Environment and Conflicts Project (ENCOP)

International Project on Violence and Conflicts Caused by Environmental Degradation and Peaceful Conflict Resolution

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Environmental Crisis: Regional Conflicts and Ways of Cooperation

Report of the International Conference at Monte Verità, Ascona, Switzerland, 3 - 7 October 1994

In the recent past, environmental problems have become increasingly significant in producing conflicts. Especially in developing countries, desertification, water scarcity, and climatic change play a large part in the origin and escalation of current conflicts and usually act in combination with other factors, such as poverty, economic decline, overpopulation and political instability.

Some 60 experts from all over the world met at the Monte Verità in the southern part of Switzerland to discuss theoretical and methodological questions arising from this new research topic. They also considered case studies and proposals for peaceful approaches to the settlement and prevention of conflicts. Some of the valuable contributions to the conference are presented in this paper.

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Note to the Reader

The *Environment and Conflicts Project* (ENCOP) investigates the relationship between environmental problems and actual or possible violent conflicts, as well as means to peaceful conflict resolution.

The project management is represented by the Swiss Peace Foundation, Bern, and the Center for Security Studies and Conflict Research at the Swiss Federal Institute of Technology, Zürich. Partners of the project are the Unit for the Study of Wars, Armaments and Development at the University of Hamburg, the Institute in Lagos, Nigeria, and the Centre for Development Research in Dhaka, Bangladesh.

The ENCOP Occasional Papers represent intermediate results of the project's work and other contributions to the topic. Comments and opinions are most welcome. Requests for additional copies of the papers should be directed to either the Center for Security Studies and Conflict Research at the Swiss Federal Institute of Technology or the Swiss Peace Foundation.

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Preface

The examination of the importance of environmental factors for violent conflict is still a pioneering research area which has generated a great response within and outside the scientific community. So, it was a great honor and pleasure for us to organize the first world-wide conference on environmentally induced conflicts with sixty prominent experts from 17 countries at such an auspicious place as the Monte Verità, the „mountain of truth".

The aim of the conference was first to analyze the relationship between environmental change and violent conflicts and to discuss theoretical and methodological questions. Second, we also expected proposals on how to prevent and manage environmentally induced conflicts. The conference showed that the exclusive reliance on case studies has to be overcome in favor of a more generalized approach in a theoretical sense and of a more practice-oriented approach in the field of prediction and management. Besides the one week's fruitful presentations and discussions, the immediate interdisciplinary contact between conflict researchers, geographers, scientists and representatives from the federal government and NGO's were an enriching experience for all the participants.

This conference report, published in our ENCOP Occasional Paper Series, gives a cross-section through the conference's presentations. The first section presents some considerations on theoretical and methodological questions exploring the linkages between environmental degradation and conflicts. The first part is followed by some case studies that give an impression of the importance of environmental degradation for the conflict dynamics in selected regions of the world. In the third section approaches to cooperation and conflict resolution are examined and some mechanisms such as regional integration and negotiation strategies are evaluated.

We regret that Prof. Thomas Homer-Dixon, too busy with his follow-up project, could not manage to submit an original paper based on his most valuable presentation at the conference. We therefore would like to refer to an article by him that appeared in „International Security", Vol. 19, Summer 1994, pp. 5-40. It represents the main arguments of his contribution at the conference.

We hope that our conference has been able to draw the attention not only of the scientific community but also of the general public to this utterly important research field. Subject-related follow-up conferences have been announced and promise a continuation of the scientific discussion and a deepening of personal contacts.

Kurt R. Spillmann

Zurich, September 1995

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Swiss National Science Foundation (Berne)
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Conference on Environmental Crisis: Regional Conflicts and Ways of Cooperation, Monte Verità, Ascona, Switzerland, 2 to 7 October, 1994

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Opening address by Ambassador Robert Mayor, Federal Department of Foreign Affairs

Ladies and gentlemen,

It is an honor - and a great pleasure - to be with you at the opening of your conference and to welcome all the distinguished guests coming to Ascona from all over the world. I have been charged to convey to you the best wishes of our Minister for Foreign Affairs, Federal Councilor Flavio Cotti, who unfortunately cannot attend this conference. He regrets it particularly as we are meeting in Ticino, his beautiful home Canton.

I would also like to thank the organizers of this conference, namely the Center for Security Studies and Conflict Research of the Swiss Federal Institute of Technology and its Director, Professor Kurt Spillmann; the Swiss Peace Foundation, its President Ambassador Fritz Staehelin and its Director, Mr. Bächler. The promotion of peace and security is one of the bases of the Swiss foreign policy and the Department of Foreign Affairs can benefit, thanks to a fruitful cooperation with both institutions, from the outstanding quality of their acute and in-depth analyses and researches. For this reason, I am confident that the outcome of this forum will fully satisfy the expectations of the participants.

Ladies and gentlemen, let me now expand with a few words on the interrelation between environment, development and security, its incidence on the Swiss development policy, and in which way the "Environment and Conflicts Project" can be of a particular help in the framework of North/South relations.

Since ancient times, nations have fought to assert or resist control over raw material, energy supplies, land, river channels, sea passages and other water sources. The legend of the Golden Fleece and the Trojan War remind us of this constant fact of life. Environmental stress itself can be both a cause and an effect of political tension, and even of military conflict. A number of factors affect its connection with poverty and security, and it can thus be an important part of the web of casualties associated with any conflict and might, in some cases, be catalytic. One manifestation of growing concern to the international community is the phenomenon of "environmental refugees". The immediate cause of any mass movement of refugees may appear to be political upheaval and military violence. But the underlying causes often include the deterioration of the natural resource base and its capacity to support the population. A present-day example in that respect is Haiti where one of the world's most severe soil degradations, down to bedrock over large parts of some regions, has undoubtedly been amongst the origins of the present difficulties.

After the International Conference on Population and Development in Cairo we stay in the middle of the sequence of big UN conferences on development issues in the broadest term: the UN Conference of Rio on Environment and Development, the Vienna Summit on Human Rights, the Cairo Conference and next year the Copenhagen World Summit for Social Development. It became clear, especially at the Cairo Conference, that underdevelopment seems to be shifting to a new category of discrimination which can no more be attributed to the so-called exploited population but to the ever growing number of

people who are even not exploited any more, but just forgotten. Hans-Magnus Enzensberger writes in his newest book "Aussichten auf den Bürgerkrieg" (Outlooks for a Civil War): „In New York as in Zaire, in the metropolis as well as in poorer countries, more and more people are expelled from the economic circuit because their exploitation is no more worth-while.“ And at the same time these people are more and more affected by the shady sides of the developed world, be it waste, traffic pollution, or diseases.

The interrelation between development, environment and peace had already been for the first time articulated before the Stockholm Conference of 1972 which led to the foundation of the United Nations Environment Programme: experts from industrialized as well as from developing countries met in fact already in 1971 in the Swiss village of Founex - close to Geneva - and formulated on that occasion the environment ideology which characterizes all discussions on the subject since then. Main events have been the Stockholm Conference of 1972 and in particular the Report of the Brundtland Commission of 1987 which has dedicated a whole chapter to the question of "Peace, Security, Development, and the Environment". The conclusion to that chapter reads: „The real sources on insecurity also encompass unsustainable development, and its effects can become intertwined with traditional forms of conflict in a manner that can extend and deepen these conflicts.“ This has, of course, been the input for the Rio Conference of 1992 on Environment and Development.

As for Switzerland, the Federal Law on Development Cooperation, expressing the same conception, stipulates as one of the five main objectives of Swiss endeavors in that respect the establishment and maintenance of the ecological and demographic stability. It is for this reason that the Environment and Conflicts Project, ENCOP, raises considerable interest on our side, as it focuses on the conjunction of two different but interrelated processes:

- A process of *global man-made ecological transformation* which goes back to the 1950's, but which was only brought to attention of both policy-makers and a wider public in the 1980's. There can be no doubt that the Rio Conference has been a main landmark in the recognition of this transformation, and a focal point for the reorientation of policies. Today it has become common knowledge that some global environment problems (global warming, desertification) may affect poor developing countries in a disproportionate manner and lead to the development of massive conflict situations.
- The second tendency we witness today is, after the demise of the overriding ideological conflict between east and west, *the proliferation of international, and even more often subnational conflicts.* It is estimated that the number of "displaced people" amounts to more than 40 millions these days. These "new conflicts" are carried out with increasing violence and the violation of most basic humanitarian values. Typically, they are determined by a complex interplay of social, political, ethnic, ecological and cultural factors, which defies an easy analysis with our standard concepts, but also with the more rigorous scientific instruments of conflict and peace research.

Against the background of these two processes, there is today a widespread understanding that sustainable development and peace are closely interdependent: there can be neither one without the other. This aspect was clearly formulated in the Swiss government's "guidelines on North/South relations" (published this year in March 1994). It should be noted at the same time that "peace" here does not mean the absence of tensions and con-

flicts, but rather refers to peaceful, non-violent means of conflict management and mediation. However, *such mediation will only be possible with a sound understanding of modern conflicts and with mechanisms which empower the various actors to become actively involved in it.*

This is where ENCOP intervenes. It has taken seriously the role of ecological degradation as a reason for both international and subnational conflicts. One of its innovative features is the attempt to *disentangle the intertwined ecological and other causes of modern conflicts* by looking at a good number of today's over 50 acute and more than 100 latent conflicts in terms of ecological root causes.

The first results of this baseline study of "socio-ecological conflict research" are interesting as a backdrop for the implementation of the "guidelines on North/South relations" and the currently widespread discussion on conflict management, conflict prevention, and "preventive diplomacy". We hope that this conference will be a constructive forum where some further and important steps in discussion and critical evaluation will be made.

ENCOP shows that conflicts over global commons are increasingly captured and mediated by a system of international regulations and conventions. On the other hand, the much more widespread conflicts over the degradation or utilization of regional commons (e.g. river basins), especially in the Third World, are characterized by *a lack of regulatory mechanisms, regional institutions, norms and contracts etc*. This is even more the case with similar conflicts at a subnational level. Finally, ENCOP has also drawn attention to the lack of local capacities in the south to negotiate, implement, control and enforce conventions or regulations.

Therefore, one of the appealing features of ENCOP, from the point of view of the Swiss Development Cooperation, is the fact that it not only carries out researches on conflicts in the Third World, but that it works *within an international network and within research partnerships with institutions in the regions of conflict.* Thereby it contributes, at the same time, to the urgently needed development of local research (and potentially intervention) capacities in the South. This approach is entirely in line with the research support policy formulated by the Swiss Development Cooperation.

Finally, the ENCOP team has already begun to formulate a follow-up project, the Environmental Conflict Management ENCOM, aiming at the implementations of ENCOP findings. We hope that in this next phase the analytic and sometimes abstract baseline work of ENCOP will become more action-oriented. We also hope that the integration of ENCOP and its successor ENCOM in the Swiss Peace Foundation will allow for a well-informed public debate on Swiss foreign policy and the challenge it faces in the field of safeguarding and maintenance of peace and security.

May I add that I am personally very interested in hearing your conclusions, in particular those concerning the relationships between overpopulation, degradation of the environment and aggressiveness. Having lived myself for over seven years in Africa, I have been impressed by the negative incidences of high birth rates.

Ladies and gentlemen, please allow me, as a conclusion, to recall that utopians, writers and painters have been inspired by the unique landscape of Monte Verità at the beginning of this century. It is also my hope that its atmosphere and spirit will in turn give inspiration so that the in-depth shared reflections will help you to develop analyses and strategies contributing to promote peace and security in the ever more complex North/South interrelations. I wish you a fruitful Conference!

Kurt R. Spillmann

From Environmental Change to Environmental Conflict

A couple of years ago a well-known journal in the field of Peace and Conflict Studies published an article entitled „The Greening of Peace Research". It alluded to the fact that ecology was then rising on the horizon of our discipline, and insinuated, somewhat ironically, that this development was merely following a general fashion. Indeed, the integration of ecological factors into conflict research came relatively late. But it did not remain just a trendy phenomenon. Since the beginning of the extensive public discussion about global change and population growth, ecological concerns have become firmly established as an item of security thinking and conflict studies. However, these linkages are seen in different ways - from redefining the concept of security to include environmental hazards to using environmental matters as a means to achieve peace. Without ignoring other concepts, the ENCOP project definitively concentrates on a *causal linkage*: our main interest is focused *on the environmental crisis as a source and trigger of conflict and war*, both within and between nations. I will structure my introductory remarks along five points dealing with conceptual assumptions of the ENCOP project and with observations derived from findings of our project.

1. **Humanity is not only confronted with environmental change and a growing shortage of important resources, but it is itself transforming the environmental basis of human life on this globe.**

The ENCOP research group wants to stress two aspects under this heading: first on man as the *actor* in the interrelationship between man and nature, and second on the *global* implications of man's impact on the environment, which make for a challenge of new proportions.

Of course, human societies have been altering the natural environment since they appeared on the face of the earth. Yet the pace at which contemporary humans are intruding into the cycle of natural processes is historically new, as is the scale of our interventions. While the mental disposition of humans to use their natural environment to the utmost (and even to the extreme of extinguishing other species) is neither unique nor new among living beings, there are three new aspects to that phenomenon: First, the very large number of humans who globally subject their environment to their individual and collective needs; second, the sheer power and reach of tools (both on the macro- and on the micro-level) with which they can transform the environment; and third, the amount of energy they (or rather: we) have been able to harness in order to make our tools ever more powerful, from the stone ax to the use of nuclear power. We interfere with the existing environment everywhere and on all levels. We are not merely manipulating single elements, but we have begun to influence global ecological processes and balances.

This development is driven by the outstanding reproductive success of the species Homo Sapiens and by its increasing efficiency in using its brain and its tools. World population

has doubled within the last 40 years and is further growing at hyperbolic rates, adding more than 90 million people every year. All these human beings strive for water, food and shelter. They want to survive and claim their rightful share in the planet's resources. All capacities and available tools are used in this endeavor.

Because we multiply so rapidly, consume so rapaciously and increase our production of waste so rapidly we are using more of the earth's resources and change our own environment more profoundly than any other species before us. We are constantly increasing our productivity. The second half of the twentieth century alone has seen a fivefold increase in worldwide economic output, built upon the increase of human numbers, human efficiency and an immense increase in the extraction of resources from nature. Untouched nature is shrinking, in size not only, but also in its cushioning function against fluctuations in temperature and climate, in the forest's functioning as a bank of biodiversity or a sink of carbon dioxides, in the wetlands functioning as filters against pollutants to mention only a few examples.

With increasing frequency the cumulative results of our consumptive, productive and disposing activities build up to irreversible transformations of the existing environment. And I suspect that a very large part of these adverse effects of human activities result from everyday activities without any intention to harm the environment. But because so many humans strive to survive on this globe the cumulative results of their individually harmless endeavors are assuming dangerous proportions.

2. Transformation does not affect nature only but social and political systems as well and can, therefore, produce conflict.

The behavior of individuals and the organization of societies and states have always been influenced by the natural environment surrounding them. Technology and trade somewhat diminished this direct dependency by enabling some countries to import ecological capital, i.e. goods and resources coming from afar. But political order as a whole cannot be detached from its environmental context. It depends on the opportunities and constraints the environment provides for social and economic development.

Humans are both the subject of ecological change and the objects of the transformed environment striking back through, for example, climate destabilization and water shortage.

Basic resources for human survival like fertile land and fresh water are dwindling. Settlement areas are poisoned or threatened by increased flooding and landslides. Climatic conditions seem to be changing and becoming less stable, causing injuries to health, endangering the crop production and thus the food supply of nations. Generally speaking, ecological transformation is costly and in certain areas it is becoming the cause for economic stagnation or decline. People are pushed out and physically forced to leave their homes. Migrations follow, overwhelmingly to areas close by, but increasingly also to areas further away. The impact of these processes are seriously challenging the stability of existing social and political orders, both regionally and internationally.

Three types of environmental transformation can produce conflict:

1	2	3
Non-anthropogenic	Anthropogenic, planned / desired / accepted	Anthropogenic, but unplanned / undesired
environmental transformation by known, nonsocietal source	environmental transformation by known, societal source	environmental transformation by diffuse / unrecognized human source
(natural catastrophes)	(large engineering actions)	(cumulative effects of large numbers of small actions, that individually are useful and appropriate)
resulting from floods, droughts, earthquakes, storms, volcanic eruptions etc.	resulting from dam-building, mining, diversion of water-courses, logging etc.	resulting from overgrazing, clearing of land, dumping of waste in the water, air or soil etc.
can lead to conflicts between affected groups, struggling for damage control and survival	can lead to conflicts between those who cause the damage and the groups suffering from deprivation by it	can lead to conflicts between groups that struggle for damage control and survival

The first form of conflict is induced by the effects of natural disasters like earthquakes, volcanic eruptions, tornadoes, floods, droughts etc. These environmental changes are not caused by human activities. They happen independently of any human planning or decisionmaking. The variety of such disasters, their frequency and sometimes gigantic dimension demonstrate that no environment has ever been stable. Environmental changes have characterized the development of this planet all through its history. With increasing density of the human colonization of the planet's surface and with people living practically everywhere on the planet the likelihood grows that increasing environmental changes (of this „disaster"-type) will spell disaster for an increasing number of people. When traditional survival strategies and possibilities collapse under the impact of such events, groups who see no other way out might feel forced to fight with neighboring - now rivaling - groups for the remaining resources.

The second type of conflict-prone environmental change is caused by a deliberate decision of a government, to seek certain benefits for the state as a whole at the expense of a limited group of people. A government can designate such national sacrifice areas. This can be the case with large dam constructions or mining projects. The deprived group can identify the government as the source of change (and in this case: the source of evil) and can start to fight, if it is not offered or doesn't see any other way out.

The third type of conflict-prone ecological change is also caused by humans, but the source of chance cannot be identified and therefore not fought. Ecological damage in this case results from the cumulative effects of individual actions which may be rational or even necessary but which in cumulation produce negative results. Such actions may consist of such rational doings as the clearing of pieces of forests by small farmers seeking to

gain farmland for subsistence farming in the Amazon, or the individual Westerner's use of cars, planes and heating systems, with individually no bad intention. But many small amounts make large sums. Each individual is sure, that his small action does not make any difference vis-à-vis the enormously big Amazon forest or the seemingly endless vastness of the atmosphere. Yet it does. This kind of problem is well known under the heading of the *Tragedy of the Commons*. Each individual uses the commons to his own maximum benefit, and no one individual can be made responsible for the final destruction if it. The relationship between causes and effects remains unclear. Actors and victims may be living geographically far apart. The responsibility for the environmental change cannot be attributed to a particular individual or even a particular group. And so it is with the ensuing conflict. Groups, that feel urged to fight for their lives may fight an adversary that has nothing to do with the threatening change. Environmental conflicts do not necessarily manifest themselves as ecological issues of contention. Rather, ecological transformation forms a background source of social and political disintegration, which in turn leads to conflict and potentially to war. These are „environmentally *induced* conflicts." The lack of clarity in the causal relationships makes this type of conflict a particularly difficult one to deal with. It is, therefore, too early to spell out in detail a causal relationship between environmental change and conflict, especially as human reactions to stress can vary considerably and one group might adjust creatively to a change whereas another prefers to perish in a stubborn fight for its traditional way of life.

3. **Most wars and violent conflicts we identified as environmentally induced are internal in nature and take place in ecologically sensitive regions of the developing world. Their environmental dimension is intimately linked to the development dilemma rather than the security dilemma.**

This finding corresponds with an actual general trend. According to the war register provided by Prof. Gantzel at the University of Hamburg, only two of the 51 greater and smaller wars in 1993 were classic international conflicts. The others were anti-regime wars or other civil wars (mostly secessionist wars and struggles between different ethnic groups). A qualitative analysis of these wars showed that in 22 out of 51 cases war correlated with serious environmental degradation, and a more or less distinct environmental influence on the outbreak of the conflict was identified.

The regions most affected by environmentally induced wars are Africa (10 out of 16) and Asia (7 out of 15).

Central America also has a high number of cases (2 out of 5) compared to its size and number of countries. The ecological resource mostly involved in war is fertile soil, i.e. the loss of land and living space due to soil degradation and poisoning, erosion and - of course - population increase.

Fertile land is a basic resource of local food supply. When it is damaged or reduced, it propels local population into competition and conflict, especially in countries with a large agricultural sector or subsistence economies. Africa is a sad example for the increasing importance of soil degradation in war. In the 1970's and 80's, armed conflicts mainly caused by the manifold effects of decolonization and in part overshadowed by the cold war were concentrated in Southern Africa and on the Horn. Today, another and different „war belt" stretches from the Atlantic to the Indian Ocean. The single countries of this belt, Senegal, Mali, Niger, Chad, Sudan, Ethiopia, and Somalia, all belong to the Sahel Zone, which has been particularly affected by over-grazing, drought, and soil erosion.

The typical conflict setting we find here is the „Desert versus the Oasis Syndrome“, as it was called by Mohammed Suliman, a member of the ENCOP team from Sudan. Or to put it in other words: conflicts between pastoralist nomads and settled farmers induced by the transformation of their natural living space. In this intermediate zone between the desert in the North and the fertile savannas in the South, farmers and nomads used to live in a complex and complementary relationship. The former provided the nomads with a retreat area during the dry season, the latter used to supply the farmers with meat and hides and other trading goods. With the continuous advancing of the desert and population growth, this complementary relationship eventually broke down and a mortal combat between these two groups for the declining resources has begun. Since nomads and farmers usually belong to different tribes or ethnic groups, they themselves and external observers falsely perceive these armed strifes as ethnic or religious conflicts.

In other regions, the loss of living space through development projects like mining, oil extraction or the flooding of huge areas to build reservoirs has triggered wars. We analyzed two cases, Southern Nigeria and the island Bougainville in Papua Guinea. The disastrous ecological effects of oil extraction in the former and copper mining in the latter caused the local population belonging to a specific ethnic group to call for secession. In the case of Bougainville, this led to an open war between the government and local guerrillas. The marginalization of ecological destruction in national „sacrifice areas“ by central governments acting in the interest of the nation, is a widespread pattern of environmentally induced conflicts. When the affected populations share a common identity they are able to mobilize their members to protest, and when they possess the means for combat, such conflicts can to lead to open war.

4. Water shortage is the environmental problem number one and most prone to lead to violent conflicts or war.

There are a number of reasons that make the water issue a very delicate one:

1. Water is a vital resource of human life. An adequate water supply is therefore predestined to be perceived by states as an issue of „national security“ or even survival. The willingness to use military force against a neighbor to secure the own water supply is therefore high.
2. Most large rivers are transboundary, creating situations of direct competition between the riparians.
3. Unlike the air, flowing water is a resource which can be captured. Since upper riparians can completely externalize the costs of water utilization to downstream countries, rivers are a seizable resource, not a common one in the proper sense. In respect to my differentiation of environmental harm, river water belongs to the first group: damages stem from a single action by a definable agent and with a clear distinction between the privileged and the damaged party. Thus competition over water resources very often becomes a zero-sum game.
4. Because they can be seized, rivers are politically instrumentable. Upstream riparians can harness the water to put downstream states under pressure. For this reason, riparian disputes often commingle with traditional sources of conflict like territorial disputes or inter-state rivalries.

Water is one of the resources most under pressure. In many parts of the world, especially in arid and semi-arid regions, current water consumption has reached the bottom line of

sustainable supply or lies even beyond it. The Middle East is already experiencing serious struggles over the sharing of international rivers and groundwater bodies. The distribution of regional water resources is an integral part of the Arab-Israeli conflict, and water plays a major role in the ongoing peace negotiations. Even if solving the water problem is not a sufficient condition for peace, it is nevertheless an indispensable one.

The Middle East will not remain the only region affected by water conflicts, since we have more than 200 transboundary rivers basins on earth, and water shortage is widespread. Under somewhat different hydrological conditions, the Indus, Ganges and Bramaputhra on the Indian Subcontinent, the Amu and Syr Darja in Central Asia, the Mekong in Southeastern Asia, the Sambesi in Southern Africa, and the Colorado and Rio Grande between Mexico and the U.S. - just to mention a few - all are rivers containing a conflict potential. In part, this potential has already become manifest.

5. Global climate change will contribute to conflict and war by exacerbating existing environmental stresses on the local and regional level.

In the debate on environmental transformation, great emphasis is given to the impact of global climate change or stratospheric ozone layer depletion. This concern is justified, since the consequences of the greenhouse effect could be gigantic. However, we agree with the finding of the „Environmental Change and Acute Conflicts Project“ by Thomas Homer-Dixon that these are not the problems most likely to lead to war at present. The widespread effects of climate change will probably not be seen until well into the next century. Presently, the most immediate environmental problems have local and regional sources and concern basic resources like fertile land, water, forests, and fisheries. This does not mean that global processes do not have any influence on violent conflicts at all.

The assessment of the future impact of the greenhouse effect on conflicts, of course, greatly depends on the evidence about an anthropogenic influence on climate. There still is great uncertainty on this matter. But many of the phenomena which are supposed to happen as a result of the greenhouse effect - droughts, water shortage, and floods - are already occurring today on a regional scale, and they do induce war. Global climate change will exacerbate these trends, interacting with local sources of environmental degradation like deforestation, over-grazing, and the depletion of water resources. If it is true that global factors are in part responsible for the persistent droughts in the Sahel zone, as is assumed by some climatologists, then climate change is already contributing to war.

Anthropogenic climate changes belong to those environmental damages which stem from the cumulative effects of individual actions. They build up very slowly and act over great distances. The sources of harm will be hard to ascertain. Wars arising from such transformations will therefore not take place between those responsible and those affected but between the ‘victims’ alone - independent from their share of greenhouse gas emissions. Wars will arise in those regions where changes in precipitation patterns stiffen competition for short water supplies and where droughts or the rise of the sea level destroy agricultural economies and cause millions of people to emigrate. This diffuse source and the indiscriminate impact of environmental damage is part of the „*Tragedy of the Commons*“.

Conclusion

An-thro-po-ge-nic is a five syllable word meaning „*us*“. Human activities are changing the face of the earth at an increasing speed and with an ever broader range of consequences. Growing numbers of humans with ever more powerful tools impact on the earth. And the earth strikes back at the humans, causing them to fight against each other. Only through awareness can we hope to moderate the consequences of the human onslaught on the planet. Only through research can we prove and demonstrate the relationship between anthropogenic transformation and war.

We cannot aspire to change very basic features of the human nature over night. And competitive (and therefore conflictual) behavior seems to be one of the most basic features of human nature. Competition for dwindling resources - on a private, corporate, local, regional or national level - may be the single most important factor among the anthropogenic factors causing detrimental environmental transformation. Some of them we have learned to recognize and to fight. Others - like the cumulative results of small actions that in themselves seem perfectly reasonable - are only now being recognized as causal factors of environmental degradation. Through millions of years our innate programs worked fine. We were able to successfully change the environment in order to improve living conditions and to exploit a seemingly endless bounty of natural goods. But now human success in this process threatens to exhaust the once infinite riches of the earth. But we continue to compete for them, in ever increasing numbers and with ever more powerful tools. This we must change. But it is enormously difficult in our open societies to impose restraints on human beings. Explanations are required to induce a change of paradigm.

ENCOP wants to contribute to this process through explaining the relationship between human action and environmental change and between environmental change and violent conflict. This is the purpose of our endeavors in ENCOP and this is the purpose of this conference.

Günther Bächler

The Anthropogenic Transformation of the Environment: A Source of War? Historical Background, Typology and Conclusions

As we have seen, there are countless transformation processes going on. Not all of these processes lead to violent conflict between social or political entities. But I fully agree with Thomas Homer-Dixon's view (expressed in his contribution to International Security, summer 1994, 19:1/35) that environmental scarcity can itself be an important force behind changes in the politics and economics governing resource use. It does play an independent role as a source of conflict and it is more "than a fully endogenous intervening variable" (ibid.). It is mainly the degradation of *renewable* resources, combined with the development dilemma and/or mismanagement, and not the classical security dilemma between nation states that is likely to lead to social tension, as well as political and even armed conflicts.

Concerning the question which of the transformation processes do lead to violence, ENCOP comes to results similar to those of Thomas's group: we have to focus on renewables such as soils, forests, vegetation, water and marine resources. The isolation of the climate change as a factor of regional conflict, on the other hand, is very difficult. Perhaps it is only an intervening variable, precipitating or aggravating local and regional degradation processes.

I will proceed in four steps:

- First, against the historical background of both social and ecological change in Europe, I will revise our initial hypothesis on environmentally induced conflicts;
- then I will elucidate the first level of our findings by introducing seven different types of environmentally induced violent conflicts;
- afterwards, I will examine more closely the second level by defining three general patterns of human-ecological transformation processes which may lead to violent conflict;
- finally, I will conclude with seven theses.

In my short introduction I will hardly have time enough to illustrate our findings with empirical examples. But I will always be referring to the case studies indicated in Annex I of my paper. I will speak neither about environmentally induced conflicts in general nor about all imaginable types of ecoconflicts. I will try to explain only those cases we analyzed in the framework of ENCOP, hoping that our set of cases allows a more encompassing analysis of the phenomenon of current and future ecoconflicts.

1. Ecoconflicts: there's nothing new under the sun

We started our work with a basic assumption: environmentally induced conflicts are different from traditional resource wars. We defined environmental conflicts as "characterized by the principal importance of degradation in one or more of the following fields: overuse of renewable resources; overstrain of the environment's sink capacity, impoverishment of the space of living" (ENCOP definition, 1 May 1992). Consequently we suggested that there is something new under the sun: "Since conflicts over non-renewable resources, such as oil, gas, minerals, are historically well-known events, 'environmentally induced conflicts' over renewables were not known until recently" (Bächler 1994).

Is this correct? Now, after having done quite an amount of empirical work and after having hypothesized that environmentally induced conflicts appear mostly in the light of the development dilemma, the question arises whether ecoconflicts are really unprecedented in history. Indeed, they are not. There have already been conflicts caused by the degradation of renewable resources - e.g. in the medieval European context. This is good, at least for theoretical reasons, because former conflicts help us to better understand and explain the new ones.

Built into the premodern ecosystem too were sources of instability. As far as twelfth and thirteenth century Europe is concerned, Caroline Merchant wrote in her most famous book "The Death of Nature":

> "Through force and the need for military security, a hierarchical structure of landlord domination had imposed itself on the communal structure of agrarian society, extracting surplus value in the form of labor, services, rents, and taxes. The amount landlords exacted was regulated by long-established tradition, and medieval landlords did not, under stable conditions, strive to maximize their gains. But the built-in pressure for seigniorial privileges - the rights traditionally accorded a feudal lord over his domain - was in constant tension with the peasant pressure for community control of common rights and resources. When combined with other interacting destabilizing forces - population pressure and technological innovation - this tension could produce sharp conflict, altered relations between landlords and peasants, and significant changes in the ecosystem as a whole" (Caroline Merchant, The Death of Nature, 1980, pp. 44-45).

In medieval Europe, conflict was already virulent over the use and social control of technology for energy production. The energy of the preindustrial economy was drawn from renewable sources - wood, water, wind, animal, and human power. Simultaneously, the pan-European population increases resulted in an era of social change combined with political unrest and protest. Forests, fens and marshes were converted to arable lands, and marginal wastelands turned to pasture for stock breeding. Quite a number of regulations over the private use of meadows, pastures, and woodlands had been implemented. Relatively small family holdings were already divided and subdivided. The growth of towns as centers for trade and crafts induced by the slight change in rural structures increased the pressure to expand cropland areas. As a result, by the early fourteenth century, most wasteland was being cultivated. Forests had shrunk dramatically over much of Europe (see Merchant 1980, pp. 46-47).

The European take-off combined with demographical trends led to a breakdown of the medieval agrarian economy and to a man-made transformation of the ecosystem. In many regions fertility declined, soils became quickly exhausted and - mainly sensitive marginal soils - were badly eroded. Population pressure, soil erosion and landlord exactions led to a situation where there was not enough fertile land per family to ward off starvation in a poor harvest year - such as in 1315.

The human-ecological transformation of the European ecoregions induced a change in the relationship between landlord and peasant as well.

On the one hand, in those areas where peasant collectivity and self-determination were strong and landlords weak, mainly in central Europe, socioecological balance could be more or less maintained. In East Prussia, for instance, violent conflict broke out in the so-called Peasants' War of 1525. The peasantry was rebelling against the power of the landlords, because the latter had taken over the regulation of grazing, hunting, and fishing rights. Peasants rose in armed rebellion to demand the return of self-regulation of common resources and control over village officials. The result of the success story of the rural population and perhaps of the European modernization process as such can be studied centuries later: by the seventeenth century, in western Germany peasants controlled up to 90 percent of the land.

On the other hand, in those areas where princes, landlords, or other institutions were powerful enough to continue to levy high taxes, to control the natural resources, as well as to attack the traditional land-owner rights, soil quality degraded tremendously. The reason was that the peasants could not invest in sufficient animals to maintain soil fertility over a long period of time.

I will close this historical excursus with two theses:

1. The destruction of the forest ecosystem, coupled with the degradation of soils by both the change of rural self-regulation mechanisms and the rise of the early modern industry, combined with the overuse and mismanagement of resources, as well as accompanied by social and quite often violent struggles, bears *striking parallels to present environmentally induced social change and political conflict in developing countries*. As in medieval Europe, in third world countries the man-made transformation of forests, woodlands, prairies, marginal lands, lakes, rivers etc. has a major impact on human health, nutrition, welfare, and technological innovations. Moreover, it induces social, political and legal change often accompanied with social uprisings, civil strifes, clashes between different social or ethnic groups, and wars.

   I shall come back to the shift of conflict geography from the European theater to the South later on.

2. We have also to be aware of two differences which are not negligible:

   A. The quality of the current transformation has changed. It has a severity, speed and globality unprecedented in history. A good indicator is the hyperbolic growth rate of the use of extrasomatic energy in the last fifty years (see part I of this contribution).

   B. The simultaneousness of different periods of time in dual societies. Whereas the medieval economy had been based on organic and renewable energy sources, the emerging market economy was based not only on the non-renewable energy source - coal - but also on inorganic matter such as iron, copper, silver, gold, tin, and

mercury. There was a socioecological change going on which induced modernization conflicts in a consecutive manner. Almost all of society was affected as one period of time followed another. A genuine civilization process took place without the intervention of third parties or a transfer of foreign cultural values.

In contrast to Europe, in developing countries the renewable resources were transformed on the basis of the industrial exploitation of non-renewable resources (drilling for fossil energy, large strip mining, minerals etc.) from the very beginning of the modernization process. The confrontation of high-energy societies of the North and low-energy societies of the South in the colonial and post-colonial period is now engraved on each developing economy. Before the background of the simultaneousness of an expanding modern and of a static traditional sector, a relatively weak and more and more marginalized rural society is forced to overuse the renewables and, as a consequence, to destroy its living space. Moreover, self-reliant sustainable development by third-world societies is far from being a real option. As Dieter Senghaas stressed in his "Learning from Europe", the disregard of the rural sector is the main reason for the failure of a gap-closing ("nachholende") development and thus, I would say, for most environmentally induced conflicts in third-world countries.

2. Typology of environmentally induced conflicts

In this section I will present some results of the evaluation of 33 regional case studies.

At first glance we can distinguish the following three categories of conflicts:

A) intrastate

B) internationalized intrastate

C) international.

However, in view of the conflicts we are examining here, this rough division into categories needs further subdivisions.

A. Intrastate Conflicts

Environmentally induced conflicts are found at present exclusively on the internal level. Most of them do not entail violence; only a few escalate into war. Internal armed conflicts are found almost solely in third-world regions. Among these conflicts are:

Type I: The ethnoecological conflict.

Heavy environmental degradation can be a source of ethnic tensions, when ethnic groups with different socioeconomical traditions share a sensitive ecoregion ("white" nomads vs. "black" peasants). We find typical ethnoecological conflicts in Rwanda and Burundi, and also in Zaïre (Shaba Province) and Kenya. There are comparable conflicts, with indigenous peoples and ethnic minorities rising to protect their own rights, in Niger, Sudan, Chad, as well as in Tajikistan. Furthermore, the Yanomami in the Amazonas, the Aborigines of Australia and the Adivasi in India must also be mentioned.

4 conflicts out of 33 are in this category.

Type II: The socioecological/periphery-center conflict.

Many power struggles escalate due to the pressure put by the modern center of a country on certain regionally limited habitats of the rural population, pushing these populations into even more precarious circumstances. Large agricultural, mining or industrial projects are usually the underlying causes, such as cash crops in Casamance (Senegal), copper mines on Bougainville (Papua New Guinea), the Narmada Dam Project in India, the overuse of renewables in the Amazon region of Brazil or drilling for oil in the Gulf of Nigeria.

12 conflicts are in this category.

Type III: The displacement conflict.

This type of conflict arises from the massive resettlement of people to other eco-geographic locations within their own country. Such resettlements may on one hand be structurally engendered, as by desertification in the entire Sudan-Sahel or in Central China, causing internal migrations to ecologically better regions or to urban agglomerations. In Algeria for instance, the FIS tried - especially before 1992 - to use the social effects of environmental conflicts for their moral and religious criticism of the state. They attempted to instrumentalize for their own political aims those segments of the population which had been marginalized by the socioeconomic and ecological crisis.

On the other hand, such massive resettlements are often forced by government measures in connection with large technical projects such as dams and hydroelectric plants (Tucurui in Brazil), or in connection with an (actual or supposed) overpopulation of certain regions.

3 conflicts are in this category.

B. Internationalized Intrastate Conflicts.

Some conflicts tend to become internationalized. This is especially the case when, for whatever reasons, "environmental refugees" cross national borders. In nearby rural areas or urban agglomerations they are a source of social, political or ethnic conflict, as they are, too, when they migrate to industrialized countries.

Type IV: The migration conflict.

Environmental refugees intensify conflict situations in which economic decline, political instability or traditional strife already exist or are brought about by population pressure. Violence accelerates the process, often opening old pre-colonial wounds. The potential for social and political disquiet is reinforced by urban impoverishment. Conflicts grow between nomads and settlers, between ethnic groups sharing an ecosystem, between neighboring states, as well as within the countries harboring migrants, be they neighboring states or northern industrial countries. In regions where environmental migration takes on a dimension transgressing borders - as between Bangladesh and India - it leads to friction, border hostilities and armed attacks, as in our case study on southern Algeria. Environmental refugees who crossed the border from the degraded northern part of El Salvador provoked the famous Soccer War between El Salvador and Honduras in 1969.

Only 1 conflict is in this category, but in a few months we will have more cases of this type.

Type V: The demographically caused environmental conflict.

In many countries population pressure on renewable resources acts as a catalyst in bringing about conflict. This is especially so where land and/or water resources are already being overused and such shortages are aggravated by increased demographic or ecological adversities. The Transmigrasi Conflict in Indonesia, the conflicts between Bangladesh and India, as well as the clashes in the Chittagong Hill Tract have to be seen from this angle.

In many countries population pressure could develop into quite a potential for conflict. Conflicts resulting from overpopulation are at first internal, with a tendency to become internationalized.

3 conflicts are in this category.

A recapitulation of the main points concerning internal and internationalized conflicts in view of their intensity.

Not all environmental conflicts escalate to the point where violence is used (7 out of 23). There are constructive reactions, but also various tragic reactions to environmental transformations: ignoring the situation, lethargy, fatalism, passivity, starvation and migration.

There is no obvious linear cause-and-effect connection between violence and poverty, nor between non-violence and affluence. Collective counter-violence against the actual or supposed guilty party, social protest, armed conflicts and war presuppose able, organized conflict parties. Where accustomed ways of life and mechanisms for dealing with conflict have been destroyed by earlier colonial powers or by flight, migration, displacement or war, conditions are too anarchic for parties to be formed. The victims are therefore not fit for conflict and find themselves in danger of further marginalization.

Environmentally caused conflicts usually escalate when they become part of a war already taking place, or when the rural population is in a position to collectively defend itself against the destruction of basic necessities, or when total failure of the state or unstable political institutions preclude any participation of social or ethnic groups that could organize and arm themselves.

C. International Conflicts

Environmental conflicts which are basically international remain at present below the threshold of violence. But the inherent tensions and readiness for violence must be appraised quite differently, depending on the type of conflict.

