of UN institutions. Efforts should be intensified, particularly in regional contexts, to codify rules for the management of natural resources and especially shared water resources. Existing agreements, e. g. to combat desertification and manage the use of resources, should be strengthened.
- To benefit fully from international and regional environmental agreements, they must be ratified, implemented and enforced effectively. To improve implementation, the transfer of knowledge and technology should be enhanced, and existing mechanisms for capacity building strengthened. International financing must be made available and innovative implementation instruments, including market-based instruments such as emissions trading and joint implementation and common policies and measures, further explored and properly applied.
- Strengthened verification and compliance mechanisms, possibly including binding consequences and penalties in cases of non-compliance, can enhance mutual trust and confidence among parties to international environmental agreements. Efforts are also needed to foster mechanisms for amicable dispute resolution, especially in resource regimes. In this context, existing dispute settlement procedures (International Court of Justice, World Trade Organization) as well as other innovative approaches deserve consideration.
- Decision-making in international institutions needs to be facilitated. This can, inter alia, be achieved through an increased use of innovative procedures of majority decision-making and other innovative approaches to consensus building. This includes the establishment of expert panels on specific questions and focused round-table discussions. Such mechanisms also allow for broader societal and non-governmental input. Basic participatory rights of non-governmental actors such as access to information, documentation and decision-makers need to be guaranteed. In general, public and private efforts and activities are to be coordinated and integrated for effective solutions.
- Given the large and increasing amount of international environmental institutions, a review should be initiated with

the aim of streamlining the body of existing rules. At the global level, relevant international bodies such as UNEP should be strengthened, enabling them to work effectively to solve environmental problems which pose potential security threats. In addition, exchange, integration and co-operation among the diverse institutions involved in the fields of environment and security should be enhanced which may involve establishing new for a and structures.

DEVELOPMENT POLICY KEY FINDINGS

- In order to establish preventive mechanisms for environmental conflicts, development policy, which is specifically directed at ameliorating selected consequences and contextual factors, plays an important role in respective regions. Development policy contributes to stabilizing the socio-economic and political context of actors experiencing environmental stress and can contribute to the prevention of environmental conflict. At the same time, it can be positively employed in post-conflict phases by supporting political, economic, and administrative reforms to change past structures which have contributed to conflict. Development co-operation can address both the consequences of environmental stress and the prevention of environmental stress at the different stages along the conflict continuum.
- To prevent deep-rooted societal conflicts, there are a number of possible sustainable development measures that should be implemented, ranging from sustainable economic growth and poverty reduction programs to strengthening equity, democratization and respect for human rights. The strengthening of local and sub-regional authorities and self-government bodies and the involvement of local participants in the development process are important prerequisites to enable the incorporation of the society into participatory structures. Democratic processes should be strengthened, allowing for the creation of a climate and the capacity for constructive interaction between civil society and government, a requirement for long-term sustainability.
- Multilateral and bilateral development co-operation is one approach to preventing conflict and ensuring sustainability. Development co-operation with the goal of sustainable human development needs to address specific population policies to offer solutions, for both environmental stress and rapid population growth. Economic decline or unequal economic growth may heighten tensions and contribute to the potential incidence or escalation of conflict. Therefore there is a need for shared and coordinated approaches to development co-operation among the various international donors and regional bodies to allow for more effective and appropriate conflict prevention and peace building. Selected forms of development assistance should be shaped by the varying potentials of the countries involved, according to the needs and interests of their populations. Preventing unnecessary debt burden and economic dependency is a critical component to sustainable development.
- The various institutions in the global community are asked to continue improving the different responses mentioned

above. The need to scale up popular development initiatives implies turning attention not only to national political structures, but also to developing sound long-term macroeconomic stabilization plans and continued financing for projects. This involves the need for improving the methods for organizations and related groups to exchange information, to create and maintain feasible budgets for project implementation, to adopt common approaches for economic and aid co-ordination, and to provide mutual support. It also entails building new forms of international co-operation via the reform of existing global institutions and for all donors to improve common standards for safeguards which prevent negative social impacts resulting from development projects.

FOREIGN AND SECURITY POLICY KEY FINDINGS

- As environmental conflict is a cross-sectoral issue, it also calls for foreign and security policy responses in order to prevent escalation and to address the underlying consequences of environmental stress. Security institutions should increase their awareness of the links between environmental stress and security in order to contribute to the prevention of environmental conflicts. Environmental issues are valuable in establishing dialogue and co-operation. They serve as confidence building measures that may be used to promote regional stability. The aim of the responses enumerated in the following is to establish links between environmental policy and foreign and security policy.
- This global, integrative and co-operative approach includes the contributions of foreign policy and security institution's specific instruments and mechanisms which can support the prevention or resolution of conflicts. Enhancing cooperation and interaction amongst existing institutions based on their respective charters, missions and capabilities is needed. This will require communication among foreign and security policy actors and institutions with relevant development and environmental organizations and stakeholders within civil society. While environmental issues may serve as triggers to conflict that threaten regional stability, co-operation on commonly shared environmental issues can establish dialogue and lines of communication which are valuable in reducing regional tensions over non-environmental issues. The establishment of regular interaction and consultation at the different levels of policy-making is required for co-operative security and for information sharing.
- Security institutions should contribute to information sharing on the basis of available data, including early warning and remote sensing data, according to their respective mandates. In order to establish communication and exchange between security organizations and other relevant actors in the field of environment, the opportunity to designate, within security organizations, an official responsible for such a task could be discussed. Foreign and security institutions can enhance and strengthen the positive activities of the parties involved through the provision of confidence building measures such as treaty monitoring and

short-term stabilization programs and impartial adjudication.

- As far as security institutions are concerned, existing prevention and dialogue mechanisms can be used to address the security impact of environmental issues, capitalize on the catalytic function of environmental co-operation for confidence building, and enhance dialogue and co-operation among themselves. The existing mechanisms of mediation, dispute settlement, conciliation, and arbitration in the foreign and security field should be employed in environmental conflicts as appropriate. This includes the use of dispute settlement mechanisms of existing environmental regimes such as the International Court of Arbitration, and other principle international and regional security institutions such as UN and OSCE. Within NATO, the North Atlantic Council, the Euro-Atlantic Partnership Council, the Mediterranean Co-operation Group, the special relationship with the Russian Federation and the Ukraine all provide opportunities for consultation and preventive diplomacy.
- In the post-crisis management stage, a monitoring process which includes environmental, political, economic, social and demographic factors and the perceptions of threat should be established as a long term stabilization measure. The international donor community, through short-term stabilization projects, can demonstrate their potential advantages of de-escalating or resolving the conflict. Post-crisis management mechanisms should also assess the environmental stress generated over the course of the crisis and its resolution. Furthermore, it should consider the social, economic, demographic and political consequences resulting from environmental stress.

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¹ The Pilot Study (including an English, French, and German Executive Summary) has been published and is available free of charge upon request from the CCMS Secretariat: NATO Scientific Affairs Division (Fax: *32 2 707 4232, email: ccms@hq.nato.int).

² The environment and security debate in policy and academic arenas has been fostered by the publications of Lester Brown, Thomas Homer-Dixon, Richard Ullman, Jessica Mathews, Norman Myers and Robert Kaplan.

³ These include the following research projects: the Project on Environment, Population and Security, conducted by Thomas Homer-Dixon of the Peace and Conflict Studies Program of the University of Toronto; the American Association for the Advancement of Science and the Environmental Conflicts Project (ENCOP) lead by Günther Baechler of the Swiss Peace Foundation and Thomas Spillmann of the Swiss Technical University.

⁴ Several projects, for example the International Peace Research Institute-Oslo (PRIO) under the head of Nils Petter Gleditsch, use quantitative methods to look for correlation between different types of environmental degradation and conflict.

⁵ The Global Environmental Change and Human Security Project (GECHS) of the International Human Dimensions Programme, University of Victoria, Canada under the Chair, Steve Lonergan and the Dutch National Research Programme on Global Air Pollution and Climate Change.

⁶ Several examples include the civil wars in Rwanda and Sudan, the escalation of the domestic political crisis in Nigeria, domestic and transboundary tensions on the Indian subcontinent, or conflicts about the distribution of water in the Middle East. In these examples, the inter-linkages between environmental stress and conflict have played an important component in the conflict dynamic.

⁷ Information on the Pilot Study Interim Report was also referenced in the Spring 1997 edition of the Woodrow Wilson Center's *Environmental Change and Security Project Report*, Issue 3.

State Failure Task Force Report: Phase II Findings

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Abstract: In response to a request from Vice President Al Gore in 1994, the CIA established “The State Failure Task Force,” a group of independent researchers to examine comprehensively the factors and forces that have affected the stability of the post-Cold War world. The Task Force’s goal was to identify the factors or combinations of factors that distinguish states that failed from those, which averted crises over the last 40 years. The study represents the first empirical effort to identify factors associated with state failure by examining a broad range of demographic, societal, economic, environmental, and political indicators influencing state stability. The Task Force found that three clusters of variables had significant correlation with subsequent state failures: (1) quality of life; (2) openness to international trade; and (3) the level of democracy. However, it is the interaction among these variables that provided the most important insights. Following are excerpts from Phase II of the State Failure Task Force findings.

INTRODUCTION

The initial report of the State Failure Task Force¹ developed a global model of the factors that contributed to serious political crises over the last four decades. In this report, we describe the progress of the Task Force on four additional research issues:

- **Confirmation and refinement of the global model.** This work included testing the model on an updated problem set, varying the set of control cases, and testing new or refined variables. In particular, we refined the level-of-democracy variable to examine partial democracies—countries that combine democratic and autocratic features—and their risks of state failure.
- **Fitting a model for Sub-Saharan Africa.** We also examined how the global model might best be modified to apply to the countries of Sub-Saharan Africa. To improve the accuracy of prediction, the Task Force undertook a pilot study of event sequences in a limited number of Sub-Saharan African cases of state failure and state stability to identify factors that could be precipitators or “accelerators” of crises.
- **Transitions to democracy and autocracy.** The initial study only examined cases of adverse or disruptive regime transitions. Because of the great interest in transitions to democracy, and the conditions that provide for stable or unstable democracy, the Task Force applied its methodology for analyzing risks of state failure to transitions toward and away from democracy. This report explores the preliminary findings of these analyses of the emergence and decay of democratic regimes.
- **The role of environmental factors in state failure.** It appeared from the Phase I results that environmental factors did not directly contribute to the risks of state failure. The Task Force believes that this finding was due, in part, to the paucity, poor quality, and lack of comparability of the national-level environmental data and, in part, to the impact of environmental factors on political conflicts being mediated by other economic, social, and political conditions. We, therefore, undertook special initiatives to assess the state of global environmental data and to develop a mediated, two-stage model of the role of environmental factors on the risks of state failure. In this model, it appears that environmental hazards—in states with underlying vulnerabilities and limited governmental or social capacity to respond to environmental deterioration—is associated with increased risk of state failure.

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I. CONFIRMATION AND REFINEMENT OF THE GLOBAL MODEL

Updating the Problem Set and Revising the Control Cases

One problem frequently encountered in statistical analyses such as the one performed in the initial phase of the State Failure project is that specific results may be highly sensitive to a particular data set.² If the results reflect statistical accidents, rather than underlying social and political forces, then slight changes in the data set may greatly shift the results. Adding or subtracting cases, or changing the particular control cases, could make some variables newly significant or remove some variables from the list of significant factors. Our first task in re-examining our results was to update the problem set to include state failure cases from 1994-96, and to select new control sets for testing this new data, to make certain that our initial results proved robust.