Type VI: The bilateral or multilateral conflict in a degraded trans-boundary ecoregion.

Here we find mainly the famous water resource conflicts between countries sharing a river basin. We can trace the development of use and distribution conflicts by examining agreements on international waterways. Geophysical scarcity as a result of the natural distribution of worldwide water resources fit for use is a given and ascertainable entity. But determining water distribution in the light of geopolitical scarcity presents problems. This geopolitical scarcity is the result of flow quantities altered by large national projects, while socio-economic scarcity is the outcome of economic activities and consumer patterns of the population in question. For example, the agreement of 1906 between the USA and Mexico on the distribution of the Colorado and Rio Grande waters is based more on geopolitical aspects, while the second agreement of 1944 is based more on

socio-economic aspects. It is not until the additional agreement of 1972 and especially the Environment Agreement within the framework of NAFTA that we find the problem of environmental scarcity being addressed, a scarcity resulting from salination, pollution and poisoning of the two river systems.

9 out of 33 conflicts are in this category, 6 of them without violent actions. The tendency of concerned parties to cross the violence threshold is probably greatest in nonintegrated areas, i.e., where there are no international agreements and regulatory mechanisms, etc., and where one side perceives an advantage to be gained by the threat or use of force.

Conflict intensity can be divided into four subtypes:

Type VIa: "Mekong": This river is in a poorly integrated region with countries that have relatively symmetrical relations (Vietnam, Cambodia, Laos and Thailand). Although the region is full of conflicts, the river plays no role at all as an object of international conflict, although the individual countries definitely have water problems. Apparently there are specific cultural elements at work here. This situation could change if China, the hegemonic power of the region, were to realize its plans to build a cascade of fifteen dams upstream.

Type VIb: "Rhine": Here, in a strongly integrated region with industrial countries that have relatively symmetrical relations, there are now and then environmental conflicts, but they are solved on a political level thanks to existing regulatory mechanisms (The Rhine Commission).

Type VIc: "Colorado/Rio Grande": In conflict-rife bilateral relations between an industrial country and a developing country, water is also the object of numerous conflicts, but without having led to the threat or use of military force. Relations between the upstream and the downstream countries are asymmetric, but the economically powerful industrial country upstream - usually after protests from the weaker downstream partner - has been willing to mitigate conflicts by political compromise as well as financial and technical measures.

Type VId: "Euphrates/Tigris": Here is a poorly integrated region rife with conflict. The countries of the region are in the process of modernization, under authoritarian and military regimes. The inter-national waterways, in a region plagued by aridity, are the object of political conflicts and lead to the use of force and even to threats of military action by the more powerful state upstream.

Due to the unpredictability of the protagonists, the uncompromising use of power on the part of those upstream, the occasional damming of the water, the lack of willingness to cooperate, as well as the lack of regulatory mechanisms, the Conflict Type VId has all the elements that can lead to crossing the violence threshold. By contrast, in the three other subtypes a willingness to cooperate prevails, a willingness which is institutionalized in the case of the Rhine, dependent on the good will of the upper riparian in the case of the USA and Mexico, and due to cultural roots in the case of the Mekong.

Type VII: The international conflict arising from distant sources.

Instigators and victims of worldwide environmental changes are usually far removed from each other globally. They have political contact, if at all, only on a rather abstract level, such as that of UN-conference-tourism. However, the North/South line of encounter, which determined the discussions in Rio, will not be the line of encounter in future environmental conflicts, neither in those now smoldering, nor in those to emerge later.

Rather, global transformation will breed victims who become the main actors in regions where climatic changes intensify conflict over already scant water resources, and where aridity, floods or the rise in sea level lead to growing socio-economic problems in societies with high population but low resources.

So far we have not been able to isolate *the regional impact of global climate exchange* as an independent variable. The case of nuclear tests in French Polynesia fits into the definition of conflicts arising from distant sources. But in fact it is another subtype which I would define as "imperialistic power projection".

3. What role does ecology play as cause and medium in (future) international conflicts of violence? Three general patterns:

Pattern I could be called a modernization conflict in marginalized ecoregions. Pattern II could be called a modernization conflict in national sacrifice areas. And Pattern III could be called environmental scarcity conflicts and international bargaining.

ad I) Marginalized ecoregions.

Marginalization signifies here an existence at the fringes of the modern sector, in ecologically fragile or severely degraded regions. Manifestations such as soil erosion, desertification and drought throw the indigenous inhabitants into an existential crisis and force them to act. As already noted, there is a wide spectrum of possible reactions. Due to marginalization, a centuries-old equilibrium between ethnic groups is often thrown out of balance. And if the central government intervenes directly or indirectly, an armed conflict ensues, as in the Jebel Marra region in Sudan.

The *"ecological marginalization of poverty"* has several faces: feminization of poverty in female-headed households; landlessness; marginal farmers who do not have access to the productive resources necessary to provide for themselves and their families; and lack of jobs in the modern agricultural sector. Climatic change, compounded by political and economic mismanagement has led to rural exodus to urban areas and/or to uncultivated land areas. Marginalized populations often get little support in breaking the vicious circle that forces them to mismanage land or to leave.

The continuing retreat and compression of poverty into low-potential agricultural areas and into exploding peri-urban areas are a major cause of severe environmental degradation. 370 million of the poorest live in rural areas where reduction of agricultural productivity, land-surface degradation, and water scarcity constitute a fundamental constraint to potential food production, and therefore to rural self-reliance in tropical drylands (see also Falkenmark 1993:428). If people are forced to take what they need from wherever they can find it, they have no choice but to overuse whatever is available to them to meet their present needs.

Environmental degradation and intractable poverty become increasingly intertwined in particular geographic areas with fragile environmental conditions, mainly in remote rural areas and on the fringes of growing urban areas. The masses of the world's poorest people are more tightly clustered by regional location than they were several decades ago. The marginalized areas with the environment and poverty connection are the very regions that are highly prone to conflict. Africa and Asia (including the Middle East) are

not only the continents with the most severe desertification, but also the two continents with (a) most current wars, (b) most wars with an environmental dimension, and (c) most potential wars.

Soil erosion is one of the major environmental challenges world-wide. Desertification, defined as the degradation of millions of hectares of arid, semi-arid and sub-humid land, is part of the global transformation of the pedosphere. In local and regional terms, the 'oikos' in arid and semi-arid areas of Africa, meaning the ordered relationship between nature, human beings and the economy, is threatened at the most basic level.

The increase of anti-regime wars has to be seen in the light of the degradation of an ecoregion within a country, leading to opposition against the central government. However, the transformation of subnational ecoregions does not necessarily contribute to nationwide quarrels or civil wars. There are very often regionalized small wars or low-intensity conflicts of long duration (5 to 10 years or even longer).

ad II) National sacrifice areas.

National sacrifice areas are peripheral rural areas from which the center (with the help of multinationals) draws profits, thanks to high capital investments in major projects. Meanwhile, the local population bears the economic and ecological burden without participating in the profits. Not infrequently we have seen in this connection such ringing names as Royal Dutch Shell or Rio Tito Zink of Great Britain.

The inhabitants of such areas are forced to leave (construction of dams), or they are hired as the lowest laborers in the national planning strategy (eucalyptus plantations in Thailand), or they pursue their subsistence agriculture in heavily compromised regions presenting severe health hazards (the Ogoni in the oil-producing region of Nigeria).

In such national sacrifice areas there are inevitable conflicts, which the national governments try, through management or military measures, to keep away from the center - to keep regionally encapsulated or otherwise under control, but of course such strictures do not solve the basic problems. The "ethnicizing" of such a conflict often presents itself as the obvious and cheap way out. In any case it is often denied, as in Nigeria, that ecology is the source of the conflict.

Both patterns (ad I and ad II) have something in common: conflicts do not generally affect all social relations in a country. The development dilemma becomes more complex, with a widening of the chasm between the modern and traditional sectors in dual societies and with further neglect of the agricultural sector.

Poverty, as well as desertification and other signs of transformation, may well generally get worse, not in any linear and regular manner, but on the basis of emphasis given by regional processes. There is a gap between the modern sector - oriented toward the world market - and the poor, landless strata of society. In the same way, there is a gap between, on the one hand, highly productive rural agricultural areas and efficient urban centers and, on the other hand, ecologically fragile rural communities and infrastructurally weak urban communities. The dividing line between both sectors often becomes the front line of conflict.

It would be reassuring to say that if modernity were to win out, conflicts would disappear. But then we would be ignoring the fact that even today, in Asia, Africa and Latin America, more people live in degraded areas than in those that are highly productive.

The duality of "latecomer" societies, that is, the division into modern and traditional sectors, is shaken by environmental changes. Latecomers, dependent on the use of resources in transformed ecoregions, meet with ecological conditions inferior to those of their industrialized predecessors. And, failing alternatives, they degrade thoroughly the few remaining resources.

ad III) International bargaining.

If we compare the types of current wars with the environmental wars' potential it is evident that there could be a shift in the typology of wars. Since all current wars are intrastate wars, future environmentally induced wars could lead to a revival of interstate wars. One cause could be that the transformation of transnational ecoregions (such as internally shared river basins or drylands) affects two or more neighboring states. We find that at present only conflicts about international river basins are likely to become violent (see annex II, section 4). As I stressed above, conflicts of type VI do not necessarily lead to a classical security dilemma between nation states. In most cases they are linked with national or regional development strategies.

4. Conclusions

Environmental degradation, which has always been a result of violence and war and an instrument put to their use, has recently become in itself a source of violence - that is, the subject rather than the object, so to speak, of human destruction. Here are six theses to take into consideration:

1. Environment often plays a background part in conflicts. It has effects over long spans of time and operates as a sometimes hidden and sometimes visible systemic force. However, the immediate motives and triggers of conflicts of violence may be found among the protagonists involved and their interests. Unless used purposely as such an instrument, the environment is a less suitable weapon than, for example, ethnic groups or migrants or foreigners.

2. It is not desertification or a water shortage per se which leads in the direction of violence, but the disintegration of existing ways of life as well as of the lack of mechanisms or regulations for dealing with conflict.

   It is often difficult to differentiate between the role of the environment and the role of the economy in a conflict, as they are mutually dependent. Ultimately, such a differentiation is meaningful only for heuristic reasons, when it is necessary to show that environmental conflicts arise due to an ecological scarcity of goods rather than a geopolitical or socioeconomic scarcity of goods.

   Case studies have fully verified the hypothesis that the environmental conflict can be traced back to ecological scarcity of renewable environmental resources and not, as in traditional resource conflicts, to economic scarcity. In fact, the basic causes of conflicts are not the unequal distribution of, or the access to, renewable resources. These are secondary problems dependent on the major sources of conflict, namely the anthropogenic degradation of air, water and soil/vegetation. Not the "common goods" but the "common bads" are the casus belli, and increasingly so.

3. For now (and undoubtedly for the foreseeable future), the typical environmental conflict is not war on a global scale, the great global conflagration. It is not even the classic international war between two hostile governments operating with heavy-weapon systems. Nor are Eastern Europe, Russia and the OECD nations at loggerheads. In these latitudes environmental conflicts are solved mainly by political and legal means. As far as global commons are concerned, it has been possible to make the most important environmental elements the subject of environment laws and conventions. On regional and national levels too, much progress has been made with regulations, so that violent conflicts are not likely to erupt in the foreseeable future.

4. There is an increase of conflict intensity in the developing countries of Asia and Africa, in individual threshold countries, and the southern C.I.S. countries. The parties to the conflicts present a multicolor picture and indicate that the conflicts are non-war power struggles and seldom all-out war: minorities vs. majorities, tribes or clans vs. tribes or clans, indigenous populations vs. immigrants, settlers vs. nomads, nomads vs. governments, subsistence farmers vs. multinationals, the unemployed vs. the socially secure, boundary population vs. boundary population, etc.

5. As in medieval Europe, the change in traditional land-use rights has had a major impact on the socioecological equilibrium in fragile areas. Traditional local authorities in arid and semi-arid regions once played an important role in establishing and protecting land-use rights. They avoided many of the environmental problems that exist today. This has changed during the colonial and post-colonial period and with the centralization by national governments of political authority in the capital or in a provincial city.[1]

   Natural resources in many third world regions have usually been held in common rather than owned by individuals. One reason for this is that resources in those areas are inadequate to support large populations, mainly in the arid but increasingly so in the semi-arid zone, and animals have to be moved over long distances and in patterns that are difficult to predict. This implies that the cost of establishing and enforcing systems of individual land-use rights is high. One of the consequences is the growing number of poor people who tend to be excluded from access to resources and infrastructure.

6. To surmount the conflict-prone environmental crisis, third-world countries have to learn form Europe's past which four factors are crucial for modernization processes: a powerful rural population; overcoming both subsistence farming and feudal land-

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[1] "Within the poorer countries (...) land control has taken traditional "labor-intensive" forms, such as the use of herders rather than fences to guide animal movements, but these have been eroded by many of the changes described above. Growing population pressure has severely complicated the maintenance, enforcement, and adjudication of land use rights. Rising animal prices have encouraged an expansion of individual economic activity within the livestock sector and permitted ownership of animals to be transferred to people not subject to traditional forms of control. Increased cash crop opportunities have added further to pressure on cultivable soils. At the same time, technological advances in animal health and water development have increased the pressures on traditional production systems. Finally, both the undermining of lcoal authority by colonial regimes and national governments and the tendency within these governments toward centralized authority have weakened traditional systems for managing the use of natural resources." (Stryker, 1989:94)

ownership; local self-determination; and the creation of participatory conflict regulation institutions.

1. Typology of environmentally induced conflicts (basis: 33 case studies)

Overview

A.	Intrastate
A.I.	Ethnoecological conflicts
A.II.	Socioecological conflicts (periphery/center)
A.III.	Displacement conflicts
B.	Intrastate, becoming international
B.IV.	Migration conflicts
B.V.	Demographically induced conflicts
C.	International
C.VI.	Bi- or multilateral conflicts induced by the degradation of a trans-boundary ecoregion
C.VII.	International conflicts arising from distant sources

Results

Types of conflicts	**country/ regions**	**environmental problems/variable**	**parties involved**	**conflict intensity**
A. Intrastate				
A.I. Ethnoecological conflicts				
A.I.1.	Rwanda	regional overuse, soil erosion, deforestation, subsistence crisis, population density	Hutu-Government vs. FPR (Tutsi-)rebels and political oppo-sition	inter-elite war, massacres and genocide
A.I.2.	Sudan (Jebel Marra)	Sahel drought, deser-tification, regional overgrazing	fur farmers vs. Arab nomads third party's interv.	civil war / skirmishes
A.I.3.	Sudan (North-South)	environmental scarcity subsistence crisis caused by mecha-nized farming	Government vs. SPLM/SPLA	civil war, intertribal violence in Southern Sudan
A.I.4.	Tajikistan (Amu Darya)	hydrological system of Vakhsh, Pyandsh: up-down-stream	factional divides Gorno Badakshan and Kurgan Tyube region	low intensity, violent clashes

A.II. Socioecological conflicts (periphery/center)				
A.II.5.	Botswana (Southern Okavango, Maun)	Southern Okavango Integrated Water Development SOIDW: water scarcity, overgrazing, mining, unique ecosystem	government vs. local population (peasants, cattle breeders) and Greenpeace/Kalahari Conservation Soc.	peaceful dispute settlement, project cancelled in 1992
A.II.6.	Bougainville (Papua-Newguinea)	impoverishment of the living space, Panguna copper mine	government vs. BRA (guerilla)	secessionist war (ends summer 94?)
A.II.7.	Brazil (Amazon Region)	a) overuse of renewables: soil in Southern Para	landless migratory peasantry vs. small/ large-scale farmers	highly explosive, socioeconomic and cultural "battlefield"
A.II.8.	Brazil (Lower Amazon)	b) overuse of fish resources; an effect of the decline of jute/ varzea agriculture	community fishers (ribeirinhos) vs. trawlers (geleiros)	"dialoguing the conflict" but violent clashes between patrols
A.II.9.	Brazil (Tapajos River)	c) overstrain of sink capacity: mercury pollution	gold washers vs. local population	no violence effects of mercury as mystery and myth
A.II.10.	Chile (Alto Bio Bio)	ENDESA dams project (6 dams planned)	government vs. marginalized pehuenche (pequenos agricultores)	low-intensity, INGO intervention
A.II.11.	India (Narmada)	Sardar-Sarovar dam project: flooding of living space	government vs. indigenous people (Adivasi)	non-violent protest, INGO intervention (repression)
A.II.12.	Nigeria (Niger Delta Region)	environmental devastation caused by oil mining in a densely populated rural area	government, Shell et al. vs. indigenous and ethnic groups, esp. Ogoni	violent clashes, high escalation risk
A.II.13.	Nigeria (Northern/ Sahel)	complex system of dams causing subsistence crisis and migration (depl. fish stock of Lake Nguru)	government vs. farmers/fishermen and the southern states (ethnic problems)	nonviolent protests, violent reactions by the military and police forces against farmers
A.II.14.	Philippines	destruction of trad. land rights: expansion of mining, large-scale deforestation, dams, nuclear plants etc.	government and new private landowners vs. indigenous Igorot/ Lumads et al. regional hotspots	nonviolent struggles against logging, mining, Mt. Apo; Geothermal plant, "development aggression"

A.II.15.	Senegal (Casamance)	subsistence crisis caused by cash crops, overuse, overfishing	government vs. Diola population (armed forces)	antiregime war, violent clashes between ethnic groups, terrorist assaults, massacres
A.II 16.	Thailand	large-scale Eucalyptus plantations in Northeast Thailand	government and private enterprises vs. rural population and Karen immigrants	social protest, burning of plantations, forced displacement

A. III. Displacement conflicts

A. III.17.	Algeria	soil erosion, water scarcity, subsistence crisis, bidonvilles, environment is **not an independent** variable	government vs. FIS, marginalized poor (urban. r. 60%)	unrest, civil strifes, coup d'état against fundamentalists
A.III.18.	Brazil (Tocantins River)	d) impoverishment of living space, Tucurui hydroelectric plant	local ribeirinhos vs. immigrants, rural exodus	social and ethnic clashes(20 yrs. of permanent struggles)
A.III.19.	China (Northern, Henan province)	long-distance migration, env. refugees, population pressure: loss of arable land	local population vs. migrants and refugees	no violence, high risk of exacerbating ancient regional/provincial/ethn. animosities

B. Intrastate, becoming international

B.IV. Migration conflicts

B.IV.20.	Southern Algeria/ Mali, Niger	sahel drought, desertification	govern. vs. Tuareg immigrants to Wilayat Tamanrasset and Illizi	low-intensity, skirmishes, criminal violence

B.V. Demographically induced conflicts

B.V.21	Bangladesh/ India (Assam)	population pressure, subsistence crisis, environmental refugees	Ind. Government and local people vs. Bengali immigrants	low-intensity, social and ethnic clashes
B.V.22.	Bangladesh Chittagong Hill Tract	population pressure, subsistence crisis, displacement (soil erosion, deforestation)	government vs. "Shanti Bahini" (Chakmas)	guerilla war (counterinsurgency), ethnic clashes
B.V.23.	Indonesia (Java)	population pressure/ density, land degradation, subsistence crisis:	government vs. indigenous people (Irian Jaya)	no violence, growing social and political tensions

		Transmigrasi		
C. International				
C. VI. Degradation of a transboundary ecoregion (bi- or multilateral)				
C.VI.24.	Bangladesh/ India	Farakka barrage on the river Ganges, flood vs. drought	Beng. Government vs. Ind. Government up-downstream	no violence, political conflict (asymmetric)
V.VI.25.	China/Thailand/ Laos/Cambodia /Vietnam: lower Mekong River	planned cascade of 15 dams by the upper riparian China, up-down-stream	Chinese Government vs. governments of the lower riparians up-downstream	no violence will be a future problem (international tensions?)
C.VI.26.	Hungary/ Slovakia Danube River	Gabcikovo hydropower station and diversion of Danube River	government vs. government vs. Hungarian minority	no violence, INGO, Int. Court of Justice (military threat?)
C.VI.27.	Kazachstan/ Uzbekistan/ Turkmenistan	Aral Sea shrinking, soil erosion, water scarcity, salinization	government vs. government vs. local population	no violence, (secession of Karakalpakia, Uzbekistan?)
C.VI.28.	Kyrgyzstan/ Uzbekistan	hydrological system (Naryn and Toktogul) up-down-stream	Uzbek vs. Kyrgyz population in the Fergana Valley	ethnic clashes, high tensions
C.VI.29.	Mexico/USA	Colorado/Rio Grande: irrigation, overuse, salinization, pollution (fertilizers) up-down-stream	government vs. government, regional actors (twin cities)	no violence, bilateral regime, bargaining: US-water vs. Mexican emmigrants
C.VI.30.	Nigeria/ Cameroun/ Chad (Lake Chad)	shrinking, drought, high evaporation subsistence crisis, immigrants from N.	government vs. government vs. government	potential violent conflict, water regime is disputed (Basin Commission)
C.VI.31.	Senegal/ Mauretania	desertification, environmentally induced population displacement (expulsion of Blacks by Mauretania)	(white) Moors vs. (black) Africans vs. Sen. Govern. (OMVS-project)	pogroms in 1989 both in Mauretania and Senegal, transborder struggles between armed forces
C.VI.32.	Uzbekistan/ Tajikistan	shared irrigation system (tributaries to Fergana Valley)	Uzbek vs. Tajik population	ethnic clashes, high tensions
C.VII. International conflicts arising from distant sources				
C.VII.33.	French Polynesia	environmental pollution, impoverishment of living space caused by nuclear tests	French Government vs. liberation movement/indigenous pop. vs. immigrants	low-intensity, counterinsurgency, protest, INGO intervention (Greenpeace)

2. Other case studies to be done/finalized:

Africa

1.	Egypt:	Environmental degradation and population pressure as a source of violent conflicts?
2.	Ghana	(Tribal) conflicts between pastoralists and peasants induced by ecological degradation in Northern Ghana
3.	Kenya:	Ecoregional overuse of renewables as a major source of political conflict, social stress and ethnic tensions
4.	Moçambique:	Ecological degradation and socioeconomic stress caused by war, conflicts caused by ecological degradation and socioeconomic stress
5.	Niger:	Drought, soil erosion and regional overuse. Is there an ecological dimension in the struggle between the Tuareg and the government?
6.	Namibia:	Displaced Owamboland people in Namibia: a high risk for violence and a danger for the democratic process?
7.	Zaïre:	Ethno-ecological and -political conflict in Shaba

Asia

8.	Indonesia:	Aceh. Ecological degradation, social marginalization and the secessionist Aceh Sumatra National Liberation Front
9.	Malaysia:	Deforestation as a source of conflict between the government and the indigenous population (Sarawak)
10.	Tibet:	A "national sacrifice area" of China?

America

11.	Haiti:	Large-scale deforestation and subsistence crisis as factors of marginalization, political unrest and migration

Middle East

12.	Israel:	Water disputes over the Jordan River Basin and peaceful dispute settlement
13.	Turkey:	GAP: Water as a weapon against the Kurds and lower riparians. Turkey's power play as a strong upper riparian.

C I S

14.	Russia:	Man-made environmental degradation and disasters as a potential of various conflicts in the Russian Federation

Europe

15. Corsica: Environmental stress a cause of conflict in Corsica?

3. Three general patterns of environmentally induced conflicts (basis: 33 case studies)

Type	**Marginalization of poverty in marginal ecoregions** [in brackets = no violence]	**Creating (inter-)national "sacrifice areas"** *doubly mentioned	**Environmental scarcity and international bargaining (power play)**
I	Rwanda; Sudan(1,2); Tajikistan		
II	Brazil (1,2,3); Chile; Philippines; Senegal; Thailand	[Botswana]; Bougainville; India; Nigeria (1,2); Philippines*	
III	[Algeria]; [China]	Brazil (4)	
IV	Southern Algeria		
V	Bangladesh/India/CHT; [Indonesia]		
VI	Uzbekistan/Tajikistan; [Nigeria/Lake Chad]; Senegal/Mauretania	[Kazachstan/Aral Sea]	[Hungary/Slovakia]; [China (Mekong)]; [Bangladesh/India/Farakka]; Kyrgyzstan/Uzbekistan; [Mexico/USA]; Senegal/Mauretania*;
VII		French Polynesia	

4. Conflict Management: Security or Development Dilemma?

T	**Security dilemma**	**Development dilemma**	**Security dilemma**	**Development dilemma**	**Security dilemma**	**Development dilemma**
I		Rwanda; Sudan (1,2); Tajikistan				
II		Brazil (1,2,3); Chile; Philip.; Senegal; Thail. Philippines*		[Botswana] India (Narm); Nigeria (1,2); Bougainville		
III		[Algeria]; [China]		Brazil		
IV	S. Algeria→					
V		Bangladesh/ India(CHT) [Indonesia]				
VI		Uzbek./Tajik.; [Nig./Lake Chad]		[Kazachstan Aral Sea]	[Hungary/ Slovakia];	←←← [China Mekong];

		Senegal/ Mauret				[Bangladesh/ India, Farakka]; [Kyrg./Uzbeki.]; [Mexico/USA]; Senegal/Maur.*
VII		.	Fr. Polynesia →			

Malin Falkenmark

Eco-Conflicts - the Water Cycle Perspective

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New eco-conflicts with major implications -- meeting the looming water crisis

Introduction

Past international conflicts have basically been military conflicts driven by political disagreements. Today, a new type of conflicts is emerging on the global arena: environmentally based conflicts. Since human societies are embedded in vulnerable ecosystems that might collapse under heavy stress, particular risks emerge when the life support function of inhabited landscapes deteriorates.

One of the issues raised at the Ascona Conference is water disputes: are they symptoms of traditional resource competition or are they indications of a "new" type of eco-conflicts? Among the issues addressed in earlier sessions of the conference have been the linkages between environmental degradation and political violence. In this paper an effort is made to answer the question just raised by broadening the conventional concept of water disputes to water-related disputes, and link the discussion to the water-related environmental degradation discussed by Homer-Dixon (1994).

The paper will address the linkages between drought and desertification, and estimate major threats in water-short regions emerging from the unavoidable population growth in the next few decades (e.g. related to mothers already born). Conclusions will be drawn in terms of environmental migration, risk for controversies, and key measures needed to reduce these threats. It will in particular clarify

- the complexity of water scarcity problems

- their probable expansion in size as well as severity
- a typology of water-related livelihood problems.

The landscape as a life support provider

Addressing population-environment-development linkages

Development takes place by the interaction of two worlds: the landscape reality, and the human perceptions of that reality. The word used for the landscape reality at this conference has been "environment". In the past, the diagnosis of the population-environment-development dilemma has suffered from fundamental perceptional problems. Even studies of global food supply tend to be crude and simplistic. The relations between environment/development/population have been discussed as triangular linkages. Myers (1993) however complains about the complications emerging from the linkages between linkages.

Thus, even if the environment-development-population linkages in the past could be discussed in terms of correlations and regressions, this will not be sufficient for the linkages of the near future. The reason is simple: since things change with time in all three realms, rather than thinking of a static triangular linkage relationship quantified from observations in the past, it is preferable to think at least in terms of a spiral along the time axis (*Figure 1*). Population grows, increasing the population supporting capacity needs. At the same time the "environment" continues to degrade, reducing the population supporting capacity. This image also clarifies the increasing risk for competition and conflicts as time passes.

Living at the mercy of the water cycle

Life on this planet is constantly at the mercy of the water cycle. The amount of water that this cycle brings to a particular region, in combination with the amount that the atmosphere tries to recapture by evaporative demand, determines the aridity and therefore the plant production capacity. Such hydroclimatic preconditions provide clear constraints to the population supporting capacity from rainfed agriculture together with seasonality and erraticness of rainfall and vulnerability of the soils in terms of crust formation tendencies and erodibility.

By the water partitioning at the ground, the incoming precipitation is divided between two main branches: the vertical branch returning water back to the atmosphere, and the quasi-horizontal branch feeding aquifers and rivers. In terms of the production functions of water, it is useful to distinguish between "green water production" in the former branch, based on water passing through the root zone and operating biomass production (which stops when green water is lacking); and "blue water production" in the latter branch, involving socio-economic production activities based on the water available in aquifers and rivers (Falkenmark & Rockström 1993). That water is accessible for societal use while it passes through the landscape, above and below the ground surface.

The water cycle therefore provides life support constraints both in terms of the green water dependent biomass production potential, and of the blue water dependent socio-economic production related to health, industry and urban activities. Polluted water adds further constraints.

Figure 1
A time-driven spiral, symbolizing the changing relations population/environment/development. This relation is often discussed in terms of triangular linkages, as validated by past experience. Such approach however neglects two fundamental changes with time:
1) population is growing rapidly
2) life support from environment is deteriorating.

Environmental scarcity - concept in need of clarification

What is badly needed is a clearer idea of what the so-called environment really represents. The concept "environment" basically stands for the system that surrounds human beings, and to which they are exposed. When the number of individuals and the scale increases, the concept becomes more and more unclear, however. Basically, the term might be understood as the biophysical system that provides the human population with its life support: the landscape as the life support provider, by its function of hosting the natural resources on which development depends: water, biomass, minerals, energy (Falkenmark & Subrapto 1992). To get hold of these resources man has to manipulate the landscape, i.e. "transform the environment". Besides the intended benefits, side effects are produced, many of them negative. These have in the past tended to be unprecisely spoken of as "environmental effects".

Also the term "environmental scarcity" tends to be a rather diffuse concept. Up till now main attention has been given to the so-called desertification -- basically referring to land fertility degradation. A convention is presently under ratification. This effort however only addresses part of the problem in the dry climate tropics and subtropics (lack of "green water"), which is in fact the scarcity of both "green" and "blue" water to fulfill the many parallel water functions in the life-support systems. Regarding the latter, there has until lately for some reason been an almost complete conspiracy of silence on the international arena in spite of its implications in terms of livelihood-related threats like crop failures and polluted water sources (Falkenmark 1989).

What is at stake is no less than human health, food security, ecosystem health, peace and security.

Deteriorating life supporting capacity

Basically, the life supporting capacity of the landscape may be disturbed in three main ways. First of all, *pollution* due to improper waste handling, and *land degradation* in areas with vulnerable soils are disturbances that will disturb the productivity of terrestrial, aquatic and coastal ecosystems, with implications for both food security and biodiversity. Livelihood problems may however emerge also when the demand increases beyond the production capacity, forming a *resource scarcity* situation.

These three problems may develop from different driving forces: they may be driven by poor waste handling, by population growth beyond the supporting capacity of the landscape (including its water systems), creating competition, disputes and conflicts; and they may be driven by poor land management, causing degradation of the productivity of the landscape, including its soils and water systems, and involving the risk of poverty and diseases.

Lack of water - a major complication

It is an experience of the industrialized countries in the North that easy access to water has been a sort of "lubricant" for socio-economic development, the reason being that most societal sectors in some way tend to depend on water. In order to intellectually manage the problematique in the dry climate zone, it is necessary to realize that water is a complex resource: vital, non-substitutable, and finite. Where there is no water, people cannot survive but have to leave. This was clearly illustrated by the risk for evacuation of the city of Bulawayo (Zimbabwe) during the 1992 drought.

Water has basically four main functions which have to be taken into account in developing a coping policy:

- *health function*, manifested in the fundamental importance of safe drinking water as a basic precondition for socio-economic development (cf. the massive efforts that went into the International Drinking Water Supply and Sanitation Decade 1981-90);
- *habitat function* of water bodies, hosting aquatic ecosystems, which are easily disturbed when the water in the water bodies gets polluted;

- *carrier function* for dissolved and suspended material picked up by the mobile water along its pathways through atmosphere, landscape and water courses, and carried along; this function plays a central role in the land degradation processes (leaching of nutrients; erosion and sedimentation);
- *production function*, at the Dublin Conference and in Agenda 21 from the UNCED Conference expressed as "water as an economic good". Avoiding any confusion with the different question of who pays what, this concept is basically understood as water as an economic production factor. There are however two production functions to distinguish:
  a) biomass production, operated by a flow of "green water", entering through the roots and leaving through the foliage. In the absence of "green water", photosynthesis stops altogether and the vegetation wilts;
  b) societal production in households and industry, based on "blue water", withdrawn while passing through the landscape, and delivered to cities and industries through water supply systems.

The fact that water has so many parallel functions means that scarcity of water may complicate life in human settlements in many different, parallel ways.

Water-related manifestations of "environmental scarcity"

Soil fertility problems

As already indicated, water scarcity has often been spoken about under the indirect concept "desertification", which - although still kept in strategic use - remains an extremely unsatisfactory and unprecise concept, inherited from the 1970's . In its most general use, the concept basically refers to loss of soil fertility due to a whole set of causal factors:

- fertility loss manifested as water deficiency in the soil, i.e. soil desiccation;
- fertility loss manifested as nutrient deficiency in the soil;
- fertility loss manifested as water surplus in the soil, i.e. water logging and/or the leaching of nutrients;
- erosion of fertile soil on devegetated slopes (highland degradation).

One particular aspect of deficient soil productivity is deficiency in soil water, impeding crop growth in the sense that there is not enough green water available in the root zone to meet the water requirement of the crop. Such deficiency may be caused in two main ways: on the one hand lack of precipitation, in other words dry climate, and on the other lack of soil permeability, needed to allow the rainfall to infiltrate into the root zone instead of allowing it to form flash floods with severe consequences in terms of erosion. Both types of causal factors, when combined with droughts (temporary rainfall deficiency), result in local deficiencies in soil productivity, due to lack of "green water" needed by the plants to allow photosynthesis.

Multiple water scarcity

The environmental preconditions for human activities mentioned earlier may be problematic by their complicating human activities. This is easily exemplified for the dry climate tropics/subtropics: large parts of this region are characterized by a precipitation, erratic and too limited to allow full crop yields to develop during the short wet season (Falkenmark & Rockström 1993). The result is extreme vulnerability to crop failures during dry episodes and dry years - both in fact part of the climate characteristics.

The multiple environmental vulnerability in the dry climate tropics can be expressed in terms of a whole set of *water scarcity modes* (Falkenmark 1993):

A) lack of green water manifested as a short growing season due to limited rainfall and a long dry season;

B) intermittent droughts being part of the climate, and generated by disturbances in the water vapor circulation between the Pacific and other regions;

C) dryland degradation or desiccation of the landscape due to soil vulnerability and adding to the scarcity of green water;

D) scarcity of blue water originating from rainfall surplus recharging aquifers and rivers.

Since droughts tend to be more intense the smaller the annual rainfall, these different modes of water scarcity often appear together. This is illustrated by the situation in the hunger crescent in Africa (*Figure 2*), where the famine-stricken crescent of coun- tries with severe problems during the 1984/85 drought passes through a region where all four modes of water scarcity are superimposed.

Typical water scarcity profiles

The first two of these modes, A and B, are climate-related and should be referred to as problematic environmental preconditions. The third, C, is the result of vulnerable soils, and is basically driven by increasing population pressure on a vulnerable landscape. The last, D, when combined with a growing population, develops into a population-driven scarcity, escalating as more and more people will have to depend on a non-substitutable but finite resource. The way in which water scarcity has been addressed in the international community has been focused on the combination of B and C, in other words under the concept "droughts and desertification".

Today ABC is a quite frequent combination over large parts of both sub-Saharan Africa and Asia, probably explaining the difficulties in the last few decades of increasing per capita crop production in these regions. The main risk for society resulting from this combination is related to *crop failure*, exacerbated as land desiccation proceeds.

With time, due to the unavoidable population growth (mothers already born), water scarcity D will escalate rapidly (*Figure 3 b*). By 2025 the number of people living in countries with water stress or chronic water scarcity will have grown from 300 mln by 1990 to over 3000 mln, i.e. *with a factor ten in 35 years only* (*Figure 3 c*). The geographic distribution is indicated in *Figure 4* (Engelman et al 1993). The combination ABCD will in other words be widespread in Africa and S Asia. Additional threats added to the crop failure risk will be increasing morbidity/mortality due to pollution wherever the increasing waste production is not properly coped with, and evidently water disputes.

Figure 2
Correlation between famine-proneness during the 1984/85 drought, and the four water scarcity modes mentioned in the text. From Ambio 1993, No 7.
Map 1. Sub-Saharan countries suffering from severe famine.
Map 2. Area with limited length of growing season (black area less than 150 d). Data from FAO.
Map 3. Degrees of drought risk according to FAO. Classification based on the number of times in a 50 year period with at least two consecutive drought years.
Map 4 . Area with strong land degradation (black) according to UNEP.
Map 5. Limited water surplus available to recharge aquifers and rivers. Recharge given in cm per year. Data from Reichel and Baumgartner.

Figure 3
Water availability as seen on a regional (country) scale.
Upper figure (a) illustrates water availability as composed of an endogenous component emerging from rainfall over the country, and an exogenous component emerging from rainfall over upstream countries.
Mid figure (b) visualizes growing population pressure on a finite availability. Each cube represents one flow unit of water of one million cubic meters per year, each dot 100 individuals jointly depending on that water.
Lower figure (c) indicates number of people by 1990 and 2025 AD, living in water stressed countries, i.e. more than 600 p/flow unit of available water. Columns show different continents and the gross total. Data from M. Arnestrand, Royal Institute of Technology, Stockholm.

Figure 4
Countries with water stress or chronic water scarcity by 2025. From Engelman & LeRoy (1993).

The dispute-generating dimension

The water availability matrix

As already indicated, a country may receive its water resources either from the net precipitation over the territory (endogenous availability) or from entering water in multinational aquifers and rivers bringing water from upstream countries in the same river basin (exogenous availability). In different countries, these two complementary blue water sources may exist in different constellations: there may be scarcity of endogenous water, and/or scarcity of exogenous water. *Figure 5* shows different possibilities in terms of relations endogenous/exogenous. The typical problem pattern will vary according to position in the matrix. Water scarcity problems related to both crop production and societal production are largest in square 1. Upstream/downstream competition is largest in square 3 (some examples are Botswana, Namibia or Egypt). Water quality-related problems with an upstream/downstream dimension are dominant in squares 6 and 9.

Figure 5
Water availability differs between countries due to different relations between runoff produced from rainfall within the territory (endogenous water), and imported water in entering aquifers and rivers fed by rainfall over upstream territories (exogenous water). Cf. also Figure 3a.

Making water accessible for use

Besides these direct water scarcity and water quality manifestations, a whole set of controversial problems may be envisioned due to societal needs to mobilize a greater fraction of the available water for use where and when needed. A *first* type is closely related to seasonality-related problems and how they may be overcome by establishment of water storage facilities behind dams. *Second*, the irregularities of human settlement patterns will call for redistribution of water from water-richer regions to support activities in drier regions with concentrations of human production activities (urban and industrial areas, irrigated cash crop production).

The side effects from both these types of water development projects (dams, canals, pipelines, aqueducts) tend to make them quite controversial (resettlement, altered fisheries, altered pastures etc.). In the case of dams, disputes are due to the unavoidable side effects of flooding the area behind the dam, and other side effects. Large conceptual problems at present are reflected in the confusing mix-up of avoidable and unavoidable side effects of the dam on the one hand, and on the other of the downstream use of the water made accessible through the dam. The unavoidable effects have to be possible to accept; the avoidable ones could be avoided by proper planning.

Typology of water-related disputes

As a result, possible controversies may be structured in three categories:

- those related to *direct blue water competition* either between upstream and downstream blue water uses, or between green water consuming biomass production and blue water dependent societal uses;
- those related to *water quality*, where upstream water users pollute the life-line of downstream stakeholders along the same river;
- those related to *water projects*, which may be related either to coping efforts (reservoirs to cope with seasonality; transfers to cope with spatial distribution problems), or to energy production (hydropower plants).

Figure 6 provides a number of examples of the different types of controversies as related to the matrix in Figure 5.

Traditional resource competition

The conventional type of water disputes is *upstream/downstream* competition, and is most typical for squares 3, 6 and 9. Scarcity dominates the problematique in square 3, pollution in square 9. Homer-Dixon (1994) discusses a whole set of examples of this mode of disputes in terms of both conflict sources and response patterns. Due to the topographic characteristics of sub-Saharan Africa, where most of the river basins are in fact international, a whole set of such competition modes may be foreseen as population grows at the present rate. Different levels of human development will complicate the upstream/downstream response constellations as indicated by Homer-Dixon's example of South Africa vs. Lesotho.