It was reassuring to find that despite significant revisions and updating of the problem set and analyses using two different sets of control cases and three distinct analytical techniques, the *same* three variables—infant mortality, trade openness, and level of democracy—emerged as the critical discriminators between stable states and state failures. Moreover, these analyses resulted in about the same two-thirds range of accuracy in discriminating failures and stable cases.

State Failure Cases³

The set of “state failure cases” in the initial State Failure Task Force Report was updated and revised by reexamining all of the cases and consulting area experts to identify recent events (1994-96) for inclusion.⁴ A number of cases in the initial problem set were dropped as being of insufficient magnitude or not meeting the precise definitions for failure events. A considerable number of new cases from recent years were added. However, none of these changes affected the global model results.

Control Cases⁵

The two new sets of control cases were obtained, as before, by randomly selecting to match every country-year that preceded a state failure by two years, three countries that were stable (experienced no crises for the succeeding five years). Changing the control sets made no difference to any of the global model results.

The three analytical techniques used were logistic regression, neural network analysis, and genetic algorithm modeling.⁶ Logistic regression and neural network analysis were used to estimate the “predictive” accuracy of our models. Genetic algorithm modeling was used to help identify candidate sets of variables, as a check on the univariate regression methodology, and to validate the suggestions of Task Force social science and area experts. Although each method relies on different assumptions and methods of estimation, all techniques converged on identifying the same three-factor model as the most efficient discriminator between stable and failure cases and yielded models with accuracy of predicting case outcomes of about two-thirds.

Figure 1: Phase I Analytic Process

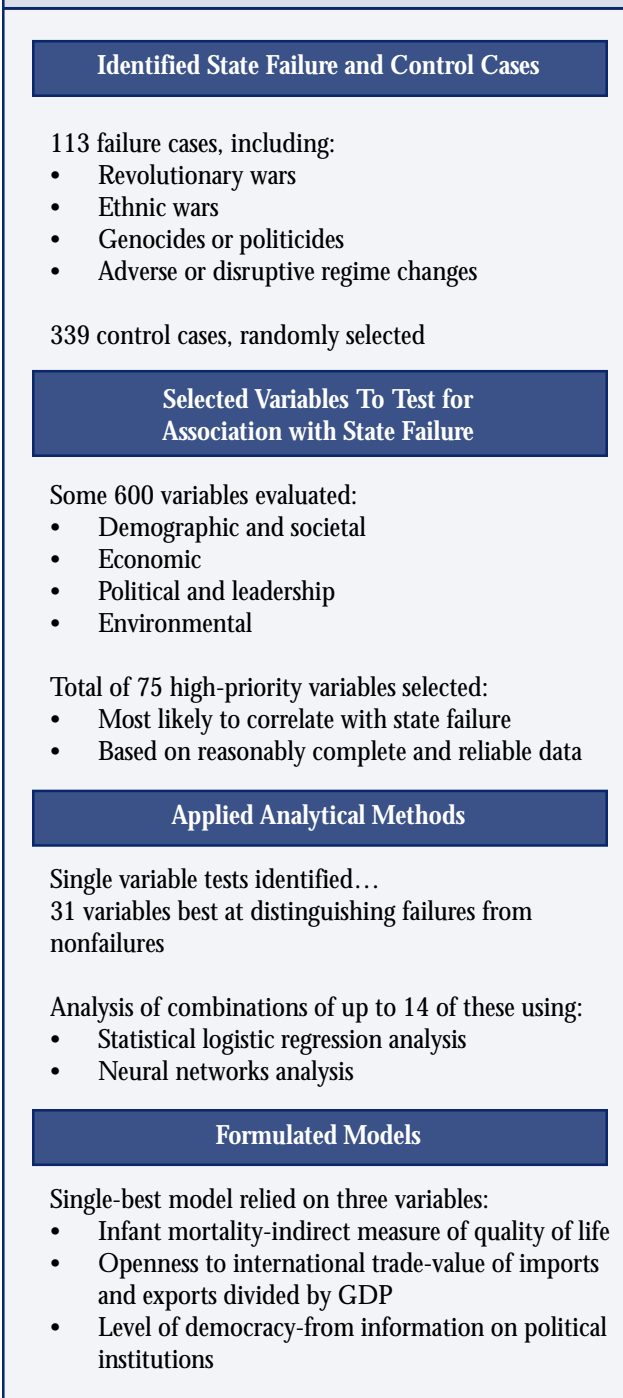


Table 1: Historical State Crises, by Type

Type of Crisis	Initial Phase	Phase II
Revolutionary war	41	50
Ethnic war	60	59
Regime transition	80	88
Genocide and politicide	46	36
Total Number of Consolidated Crises	113	127

Summary of Phase I Findings

The global model developed in the initial phase of the State Failure project and detailed in the task force report^a had the following features:

- It considered as “failures” four different kinds of political crisis—revolutionary wars, ethnic wars, adverse or disruptive regime transitions, and genocides or politicides—of varying magnitudes.
- The model examined all such crises that occurred during the years 1957-94 in countries whose population in 1994 was greater than 500,000 according to US Census Bureau data.^b
- The model compared conditions in countries that experienced crises at a time two years before the onset of a crisis with conditions in a matched set of stable—or “control”—countries that did not experience a crisis any time in the succeeding five years.

The global model was developed after examining hundreds of candidate factors suggested as theoretically relevant to state crises and rigorously analyzing 75 variables that had been deemed highly relevant by experts and had global data available for most of the 1955-94 period. The Task Force found that the most efficient discrimination between “failure cases” and stable states was obtained from a global model with only three factors: the level of infant mortality, the level of trade openness, and the level of democracy.

For this global model, a country’s infant mortality was measured relative to the world average level of infant mortality in a given year (to correct for a long-term global decline in infant mortality rates). Trade openness was measured as the total value of imports plus exports as a percentage of a country’s GDP. Countries were classified as either “More Democratic” or “Less Democratic” (autocracies) on the basis of their level of institutional democracy.

Using these three variables, roughly two-thirds of historical failure and nonfailure cases could be accurately classified. In addition, several interesting relationships among these factors were found:

- Although high infant mortality consistently appeared to be linked to state failures, we are certain that there is NO direct causal connection between infant deaths and ensuing political crises. Instead, infant mortality appears to be acting primarily as an indicator for the overall quality of material life. Like the canary in a coal mine, whose death indicates serious health risks to miners, high infant mortality serves as a powerful indicator of more broadly deleterious living conditions. This was clear since in some models, income level (real GDP per capita) worked almost as well as infant mortality in predicting state failure. In addition, both infant mortality and GDP per capita could be replaced by a bundle of health and welfare indicators, such as levels of nutrition, health care, and education with almost the same results. Infant mortality plays a key role in the global model not because infant deaths per se are a causal factor, but because infant mortality is the single-most-efficient variable for reflecting a country’s overall quality of material life.
- The effects of trade openness and infant mortality on risks of state failure were separate, not overlapping. Levels of trade openness and infant mortality showed almost no relationship. They varied independently and operated independently to affect state failure risks.
- Infant mortality had a much stronger impact on the risk of state failure in democracies, and had a relatively weak effect on the risk of failure in less democratic countries. Trade openness showed the reverse pattern; that is, trade openness had a stronger impact on the risk of state failure in less democratic countries and had a weaker, though still significant, impact on failure risks in more democratic countries.
- Three additional variables were found to be important indicators for specific kinds of political crises, although they did not emerge as important in the overall model. For adverse or disruptive regime changes, regime duration was a significant factor. New regimes were found to have substantially higher risks of further adverse or disruptive changes in their earlier years. For ethnic conflicts, both the ethnic character of the ruling elite and a youth bulge were found to be important factors. Ethnic wars were most likely when a single ethnic group dominated the ruling elite; this was true whether the dominant group came from a minority or majority ethnic group. In addition, the risks of ethnic war were greatly increased by the presence of a “youth bulge”; that is, a large percentage of 15 to 29-year-olds relative to the population age 30-54.

^a See Esty, Daniel C., Jack A. Goldstone, Ted Robert Gurr, Pamela Surko, and Alan Unger. Working Papers: State Failure Task Force Report. McLean, VA: Science Applications International Corporation, 30 November 1995.

^b Despite being over our population size cutoff, two countries were omitted: Eritrea (because data were not available) and Qatar. Two countries with populations below 500,000 using US Census Bureau data—Comoros and Luxembourg—were inadvertently included. These deviations from the rule did not contribute significant error; however, because the number of countries in the study was large.

Retesting With a Refined Level of Democracy Variable

The original global model, using infant mortality, trade openness, and level of democracy, measured democracy as a dichotomous variable, classifying countries as “more democratic” or “less democratic.” However, it became apparent that not all democracies were “equal” in their vulnerability to state failure. The rich and well-established democracies were extremely stable. In contrast, the more recently established and poorer democracies were at very high risk of failure. Given this result, and the interests of policymakers in democratic transitions, it was clearly important to better differentiate the democracy variable to examine the risks associated with “partial democracies.”

Using both the democracy and autocracy scales of the Polity III Global Data Set⁷, each country was classified as a full democracy, a partial democracy, or an autocracy, on the basis of its political institutions:⁸

- **Full democracies** have all the characteristics of liberal democracy—such as elections, competitive parties, rule of law, limits on the power of government officials, an independent judiciary—and few or none of the characteristics of autocracy.
- **Partial democracies** have some democratic characteristics—such as elections—but also have some autocratic characteristics, such as a chief executive with almost no constraints on his/her power, sharp limits on political competition, a state-restrained press, or a cowed or dependent judiciary. Most are countries that have recently transitioned toward democracy but have not yet fully replaced autocratic practices and institutions; some resemble what Fareed Zakaria has referred to in a recent *Foreign Affairs* essay as “illiberal democracies.”⁹ They are countries that have adopted some democratic practices but have not yet fully extinguished autocratic practices in their government.
- **Autocracies** have various characteristics of autocracy and few or none of the characteristics of democracies.

Guarantees of political rights are essential to institutionalized democracies, and most such