A "new" type of eco-conflict

A seldom discussed mode of water competition is the *green/blue competition* which might be expected to grow as the demands for increasing biomass production grows (Falkenmark & Rockström 1993). What is referred to is the competition between green water production and blue water production, in other words biomass production, returning water to the atmosphere, and socio-economic production depending on the rain water surplus left to feed aquifers and rivers. This type has created considerable problems in regions with high evaporative demand like Australia.

This problematique has to be paid attention to in efforts to mitigate the so-called desertification problem. In the dry climate zone in areas with fine or medium soils, land degradation tends to develop as a consequence of clearing of the land through overgrazing, deforestation, fuelwood harvesting etc. (Sandström 1995). The conventional mitigation measure is afforestation with the aim of increasing the infiltration and the groundwater recharge to secure water supply from local springs. It has to be kept in mind that the overall yield may however shrink due to larger transpiration losses.

Who owns the rain?

This type of dispute may in other words be expanding with the widespread call for tree plantations to remedy soil degradation. One illustration is a dispute on a bilateral river passing from South Africa to Swaziland. In Australia , the example of Melbourne city water supply is quite illustrative: the city tries to convince the forest industry to accept longer rotation periods to reduce the green water consumption so as to leave more "blue water" for the city of Melbourne.

Figure 6

Examples of different categories of water disputes for different positions in the matrix in Figure 5.

Another example of green/blue competition is principally the West Bank groundwater dispute. At issue is basically the sharing of the rainfall over the West Bank and the groundwater produced between Palestinian biomass production on the one hand, and the water supply of coastal cities in Israel on the other. These cities depend on the surplus feeding the aquifers transversing Israel towards the Mediterranean.

Urban/rural water competition

Still another mode of water competition is the one between urban and rural areas - to a certain extent belonging to the category project-related. This type is now rapidly expanding over the dry climate zone, driven by the rural exodus and the industrialization of many developing countries. The development of urban areas is of course an extreme form of transformation of the "environment". The rapid growth of the urban population typical in the South tends to generate water disputes: the city represents a larger and larger "point demand of water" which has to be brought to the city from sources further and further away. This introduces conflicts between city activities and competing water needs in rural areas, including the water needed for food production not only for rural self-reliance but also for the urban market. One example is Arizona in the US where the response was so-called water farming, i.e. the city buys water from the farmers outside the city, which have to cease their irrigated agriculture. An actual Third World example is Tamil Nadu in India where a rapidly growing industrial area in a neighboring state wants to transfer water from the Bhavani river, presently used for command area irrigation further downstream.

Disputes around water quality deterioration

There are a number of well-known examples of quality-related controversies: best known might be the problems in the Rhine river, suffering from the pollutants introduced from French salt mines. In recent years, the problems of the city of Rotterdam have attracted increasing interest. As a consequence of German industry polluting the Rhine with heavy metals, the silt continuously being excavated from Rotterdam harbor - one of the largest harbors in the world - has to be treated as environmental hazard and put on a special deposit, instead of being used for soil improvement purposes as would be more desirable (Vellinge 1993).

Conclusions

New eco-conflicts with major implications

Clear water-related threats to human life support that come out of this article include:

- competition for water in water-stressed regions, and around over-populated cities with more and more severe water supply problems;
- drought-driven crop failures with consequences for food security for a rapidly growing population;
- unsafe water sources due to escalating water pollution with risks in terms of water-related diseases.

The international community has strong reasons to find ways to meet the escalating water scarcity which will otherwise generate large-scale environmental migration and myriads of water-related disputes.

The paper has tried to clarify what might be meant by the term "environmental scarcity", used in earlier publications on eco-conflicts, by relating it to problems of livelihood security. Thus, controversies may be due to direct water competition between upstreamers and downstreamers, to upstreamers polluting the lifeline of downstreamers, or to different views on water-related projects, aiming at either coping with temporal and spatial water availability inequalities, or with energy production efforts.

Meeting the approaching water crisis

It has also been shown that water scarcity might develop into a major world water crisis driven by the "unavoidable" population growth in the next few decades, sending more than 35 % of the world population into water stress or chronic water scarcity. The international community should be urged to pay attention to these major threats to human life support. The way to minimize environment-related conflicts is by finding the proper ways to manage human activities in vulnerable dry-climate landscapes, and by developing a water ethics on how water may be shared between upstreamers and downstreamers. This predicament is particularly challenging in regions where upstreamers are water providers - the "water towers" of the basin - whereas the runoff generated is the very lifeline of downstreamers, living in countries so dry that they are water consumers in the true sense of the word.

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Nurit Kliot

Milk and Honey But No Water: Scarce Water Resources in the Israeli-Palestinian Jordanian Realm

Water sources are interrelated to the competing nationalistic ideologies of Israel, Jordan and the Palestinians. Water constitutes a scarce resource in all three societies and should be considered a strategic resource. There are four major areas of dispute for Israelis and their partners to the scarce waters:

1. Data availability, validity and reliability.
2. Water supply and demand. In particular the disputes surround five major aspects of supply and demand.
   a) The low total of water supply and the varied nature of supply.
   b) Water shortages which are reflected in deficits and overpumping.
   c) Water supply includes water resources not available for immediate consumption such as brackish and polluted water resources.
   d) The water resources available for use include a large proportion of common water resources.
   e) The co-riparians are disputed over sectorial allocation of water resources and over water prices.
3. Issues covering water quality gain more and more weight in the dispute among the riparians.
4. Most importantly, Israelis and the Arabs are deeply disputed on legal issues of water rights and geopolitical issues such as future borders, sovereignty and the final and peaceful political arrangements in the region.

Possible solutions include:

1. Allocation of water according to equity, namely equal quotas of water will be apportioned to Israelis and Palestinians.
2. Water will be diverted from agriculture to the domestic sector.
3. Major investments in storage, desalting plants for brackish water and in conservation will have to take place.
4. Joint institution for the gathering, exchanging and evaluating of data will be established for Israelis, Palestinians and Jordanians.

Introduction

Water resources (and to a large extent land) are interrelated with the competing nationalistic ideologies of Israel, Jordan and the Palestinians (Isaac, 1993:58; Kliot, 1993). Water is widely considered as a strategic resource in Israel and its availability has strong connections with national security. This importance is strengthened by the role of agriculture in the Zionist ideology and by the intensive use of irrigation in Israeli agriculture (Baskin, 1992:1). Similarly, the Palestinians consider gaining control over water resources as closely tied to gaining independence, and failure to retain control of underground water sources in the West Bank is seen as inevitably leading to the repression-downfall of the Palestinians. Finally, water resources were considered in Jordan as a strategic resource

and as crucial to the economy of that country. Jordan's King Hussein has even stated in the past that the next war in the Middle East would focus on scarce water resources (*Independent on Sunday* 15 May 1990). At present all three parties are involved in bi-lateral and multi-lateral peace talks in which water and environmental issues play a large part.

The purpose of this paper is to discuss, in detail, points of conflict and pertinent areas of dispute in all the matters concerning water resources in the region. Finding peaceful solutions to satisfy regional human needs is hindered by the acute water stress in the area.

Water stress situation is defined as a situation in which the appropriate quota of water necessary for adequate fulfillment of human needs is limited.

This quota has been defined as 100 m^3 per person per year for domestic needs and 1700 m^3 per person for all human needs (Falkenmark, 1993). Falkenmark (1993) also classified situations of water scarcity in which the total water quota available per person is only 1000 m^3. According to Shuval (1993) only water quotas less than 500 m^3 reflect water stress, but Israelis, Palestinians and Jordanians are all far below the above threshold. The available quantity of water for Israelis is 475 m^3 per person per annum, for Palestinians 165 m^3 per person per annum; for the Jordanians only 260 (Gleick, 1993:106). Israelis and their partners share the scarce waters of the Jordan Yarmouk[2] River and the groundwater. This has become a source of dispute in four major areas:

1. Data availability, validity and reliability concern all the partners to the Jordan river and the common groundwater resources.
2. Israelis, the Arab co-riparian states, and Palestinians strongly disagree on water supply and demand, and on the distribution and use of the existing water resources.[3]
3. Issues concerning water quality gain more and more weight in the dispute among the partners to those water resources.
4. Most importantly, Israelis and the Arabs (including the Arab states of Syria, Lebanon, Jordan and the Palestinians) are deeply disputed on legal issues of water rights and geopolitical issues such as future borders, sovereignty and the final and peaceful arrangements in the region.

1. Data on water resources availability and use

Data, in particular its collection, validity and reliability deeply concern all the Middle East countries, but especially the Palestinians, who often complain that they cannot get access to data from Israel. They also claim that any data supplied to them has become so manipulated as to render the resultant statistics useless for analysis (Lonergan and Brooks, 1993:12). These issues were raised by both Israeli and Palestinian water specialists during international academic conferences in 1992 and 1993 (for example in Zurich, Urbana-Champaign). The specialists promised to work together in an effort to establish a reliable data bank for the benefit of all the parties involved.

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2 The other co-riparians to the Jordan-Yarmouk: Syria and Lebanon.

3 On 26.10.94 Israel and Jordan settled their differences in a Peace treaty which also deals with water issues. This matter will be discussed later. Other issues at conflict, such as the water policy pursued by Israel which supports irrigated farming at highly subsidized cost, will also be discussed in the paper. The paper will conclude with a short discussion on the options available for alleviating the various conflicts.

The data on quantity and quality of the water resources available for Israelis, Jordanians and Palestinians is highly varied, especially the data relating to the common underground water resources. The variation in data is a result of three different processes: natural variability in precipitation, lack of data or weakness in measurement and monitoring of data and finally, and most importantly, the political interests behind various sources of data. One of the major bones of contention, the establishment of a reliable data bank and sharing data, is a prerequisite to any plan to partition, redistribution, or joint management of the water supply. Moreover, joint data collection and monitoring is considered a mandatory first step in any process of sharing common resources according to customary international law and the partners to the Middle East water resources will have to adopt these measures as a first step in the process of developing mutual trust in this area. It is important to note, though, that the Israeli-Jordanian Peace Treaty has a weak stipulation on data collection and exchange. Article 6.4.d calls for a "transfer of information and joint research and development in water related subjects".

2. Conflicts on Supply and Demand

Table 1 which presents data on water supply and demand in Jordan, Israel and for the Palestinians, emphasizes four crucial issues:

a) *The total water supply is desperately small.* The meager water supply is mostly an outcome of the arid and semi-arid climate prevailing in most of the region but also a result of mismanagement of the resources.

b) *Water shortages as reflected in water deficits* (caused by climatic variability and high demand) prevail in Jordan, Israel and among the Palestinians.

c) *Supply as presented in Table 1 is hydrological supply*, which includes all water resources, including those which are not available for immediate consumption, such as brackish and polluted water resources and groundwater resources not yet tapped.

   Thus, Jordan could expand its water supply by increasing its storage capacity of storm water, by desalination of brackish water and by augmenting treatment of waste water. As stated before, the Treaty of Peace between Israel and Jordan (26.10.94) deals extensively with all the existing water issues between Israel and Jordan. Article 6 of the Treaty and its annex II specify, in detail, the agreements on all water-related matters. The Agreement is basically an *allocation* agreement of water quotas from surface resources (the Jordan-Yarmouk) and ground water resources in the Arava Valley/Wadi Araba in the Negev. Accordingly, the Agreement allocated to Israel 12 MCM of the Yarmouk waters during the summer period, and an additional 13 MCM from the same resource during the winter period. Jordan is entitled to the remainder of the flow in both summer and winter periods. There is also a provision which allows Israel to pump an extra 20 MCM from the Yarmouk during the winter period, whereas Jordan will receive the same amount from the Jordan River during the summer. Both countries were allowed to store any excess flood water during the winter time. Jordan is also entitled to store for its use a minimum average of 20 MCM of the floods in the Jordan River south of its confluence with the Yarmouk. Jordan is also entitled to an annual quantity of 10 MCM of desalinated water from the desalination of about 20 MCM of saline springs now diverted by Israel to the Jordan River. Israel will explore

the possibility of financing the operation and maintenance cost of the supply to Jordan of this desalinated water.

Table 1: Water Supply and Demand. Israel, Jordan and the Palestinians 1993, in million m^3

Jordan	Hydrological Supply	Real Usable Supply	Demand[4]
Surface water	523-873[6]	860	Agriculture 642
Ground water	357-480[7]		Domestic 180
Renewable	275		Industrial 40
Non-Renewable	82-205		
Total		860	
Brackish Aquifers	2.919[8]		
Deficit[5] (1990/1991)			- 35 million
Israel[9]	Hydrological Supply	Real Usable Supply	Demand
Surface water	650-910	1.7 (1.4 in 1941)	Agriculture 1,200
Ground water	850-910		Domestic 500
(renewable)			Industrial 150
Brackish sewage	200		
flood water			
Total	1,890-2,311	1.700-1.800	1.800-1.900
Deficit (1990/1991)			± 60-70
The West Bank[10]	Hydrological Supply	Real Current Usable Supply (by Palestinians)	Demand[3] (water usage)
Surface water	170[11]		Irrigation 90-120
Ground water	580-780	125[10]	Domestic and Industrial 40-50
Total	750-950		137-140

4 Shatanawi, 1993 (Data for 1992).

5 In recent years Jordan had water demands which surpassed water supply by at least 35-40 million m^3. The difference was covered by overpumping of groundwater resources beyond their sustainable yield.

6 Canaan, 1990; Shahin, 1989; Al-Weshah, 1992.

7 Alam, 1989, Al-Weshah, 1992; Chezawi, 1992.

8 Qaisi and Daoud (1993:200). The brackish water includes the Disi Aquifer which is shared and overpumped by Saudi Arabia and Jordan. This source includes non-renewable fossil water resources.

9 Israel State Comptroller Report, 1991, Schwartz, 1986; Orthenberg interview 15 May 1991.

10 Data based on Shuval, 1992; Baskin, 1992; El Musa, 1992; Al-Khatib, 1992.

11 Data based on WRAP Task Force Report, October 1994. According to this report Palestinians in the West Bank use 95-100 MCM of water for irrigation and 25.5 MCM for domestic and industrial use.

Figure 1: Hydrology, geomorphology and geography of the Jordan-Yarmouk basin

Until the desalination facilities are operational, Israel will supply Jordan 10 MCM of Jordan River water (excluding the summer period). Thus, for the immediate or short range, Jordan is able to expand its water supply by some additional 50 MCM per year. But Israel and Jordan agreed to cooperate in building a diversion/storage dam on the Yarmouk and to build a system of water storage on the Jordan River along their common boundary in order to supply Jordan with flood water from that river during the winter. It is estimated that within a medium time-range Jordan will be able to add another 50 MCM of water by way of these storages.

Aside from the above expansion in water supply, by the year 2000 Jordan hopes to increase its total supply from its endogenous sources by 140 million m^3 and increase water supply from the Jordan-Yarmouk by 160 million m^3 (Shatanawi, 1993:3). Israel also could expand its supply by desalinization of brackish water (180 million m^3), and enlarge its reclaimed sewage and flood water storage though it already utilizes 70% of its sewage. The same is true for the Palestinians who have no control of any of the water resources in the West Bank. Measures to expand water supply in the West Bank will include storing storm water and sewage treatment. These two sources are not utilized at all, at present.

d) The data presented in table 1 also conceals the fact that *a very large portion of the water resources which are presented in the table as comprising solely the supply of country A are in reality common water sources to be shared with other co-riparians in that basin*. Thus, the Jordan-Yarmouk river basin is shared by Lebanon, Israel, Syria and Jordan and the ground water resources are common to the Palestinians and Israelis. The proportion of endogenous water resources (as a proportion of current developed water resources) is as follows:

Jordan:	77 percent
Israel:	30-40 percent
Palestinians:	15-17 percent

Jordan shares the Disi aquifer with Saudi Arabia and the Yarmouk with Syria and Israel. This amounts to about 23 percent of the water resources, but Jordan's supply from the Yarmouk is limited by the extensive abstraction of this source by both Israel and Syria. Both Jordan and the Palestinians also complain of the fact that Israel's use of the Lower Jordan (below Lake Kinneret) as a sewage canal and drain for brackish water hampers their potential use of the lower Jordan, to which they are co-riparians. The water flow in the lower Jordan at its exit from the Kinneret was 557 million m^3 before Israel began to utilize it, whereas currently it discharges to the Dead Sea only 60 million. Israel declared that it is going to desalinize the salty water in the Jordan, and will shortly stop dumping waste water; in order to improve the quantity and quality of water in the Lower Jordan. Israel, the West Bank and Gaza Strip share four aquifers (See Map 2). There are three aquifers which are shared by Israel and the Palestinians in the Mountain Aquifer. They are Cenomanian, Turonian and Eocene Aquifer systems, and they are divided into 3 subsystems. The first, the Western aquifer (Taninim-Yarqon) flows west into Israel and its safe yield is estimated at 300-340 MCM, of which 40 MCM is brackish. Israel uses 300 MCM of this aquifer and Palestinian use is 25 MCM. The second sub-aquifer of the Mountain aquifer is the Eastern aquifer which flows in the direction of the Dead Sea and its overall capacity is 125 MCM (150-250 according to Kahane, 1994) of which the Palestinian use 60 and Israel 65 MCM. Only half of the flow of the Eastern aquifer is fresh water. The third sub-

aquifer of the Mountain aquifer flows northeast and flows into Israel. Its safe yield is 140 MCM of which Israeli share is 110 MCM and Palestinian share 30 MCM (*Palestinian Water Resources*, 1994, p. 8). In sum, of the total capacity of 600 MCM of the Mountain aquifer Israel utilized 400 MCM (Nevo, 1994) or 475 MCM (*Palestinian Water Resources*, 1994). Israel and the Palestinians of the Gaza Strip most likely share also the Coastal aquifer (Feitelson and Haddad, 1994; *Palestinian Water Resources*, 1994), but some hydrologists maintain that there is no evidence to any connection between the Israeli coastal aquifer and the Gaza Strip aquifer (Nevo, 1994:37). The safe yield of the Gaza aquifer is only 50-60 MCM but 120 MCM of water was pumped from it in the 1960s and 90 MCM is pumped today (Nevo, 1994: 37).

Israel also shares the Jordan-Yarmouk with its neighbors. As stated in the Peace Treaty with Jordan, half of the desalinized water will be allocated to Jordan. The common-ground water resources comprise the major disputable water resource between Israel and the Palestinians (see section 4 of this paper).

e) *Disputes over water allocation and water prices.* Israeli policies in the water sector have been highly criticized on two counts: the generous allocation of water to agriculture and the subsidized prices of irrigation water. Until recently Israel allocated more than 70 percent of its water supply to agriculture (the proportion fell to 60 percent in the last year).

However, this allocation seems disproportionate compared with agriculture's contribution to the economy of Israel. Agricultural employment accounts for less than 4 percent of the labor force, agriculture now contributes just 5.4 percent of Israel's export earning and its contribution to the GDP (1990) was less than 10 percent (Kliot, 1993). Furthermore, according to Fishelson (1992) only about half of the water devoted to agriculture in Israel has a marginal value greater than its cost.

In addition, farmers pay for less than the full cost of delivering irrigation water. It is estimated that the actual cost of water in Israel is $.36 cents per cubic meter while its price to agriculture is $.16 to $.25 cents. Though the subsidy level for water to farmers in Israel is modest by regional standards, the low marginal economic productivity of water used in agriculture strongly suggests that some water should be reallocated from irrigating crops to industrial and household use (Lonergan and Brooks, 1993; Lonergan, 1994: 86). To quote Fishelson (1992), again, appropriate market pricing of water would transfer 300 MCM from inefficient agricultural uses to non-agricultural uses.

Jordan's emphasis is on irrigation because it consists basically of an agrarian society. The water sector has been geared almost exclusively to meeting the needs of the agricultural sector. Yet, despite major investments in irrigation, agriculture's contribution to the GDP is only 8-9% and it employs only 8% of Jordan's labor force (Sexton, 1990:16-17). Jordan has a complicated, weak water pricing policy, varying from region to region and from sector to sector (Beschorner, 1992; U.S. AID, 1993). Water is highly subsidized so that farmers pay less than 10 percent of the operational and capital costs of irrigation water (Belbeisi and Bani-Hani, 1989). In many places water is delivered to farmers at no cost at all. Raising the price of water by taking into account the value added for certain kinds of water use is one means of recovering the cost of system operation and maintenance.

Finally, the Palestinians' wish to develop extensive irrigated farming, based on any water resources other than recycled waste water, will most likely lead to disappointment as there is not enough water for both domestic and agricultural needs. Only small amounts of good quality water will be diverted towards vegetables, limited fruit crops, and poultry. Israel is already in the process of diverting water to the domestic sector and Jordan will have to follow the same path.

f) *Disputes over water conservation.* Because of the meager water resources available to Palestinians, Israelis and Jordanians, issues concerning conservation are becoming more and more politically sensitive. In this respect Jordan has the highest potential for significant water saving in almost all sectors of the economy. Unaccounted-for water (namely water lost in the municipal delivery system) is very high -- more than 55% in most of the cities of Jordan (Qaisi and Daoud, 1993:205). Jordan also has low irrigation efficiency which should be improved and may save about 50 million m^3 a year (Canaan 1990:19; Al Weshah, 1992:130). In Israel, water losses in the urban pipe system are also excessive, but irrigation efficiency is very high. Israel needs to curtail water losses in the urban sector. As for the Palestinians -- the water delivery systems are in a deteriorated condition and most of the water and sewage delivery network will have to be re-built. According to a recent report "huge unaccounted-for losses in distribution networks" was specified as one of the major problems of water supply in the West Bank Gaza Strip (*Palestinian Water Resources*, 1994: 9).

3. Disputes over Water Quality

The most critical region in relation to water quality is the Gaza Strip. Gaza's aquifer annual replenishment is about 60 million m^3, but it is overutilized and overpumping is reaching 100 million m^3. The result of long over-abstraction is that Gaza's groundwater is very saline with IDS ranging between 650 - 3600 ppm (Zarour and Isaac, 1993). Water unfit for human consumption was found in 34% of the Artesian wells used by the Gaza city residents (Shawwa, 1992:17). Groundwater contamination by sewage, fluorine, fertilizers and solid waste is a major problem in Gaza (Al-Agha 1993: 9). Gaza urgently needs support for its aquifer by the addition of water, and by the provision of fresh water for domestic consumption. Desalination of sea water is not economical for Gaza -- one of the poorest areas in the world -- but perhaps local desalting of brackish water may prove to be economical.

Very few of the West Bank settlements have sewage collection systems and none have treatment plants or effluent disposal systems (Nevo, 1994:33). In the West Bank 40-50 percent of the urban areas and almost all of the rural areas lack a water-borne sewerage collection system (*Palestinian Water Resources*, 1994:19). Sewage is generally discharged untreated into open channels or wadis and contaminates the ground water aquifers. Wastewater collection systems are increasingly being identified as a priority need in the Gaza Strip and the West Bank and it is high in the list of tasks specified by the Palestinian Task Force, the compiler of the report on Palestinian water resources.

About 10 percent of the wells in the Coastal aquifer of Israel are also polluted with salt and agricultural pollutants. If World Health Organization Standards for drinking water were observed in Israel, many of the coastal wells would be unfit as sources of drinking water (Lonergan and Brooks, 1993:62). Drinking water quality is generally poorer on

the West Bank and significantly so in the Gaza Strip. Some 20 percent of West Bank villages still have no regular water supply (Al-Khatib, 1992).

Finally, water pollution is also a major problem in Jordan. Water resources are polluted with both agricultural run-off, mainly fertilizers and pesticide residues, and with sewage effluents not yet treated. Jordan utilizes only 45 million m^3 of recycled sewage in agriculture, but by the year 2000 will use 85 million, and by 2010 -- 144 million m^3 (Shatanawi, 1993). None of the above countries can afford to lose any water to pollution, because of the extreme shortage. Water pollution reduces the general water supply and places additional pressure on the shared resources. Water quantity and protection of the shared waters of the Jordan and Yarmouk Rivers was introduced into the Peace Treaty signed between Israel and Jordan. The two countries committed themselves to prevent any untreated wastewater flowing into the courses of the Yarmouk and Jordan Rivers. Saline springs currently diverted to the Jordan River will be desalted within four years (*Peace Treaty between Israel and Jordan*, 26.10.1994). Israel, Jordan and the Palestinians will have to develop water delivery systems which will utilize all the recycled sewage water in their irrigated farming, whereas the good quality water resources will be preserved for the domestic sector.

4. Legal and Geopolitical Issues

The widest gap between Israelis and Palestinians and Israel and Jordan lies in the definition of what constitutes their water rights and their position in relation to international water law. The most extreme Arab position is reflected in a report and recommendations which were prepared for the League of Arab States.

According to this report the Jordan-Yarmouk and their tributaries are Arab rivers and the riparian states -- Syria, Jordan, Lebanon and the Palestinians -- are invited to take measures to prevent Israel from stealing Arab waters (Armanazi 1993:15). The Mountain aquifers were also defined as Arab water, and Israel was blamed for stealing the Arab-Palestinian waters. Jordan no longer uses the expression "stealing" but demands that her historical rights to the Jordan River be restored (Shatanawi, 1993:3). The Peace Treaty evidently restored Jordan's rights to the river. Both Israel and Syria were blamed for over-abstraction of water from the Yarmouk. According to the Peace Treaty, Jordan acknowledges Israel as a riparian on the Jordan-Yarmouk and did so also during the 1950s when the American mediator E. Johnston tried to help the partners to the Jordan-Yarmouk basin to reach an agreement on water sharing. More recently, Palestinian water specialists have been declaring that there are common (shared) aquifers between the West Bank and Israel (Al-Khatib 1992:12; Elmusa 1992).

Palestinian demands from Israel are as follows:

1. Israel should cease all ground water exploitation from the Eastern aquifers of the West Bank immediately. These aquifers have no linkage with the Israeli hydrologic cycle. Israel should stop all direct pumping from the Western and North-eastern aquifers, as long as this dispute is not resolved, and allow the Palestinians to rehabilitate and use the wells of these aquifers.
2. Redistribution of the common water resources is demanded (Al-Khatib 1992; Elmusa 1992; Zarour and Isaac 1992). The Palestinians would also like to have a share in the Jordan-Yarmouk river.

3. There is an enormous disparity in the water use of the common resources as expressed in Table 2. Many Palestinian and Israeli specialists demand rectification of this disparity; and allocation of additional water to the Palestinians, mainly for the domestic sector (Shuval 1992; Baskin 1992; Kliot 1993; Wolf 1993).

4. The Palestinians deny that Israeli claims of historic rights to utilize the water resources of the West Bank have any standing in international law. They base their claims for water mainly on equity. Israeli claims could be summarized as follows:

   a. It has to be acknowledged as a partner to all common water resources and its rights to the water should be confirmed by all the partners.

   b. Israel did not steal Arab or Palestinian water, but was using the natural flow of the Mountain aquifer into its territory.

   c. Based on the principles of prior use and existing use of water resources any demand to transfer water from existing uses in Israel will cause appreciable harm to Israel - against the accepted norm of international water law which calls for the prevention of such harm.

Table 2: Israel and Occupied Territories Water Consumption (per capita)

Palestinians	Aggregate	Domestic
West Bank	125-130	25-35
Gaza	160-183	23-38
Israel	450-500	> 100

Sources for the Table: Al-Khatib, 1992; Baskin, 1992; Elmusa, 1992; Kliot, 1994; Palestinian Water Resources, 1994.

Many legal experts maintain that international law would accept Israel's "first use claim" of the Mountain aquifer waters. This is especially true regarding the water which flows into the Yarqon and Taninim Rivers and into the Harod and Beth She'an valleys (Utton, interview 7.9.94; Hayton, interview 8.9.94). It is clear that the partners to the water resources decided to adopt peaceful negotiations in order to find solutions in the short and long run to their water problems. Some of the solutions will be examined in the last part of this paper.

Solutions and Future Prospects

1) Many of the specialists suggest first apportioning equal allocation of water per person for domestic-urban and industrial use (Baskin, 1992:8; Shuval 1992). Shuval has even put the value of these equal water requirements at 125 m^3 per person per year (Shuval 1993.

2) Negotiating property rights to existing resources and addressing the issue of equity is extremely important and has to be included in the first stage of negotiations (Wolf 1993).

3) Palestinians and Israelis will have to try and bridge their zero-sum game in the water sector. Israel will be required to divert water from agriculture to the domestic sector

and to the Palestinians. The immediate water allocation for the Palestinians will double to constitute 300 million m^3.

4) Major investment in flood water storage, plants to desalt brackish water and wastewater treatment plants will be constructed in the West Bank within 5 years. In the long range the economic feasibility of desalination plants will be carefully examined.

5) It is recommended that the Palestinians will be assigned to the Eastern aquifer for their separate and independent management and Israel and the Palestinians will try and establish an institution for joint management of the Mountain aquifer.

6) It is also recommended that all plans for water importation will be abandoned at this stage as they aggravate a geopolitical situation which is already complex.

7) Palestinians, Israelis and Jordanians have to develop a joint institution for the gathering, exchanging and evaluating of data on the common resources. This institution will serve as a foundation for any plans to increase water supply by the construction and maintenance of common projects.

Conclusions

This paper presented the major water issues over which Israelis, Jordanians and Palestinians are in deep dispute. These include, first, data collection and monitoring of data, which is the first stage needed for any cooperation in water resources development. Secondly, the partners to the Jordan-Yarmouk were found to clash on all aspects of supply and demand. The meager water resources were mismanaged, underpriced, and overspent on irrigated farming which contributes very little to the economy. Third, water quality grew in importance as policies which reduced the general water supply became less and less acceptable. Finally, it was found that the partners to the water resources are far apart in their legal stance and in their fundamental definition of what constitutes their legal water rights. The partners' tendency to negate each other's water rights will have to stop if the water conflict is to be resolved.

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Jad Isaac

Core Issues of the Palestinian-Israeli Water Dispute

Israel controls the greater part of the Jordan River basin and the West Bank's aquifers. Palestinian consumption is severely restricted by the military authorities, causing serious water deficiencies in most Palestinian homes. Questions of rights to water resources have thus far been insufficiently addressed in both the multilateral negotiating fora and the Israeli-Palestinian bilateral agreements, the DOP and Cairo Agreement. Yet any attempt to bypass the allocation dispute will lead, at best, to an unstable final settlement. This paper outlines a set of much-needed measures. Firstly, Israel should instigate a number of confidence building measures: a recognition of Palestinian water rights, and an increase in water supply to Gaza and the West Bank. Secondly, Israel and Palestine should adopt a Water Charter: this could act as a springboard for the agreement of an integrated water program in which allocation, conservation, enhancement and quality are considered as a totality.

1. Introduction

Much has recently been written on the subject of the Middle East water crisis, a great deal of it highly apocalyptic in tone. Clearly, water is a highly politicized issue in the Middle East, and the many alarm bells are ringing because of this inseparability of water and politics. Water is a key area of dispute: nevertheless many claims concerning the water crisis are hyperbolic and misleading. A recently published book, *Water Wars: Coming Conflicts in the Middle East*, portraying Saddam Hussein and Colonel Qaddafi on the cover, proclaims that water, not oil, is the chief threat to regional peace (Bulloch and Darwish 1993); and Meir Ben-Meir, formerly Director General of Israel's Ministry of Agriculture, predicts that "the next war in the Middle East will be struggled over water" (quoted in Lindholm 1992). Such claims are unconstructive hydrofictions. Yes, water is a critical area of dispute in the Arab-Israeli conflict; but given the current climate of peacemaking, and given the general war-weariness among states and populations, such predictions are excitable pieces of subjectivism. A little more calm objectivity is needed. It is essential both that we deal with the correct facts and that we prioritize the appropriate issues.

Much of the subject is shrouded in a fog of misinformation. Erroneous data and misleading claims often lead to mistaken understandings of the conflict's roots. In such instances, factual errors serve to suggest that all parties (Israelis, Palestinians and Jordanians) suffer from a general shortage of water affecting the region. In reality, the water crisis is not chiefly one of insufficient supply, but of uneven and unequitable distribution. There needs to be an increased awareness that Israel and Palestine are arid areas, where water is naturally a scarce resource, and where water consumption should be appropriate to these facts of nature. While supply enhancement may become salient at some future point, allocation of existing supply is the issue that should be prioritized.

It is upon the issue of water maldistribution that this paper will therefore focus. While some consideration will be paid to water supply and consumption in the Middle East as a whole, the

emphasis will be upon the Palestinian-Israeli dispute, which is perceived to be the central element in the conflict. Palestine will here be defined as the West Bank, including East Jerusalem, and the Gaza Strip.

2. Water supply

Central to the riparian dispute between Israel and Palestine is the Jordan drainage basin, which constitutes the region's chief water resource. The headwaters of the River Jordan, located in northern Israel, the occupied Golan Heights and southern Lebanon (including Israel's self-proclaimed "security zone"), feed Lake Tiberias; Syrian and Jordanian waters (most importantly the Yarmouk River), meanwhile, and West Bank and Israeli springs feed the Jordan River below Lake Tiberias. As a whole, these elements constitute the Jordan international drainage basin, a naturally-defined area that cannot be artificially sub-sectioned. A second area of dispute is the control of aquifers which flow west from the heights of the West Bank towards the Mediterranean. Underground water resources are the most important in this second area of dispute: surface waters contribute only 30% of total supply in Israel and Palestine (Zarour and Isaac 1991). See Figure 1.

Figure 1: The Jordan International River System

Israel presently controls the major part of both these water resources, the Jordan River basin and the westward-flowing West Bank aquifers. As a result of Israel's occupation of the Golan Heights and its control over southern Lebanon, Israel controls the headwaters of the Jordan River. Through the occupation of the West Bank, and restrictions on Palestinian access to their water resources, Israel controls both the westward-flowing aquifers and all waters which flow eastward into the Jordan. In addition, Israel is drawing water from the Yarmouk River, and is currently vetoing Jordan's receipt of a World Bank loan for the development of a dam at Makrin, upriver of Israeli influence. By its pre-1967 borders, Israel accounts for only 3% of the Jordan basin area; yet it currently has control of the greater part of its waters. At present, Israel is drawing an annual 70-100 million cubic meters (mcm) from the Yarmouk, and is piping 1.5 mcm per day from Lake Tiberias in its National Water Carrier (Rudge 1992). Consequently, the River Jordan, which, in 1953, had an average flow of 1250 mcm per year at the Allenby Bridge (Main 1953), now records annual flows of just 152-203 mcm (Soffer 1994). Palestinians are currently utilizing less than 0.5% of the Jordan's waters.

Furthermore, Palestinians are prevented from fully utilizing the West Bank's underground water resources. Permission for well-drilling must be obtained from the military authorities; permits have been granted for only 23 wells since 1967, only three of these being for agricultural use (The Water Commission 1993). Rigorous water quotas are imposed on Palestinians, supply is often restricted leaving communities without water for considerable periods, and excess pumping is punished by heavy fines.

In addition, Palestinians are forced to pay extortionate rates for their water supply. Whereas settlers pay $0.40 for domestic consumption and a highly subsidized rate of $0.16 for agricultural use, Palestinians pay a standard rate of $1.20 for their piped water (Zarour and Isaac 1991). And 26% of West Bank households have no connection to piped water (Isaac et al 1994). Estimates vary as to what proportion of the West Bank's aquifers are exploited by Israelis, as Table 1 shows: it is estimated here that a mere 115-123 mcm are consumed by West Bank Palestinians per annum (Isaac et al 1994), even though an estimated 600-660 mcm are annually available (Zarour and Isaac, 1991).

Table 1: Control of West Bank Aquifers, various estimates

Basin	Palestinian allocation (mcm)			Israeli allocation (mcm)**			Total capacity (mcm)		
	Z&I	S	W	Z&I	S	W	Z&I	S	W
Western	25	27	20	310	323	300	335	350	320
Northeastern	30	25	20	110	106	120	140	131	140
Eastern	60	58	50	65	35	75	125	151*	125
Total	115	110	90	485	463	495	600	632	585

Sources: Zarour and Isaac (1991), Shuval (1993), Wolf (1993). Shuval distinguishes between fresh and brackish water, but these are here considered as one. * includes 58 mcm of brackish water that Shuval estimates to be unused.** includes settlers.

As Figure 2 demonstrates, Israel is currently meeting 25.3% of its water needs by exploiting Palestinian waters from the West Bank aquifers.

Figure 2: Water Sources and Consumption in Israel and the Lebanese, Syrian, Jordanian and Palestinians Occupied Territories

3. Water consumption

Israel's water consumption is much in excess of usage in both occupied Palestine and the neighboring Jordan basin states. While Israel consumes 1700 mcm per year (Gleick 1993), Palestine (excluding settlers) consumes only 219 mcm (Isaac et al 1994). Each Israeli (excluding settlers) annually consumes an average 370 cubic meters (cm) (Gleick 1993); each Palestinian, on the other hand, uses only 107 cm.

Furthermore, it appears that Israeli policy is premised upon the aim of supplying water to the Jewish population above all others. Within Israel, Arabs constitute 18% of the population, yet only 2% of Israel's water supply is utilized in Arab villages (Lindholm 1992). Lindholm (1992) interprets this as "part of a policy of 'Judaization' ... resources are first and foremost allocated and distributed to Israeli Jews". This "apartheid" is even clearer in the West Bank and Gaza Strip, where Israeli settlers consume quantities much greater than those consumed by Palestinians, and where settlers receive continuous supplies while Palestinians' supplies are intermittent. In the West Bank, Israeli settlers extract 65 mcm per annum of water (Isaac et al 1994), a per capita consumption of 650 cm per annum. In Gaza, meanwhile, 3500 settlers (Peace Now 1993) extract 6 mcm per year (Berck and Lipow 1993), implying a per capita consumption of 1714 cm per year. The contrast between Palestinian and settler consumption is clear (see Figure 3).

The unequal allocation of water is similarly evident when one considers the extent of Israeli irrigated agriculture. Irrigation accounts for around 70-80% of Israel's water consumption, yet agriculture provides only 6% of Israel's GDP (Zarour and Isaac 1993) and only 3.5% of its employment (Central Bureau of Statistics 1993). 47% of Israel's cultivated land is irrigated (Eckstein, Zackai and Nachtom 1993), while in the West Bank, settlers irrigate 70% of their cultivated land; in stark contrast all but 6% of Palestinian land is purely rain-fed (Zarour and

Isaac 1991). The relative importance of agriculture to Israel and Palestine, as well as the contrast in water consumption between the Palestinian and Israeli agricultural sectors, is illustrated in Table 2.

Figure 3: Israeli and Palestinian Per Capita Water Consumption

Table 2: Agriculture in Israel and Palestine

	Israel	Palestine
contribution to GDP by agricultural sector (%)	6	23-29*
employment in agriculture (% of total employment)	3.5	26.3**
cultivated land that is irrigated (%)	47	6
total water consumption (mcmy)	1700	225
agricultural water use (% of total consumption)	75	62
total water use for irrigation (mcmy)	1275	140
1990 population (millions)	4.5596	2.0375
per capita water use for irrigation (cmy)	280	69

Sources: Central Bureau of Statistics (1993), Eckstein,Zackai and Nachtom (1993), Gleick (1993), Isaac et al (1994), Zarour and Isaac (1991), Zarour and Isaac (1993).* The 1st figure is for the West Bank, the 2nd for Gaza.** excludes Palestinians working in Israel.

The unequitable distribution of water supplies is aggravated by the dense and growing population of Palestine. The crisis in Gaza is already a direct consequence of the overpopulation of the Strip. An area which housed only 50,000 people before 1948 is now one of the most densely populated regions in the world, a result of both the high levels of forced immigration following the 1948 and 1967 conflicts, and the high rate of natural population increase. High immigration, in the form of returning refugees, and a high natural increase are both probable in the coming years, in both Gaza and the West Bank. Thus, by the year 2000, the Gazan population is projected to have increased from 711,000 (1990 figure) to 1,162,500; and the West Bank population from 1,326,500 (1990 figure) to 2,289,400 (Isaac et al 1994). As Table 3 shows, this projected population increase of 1,414,400 within the space of only ten years will result in substantial water demand increases, rendering finding a solution to Palestine's water shortage absolutely imperative.