Figure 2: Global State Failures, 1955-96

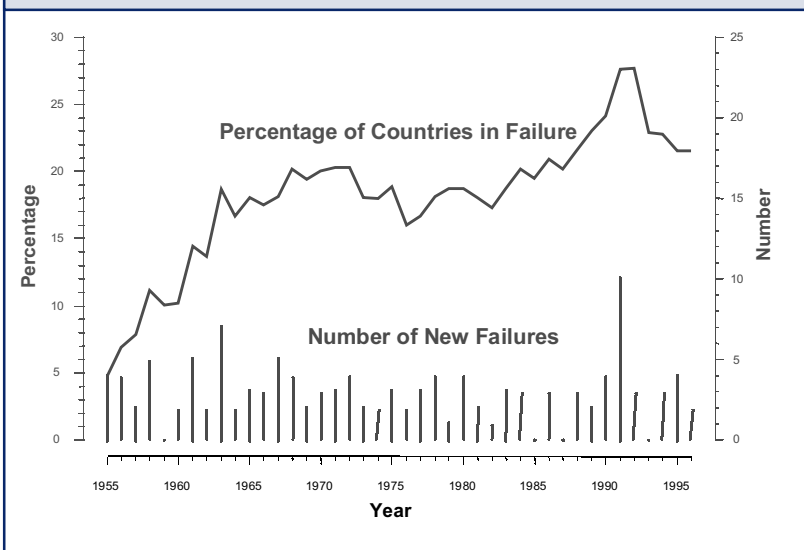


Figure 3: Number of Global State Failures by Type, 1955-96

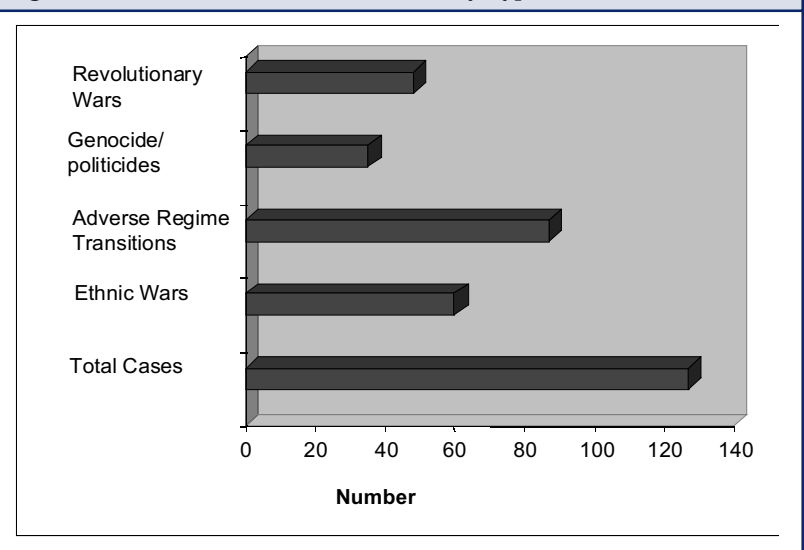


Figure 4: Global State Failures: Revolutionary Wars, 1955-96

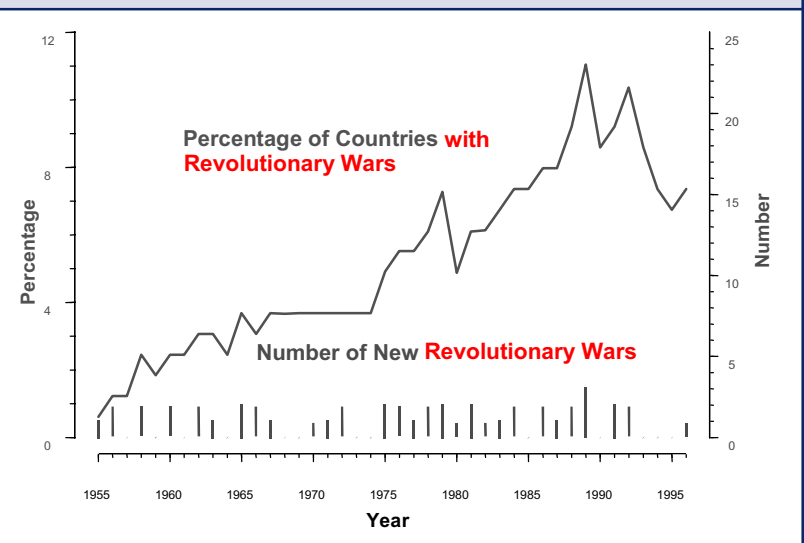


Figure 5: Global State Failures: Ethnic Wars, 1955-96

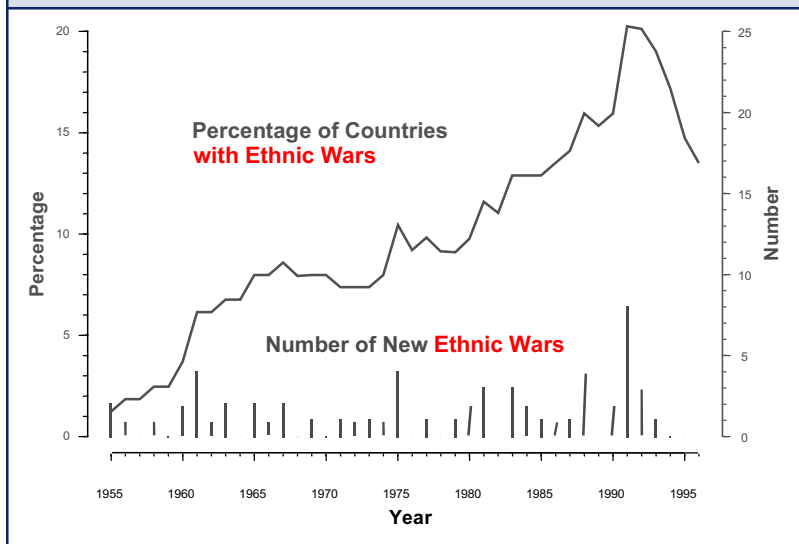


Figure 6: Global State Failures: Genocides and Politicides, 1955-96

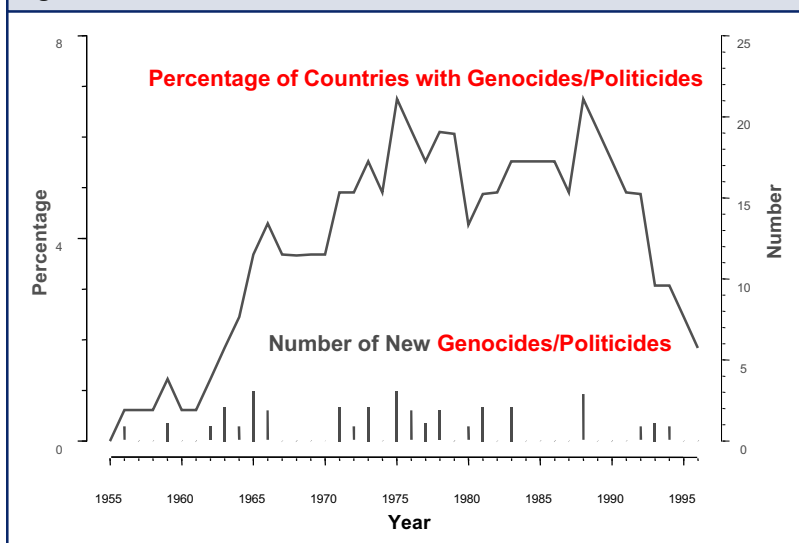
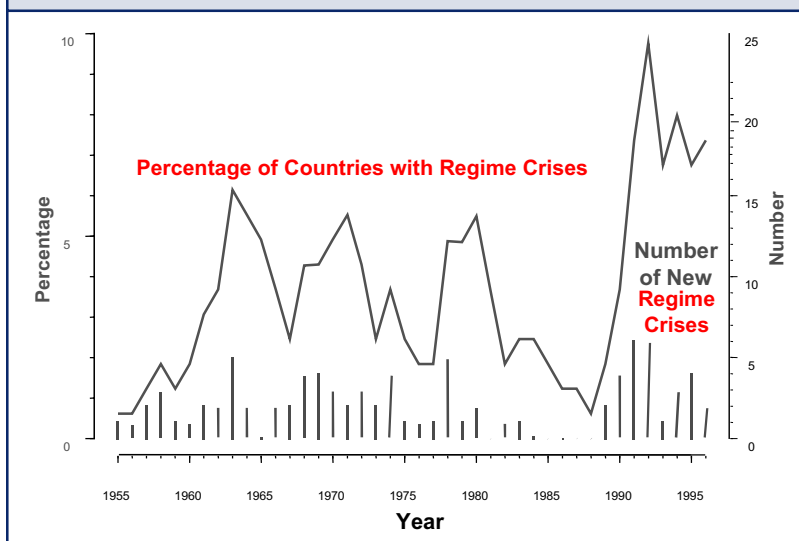


Figure 7: Global State Failures: Adverse or Disruptive Regime Changes, 1955-96



polities guarantee civil rights to all citizens. Therefore, while the democracy index is based on an analysis of political institutions, it correlates very closely (+.90) with Freedom House indices of political rights and civil liberties.

Results

Using the trichotomized measure of democracy, we discovered that *partial democracies are indeed far more vulnerable to state failure-type crises than are either full democracies or autocracies*. To be precise, when using this measure of democracy in the global state failure model—along with infant mortality and trade openness—to discriminate between stable and crisis cases, we find that partial democracies, other things being equal, are on average *three times* more likely to fail.

This refined version of the global model also confirms and makes more precise our estimates of the impact of trade openness and infant mortality (or overall quality of material life) on failure risks. Using the updated problem set, revised data, and new control cases, we find that states with above-average trade openness, other things being equal, have one-half the failure risk of countries with below-average trade openness. In addition, countries with above-world median levels of infant mortality have, other things being equal, three times the risk of state failure as compared with countries with below-median levels of infant mortality.

II. FITTING A MODEL FOR SUB-SAHARAN AFRICA

In the initial work of the Task Force, there was some concern that grouping advanced democratic nations and poor autocracies in one global analysis was like comparing apples and oranges. We have, therefore, applied our analytic techniques to testing the model on those crisis events and a matched set of control cases, drawn solely from the countries of Sub-Saharan Africa.¹⁰ In addition to testing all of the factors that emerged as significant in the initial report, we also examined a variety of additional factors that area experts suggested as specifically relevant to Africa, including a country's colonial heritage, conditions of ethnic discrimination, and level of urbanization.

The model that most effectively discriminated between crisis cases and control

Changes to the List of Historical State Crises

The set of crises used in the analyses reported here consists of 127 “consolidated” cases of state failures, of a single type, and complex events involving several different kinds of failure in sequence. This is 14 more than in the initial study. The differences, as compared with the list in the initial report, can be summarized as follows:

- **Revolutionary wars.** Examples of cases added are Islamist revolutionary movements in Egypt (1986 to present) and in Algeria (1991 to present) and the revolutionary war that overthrew Mobutu’s regime in Zaire (now Congo-Kinshasa) in 1996-97.
- **Ethnic wars.** Some ethnic rebellions from the original list were dropped because they were of very low magnitude; others were consolidated into other events. An example of a consolidated case is India, where multiple autonomy rebellions from 1952 to the present are treated as one event. Some internal wars meet the criteria of both revolutionary and ethnic wars, such as the civil war for control of the Afghan Government (1992-97) fought by political movements based on the Pashtuns, Tajiks, Uzbeks, and Hazaris.
- **Adverse or disruptive regime transitions.** A number of cases were dropped and others added. Examples of recent failures of democratic regimes now included in the data set are Albania 1996, Armenia 1994-96, Belarus 1995-96, and The Gambia 1994. Dates and descriptions of a number of historical cases also were changed on the basis of new and more detailed information.
- **Genocides and politicides.** No new cases since 1994 were identified, although indiscriminate attacks on civilians in Chechnya during 1994-96 approached the threshold for politicide. The cases dropped were ones in which killings of civilians did not, on closer examination, appear to be part of a systematic and sustained policy. For example, killings of Kurdish civilians by Kurdish militants and the Turkish military since 1984 are not numerous or widespread enough to meet the definitional criteria.

In addition, the three lowest magnitude ethnic wars—Papua New Guinea (Bougainville, 1988-97), Thailand (Malay Muslims, 1993-present), and the United Kingdom (Catholics in Northern Ireland, 1969-94)—were excluded from the global analysis of state failures because they were considered too small to count as major events. They were, however, retained in the data set for future study of ethnic conflicts.

^a Other conflicts categorized and counted as both revolutionary and ethnic wars are Angola 1975-97, Ethiopia 1975-91, and Somalia 1988 to the present.

Trends and Patterns in State Failures

Some types of state failure are particularly likely to lead to other failures, with several patterns emerging from the analysis of discrete and complex cases:

- There is a substantial risk that internal wars—revolutions and ethnic conflicts—will precede other state failures. Of 50 revolutionary wars, 19 (38 percent) are the first event in a complex case that subsequently included one or more adverse regime transitions, ethnic wars, or genocides. The percentage is higher for ethnic wars—44 percent (26 of 59) of these are the first event in a complex case.
- Adverse and disruptive regime transitions are less likely than revolutionary or ethnic wars to lead to other kinds of state failures. Nearly half (41 of 88) are discrete events; less than one-fifth (15 of 88) proved to be the first stage in a complex event.
- Genocides and politicides almost always are a consequence of other kinds of state failure. Usually the connection is clear-cut, for example, when an authoritarian regime seizes power and sets out to eliminate political opponents (as in Chile 1973-76) or when revolutionary or ethnic challenges prompt a regime to use extreme measures to reestablish security (as in Indonesia against suspected Communists in 1965-66 and against East Timor nationalists after 1975). In 1996, the only ongoing episode was in Sudan.