Table 3: Demand projections for Palestine

	Population (million)	Domestic (mcm)	Industrial (mcm)	Agricultural (mcm)	Total (mcm)
1990	2.038	78	7	140	225
2000	3.452	263	18	217	497
2010	4.777	484	37	305	826

Source: Isaac et al (1994).Figures are premised upon the return of 500,000 Palestinian refugees to the West Bank and Gaza, and the lifting of Israeli restrictions on water consumption.

In densely populated Gaza the water crisis is reaching catastrophic proportions. In contrast to the West Bank, Gaza naturally has a water deficit, with 65 mcm of groundwater needing to cater for 800,000 inhabitants. At present, 102 mcm (including 6 mcm consumed by settlers) are extracted annually from the Strip's increasingly depleted and increasingly saline aquifer (Isaac et al 1994). Water quality is appalling, as is suggested by Figure 4, which shows levels of total dissolved solids (TDS) in Gaza's groundwater: by way of comparison, note that TDS levels of over 1200 mg/liter are considered "unacceptable".

Figure 4: Total Dissolved Solids in Gaza's Groundwater (mg/liter)

Gaza's groundwater level is dropping by 15-20 cm per year (Zarour and Isaac 1991). Palestinians voice concern about the waters of Wadi Gaza, which are currently impounded upstream in Israel, but which used to replenish Gaza's aquifer; likewise, and more vitally, Palestinians are concerned over the presence of Israeli wells on the outskirts of Gaza. On top of this, Gaza Palestinians have to contend with the 3500 settlers having access to the only supplies of sweet water in the Strip. The situation in Gaza is highly critical, and needs immediate attention.

4. The legal status of Israeli riparian practices

International law, it is often noted, is hindered by its ambiguity; nevertheless, it is only through such ambiguity that international law can fulfil its function of conflict resolution. Ambiguity is a necessary weakness of international law.

A further weakness of international law is that it can so easily be rendered impotent when a state ignores, or is not party to, the laws in question. The Geneva Convention, for instance, places restrictions on the powers of a belligerent occupier, and provides safeguards for the protection of the rights of those occupied. The Israeli government, however, claims that it is has not displaced a legitimate sovereign in either the West Bank or Gaza Strip, and hence is not bound by the Geneva Convention: this argument (which, it should be noted, even the Israeli Supreme Court has rejected) legitimates the alteration of legal and administrative structures, and the exploitation and degradation of resources, in the West Bank and Gaza Strip (Scobbie 1994). Such are the limitations of international law.

International water law is particularly limited. While the Helsinki Rules on the Uses of the Waters of International Rivers (1966), the Complementary Rules applicable to International Resources (1986) and the Seoul Rules on International Groundwater (1986) provide a framework for the resolution of riparian disputes, none of these Rules are binding in international law. The Rules are simply articles that have been adopted by the International Law Association.

Furthermore the Rules, by virtue of their necessary ambiguity, can often do little more than legitimate each riparian's claims. The Helsinki Rules, for instance, list a total of eleven relevant factors which should be considered in the resolution of a riparian dispute, a list which is not necessarily comprehensive. Article V (2) of the Helsinki Rules is worth quoting in full:

> Relevant factors which are to be considered include, but are not limited to:
>
> (a) The geography of the basin, including in particular the extent of the drainage area in the territory of each basin State;
>
> (b) The hydrology of the basin, including in particular the contribution of water by each basin State;
>
> (c) The climate affecting the basin;
>
> (d) The past utilization of the waters of the basin, including in particular existing utilization;
>
> (e) The economic and social needs of each basin State;
>
> (f) The population dependent on the waters of the basin in each basin State;
>
> (g) The comparative costs of alternative means of satisfying the economic and social needs of each basin State;

(h) The availability of other resources;

(i) The avoidance of unnecessary waste in the utilization of waters of the basin;

(j) The practicability of compensation to one or more of the co-basin States as a means of adjusting conflicts among uses; and

(k) The degree to which the needs of a basin State may be satisfied, without causing substantial injury to a co-basin State.

Given this list of relevant factors, it is hardly surprising that each riparian is able to invoke principles which substantiate its perceptions of "legitimate national rights". Rights over particular water resources cannot be legitimately grounded in individual relevant factors, however. The relevant factors should be viewed as a totality, and the rights of parties in a riparian dispute should be interpreted, not absolutely, but relatively, in terms of the extent to which the relevant factors are applicable to the various parties.

Such an approach to water rights precludes the possibility of simplistic judgments about the 'ownership' of rights. Nevertheless, this approach does not prevent us from reaching the conclusion that Israel's control of regional water supplies contravenes the Helsinki Rules. This can be clearly demonstrated through a factor by factor analysis of Israel's claims.

Geography and hydrology (factors [a] and [b] above) provide a legitimate basis for Palestinians, not Israel, to claim sovereignty over West Bank waters. And as has already been mentioned, Israeli territory contributes only minimally to the Jordan basin, yet Israel utilizes the greater part of its waters.

Israel argues that current utilization of water must be considered, invoking factor [d]. According to Berck and Lipow (1993), "Prior use establishes water rights. Israel has honored prior use rights of Palestinians' allocated water before the Israeli conquest of the West Bank and Gaza but has appropriated all of the ground water that was still not being exploited in 1967". This argument is, to say the least, rather spurious. The claim is invalidated by the illegality of the occupation. And it is simply false to say that "Israel has honored prior use rights of Palestinians": the military authorities have expropriated wells belonging to absentee owners, as well as those within the boundaries of confiscated Palestinian land. The sometimes-invoked argument that Israel merely inherited water resources that had been under British Mandate control, meanwhile, is simply untrue. Palestinians, as the indigenous inhabitants of the region, are the party with historical prior use rights.

Israel is also keen to emphasize the economic and social damage it would suffer if its water allocation were reduced, a claim that invokes factor [e] above. The size of Israel's population (factor [f]) is often cited as a corollary to this point. The common implication is that the populations of Israel's co-riparians have only minimal economic and social needs. Meir Ben-Meir states most generously that "Israel will not irrigate cotton and let Palestinian children die from thirst" (quoted in Stutz 1994): implicit in this statement is the assumption that Palestinians only have personal, minimal water needs. On the contrary, Palestinians need water to build industry and agriculture, to build a modern Palestine that is worth building.

As for factor [f], Israel's 4.6 million population must be taken into account, but not to the exclusion of over 2 million Palestinians. The legitimacy of Israeli needs is further compromised by the fact that, of all the Jordan basin States, only Israel has an uneconomic water-guzzling agricultural sector that is not pivotal to the state's economy. Israel's focus on its needs does not stand up to international legitimacy.

The obvious conclusion is that Israel is flagrantly violating international water law. Unfortunately for Israel's co-riparians of the Jordan basin, questions of rights, justice and equity are being ignored. Instead Israel is pursuing its own agenda, centered purely upon a perception of its own "water security".

5. Israel's approaches to solving the water crisis

Security is perhaps the central concept in Israeli political dialogue - the slogan "national security" is frequently reformulated in terms of "environmental security", "food security", "water security". As de Shalis and Talis (1994) observe, the Israeli political agenda is overburdened with security issues: "Almost any political question in Israel is overridden by even the smallest security consideration". It is this obsession with security that informs many of Israel's approaches towards solving the water crisis. Above all, Israel has felt a need to have military or political control over its water supplies, and has therefore resisted perceiving the problem in terms of water rights, or in the economic terms of supply and demand, surplus and deficit.

Israel's proposed solutions to the riparian dispute have been twofold. Firstly, they have favored large-scale projects which would increase available water in Israel, Palestine and Jordan. Secondly, they have argued that West Bank waters should be under the joint management of Israelis and Palestinians. Both of these approaches are inappropriate.

The development of large-scale water projects has frequently been advocated by those who hold that there is an insufficient supply of water in the Jordan basin and western aquifers of Palestine and Israel. Many fantastic and creative schemes have been proposed for the enhancement of water supply, most notably the following:

* Large-scale desalinization projects, often linked with hydro-electric power generation:
- Red Sea-Dead Sea conduit
- Mediterranean-Dead Sea conduit

* Water diversion projects:
- from Lebanon's Litani River to the Jordan headwaters.
- from the Nile to Israel or Gaza, with a pipeline going underneath the Suez Canal

* Water conveyance projects:
- oil tanker conveyance of Turkish or Yugoslavian waters
- Conveyance of Turkish or Norwegian waters in enormous balloon-like "medusa bags"

Unfortunately, faith in such dream-solutions is often ill-founded. They flounder in the face of astronomical capital expenditure. To cite one example: recent Jordanian-Israeli discussion over the proposed Red Sea-Dead Sea desalinization, pipeline and hydroelectric project has reached an estimated initial cost of $3 billion. Needless to say, this figure ignores the environmental cost of overloading the Dead Sea. In addition, the potential political dangers of transferring water from one international river basin to another must be considered: while an enhanced water supply to the Jordan basin States might decrease riparian tension in Israel, Palestine and Jordan, political tension would no doubt be increased among the riparians of the donated waters. All mega-projects currently under consideration are economically, environmentally and politically unsound.

High rates of population growth may at some time render supply enhancement projects necessary, but there is no such need at present. And if regional consumption does outstrip de-

mand, we should look first at issues of appropriate water utilization, internal supply enhancement and conservation. Above all, there must be a restructuring of Israel's water consumption. The majority of Israel's water consumption is for uneconomic subsidized agriculture. There needs to be a recognition that the Middle East is an arid and semi-arid region, and that water use should be appropriate to this natural fact. Cultivated land should not be extensively irrigated; and water should certainly not be subsidized.

Not only would a shift in Israeli agricultural policy be environmentally sensible; it would also be economically beneficial. As Berck and Lipow (1993) persuasively argue, "Israeli overexploitation of water resources constitutes an economic burden". The high levels of water subsidization give the erroneous impression that extensive irrigation makes economic sense; if the true cost of water were charged consumption patterns would be very different. There has recently been a price increase from $0.12 to $0.16 for agricultural water, and a consequent 10% drop in Israeli agricultural production, a decrease which did not adversely affect Israel's GDP (Berck and Lipow 1993). More moves need to be made in this direction.

Internal supply enhancement projects are economically, politically and environmentally more feasible than the much vaunted mega-projects. They should be developed in both Israel and Palestine. Rooftop rainwater harvesting is currently utilized in 50,000 Palestinian houses, supplying an average 100 cm per house ("Water collecting systems" 1988), implying a total harvest of 5 mcm. This simple measure could potentially provide an additional 17-25 mcm per year in the West Bank alone. The collection of rainwater run-off from agricultural plastic sheeting could enhance water supplies by a further 4 mcm. Such practices would not lead to significant aquifer depletion: 75% of rainfall, it should be noted, is lost through evaporation (IBRD 1993).

These internal supply enhancement practices should be complemented by an increased focus on conservation. According to Palestinian water authorities, as much as 50% of domestic water is lost owing to old, inefficient supply systems. Within agriculture, drip irrigation systems should be developed: this technique requires 20-25% less water than conventional sprinkler methods, and 40-60% less than simple surface methods (Gleick 1993). The artificial recharge of aquifers could help to counter overexploitation of groundwater resources. Additionally, cloud seeding, a process in which chemical condensation nuclei are introduced into cloud systems, could increase precipitation by 10-20% (Schiller 1993). All such measures have potential for development.

Israel's second approach has been to argue for joint management of West Bank aquifers. This preference is grounded in the claim that Palestinian mismanagement may well lead to the degradation of groundwaters. "Self-rule control over Israeli water resources constitutes a threat to the infrastructure and social fabric of Israel", declares The Movement for Preservation of Israel's Water (1994). Israel fears overdrilling which, it is claimed, could result in salination; and they are also concerned that Palestinians might "voluntarily or involuntarily pollute our groundwater. Voluntarily, by terrorist action. Involuntarily, by letting sewage flow through the porous surface to the aquifer" (Stutz 1994).

These comments are quite unreasonable, and are clear evidence of the Israeli obsession with security. The idea that Palestinians might voluntarily pollute aquifers is farcical. Palestinians are not going to indulge in quasi-kamikaze activities that ruin their own water supplies as well as those of Israel. Additionally it should be noted that this argument is premised upon the assumption that the Palestinian-Israeli conflict is not going to be resolved: what chance is there of a resolution if such an assumption is going to inform Israeli negotiating stances? As

for the suggestion that Palestinians will be incapable of controlling drilling levels and managing sewage, this largely depends on whether the Palestinian Authority will be given extensive administrative, executive and legislative jurisdiction. If the Palestinian Authority lacks respect, people will be less willing to cooperate with and abide by its rulings. Stable management of the West Bank's groundwater will be achieved only if the Palestinian Authority controls these water resources.

6. Peacemaking so far

Negotiations thus far have achieved very little. The multilaterals on water have been stalled almost from the word go. There have been two problems in particular: the Syrian and Lebanese boycott of the multilaterals, and Israeli opposition to water rights being an agenda item. The question of water rights has been utterly neglected; the issue that should properly be pivotal to a regional solution is being ignored. Given the extent of Israeli intransigence and the absence of Syria and Lebanon, this is hardly surprising: as Joel Peters (1994) says, "[p]rogress towards finding solutions to the problem of water at the multilateral level will... remain problematic until a positive resolution of the political conflict is secured". Instead of water rights, therefore, the Working Group has focused on enhancing water supply, water management and data. And even within these areas, while there has been some meaningful discussion during inter-sessionals, the Working Group has been unable to reach any important concrete decisions.

Progress towards resolving the Middle East's political disputes has thus far been confined to the bilateral track. However, bilateral negotiations and agreements have failed to address "low politics" issues - such as the unequal control of water resources - in any meaningful way.

The Washington Declaration received widespread approval, in Jordan, Palestine and Israel, but it left substantive areas of dispute untouched. Jordan is now demanding access to an increased supply of water from the Jordan basin, a demand which is grounded in both historical rights and their contribution to the basin's water sources. Israel, however, has no intention of acceding to these demands. Indeed, as Ze'ev Schiff (1994) observes, "it is possible that Israel will not only not make concessions, but will make new demands. Today, Israel holds most of the cards". Much depends, as Schiff says, on Israel's "sensitivity and generosity". Israel's recent granting to Jordan of a mere 4 mcm from the Yarmouk River hardly demonstrates such attributes.

Politically, it is on the Palestinian-Israeli bilateral track that most progress has been made. The Declaration of Principles (DOP, 13 September 1993) provided the framework for a five-year interim period, during which time Palestinians would be given autonomy over certain spheres of control in the West Bank and Gaza Strip; this period is envisaged as paving the way for a permanent settlement to the Palestinian-Israeli conflict. The DOP is the foundation upon which further, less ambiguous and more detailed agreements are to be constructed. In this sense, the DOP has thus far lived up to expectations: the Cairo Agreement (4 May, 1994) specified the terms of Israeli withdrawal from the Gaza Strip and Jericho, in accordance with Annex II of the DOP; and the Agreement on Preparatory Transfer of Powers and Responsibilities (29 August 1994) made arrangements for Palestinian autonomy over various spheres of civil life in the rest of the West Bank, in accordance with Article VI of the DOP. Remaining on the DOP's agenda are an agreement on the mode and conditions of elections in the Gaza Strip and West Bank (including East Jerusalem), and the Interim Agreement, which will specify both the make-up and powers of the Palestinian Council in the West Bank and Gaza

Strip, and the arrangements for Israeli military withdrawal (Articles III and VII respectively). In all cases it is the DOP which has acted, and will act, as the chief guide to subsequent agreements.

It is upon the Declaration of Principles, therefore, that we should center our attention, in an attempt to understand the status of Palestinian water rights during the interim period; subsequent agreements should be interpreted in the light of the terms outlined in the DOP. It should first be noted that the DOP is a highly ambiguous document, and necessarily so; without ambiguity there would have been no declaration. Ambiguity is an important tool of conflict resolution; it need not favor one party more than the other. In the case of the DOP, however, the unequal power relationship between Israelis and Palestinians renders ambiguity dangerous. Israel, as the occupying power that is granting limited autonomy to an occupied people, is in a position to apportion powers and responsibilities as it sees fit, and in accordance with its interests. Such an abuse of ambiguity is clearly evident when one considers the fate of water in the Cairo Agreement, and one fears that this abuse of the spirit of peace may be repeated in the Interim Agreement.

The Declaration of Principles fails to make clear the extent to which water should be under Palestinian control during the interim period. It is not made explicit whether autonomy includes limited control of water resources; or whether, on the other hand, control of water resources is a permanent status issue, that might perhaps fall under the headings "security arrangements", "relations and cooperation with other neighbors" or "other areas of common interest" (Article V [3]). Here it is assumed that while the riparian dispute will undoubtedly figure as part of the final status negotiations, this in no way precludes the granting of control over water resources during the interim period. In other words, discussion of the water issue will be ongoing, as Annex III of the DOP specifies:

The two sides agree to establish an Israeli-Palestinian Continuing Committee for Economic Cooperation, focusing, among other things, on the following:

1. Cooperation in the field of water, including a Water Development Program prepared by experts from both sides, which will also specify the mode of cooperation in the management of water resources in the West Bank and Gaza Strip, and will include proposals for studies and plans on water rights of each party, as well as on the equitable utilization of joint water resources for implementation in and beyond the interim period.

Nowhere does the DOP state that Palestinians will control water resources in Gaza and Jericho, and nowhere does it state the contrary. Under the terms of the Cairo Agreement, however, "[a]ll water ... systems and resources in the Gaza Strip and the Jericho Area shall be operated, managed and developed (included drilling) by the Palestinian Authority ..." (Annex II, Article II [B.31,a]), with the exception of settlements and military areas, which shall continue to be operated by Mekoroth. This arrangement at first appears uncharacteristically generous of Israel - until one considers that both Gaza and Jericho are water deficit areas, where Israel is more than glad to delegate responsibility. The Jericho Area is delineated in such a way as to exclude all but one of the four surrounding springs, which stay under Israeli control; and wellwater extracted in the Jericho Area is too saline for domestic consumption. And Gaza, as has already been pointed out, suffers from a chronic water shortage. To overcome this deficit, the Palestinian Authority is obliged to find additional water supplies to meet the people's demands, from Israel. In the words of Annex II, Article II (B.31,a), "[t]he Palestinian Authority shall pay Mekoroth for the cost of water supplied from Israel and for the real expenses incurred in supplying water to the Palestinian Authority". Both Gaza and Jericho are

downstream areas: hence there is no danger, from an Israeli perspective, of their infamous "water security" being threatened by Palestinian overpumping. In short, Israel has nothing to lose by donating control of water resources to the Palestinian Authority; on the contrary, they have much to gain.

Such a situation would, however, be no bad thing if Palestinians could be sure that the Cairo Agreement set a precedent for control of the West Bank's water resources under the Interim Agreement. Such a scenario - that of Palestinian control of West Bank waters, albeit under the condition that the Palestinian Authority "... shall prevent any harm to the water resources" (Annex II, Article II [B.31,a]) - is unlikely to come to fruition. The West Bank's aquifers are central to Israel's interests in the Occupied Territories, interests which are not going to be forfeited out of respect for precedent, or out of recognition of rights. Precedent, in any case, has no force, as the Cairo Agreement makes explicit: "[n]othing in this Agreement shall prejudice or preempt the outcome of the negotiations on the interim agreement ..." (Article XXIII [5]). Israel, if it were to refuse to grant Palestinian control of West Bank waters, could claim to be acting within the terms of the DOP and the Cairo Agreement. It would not be acting, however, within the spirit of the DOP.

According to this interpretation, the Interim Agreement could result in the following scenario. The Palestinian Authority would control the downstream deficit waters of Gaza and Jericho, and would be forced to purchase water from Israel, while in the West Bank, Palestinians would continue to be prevented from utilizing their rightful water resources. One fears that the "Palestinian Water Administration Authority", to be established after the Interim Agreement in accordance with Article VII (4) of the DOP, could be denied anything other than symbolic control. It could be little more than a sham institution.

The interim period framework set out in the Declaration of Principles provides no basis for an equitable solution to the Israeli-Palestinian riparian dispute. Negotiations and agreements are being premised, not upon principles of justice, but upon Israeli national interest and Palestinian desire for peace. Israel's short-termist conception of its national interest, a conception that recognizes Palestinian rights only when there is no conflict of interests, makes it hard to perceive how a just final status agreement will ever be reached. Israel needs to be willing to sacrifice some of its short-term interests, for the sake of the long-term interests of both Palestine and Israel. The recently imposed closure of 10,000 dunums of fertile irrigated farmland at Jiflik in the Jordan Valley - an area of vital importance to Palestinian agriculture - clearly reveals the Israeli attitude to peace. If the issue of water allocation continues to be addressed with an eye for might rather than justice, Palestine will remain the thirsty partner to an unjust peace. And, as is so often pointed out, an unjust peace is no peace at all.

7. Some modest proposals

The failure of the peace process so far to address the riparian dispute, and the urgency of finding a solution to the conflict, render some alternative approaches necessary. Here, two proposals are made: firstly, that Israel should instigate some confidence building measures, to show that it is committed to resolving the allocation problem, rather than bypassing it; and secondly, that there should be a redirecting and restructuring of the negotiations regarding water.

As a first confidence building measure, Israel should recognize Palestinian water rights with something more than the Declaration of Principles' reference to the "water rights of each

party". This move could hopefully act as a springboard for negotiation over the issue of water allocation.

Words, however, are not sufficient: declarations alone, no matter how detailed, cannot solve the problems of Gaza Palestinians who have no access to clean water. No Gaza Palestinian will be too impressed by the recognition of intangible rights, by the consideration of proposals for project proposals, or by the establishment of a data bank. Concrete action is needed. Israel, as a confidence building measure, should immediately provide Gaza with 50 mcm through the National Water Carrier. Such a move is urgently needed, and would serve as a practical recognition of Palestine's riparian rights. Gaza Palestinians should not be charged the full cost of this allocation, as is the case within the terms of the Cairo Agreement; instead it should be offered in partial recognition of Palestinian water rights.

Additionally, Israel should immediately make more water available for domestic consumption in the West Bank. The 35 cm per capita annually consumed for domestic purposes in Palestinian towns (Zarour and Isaac 1991) is simply insufficient, with shortages being critical during the summer. 70-100 cm per capita/annum should be made available to those who are connected to piped water supplies. And Israel should facilitate the work of the Palestinian Authority in distributing water to those who have no piped supplies.

Such confidence building measures would clearly demonstrate that Israel desires a just and equitable solution to the riparian dispute. Thereafter, substantive Israeli-Palestinian negotiations on water should begin. Final status negotiations will include discussion of water issues: however, preparation for the final status must start now. Questions regarding the aims of these negotiations, the interests and needs that they should recognize, and their organizational and operational structure should be addressed.

A clarification of the aims of negotiations is the issue that must be prioritized, and it is this issue that, at present, is being insufficiently focused upon. First and foremost, a distinction should be drawn between aiming for a short-termist and potentially unstable "settlement" of the riparian dispute, and aiming for a more sustainable "resolution". Resolutions involve creative and, most importantly, cooperative solutions to common problems. It is not fanciful to envisage a resolution, rather than a settlement, to the region's riparian dispute. On the contrary, the only way that peace can be meaningful is if agreements are sustainable. And the potential does exist for cooperative solutions to the water crisis.

Israeli policy, as has already been noted, is centered upon enhancing water supplies. Israel, however, is mistaken if it thinks that supply enhancement can be attained without the allocation dispute being attended to. A settlement which increased resources without addressing water equity would be unstable, a good deal more unstable than one which incorporated equity yet offered no prospect of regional cooperation. Any resolution of the riparian dispute must aim to look at the conflict as a totality.

Specifically, three issues - water equity, increasing water supplies and appropriate water utilization - should be considered within a single formula. To reiterate: the water crisis is not one of insufficient supply, but of an uneven and unequitable distribution which is aggravated by inappropriate consumption practices. However, any resolution must necessarily consider Israeli perceptions, interests and needs, and hence the issue of supply enhancement should be included with any negotiation formula. Linkage of these three issues is envisaged as being framed within a "Water Charter". Such a document could provide the framework for resolution of the riparian dispute. The following is a speculative proposal for the elements to be included:

1. Aims

(a) to ensure water equity for the people of Israel and Palestine.

(b) to ensure adequate water supplies for both parties.

(c) to ensure appropriate water utilization.

(d) to ensure the preservation of water quality and the environment.

(e) to foster regional cooperation.

2. Principles

(a) The Jordan River basin is considered to be an indivisible hydrological unit.

(b) The Jordan basin is considered to be an international drainage basin.

(c) All Jordan basin states have riparian rights within the whole basin.

3. Water rights / entitlement / allocation

(a) The Palestinian Authority is entitled to the waters originating in the West Bank.

(b) Palestinians have rights to waters which originate in the Israeli coastal aquifer and recharge Gaza's aquifer.

(c) Both the Palestinian Authority and Israel have rights to the waters of the Jordan basin. Jordan, Syria and Lebanon also have rights to these waters. The rights of riparians to the Jordan basin should be discussed on a multilateral level, in accordance with its status as an international drainage basin.

(d) Palestinians have storage rights to Lake Tiberias, which is part of the Jordan River basin.

(e) Palestinians are entitled to compensation in view of the illegal expropriation of Palestinian waters over the past 27 years.

4. Water supplies

(a) Both parties recognize that, given projected population growth rates, present water supplies will, in future, be insufficient to cater for demand.

(b) Both parties recognize the future necessity of enhancing water supplies in order to cater for future demand.

5. Water utilization

(a) Both parties adhere to the view that water should be utilized in a manner that is appropriate to the region's arid climate and scarce water resources.

(b) Both parties adhere to the principles of sustainable development.

(c) Both parties agree that, in order to foster appropriate utilization, the price of water should reflect the real cost of supply.

(d) Both parties agree to improve water management through research into and development of internal supply enhancement technologies and water reuse systems, through improving supply efficiencies, and through reducing demand to appropriate levels.

6. Water quality

(a) Both parties agree on the importance of preserving water quality.

(b) Both parties adhere to the polluter pay principle.

7. Final status control of water resources

(a) The Palestinian Authority will be responsible for the operation, management and development (including drilling) of water resources in the West Bank and Gaza Strip.

(b) Israel and the Palestinian Authority will commence negotiations on water rights within the framework of the rights listed above, within the framework of the Helsinki Rules, and other relevant articles of international law.

(c) These negotiations should address the issue of alleviating environmental problems related to water shortages.

(d) These negotiations will commence and reach conclusion within a set timescale.

8. Water development

(a) Simultaneous to the final status negotiations, talks will commence which will cover issues of supply and utilization: conservation, appropriate consumption, large-scale water development projects, and other areas of common interest.

(b) These negotiations will reach conclusion within a set timescale.

9. Interim arrangements

(a) Upon the completion of final status negotiations, water allocations and control of water resources will be increased in the West Bank and the Gaza Strip in partial accordance with the final status agreement.

(b) Allocations of water and control of water resources in the West Bank and Gaza Strip will be increased in accordance with the extent to which water conservation and development projects are put into effect, and in accordance with the extent to which shortfalls in regional supply are being met by these projects.

The chief problem with this Water Charter, indeed with any such agreement, is that Israel would be of the opinion that it benefits insufficiently. Israel hopes that it can instigate large-scale water development projects without having to address the issues of water rights and appropriate water utilization. Movement in both the multilateral and Israeli-Jordanian bilateral negotiations suggests that this is a hope that might well come to fruition. Given this prospect, why should Israel want to discuss water allocation, an area in which it is bound to be the party making concessions?

It is in overcoming this difficulty that international financial institutions could play a central role. Specifically, the World Bank should make it clear to Israel (and any other interested parties) that loan guarantees for large-scale water projects will be forthcoming only after progress towards overcoming the allocation dispute has been made. Israel has a strong, high GDP economy, and might well perceive mega-projects to be in its interests: Israel should have the right to enhance its water supplies, but not while it is appropriating Palestinian waters. The World Bank should insist upon linkage of equity and development. If such a position were adopted, Israel would no doubt be much more willing to enter into meaningful discussion of water allocation; and there would be a much greater likelihood of a "win-win" resolution to the riparian dispute being secured.

What structural and operational changes to negotiations would encourage the negotiation of a resolution-oriented agreement? Above all, a third party should be introduced, a thoroughly

independent body, not simply a subscriber to one party's agenda. The "honest broker" would fulfill the following functions. Firstly, it would be responsible for verifying data, for establishing the facts which would form the basis of negotiation, and for clarifying misleading assertions. Secondly, it would act as a clearing-house, as an incubator for positions. And thirdly, it would be in close contact with international financial institutions, and would attempt to guide the dispute by holding the right to sanctions against one or other of the parties.

Such a framework, it is believed, could provide an environment conducive to overcoming the water crisis. Nevertheless, we should recognize that the Israeli-Palestinian dispute will not be overcome without the cooperation of the other Jordan River basin States. As Housen-Couriel (1994) states, "there is no doubt that the most effective regimes will include as signatories all states which possess water rights in a given river or lake basin". And Israel cannot be expected to agree to a permanent status formula with the Palestinians unless it is safe in the knowledge that new demands from Syria, Lebanon or Jordan are not just around the corner. Perhaps above all, resolution of the Palestinian-Israeli riparian dispute is dependent upon there being some progress on the Israeli-Syrian track. That does not mean, however, that attempts to accelerate the Israeli-Palestinian talks are futile: on the contrary, if some results were achieved, the likelihood of there being a real, meaningful peace in the Middle East would be immeasurably enhanced.

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Vaclav Smil

China's Environmental Refugees: Causes, Dimensions and Risks of an Emerging Problem

Recent rapid expansion of China's economy is based on weak, and deteriorating, environmental foundations. The situation is most worrisome in arid interior provinces where shortages of water and high erosion rates aggravate widespread rural poverty. These areas are already the source of substantial outmigration, some of it officially organized. Further environmental deterioration could lead to displacement of millions of people during the coming generation. Most of these environmental refugees would inevitably end up in China's prosperous coastal cities which are already overburdened by millions of economic migrants. Such a development could become a major source of inter-regional conflict and it could have a destabilizing effect on China's cohesion and economic modernization.

1. Chinese contradictions

Reports from China of the mid-1990s carry the news of record-breaking industrial outputs, unprecedented absorption of foreign investment, and the rapid transformation of the long-isolated Maoist monolith into a dynamic, open economy. As foreign businessmen and tourists flock to China, and as the Chinese products invade the global market it might appear incongruous even to suggest that an entirely different migration may cloud the country's future: that large numbers of desperate Chinese peasants may be forced to leave severely degraded, food-short interior provinces, becoming environmental refugees and seeking succor and economic opportunity in the nation's richest destinations, in its large eastern and southern coastal cities.

This is because few observers - impressed as they are by the expanding economy and rising standards of living - realize that these recent, and indisputably impressive, successes are based on steadily weakening environmental foundations (Smil 1993), and are accompanied by a number of worrisome social problems (Hornik 1994; Smil 1994). China's serious and widespread ecosystemic deterioration and pollution mean that large-scale migrations induced by environmental degradation - developments leading almost inevitably to major economic dislocations in both the emigration and absorption areas, and carrying the unpredictable risk of various conflicts and threats to national cohesion - have become more than just a plausible long-term outcome of current trends: they are a matter of fairly high probability.

Synergies of China's large and extremely diverse territory, huge population, limited transportation links and spatially uneven economic progress have produced complex patterns of relative affluence and continuing poverty, as well as notable differences in prevailing environmental degradation and pollution. Significant numbers of people living below the statistically defined poverty line can be found in every province of the country, and larger areas of persistent misery and ecosystemic decay which might in future be-

come significant sources of environmental refugees are located in twenty of China's 26 provinces.

Eleven of the poorest provinces form a contiguous interior arc from Guangxi in the south on the Vietnamese border to Hebei, surrounding the country's capital, in the north (Fig. 1). In 1992, the population of these provinces was still overwhelmingly (slightly over 80 percent) rural, and its total reached almost exactly 400 million people, about 35 percent of China's total. Its relatively high densities were supported by as intensive farming as the often harsh, or unpredictably variable, environment would permit.

Yet this traditionally intensive agriculture has been increasingly compromised by excessive soil erosion (about 80 percent of China's unsustainable soil loss originate in those interior provinces), by extensive deforestation (recently most rapid in previously well forested mountainous parts of Sichuan, and in Yunnan's subtropical growth), and desertification (everywhere on the northern fringes of cultivated areas), by inappropriate conversion of woodlands, grasslands and wetlands to cropfields (result of misguided Maoist policies), by unsustainable ways of cropping (declining crop rotations, inadequate organic recycling), and by pollution originating from large industrial enterprises as well as from numerous new small-scale rural manufactures operating generally without any emission or effluent controls.

Figure 1

The two provinces with the highest relative incidence of poverty are Yunnan and Guizhou, and both of them have recently experienced excessive deforestation and unsustainable erosion of their often poor, leached subtropical soils. Guizhou's eastern neighbor, Guangxi, is also very poor. Undoubtedly, the combination of relatively high population growth (all three provinces have natural increase significantly above the national mean), continuing environmental degradation and tardy industrial development could make these three southwestern provinces, now totaling almost 120 million people, a major source of environmental refugees.

But their environment is not without natural advantages: their subtropical climate, yearlong growing season, normally abundant precipitation and considerable resources of water power and deposits of many minerals are a good foundation for potential advances. In contrast, a region on the other extreme of China has to live with much harsher prospects, and I believe that it is this relatively densely populated but poor, arid and erosion-prone northern interior that is most likely to produce large numbers of future environmental refugees. Indeed, the region is already a notable source of such population movements.

Consequently, I will look in some detail at the natural reasons for this unfortunate prominence of the northern interior, at recent human actions which have further degraded the region's environment, and at the already abundant evidence of considerable hardships and economic difficulties experienced by the area's inhabitants. Afterwards, I will examine the likely population, economic and environmental trends during the next one to two generations and assess the possible extent and impacts of emigration from the most vulnerable interior arc, as well as from other provinces.

2. The most vulnerable region

Every region in China has some natural disadvantages potentiated by a long history of environmental mismanagement. Leaving the very thinly populated areas of the continental interior (Xinjiang, Tibet) aside, the two basic contrasts between the more and the less fortunate provinces are the ones between the southern and the northern half of the country (traditionally, the Yangzi River is their divide) and between coastal and interior China. These divisions are primarily the function of climate - of precipitation and temperature patterns reflected in crop, grassland and forest productivity, in soil erosion and in opportunities for intensive farming.

China's precipitation has a clearly declining gradient in the northwesterly direction (Fig. 2): while the southeastern provinces receive annually well over one meter of rain, those along the middle course of the Huang He get generally less than 500 millimeters (Domros and Pang 1988). Consequently, the greatest environmental contrast is between the coastal provinces of Jiangsu, Zhejiang, Fujian and Guangdong and the interior belt stretching from just west of the capital through Shanxi, Shaanxi, Ningxia and Gansu to eastern Qinghai (Fig. 3).

Recurrent severe droughts also affect the North China Plain in Shandong, Anhui and Henan, as well as some areas in the South, but no other large region in the country combines the unusually high environmental vulnerability with relatively high population density to such an extent as the basin of the Huang He between the western Hebei and the deserts and high mountains of interior Asia. A 1991 survey showed that 75 of the country's 100 economically most advanced rural counties were in the southeastern coastal

provinces and in the suburbs of Shanghai. Although they accounted for less than four percent of all counties, these areas generated more than one-sixth of all the economic wealth in China's countryside (Xinhua 1992a).

In contrast, about one-quarter of China's poorest counties are in the provinces of the interior North (Chai 1992) - with one-fifth in just three provinces, Shanxi, Shaanxi and Gansu - and the region's environmental disadvantages are clearly mirrored by a number

Figure 2

Figure 3

of socio-economic indicators calculated as population-weighted means from the official provincial statistics (Table 1). Of course, the region's infant mortality and chronic mal-nutrition rates are also above the national mean, while the average life expectancy and literacy of its people are significantly below the country's average.

Table 1: Environmental and economic contrasts between China's coastal and interior provinces in 1990

	coast	interior	difference (%)
Average precipitation (mm)	1600	400	- 75
Average available runoff (m^3/capita)	2900	600	- 80
Average soil erosion (t/ha)	15	45	+ 300
Grain yield (t/ha)	4800	2700	- 45
Grain output (kg/capita)	375	300	- 20

Meat output (kg/capita)	23	14	- 40
Net agricultural income (Rmb/capita)	920	500	- 45
Gross industrial output (Rmb/capita)	3300	1500	- 55

Sources: Smil (1993) and State Statistical Bureau (1993).

2.1 Natural causes of the North's environmental vulnerability

By far the most important natural reason for the precariousness of the Northern outlook is the region's aridity precluding highly intensive cropping, limiting irrigation and hindering industrial development. Currently the whole country receives annually about 6 trillion tonnes of precipitation. Nearly 20 percent of this amount is potentially usable, and the actual annual withdrawals for agricultural, industrial and household uses now amount to little less than half of this potential. However, the whole northern China, covering about one-third of the country, having about two-fifths of the country's population, growing the same share of staple grains and accounting for nearly 45 percent of all industrial output, has access to less than one-tenth of China's stream runoff.

In the basin of the Huang He, the region's principal stream, less than 20 m^3 of water runoff are available for each hectare of cultivated land and no more than about 600 m^3/person; comparable rates in the Yangzi basin are, respectively, about 170 m^3/ha and 2,800 m^3/person, while per capita runoff availabilities average 4,400 m^3 in Japan, 6,500 m^3 in Switzerland and 9,900 m^3 in the USA (World Resources Institute 1992).

The interior aridity is not only a matter of limited precipitation, but also one of a highly skewed temporal distribution. During the two wettest months, in July and August, the summer monsoon brings 50-70 percent of annual moisture in the arid North, compared to just between 25-45 percent in the South. Moreover, northern rains often come in extraordinary downpours creating flash floods and causing high erosion - but leaving little soil moisture behind.

All of China's short-term precipitation records come from the North, including the one-hour deluge of 267 millimeters from Shanxi, and the incredible one-week rain of 2.051 meters amounting to more than three times the mean annual precipitation in the area, between August 2-8, 1963 in Hebei (Domros and Pang 1988).

Historic records also reveal long spells of either abundant or scarce precipitation. Thirty-year running means for Beijing for the years 1724-1980 show annual maxima around 750 millimeters and minima down to about 450 millimeters, a 40 percent variability, and an even longer comparison indicates that the North has been relatively dry ever since 1680. Official statistics on areas affected by drought (defined as those regions where the annual crop production was reduced by at least 30 percent in comparison with years of normal precipitation) show a distinct upward trend during the late 1980s (Domros and Pang 1988).

Huang He's flows reflected this trend quite dramatically. In 1981 the river's flow into the Bohai was 48.5 billion tonnes, almost perfectly its long-term average; by 1986 the runoff dropped to 26.1 billion tonnes, and in 1987 it was just below 20 billion tonnes, only two-fifths of the mean; and by 1991 Huayuankou station in Henan recorded the lowest summer flows in history (Smil 1992). In consequence, the river's normally low early summer

flow had repeatedly ceased altogether downstream from Jinan, about 200 kilometers from the sea, for more than a month.

Aridity is not the North's only natural disadvantage. The region also contains the world's largest area of loess (*huangtu* or yellow soil in Chinese), deep (commonly 50-200 meters) and easily erodible aeolian deposits (Wang and Zhang 1980; Fig. 4). When covered by natural grasslands and forests, loess erosion is not extraordinarily high. As soon as this cover is removed, erosion rates become enormous: they average over 40 tonnes per hectare a year throughout most of the region, three to four times higher than in other farming areas. Locally, the rates may be well over 100 tonnes per hectare.

Eroded particles eventually end up in the Huang He, making it the siltiest river among the world's major streams: after leaving the region it carries almost 50 kilograms of silt in every cubic meter of water. Naturally, this high silt content makes it very difficult, and often simply impossible, to build dams and to irrigate crops and very costly to use such water in industrial production.