There also are distinctive trends in the onset and frequency of each type of state failure. In the aggregate, the number of states in failure increased up to the end of the Cold War, but in the mid-1990s began to decline. Revolutionary wars have declined in frequency; whereas, ethnic wars have tended to increase, most sharply so in the immediate aftermath of the Cold War. Adverse and disruptive regime transformations, on the other hand, have no distinct long-term trend but show a sharp upward spike in the 1990s, mainly due to failures of new and partially democratic regimes in Africa and some of the post-Communist states.

Table 2: Global Model Results

Key Variables	Countries at Greater Risk	Countries ;
Material Living Standards	Infant mortality above median	Infant morta
Trade Openness (imports+exports)/ GDP	Below median	Above medi;
Level of Democracy	Partial democracies	Autocracies;

Figure 8: Countries by Level of Democracy, 1996

Full Democracies		Partial Democracies	Autocracies	
Argentina	Lesotho	Bosnia and Herzegovina	Afghanistan	Nigeria
Australia	Lithuania	Cambodia	Albania	North Korea
Austria	Madagascar	Comoros	Algeria	Oman
Bangladesh	Malawi	Congo, Republic of the ^a	Angola	Rwanda
Belgium	Mali	Ethiopia	Armenia	Saudi Arabia
Benin	Mauritius	Fiji	Azerbaijan	Serbia and Montenegro
Bolivia	Mongolia	Georgia	Bahrain	Singapore
Botswana	Namibia	Ghana	Belarus	Somalia
Brazil	Nepal	Guinea-Bissau	Bhutan	Sudan
Bulgaria	Netherlands	Guyana	Burkina Faso	Swaziland
Canada	New Zealand	Honduras	Burma	Syria
Central African Republic	Nicaragua	Jordan	Burundi	Tajikistan
Chile	Norway	Kyrgyzstan	Cameroon	Togo
Columbia	Panama	Malaysia	Chad	Tunisia
Costa Rica	Papua New Guinea	Mexico	China	Turkmenistan
Cyprus	Philippines	Moldova	Congo, Democratic Republic of the ^b	Uganda
Czech Republic	Poland	Mozambique	Cote d'Ivoire	United Arab Emirates
Denmark	Portugal	Pakistan	Croatia	Uzbekistan
Dominican Republic	Romania	Paraguay	Cuba	Vietnam
Ecuador	Slovenia	Peru	Egypt	Zimbabwe
El Salvador	South Africa	Russia	Gabon	
Estonia	South Korea	Senegal	The Gambia	
Finland	Spain	Sierra Leone	Guinea	
France	Sweden	Slovakia	Indonesia	
Germany	Switzerland	Sri Lanka	Iran	
Greece	Taiwan	Tanzania	Iraq	
Guatemala	Thailand	Yemen	Kazakhstan	
Haiti	The Former Yugoslav Republic of Macedonia	Zambia	Kenya	
Hungary			Kuwait	
India	Trinidad and Tobago		Laos	
Ireland	Turkey		Lebanon	
Israel	Ukraine		Liberia	
Italy	United Kingdom		Libya	
Jamaica	Uruguay		Mauritania	
Japan	Venezuela		Morocco	
Latvia			Niger	

^a Congo (Brazzaville)

^b Congo (Kinshasa)

cases in the Sub-Saharan Africa model had six significant elements.¹¹

Level of Democracy

As with the general model, partial democracies were most vulnerable to state failure. This result again showed a high degree of statistical significance. However, while in the global model full democracies and autocracies were about equally stable, in Sub-Saharan Africa autocracies were slightly more stable than even full democracies—presumably because in Africa full democracies have greater problems managing ethnic conflicts and fluctuations in material living standards than do the full democracies of Europe and North America. In addition—and this is one of our most striking results—we found that the vulnerability of partial democracies to state failure was especially great in Sub-Saharan Africa and much higher than in the world at large. The precise results of this model were that in Sub-Saharan Africa, other things being equal, partial democracies

were on average 11 times more likely to fail than autocracies. Full democracies were far less vulnerable; other things being equal, they were on average more than twice as likely to fail than autocracies.

Trade Openness

Trade openness is also confirmed as a highly statistically significant correlate of state failure. The greater a country's trade openness, the *less* likely that country is to experience a major state crisis. As in the global model, other things being equal, countries in Sub-Saharan Africa that were above the median in trade openness were on average only about one-half as likely to fail as countries below the median.

Change in Material Living Standards

In the global model, which compared countries with a huge

Key Variables

Key variables measure the following items:

- **Infant mortality.** Although this variable directly captures reported deaths to infants under one year old per thousand live births, it also serves as an indirect measure of a host of broad-based material standard of living and quality-of-life indicators. Infant mortality is strongly correlated with a variety of other variables encompassing economic performance, education, social welfare, environmental quality, and democratic institutions.
- **Trade openness.** This variable is a ratio that measures the value of imports plus exports divided by GDP. Of the other variables analyzed in the first phase of this project, it correlated only with the density of roads—generally accepted as an indicator of economic development—and population size.
- **Level of democracy.** This variable is constructed from information on political institutions. Democratic regimes have competitive political participation, elected chief executives, and significant checks on executives' exercise of powers. The variable correlates closely with indicators of civil and political liberties and also with measures of economic well-being.
- **Regime durability.** This variable is a count of the number of years since the last major, abrupt change in regime. Abrupt shifts toward or away from democracy count as regime changes and reset the duration count to zero. Regime changes that follow state breakdown and civil war also reset the count. Nonviolent transitions from one authoritarian regime to another, or one democratic regime to another, do not register on this variable. Regime duration is correlated with several indicators of economic development, including per capita GDP.
- **Youth bulge.** This variable is a ratio of the population in the 15- to 29-year age bracket relative to that in the 30 to 54-year age group. It correlates with six other variables related to economic development and education.
- **Ethnicity of the ruling elite.** This is a variable that compares the ethnic composition of the ruling elite to that of the population at large in an ethnically divided society. It indicates whether the elite demographically represents a minority group, a majority group, or the population as a whole. It is uncorrelated with other variables in this study.
- **Annual change in GDP per capita.** This variable indicates the direction of recent changes in material welfare. It is measured by taking the change in real GDP per capita from the previous year. Positive change indicates growth; negative change indicates economic decline.
- **Level of Urbanization.** This variable measures the proportion of total population that is living in cities of 100,000 inhabitants or larger. It captures the degree to which a country's overall population is urban.
- **Colonial heritage.** This variable compares the impact of French colonial heritage to the average impact of all other former colonial powers in Sub-Saharan Africa. It has often been opined that different colonial powers left (or are still active in creating) different degrees of political stability in their former colonies. While there are not enough cases to support statistical tests for every past power—Britain, France, Germany, Italy, Belgium, and Portugal—on the recommendation of area experts, we chose France as a country with many former colonies and a still active role in most of the period covered.
- **Ethnic discrimination.** This variable is derived from information on ethnic and religious groups that are economically or politically disadvantaged because of present or past practices of discrimination by dominant groups. The indicator signifies the existence of at least one politically significant communal group subject to significant discrimination or that sought greater political autonomy from the state in which it was situated.
- **Land burden.** This variable is the number of farmers per unit of cropland multiplied by the ratio of farmers to the total number of workers. It is highest in countries where a large proportion of the population is dependent on agriculture, but arable land is limited.
- **Deforestation rate.** This variable measures the annualized rate of change in forest area from 1980 to 1990, using data provided by the UN Food and Agriculture Organization.
- **Telephones per capita.** This variable measures the number of telephone lines in a country divided by the total population. It is used as a rough indicator of a country's capacity to respond to "shocks" or changes. A country's ability to install and operate a major physical infrastructure reflects, we believe, its general ability to "get things done." In addition, there are reasons to think that communication capacity is especially important for effective responses to environmental problems. Telephones per capita correlates highly with per capita GDP level, although the annual changes in the two variables are not correlated.
- **Soil degradation.** This variable combines information about the severity and extent of soil degradation within a country, based on an assessment completed in 1990. The assessment utilized regional experts to estimate degradation over the previous five to ten years.
- **Population in subsistence agriculture.** This variable is used to measure the degree to which a country's population is vulnerable to either deforestation or soil degradation. Subsistence agriculture is an activity that indicates high poverty and high dependence on the health of terrestrial ecosystems. The percent of population dependent on subsistence agriculture is inversely correlated with the level of GDP per capita, although the annual changes in the two variables are not correlated.

Figure 9: Sub-Saharan Africa State Failures, 1955-96

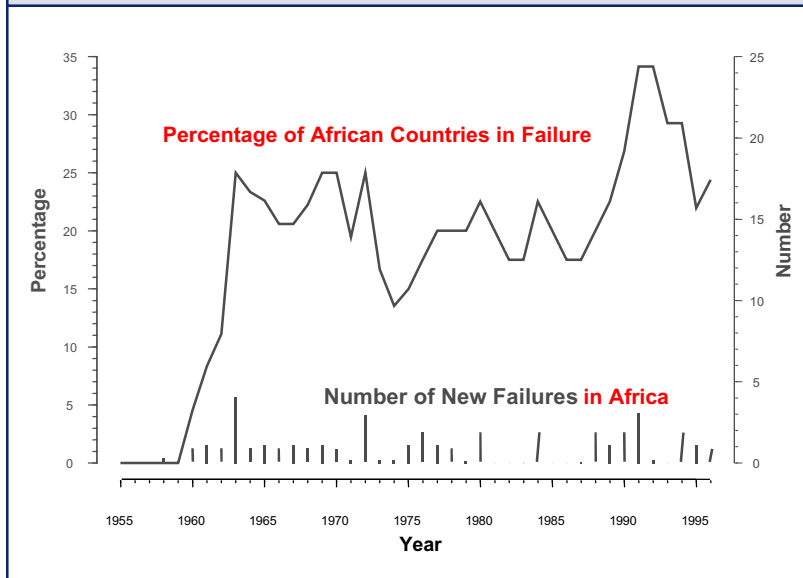
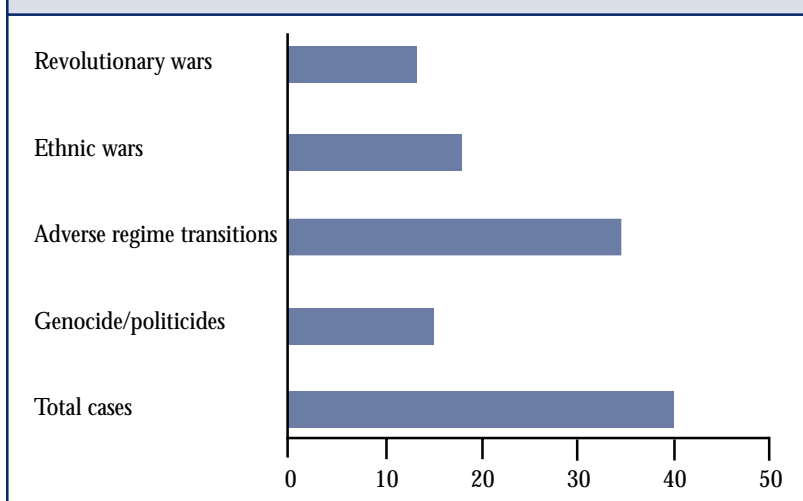


Figure 10: Number of Sub-Saharan African State Failures by Type, 1955-96



range of living standards, the level of material living standards—as measured by infant mortality (or by GDP per capita or a basket of health and welfare measures)—was found to be a powerful discriminator of risks of state failure. In the Sub-Saharan African cases, where most countries are clustered at the low end of the scale of material living standards, recent changes in living standards emerged as a stronger indicator of failure risks than did absolute levels. In particular, other things being equal, countries that had experienced a negative annual change in GDP per capita were on average twice as likely to experience a serious political crisis two years later than countries that had had a positive change in GDP per capita.¹²

Colonial Heritage

The Task Force—along with Sub-Saharan Africa regional experts—discussed the possibility that differences in colonial heritage affect vulnerability to state failure. Although states of all varieties of colonial background did experience problems, the data showed that, holding other factors equal, former French colonies on average had only one-third the risk of failure of other African countries. This was a firmly statistically significant result. However, we note that until recently France has also maintained a higher level of engagement—political, financial, and military—with its former colonies than most other powers. As these levels of engagement decline, it may well be that French colonial heritage will become less significant as a moderating factor in regard to state crises.

Variables Tested for the Sub-Saharan Africa Model

Economic

Trade openness
GDP per capita
Change in GDP per capita
Land burden
Urban population
Population density
Change in reserves

Political/leadership

Separatist activity
Democracy
Change in democracy level
Economic discrimination
Political discrimination
Ethnic discrimination
Party fractionalization
Parliamentary responsibility
Party legitimacy

Demographic/societal

Youth bulge
Colonial heritage
Labor force
Annual change in employment
Secondary school enrollment ratio
Ethno-linguistic fractionalization
Amnesty International political terror scale
US State Department political terror index
Government repudiation of contracts
Risk of expropriation

Agricultural

Cropland area
Irrigated land
Population in agriculture
Population in subsistence agriculture

Energy

Commercial energy use
Commercial energy production

A Pilot Event-Data Analysis

The general models of state failure identify risk factors associated with serious political crises, but they are less useful in forecasting outcomes for individual countries. To better understand the factors that might precipitate a failure in a high-risk country during the two-year period before a crisis, the Task Force conducted a pilot analysis^a of events in twelve Sub-Saharan African cases—four ethnic wars, four regime crises, and four control cases—since the mid-1980s.^b We used the Global Events Data System at the University of Maryland—which relies on Reuters' international wire service—to track daily events over a period of two years before the onset of state failure (or, for the control cases, during a two-year period in which no state failure occurred) and to identify:

- **“Accelerators.”** Feedback events that affect the general conditions underlying conflict development, which also have a cumulative interaction effect that may increase escalation.
- **“De-accelerators.”** Events such as negotiations and policy reforms that are likely to de-escalate a crisis.
- **“Triggers.”** Events that are likely to propel a high-risk situation to the next phase of crisis escalation.

Based on previous analyses using this approach, we would expect to observe an increase in the number and severity of accelerator events shortly before the onset of state failure.

The method analyzes political events over time, with separate models for ethnic warfare and regime crisis. Examples of accelerators of ethnic warfare are “attacks on or threats to core symbols of ethnic group identity” and “external support for communal group objectives from international actors.” For example, whereas external support for communal groups is typically thought to be a factor that facilitates conflict escalation, tracking accelerators allows us to trace the ebb and flow of the types, quality, and quantity of support over time.

On the basis of the pilot study, the Task Force concluded that the results of the analysis are sufficiently interesting to merit further study. Although the sample size was too small for rigorous statistical analysis, the time clusterings of events for countries in crisis were more similar to those of other countries in crisis—either regime crisis or ethnic war—than to countries not in crisis,^c suggesting that further analysis by methodologists and area experts may be fruitful. A side benefit of the analysis was that it allowed the start dates of four of the crises to be adjusted, because—based on the sequence of daily events—some of the crises apparently began either earlier or later than the Task Force had previously specified in the list of historical crises. In general, the pilot study results demonstrate that monitoring accelerators is a potentially powerful analytic tool that allows analysts to observe the development of crises in high-risk countries in fine-grained steps, rather than being constrained by the limitations of yearly data.

The graphic illustrates the pattern of accelerators in **former Zaire**, a case of ethnic war beginning in April 1992.^d It shows a gradual buildup of events from April 1990 to a peak in October 1991, but deaccelerators seem to check complete breakdown up to that point. Accelerators of ethnic warfare (disunity with the elite and elite responses to threats) reach a high level from January to March 1992.

^a The accelerators approach used here is derived from a study of the accelerators of genocide and politicide reported by Barbara Harff, “Early Warning of Genocide: The Cases of Rwanda, Burundi, and Abkhazia.” In Ted Robert Gurr and Barbara Harff, *Early Warning of Communal Conflicts and Genocide: Linking Empirical Research to International Responses*. Tokyo: United Nations University Press, Monograph Series on Governance and Conflict Resolution No. 05, 1996.

^b For a description of the cases, see appendix B.

^c See appendix B for details on the method.

^d For details on the Liberia case, see appendix B, figure B-1: Liberia: Regime Crisis Case.

Level of Urbanization

Although the absolute level of GDP per capita was not a significant predictor of state failure, when combined with the level of urbanization—as measured by the proportion of population living in urban areas—the impact was statistically significant. Having a high proportion of urban population increased the risk of political crisis only in countries whose GDP per capita was below the average for Sub-Saharan Africa. Among such low GDP per capita nations, the risk of failure was twice as high as for countries

with higher levels of urban population.

Interestingly, the effect of the share of population in urban areas on failure risks becomes favorable in countries with higher levels of GDP per capita. Other things being equal, for countries that had—by Sub-Saharan African standards—above average GDP per capita, those that also were above average in their proportions of urban population were only one-fifth as likely to fail as those that had lower levels of urbanization. In sum, countries with either high GDP per capita and higher levels of urbanization—relative to other Sub-Saharan African countries—or low GDP per capita and low urbanization were more stable; it was only when relative levels

of urbanization were “out of balance” with relative levels of economic development that political risks increased.

This confirms the bimodal effect of urbanization on political risks described by Jack Goldstone in his work on early modern European states;¹³ namely, that if the economy is doing well, and urbanization takes place in the context of good employment opportunities, then migrants to cities are socialized into an urban context that they view as rewarding hard work and promising a better future. This is politically stabilizing. In contrast, if the economy is doing poorly and urban migrants find poor opportunities for employment, then migrants are socialized into an urban context that is frustrating and that they view as hostile and unresponsive. This situation greatly aggravates the risks of political crisis.

Ethnic Discrimination

The presence of communal groups that are subject to significant economic or political constraints appears to increase the risks of political failure, all other things equal, by almost a factor of two. However, this result was only weakly statistically significant and should be viewed as suggestive rather than conclusively demonstrated.

The Sub-Saharan Africa model had roughly the same accuracy as the global model—about two-thirds—in discriminating between state failure and stable cases¹⁴ but resulted in substantially reduced “false positives” for Sub-Saharan African countries.¹⁵

Table 3: Sub-Saharan Africa Model Results

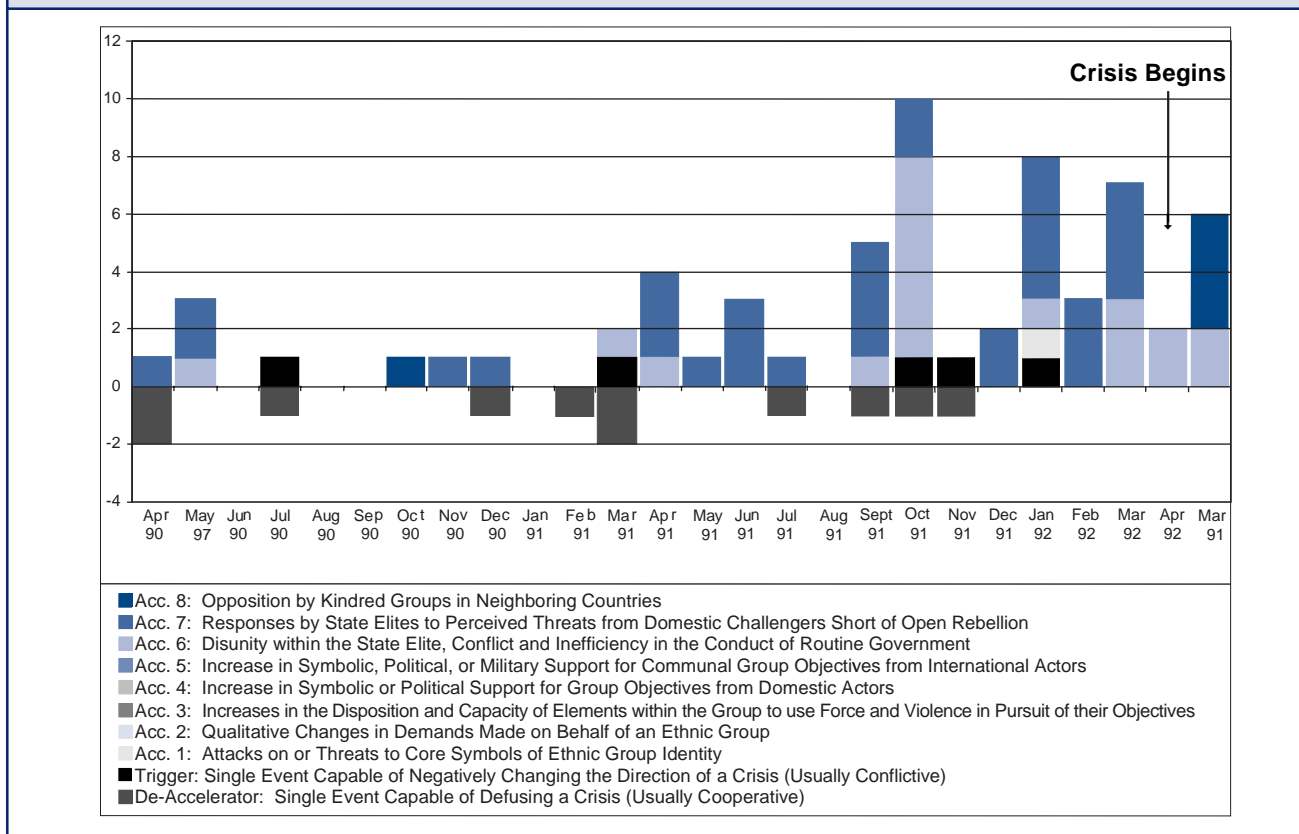
Key Variables	Countries at Greater Risk	Countries at Lesser Risk	Relative Risk of Failure
Material Living Standards Change	Negative annual GDP per capita change	Positive annual GDP per capita change	2.0
Trade Openness (imports+exports)/GDP	Below median	Above median	1.9
Level of Democracy	Partial democracies	Autocracies	11.0
	Full democracies	Autocracies	2.6
Level of Urbanization	High urbanization and low GDP per capita	Low urbanization and low GDP per capita	2.0
	Low urbanization and high GDP per capita	High urbanization and high GDP per capita	4.9
Colonial Heritage	Not French	French	2.6
Ethnic Discrimination	Higher	Lower	1.9

III. TRANSITIONS TO DEMOCRACY AND AUTOCRACY

Trends

Institutionalized democracies have increased significantly in number since the late 1980s. At the end of the Cold War, the number of full democracies in the world system exceeded the number of autocracies for the first time since World War II. As of 1991, full democracies numbered 57, compared with 55 autocracies. By 1996 the number of full democracies

Figure 11: Former Zaire Ethnic Conflict (Accelerators, De-accelerators, and Triggers)



had increased to 71, whereas autocracies had declined to 49. The post-Cold War transition—which Samuel Huntington calls “the third wave of democratization”¹⁶—also has seen the establishment of a large number of partial democracies. In 1996 there were 27 such polities, double their numbers in the 1980s.