2.2. Recent environmental mismanagement

Both the natural aridity of China's North and the high erosion rates of its loess deposits have been aggravated by generations of human mismanagement, above all by deforestation, improper cropping and overgrazing. All of these degradative trends accelerated after the establishment of the Communist rule in 1949 (Smil 1984). Deforestation rose sharply during the Great Leap Forward (1958-1960) when the delusional Maoist policies led to massive tree cutting for charcoal production needed to fuel small iron furnaces used in a futile attempt at crash industrialization aimed at equating British, and eventually, American steel output in a matter of years.

More forests, shrubs and orchards were cut not long after the country recovered from the worst damages of the Leap, during the late 1960s and the early 1970s. They were destroyed in order to make room for grain fields: another Maoist delusion elevated cereal grain cultivation to the surpassing goal of Chinese farming, leading to great shortages of cooking oil, legumes, sugar and fruits - but resulting in extensive deforestation, orchard destruction and subsequent slopeland erosion. As a result, the Huang He's total silt load rose from about 1.4 billion tonnes in the early 1950s to over 1.7 billion tonnes in the early 1990s. In the driest parts of the region these practices also led to progressive desertification.

Figure 4

Indiscriminate conversion of scrublands, orchards and pastures to grain fields was especially damaging in the loess area: it brought only meager yields in exchange for vastly accelerated erosion rates. Counties which were previously able to secure adequate food from combined yields of their fields, pastures and orchards were planting much larger areas of grain - but producing less food. These misguided policies were abandoned soon after Mao's death in 1976, but new pressures resulted in continued excessive tree cutting and in improper cropping.

Since the early 1980s the frenzied pace of both rural and urban housing construction, higher rates of industrial development, and the establishment of thousands of new small coal mines in the North have resulted in much higher demand for all kinds of timber, while the privatization of farming led peasants to maximize their incomes by planting the most rewarding crops and drastically reducing desirable crop rotations, above all a regular cultivation of traditional green manures.

The new wave of housing and industrial construction, as well as the expansion and modernization of transportation links and transmission rights-of-way has accelerated farmland losses. For example, annual losses of arable land in Gansu province, whose natural population increase has been recently over 300,000 people a year, averaged about 25,000 hectares during the 1980s (Gansu provincial service 1989). Given the province's prevailing grain yields (less than 2.5 tonnes/hectare), and assuming that grain supplies 75 percent of typical rural diet and that milling and storage losses reduce the harvested mass by

about 15 percent, Gansu's annual loss of arable land has been equivalent to losing food for about 300,000 people - almost exactly the province's annual population increase!

Water shortages in the region have been aggravated by substantial population increases, by the precipitous expansion of coal mining, by construction of new large coal-fired power plants, and by the establishment of numerous local manufactures absorbing the rural labor released by farming privatization. The population of western Hebei, Shanxi, Shaanxi, Ningxia, Gansu and eastern Qinghai increased by almost 20 percent during the 1980s. Coal extraction in these six provinces nearly doubled during the 1980s (to more than 400 million tonnes in 1990, equal to nearly 40 percent of the national total), and the region now supplies almost one-fifth of China's electricity.

Yet another of the region's serious environmental problems is desertification. This process has degraded about 70 million hectares of China's pastures since the early 1950s. At least one-third of Nei Monggol's grassland suitable for cattle grazing is affected by desertification and deterioration caused by overgrazing. All of the region's three largest grasslands - Hulun Buir, Songnen, and Horqin - are deteriorating. Qinghai's high-altitude grasslands decreased by about one-fifth during the past generation because of overgrazing, desertification and conversion to cropfields. Rats have been another factor of pasture degradation, consuming annually more than four million tonnes of grass, an equivalent of forage for about three million sheep.

2.3. Existing difficulties

Not surprisingly, the combination of the region's environmental harshness and human mismanagement has created widespread human hardships and economic difficulties. Once the practice of Maoist secrecy was lifted, some of the first candid, and moving, reports describing hard life in rural China came from the northern interior. For example, in one of these publications Zhang Qinghai described desperate fuelwood shortage in Gansu's deforested Yongjing county where an average household of five people had only 250 kilograms of straw to burn for cooking and heating for the whole year - an amount sufficient for no more than just one month of adequate consumption (Zhang 1981).

Since the early 1980s the Chinese media have reported extensively on the ravages of the near-chronic drought in the region, and a few recent items will convey the degree of the impact and the acuteness of human suffering. To me no other figure is as compelling as the fact that even during the years of normal precipitation at least 50 million people in the region's rural areas - population equivalent to that of France - have to live with a limited supply of drinking water (Liaowang 1987). In many villages these shortages necessitate long trips to the nearest water source, in cities they translate to frequent interruptions of water delivery and to only tiny per capita consumption.

Prolonged droughts of the 1980s only worsened these hardships, and the early 1990s have shown little improvement. During the second half of 1991 rainfall in Qinghai's farming areas was 50 to 80 percent below normal. This drought lowered the water level in Longyangxia, the largest reservoir on the upper Huang He, by 20 meters; four months later more than one million of Qinghai's people and 4.5 million heads of livestock suffered acute water shortage (Xinhua 1992b).

By the late spring this drought affected nearly 19 million hectares throughout North China, including five million hectares of grain fields; more than 12 million people and 16 million heads of livestock suffered from shortages of drinking water. Droughts in the Northwest may be aggravated by sandstorms. On May 5, 1993 sandstorms sweeping through the Hexi corridor in Gansu killed 49 people, injured 153, damaged 330,000 hectares of fields and trees and caused the loss of about 60,000 sheep and cattle (Xinhua 1993).

Such hardships have led to recurrent, and sometimes violent, disputes over contested sources of water. Zheng Yi's award-winning novel captures grippingly all of the ingredients of the region's misery: droughts potentiated by extensive deforestation, the desperate search for ever more distant sources of water, disagreements over ancient property rights, and sudden outbursts of violence (Zeng 1989). And these environmental hardships have certainly been an important consideration in deciding to leave the worst affected areas. In many thousands of cases they have surely been the leading cause, but we have no way to disaggregate - in terms of actual annual or provincial totals - the complex motives and opportunities of migration from China's poorest rural counties.

Until the early 1980s all migration from rural areas was strictly controlled on both ends: it required a special communal permit to leave a village, and, unless the migrant was willing to join a criminal underground, it could not be contemplated without securing a new food ration registration in a city. Deng Xiaoping's reforms removed these constraints. The disbanding of communes in the early 1980s ended the virtual serfdom of Chinese peasants, and the reemergence of private businesses, resurgence of traditional peddling, and rising urban demand for industrial and construction labor created powerful incentives for migration to cities. To what degree these incentives of urban economic pull have been augmented or potentiated by other factors, including the migration push provided by a degraded environment, we can only estimate.

According to official figures China's net loss of arable land amounted to about 17 million hectares between 1957 and 1990. No reliable provincial breakdown of this total is available, but if the arid North's arable land loss was merely proportional to its share of the nationwide cultivated area - a conservative assumption given the region's high erosion and desertification rates - it would amount to about three million hectares. Given the North's average ratio of about 5.5 peasants per hectare of cultivated land this would translate to the displacement of some 17 million people during the past generation.

When deforestation, water shortages created by the overuse of aquifers, and all forms of industrial pollution are also taken into account it seems reasonable to conclude that during the past 30 years man-made environmental change has been responsible for imperiling the livelihood of about 20 million of the region's people. Many of them moved to nearby towns, others to more distant cities, but until the summer of 1991 it appeared that environmentally-induced migration of Chinese peasants has been the result of a gradual push-and-pull process influenced by individual decisions responding to specific local circumstances and new economic opportunities.

However, in June 1991 *Renmin ribao* disclosed the existence of an unexpectedly massive, state-organized migration, by far the largest environmentally-induced population resettlement since the founding of the PRC. Between 1983 and the end of 1990 320,000 people were resettled from arid, eroded, desertifying, poverty-stricken and clearly overpopulated mountainous areas in the middle of Gansu province and in southern Ningxia.

They were moved to newly irrigated areas along the Huang He (about 160,000), to Hetao area (110,000) and to Hexi corridor (50,000).

This is clearly one of the world's largest organized moves of environmental migrants, and according to the Chinese plans the total number of relocated peasants should reach 900,000 by the end of the century. Chinese reports had nothing to say about the friction such a massive displacement had to generate in the reception areas which themselves are rather poor - and whose environment is also no better than marginal: recall the damages inflicted on the Hexi corridor during the 1993 drought and sandstorms.

3. Looking ahead

A number of effective measures can be taken to ease the existing hardships in the North, as well as elsewhere in China's poor and degraded interior (Smil 1993b). Water shortages can be relieved by a variety of conservation measures, and in some locales they can be eliminated, at least temporarily, by discovering deep aquifers and drilling wells. Diversions of distant streams are a more permanent, but a much more costly, and also environmentally risky, possibility. Still, the Chinese planners have been recently considering a number of such water transfers.

As elsewhere around the world, air and water pollution can be much reduced with effective controls which become much more common as an economy develops, and the scope for urban energy conservation is great both for households and for industries. Rural household energy shortages in many rainier areas have been already eased by re-establishment of private fuelwood lots on barren slopelands planted with fast-growing trees and shrubs.

With the opening of many new small private or collectively-run mines some coal-rich rural areas, especially in Shanxi province, became actually exporters of fuel. And there are several effective options to restore degraded farmlands in southern subtropical provinces (Parkham et al. 1993). Unfortunately, these possibilities do not add up to a comforting near-term outlook.

Both water and energy conservation will be impossible without pricing reforms going far beyond new charges for irrigation and industrial water consumption, and without installation of millions of more efficient water consumption devices, stoves, boilers and appliances. Clearly, these are very capital-intensive and hence obviously long-term tasks, and it is unlikely that they could be accomplished in just a decade or two when the combination of population growth and economic modernization will put more stress on already limited or degraded natural resources.

Truly long-range forecasts are impossible, but demographic imperatives make shorter prognoses much less vulnerable. Even with successful population controls China's population, totaling 1.171 billion at the end of 1992, will closely approach, or slightly surpass 1.3 billion people by the year 2000, and it will be most likely between 1.5 and 1.6 billion by the year 2025 (United Nations 1992). Naturally, these huge population increases will exert enormous new pressures on China's environment.

In order to feed, house, educate and employ nearly 150 million new citizens during the 1990s, and then to accommodate an additional quarter billion people during the coming generation, China's economic growth rates would have to be high even if the average

standard of living would remain at the current level. But both the government planners and the managers of thousands of new private businesses have in mind a major long-term increase in China's per capita GNP, and further substantial improvements in the average quality of life are clearly expected by hundreds of millions of Chinese who experienced the first benefits of rapid economic growth since the beginning of Deng Xiaoping's reform.

Table 2 summarizes additional annual output of several major commodities required to meet two different needs: first just to maintain the average 1990 per capita consumption by the year 2000, the second one to satisfy a modest two percent per capita growth. As indicated by comparisons in the right column, such increases are equal to installing and operating new capacities equivalent to total 1990 output levels of many of the world's largest economies.

Table 2: China's additional annual output required by the year 2000

	Additional output at 1990 per capita level, and with 2 % yearly growth	Comparable to total 1990 output in
Primary energy (Mtce)	110	Brazil
	360	India+Brazil
Coal mining (Mt)	110	UK
	360	India+S. Africa
Electricity (TWh)	65	Pakistan+Malaysia
	215	Brazil
Steel (Mt)	7	Australia
	23	Italy
Cement (Mt)	25	Brazil
	80	Japan
Grain (Mt)	45	Canada
	100	Africa
Nitrogen (Mt)	3	Canada
	10	Japan

Environmental impacts generated by these economic demands can perhaps be best visualized by comparing some new resource requirements to existing national totals. For example, by the year 2000 China's water supply will have to increase at least by an equivalent of Egypt's total annual 1990 consumption, and its additional generation of sulfur dioxide from coal combustion would equal that of total German emissions in 1990.

Clearly, even the most aggressive conservation and control efforts will not be able to reverse the country's environmental degradation during this decade, or during the first generation of the next century. Perhaps the best that could be expected during the coming generation would be a gradual moderation of the current rates of environmental destruction. Only later, with a stabilized, or preferably reduced population total, can China achieve some notable reversals of its environmental degradation.

4. Possible totals of displaced peasants

Estimating the totals of people who might become environmental refugees during the next 20-30 years can be done in several ways. The first approach is to derive such figures as fractions of populations in the most vulnerable areas. Even if the population of the whole poor interior arc extending from Guangxi to Hebei would not grow faster than the national average - once again, a conservative assumption as the region's natural increase has been consistently above the countrywide mean - its total would reach at least 450 million people by the year 2000 and it would be around 530 million 25 years later. Analogically, population of the most vulnerable, arid northern interior would go up from about 140 million people in 1992 to almost 180 million three decades later.

Given these huge absolute increases, even some very conservative assumptions concerning the shares of populations directly or indirectly displaced by progressing disappearance and degradation of natural resources produce a series of staggering numbers. If no more than about five percent of the interior arc's population will be so affected, their total would add up to over 20 million people by the end of the century and to about 30 million by the year 2025. For the northern interior it would not be excessive to assume a higher rate of around 10 percent, and it would produce up to 18 million uprooted people by the year 2025.

Another approach is to use a study by the Chinese Academy of Sciences which forecast China's total surplus rural labor at nearly 320 million peasants by the year 2000 (The National Conditions Investigation Group under the Chinese Academy of Sciences 1992). If just ten percent of this number would be attributable to environmental degradation, the nationwide total would be over 30 million people by the year 2000.

Yet another way is to estimate the displaced population on the basis of arable land losses. If all of China's farmland losses - due to construction, erosion and desertification, alkalization, waterlogging and pollution - would equal just three million hectares during the 1990s (they added up to four million hectares during the 1980s) then, given the 1990 ratio of about eight villagers per hectare of arable land, at least 24 million peasants (or some five million families) would lose their livelihood during the 1990s. If only an additional five million hectares would be lost during the next 25 years, the total of uprooted rural labor would be around 40 million people by the year 2025. This total could be realistically enlarged by at least another 10-15 percent to account for the effects of other forms of environmental degradation.

These three different approaches are broadly consistent, pointing up to somewhere between 20-30 million peasants displaced due to environmental degradation during the 1990s, and to at least another 30-40 million people uprooted by the year 2025. Actual figures may easily be 10-20 percent higher. All of these estimates are based merely on the assumption of further ecosystemic degradation and pollution of China's environment arising from population- and development-induced pressures within the country. In the long run, the numbers of environmental migrants could be much higher if the national and local degradation would be aggravated by an early onset of a relatively rapid global warming.

Major uncertainties surround our understanding of this possible global change, but a relatively rapid climatic shift is certainly within the realm of geophysical possibility which

could profoundly affect China's precipitation pattern. Naturally, decreased rainfall throughout China's northern interior would be by far the most worrisome development, but the region's socio-economic stability would not be imperiled only by an absolute decline of precipitation and hence by a further contraction of its already low usable run-off.

Even if the total precipitation and its spatial distribution would remain roughly the same, the region could be seriously affected by increased variability of rain, or by even higher concentration of rainfall during two peak summer months. Such shifts could make it impossible to grow traditional winter crops, while also lowering the yield of summer harvests. Increased aridity in northern China would have consequences beyond the most vulnerable region between western Hebei and Gansu. The whole North China Plain - provinces of Henan, Shandong, most of Anhui and a part of Jiangsu - now containing about 250 million people would also be affected.

Nor can it be assumed that a relatively rapid global warming would leave the South unaffected. Should it bring delayed onsets of the summer monsoon, or should it intensify its winds and rains, there could be major long-term effects on food production even without any significant changes in total precipitation. Of course, more violent monsoons would also have important secondary effects on soil erosion of steep southern slopes, on stream and reservoir silting, and on flood levels and frequencies.

Pronounced warming would almost certainly lead to important shifts in vegetation boundaries. This would have effect on crop and forest productivity across the nation, but, again, the greatest potential for economic and human hardships would be in North China where such a change immediately raises the prospect of extensive desertification: after all, the region borders some of the world's largest deserts in Mongolia and in Xinjiang. Northeastern provinces of Heilongjiang, Jilin and Liaoning could also be severely affected by the spreading aridity. Farther afield, expanding desertification could further increase both the frequency and the intensity of damaging sandstorms.

Even if restricted largely to one major region of the country, changes brought by rapid global warming could increase China's total of environmental refugees by additional tens of millions of people: it is not inconceivable that the total number of peasants unable to support themselves in the degraded, inhospitable or insufficiently productive countryside could reach up to 100 million people during the next 25-30 years. Where could these tens of millions of people go? Could they all be absorbed by a combination of burgeoning local small industries, new private enterprises and large state projects? Unfortunately, a confident answer to this question is: most unlikely.

5. From the interior to coastal cities

Of course, significant numbers of displaced peasants will set up their small businesses and services, and will find jobs in local small-scale manufactures and in the interior's growing cities. But the absorption capacity of industries and services in the countryside, and even more so in urban areas of most of the interior provinces, will be limited by the deviation-amplifying synergy of poverty and environmental degradation.

Development of interior cities is already hampered by some of the same environmental factors which will have driven the peasants from the countryside. The clearest case of these limits are already extensive and chronic water shortages now experienced by about

three-quarters of all large cities north of the Yangzi. Their cumulative water deficit comes to more than 10 million tonnes a day, and the capital is among the worst affected cities (Xinhua 1988). The degree of concerns about Beijing's water supplies is perhaps indicated by the fact that a number of experts has repeatedly advocated eventual relocation of the capital to a less arid location.

And the persistence of substantial migration-inducing economic disparities even after generations of heavily subsidized investment in many rich countries - Canadian Maritimes, Italian *mezzogiorno*, or the English North are all excellent examples - makes it clear that during the next generation neither the level of industrial development nor the progress of the service sector in China's interior will approach those attained in coastal regions. Just the opposite is going to happen as the standard of living of the two Chinas will grow further apart. This process of regional divergence started with the onset of the modernization drive during the early 1980s, and it is hard to imagine that it could be reversed even by some extraordinary measures undertaken by the central government.

Inevitably, very large numbers of migrants would be forced to move away from the interior. Given the already very high residential density and cultivation intensity of the coastal countryside they could not be readily absorbed in rural areas of Jiangsu, Zhejiang, Fujian or Guangdong. Rural areas of these provinces are among the most densely settled and most intensively cultivated parts of the Earth, with per capita availability of arable land often lower than 500 m^2. Not surprisingly, these areas have become themselves major sources of outmigration as higher mechanization of field tasks and widespread abandonment of traditional labor-intensive organic manuring in favor of synthetic fertilizers have been displacing many peasants.

Consequently, a disproportionately large number of peasants migrating from the interior would end up in towns and cities of coastal provinces where their influx would cause major socio-economic upheavals. While other poor populous countries have experienced spontaneous and relatively rapid urbanization during the past two generations, China's share of urban population grew very slowly since the establishment of the PRC, from about 14 percent at the time of the first population census in 1954 to just 19 percent in 1980.

As already noted, until the early 1980s all immigration to China's large cities was tightly controlled, and Maoist policies actually led to repeated waves of forced emigration of intellectuals, politically suspect individuals and young people (high school and university graduates) to remote rural or mountain regions (Gui and Liu 1992). These barriers were removed in the early 1980s, and since the end of the decade all large coastal cities have been experiencing unmanageable waves of unskilled peasant migrants seeking better economic opportunities.

Suddenly, most of the newly (and only relatively) affluent Chinese cities have become literally overwhelmed with millions of poor peasants. Their influx is overburdening incoming trains and buses, large numbers of young men are left stranded in unfamiliar cities, camping in public places, begging and pushing up crime rates. Not surprisingly, the situation has been worst in Guangdong province, the area with China's fastest rates of economic growth, as well as in Shanghai and in Beijing, China's two largest metropolitan areas.

In early 1989 a total of 2.5 million people came to Guangdong not only from the neighboring Guangxi, but also from more distant places. Most of these migrants tried to settle in the provinces capital, Guangzhou, or in Shenzhen special economic zone near Hong Kong. Needless to say, such an influx far outstripped available job opportunities in the province. Guangdong authorities had to appeal to the State Council and to the neighboring provinces for help in trying to stem this flood and to return most of the migrants to their homes.

Figures released by the Ministry of Public Security showed that in 1989 the floating population of job seekers in China's 23 large cities with a population of more than one million people was well over 10 million, with daily averages close to two million in Shanghai and over one million in Beijing. For these two cities these numbers represented, respectively, about 15 and more than 10 percent of all population. These numbers represented merely the beginning of what is undoubtedly the world's largest migration wave. In May 1994 Chinese media quoted the Vice Minister of Public Security estimating the floating population at over 80 million people, and before the end of the year the official estimate surpassed 100 million people. Every large city has acquired extensive, illegal, but tolerated, squatter settlements housing growing numbers of migrants usually grouped by their provincial origins.

And even these staggering totals offer only a pale indication of possible future events. Two basic differences will matter above all. First, the numbers of potential migrants will grow substantially larger, easily two to three times higher than the recent total even in the absence of any early effects induced by possible pronounced global warming. Second, for many more migrants the move will not be a matter of economic choice but of existential necessity: they would not come merely to make more money, but in order to survive. This would be even more the case should the numbers swell as a consequence of global climatic change which would make large areas unsuitable for intensive farming.

Needless to say, such conditions would make voluntary return of migrants to the places of original residence most unlikely, and given the huge numbers of migrants the prospects of organized, or forced, removal (as in the recent years) would be much more uncertain. Such uncontrollable migrations would surely exacerbate China's ancient provincial and regional animosities. They could also be used as a powerful argument by centrifugal forces favoring greater provincial or regional autonomy.

Possibilities of a Yugoslav-style break-up of the country have been recently considered in a *neibu* (limited circulation) report prepared for the Chinese leadership. Factional disputes in the Chinese leadership have often produced „an up-and-down motion of centralizing and this is not only a Marxist feature, but happens to be a traditional Chinese feature" (Donald and Arnold 1992). A decentralizing wave could be considerably strengthened by the combination of an already widening economic gap between the coastal provinces and the interior and by the growing desperation of uprooted peasants.

6. Complexities and uncertainties

Reasons for long-distance migrations from China's interior to coastal areas are, and will continue to be, a complex combination of push and pull factors, but the process clearly carries a considerable risk of environmental conflicts. As defined by Böge (1992), such conflicts arise from anthropogenic environmental degradation influenced by a variety of

natural and socio-economic factors - and the emerging phenomenon of China's environmental migrants, or outright refugees, is a clear case of such potentially destabilizing developments.

In the Chinese case, the now well documented environmental degradation of the countryside consists of at least five major contributions. No clear ranking of these problems is possible, but given China's huge population and limited availability of farmland, the most important nationwide category is the continuing loss of arable land. This worrisome decline is due to a variety of causes: urbanization, industrialization and erosion are the leading reasons, while salinization, alkalization, desertification and chemical pollution are important in some provinces.

Excessive use and pollution of fresh water is an acute problem throughout the arid northern China, as is atmospheric pollution caused by combustion of more than one billion tonnes of coal and generating only partially controlled particulate matter and virtually uncontrolled sulfur dioxide emissions. The remaining two degradative processes with major nationwide implications are deforestation and deterioration of grasslands and wetlands.

Social effects of China's rural environmental degradation encompass most notably insufficient supplies of such basic existential commodities as water and fuelwood, the former one mainly in the arid North, the latter one throughout the deforested Chinese countryside; declining availability of good-quality farmland in both highly degraded regions and in many suburban locations; shrinking size of average family holdings resulting in unviable operations and abandonment of farming; stagnation and decline of crop yields on degraded soils; increased risks of such natural catastrophes as droughts, floods, sandstorms or rapid stream siltation; and growing impacts of chemical toxification of soils and plants from industrial wastes.

These effects have already led to sizable population displacement, both as gradual migration of individuals and families, and as state-organized large-scale resettlements. I have reviewed unfavorable natural conditions, continuing deterioration of vulnerable areas and rising population pressures in order to indicate the very high likelihood of further substantial increases of population movements induced by environmental degradation. Source areas of these population movements would include virtually all interior provinces, and above all the arid North.

As with so many other developments, the rate of change will be very important. The combination of continued effective population growth control, steady economic progress avoiding huge disparities in regional wealth, modest successes in local environmental protection, and absence of any rapid global climatic change could make the problem of China's environmental refugees a manageable one. Loosening of population growth campaign, increasingly uneven economic advances resulting in huge regional disparities of living standards, further substantial deterioration of vulnerable environments, and a rapid progression of global climatic change would yield a combination carrying high risks of social and political crises. Interprovincial migration induced by environmental degradation may then become a source of conflicts spanning a variety of scales.

Already, these movements are a growing cause of individual hardships, and within a generation their enormous scale could elevate them to a problem endangering both the economic viability of degraded interior regions and the normal functioning of overburdened

coastal cities. Nobody can describe today specific conflicts which can arise from these developments 20 or 30 years in the future, or assess their frequency and intensity. But we can be fairly sure that the possible scope of these events - involving long-distance migrations of tens of millions of people to a relatively small number of already overburdened cities - makes it most unlikely that they will pose only minor local complications.

These events would cause countless personal tragedies, they would carry considerable risks of civil unrest both in the areas of outmigration and in the overrun cities, pose the danger of losing effective administrative control, and ultimately they could be imperiling national cohesion. They could pose a threat to the maintenance of national unity between the environmentally more fortunate and economically more advanced coastal and southern regions and China's degraded and poverty-stricken interior.

We must hope that none of the more extreme scenarios will come true - but we must be aware of their possibility. The main reason for this awareness is not to appreciate a potentially dangerous change - but to use this information in order to forestall any destabilizing development.

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Partha S. Ghosh

Population Movements and Interstate Conflicts in South Asia

The subject of the present paper apparently does not fall within the scope of the conference. But after having listened to the various perspectives presented at the conference during the five long days of discussion it was evident that all kinds of developmental questions are intricately linked to environmental issues. One such issue area is the demographic variable in its multifarious ramifications. It is from this perspective that this paper addresses itself to the question of inter-state migrations in South Asia with the hope that other colleagues who are more directly involved with the study and research of the environmental question would benefit from this perspective as well.

Introduction

The term "population movement" used in this paper would connote all kinds of human migrations from one part of the South Asian region to another, both voluntary and non-voluntary as well as permanent and temporary. While such movements of population are

more often intra-state (for example, migrations of the rural poor to the urban centers), our concern here is not with them but only with those migrations which are cross-national.

Of all the regions in the world, South Asia has witnessed the most massive population movements in recent times in a relatively short span of time. During less than half a century after India's independence in 1947, about 30 million people have moved from one part of the region to another either pushed by war, or in search of security against religious or other kinds of persecution, or for work or food, or by drives towards ideological or racial homogenization. These movements have caused complications for interstate relationships and thwarted regional cooperation. The objective of the present paper is to underline the political dimensions of the issue and relate them to the broad contours of South Asian regional security.

Population, society and politics

There is a continuing, dynamic and intricate relationship between demographic issues on the one hand and political and sociological issues on the other. In India, however, population issues have largely been the forte of demographers who have not paid enough attention to these interactions.[12] It is only of late that these interrelationships have been recognized and academic literature has started pouring.

The Indian experience, however, is not universally true. Scholars in several other parts of the world have long recognized the interrelationship between demographic issues and socio-political questions. The basic premise has been that ecological demography (a partnership between demography and human ecology) promises the most systematic and comprehensive treatment of the core of sociology - the study of societies and social systems and vice versa.[13]

As far as the interaction between demographic issues and politics is concerned, it has been both theoretically and empirically proved that the demographic characteristics of a society inevitably influence the politics of that society. Nazli Choucri, one of the scholars in this field of research, while highlighting the importance of the study of population-politics interaction, writes that "many problems which are viewed as strictly political have, in fact, demographic roots. Conversely, policy interventions that are proposed with demographic intents often result in distinctly political consequences. It is this dual interaction between population and politics that has contributed to the increasing politicization of the demographic issues in the world today."[14]

Demographic variations as a factor influencing politics, however, could be of various types. It could be by internal migrations, increased birth rate and/or reduced mortality rate, cross-national migrations, or dismemberment of a country (partition of India overnight turned the Hindus into a minority in Pakistan, or, later, the secession of Bangladesh

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[12] R. Jayasree, K.B. Kurup, Dominic E. Azuh and N. Audinarayana, "Population Research in India: 1970-1990", in P. Krishnan, Chi-Hsien Tuan and Kuttan Mahadevan, *Readings in Population Research: Policy, Methodology and Perspectives* (Delhi: B.R. Publishing, 1992), pp. 485-557.

[13] For more on the point and relevant literature, see N. Krishnan Namboodiri, "Ecological Demography: Its Place in Sociology" in ibid., pp. 321-49.

[14] Nazli Choucri, "The Pervasiveness of Politics", *Populi* (New York), vol. 5, no. 3, 1978, p. 30. See also W. Howard Wriggins and James F. Guyot, "Demographic Change and Politics: An Introduction", in W. Howard Wriggins and James F. Guyot, eds., *Population, Politics, and the Future of Southern Asia* (New York: Columbia University Press, 1973), pp. 1-29.

overnight turned the Punjabis into a majority in the linguistically and ethnically pluralistic Pakistan). Even such issues as abortion or sterilization can be highly sensitive political issues. The massive defeat of the Congress party in India in 1977 was largely attributed to the government's forced sterilization drives during the preceding couple of years.[15] Similarly, the issue of abortion became a major political issue in several Muslim countries on the eve of the recently held International Conference on Population and Development at Cairo (September 1994). In Bangladesh mass rallies were organized to force the government to withdraw from the conference.

Politics of inter-state migration

The phenomenon of cross-border population movements, together with the inter-state conflicts they generate, is increasingly becoming a major concern for the affected elites all over the world. Since the phenomenon is closely linked to the principles of self-determination, national integration, or just the ripples it causes on local politics, its nature and dimensions often become extremely complicated. The symptoms of these complexities are evidenced from the dissimilar stands taken by states with regard to questions such as ethnic loyalties, secessionist movements, and so on, within and outside their respective national boundaries. It is more a norm than an exception for a state to take a particular position with regard to these issues when it comes to dealing with them internally but quite a different one in dealing with the same in respect to other nations. What should follow from this is that the external position of a state upon these questions is generally uniform. But even that is not so. It varies depending upon the nature of the relationship that exists at a given time between and among nations.

Within the scope of cross-national migrations two broad categories of inter-state conflicts may be considered. In the first place, inter-state conflicts can be caused by population pressure upon resources leading to expansionist tendencies, or, secondly, by clandestine population movements affecting the demographic balance of the host region to the detriment of the political future of the local elites forcing the latter to enter into a conflictual relationship with the country of origin of the migrants. Summarizing the various aspects of the migration problem vis-à-vis inter-state relations, Choucri writes:

„Population size may function as a political parameter when, for example, it generates population pressures upon resources that lead to expansionist tendencies. Population composition may be a parameter of a conflict when it sets the cleavages in a society, generating tensions that result in ethnic or religious conflict. So, too, the population distribution may be a political parameter when, for instance, tribal allegiance crosses national boundaries and generates overt conflict, or when the migration of population changes the ethnic composition of the receiving community and results in nativist reaction.“[16]

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[15] V.A. Pai Panandiker and P.K. Umashankar, *Fertility Control-Induced Politics of India*, monograph, Centre for Policy Research, New Delhi, June 1994.

[16] Choucri, "The Pervasiveness of Politics". For details, see her Population Dynamics and Violence: Propositions, Insights and Evidence (Lexington: D.C. Heath, Lexington Books, 1974); Nazli Choucri and Robert C. North, Nations in Conflict: National Growth and International Violence (San Francisco: W.H. Freeman, 1975); Robert C. North, The World That Could Be (Stanford: Stanford University Alumni Association, 1976). See also the chapter on "The Causes and Consequences of Migration“, in J. Beaujeu-Garnier, Geography of Population (London: Longman, 1978).

Of all the kinds of demographic factors impinging upon politics, however, the most complex are probably the ones having religious and/or ethno-nationalistic roots. Since both religious nationalism and ethno-nationalism draw their sustenance from human emotions which are often irrational the inter-state conflicts rooted in ethnic and religious discords are the most intractable and most violence-prone of all the issues relating to international conflict. Compared to these, resources issues, for example, seem to be much more concrete and hence conducive to compromise, if not solution.[17] This author has discussed elsewhere the religious and ethnic majority-minority cleavages that have been causing inter-state conflicts in South Asia.[18]

Categories of population movements

The factors responsible for population movements in South Asia fall in one or more of the following seven categories:

1. traumatic geographical surgeries,
2. failure in nation-building leading to civil war,
3. inter-ethnic conflicts leading to civil strife,
4. open or virtually open inter-state boundaries,
5. inter-state developmental disparities,
6. contractual obligations, and
7. military interventions by extra-regional powers.

1. Geographical surgeries: political fall-out

Population movements that took place across Indo-Pak borders immediately before and after the partition of the Indian subcontinent belong to this category. The so-called two-nation theory created so much cleavage between the Hindu and Muslim communities that when the decision to divide the country was taken it was greeted with unprecedented communal carnage. In the wake of the partition large numbers of Hindus and Muslims migrated to India and Pakistan respectively in the midst of severe violence. It was estimated that about 15 million people were involved in this process of cross-national migration. To this figure was added a few more millions who migrated to India from Pakistan following anti-Hindu riots in Pakistan during the fifties and the sixties. Before the secession of Bangladesh from Pakistan in 1971, the politics and pronouncements of the Pakistani government often used to lead to communal violence in that country causing exodus of Hindus to India. For example, in 1964 the theft of the holy relic of Prophet Mohammed from the Hazratbal shrine in Srinagar (Kashmir) led to widespread violence in East Pakistan where the Hindu population was concentrated. This led to large-scale population movements. It was estimated that the total number of refugees who arrived in India in 1964 was about a million. Earlier communal riots had led to refugee influx in India and by 1964 the total number of Pakistani refugees of this variety was estimated to

[17] Robert Mandel, "Roots of the Modern Inter-State Border Dispute", *Journal of Conflict Resolution* (London), vol. 24, no. 3, September 1980, p.435.

[18] Partha S. Ghosh, "Ethnic and Religious Conflicts in South Asia", Conflict Studies (London), No. 178, September 1985.

be about 5.5 million.[19]

Large-scale migrations of Muslims to Pakistan and Hindus to India have resulted in serious complications for India-Pakistan relations. These complications are often not noticeable for they are indirect or are overshadowed by the strategic cleavage which is more apparent and advertised. For an analysis of the extent and nature of Indo-Pak conflict as it has been affected by cross-country migrations the issue here can be approached from two angles: one, by gauging the influence the Hindu and Muslim immigrants or refugees exercise on the politics of India and Pakistan respectively, and two, by analyzing as to how this influence contributes, either directly or indirectly, towards creating the enemy image of one country in another. Of course, both questions are closely intertwined.

It is estimated that about 7,200,000 Indian Muslims emigrated to Pakistan in the wake of the partition. In pre-1971 Pakistan these refugees or immigrants constituted about 10 percent (20 percent after the secession of Bangladesh) of the population of Bangladesh. The circumstances under which Pakistan was created and the nature of pre-partition Muslim politics earned for them a unique status and purpose which otherwise is denied to an immigrant community. (The only exception probably is the case of immigrant Jews in Israel.) Having been comprised of relatively more educated people, members of the Indian Civil Service and the Indian Army, noted businessmen, and, most importantly, leaders and sympathizers of the Muslim League which spearheaded the Pakistan movement, these immigrants constituted a political force to reckon with. Actually about three-quarters of the so-called "twenty-two families" who were supposed to control Pakistan's economy were from outside Pakistan.[20] Besides, as the immigrants contributed to a rapid urbanization of Pakistan which was one of the fastest in the developing world their influence in politics was all the more apparent.[21]

The Muslim immigrants who had left their original homes in India in search of a better one in Pakistan had naturally a larger stake in the viability of Pakistan. This explains this group's insistence on strengthening forces that would help build Pakistan's unity such as Islam, Urdu, and the negation of federalism. The Muslim League both on account of its immigrant leadership as well as the large following that it had among the immigrants and refugees represented these theories of nation-building. Another party which also strongly represented these ideas was Jamaat-i-Islami, again a party having a large following among the immigrants. With the gradual decline of the Muslim League it was this party which attracted most of the disillusioned immigrant Muslim Leaguers. It may be noted that Jamaat-i-Islami was originally opposed to the Pakistan movement on religious grounds like some of the orthodox *ulema*, but once Pakistan was created it accepted the reality and moved its headquarters from India to Pakistan. It became the most vociferous champion of Islam, opposed all modernist ideas of statecraft and supported the Pakistani establishment in the eastern wing of Pakistan against what they regarded as the Hindu-

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19 The Indian Commission of Jurists, *Recurrent Exodus of Minorities from East Pakistan and Disturbances in India: A Report to the Indian Commission of Jurists by its Committee of Enquiry* (New Delhi, 1965), pp. 309-12.

20 For an analytical and informative study of the role played by refugees in Pakistan's politics, see Theodore P. Wright, Jr., "Indian Muslim Refugees in the Politics of Pakistan", *Journal of Commonwealth and Comparative Politics* (London), vol. 12, 1975, pp. 189-205.

21 On this point, see Shahid Javed Burki, "Migration, Urbanization, and Politics in Pakistan", in Wriggins and Guyot, *Population, Politics and the Future of Southern Asia,* pp. 148, 152, 162-67.

tainted force of Bengali separatism.[22]

As far as the influence in India of the Hindu refugees from Pakistan is concerned, unlike in the case of Pakistan, they did never form the mainstream of Indian politics. This was partly due to their relative insignificance in terms of proportion to the vast Indian population and also to the continuance of the Congress party at the helm of affairs which refused to subscribe to a sectarian and anti-Muslim attitude which the refugees were inclined to represent. Nevertheless, these refugees contributed towards building a deep-seated distrust between the Hindus and the Muslims and this development played a not too insignificant role in souring the Indo-Pak relations.

The incidence of Hindu-Muslim riots, which is so much a familiar phenomenon in India's body politic, is largely attributable to the psychology of suspicion between the two communities generated by the division of the country and subsequent flights of millions of Hindus in the midst of violence. It may be a fact that no one possibly can establish any direct linkage between the incidence of Hindu migrations and the phenomenon of communal violence in India, as over the years Hindu-Muslim riots have taken place in many parts of the country which cannot even remotely be considered as places where immigrants or refugees got settled, still it cannot be disputed that the tendencies which breed communalism, the most important of which is the politicization of communalism and communalization of politics, have much to do with the holocaust of Hindus in Pakistan and their subsequent exodus to India.[23] The birth of the Hindu communal party *Jana Sangh* in 1952, one of the major constituencies of which were the dispossessed Hindus from West Pakistan, was a direct outcome of the post-independence communal strife. The linkage of Jana Sangh with the Hindu chauvinistic *Rashtriya Swayamsevak Sangha* (RSS) is too well known to be recapitulated here.[24]

2. Nation-building or nation-breaking

The East Pakistan crisis and the exodus of Bengali refugees to India belong to this category. Pakistan, which owed its origin to the theory of two nations, became, ironically speaking, victim of its own thesis within less than a quarter of a century of its creation. On the same premise of national disharmony was fought the Bangladesh liberation war of 1970-71. The people of East Pakistan, claiming a distinctive linguistic-cultural identity of their own around which developed the phenomenon of Bengali nationalism, came in conflict with Pakistani, or more precisely Punjabi, nationalism. The Bangladesh liberation movement was subjected to massive repression, unprecedented in its scale and dimension, by the Pakistani military regime, causing an exodus of East Pakistani refugees to India whose number was estimated at about ten million.

Though the presence of such a huge number of Pakistanis on Indian soil strained India's scarce resources, it gave an effective political and diplomatic handle to the government of India to muster international support for its anti-Pakistan policies which culminated in the war of 1971 resulting in the dismemberment of Pakistan. A resolution passed in both

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[22] Wright, "Indian Muslim Refugees“, p. l98. For an analysis of Pakistan's failure in national integration, see Rounaq Jahan, *Pakistan: Failure in National Integration* (New York: Columbia University Press, 1972).

[23] ICJ Report, "Recurrent Exodus“, Note 8.