The long-run trend by which democracies have come to outnumber autocracies has two sources. One is the significant number of new democracies established in the post-Communist states. The other, and more important factor, is that many countries that tried and failed to establish democratic polities tried again. South Korea, for example, shifted from autocracy to full democracy in 1960, but a year later lapsed back to autocracy. In 1963 it shifted again to partial democracy but returned to autocratic rule in 1980. South Korea’s most recent transition began in the mid-1980s and was completed in 1988 when it became, and has thus far remained, a full democracy. In short, South Korea accounts for three transitions toward democracy and two cases of backsliding to autocracy. Pakistan, Turkey, Thailand, and Bangladesh—all full or partial democracies by 1997—also made three or more democratic transitions between 1955 and 1996.

Transitions are defined in terms of shifts among the three categories of regime type—full democracy, partial democracy, and autocracy. For the analysis of trends, the Task Force defined transitions to democracy as shifts from autocracy to either partial or full democracy as well as shifts from partial to full democracy.¹⁷ These transitions are said to be *stable* if the regime does not regress toward autocracy in the first five years after the initial transition.¹⁸ A regime is *unstable* if it regresses toward autocracy within five years. Thus, a country that changes from autocracy to partial democracy, then two years later transitions from partial to full democracy, is counted as having made one stable transition. A country changing from partial democracy to autocracy and remaining an autocracy for five years is counted as a stable downward transition; whereas a country that shifts from democracy to autocracy, then within five years returns to partial democracy, would be counted as an unstable downward transition.

Table 4: Democratic Transition Success Rates, by Region

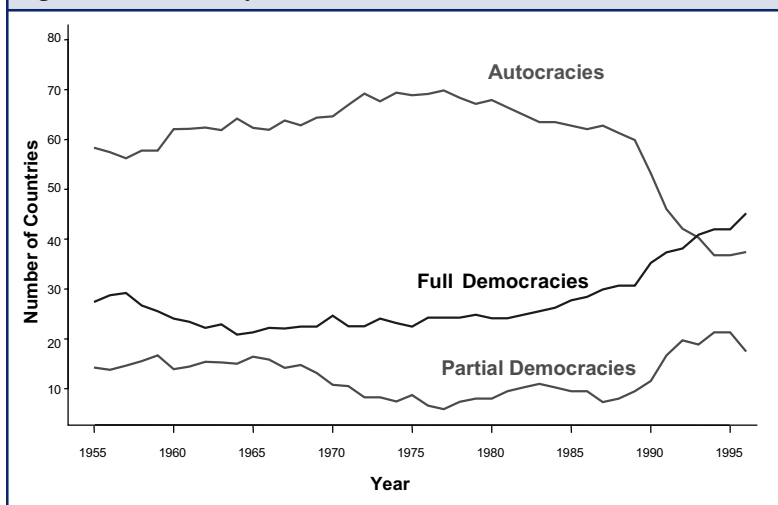
Region	Total Transitions, 1957-1991	Percent That Survive for Five Years or More
Europe	14	93
Latin America	24	83
Newly Independent States	12 ¹	67
Asia	14	64
Africa	10	40
TOTAL	74	73

¹ Uzbekistan, Turkmenistan, and Tajikistan did not make initial transitions to democracy.

Four major observations can be made about the evidence:

- **Many democratic transitions do not endure.** Between 1957 and 1991 there were 54 durable transitions—that persisted for at least five years—toward full or partial democracy in independent countries, including 16 democracies established during the period 1989-91 in the Soviet and Yugoslav successor states. Another 20 democratic transitions were attempted between 1957 and 1991 but reverted to autocracy during their first five years. An additional 33 democratic failures—durable democracies that shifted toward autocracy for at least five years—occurred.
- **Post-Cold War democratic transitions may be more durable than earlier ones.** Before 1986, 24 regimes made durable transitions toward democracy, more than offset by 44 failures—reversion to autocracy—of full or partial democracies.¹⁹ The 38 durable transitions toward democracy between 1986 and 1991, however, were offset by only nine failures. A more precise comparison looks only at the outcome of democratic transitions that were attempted between 1957 and 1991. Of the 36 transitions that occurred before 1986, 12 countries (33 percent) reverted to autocracy within five years; whereas, for the 38 transitions in 1986 or later, only eight (21 percent) failed to survive. The short-term survival of democratic transitions thus appears to have increased slightly in the post-Cold War period, although the difference is not quite statistically significant.
- **World regions differ substantially in the success of democratic transitions.** Before 1986, Africa south of the Sahara had only one durable democratic transition and the record in Asia was only slightly better. In Latin America and the Caribbean, half of the pre-1986 transitions endured to early 1997. The success rates of recent democratic transitions are highest in Asia—where Cambodia is the only recent democratizing regime to backslide (in 1997)—and in Latin America. Despite a great deal of concern about the durability of the post-Communist states, 14 of the 19 that became partial or full democracies during 1989-91 have maintained democratic regimes. The exceptions are Azerbaijan and Armenia—where democratic governance was undermined by civil war—and Belarus, Kazakhstan, and Albania where it was subverted by chief executives who dissolved or emasculated legislatures that constrained their power.
- **Partial democracies are less durable than either autocracies or full democracies.** There are inherent political contradictions in most partial democracies—a tension between demands for greater and more effective participation on the one hand, and the desire of political elites to maintain or enhance their control. Most partial democracies transition within a decade or so either to full democracies or revert to autocracy.

Figure 12: Democracy Trends, 1955-96



Variables Tested for the Democratic Transition Models

Demographic

- Infant mortality, normalized
- Secondary school enrollment ratio
- Youth bulge, normalized
- Annual change in infant mortality

Political/leadership

- Ethnic character of ruling elite
- Years national leader was in office
- Regime durability
- Democracy minus autocracy index
- Autocracy index
- Regime duration
- Political rights
- Civil liberties

Economic

- Real investment share of GDP, normalized
- Trade openness
- Land burden
- Real GDP per capita, normalized

Models

In developing statistical models of transitions, the Task Force used a narrower definition of transition than it did for the analysis of trends.²⁰ Because crossing the autocracy-democracy divide was thought to be the more critical transition, and because the number of shifts between partial and full democracy was relatively small, the Task Force decided to limit its statistical analysis to transitions from autocracy to partial or full democracy and those from partial or full democracy to autocracy. In this analysis, models were developed that attempted to answer two research questions:

- What social, economic, and political conditions differentiate countries that make durable democratic transitions from others?
- What conditions characterize countries in which democratic regimes fail to succeed?

These questions are different from the issue of the conditions of “state failure” because the democratic transitions are defined and measured differently from state failures. Moreover, few transitions from autocracy to democracy, and only about half of the transitions from democracy to autocracy, meet the criteria of adverse regime transitions.

Transitions from Autocracy to Democracy.²¹

A total of 39 transitions to democracy were available for analysis and were matched with 68 control cases—autocracies in the same region that did not shift to democracy during the matching years.²² Experts examined the state failure database to identify variables that they thought should contribute to democratic transitions, and statistical tests were used to determine which of them differentiated significantly between the transitions and the controls.

Then various combinations of these variables were analyzed to determine the most efficient set. From more than 60 models analyzed, the one with the highest accuracy included two variables: relatively low land burden—an index that is highest for

Table 5: Democratic Transition Model Results

Autocracy to Partial or Full Democracy		
Key variables	Countries More Likely To Transition	Countries More Likely To Transition
Regime durability	Below median	Above median
Land burden	Below median	Above median
Partial or Full Democracy to Autocracy		
Key variables	Countries More Likely To Transition	Countries More Likely To Transition
Infant mortality, normalized	Above median	Below median
Regime durability	Below median	Above median

Investigating Links Between Conflict and the Environment

The efforts reported here build on a thriving set of research programs at a variety of institutions investigating the environment's role in violent conflict. Early hypotheses centered on environmental degradation and resource depletion directly precipitating violent conflict. Two major sets of case studies in the 1990s suggested that environmental causal pathways to conflict were more complicated. Environmental variables—which alone were neither necessary nor sufficient to cause conflict—were found to play multiple roles along a complex causal chain involving intervening social, political and economic variables.

- *Dr. Thomas F. Homer-Dixon of the University of Toronto found that when “environmental scarcity” of renewable resources did play a causal role, it was most likely to be through impacts that were “sub-national, persistent, and diffuse.” These impacts indirectly contributed to acute conflict by exacerbating more familiar sources of conflict—for example, ethnic divisions or relative deprivation.*
- *Drs. Guenther Bachler and Kurt Spillman, codirectors of the Swiss Environmental Conflicts Project (ENCOP), identified seven types of “environmentally-induced conflict” in a typology that distinguished levels of conflict and parties to conflict. ENCOP case studies also highlighted “environmental conflicts” as traditional conflicts “induced by environmental degradation.”*

As the number of case studies accumulated through these projects and other efforts such as those at the International Peace Research Institute, Oslo, and Columbia University, it became clear that intervening “institutional capacities,” or coping mechanisms, to address environmental challenges were critical in determining whether conflict would occur.

Until very recently, a gap in the research program has been the use of statistical analysis examining a large number of countries over time. The need for this kind of study is made clear by the highly qualified conclusions that the case studies produced. The work of the State Failure Task Force is one of only two such studies undertaken to date, the other being the work of Hauge and Ellingsen. In addition, ours is the only study to explore systematically the interactions between environmental change, vulnerability, and capacity in this context, and the only study to use quantitative measures to attempt to uncover these relationships.^a

^a See appendix D for selected bibliography.

countries with largely agricultural populations and scarce cropland—and low durability of the regime before the transition. This model correctly classified two-thirds of the cases in a set of 39 transitions and 68 controls. The best three-variable model correctly classified two-thirds of the cases and showed that durable democratic transitions were most likely when infant mortality was relatively stable, autocracy was already restricted, and land burden was low.

These models suggest some interesting substantive findings. The regimes most likely to undergo stable democratic transitions during the last 40 years:

- Already had shifted away from purely autocratic forms of government.
- Tended to have had less durable regimes; that is, they had attempted previous political experiments.

Transitions were also more likely to occur in societies with greater economic capabilities (measured by low land burden) and less short-term variability in quality of life (measured by changes in infant mortality).

Once a country has transitioned to democracy, the Task Force found that the likelihood that the transition will be stable depends on several factors:

- Countries whose democratic transitions are most likely to succeed have greater annual improvement in infant mortality, a lower level of infant mortality, greater trade

openness, a higher proportion of the population in urban areas, and more years of experience as a democracy.

Transitions from Democracy to Autocracy.²³

A total of 35 democratic failures—transitions from full or partial democracy toward autocracy—were available for analysis and were matched with 98 control cases;²⁴ that is, democratic countries in the same region that did not fail during the matching years. The two-variable model with the highest accuracy—nearly three-quarters of cases correctly classified—included infant mortality normalized by world average and regime durability. High infant mortality and low regime durability characterized transitions to autocracy.

It is not surprising that newer democracies—those of low durability—are more likely to fail than long-lived ones, based on the evidence that many democracies fail during their first five years. The role of infant mortality—and by extension, other aspects of quality of life—in raising the prospects for democratic survival is consistent with the results of the general models of state failure.

IV. THE ROLE OF THE ENVIRONMENT IN STATE FAILURE

Goals and Hypotheses

We set out to determine whether the proposition that there is a measurable connection between environmental degradation

and state failure was true. Our goals were to:

- Test the argument with data drawn from all countries, over an appropriate time period. Although a number of scholars in recent years have claimed that there is a connection between environmental degradation and political violence, these claims have been largely based on individual case studies.²⁵ These individual studies, albeit largely of high quality, fail to rigorously test the correlative claim.
- Determine whether it was possible to offer analytical guidance to decisionmakers as they face new security challenges. US policymakers—in the State Department, National Security Council, Defense Department, and other agencies—have increasingly framed environmental issues in security terms.²⁶ No clear consensus exists, however, as to what kinds of environmental changes are most important, what factors make a given level of environmental change more or less dangerous, or what types of policy interventions are most promising.
- Construct a specific model, and test it with empirical data, to provide the foundation for monitoring and forecasting potential trouble spots, where environmental deterioration could potentially enhance the likelihood of state failure.