[24] These questions have been discussed at length in Partha S. Ghosh, *Cooperation and Conflict in South Asia* (New Delhi Manohar, 1989), pp. l6-46.

the Houses of the Indian Parliament on 31 March 1971 declared, *inter alia*: "Throughout the length and breadth of our land, our people have condemned in unmistakable terms, the atrocities now being perpetrated on an unprecedented scale upon an unarmed and innocent people... This House records its profound conviction that the historic upsurge of the 75 million people of East Bengal will triumph. The House wishes to assure them that their struggle and sacrifices will receive the whole-hearted sympathy and support of the people of India." There was hardly any concern about the drain on India's exchequer to maintain the refugees.

3. Inter-ethnic conflicts

The Sinhala Tamil ethnic conflict which led to the arrival of thousands of Sri Lanka Tamils as refugees in India and the political conflict between the Ngalongs and the ethnic Nepalis in Bhutan which made many of the latter take refuge in Nepal and India fall into this category.

The discriminatory treatment meted out to the minority Sri Lanka Tamils by the majority Sinhalese forced large numbers of Tamils to take refuge in the neighboring Tamil Nadu in India and later in the Indian state of Orissa. The problem actually started after the unprecedented anti-Tamil riots that took place in Sri Lanka in July 1983. The anti-Tamil pogrom caused migrations of Sri Lanka Tamils to India. It was estimated that about 30,000 Tamils took shelter in India during those months. The flow continued depending upon the state of ethnic relationship. For example, during the first quarter of 1985 there was again a spurt of refugees and in February alone about 15,000 arrived in India. In May 1985, in a statement in the Indian parliament, Prime Minister Rajiv Gandhi said that there were about 100,000 refugees from Sri Lanka and that it was straining the Indian economy.[25] The flow of refugees continued unabated, and according to contemporary reports about 200 people arrived every alternate day.[26]

The Sri Lankan Tamil refugees in India presented a problem to Indian politics which was somewhat unique compared to other situations, namely, the Bangladeshi or Nepalese nationals in India or Hindu refugees in the aftermath of the partition. The number of Sri Lankan refugees was too insignificant to cause any demographic challenge to an already over-populated India, nor were they trying to interfere with Indian politics. But on account of the nature of Tamil Nadu politics and the emotional response that the refugees evoked the problem assumed larger relevance for Indian politics (particularly so because Tamilnadu had an earlier record of a separatist movement). Both the contenders for power in Tamilnadu, the *All India Anna* DMK (AIADMK) and the DMK, rely heavily on their capacity to project themselves as champions of the Tamil cause. The Congress party ruling at the center keeps shifting its alliance with either of them depending upon prevailing political exigency. As it usually happens in this kind of situation the opposition party has an inner compulsion to assume an ultra-chauvinistic stance to which the ruling party is forced to respond to in almost equal terms.[27]

The intermeshing of the Sri Lanka Tamil politics with that of Tamil Nadu and then with that of Indian politics found its most dramatic expression in the assassination of Rajiv

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[25] *The Hindu* (Madras), 4 May 1985.
[26] *India Today* (New Delhi), 30 September 1985, p. 50.
[27] For more on this point, see Ghosh, *Cooperation and Conflict*, pp. 170-73.

Gandhi during the parliamentary elections of 1991. The killing which was masterminded by the suicide squad of the „Liberation Tigers of Tamil Eelam“ (LTTE) took place on the Tamil Nadu soil itself, causing tremors to run through the state's politics. The ruling DMK came under severe political pressure from its rival, AIADMK, which routed the DMK in the assembly elections that took place six months later in January 1992.

The ethnic conflict between the majority Drukpas and the minority Nepalis in Bhutan has caused many Nepalis to migrate into India and Nepal. In Nepal several camps have been set up for these refugees. It is the claim of the Bhutanese authorities that they have only evicted those Nepalis who had illegally settled in Bhutan. While there is some truth in this claim it is also a reality that under the garb of its citizenship laws and tackling the Nepali terrorism the Bhutan government has illegally ousted many ethnic Nepalis from its territory. According to recent reports, over 85,000 persons of Nepalese origin have left Bhutan since 1990, a majority of whom have taken refuge in Nepal.[28] The situation has not gone out of control only because of the fact that the Bhutanese monarchy has a good relationship with India and the latter on its part can persuade the democratic set-up in Katmandu not to take undue advantage of the situation.

4. The open borders

The third category of population movements are attributable to open or virtually open international borders. Before this problem is addressed, it would be instructive to underline the fact that out of the 26 states that comprise India (including the recently created Delhi state) 17 have international borders, namely, Arunachal Pradesh, Assam, Bihar, Gujarat, Himachal Pradesh, Jammu & Kashmir, Manipur, Meghalaya, Mizoram, Nagaland, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, and West Bengal. The states which do *not* have international borders are Andhra Pradesh, Karnataka, Kerala, Madhya Pradesh (M.P.), Delhi, Haryana, Maharashtra, Orissa and Goa. For details about the demography of the states having international borders, see Table I.

The border between India and Nepal is open by treaty. It is indicated by a no-man's land of ten yards known as „Dasgaja“ and stone pillars erected at every quarter mile from Mechi river in the east to Mahakali river in the west. The open border has resulted in legal Nepali migrations to India and legal Indian migrations to Nepal. About twenty years ago it was estimated that the annual flow in both directions totaled about 50,000. Some of them went to live in the country of their adoption permanently while others returned home after the purpose of their migration was served.[29]

Because of the political problems associated with the growing number of Nepalis in India and the growing number of Indians in the *Terai* region of Nepal it is almost impossible to have hard data on the number of migrants both ways. In Nepal it was a general practice during the monarchy to exaggerate the problems arising out of growing numbers of Indians in Nepal. The Task Force on Migration which was set up in 1983 under the auspices of the Nepali National Commission on Population only referred to "some" emigration of Nepalis to India but discussed at length the problems Nepal faced from the rising

[28] *Times of India* (New Delhi), 30 August 1994.
[29] K.N. Sud, "Nepalese in India", *Hindustan Times* (New Delhi), 9 September 1975.

number of Indians in the Terai.[30]

Table I: Population, population growth rate and density - development index of states having international borders

S. No.	State	Population	Population Growth p.a. (India: 2.14)	Population Density (persons/km^2) (India: 273)	Relative Index of Development (India: 100)	International Border
1.	Arunachal Pradesh	95,530	3.11	10	66	Myanmar
2.	Assam	22,295,000	2.13	285	54	Bangladesh, Bhutan
3.	Bihar	86,339,000	2.13	496	43	Nepal
4.	Gujarat	41,174,000	1.91	210.74	114	Pakistan
5.	Himachal Pradesh	5,111,000	1.79	92.88	75	China
6.	Jammu & Kashmir	7,719,000	2.63	26	135	China, Pakistan
7.	Manipur	1,827,000	2.54	82	55	Myanmar
8.	Meghalaya	1,761,000	2.80	79	54	Myanmar
9.	Mizoram	686,000	3.35	32	54	Bangladesh
10.	Nagaland	1,216,000	4.60	72	55	Myanmar
11.	Punjab	20,191,000	1.86	402	199	Pakistan
12.	Rajasthan	43,881,000	2.50	128.58	69	Pakistan
13.	Sikkim	404,000	2.51	57	73	Bhutan, China, Nepal
14.	Tamil Nadu	55,638,000	1.40	429	135	Sri Lanka (maritime)
15.	Tripura	2,745,000	2.95	262	55	Bangladesh
16.	Uttar Pradesh	138,760,000	2.29	472	72	China, Nepal
17.	West Bengal	67,983,000	2.22	767.06	97	Bangladesh, Bhutan, Nepal

Sources: Mahendra K. Premi, *India's Population: Heading Towards a Billion: An Analysis of 1991 Census Provisional Results* (Delhi: B.R. Publishing, 1991), pp. 6-7; Centre for Monitoring Indian Economy Pvt. Ltd., *Economic Intelligence Service: Profiles of Districts, November 1993* (Bombay, 1993).

Indeed there has been a disproportionate rise in the population of the Terai. The annual growth rate in the region increased from 2.04 percent in 1952-54 to 2.39 percent during 1961-71 and to 4.41 percent during 1971-81, while the growth rate in the Mountain and Hill region increased only from 1.42 percent during 1952/54-61 to 1.65 percent during 1971-81. In an extreme case, the district of Kanchanpur in the Terai region registered an annual growth of 9.39 percent in contrast to which the Humla district in the Mountain

[30] Nepal, National Commission on Population, Task Force on Migration, *Internal and International Migration in Nepal: Summary and Recommendations* (Katmandu, August 1983), pp. 13-14, 29. Cited hereinafter as *Task Force Report.*

region showed a negative growth of - 2.72 percent.[31]

Obviously this different population growth was to a considerable extent explainable by the migration of Hill people to the Terai region. But, due to the very nature of regional politics in Nepal[32] together with the Nepal King's political compulsions to project his cause as the champion of Nepali nationalism vis-à-vis its large southern neighbor India the growth in the Terai population was disproportionately attributed to migration from India. The Task Force report referred to above reflected these politics. No wonder it was subjected to acrimonious debates in the Nepali *panchayat* (parliament). Several members were ever active in highlighting the danger of India's "demographic invasion of Nepal". A survey of the *Nepal Press Digest* during the eighties would reveal the amount of space and importance that this single issue had occupied in the Nepalese press. And as it has been said, though in an altogether different context, that "there can be little doubt that political orientation of the Press in Nepal, characterized by the more ostentatious shifts in loyalty, is determined by what the government has up its sleeves"[33], this attitude of the press was certainly indicative of the mood of the ruling élites over the question of Indians in Nepal.

The Task Force Report, to which reference has already been made, said: "According to census of 1971, immigrants constituted 7.7 percent of the total population of the Terai... [of which] 97.7 percent were born in India ..."[34] It drew attention to the problems that Indian migrations were creating for the Nepali people in the Terai region and cautioned that "unrestricted flow of immigrants can have political implications affecting international relations"[35]. Its main recommendations were as follows:

„Indians or other foreigners should be allowed to work in Nepal only against permits. Those who are working without such permits at present should be sent back. Citizenship certificates should not be issued on the recommendation of politicians. A commission equipped with judicial authority should be formed to deal with citizenship issues. No naturalized citizen should be appointed or nominated as chief of any agency dealing with political or economic affairs, nor should he be allowed to contest elections to the National Panchayat before twelve years have passed since he became a naturalized citizen of Nepal. Only Nepali citizens should be appointed as agents for the sale of Indian goods in Nepal."[36]

In August 1983 a host of 35 legislators expressed their concern in this regard and asked the government to enforce stringent measures against fraudulent practices in granting citizenship rights. A militant Nepali organization, the *Rashtriya Samaj Sudhar Sangstha* (RSSS), spearheaded an anti-Indian campaign and propagated the theory that the 5.8 million people of Indian origin, most of whom lived in the Terai, constituted 30 percent

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31 Devendra Prasad Shrestha and P. Hanumantha Rayappa, "Levels of Agricultural Development and Patterns of Population Growth in Nepal", in Ashish Bose and M.K. Premi, eds., *Population Transition in South Asia* (Delhi: B.R. Publishing, 1992), p. 296.

32 For details, see Ramakant and B.C. Upreti, "Regionalism in Nepal", in Urmila Phadnis, et al, eds., *Domestic Conflicts in South Asia, vol. 2, Economic and Ethnic Dimensions* (New Delhi: South Asian Publishers, 1986), pp. 165-81.

33 Lok Raj Baral, "The Press in Nepal", *Contributions to Nepalese Studies* (Katmandu), vol. 2, no. l, February 1975, p.180.

34 *Task Force*, Note 19, p. 17.

35 Ibid., p. 34.

36 Quoted in *Motherland* (Katmandu), 11 August 1983, as reproduced in *Nepal Press Digest*, vol. 27, no. 23, 16 August 1983, p. 337.

of Nepal's population and they were actually colonizing Nepal. The Nepal government did not do enough to control the agitation, it rather permitted an unofficial delegation to go to China to ascertain how Beijing would react if a Sri Lanka type situation were to develop in this buffer state.[37] The Task Force report became a sensitive issue in Indo-Nepal relations and also in Indo-Nepal diplomatic parleys. Eventually, realizing discretion the better part of valor, the government shelved the report indefinitely.[38]

Like the growing number of Indians in Nepal there has been a growth of Nepalese also in India. The Nepalese emigration has largely been to the north-eastern states of India and the northern districts of West Bengal and Uttar Pradesh. In 1951, Assam's Nepalese population was 101,335. It rose to 132,925 in 1961 and to 353,673 in 1971. There is also a large number of Nepalese in Tripura, Manipur, Meghalaya, Nagaland, Mizoram, Arunachal Pradesh and Sikkim. According to an estimate, there were nearly 5 million persons of Nepali origin permanently settled in India two decades ago.[39]

The existence of a large number of Nepalis in India has serious reverberations on Indian politics and correspondingly on Indo-Nepal relations. India’s policies to restrict the flow of Nepali nationals to India have served as an irritant in the Indo-Nepali relations. In October 1976 the Government of India, probably as a response to a series of virulent demonstrations in Nepal against India's "annexation" of Sikkim in August 1975, imposed restrictions on travel of Nepalis in certain areas in India, including parts of West Bengal, Sikkim, Assam, Meghalaya, Manipur, Nagaland, Arunachal Pradesh, Tripura, and three districts of Uttar Pradesh. Considering the fact that India and Nepal had been "open" to each other from time immemorial, Nepal resented this policy. To accommodate the Nepali sentiments India introduced a system of permits. This, however, did not satisfy the Nepalese. Indeed, the restrictions caused difficulties not only to Nepalese nationals but also to about 5 million Indian nationals of Nepalese origin in the aforesaid areas who had close relatives living in Nepal. The Government of India, however, did not relent. Even the Janata government (1977-80) which was committed to improve relations with the neighboring countries did not alter the decision. In 1980, the government introduced the system of identity cards in the state of Sikkim to control the Nepalese infiltration into the state and thereby prevented distortions in the electoral rolls which had shaken the Assam politics.

The Nepali question found its most articulated political expressions in the politics of Nar Bahadur Bhandari of Sikkim and that of Subhash Ghising, the leader of the Gurkha National Liberation Front (GNLF) of Darjeeling (West Bengal).[40] The GNLF movement assumed some international dimensions when, on 23 December 1986, Ghising wrote a letter to the King of Nepal, copies of which, sixteen in all, were sent to various governments and international agencies including the superpowers, the United Nations and the governments in the South Asian region. It invoked justice for "the unpardonable historical crimes against humanity or still unresolved question of the very political existence or future states of... Gorkhas in the Indian Union.“ It sought „fresh new treaties for a per-

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37 *The Hindu*, 6 September 1983.

38 See Lok Raj Baral, *Regional Migrations, Ethnicity and Security* (New Delhi: Sterling, 1990), pp. 128-34.

39 Sud, „Nepalese in India"; A.C. Sinha, "Immigrants from Nepal", The Statesman (New Delhi), 17 April 1982.

40 For details, see Ghosh, *Cooperation and Conflict*, pp. 110-118; Baral, *Regional Migrations*, pp. 55-64.

manent political settlement of the... victimized Gorkhas as per the provisions of the Charter of the United Nations" taking into account "the future status of their ceded land and territories."[41]

More or less similar to the problem of the Indo-Nepal border, the loosely enforced 2,00 km between India and Bangladesh has resulted in out-migration from Bangladesh. However, unlike the Nepalese situation there is no corresponding Indian emigration to Bangladesh. Although the Bangladesh government refuses to concede the fact that millions of Bangladeshis are in India yet even a casual scrutiny of the demographic evidence reveals this.[42] About a decade ago, on an average, 2,000 people were pushed back by India's Border Security Force (BSF) every month, but the number of people entering illegally was suspected to be at least 10 times as high. The 1981 census revealed that in the eight border districts of West Bengal, the population had grown by over 30 percent between 1971 and 1981, whereas the remaining districts reported growth rates below 20 percent. In the extreme case of a town in northern West Bengal, the population jumped from about 10,000 to 150,000.[43]

There has also been the problem of Bangladeshis entering into India with forged travel documents or with valid documents but refusing to go back after the expiry of their validity. It was revealed by the West Bengal government in 1983 that at least 400,000 passport-holders from Bangladesh, who entered West Bengal during the previous ten years, had disappeared into the Indian community without a trace. The Bangladeshi infiltration upset the demographic balance of Assam and this was the problem which was at the core of the Assam crisis which rocked Indian politics from 1978 till an accord was signed in August 1985 between the agitationists and the central government aiming at tackling the problem.[44] Evidences of Bangladeshi infiltrations are found in as distant parts of India as Delhi, Haryana, the Punjab and western U.P. According to recent estimates, there were about 1.3 million illegal migrants to northeastern states and West Bengal.[45]

The Assam accord was virtually a compromise between the positions held by the Government of India and the agitationists. Neither disputed the basic fact that there existed millions of unauthorized foreigners (mostly Bangladeshis, some Nepalis) in Assam and that they should be evicted. But over the question of the cut-off year, i.e., the year they had arrived in India, there was no agreement. For the agitationists it was 1951 while for the Indian government it was 1971. According to the accord, 25 March 1971 has been fixed as the cut-off date. It has also provided that the so-called foreigners who came between 1 January 1966 and 24 March 1971 would continue to stay in India but would become full citizens with voting rights only after ten years.[46] Because of the very nature

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41 For the complete text of the treaty, see *The Hindu*, 24 December 1986.

42 Noted Indian demographers like Ashish Bose and B.K. Roy Burman have testified to this. See *India Today*, 15 June 1984, p. 136; B.K. Roy Burman, "Points and Counter-Points in North East India", in Akhtar Majeed, ed., *Regionalism: Development Tension in India* (New Delhi: Cosmo Publications, 1984), pp. 65-74.

43 Ashis K. Biswas, "The Unchecked Influx", *The Hindu*, 17 February 1982.

44 For a summary of the Assam Accord, see *India Today*, 15 September 1985, p. 27. For a fairly detailed analysis of the Assam problem, see Citha Dorothy Maass, "The Assam Conflict", *Internationales Asienforum*, vol. 15, 1984, pp. 219-59.

45 S. Mukerji, "Migration in Eastern India: How Much of It Is Illegal", The Journal of Family Welfare, 37(3), September 1991, p. 71. For a detailed study of Bangladeshi immigration into Tripura, see Gayatri Bhattacharyya, "Refugee Rehabilitation and Its Impact on Tripura's Economy", Ph.D. dissertation, University of Calcutta, 1978, pp. 19-20.

46 *India Today*, 15 September 1985, p. 27.

of the accord as well as the most difficult task of identifying the illegal migrants it was obvious from the beginning that the accord was doomed to failure. Almost a decade has elapsed after the date of signing the accord but there is hardly any evidence of illegal foreigners being actually evicted. During the initial months of Assam Gana Parishad rule in Assam there was some effect at achieving the goal but it was nominal and that too got bogged down due to the pressures of local politics.[47]

In 1981, there was no census in Assam but the 1991 data tend to suggest an end of the foreigners' problem. In a recent statement the Assam chief Minister Hiteshwar Saikia refuted the statement made in the Indian parliament by the Home Minister S.B. Chavan that illegal immigration continued unabated in the state. Saikia said emphatically that "if anybody can identify a single foreigner in Assam, I am willing to quit politics forever."[48] Behind the Chief Minister's assertion was the fact that Assam had witnessed a fall in its population in the 1991 census. Given the fact that all other north-eastern states witnessed sizable growth in their population one may have legitimate misgivings about the Assam figures.[49]

Another case that can be cited in this category of migration is that of clandestine Pakistani infiltrations into the bordering villages of Rajasthan and Gujarat though data in this context is extremely sparse and that too of doubtful authenticity. About a decade ago, there were reports in the Indian press that some of the bordering villages in the districts of Ganganagar, Bikaner, Jaisalmer and Barmer of Rajasthan had registered much higher rates of growth than other villages. For example, between 1971 and 1981, the population of Rajasthan's Bandha village had gone up from 172 to 5,888, of Muhar village from 9 to 247, of Kuldar from 32 to 240, of Modana from 422 to 1,198, of Mota Kilonki-dhani from 48 to 540 and of Madasar from 445 to 1,171.[50]

While part of this population growth was attributed to the construction of Rajasthan Canal, now called Indira Gandhi Nahar, which attracted people from other districts, part of it was reportedly due to infiltrations from Pakistan.[51] There was a sudden rise in the number of Muslim-dominated villages along the border. In this connection it may be noted that in the wake of the 1965 and 1971 Indo-Pak wars many Indian Muslims crossed over to Pakistan and settled there. They, however, managed to continue as Indian citizens, thanks to local district politics. These people had a unique status of holding a dual citizenship, of both India and Pakistan, and continued to cross the border with relative ease.[52] There were reports of Pakistani espionage agents operating in the area and some of their accomplices were nabbed by the Indian authorities.[53] Lately, the government of India has undertaken the job of barbed-wire fencing the sensitive parts of the 1,040 km long Indo-Pak border in Rajasthan to prevent infiltration, smuggling and cattle

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47 Baral, *Regional Migrations*, pp. 117-118.

48 *Times of India*, 22 August 1994.

49 For details of the census data, see Raghubir Chand and Mahabir Chand Thakur, "Changing Population Profile", *Seminar* (New Delhi), No. 378, February 1991, pp. 19-23; Mukerji, "Migration in Eastern India", pp. 71-73.

50 *India Today*, 15 September 1985, p. 53.

51 The facelift that the canal has effected to the local economy has been discussed in B.G. Verghese, *Winning the Future: From Bhakra to Narmada, Tehri, Rajasthan Canal* (New Delhi: Konark, 1994), pp. 67-73.

52 *Sunday* (Calcutta), 10-16 November 1985, pp. 15-22.

53 *India Today*, 15 September 1985, pp. 53-54.

movement.[54]

5. Developmental variable

In this category of population movement we may mention the migration of Chakma tribals of Bangladesh into Tripura and some other north-eastern states of India. At the root of the Chakma problem are certain developmental issues. The construction of the Karnafuli (Kaptai) hydroelectric project in 1962 submerged 54,000 acres of settled, cultivable land affecting about 100,000 people, 90 percent of whom were Chakmas. This not only destabilized the tribes economically, it also affected their social and cultural lives because of the change in the kind of economic activities that replaced the traditional ones.

Besides, the state-sponsored resettlement policies also tended to make the Chakmas alien in their homestead. These resettlement policies started during the Pakistan regime and continued even after the creation of Bangladesh. During the time of Ziur Rahman, the resettlement drive was intensified resulting in growth of militancy among the tribals. State repressions followed, causing Chakmas to seek refuge in India by the thousands. By August 1987, there were about 33,000 such refugees spread over five camps in Tripura.[55] After the restoration of democracy in Bangladesh there has been some improvement in the situation and efforts are under way to send the refugees back to their villages.

6. Contractual obligations

There are some movements of population resulting from agreements between two nations. Into this category fall two cases, that of Indian Tamils and that of the so-called "Biheris" of Bangladesh.

According to the Sri Lankan census of 1981, Indian Tamils were 825,233 in number, constituting 5.6 percent of the island's population. Their presence there is a legacy of the colonial period when they were brought from south India as indentured labor. This subsequently led to a controversy between India and Sri Lanka about the legal status of these people - were they Indian nationals to be repatriated to India or Sri Lankan nationals to stay on in the island?

After protracted negotiations, on 30 October 1964, the Shastri-Sirimavo Pact was signed to resolve the issue. According to the Pact it was decided that of the 1953 estimate of 975,000 stateless persons of Indian origin in Sri Lanka, 300,000 (together with the natural increase in that number) would be granted Sri Lankan citizenship while 525,000 (together with the natural increase in that number) would be granted Indian citizenship. The status and future of the remaining 150,000 people (together with the natural increase in that number) would be decided later by a separate agreement. Later, in January 1974, through another agreement between the two countries it was decided that both the governments would grant citizenship to 150,000 persons left undecided by the 1964 Pact according to a 50:50 ratio.[56]

For various reasons the process of repatriation was never smooth. In the first place, most of the persons granted Indian citizenship were unwilling to go to India, and secondly,

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54 *The Hindu*, 22 August 1994.
55 Ibid., 3 August 1987.
56 For details, see Ghosh, *Cooperation and Conflict*, pp. 155-61.

when in India, they faced various resettlement problems. A recent study has revealed that by 31 January 1989, 116,000 families had been repatriated to India but their rehabilitation was far from satisfactory.[57]

Another case of stateless citizens was that of the so-called "Biharis" in Bangladesh. Since these people supported the Pakistani authorities in the Bangladesh liberation war they were looked upon with contempt in the liberated Bangladesh. Still, the Bangladesh government had offered them citizenships which they refused, opting to remain Pakistani nationals. After years of diplomatic wranglings between Bangladesh and Pakistan an accord was almost reached a decade ago according to which Pakistan would agree to accept them as Pakistani citizens. The number of such expatriates would be 250,000.

7. External interventions

Population movements have also been caused by external interventions. So far, there are two cases of this variety: Tibetan refugees in India following the Chinese annexation of Tibet and the Afghan refugees in Pakistan following the Soviet intervention in Afghanistan. Tibetan refugees started arriving in India first in 1950. It was during this year that the People's Republic of China started asserting its sovereignty over Tibet. It was, however, only in 1959 that large numbers of Tibetans fled to India and Nepal in the wake of the Chinese military action into the plateau. The reports of the International Commission of Jurists (ICJ), published in 1959 and 1966, documented several cases of religious persecution, torture, forced sterilization, destruction of families and so on, perpetrated by the Chinese authorities, which occasioned the forced migration. It is difficult to ascertain the exact number of such refugees, still it is estimated that about 85,000 Tibetans, mostly commoners, fled from their native land between 1959 and 1962. Of this number 80 percent were resettled in India with the second highest concentration in Nepal.[58]

The presence of Tibetan refugees has caused some tensions between India and China but of late after the growing normalization of this relationship there is a constant effort on the part of both the governments to play down the issue. India has recognized Tibet as an autonomous region of China while the latter has virtually recognized the Indian claim over North Eastern Frontier Agency (NEFA) which is now the Indian state of Arunachal Pradesh. Insofar as domestic politics are concerned, the Tibetan refugees have not caused any tension in the places they reside in. Rather they have often contributed to the growth of the local economy. The apprehensions that the refugees were potential destabilizers of Bhutanese politics are also largely misplaced and exaggerated.[59]

The Soviet intervention in Afghanistan in December 1979 resulted in a huge inflow of

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[57] L. Vedavalli, *Socio-Economic Profile of Sri Lankan Repatriates in Kotagiri* (New Delhi: Konark, 1994), pp. 38-39, 46-49, 154-55. See also Partha S. Ghosh, "The Other Tamils", *The Statesman*, 8 September 1990.

[58] Dawa Norbu, "Refugees from Tibet: Structural Causes of Successful Settlement", paper presented to the Fourth International Research and Advisory Panel Conference on Forced Migration, Oxford University, 5-9 January 1994, pp. 1-3. See also K.P. Saksena, "Problems of Refugees: The Indian Experience", paper presented at the Tenth Course of the International School on Disarmament and Research on Conflict (ISODARCO), Venice, 17-27 July 1984, pp. 14-16.

[59] Norbu, "Refugees from Tibet", pp. 29-35. See also his paper "Tibetan Refugees in South Asia: A Comparative Regional Perspective", presented at the Seminar on Refugees and Regional Security in South Asia, Colombo, 10-11 July 1994.

Afghan refugees into Pakistan. Although even before the Soviet intervention many Afghans had come to Pakistan as refugees (by Amin's time some 400,000 Afghan refugees were in Pakistan), the intervention increased the flow considerably. In spite of the fact that it was difficult to assess the actual number as many refugees created phantom families to get the $5-a-month subsistence allowance given to each person, it is estimated that by the end of 1983 the figure had reached the 3 million mark and by 1984 the inflow seemed to have settled at 10-15 thousand heads per month. Of the registered Afghan refugees in Pakistan some 67 percent were in NWFP, some 28 percent in Baluchistan and the rest scattered all over the country.[60]

The ecological, economic and cultural problems that the Afghan refugees created influenced Pakistan politics, threatening the country's political stability.[61] What was, however, of even more significance was the possibility it could bring in its train of contributing to separatist tendencies that were already part of Pakistan's body politic. It goes to the credit of Zia-ul Haq that he turned this disadvantage into an advantage. So far as Zia's troubles from democratic forces in the NWFP were concerned, the presence of refugees probably helped him. It was argued by some commentators that had it not been for the refugees who consumed so much time and energy of NWFP politicians the Movement for the Restoration of Democracy (MRD) agitation of Sind in 1983 could possibly have received support in the province.[62]

But while the refugees weakened somewhat the democratic movement in NWFP they made the Pushtoon problem more complex, viewed from a long-term point of view. The establishment of a Communist regime in Kabul indeed disillusioned the majority of the Pakistani Pushtoons about their merger with Afghanistan and made them sympathize with their ethnic cousins from across the border. But Afghan interest in Pushtoonistan did not recede. Both the Taraki and Karmal regimes celebrated Pushtoonistan days in Kabul. Given the fact that there was every possibility that all the refugees would not return even if the Russian troops withdrew and a political solution was worked out the Pushtoon problem loomed large on the Pakistani horizon and it was feared that "under a different set of circumstances the issue could be revived again with the Soviet support."[63] Of course, the collapse of the Soviet Union and the end of the Cold War have drastically altered the situation.

In Baluchistan the refugee problem had only negative consequences. On the one hand, it made the Baluchis resent the refugees who made the scarce resources of the province even scarcer, on the other, it emboldened the separatist forces who wanted to take advantage of Pakistan's predicament. Since the bloodiest battle the Baluchis fought against the Pakistani government during Bhutto's rule, the brunt of the fighting had been taken over by Baluchistan People's Liberation Front (BPLF), a left-wing guerrilla movement. It was reported that about 4,000 BPLF guerrillas lived in Afghanistan and got assistance

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60 Ali T. Sheikh, "Afghan Refugees“, paper presented at the Tenth Course of ISODARCO, Note 47.

61 Hafeez Malik, "The Afghan Crisis and its Impact on Pakistan", *Journal of South Asian and Middle Eastern Studies* (London), vol. 5, no. 3, Spring 1982, pp. 45-50.

62 Mohammad Ayoob, "Dateline Pakistan: A Passage to Anarchy?", *Foreign Policy* (New York), No. 59, Summer 1985, pp. 159-60.

63 Malik, "The Afghan Crisis“, p. 47; Akbar Krishna, "A Touch of Bathos", *Illustrated Weekly of India*, (Bombay), 3 November 1985, p. 51. For a study of the Pak-Afghan conflict over Pushtoonistan see Mujtaba Razvi, *The Frontiers of Pakistan: A Study of Frontier Problems in Pakistan's Foreign Policy*, (Karachi: National Publishing House, 1971).

from the Karmal government in Kabul.[64] The situation provided a potential handle for the Soviet Union to encourage Baluch separatism to the detriment of Pakistan's national integrity.[65]

Regional milieu

The enormity of the problem that cross-national migrations pose to the South Asian regional system makes one wonder how it could be tackled. At the root of these migrations lies either the economic factor, or religious or ethnic persecutions, or interstate conflict, or extra-regional interventions. Since all these factors - barring probably the last one - are potentially active, it is likely that South Asia has to live with the problem for years to come.

The factor that contributes most to the phenomenon are the diverse stages of political development in different countries of the region. The process of nation-building which may answer the question of migrations arising out of ethnic and religious dissonances as well as the process of democratization which may address itself to the economic and political conditions responsible for cross-country migrations are dissimilar. Paradoxically, it has somewhat succeeded in India alone which has the least attributes of nationhood. It is a multi-lingual, multi-religious, multi-ethnic and multicultural society, still, it seems to have emerged as a viable state. It is difficult to provide a fully satisfactory explanation for this but what appear to be the probable explanations are its modern approach to the nation-building process and its strategic and military predominance in the region.

Unlike India, in all the other countries of South Asia the process of nation-building has been jeopardized by state patronage to particular religious, ethnic or linguistic groups. In Pakistan the emphasis has been on Islam and Urdu, in Bangladesh on Islam or Bengali, in Nepal on Nepali language, and in Sri Lanka on Buddhism and Sinhala. These particularistic tendencies have affected the process of nation-building in each of these states.

As far as the growth of democratic institutions is concerned, India has a better record. Except for Sri Lanka, democracy has a chequered record everywhere. Pakistan and Bangladesh have most of the time been military dictatorships, while Nepal has been ruled by an assertive monarchy. Even in Sri Lanka the democratic process has been marred by an over-emphasis on Sinhala-Buddhist nationalism to the detriment of Tamil interests. Not that Indian democracy has no weaknesses; but the factors that probably have sustained it are, in addition to secularism, its efforts towards self-sufficiency, decentralization of industries taking into account the politics of scale as well as the economies of scale, indigenous production of armaments, and the development of the institutions of participatory democracy as "a mechanism for the change of elites and the availability of

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64 Jamal Rasheed, "All Eyes on Paluchistan", *Middle East International* (London), 15 January 1982, p. 10.

65 For an analysis of the Baluch separatism and the Soviet connection, see Selig Harrison, *In Afghanistan's Shadow: Baluch Nationalism and Soviet Temptations* (Washington: Carnegie Endowment for International Peace, 1980); Inayatullah Baloch, "Afghanistan-Pakistan-Baluchistan", *Aussenpolitik* (English Edition) (Hamburg), 3rd Quarter 1980, pp. 283-301; Inayatullah Baloch and Hans Frey, "Pakistan and the Problems of Subnationalism", *Journal of South Asian and Middle Eastern Studies*, vol. 5, no. 3, Spring 1982, pp. 60-69; Urmila Phadnis, "Ethnic Movements in Pakistan", in Pandav Nayak, ed., *Pakistan: Society and Politics* (New Delhi: South Asia Publishers, 1984), pp. 182-211.

counter-elites".[66]

From the above follows the complex phenomenon of mutual distrust. Belonging to the same geographical region and experiencing a conflictual inter-state relationship the political system of each South Asian country has an in-built tendency to build up its credentials by highlighting the shortcomings of the others. Thus while India takes advantage of the Pakistan and Bangladesh governments' vulnerability vis-à-vis democratic forces there, these governments tend to malign India for its record on communal riots and ethnic dissonances.

Feeding the teeming millions

South Asia is one of the poorest regions of the world. Within the region, according to the latest World Development Report, India is poorer than most of the others. Still, surprisingly, the ongoing migrations are mostly towards India and not vice versa. Almost all such migrants are from Bangladesh and Nepal. What can explain this paradox? Regional development is lopsided in each of the South Asian nations. Yet, other countries such as Bangladesh and Nepal, being small in size, have an extremely limited capacity to absorb internal economic migrants. India provides a vast area somewhere within which these migrants can get their source of livelihood. No wonder that Bangladeshi or Nepali migrants travel as far as Delhi, Haryana or Punjab.

There was a time when people in order to escape poverty used to flock to less inhabited countries such as the United States. During the last decade of the eighteenth century Thomas Robert Malthus in his celebrated "Essay on Population" (1798) dwelt extensively upon the growth of population in England and virtually predicted its doom. Three developments, however, saved England - migration of Britons in large number, the Industrial Revolution and the growth of the British Empire. In the 1820s more than 200,000 Britons emigrated. The figure trebled in the following decade and reached almost 2.5 million in the 1950s. Between 1815 and 1914, around 20 million Englishmen left their country. In 1900 Britain’s population was 41 million. Had the massive population movement not taken place this population would have numbered 70 million.[67]

For obvious reasons this cannot be the solution for South Asia, and for that matter any country of the world anymore. Not only are large-scale migrations not possible, even the small-scale ones attempted by enterprising groups and individuals to the developed countries are being resisted by the latter. In the given situation there is less likelihood that in the foreseeable future there would be any visible change in the world's demographic and technological map. Political instability is inherent in such a situation which would get expression in all kinds of demands for autonomy and self-determination. Not that they are the solutions to the problems, but that is how the political leaders are most likely to articulate their demands.

Civilizational underpinnings

The centrality of India in the South Asian region and its long history as a civilization

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[66] Rajni Kothari, "Political Reconstruction of Bangladesh: Reflections on Building a New State in the Seventies", *Economic and Political Weekly* (Bombay), 29 April 1972, pp. 882-885.

[67] Paul Kennedy, *Preparing for the Twenty-First Century* (New York: Random House, 1993), pp. 4-5.

have created a kind of political cleavage which can be explained through the following formulations: Indian culture being an ancient one deeply rooted to the soil provides an in-built identity to the nation which no matter how diverse the social structure is cannot be done away with. As a result it has no compulsion to project others in the neighborhood as its enemies to highlight this image. In contrast, most of India's neighbors, being small and having at some point in time been parts of the Indian civilization, have an in-built compulsion to project their distinctiveness from India lest the world ignore their existence.

What follows from this broad dichotomous reality is that many of the problems which India's neighbors find important from their respective national viewpoints are not given such importance by India for the simple reason that they are just parts of the Indian experience. Let us take the example of the sharing of the Ganga water between India and Bangladesh. The problem of sharing the river water is so much a national issue that its international dimensions are largely ignored by the average Indian. The Kaveri dispute between Tamil Nadu and Karnataka, the displacement of thousands of families by the Sardar-Sarovar Project in Gujarat, the conflict of interest among the states of Delhi, Haryana, Himachal Pradesh, Rajasthan and Uttar Pradesh over the sharing of the Yamuna and Sutlej waters, and so on, are so much part and parcel of the Indian body politic that it is not surprising that Indians fail to attach the amount of importance to the Farakka issue which Bangladesh expects from it.

The Kashmir problem may be seen from the same perspective. For Pakistan it is probably the only issue which the entire nation can be rallied to and by this the Islamic thrust of its nation-building strategy can be buttressed. But for India neither the fact that Kashmir is a Muslim-majority state nor its demand for self-determination is a unique situation. For a nation 12 percent of whose population belong to the Islamic faith (more than the entire population of Pakistan!) and which from the start has learnt to live with all kinds of autonomy and secessionist demands, Kashmir is just another problem which would have to be tackled within the broad framework of secularism, democracy and decentralization. It may be noted that in spite of large-scale disaffection among the Kashmiris against New Delhi and all those talks of violation of human rights in the valley, there has been no exodus of Kashmiri Muslims to the Pakistan-occupied Kashmir (which Pakistanis call *Azad Kashmir* - „the liberated Kashmir“).

Conclusion

The movements of population that South Asia have witnessed during the last half-century are massive and variegated. Of late the intensity has visibly gone down although the process is going on. The migration of a couple of hundred thousands here and there into India would not affect Indian economy either way. But it is not unlikely that interested political parties may take maximum political advantage of the ethno-religious characteristics of the migrant communities to ignite primordial sentiments among the Islamic sections of the masses to the detriment of India's pluralistic social fabric. The Hindu-chauvinistic parties do emphasize the Islamic dimensions of the Bangladeshi infiltrations into India.

The problem of interstate population can only be tackled through a modernist approach to nation-building. The developmental goals have to be coordinated through South Asian regional cooperation which should subsume strategies to remove intra-national economic

disparities as far as possible. The task is indeed daunting but the stakes are no less high.

John Markakis

Environmental Degradation and Social Conflict in the Horn Of Africa

The Debate: Context and Perspective

The Horn of Africa is a region of endemic conflict waged at many levels: state, region, nation, religion, tribe, clan. The conflict-ridden countries of the region - Ethiopia, Sudan, Somalia, Eritrea, Djibouti - are among the poorest in Africa, frequently visited by famine, and none of them is able at present to feed its population without assistance from abroad. The Horn is also a region devastated by environmental degradation in many forms; deforestation, soil erosion, soil salinization, desiccation, desertification, loss of biodiversity. In short, the region is a good place to raise the question posed in the ongoing debate concerning the impact of environmental change on human society: that is, is there a discernible connection between environmental degradation, impoverishment and social conflict?

This debate is carried on in the developed world at an academic level, it has a globalist perspective, universal concerns, indefinite time framework, and objectives that are essentially scientific and educational; that is, to understand how change in the environment affects human behavior. The context in which the debate unfolds inevitably plays a role in defining its terms and fashioning its concepts. However, the empirical content of the debate is drawn mainly from the developing world, and these terms and concepts are applied to situations where the context is quite different. This can lead to distortion and confusion, as the history of development and modernization theories shows. It is necessary, therefore, to bring this issue into the debate.

In the developed world the debate is concerned with global issues, such as changes occurring in the atmosphere and hydrosphere, climatic change, etc., the effects of which are expected to be felt in the distant future. No country in the developed world is considered at direct or imminent risk due to the degradation of the global environment. By contrast, as Homer-Dixon points out, ‘vast populations in the developing world are already suffering from shortages of good land, water, forests, and fish; in contrast, the social effects of climatic change and ozone depletion will probably not be seen till well into the next century’ (1994:7).

It is axiomatic in the developed world that activities harmful to the environment can be halted at no great cost to society. For example, Deudney (1990:463) maintains this can be done probably even without cutting military expenditure. What is required is public education and political will. By contrast, in many developing societies it is extremely difficult, if not impossible, to halt the process of environmental degradation at present, given the fact that the very lives of people depend on it. For example, deforestation cannot be halted as long as the need for cultivable land and for fuel cannot be met otherwise.

The influence of the material factor on human behavior is a point of contention in the debate. The assertion that 'scarcities of renewable resources are already contributing to violent conflicts in many parts of the developing world' (Homer-Dixon, 1993:16) is criticized for exaggerating the role of the material factor. Resource scarcity, it is pointed out, is a constant factor in the history of mankind, and humanity has been able to adjust to it. Resource scarcity is one economic variable among many and must not be credited with an independent role in determining human behavior. This point of view is reinforced by the scientific and technological prowess of the developed world and the belief that alternative resources can always be developed. As proof, Deudney (1990:471) notes that in the 'age of substitutability' the prices of raw materials have been stagnant or falling; with 'disastrous results for the Third World,' he adds, without considering the implications of this disaster.

This point of view does not take into account the primacy and immediacy of the material factor in subsistence economies, still the dominant mode of production in Africa. In many parts of the developing world the condition of the local environment is a crucial determining factor in the ability of societies to sustain themselves. Subsistence cultivation uses no inputs to mediate its productive interaction with the environment, therefore, it is entirely dependent upon it. Subsistence economies have no surplus, no reserves, and little capacity for adaptation through technological innovation in the short run. Environmental change with a negative impact on production has an immediate and dramatic impact on people's lives. In the Horn of Africa, for instance, two successive harvest failures spell famine.

Resource scarcity intensifies competition. In the developed world group competition for scarce resources is waged and regulated through institutionalized economic and political processes, and social conflict occurs only when such processes break down under intolerable pressure. The improbability of such a breakdown is a prime benefit of development. By contrast, competition between states lacks effective institutionalized control and can lead to violent interstate conflict. Accordingly, in the developed world the prevalent perception of the sort of conflict that can result from the environmental crisis is war. War is defined as a massive conflict of some duration, waged by centrally organized sides one of which, at least, is a government employing regular troops. And to quote Deudney (1990:470) once more, 'interstate violence is not likely to result from environmental degradation.'

In fact, the prevalent form of contemporary conflict is civil war within, not between, states, and by far the highest incidence of it is in the Third World (Wallensteen, 1993). In many developing states, legal rules and institutions governing group competition for scarce resources have merely a formal existence, making the transition from competition to conflict easier. Such conflict may or may not involve the state. 'Conflict on the periphery' (Fukui & Markakis; 1994) occurs in areas where the state has no effective presence. In the Horn of Africa, conflict among pastoralists in the borderlands is endemic and quite outside the purview of the states in the region (Markakis, 1993). Wars within civil wars are not infrequent, as when rival factions of rebel movements fight for primacy. Such is the history of the conflict in both Eritrea and southern Sudan.

Normally in the developing world, political power utilizing the instrumentality of the state is the regulating factor in competition for resources. The role of the state, therefore, is crucial in the generation of conflict. In Africa, the post-colonial state developed highly centralized structures and authoritarian regimes, which afford access to state power only

to privileged groups and exclude the rest. Since the state throughout Africa controls the production and distribution of material and social resources, access to power secures access to resources, while powerlessness guarantees poverty. The state is not an arbitrator in this process, but a key participant. Those who control it use its power to defend their privileges, while other struggle for state power in order to gain access to resources. Consequently, the state is both the bone of contention and a protagonist in the conflict.

Two other features of the post-colonial state in the Horn of Africa acted as catalysts in the generation of conflict. One is what Mazrui (1975) has called the 'ethnocratic' nature of the state, meaning the monopolization of state power by ethnic groups. The dominance of the Amhara in Ethiopia, the Arabs in Sudan, the three clan (Marehan, Ogaden, Dolbahanda) coalition forged by the Siad Barre regime in Somalia, and the Issa Somali in Djibouti are well known instances. Monopoly of state power afforded these groups, or rather, their elites, privileged access to material and social resources. In Ethiopia and Sudan, the subordinate groups suffered cultural suppression in the name of national integration, as the dominant groups sought to impose their own culture on the state. The ethnocratic nature of the state promoted ethnic political mobilization and made ethnicity the ideological dimension of conflict.

The second feature was the total control of the economy exercised in the Horn for more than two decades by the pseudo-Marxist military regimes that ruled Sudan, Somalia and Ethiopia in the 1970s and 1980s. Thorough nationalization gave the state absolute monopoly of the production and distribution of material and social resources, and thus enhanced the power and privileges of the ruling groups. It then became impossible to redress material iniquity without recourse to state power. During the 1980s, all three countries experienced serious economic decline, exacerbated by drought and war, and dramatized by famine. As a result, material insecurity and the struggle for resources intensified sharply, and so did the conflict for state power.

In summary, it is generally agreed that context - material, social, political - is a determining factor in the process that leads from environmental degradation to resource scarcity to competition and social conflict. It is a fact that the context of the ongoing debate on this process has been defined by and in the developed world and represents its perspective. I have argued that the context in the developed world is quite different, therefore, it requires a different perspective based on the reality of that world. For example, the nature of the state is a crucial contextual factor in the generation of conflict in the developing world, and that factor scarcely figures in a debate dominated by the perspective of the developed world. For instance, the oft-cited example of the Philippines (Homer-Dixon, 1994) ignores (a) the fact that the bulk of the land in that country is owned by a small ruling class which uses the power of the state to maintain its position, and (b) the fact that such a grossly iniquitous land tenure system is a major cause of ecological degradation. Ignoring these facts involves the risk of blaming the landless peasantry both for the damage to the environment and the resulting conflict when, in fact, they are the victims.

The Horn of Africa

Homer-Dixon (1993:18) lists three ways in which scarcity is produced. First, the depletion and degradation of resources at a rate faster than their renewal; second, population growth; third, unequal distribution of available resources. All three are operative in the

Horn of Africa. The region is a classic and well-known example of environmental degradation, a phenomenon that is not new there, but one that has reached exaggerated dimensions lately due to adverse climatic trends and an explosive rate of population growth.

The Horn is not a crowded region. Sudan, Africa's largest country in size (2.5 million square kilometers) has a population of 25 million. With half the area of Sudan, Ethiopia has twice as many people. Somalia is half the size of Ethiopia and has one tenth of the latter's population. Eritrea has an area of 125,000 square kilometers and a population of perhaps 2.5 million. The Djibouti enclave measures 23,000 square kilometers, and has a population of less than half a million. The countries of the region have high rates of population growth. Only Sudan's rate (2.8) is below three percent. Somalia's is 3, Ethiopia's (and probably Eritrea's also) 3.1, and Djibouti's 3.5. These countries doubled their population in the last three decades, and projections for the future are frightening. For example Ethiopia, whose population was estimated at less than 20 million in 1950, is expected to approach 150 million by the year 2055.

Population size and growth trends become meaningful when compared to available resources, and in countries that are overwhelmingly agricultural this means land and water. The Horn lies in the arid zone, and outside the Ethiopian highlands precipitation is low and arable land scarce. All of Djibouti, most of Somalia, two thirds of Sudan, half of Ethiopia and Eritrea lie in the arid lowlands, where population density is very low. People congregate in areas where precipitation permits cultivation, and there population densities are high and landholdings minuscule. For example, average density for Ethiopia is 34 per square kilometer. A narrow central belt that traverses the country from north to south, which contains 65 percent of all cultivated land and 61 percent of the population, has densities reaching 300 per square kilometer.

The third cause of environmental scarcity is unequal distribution of resources that concentrates the available resources in the hands of the few, exacerbating scarcity for the many. That the countries of the Horn qualify on these grounds as well was made clear above, in the discussion on the nature of the post-colonial state. There are gross disparities in the distribution of resources between classes, regions and ethnic groups within each country of the Horn; the grossest and most obvious being the disparity between the urban and rural sectors. The leveling down effected in Ethiopia by the 1974 revolution is now in the process of being reversed under pressure by the international funding institutions.

The southward drift of the Abyssinians from the northern Ethiopian plateau is one example I will cite to illustrate on a grand historical scale the connection between environmental degradation and social conflict. If Egypt is the gift of the Nile, as Herodotus wrote, the essence of this gift is the topsoil of the plateau that is carried away by water over the millennia to fertilize the Nile delta. The drift of the Abyssinian people southwards has a history of many centuries, and is obviously linked to the degradation of their mountainous homeland. This movement accelerated greatly at the end of the last century, when the Abyssinian kingdom expanded vastly to the south to become the Ethiopian empire, and northerners flocked to the conquered territories. The most recent massive phase of this movement was the resettlement program carried out during the famine of the mid-1980s.

The conquest of what is now the southern half of Ethiopia, and the imposition of Christian Abyssinian rule over a large number of diverse ethnic groups, many of them Muslim,

produced an iniquitous conjunction of political power and ethnicity and set the stage for future conflict. The potential for conflict was greatly strengthened by the expropriation of land in the conquered provinces. Two thirds of the land was taken by the state and distributed to northerners who moved south, and the bulk of the peasantry there was reduced to quasi-serfdom. Thus, the element of class contradiction was added to the conjunction, making conflict a likely prospect. The suppression of other cultures practiced in Ethiopia in the name of national integration exacerbated the situation.

Conflict on a large scale broke out in the early 1960s, with rebellions in Eritrea, Ogaden, Bale and Sidamo, and became endemic after the 1974 revolution when rebellion spread to the Danakil, Tigray, Hararghe and some Oromo areas. The military regime that seized power in 1974 succeeded in eliminating the class contradiction by nationalizing all land and distributing it, more or less equally, among the working peasantry. It was unable to solve the 'nationality problem', as it was called, and it was overthrown in 1991. The regime that is now in power in Ethiopia is trying to solve the nationality problem by dissolving the conjunction between state power and ethnicity in a highly decentralized federal system of government based on autonomous ethnically defined units, each with its own language and cultural attributes.

In the Horn, population movement and conflict are apparently related, but the nature of the relationship is not obvious. It might seem that conflict is the cause of movement, but the reverse can also be true. In the former instance, the effect is immediate and dramatic and the relationship easy to perceive. In the latter, the process is cumulative and hard to perceive. Often, other factors intervene to make the connection even more obscure. More often than not, movement is caused by a shift in the balance between humans, animals and resources, and this is dramatically manifested when the balance is suddenly and radically upset; for example, by drought.

Demographic, environmental and economic trends in the Horn during the past decades have undermined the sustainability of many local production systems, forcing people to seek alternatives or supplements abroad; through emigration, seasonal migrant labor, trade, relocation to an urban slum. One study of the Horn maintains that 'mass population movements are an integral part rather than an incidental element of the regional political economy' (Crisp & Cater, 1990:20) Such shifts are gradual and hardly noticed, until they give rise to conflict. In a region of scarce resources, population movement is likely to provoke conflict because it puts additional pressure on an already fragile economic base. Itself the product of scarcity and instability, population movement is likely to lead to more conflict and instability.

The second example concerns the conflict between two Somali clans over the Haud pastures in the Ogaden region of Ethiopia. The Haud plain has no permanent water sources, a seeming defect that was actually a blessing, because it had no permanent population of livestock. Traditionally, the Ogaden clan from Ethiopia and the Ishaq from across the border in Somalia visited the plain during the brief raining season when nature bloomed, and left it to regenerate until the following season.

In the past few decades, the relationship of the two clans deteriorated as competition for the Haud pastures intensified. This was due to the rapid increase in the size of the herds after the introduction of veterinary care, a trend that was further encouraged by the appearance of a market for livestock in the Arab region more recently, and the concomitant degradation of other pastures. The Haud came under increasing pressure, as the pastoral-

ists sought to prolong their stay in the area. The Ishaq built cement water tanks near the border and trucked water to the Haud, making it possible to keep their animals there throughout the year. The Ogaden reacted forcefully, and violent clashes between the two clans became frequent.

In the mid-1970s, the Western Somalia Liberation Front (WSLF) began military activity in the Ogaden with the active support of the Somali government, with the objective of uniting the Ogaden with Somalia. The WSLF recruited mainly from the Ogaden clan, and the nomads did not hesitate to turn their weapons against the Ishaq whom they chased out of the Haud. The turn of the Ishaq came a decade later, when the Somali National Movement (SNM) began the struggle against the Siad Barre regime, with the active support of Ethiopia. In return for this support, the SNM had to assist the Ethiopians in eliminating the remnants of the WSLF from the Ogaden. The SNM was an Ishaq movement, and its fighters not only fought the WSLF, but also took the opportunity to chase the Ogaden nomads out of the Haud.

In short, the pastoralists waged their own struggle for resources under the cover of wider conflicts, exploiting the latter for every possible advantage. Today, the geopolitical scene has been transformed. The SNM claimed independence for northern Somalia with the name of Somaliland, and the Ogaden has become an autonomous region of Ethiopia with the cooperation of the WSLF. No doubt, the pastoralists are assessing the significance of these changes from the viewpoint of their own primary concern for the Haud.

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Katrina S. Rogers

River Disputes as Sources of Environmental Cooperation Environmental Cooperation and Integration Theory[68]

There is a lake near Worcester, Massachusetts with the nearly unpronounceable name of Chabanakongkomuk. The translation of that ancient Native American name tells us something about environmental cooperation and conflict. It means, "You fish on your side, I fish on my side, nobody fishes in the middle - no trouble (Cronon 1983)".

It is no great revelation that within conflict one finds the seeds of cooperation just as the reverse is also the case; efforts to cooperate often lead to conflict.[69] Accumulating evidence suggests that environmental issues, in-and-of themselves are not causal and, in fact, may foster cooperative behavior more often than conflictive behavior.

Five short descriptions of riverine conflict are presented in this paper. They are examined through the lens of integration theory as a way to offer insight into how cooperation is formed between states. To do this, it is necessary to distinguish what is meant by environmental conflict and environmental cooperation. Finally, some research implications are discussed for understanding environmental cooperation in the context of integration theory.

Cooperation and integration at the state level both involve collective action, yet the two are distinct from each other in levels of organization, management, and intensity. For example, cooperation between states occurs within a specific framework of rules and is controlled by the participating states. Although the European Community - now European Union (EU) - falls short of being a federal state, it is much more than an international organization of independent sovereigns (Burley and Mattli 1993, 41). By tradition and under international law, sovereignty recognizes the sole and legitimate authority of a state over the people and territory within its jurisdiction. Integration implies both a diminishment of sovereignty as well as the creation of authority which supersedes the individual entities. Cooperation does not give up sovereignty.

Integration Theory

Integration theory emerged in the 1950s to address the increasing cooperation occurring between states over political, economic, and security matters. Early studies emphasized the conditions under which states voluntarily ceased to be absolute sovereigns, and searched for explanations for how and why states would "mingle, merge, and mix with their neighbors (Haas 1971, 6)."

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[68] A shorter version of this article was published in *ISA Notes*, February 1995.

[69] The examples used in this paper are inter-state conflicts over a shared riparian area. While internal conflict within states is more frequent than inter-state conflict, and also deserves scholarly attention, for the purpose of exploring integration theory and environmental cooperation, the focus of this work is on inter-state conflicts.

It is now understood that, although this mingling results in the diminishment of sovereignty, the loss is offset by gains in managing conflict. Europe, in particular, showed evidence of growing together and served as a crucible for the development of integration theory. Since the 1970s, integration theory has continued to focus on the European phenomenon and has been useful in explaining the development of the subsequent European Union.

Since the work by Karl Deutsch (1957), theories of integration have emphasized the necessity of two conditions: 1) the importance of shared values among participating states and 2) the necessity of mutual responsiveness, that is, constant communication between members (Cobb and Elder 1970, 14). The types and frequency of these communications demonstrate existing cooperation, measure community cohesiveness, and are indicators of integration (Deutsch and Savage 1960). Transactions, ranging from the exchange of goods and services to the frequency of airline flights and tourist reciprocity (Galtung 1966), provide some measures of mutual responsiveness.

Transactions alone, however, cannot guarantee cohesion, and several scholars have focused on measuring shared values within domestic elites as more reliable indicators (Deutsch 1957). Haas argued that a key element in successful regional integration is the attitudinal view of important decision makers in various governments. Others have noted that both a politically aware populace and a supportive government must be evident for successful integration (Etzioni 1965). According to Mitrany, transactions between nonpoliticians are equally important in improving international ties and reducing nationalism. He suggested that modern society not only creates technological problems but also produces the experts needed to solve them. These technical elites and the "proliferation of common problems (Viotti and Kauppi 1993, 206)" required cooperative responses from states. A range of nonpolitical problems and issues such as economic, social, and scientific could be seen as necessitating collaborative links between states.

Another element of integration is the role of supranational institutions in promoting regional (and ultimately global) cohesion. The creation of the European Coal and Steel Community (ECSC) and the European Economic Community (EEC) set Europe on its path to integration. In the search for principles with more general application, Lindberg and Etzioni (1965), Haas (1966), and others began to investigate the conditions that made European integration possible. As early as 1958, Haas defined integration as a process "whereby political actors in several distinct national settings are persuaded to shift their loyalties, expectations and political activities toward a new center, whose institutions possess or demand jurisdiction over the preexisting national states (Haas 1966, 16)." Haas' conceptualization of integration stressed that nothing is distinct from power and that political elites had to perceive integration to be in their self-interest in order to support it, regardless of whether or not technical elites thought it was a good idea.

Accordingly, functional cooperation would continue to increase as initial efforts were successful. Mitrany called this "ramification (Viotti and Kauppi 1993, 206)" and argued that governments would encourage the process by supporting future collaborative efforts between technical elites which would, in turn, enhance political cooperation. The more states cooperate, the less likely they will break the common bonds and ties they establish, particularly in areas where all participants benefit. Through cooperation over time on non-controversial issues, functional spillover occurs as the actors involve themselves successfully in low levels of social and economic cooperation and then, successively, move to more sophisticated and controversial issues. This functional cooperation facili-

tates a gradual socialization process and, in this way, integration sneaks up on states. So called "neo-functionalists" add a political dimension to this model, to explain subsequent compromises in sovereignty.

By the 1970s, both functional cooperation and neo-functionalist models came under increasing criticism as European integration stagnated. This stagnation implied that there were exogenous factors at work, and that low levels of interaction simply were not sufficient to explain the integration process. It was also argued that not enough attention had been given to the domestic dimensions of integration.

As integration theory seemed to lead to a dead end, the importance of interdependence began to emerge, particularly in the works of Keohane and Nye. They emphasized the role that international political economy plays on states and discussed conditions of complex interdependence where international regimes emerge to regulate inter-state relations. Central to their concept is the role that economics has played and continues to play in creating integrative conditions. To the study of economic integration, Pinder applied the terms negative and positive integration (Laffan 1992, 4). Negative integration is the reduction or elimination of barriers that hamper the free flow of goods, capital, and labor such as has occurred throughout the European Union. Positive integration is the formation of common policies and laws (Laffan 1992, 4-5). In many ways, it is easier to achieve negative than positive integration. That is, it is easier to come to an agreement about something that should be removed than the formation of a common policy, since new policies have differing impacts in the various states.

The juxtaposition of the political and economic spheres runs strongly throughout integration literature. In the case of European economic integration, one viewpoint focuses on the importance of the intellectual underpinnings of European unity while the second considers the external conditions to be of more importance (Thompson 1993, 2-4). In the first scenario, contemporary policies by European institutions are seen as part of a long term vision of a united Europe. The second way is to view European integration as a reaction to exogenous factors. The reactive behavior of integration is thus seen not as having an overall vision for unity, but rather that certain political, economic, and social forces helped to create the conditions which were conducive to unity. As Thompson has forcefully argued, these two formulations should be seen as complements to each other. "It is impossible to develop market integration without simultaneously developing a politically driven regulatory structure to govern it at the same time (Thompson 1993, 3)."

As the uniting of Europe has continued, scholars have continued to offer explanations for integration within the Union, ranging from social to legal integration (Springer 1992; Burley and Mattli 1993). Distinctions have also been made between formal and informal integration. According to Wallace, formal integration occurs when policy makers, invested with state authority, can take deliberate actions to create and revise rules, establish common institutions, and work with the institutions they create. Informal integration, on the other hand, is the daily transactions which occur between sectors of the economies of states - market interaction, communications, transportation networks - all of which function without the intervention of public authorities (Laffan 1992, 3-4).

Over the past four decades, integration theory has grown in sophistication. It benefited greatly from neo-functionalist models which added political and sovereignty considerations, and grew further with the added dimension of economic interdependence. More recent work on legal and social influences, and the description of formal and informal

integration, have each further enriched the theory and enhanced our ability to understand and explain the phenomenon whereby states "mingle, merge, and mix with their neighbors."

Integration theory also provides a rich basis for exploring the complexities of some environmental issues. During the same past forty years there has been a growing inclination for states to cooperate, to form supranational boards, commissions, and agencies to address and resolve environmental issues; a tendency toward environmental integration.

Environmental Conflict

Conflict is when two or more actors are at variance with each other over an issue, and is characterized by disagreement. According to Stephan Libiszewski, environmental conflict is caused by scarcity of a resource, which is caused by a human-made disturbance of its normal regeneration rate (Libiszewski 1993, 6). Environmental scarcity can result from the overuse of a renewable resource. The over-pumping of ground water in the US-Mexican border region is one such example (Brentwood and Rogers 1993, 223). Scarcity can also occur when the overuse of a renewable resource overstrains the sink capacity. For instance, significant factory emissions degrade air quality in southern Poland to the extent that health problems are evident in the local population (Hughes 1990, 10-11).

Environmental degradation leads to negative social impacts which in turn shape the nature and course of conflict (Libiszewksi 1993, 10). Homer-Dixon has proposed four principal social effects that emerge from environmental conflict: a decrease in agricultural production, general economic decline, displacement of population, and disruptions of institutions in particular and social relations in general (Homer-Dixon 1991; Böge 1993).

Environmental conflicts often include non-state actors. For example, the European Commission mediated between Hungary and Slovakia in their dispute over the Gabcikovo-Nagymoros dam project. The Commission also sponsored an expert panel of scientists to investigate conflicting environmental claims. These scientists, as a group, are an additional non-state actor which provide technical data to resolve, or in some cases accentuate, the conflict.

Some non-state actors derive their powers from treaty arrangements. One such example is the International Boundary and Water Commission which has oversight responsibility for the rivers which flow across American-Mexican borders. There is also an international commission which adjudicates disputes between the US and Canada over transboundary water issues. The International Commission for the Protection of the Rhine oversees disagreements between the Rhineland states.

Using the above discussion of environmental conflict, it is possible to evaluate shared riparian areas at a number of levels and combinations of conflict and cooperation. In order to analyze the conditions between states over environmental issues, it is important to consider conflict and cooperation as two separate phenomena. I have suggested acronyms both for brevity and to facilitate the analysis.

Low levels of conflict (L-CON) are marked by passive or non-threatening behavior. Activities within L-CON are limited to diplomatic expressions of concern between governments or public exchanges, usually through the media. The Rhine river is an example of a low level conflict.

Medium levels of conflict (M-CON) are characterized by verbal and political confrontations and tense disagreements between states. Rallies and demonstrations are often part of M-CON. While injury or aggressive behavior may result from such activities, violence is not their intent. Mexico's protests in the 1960s over US violations of the 1944 Water Treaty is an example. Actions included tense diplomatic exchanges, political confrontation at the gubernatorial levels, and then at the national levels between heads of state. In addition, both US and Mexican farmers exchanged oaths and threats, but physical violence did not occur. Another example were the confrontations between Egypt and Ethiopia over Nile river water in the 1980s when Egyptian President Anwar el-Sadat declared, "If Ethiopia takes any action to block our right to the Nile waters, there will be no alternative for us but to use force (Myers 1989, 32)." As bellicose as such statements may sound, it is often part and parcel of M-CON bluster and posturing.

High levels of conflict (H-CON) are distinguished by violence, either between civilian groups and/or military forces. H-CON nearly always include additional aggravating factors such as extreme population pressure or an egregiously unequal distribution of the contended resource (Homer-Dixon 1994, 19). Examples of H-CON over river water include the continuing conflict over the Jordan River on the West Bank and the 1989 conflict over projects on the Senegal River between Mauretania and Senegal.

Environmental Cooperation

Environmental cooperation can be described as existing across a spectrum of low to high. The delineation between the levels described here is not always clear cut, but they serve as useful categorizations for sorting out the integrative features within each level.

A low level of cooperation (L-COP) is characterized by action on the part of non-governmental organizations, special interests, and citizens' groups. During L-COP, there is usually reluctance on the part of the state to become directly involved in the issues, thereby tacitly abdicating resolution to other, non-state actors. It is at L-COP that informal integration begins to occur; that is, patterns of transactions emerge based on frequent, continuous, and intense exchange of technology, communication, and non-controversial areas. This exchange occurs without the intervention or overt cooperation of public authorities. The Attaturk Dam on the Tigris and Euphrates rivers is an example.

A medium level of cooperation (M-COP) may be considered to have been achieved at the point where government becomes officially involved. M-COP is characterized by the formation of oversight committees, boards, and advisory groups with limited power and authority. Such groups are most often designed to study and advise. Cooperation at the medium level may also include meetings between representatives of government bodies. At M-COP, meetings remain directly between states, only going externally for advice and information which is understood to be non-binding. M-COP is also characterized by increasing levels of transactions and the emergence of governmental officials as important state actors. The Mekong and Salween rivers example demonstrates to some extent (further elaborated on in the next section) this level of cooperation. There is increasing emergence of government officials and increased levels of interaction.

A high level of cooperation (H-COP) is characterized by integrative activities such as the formation of supranational organizations, commissions, joint advisory boards and committees, with oversight and enforcement authority. H-COP implies a subsequent dimin-

ishment of state sovereignty to cope with the shared resource. Formal negotiations, requests for mediators, meetings between heads of state or the highest level of government representatives, are all components of H-COP. The cooperation between Hungary and Slovakia over the Danube is an example of a high level of cooperative activity.

Rivers

Research done for the Environmental Change and Acute Conflict Programme at the University of Toronto by Homer-Dixon *et al.* indicated that the renewable resource most likely to stimulate interstate resource war is river water (Homer-Dixon 1994, 19). This is both because water itself is an important resource and because, since rivers are often used to form political boundaries and frequently cross national borders, questions of resource usage between upstream and downstream neighbors are easily exacerbated along those lines.

International rivers are designated by international law to be of two categories: One type flows from one country into another and is known as a "successive" river. Examples include the Colorado river which flows entirely from the US into Mexico, and the Nile river which flows from Sudan into Egypt. The second type of international river is a "contiguous" river; that is, a river that forms the boundary between two or more countries, such as the Danube river which forms part of the border between Slovakia and Hungary, and the Oder river which forms almost the entire border between Germany and Poland.

An international drainage basin has been legally defined as "a geographical area extending over two or more states determined by the watershed limits of the system of waters including surface and underground waters, flowing into a common terminus (Chauhan 1981, 90)." The watershed area usually includes both surface and ground water and both can become issues for inter-state disagreement. Over a third of the over two-hundred river basins in the world are not covered by any international agreement while approximately 30 or so have cooperative agreements (Oodit and Simonis 1993, 35).

River basins shared by two or more countries are effected by domestic policy agendas which can determine both the amount and the quality of water in regions. For instance, the larger the irrigated area in upstream countries, the less water is available for downstream countries (Oodit and Simonis 1993, 35). This is the case between Sudan and Egypt, both of which depend on the Nile for irrigation and also for the US and Mexico which both use the Colorado river for agriculture. The more industrial activity in an upstream country, such as in the case of Germany along the Rhine river, the more degraded the water is for their downstream neighbor, the Netherlands. The political relationships within and between upstream and downstream states as well as their geographical location are important factors in shaping environmental conflict and cooperation.

Europe: The Rhine River

The Rhine river is governed by one of the oldest agreements in Europe. The principles of navigation on the Rhine were agreed upon by the Congress of Vienna in 1815 and put into effect by the Mainz Convention of 1831. This Convention also established the Central Commission of the Rhine. In 1868 the Mannheim Convention simplified and revised the first treaty, and in 1918, extended privileges to ships of all countries and not just the

riparian states. Overuse and degradation of the river has lowered agricultural production and created health problems along its banks.

Shared directly by several countries,[70] the Rhine is both a contiguous and successive river and is used for industry and to supply drinking water to millions of people (van Dunne 1993). Through the early and mid-twentieth century, population growth and industrial expansion led to increased degradation of the Rhine river until, by the early 1970s, the Rhine was depleted of oxygen, fish populations were in serious danger, and toxic substances were threatening the water supply (OECD 1991, 268). The fishing industry, in particular, was adversely affected. The social impacts of agricultural decline, health problems, the decrease of fishing, and the disputes between states as companies in one state were blamed for chemical pollutants in downstream states, led to a series of measures. During the 1970s, several agreements were negotiated involving clean-up projects, waste reduction measures, and other international cooperative efforts which have resulted in significant improvements in the entire riparian ecosystem (LeMarquand 1977).

Map 1: The Rhine River

[70] The countries which directly share the resources (water, power, transportation) of the Rhine River are: Germany, Switzerland, France, Luxembourg, Belgium, and The Netherlands.

Despite all of these efforts, the Rhine has not yet recovered sufficiently to allow for the return of most of its previously lost fauna and flora. Much of this condition has to do with the channeling of the Rhine into a series of waterways making the river flow faster and also making it difficult for former habitats to reestablish themselves. A planned ecological revival is being undertaken by several countries, especially the Netherlands and Germany, to change the Rhine to a more meandering river and to use trees to combat erosion (Pearce 1993, 25-27).

The Rhine river is a case of a low level of conflict and a high level of cooperation. There are expressions of public concern, and disagreements which are sorted out by a number of institutional mechanisms. In addition to the characteristics described which place it in these categories, it is also important to acknowledge the external conditions which influence these levels. Domestic political stability within all cooperating states, strong economic conditions, and partners which cooperate on a number of levels in arguably the most “integrated” part of the world, certainly play a role in creating the conditions for high cooperation and low conflict. Additionally, the role of elites in accentuating environmental protection as well as the politicization of environmental issues into political agendas may make the Rhine river case fairly unique.

Mexico and the US: the Colorado and Rio Grande Rivers

Another region where environmental conflict occurs are the river systems shared by Mexico and the US. The Colorado and Rio Grande rivers both flow from north to south, making Mexico the downstream neighbor. In 1944 the US and Mexico negotiated a water treaty specifying allotments between the two states.

During the early 1960s, Mexico protested to the United States that it was in violation of the 1944 Water Treaty. They argued that the quality of water had deteriorated, agricultural productivity in northern Mexico had dropped, and that this was a problem of both a moral and judicial nature (LeMarquand 1977, 30). Mexico argued that the terms of the Treaty clearly specified that risks, rewards, and costs were shared equally between the two countries. The deterioration of water quality on the Mexican side, while American farmers north of the border had access to better water quality, was in violation of the spirit of the Treaty, fostered in international cooperation.

The US State Department's position was that their own legal standing was strong but, rather than fight it out legally, they began as early as 1961 to look for solutions to the problem "without prejudice to the legal position." Thus began a lengthy dispute between the State Department and other interests within the US who were opposed to any reconsideration of water allocation in the southwest. The Bureau of Reclamation and state politicians argued that the Treaty clearly specified water from "any and all sources." This phrase was to become the battle cry for politicians in the border states who were opposed to any water concessions to Mexico which might decrease their own state's allocation. Also, the Bureau of Reclamation made the case that the reason agricultural productivity in Mexico had dropped was not because of water salinity but rather because of poor agricultural practices. At one point it was even suggested that Mexico was merely using salinity as a ruse to receive more water (LeMarquand 1977, 34). Most of the political leaders in the southwest were defensive about reallocations of water. They believed that the 1944 Treaty had been too generous to Mexico in the first place and, since

it was now known that the basin had been over-allotted, they were fearful of losing even more water to the south.

After a long period of negotiations between the Presidents of Mexico and the US, the International Boundary and Water Commission (IBWC), and other political interests in the US, Minute no. 242 was signed in 1973. The US agreed to build a desalinization plant near Yuma, Arizona and to bear all the costs of the facility in order to accomplish this task.

Map 2: The Rio Grande River Basin

Although a medium level of conflict in the past, in contemporary context Mexico and the US exhibit a L-CON status. There is continuing disagreement but a number of institutions have been created to mediate and adjudicate disputes. It is also a medium level of cooperation. The formation of commissions, and the continuing transactions and border activity demonstrate that medium levels of cooperation have been achieved. In terms of high integrative activity, Mexico is still, as the downstream neighbor, dependent on the

continued goodwill of the US. International law affords them little protection and the terms of the 1944 Water Treaty are unclear with regard to Mexico's claims. In 1977 the UN Water Conference called to countries sharing water resources that they should "review existing and available techniques for managing shared water resources, and coordinate development of such resources (UN Water Conference 1977, 51)." Continued power asymmetry between the two states makes integrative behavior unlikely, in that the US will not voluntarily give up sovereignty and still dictates the conditions of cooperation. This implies that power symmetry is a necessary condition of high integrative activity or, at least, is a factor in creating the conditions where integration is more likely to occur.

Map 3: The Colorado River Basin (Reproduced with permission from LeMarquand, David G., *International Rivers: The Politics of Cooperation*. Vancouver: Westwater Research Centre, 1977, p. 26.)

Slovakia and Hungary: the Danube River

The cases of the Rhine river in Europe and the Colorado and Rio Grande rivers in North America have been sorted out over the past fifty to one hundred years. The Gabcikovo-Nagymoros Project is an ongoing riparian dispute between Hungary and Slovakia. While the previous cases provided examples of cooperation over issues of scarcity related to overuse or degradation of a resource, as will be seen in this case study, the number of actors involved also influences the course of an environmental conflict.

Map 4: The Danube River

In eastern Europe, the role of environmental groups was important in maintaining political opposition and in contributing to the fall of communist governments. In Hungary, massive protests against the Nagymoros Dam developed into an effective political oppo-

sition and "eventually undermined the Communist party's exclusive hold on power (French 1990, 6)." In former Czechoslovakia, many of the scientists who helped initiate the protests that brought down the Czechoslovakian government were also united in opposing the Gabcikovo dam in Slovakia.

In 1977 Austria, Hungary and Czechoslovakia agreed to divert the Danube river, which forms the boundary between Czechoslovakia (now Slovakia) and Hungary. The river was to be diverted through a concrete channel and would generate electricity at two dams, the Gabcikovo dam in Slovakia and the Nagymoros in Hungary. Austria had agreed to finance most of the project and also to buy most of the electricity. Scientists in Czechoslovakia argued that the scheme would lower surrounding water tables, damage buildings, and reduce supplies of drinking water. Work on the complex stopped in 1989-90 although the dam in Slovakia was almost completed and the concrete canal was finished. Hungary pulled out of the project in 1989, citing ecological concerns.

The situation became more complicated when Czechoslovakia split into two nations on 1 January 1993. During the year prior to that break-up, Slovakia announced they would finish the Gabcikovo dam and fill the reservoir. Hungary immediately responded by saying that it would use all diplomatic means to stop completion of the project (MacKenzie 1992, 7). In April 1992, the European Commission was asked to mediate the conflict, and by the end of the year, the states agreed to refer the matter to the International Court of Justice (ICJ). The European Commission, however, had difficulty in mediating the dispute, partially because the expert panel of scientists were unable to agree on the nature or extent of possible environmental damage.

In 1993, the World Wide Fund for Nature (WWF) came out in opposition to the completion of the project in Slovakia and was instrumental in keeping the conflict on the pan-European agenda. Alexander Zinke of WWF declared that the water diversion was resulting in water table depletion and that farmers' wells were running dry (MacKenzie 1993, 7). In this case, the social impacts of environmental degradation were causing disputes between local farmers.

In an interesting twist to this story, one year later the WWF reversed its position on this conflict and withdrew its opposition to the dam project following a report by Igor Mucha in which he refuted the Hungarian contention that the project was causing an ecological catastrophe. The WWF issued an apology for their opposition and is currently reviewing the Mucha report. Mucha's study showed strong evidence that the diversion of the Danube, rather than damaging the environment was actually reviving a previously-drained wetland and recharging underground water supplies (Pearce 1994, 8).

External actors have played an important role in the conflict between Slovakia and Hungary. The European Commission was influential in keeping the conflict on the political agenda, the scientists' disagreement forced the states to seek other ways to resolve the dispute, and the WWF was important in monitoring the social impacts of the proposed water diversion. The role of the European Commission may have been instrumental in channeling this conflict from a medium level to a low level. As of now, the conflict has been diffused by the fact that the issue itself seems to have subsided. A high level of cooperation is also evident because the parties agreed to binding arbitration to a higher authority and permitted the assistance of technical experts, the European Commission, and WWF.

Turkey, Syria, and Iraq: the Tigris and Euphrates Rivers

In another example of conflict over river water, Turkey and its neighbors demonstrate how the social impacts of scarcity lead to environmental conflict.

Map 5: The Tigris and Euphrates Rivers

The Attaturk dam project in southeastern Turkey was completed in the early 1990s to irrigate land and increase agricultural productivity. Large-scale projects like hydro-electric dams are often damaging to the environment because of the disruption to the

drainage pattern and the changes in the water table and surrounding area (Singleton 1987, 177). As an upstream neighbor, Turkish damming of the Tigris and Euphrates rivers has had negative consequences to their downstream neighbors, Syria and Iraq (Postel 1992, 80-82). Conflict has occurred at the political and diplomatic level, and Turkey keeps the dam under heavy guard to prevent acts of terrorism. To date, terrorist threats to the project have come only from opposition political parties and the separatist Kurdish movement, both domestic sources. Turkey, however, may have good reason to fear that one or more of the countries will support terrorism activity against the dam in the future.

When the dam was filled in 1990, downstream countries protested about decreased water supplies. Syria and Iraq in particular complained that water depletion was causing local population displacement and a decrease in agricultural productivity. These social impacts have given rise to a series of tense diplomatic exchanges over the Attaturk dam. In response, Turkey has suggested that the countries agree to negotiate a settlement but other states are suspicious of Turkey's motives.

Turkey has declared a security zone around the Attaturk Project and guards it with armed soldiers. This, however, is more as a precaution against Kurdish separatists and threats from the Kurdish People's Party (PKK) than concern over violence from downstream neighbors.

Medium level of conflict is evident in that there are tense disagreements. Since there are no mechanisms set up to mediate the concern over Turkey's activities only low levels of cooperation are apparent.

Thailand and Myanmar: the Mekong and Salween Rivers

An interesting example of a L-CON with the potential to become violent begins in the Myanmar Republic where Thailand plans to build a series of dams along the Mekong and Salween rivers. The dams are upstream from Thailand just across the border in Myanmar although they are intended to secure a continuous and reliable water supply for Thailand. Opponents of the project in Myanmar argue that Thailand's support of the project increases the legitimacy of the autocratic regime in Myanmar, which has been repeatedly accused of human rights abuses. As a way to marshal wide support for their political opposition to the government, the opposition is focusing on the proposed dam project, pointing out that much of their rain forest and many ecosystems will be destroyed by the construction of the dams. Vietnam and Kampuchea have also expressed concerns about environmental damage that will occur in both of their countries due to decreased water flows (Dasgupta 1994, 17-18). Both countries claim that a decline in agricultural productivity and resulting population movement will be substantial. Both the governments of Myanmar and Thailand want the project, but domestic opposition in Myanmar has kept the dispute on the agenda, and strengthened opposition in Vietnam and Kampuchea. The *Mya Yadana Report*, a document published by a Myanmarese group, said that thousands of people will be displaced if the dam project goes through.