Two primary expectations guided our analysis:

- **We did not expect to find any direct, measurable correlation between environmental change and state failure.** Although this expectation is at odds with some of the literature,²⁷ we were guided by the following logic: models of environmentally induced political violence all include numerous intervening variables that are held to interact in

a complex fashion.²⁸ The large number of intervening variables makes it hard to find strong direct relationships between the environment and state failure. The complex interaction means that whatever relationships do exist are likely to be different from case to case. As a result, the linkages between environmental change and state failure are unlikely to be discovered by simply adding environmental variables to a state failure model.²⁹

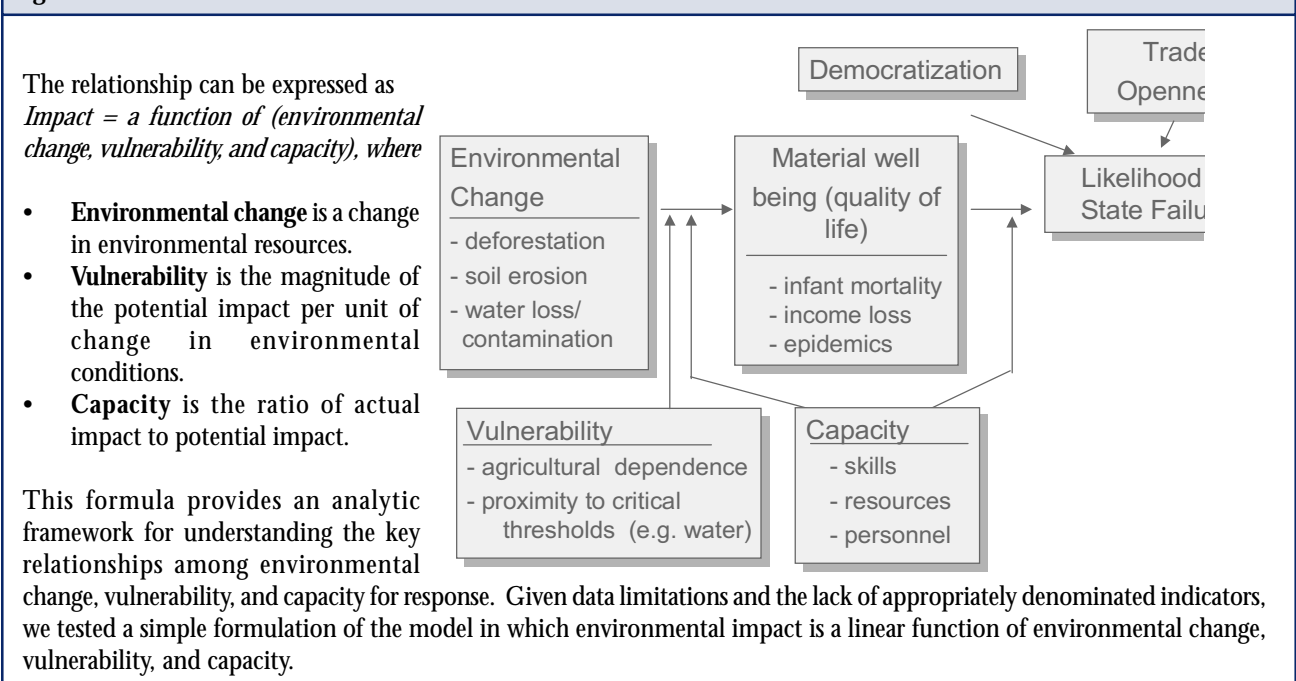
- **We did expect that environmental change might have a significant, negative impact on one of the factors associated with state failure in the general model.** In particular, we sought to explore whether environmental degradation would have an impact on quality of life measures such as infant mortality. If so, then this would demonstrate an important, though indirect, connection between environmental degradation and state failure.

Analytically, we conceived of the factors interacting in the following manner: a given change in environmental conditions generates an impact on a society that varies according to the underlying environmental conditions—a society's vulnerability—and which is mediated by a nation's capacity to respond effectively. Where capacity is high, harm will be avoided.

To illustrate, consider crop yields as the impact and drought as the environmental change. Vulnerability is the degree to which crop yields might be expected to fall in the absence of effective intervention. It might be measured through extent of irrigation or sensitivity of crops to rainfall. Capacity is the degree to which the government and social actors are able to lower the actual impact, and might be measured as the size of the government budget, number of scientifically trained experts, or extent of communications infrastructure.

To be even more concrete, for the 1991-1992 growing

Figure 13: Mediated Environmental Model



season, El Niño–driven droughts were forecast for northeastern Brazil and for Zimbabwe, with more or less equivalent lead times given to decisionmakers and a comparable projected and actual change in environmental resources—rainfall. The vulnerability—the potential drop in agricultural production divided by loss in rainfall—was also about the same. However, the net social impact, or actual loss in output, was very small in Brazil but quite high in Zimbabwe, where 80 percent of the maize crop was lost. Many analysts attribute this difference to different levels of capacity in the two settings. Officials in Brazil acted on the knowledge early, implementing effective strategies, whereas in Zimbabwe the information was never used, and no responsive strategies were developed.³⁰

Findings

Environmental change does not appear to be directly linked to state failure. To determine whether it was possible to find a statistical correlation between environmental change and state failure, we tested variables that measured deforestation and freshwater supply, but both failed to generate significant results. This was consistent with our hypothesis that the more direct effects of democratization, trade openness and quality of life—measured by infant mortality—had such a strong impact on state failure that they masked any impact of environmental deterioration.

This result is at odds with recent work by Hauge and Ellingsen,³¹ the only other study we are aware of that employs statistical tests to evaluate claims about the direct impact of

environmental harm on political violence. Hauge and Ellingsen found a significant impact from deforestation, soil degradation, and freshwater access, results that we believe are due to differences in how the dependent variables are operationalized and how the independent variables are used. Some of these differences are potentially large enough to account for the different results by themselves; taken together they make the two models essentially incomparable. Because the state failure model covers a greater time period and includes trade openness as an explanatory variable, we think its results have more validity. Nevertheless, the Hauge and Ellingsen model shows that there is more than one way to approach these questions, and we welcome the opportunity for scholarly debate.

Environmental change is significantly associated with changes in infant mortality. To investigate the merits of the mediated model, we assembled data on environmental change, vulnerability, and state capacity. Because of data limitations, we limited our scope to the period 1980-90; extending the time frame back further would have seriously reduced the number of countries and variables available for testing.

We chose infant mortality as the dependent variable because of the availability of data, the high significance of infant mortality as a factor associated with state failure, and the high correlation of infant mortality with a number of other measures of material well-being. We would have preferred to use a basket of indicators that captured the level of material well-being or quality of life, but the only well-being indices we located covered too few countries, spanned too few years, or included factors that were not relevant to our analysis.

Table 6: Hauge and Ellingsen and the State Failure Study: Differences

	Study
	Hauge and Ellingsen
Operationalization of Dependent Variables	
Definition of failure	Used incidence of civil war in one model; armed conflict in another
Overall time period	1980-1992
Unit of observation ¹	Each year of civil war or armed conflict
Use of Independent Variables	
Treatment of deforestation variable	Categorized
Range of variables included	Some overlap with State Failure, but nothing analogous to trade openness

¹This is a major difference. The State Failure Task Force chose to develop a model that asked not only to estimate the likelihood of when a civil war will start, but also when

Once the data were assembled, we screened potential capacity and vulnerability variables by computing their correlation with infant mortality. Those that were significantly correlated—telephones per capita, population in subsistence agriculture, and land burden—were then tested in combination with an environmental stress variable in a multiple linear regression model.³²

As we expected, deforestation proved to be statistically significant only when tested in a model that included measures of vulnerability and capacity. For given levels of vulnerability, capacity, and baseline infant mortality rates, we found that the greater the loss of forest cover, the higher the increase in infant mortality rate.

The results for the model using soil degradation as the environmental stress were more complex, and no linear relationship could be measured. We obtained significant results, however, by multiplying the rate of degradation by its severity and including it as an interactive term. The results suggest that soil degradation has a negative impact when severe degradation

occurs at a rapid rate; otherwise the impact is positive. One possible interpretation of this finding is that the same practices that induce soil degradation—such as agricultural production—might have a positive net impact, for example, by improving nutrition or incomes, if the degradation does not proceed too rapidly.³³

Insights

One major insight that emerges from the analysis is that available measures of environmental degradation do not currently serve as a direct signal of impending state failure. In part, this is a function of the long, complex chain of association between environmental change and state failure, with a number of factors intervening along the way. Those factors are strong enough to push some societies blessed with benign environmental conditions into failure and to prevent other societies suffering serious environmental damage from slipping into political instability. This finding is also a function of the

Variables Tested for the Environmental Model

Environmental Change

Deforestation
Soil degradation
Change in agricultural land
Access to fresh water (urban, rural, and total population)
Fraction of freshwater reserves withdrawn
Sulfur dioxide emissions
Population density

Vulnerability

Percent of population engaged in subsistence agriculture
Land burden: (farmers per area of cropland) x (farmers per labor force)
Storm damage
Share of national income by lowest 20 percent of population

Capacity

Secondary school enrollment ratio
Adult female literacy
Public expenditures on education
Telephone lines per capita
Bureaucratic quality
Corruption
Number of bribery cases
Law and order tradition
GDP per capita
Debt service
Rail mileage per square mile
Rail-ton miles per capita
Road density

Environmental Data Limitations

Our analysis was seriously constrained by the paucity of available data. Whereas the overall state failure model was able to test some 75 economic, political, and demographic variables, the environment model could test only a handful. This data constraint meant that some important environmental factors could not be examined. For example, water quality—consistently mentioned in the literature as the most serious environmental problem facing developing countries—could not be included because reliable time series data are available for only 38 countries. Air quality suffers from similar deficiencies.

Useful indicators of vulnerability were also scarce. Because the best environmental change indicators—deforestation and soil degradation—that we had were related to terrestrial ecosystems, we were able to rely on vulnerability measures that tapped the degree of sensitivity to agricultural perturbations. However, measures relevant to other environmental shocks, such as declines in air quality, would have been harder to construct.

The available measures of capacity were especially disappointing. The ideal measure, in our view, would take into account the financial resources, quality and extent of infrastructure, and knowledge and skills of public and government officials available for monitoring, assessing, and responding to major environmental problems. Despite the great attention paid to issues of capacity building in recent years,^b we were unable to identify any useful indicators that came close to capturing this concept and, instead, had to rely on proxies that imperfectly measured a few aspects of capacity.

^a Even for these countries, data are taken from single-point monitoring stations.

^b See, for example, the UN Development Programme's Capacity 21 program.

seriously limited data at our disposal. On balance, we cannot say how large an impact environmental damage has on the risk of state failure.

Nevertheless, the results of our analysis provide evidence for an indirect connection between environmental change and state failure. Deforestation and soil degradation appear to diminish the quality of life, as measured by infant mortality rates, for low-capacity states that are socially vulnerable to disruptions in soil ecosystems; and infant mortality has been shown to have a direct impact on the likelihood of state failure.

Caveats on the Findings

While we believe that the results of the mediated environmental model are useful and significant, the model has several limitations:

- The process of converting analytic concepts into measurable variables has necessarily resulted in variables that are more narrow and arbitrary than the analytic constructs that they represent. This is most true for our core capacity variable—telephones per capita, which we recognize to be a very limited measure of governmental and societal response capability—but to a degree it is true for all the variables.
- The findings represent a general tendency that applies to the set of all countries for which data were available, over the ten-year period studied. That does not mean that this tendency will be true for each individual country at every point in time. Some countries might experience far more direct connections between environmental change and state failure than we observe; other countries might experience less connection between environmental change and infant mortality than our results suggest.
- Environmental data limitations mean that our conclusions are far from the last word. We simply did not have measures for some very important environmental changes—including water quality, with its impact on public health—that might prove more significant as precursors of state failure than those we tested. Data constraints also prevented us from testing whether state failure is associated with aggregate processes of environmental deterioration, encompassing the degradation of soil, air, and water systems.

IMPLICATIONS OF PHASE II FINDINGS FOR FORECASTING AND POLICY

The main result from retesting and refining the global model is a solid confirmation of the work undertaken in the first phase of the Task Force's work. Even with an updated and expanded problem set, different control sets, and more refined measures of democracy, the basic global model continued to

accurately classify roughly two-thirds of historical cases. Moreover, the same independent variables emerged as statistically significant in a variety of retests.

The major implication for forecasting is that as far as statistical data are concerned—given current limitations in accuracy and coverage for global data—using a large number of variables does not add to the effectiveness of forecasting models. In many cases, we found that the gaps in either the temporal or geographic range of particular variables were so great that any possible gains in prediction were offset by statistical uncertainties or missing data problems associated with measuring those additional variables. Thus, in all models and regional sub-models, a handful of variables emerged as providing significant power in discriminating between state failures and stable cases over the past 40 years. Although many additional variables—including those measuring nutrition, education, droughts, and civil rights—showed significant correlations with risks of state failure, they did not add statistical power to models based on our key variables. Those variables, which consistently emerged in a wide variety of models, are material living standards, trade openness, and democracy, and in more limited circumstances, youth bulge, regime duration, ethnic dominance or discrimination, and the urban proportion of the population.³⁴ We shall have to wait until the accuracy and coverage of global data series improves before we can gain further accuracy by building more complex models. In the meantime, there is a compelling need to improve global and regional data on these key dimensions, and on many other social, economic, political, and particularly, environmental conditions.

A secondary implication is that the accuracy of statistical models forecasting state failure risks two years in advance remains at a level that is useful, but insufficient for refined predictions. In order to bridge the gap between the two-thirds accuracy of our statistical model, and the better than 90-percent accuracy required for effective policy responses, the skills of individual country analysts and policymakers in assessing rapidly changing local conditions remain absolutely crucial.

The mathematical data analysis cannot prove causality, but the correlations are consistent with causal interpretations. Our findings also suggest policy implications that are interesting and complex, although the best focus and mix of policy responses will, of course, vary from case to case.

Involvement in international trade, as measured by trade openness, is associated with a lower risk of state failure in virtually all states and all contexts. This finding suggests that policies or measures—including internal factors such as dependable enforcement of contracts, modest or low corruption, and improved infrastructure, as well as bilateral or multilateral efforts to eliminate trade barriers—that help to foster higher levels of international trade could help prevent political crises. Interestingly, it appears that it is the involvement in international trade itself, and not the eventual prosperity that such trade provides, that is the key to this effect. The work of Etel Solingen has shown that free trade, if sustained, helps bring together coalitions of elite actors that support the rule of law and stable property relationships, as a condition for building wealth.³⁵ Such

coalitions may or may not be democratic, but in either case, they promote political stability.

Partial democracies—particularly in lower-income countries where the quality of life remains poor—are associated with elevated risks of failure. Although full democracies and autocracies are fairly stable, the in-between forms of government are at high risk of undergoing abrupt or violent change. This suggests that while a policy of promoting democracy may eventually lead to a world of stable liberal states, one cannot presume that the inevitable intermediate stages will also be stable. Policymakers need to be particularly attentive to the risks of failure in such states, and should seek and encourage progress toward full democracy. Moreover, if helping to increase the odds of stability in such states is a goal, then policymakers need to focus on developing policies that help foster international trade and on supplementing democratization programs with broad development programs that help improve the overall level of material living standards.

Material living standards have an undeniable effect on the risks of state failure. In some models, it is the overall level of material living standards that emerges as important; in other models, such as that for Sub-Saharan Africa, it is the direction of change that appears crucial. In either case, the policy implication is that efforts to improve material living standards are a significant way to reduce risks of state failure. In Sub-Saharan Africa, it turns out that high levels of urbanization reinforce this effect—for states with high levels of urbanization, states experiencing growth in GDP per capita have only a fraction of the risks of state failure of those states experiencing economic stagnation or decline.

Despite the prevalence of ethnic conflicts—especially in Sub-Saharan Africa—ethnic discrimination or domination is not the sole, or even the most important, correlate of state failure. Because ethnic factors do not emerge as the most powerful—or most statistically significant—factors associated with state failure, they bear monitoring, but other policy levers may be more readily available and more effective.

Environmental stress, vulnerability, and capacity form an interdependent triad that affects quality of life and, indirectly, the risk of state failure. Our findings imply that analysts concerned with the social impact of environmental change need to monitor not simply the environment, but also changes in a country's vulnerability to environmental changes and its capacity to cope effectively with them. The increased appreciation of the need to develop indicators of environmental change and of sustainability should be complemented with equally vigorous efforts to develop useful indicators of vulnerability and capacity, where the recent track record has been less encouraging. At the broadest level, our findings also suggest that when it comes to minimizing declines in quality of life, increases in capacity and reductions in vulnerability are equally appropriate targets for policy intervention as increases in environmental protection.

Newer democracies, especially in countries where quality of life is relatively low, are more likely to fail than long-lived ones. The Task Force's models and data can be used to inform policymaking about the conditions under which democratic transitions are likely to succeed or fail. Most contemporary

democracies in Latin America, Asia, and Africa established democratic institutions one or several times, then reverted to autocratic rule before making their most recent transitions to democracy. The problem-ridden history of democratic transitions in these regions raises questions about the future durability of newly established democracies there and in the post-Communist states. Analytic results suggest it is crucial that international support for democratic institutions be reinforced by policies that promote improvement in the quality of life.

FUTURE DIRECTIONS

Potentially fruitful future analytic directions that are suggested by the Phase II results include:

- **Forming a better understanding of the conditions of successful democratic transitions.** Initial results suggest that successful democratic transitions tend to be preceded by political experimentation—including previous unsuccessful attempts to establish democratic institutions—and to occur in countries where agricultural stress is low and material living standards are higher. On the other hand, backsliding to democracy tends to occur within a few years after democratic institutions are introduced, and in countries with relatively low quality of life and high agricultural stress. Analyses are needed of the extent to which successful democratic transitions depend on improvements in the quality of life, and economic performance generally, during the early years. Models of these relationships should also take account of factors such as elite ethnicity, urban growth, and youth bulge, which have been shown to correlate with other kinds of state failure, especially revolutionary and ethnic wars.
- **Further developing the concept that the impact of environmental degradation on state failure is mediated by vulnerability and capacity, and more thorough testing of the model.** Additional steps would include:
 - Constructing additional indicators of environmental change—such as water and air quality—vulnerability, and capacity from currently available sources.
 - Building a set of “watch lists” for specific ongoing environmental threats that would focus attention on environmental deterioration in countries with high vulnerability and low capacity.
 - Developing a core set of environmental indicators—measured consistently across countries and over time—that could be used in future analyses. This effort would include using the next generation of remote-sensing satellites to gather terrestrial and atmospheric data and using intensive on-site monitoring to build an adequate database for other environmental problems such as water quality, air quality, and

chemical hazards.

- Developing models that capture regional variation—or localized “hot spots”—within a country that are masked by national level analysis. We know that the environmental impact on material quality of life will be stronger if there is a spatial correlation among the variables. For example, if a given unit of land has a high rate of deforestation, a high land burden, and poor institutional capacity, we would expect a larger local impact on infant mortality, an hypothesis that could be tested using currently available high-spatial-resolution data sets.
- As additional data become available, continuing to test the hypothesis that environmental damage directly contributes to the likelihood of state failure.
- **Developing a more detailed concept of “state capacity” to test as a mediating factor in general and regional models.** Building on the results of the mediated environmental model, further examine and develop in more depth the concept of state capacity, develop quantitative measures that tap this dimension, and incorporate this concept as a mediating factor. We should also seek or develop data sets that are better able to capture state capacity.
- **Investigating the usefulness of pilot studies of event data for bridging the gap between model-based risk assessments and “early warnings.”** The general models of state failure identify risk factors measured two years before the expected onset of failure. Even the best models identify a substantial number of false positives and fail to predict correctly some failures. The goal is to supplement general models with early warning models that track the immediate precursors of failure and provide more accurate and timely warnings than do risk assessments that are based on background conditions. Specifically, monitoring of events should concentrate on situations judged to be at high risk through expert- and model-based analysis, and statistical techniques should be applied to study the clustering of events before a crisis.
- **Investigating the impact of international support on the risk of state failure.** Many policymakers and analysts assume that bilateral and multilateral policies can forestall some state failures and minimize the severity of others. Previous Task Force analyses have assessed the impact of some kinds of international economic policies—such as IMF standby agreements—on the likelihood of state failure, but these analyses have not shown strong and consistent results. The impact of other kinds of international engagement, such as diplomatic and military support, development programs, and assistance with institution building remain to be studied. Appropriate data and indicators need to be gathered and tested in new models.

Because the objectives and hence the likely outcomes of international policies have changed since the peak of the Cold War, such models should distinguish between pre- and post-Cold War patterns of international policy and their consequences.

Appendix A: Global Model and General Material

DEFINING STATE FAILURES AND CONTROL CASES

State Failure

State failure and state collapse are new labels for a type of severe political crisis exemplified by events of the early 1990s in Somalia, Bosnia and Herzegovina, Liberia, and Afghanistan. In these instances, the institutions of the central state were so weakened that they could no longer maintain authority or political order beyond the capital city, and sometimes not even there. Such state failures usually occur in circumstances of widespread and violent civil conflict, and are often accompanied by severe humanitarian crises. In a general sense, they are all part of a syndrome of serious political crisis which, in the extreme case, leads to the collapse of governance.

Only 18 complete collapses of state authority have occurred during the last 40 years, too few for meaningful statistical generalization. Therefore, the Task Force broadened its focus and sought to identify systematically all occurrences of partial as well as complete state failures that began between 1954 and 1996. We began from existing compilations of data on revolutionary and ethnic conflicts, regime crises, and massive human rights violations of the types categorized as genocides and politicides (political mass murders). An initial list—the basis for the Phase I analysis—was critically evaluated, updated, and refined for the present study. The four types of internal wars and failures of governance are:³⁶

- **Revolutionary wars.** Episodes of violent conflict between governments and politically organized challengers that seek to overthrow the central government, to replace its leaders, or to seize power in one region. From the 1950s through the late 1980s, most revolutionary wars were fought by guerrilla armies organized by clandestine political movements. A few, like the Iranian revolution of 1978 and the student revolutionary movement in China in 1989, were mass movements that organized campaigns of demonstrations. These mass movements are included only if one or both parties used substantial violence.
- **Ethnic wars.** Episodes of violent conflict in which national, ethnic, religious, or other communal minorities challenge governments seeking major changes in their status. Most ethnic wars since 1955 have been guerrilla or civil wars in which the challengers sought independence or regional autonomy. A few, like those in South Africa’s black townships in 1976-77, involved large-scale, violent protests aimed at sweeping political reforms. Warfare between rival community groups is not considered ethnic warfare unless