The potential for violent conflict remains high because some of the conditions for military conflict are present, including population displacement, egregious unequal distribution of contended resource, and a decline in agricultural productivity. Although Vietnam and Kampuchea are unlikely to challenge Thailand militarily, there is a possibility that the political opposition groups in Myanmar will engage in violent conflict.

In terms of conflict, this is still at a low level. So far, only the rebel group in Myanmar has been vocal in their disagreement. External actors may escalate this conflict, particularly if Vietnam and Kampuchea resist the dam projects. In terms of cooperation, it is medium since two states are cooperating but there are no supra-national organizations and no integration has taken place. Thailand is bound by a common agreement between the other Southeast Asian nations to enlist the permission of the others. Only with unanimity can plans move forward. At least two involved states (Vietnam, Kampuchea) have demurred to cooperate overtly.

Map 6: The Salween and Mekong Rivers

Additional factors to consider are the disruptive influence of the rebels in Myanmar, the potential political instability of the other states involved, combined with increasing burdens on the water supply in light of population growth and increasing consumption.

Map 7: The Salween and Mekong Rivers (Detail) (Source: *Down to Earth* 3(31 July 1994)5:17)

Research Implications

International environmental issues reveal some interesting characteristics when viewed through the lens of integration theory. The discussions of shared riparian areas show that cooperation and conflict can and do exist in many different combinations. They do not demonstrate a predictable correlation between levels of conflict or cooperation, although this has not been attempted in a rigorous, analytical manner in this study nor elsewhere in the literature.

It has been my intention to limit the scope of this paper to a discussion of environmental conflict and cooperation in a general sense, to use a number of similar exemplars (riverine environmental issues), and to suggest that environmental integration is a valid concept and an area that merits further investigation. A detailed discussion of the many exogenous influences on environmental integration (such as the role of international political and economic conditions, social forces, regional political and economic stability and so forth) has not been undertaken in this paper, nor have I even begun to address the implications for conflict resolution studies. All of these are subjects I recommend for further study and research.

When looking at levels of cooperation over riparian issues, we see the emergence of integrative behavior which can and often does lead to integrative institutions. While it may seem intuitively obvious that escalated degrees of conflict are contra-institutional, this cursory look at the case studies suggests that this apparent truism cannot always be confirmed.

Economists have defined levels of economic integration and political scientists have identified components of political integration. I think that these components of political integration will be useful in developing the concept of *environmental* integration. There are four levels of political integration: institutional integration, policy integration, attitudinal integration, and security integration. According to Deutsch, political integration is observable in the emergence of political communities which are based on trust, loyalty, and shared values (Laffan 1992, 5). In the examples above of shared rivers, values do not seem to be strong or collective enough to create the conditions for integration; however, "interests" may be substituted for "values" as applied in Deutsch's definition. We have seen that states are motivated to cooperate when the shared riparian source becomes a matter of state interests. It took a decline in agricultural productivity (an “interest”) for the Mexican government to complain to the US government about the salinity of the Colorado river water. Polluted water supplies, health complaints, and loss of fishing stocks, are what motivated the Rhine states to place the clean-up of the Rhine on the cooperative agenda. It was in each of the states’ “interests.”

Institutional integration occurs when states agree to engage in collective decision-making and develop institutions which formulate and implement the required rules and regulations. Levy’s (et al.) study of international environmental institutions found little evidence that international organizations enforce rules. Rules were left to the purview of the national governments. However, their study went on to argue that “environmental protection is a political activity,” and showed that there are three functions of international environmental institutions: “they enhance the ability to make and keep agreements, they promote concern among governments, and they build national political and administrative capacity (Levy, Keohane, Haas 1993, 397).” It should be possible to begin a defini-

tion of the term environmental integration by looking at levels of cooperation/conflict between and among institutions.

Policy integration concerns the transfer of policy to a higher level of government or to a jointly-managed or coordinated level of policymaking and implementation. "The Single European Act, for example, had a significant impact on environmental policy in the European Union by introducing specific new rules on the environment into the European Economic Community Treaty (Winter 1989, 135)." The creation of the World Trade Organization and activation of its Section on Trade and Environment may also provide an example of environmental integration through policy integration at the international level.

Attitudinal integration assesses public support for integration at the state level. This assessment can be directed at elites or may attempt to measure public opinion. Eichenberg's and Dalton's recent study showed that while political elites are influential, public opinion is also having a growing influence on policymakers. Furthermore, they also demonstrated that public opinion about integration is moved by political campaigns, elite actions, and the international arena (Eichenberg and Dalton 1993, 507 & 530).

In conceiving of whether there is a relationship between environmental values and environmental integration, studies of environmental movements which deal with tracking changes in attitudes toward the environment will provide clues as to whether these changes can be linked to actions of an integrative nature. Similar to Eichenberg and Dalton, the impact of national groups (elites) and political campaigns on national governments has been well documented in the literature on environmental movements (Lowe and Goyder 1983; McCormick 1991; Lester and Loftsson in Kamieniecki 1993). Many scholars in the field think that many societies (particularly Western) are undergoing a redefinition of the relationship between humans and nature, a new understanding which is in contrast to most public policy. Milbraith (in Kamieniecki 1993, 21) presents evidence to suggest that, indeed, a "new story" has been formed, although its impact on public policy is insignificant so far.

Another avenue of research to explore is whether attitudinal changes on the part of non-state actors have a role to play in environmental integration. McCormick argues that in the absence of political leadership on the part of national governments, "environmental interest groups have taken it upon themselves to exert pressure on governments for change, particularly in liberal democracies (McCormick in Kamieniecki 1993, 132)." Looking to see whether there are linkages between international groups in effecting change should further clarify the concept of environmental integration, both in terms of better understanding what is meant by integration and what is meant by *environmental* integration.

Security integration is evident when there is a commitment and expectation among states of nonviolent relations. Deutsch distinguished between two types of security communities: that which achieves a common government becomes amalgamated, and that which maintains peace but falls short of a common government, which he called a pluralistic community. Definitions of environmental security extend the concept of security integration much further than Deutsch's original conceptualization. Lothar Brock writes that environmental security is avoidance of negative linkages between the environment and human activities. This includes the avoidance of environmental warfare, war over natural resources, and also environmental degradation, which he defines as a form of war (Brock

1991). Arthur Westing defines environmental security in the context of a broader human security which he argues, "has two intertwined components: political security and environmental security (Westing 1989:129-130)." Political security includes military, economic, and social/humanitarian subcomponents while environmental security has a protection-oriented and utilization-oriented subcomponent. The protection requirement is safeguarding the quality of the human environment, and the utilization requirement is providing a sustaining basis for any exploitation (harvesting or use) of a renewable natural resource. He also emphasizes the necessity of a commitment to the sustainable development of resources and the sustainable disposal of wastes in order for environmental security to be achieved.

In a further conceptual elaboration of environmental security Clovis Brigagao suggests eleven principles:

1. Equality of rights over natural resources
2. Prohibition of ecological aggression
3. Monitoring of ecological security
4. Regular exchange of information on national or regional situations
5. Prevention of environmental aggression
6. Cooperation over ecological emergency situations
7. Scientific and Technological Cooperation
8. Pacific resolution of international ecological disputes
9. International responsibility for the environment
10. Self-sustained development
11. People's right to environmental quality (Brigagao 1991, 47)

Brock, Westing, and Brigagao each imply that achieving environmental security is no less a situation where issues of sustainability must be defined and addressed, the linkages between human activity and environmental degradation must be explicated and understood by humans at local, national, international, and global levels, and persistent commitment must be implemented to achieve change in the processes and systems which humans currently use in impacting the environment.

It might be useful to start with these definitions of environmental security as a way to think about the ways that security issues are linked to environmental integration, but exploring this relationship will require a tightening and narrowing of the concept. The term „environmental security" needs to be more manageable in order to inform our theoretical understanding of these linkages. I would suggest beginning with Westing's components of protection and utilization as a starting point.

As the Native Americans of long ago who divided the fishing rights of that Massachusetts lake demonstrated, the potentials for cooperation and conflict co-exist within a shared riparian source. The long and complicated name of the lake also alludes to just how difficult it often is to resolve environmental disputes. A reinvigorated theory of integration offers new possibilities for examining, understanding, and explaining the dynamics of environmental cooperation. I am suggesting that the four categories of political integration found in the literature of integration theory will be useful for coming up with a definition of environmental integration which has analytical utility. Using these categories to place instances of environmental cooperation or conflict into political, policy, atti-

tudinal, and security components, will move us toward a good working conceptualization and definition of the term environmental integration.

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International Fresh Water Systems as a Source of Conflict and Cooperation: Learning from the Past and Prescribing for the Future

The deteriorating quality and supply of fresh water has already become an important issue in many parts of the world. International fresh water systems, being the major carriers of water for human consumption, catch the researchers' attention. When several countries are dependent on the same water body, the one's withdrawal or pollution provides the ground for conflict as well as cooperation among the riparians over the best use of the available supply. This paper proposes a research design for a temporal as well as comparative analysis of the conflicts and cooperation over internationally owned fresh water systems in this century. The purpose of this investigation will be to determine under what conditions conflict or cooperation takes place among nation-states over water issues.

1. The growing scarcity of fresh water

Water is one of the most precious commodities for human beings. To some, it is the very blood of the organic whole that constitutes the world. In many regions, availability of water has set the rhythm of daily life from time immemorial. The critical importance of this natural resource for the survival of the human race can be seen in the earliest civilizations, whose growth and sustenance were closely tied to the water distribution systems.

Water is also one of the most pervasive substances on Earth. The total volume of the water available on our planet is 1.41 billion cubic kilometers. If evenly spread out, this amount would suffice to cover the Erth's surface to a depth of nearly 3 kilometers. But 98 percent of this amount is not of much use as it consists of saltwater in oceans, inland seas, and deep underground basins. Although the remaining two percent is fresh water, most of it is stored in ice caps, glaciers, underground basins, in the soil, in the atmosphere, and in living creatures. Besides lakes, only about 2,000 cubic kilometers of fresh water, mainly in rivers, is available for human consumption (World Resource, 1990).

Water is also highly capricious in its inequitable distribution. More than 80 percent of the total global runoff is concentrated in the northern temperate zone, which caters to a very small population, relatively speaking. In the tropical and arid areas where most of the world population lives, the situation is complicated by scarcity as well as by the uneven distribution of water. Almost all the developing countries are in the arid and semi-arid, tropical and subtropical regions and many are facing severe water shortages. According to Malin Falkenmark, the abundance of fresh water is dominating the mindsets of the populace living in the temperate zone, which is also the developed world (Falkenmark 1990). As she argues, this perception has led to the water development and management specialists of the temperate North showing „water blindness" or „temperate bias" over the water availability for a long time (Falkenmark 1993). The volume of the rivers, which is the major source of fresh water, is also unequally distributed among the countries of the less water-rich regions (The World Water 1974). The runoff from the Amazon river alone amounts to 80 percent of South America's average runoff. Similarly, thirty percent

of the total runoff in Africa originates from a single river basin, the Congo/Zaire. The other major share among the African rivers goes to the Nile system. In Asia, the Ganges-Brahmaputra and Mekong basins are the carriers of a significantly high proportion of the continent's runoff.

Between 1940 and 1980, global water use has doubled and it is expected to double again by the turn of the century. Around 40 percent of world's population, in 88 developing countries, are already going through serious water shortages (UNFPA 1991). More and more countries are gradually being pushed into a situation of water stress and chronic water scarcity. Water scarcity has been a major problem in many countries in the Middle East, South Asia, North Africa, and sub-Saharan Africa.

The world's population is now increasing by about a quarter of a million people per day or 90-100 million people every year. According to many recent studies, the phenomenal increase of world population is directly responsible for decreasing the strength of the countries to face the demand for water. The rise in the size of world population, as pointed out by these researches, has increased the water requirements for the purposes of energy generation, domestic use, agricultural intensification and industrial production. The increased human activities produce more and more waste products which contaminate available sources of water. In the countries of the temperate zone, where the per capita water availability is relatively high, the quality of the water supply is damaged by various human activities, such as conspicuous consumption, massive urbanization, and industrial waste disposal. Water quality has also become a major environmental issue in many of these industrialized countries (See Brown 1991, Camp 1993, Postel 1984, Mathews 1989, Myers 1986, Speth 1992, Ullman 1983, Gleick 1993a, and Goudie 1990). Even in water-affluent Canada, which has nine percent of the world's available fresh water supply, there are local water shortages and widespread contamination of both surface and ground water. The situation in the United States, Germany, Belgium and Poland is even worse. Water quality in the rivers of the developed countries suffers from many other contaminants – chemical pollution is common, and the levels of nitrates from agricultural fertilizers are high. Industrial and chemical pollution may be less common but still alarming near the urban areas of the developing countries. It is estimated that 70 per cent of India's rivers are polluted with industrial waste (Clarke 1991). Domestic pollution from untreated water sewage contaminates nearly every major river in the developing world. Irrigation is by far the largest consumer of water as it makes up around 70 per cent of total water use. The amount of water used for irrigation has increased 10 times this century, and still elaborate plans are being carried out for more rapid expansion.

2. International fresh water bodies: areas of conflict and cooperation

Forty percent of the world's population is directly dependent upon the fresh water from the rivers and lakes. These international surface water bodies catch the researchers' attention in a situation of increasing scarcity. However, the real magnitude of the problem of international water bodies is yet to be measured. The international underground basins and their deposits are far from being authoritatively identified. Statistics on the international surface water systems – rivers and lakes, which are comparatively easy to identify - are not methodically done.

The Center for Natural Resources, Energy and Transport (CNRET), presently a defunct UN body, was the first to make an effort to identify the international surface fresh water

systems. In 1958, it published its report *Integrated River Basin Development*, in which 166 international river basins were identified. Its 1978 publication *Register of International Rivers* also included the lake basins, and the number went up to 214. The river basins are defined in this study as an „ area within which waters of natural origin (rain, groundwater flow, melting of snow and ice) feed a given river" and more importantly, it considered only those river basins which were 'separate' and directly communicated with the final recipient of the water (oceans, inland seas or lakes). This definition did not include the tributary or other outlet basins. As far as we know, there has been no study of this subject after 1978. The new changes of the state boundaries, particularly in the late 1980s, has made the CNRET study out of date. Moreover, that study also suffers from some serious methodological errors.

The study done by CNRET in 1978 was entirely a desk study, which drew its figures from then available maps in the UN Map Library. It is nearly impossible to locate all the international surface water systems from the small maps alone. No help from other studies and information provided by the countries and river commissions were taken. The ambiguous cases could also have been checked by site investigation.

The major problem of this study is its use of the definition of river basins. Sometimes tributary and outlet river basins are economically, politically and environmentally more significant for the riparian states than the ones identified by the CNRET study. If we count the number of all international surface water bodies in the world, it will be significantly higher than the number given by CNRET. A good example would be the undercounting of international rivers between India and Bangladesh. While the CNRET counts only one mega-basin, the Ganges-Brahmaputra, which is shared not only by India and Bangladesh but also by China, Nepal and Bhutan, the Indo-Bangladesh Joint River Commission identifies 54 river systems common to both countries. Out of these 54 rivers, India and Bangladesh are in a long-standing dispute over the Ganges and Brahmaputra, recently have used force over the Mahuri, and have a mutually agreed settlement over the Teesta. Bilateral dissension has started to appear in most of the remaining shared river systems.

When several countries are jointly dependent on the same water systems, the one state's withdrawal and pollution can lead to conflicts as well as to cooperation among the riparians to get the most out of the available supply. In this situation, a scientifically drawn exhaustive list of the international water bodies is needed to locate the areas of impending conflicts and/or cooperation. The counting and analysis of water-related developments is also very much dependent on having a list of the water systems owned by more than one country.

3. Water as a source of conflict

The connection between scarcity/pollution of water resources and interstate conflicts can be seen in two different dimensions at least. *Firstly*, an interstate conflict may be directly responsible for creating the water scarcity/pollution by destroying, blocking or poisoning the water storage facilities of the adversaries. In 1938, the Chinese released waters of the Yellow River by dynamiting the Huayuankow dike to stop the advancement of the invading Japanese troops. Hydroelectric dams were bombed during World War II and the centralized dams on the Yalu River serving North Korea and China were the targets of an attack in the Korean War. Irrigation water supply systems in North Vietnam were

bombed by the United States in the late 1960s (Gleick, 1993b). Iran claimed to have bombed a hydroelectric station in Iraq in July 1981 (New York Times, 20 July 1981). In 1986, when North Korea brought out a plan to build the Kamgansan hydroelectric dam on a tributary of the Han River upstream of the South Korean capital Seoul, it raised fear among the South Koreans that it might be used as an intentional offensive weapon in the event of hostilities. According to military analysts, the deliberate destruction of the dam by the North could flood Seoul, and to face that eventuality, South Korea saw the necessity of building a series of levees and check dams above Seoul. Recently, dams, water storage facilities, desalinization plants and water conveyance systems have been targeted by both warring sides during the 1991 Gulf War. In January 1993, the Peruca dam, the second largest dam in former Yugoslavia, was intentionally damaged by the warring parties in the Balkan.

But in this contribution the aim is to concentrate on the *second* dimension of the relationship – scarcity/pollution of water resource causing inter-state conflicts by itself. Most of the existing research on this theme are the case descriptions, lacking the theoretical rigor for general applicability (See Gleick 1993b, Cooley 1984, Falkenmark 1986, Rich 1992, Swain 1993, Lowi 1993, Lonergran 1990, Thompson 1978, Starr & Stoll 1988, Beschorner 1992/93, Starr 1991, Widstrand 1980, Ohlsson 1992). There are a number of major disputes that have already taken place over the water of the many international rivers. Some of the widely reported ongoing ones are: Jordan (Israel and Arabs), Nile (Egypt, the Sudan and Ethiopia), Colorado (United States and Mexico), Euphrates (Turkey, Syria and Iraq), Danube (Hungary and Slovakia), Han (North and South Korea), and Ganges (India, Bangladesh and Nepal).

The competition for the waters of the Jordan, Litani, Orontes, Yarmouk and others was one of the major reasons for the Arab-Israeli War of 1967 and also influenced Israel's decision to invade Lebanon in 1982 (Cooley 1984). The disagreement on water sharing has blocked any peaceful arrangement in the area since 1947. A number of studies have suggested that water scarcity will intensify and aggravate competitions, leading to unprecedented upheaval. Giving water a vital prominence, it has been said that water could become more valuable than oil as a strategic asset (Christian Science Monitor, 8 March 1990). The most pressing water conflicts have centered on the control of the Jordan River basin among the riparian states Israel, Jordan, Lebanon, and Syria.

Since the 1920s, Egypt and Sudan have shared the Nile river peacefully, but now Sudan wants to revise the 1959 agreement to get a larger share of the water. However, the major problem for Egypt comes from Ethiopia who controls the Blue Nile tributary that supplies nearly 80 percent of the Nile's water entering Egypt. Ethiopia has nothing to do with the legal agreement between Egypt and Sudan. Ethiopia's plan to divert the Blue Nile's water for irrigation projects has alarmed Egypt and even in 1985 the then foreign minister of Egypt and present Secretary General of the UN, Boutros Boutros Ghali warned; „the next war in our region will be over the waters of the Nile, not over the politics ..." (Myers 1989).

The Colorado river is shared between upstream USA and downstream Mexico. The over use of the water on the US side resulted in increasing saline content which started to create problems for the Mexican agricultural production in the 1960s. After decades of negotiations, the United States have agreed to guarantee Mexico a certain level of river salinity (Falkenmark, 1986), but have yet to fulfill their promise. Where the disparity is

so large between upstream and downstream countries, the options are very much limited for the downstream party to react.

The huge Anatolia Project, where Turkey plans to construct over 20 hydroelectric and irrigation facilities on the upper reaches of the Euphrates river, will certainly lead to water shortages for downstream users, mainly Syria (Gamba-Stonehouse 1992), which has brought both countries close to hostilities. When the Turkish projects are complete, the flow of the Euphrates to Syria could be reduced by up to 40 percent and to Iraq by up to 80 percent (The Economist 12 May 1990). In recent months, Hungary and Slovakia have come into serious disagreement over the construction and operation of the Gabcikovo/Nagymaros project on the Danube river, which has further complicated the fragile security environment of Central Europe. The construction of a large dam on the Han river by North Korea in the late 1980s has added another layer to the long-standing dispute between North and South Korea. Another incessant river water conflict is going on over the distribution of the Ganges water between India and Bangladesh, which even predates the creation of Bangladesh itself.

The list does not end here. There are conflicts reported over the Indus between India and Pakistan; over the Salween/Nu Jiang between Burma and China; over the Mekong between Cambodia, Laos, Thailand and Vietnam; over the Parana between Argentina and Brazil; over the Lauca between Bolivia and Chile; over the Great Lakes between Canada and United States; over Lake Chad between Nigeria and Chad; over the Rhine between France, the Netherlands, Switzerland and Germany; over the Maas and the Schelde between Belgium and the Netherlands; and over the Szamos between Hungary and Romania.

Many conflicts are active at present among the users of the international river basins in the different parts of the world. It is true that in some cases, there exist agreements which are supposed to regulate the water distribution among the riparian states, but the increasing scarcity and pollution is threatening their continuance. The conflicts are not limited to multilaterally owned surface fresh water systems; the groundwater has also been a source of tension. In 1984, Libya began drawing a river of water from the vast aquifer which it shares with Egypt and Sudan, to water its crops on the way to the Mediterranean. Responding to Egypt's and Sudan's objections, Col. Ghaddafi inaugurated the project with an address condemning Egypt as a „she-goat enslaved by Israel and the USA", and furthermore advocating that the Sudanese overthrow their government (Mische 1989).

Besides the conflict over the Jordan river system, most of the abovementioned conflicts have confined themselves to being non-military in nature, though the threats of use of arms in these cases are not uncommon. As early as the mid-1980s, US intelligence services estimated that there were at least ten places in the world where war could break out over the shortage of supply of fresh water (Starr 1991). However, the river systems which at present appear close to being the source of hostile actions are the Nile, Euphrates and the Indus. The acute scarcity of water in the North African and South Asian regions, combined with the regional instability, may lead to the use of force by the conflicting parties of these areas in the near future.

4. Water as a source of conflict resolution and cooperation

Water in general and rivers in particular have been seen as the source for state-building in the past. Dynamic cultures have grown across river resources: the Indus, the Nile, the Euphrates. Thus water also brings people together. Scarcity of water, need to control water, is an important motive for collaboration among humans. The scarcity and pollution of water resources has not only generated conflicts among the riparians, but also in some cases, it has been instrumental in developing cooperation among them. There has been a number of individual cases where treaties have been signed or river commissions have been established for a better exploitation of available water resources.

It is true that the international legal principles to define the rights of the different riparian owners to the use of water have yet to be worked out. Some attempts are being made by international organizations to assess the global water problems and also to find an acceptable formula to manage international water bodies. Since 1956, the International Law Association is working to establish certain rules for sharing international river basins. At its 52nd Conference in 1966 in Helsinki, the ILA decided on the Helsinki Rules for International Water Courses, which emphasized that an existing use of river water would have to give way to a new use in order to reach an equitable distribution of water, though the new user would have to pay compensation. These proposed principles could not be adopted in the UN General Assembly due to the opposition of a majority of member states. The International Law Commission (ILC), which is bound by the directives of the UN General Assembly, has taken a different position. Building on ideas from the 1972 UN Conference on the Human Environment in Stockholm, it stresses the principle of not inflicting harm on present users. The latest effort of the International Law Commission in this regard is the Draft Report concerning the Law of the Non-navigational Uses of International Water Courses in 1991, which the member states of the United Nations are expected to comment on(Biswas 1993). Besides these, there have been numerous unsuccessful attempts made by the United Nations Environment Program (UNEP), United Nations Water Conference and FAO in this regard.

The lack of a universally agreed principle on the use of international water bodies makes the successful negotiation of individual cases more important as precedents for the future. A few of the noteworthy treaties are: the American–Mexico treaty of 1906 with regard to the Rio Grande River; the treaty of 1944 between the two countries with regard to the Colorado river; the Boundary Water Treaty of 1909 between Canada and the USA; the 1964 treaty between the two countries with regard to the Columbia River; the Indus Treaty between India and Pakistan in 1960; and the Nile Waters Agreement between Egypt and Sudan in 1959. The other signed treaties are for instance between the riparians of the Rhine, the Mekong, and the Teesta. Through the initiative of the UNEP, a pilot project has been formed to share the waters of the Zambezi river among its 8 riparians. Similar plans are being formulated by UNEP for the Lake Chad Basin and the Damman aquifer in the Arabian Peninsula. In some cases, Joint Commissions (e.g., US Mexico Joint River Commission, the Indo-Bangladesh Joint River Commission) are also established by the riparian states in their own initiative, which are working to find ways to resolve the disputes. There are numerous efforts at present underway to deal with the increasing scarcity of water resources on the individual basin level.

As is the case with the identification of international water systems and water conflicts, the information available regarding the past and current water agreements is very unsystematic and not comprehensive. No doubt, the lessons from the successful basin level

resolution of disputes will lead the way by laying down the principles of a universal way of better water resource management, they will also help to see the positive contribution of the increasing scarcity nature of fresh water.

5. A research design for the future

Thus, while analyzing increasing scarcity and pollution of water resources and in particular internationally owned fresh water systems, one has to take into account both the conflict-inducing aspects and the conflict-resolving aspects. Under what conditions will one rather than the other follow? Is the present predicament, with increasing populations, agricultural, industrial and urban water usage, etc. more prone to conflict over water than has previously been the case? There is a serious lack of scholarly investigations into the impact of water shortages on the emergence of social conflict in general, and armed conflict in particular. The issues do have considerable social salience, however, there are frictions between and within states over these issues, but there are also cases of collaboration. Thus, water might not, in the final analysis, be the full explanation. It might be a necessary condition, but not a sufficient condition to give rise to conflicts. With this in mind, it is important to undertake a global study of the issues involved in order to begin unravelling some of the significant aspects of this problem. Thus, research needs to be designed in order to analyze *under what conditions conflict or cooperation takes place among states over water issues.* We are thinking of many forms of conflicts, ranging from the outsider's observation that a particular case of tension might in fact have its basis in water scarcity, to the statement by parties that they do have incompatible goals, to the actual occurrence of conflict behavior between states (ranging from closing the river to military action on the territory of the other riparian). We believe that the research design which we have outlined below will yield some answers.

No serious research work is available at present to provide basic information regarding conflicts and cooperation over international water systems. Some attempts have been made to identify conflicts, but they are quite tentative and lack a coherent methodological approach. Moreover, most of them are primarily concerned with particular cases of conflict or cooperation only. An earnest research effort to collect information about international fresh water systems, reported conflicts and efforts towards their resolution will be a contribution to the research community as well as the policy-makers.

1. A scientifically drawn inventory of fresh water systems including basic economic and political information will constitute an element of a monitoring system of long-term changes.
2. Such an inventory will be of use in risk assessment and risk management, as to the potentials of outbreak, escalation or spreading of conflicts.
3. The inventory will make possible an analysis of conflict and cooperation over a particular issue, which is of value to the general literature in two adjacent fields of study: conflict research and cooperation studies.
4. Last but not least, the work will be able to assess the relative importance of water for global peace and development, as water-related behavior can be related to other types of behavior, be it conflictual or cooperative.

Such a data collection will provide the basis for asking under what conditions internationally shared fresh water systems give rise to acute international conflicts and to durable conflict resolution. A customary hypothesis is that *scarcity* is such a condition. According to prevalent thinking in media and policy circles, a reduction in available water resources for internal uses could make a particular country more eager to gain political, economic or strategic control over international waterways. Scarcity, in other words, induces international conflict. However, a closer scrutiny of this proposition suggests that many developments are in fact possible: there are many forms of behavior that could follow, and only one of them is the path of *externally oriented conflict behavior*. There is also the possibility of working out an *international regime* for the waterways in question. Before, we have given some examples of this. Thus, scarcity does not logically only give rise to conflict. Also, of course, there might be behavior which is more *internally oriented*: increasing the efficiency of use (i.e. technological development), increasing the use of other water sources, encouraging relocation of people away from affected areas, etc. In other words, scarcity might lead to *adaptation* of behavior, not necessarily and only to aggressive actions. Populations as well as political leaders adapt to the new situation. *Internally aggressive behavior* is also a possibility, i.e. in the form of repressive actions by governments against affected areas (i.e., the forceful removal of people), or against the government by dissatisfied groups in the affected area. In other words, the reactions to scarcity are many and not predicated only on scarcity as such. Scarcity might be a necessary conditions, but it certainly is not sufficient. Furthermore, if we consider the opposite situation, the point becomes even more salient. An abundance of water could also lead to all the types of behavior we have outlined. In an extreme case, such as flooding, cooperative as well as conflictual behavior has been observed: people will help each other but also fight each other. Even the rechanneling of water into a new area could lead to conflicts in the new area, where again issues of control becomes important. Although it is likely that empirically observable scarcity could give rise to more conflicts than abundance, there is no assurance that the latter will be without conflict.

This leads to some additional propositions. One is of course that *change* in itself is the most important: it might be the upsetting of old ways of behavior that gives rise to conflict and the breakdown of earlier existing (formal or informal) forms of management. Such changes should be studied, both with respect to the waterways themselves, as well as to the international surroundings. Furthermore, this has to be done in a long-term perspective, taking into account major structural changes in the international system. The limits for historical analysis are to be set by available data and research funding. The collection of data may be conducted with three time points in mind, together covering important international changes and, thus, giving material for combined temporal (diachronic) and comparative (synchronic) analysis. It is believed that sufficiently reliable sources for the data of interest should be available for the three different time points in this century: 1930, 1960 and 1990. Data to be collected should cover these years plus/minus five years. The year 1930 indicates the conditions during the inter-war years, as well as periods of colonialism and accompanying dependencies. The year 1960 covers the height of the Cold War, as well as the end of colonial systems (e.g. the independence of new states will be incorporated). It thus contrasts 1930 in many important respects. Also, it is, together with the 1930 date, a time of little environmental concern. 1990, finally, will yield information on the post-Cold War conditions, intensive environmental debate, and thus be a useful contrast to the other two (the dissolution of the Soviet empire will form part of the data base). Taken together, the three years should indicate,

better than taking only one or two time-cuts, trends for the future. The 30-year gap between the three specific years of data collection will also be able to suggest answers to the impact of the population growth factor as well as other probable reasons for increasing scarcity and pollution of water resources.

A further proposition is that *non-water factors* are the most salient. Recently particular interest has been focused on the existence of ethnic groups, traditionally occupying a river and thus being particularly affected by redrawn boundaries or changes in water management. Again propositions can be made regarding conflictual as well as cooperative behavior. Once into this field, there is, of course, a set of customary hypotheses on why international conflicts and cooperation occur, drawn for instance from international relations, peace research, anthropology and political science. Without too much additional effort, existing data bases could be turned to control for the significance of such variables. This proposed research is designed to combine the possibility of testing some traditional hypotheses in conflict and cooperation research, adding some new ones drawn from cross-disciplinary exchanges, and at the same time draw conclusions which are directly relevant for the formulation of an international regime for the management of waterways.

A research proposal along these lines has recently been submitted by the authors.

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Environmental Approaches to the Avoidance of Violent Regional Conflicts

Regional conflicts, both sub-national and inter-state, have a multiplicity of causes that can be difficult to disentangle. Environmental factors are likely to figure more or less prominently among those causes. It is suggested that the achievement of regional environmental security, which in turn requires the satisfaction of regional social security, will thus make it more likely that regional conflicts do not escalate to deadly violence. To the extent that environmental impediments to sub-national or other regional security can be readily identified, these could be addressed directly. But since such identification is likely to be a difficult and lengthy process, it is suggested that non-cause-specific approaches to non-violent conflict resolution be stressed. At the inter-state level, it is further suggested that security can be enhanced among neighboring and nearby states through the pursuit of environmental confidence-building measures.

1. Introduction

Regional conflicts - whether sub-national ones or those between neighboring or nearby states - are both inevitable and frequent. Most of such conflicts are, of course, resolved by non-violent means, but a small number of them do escalate to armed conflict with deadly intent and consequences. Regional conflicts arise over a great variety of issues, ranging from those involving the presumed supreme interests of a state to what appear to be rather trivial matters. Moreover, such conflicts can be readily exacerbated by political, racial, ethnic, religious, or other social differences and animosities between the conflicting parties. The resolution of sub-national or other regional conflicts becomes especially difficult when the proximate or ostensible cause bears little relationship to the ultimate or underlying cause.

Of concern in the present context are regions that have a functional integrity based in large part on geographical considerations on the one hand and on ecological considerations on the other, and only to a lesser extent on political considerations (Byers 1991, Westing 1989b pp. 2-3). Such a so-called ecogeographical region functions to some considerable extent independently of the regions contiguous to it - or, at least, could do so. The region of concern here might consist of the state or states within the drainage basin, or watershed, of an inland sea (Westing 1989b); or, similarly, of the states within the drainage basin of a major river system (Westing 1989c); or else the state or grouping of states could be based more heavily on geographical constraints, such as those on a major peninsula (Westing 1991, 1993c). Thus the ecogeographical region, which generally involves several or more sovereign states, often coincides with what political scientists refer to as a sub-region.

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The present study first explores existing means for resolving regional conflict before it reaches a state of violence, and the major impediments to such resolution. It next examines approaches to minimizing those impediments at sub-national and inter-state levels, doing so both in general terms and with particular emphasis on environmental approaches. The study concludes with the observation that the resolution of regional conflict is an integral component of comprehensive human security.

2. Regional conflict and its resolution

Mechanisms do exist, at least in theory, to resolve by pacific means the many regional conflicts that will always occur. For sub-national conflicts - currently the great majority of them (Wallensteen & Axell 1994) - there is (at least nominally) access to domestic courts and other facets of a national legal system. However, once a sub-national conflict escalates to deadly violence, there is regrettably all too little in the way of effective remedies deriving from international law.

For inter-state conflicts - currently at a low ebb, remarkable in the light of the now large number of sovereign states (Westing 1994) - the machinery of the United Nations system, including the International Court of Justice, provides the cornerstone for non-violent conflict resolution. Further mechanisms for non-violent conflict resolution derive from a host of bilateral, regional, and universal treaties that function outside the United Nations system, some of which have established directly relevant regional security organizations and/or systems of adjudication. Indeed, as already indicated earlier, most of the bilateral and other regional conflicts that arise are settled by amicable means via formal and informal avenues deriving from, or facilitated by, these and other instruments.

In fact, bilateral and other regional efforts at non-violent conflict resolution are more likely to succeed than global ones because the problems are more circumscribed and more clearly definable, the need for joint action is more readily apparent, and the potential partners - being tangible entities - are more easy to deal with. Additionally, the varying regions of the world, being composed of different groupings of states, differ sharply in their historical friendships and animosities, their aggregation of political systems, their ethnic and religious compositions, their levels of development, and so forth. Since these national variables help to determine the nature of regional security issues, the necessity for regionally distinct approaches becomes truly evident. In terms of the axiom formulated by Garrett Hardin, 'Never globalize a problem if it can possibly be dealt with locally' (Hardin 1985 p. 144).

On the other hand, a number of serious stumbling blocks do exist to insuring that all of the numerous sub-national and occasional bilateral or other regional conflicts are resolved without question by amicable means. Perhaps most important at the sub-national level is the undemocratic nature of the majority of the states in the world and the widely pervasive corruption within the governments of so many of them, with the result that the actions of those in power often bear little resemblance to the aims and interests of their subjects. And then there is the prevalence of hatred and bigotry exhibited between different racial, ethnic, and religious groups - characteristics that can be readily inflamed for ulterior political purposes. First and foremost at the inter-state level is the tenacity with which states continue to cling to their national sovereignty, thereby simply refusing to subjugate themselves to the compulsory and unconditional rule of international law.

3. Sub-national conflict

Sub-national conflicts usually have a concatenation of causes - in many of such conflicts with environmental factors featuring more or less centrally and more or less obviously among those causes (Bächler 1994, Homer-Dixon 1994-1995, Smith 1994). Addressing the environmental causes of conflict is becoming ever more intractable as human numbers and aspirations continue to spiral upward.

One basic approach to mitigating sub-national conflict, and to making it more amenable to non-violent resolution, is to ameliorate the environmental problems that, to a greater or lesser extent, underlie them. That is to say, nations - both singly and in concert with their regional partners - must strive toward the three unavoidable requisites of environmental security, namely, sustainable resource exploitation, sustainable waste discharge, and adequate protection of biodiversity.

Specific environmental causes of conflict could be addressed directly to the extent that they (and their linkages with other causes) can be identified. However, to the extent that environmental causes are imbedded more or less subtly within the panoply of causes - as, for example, in the recent internal struggles in Rwanda and Sudan (Westing 1994) - at least some of the steps in the direction of non-violent conflict resolution might best be of a more general (i.e., non-cause-specific) nature. In other words, the methodology of resolution should not have to hinge upon and await the often difficult and lengthy process of unraveling and weighting the various causes (a process that might in time even be shown to have produced faulty results).

4. The enhancement of regional amity

It is clear that among the causes of inter-state regional conflict are those related to natural-resource or other environmental issues. That is so because environmental issues - both constructive and destructive - generally do not respect national boundaries. This incongruity makes it advantageous, if not imperative, that the environmental issues be addressed in concert by neighboring and other regional states. Such environmental issues are growing both in number and severity as soaring population numbers and rising demands overwhelm the carrying capacity of the affected region - issues further exacerbated in many regions of the world by ever increasing levels of poverty, income inequities, and associated social malaise.

To make it more likely that bilateral and other regional conflicts do not escalate to deadly violence, it is essential for the rule of law to be nurtured in the many sovereign states lacking (or not respecting) such a legal system. However, for such a rule of law to actually function at both the national and international levels, it becomes equally necessary that good will among adjacent and near-adjacent states be established and maintained. The maintenance of good will is especially important as a means of counteracting the often elusive underlying causes of these conflicts.

The political confidence-building measures that would foster regional amity can take a variety of forms. It is here suggested that cooperative actions at the bilateral and wider regional level on environmental issues are particularly suited to such purposes.

5. Environmental confidence-building measures

Environmental confidence-building measures - and the formal instruments that ultimately develop from them - are useful for several reasons. First, environmental issues are becoming ever more visible both to governments and to citizens at large. Second, most environmental issues are best addressed at the regional level. Third, people even with widely divergent backgrounds and cultures appear to relate to nature in a more or less comparable, perhaps fundamental, fashion, with the important result that environmental issues have a tendency to transcend political, racial, ethnic, or religious divisiveness.

Among the specific environmental issues that lend themselves especially well to cooperative regional efforts are, on the one hand, the management of natural resources shared by two or more states; and, on the other, the management of environmental problems similarly shared. As a prominent example of the former - the management of natural resources - fresh waters that flow through (or adjacent to) more than one state are most efficiently managed by the involved states working jointly, both as to the long-term use of such waters and as to the restoration and maintenance of their quality (Westing 1989c, 1994). Three excellent cases in point are the Danube River system (involving especially Austria, Bulgaria, Croatia, Hungary, Romania, Serbia-Montenegro, and Slovakia), the Nile River system (involving especially Egypt, Ethiopia, Sudan, and Uganda), and the Euphrates-Tigris River system (involving especially Iraq, Syria, and Turkey). As a prominent example of the latter - the management of environmental problems - air pollution that involves more than one state is best dealt with - in essence, can only be dealt with - cooperatively, as is clear in many regions of Europe and elsewhere.

A somewhat more subtle opportunity for regional cooperation is the management of habitats important for the maintenance of biodiversity that happen to straddle national borders, thereby requiring joint action for optimum conservation efforts (Westing 1993a, 1993b). Here three excellent cases in point are on the Indochinese peninsula (involving Cambodia, Laos, and Viet Nam), on the Korean peninsula (involving North Korea and South Korea), and in the Volcano Mountains of central Africa (involving Rwanda, Uganda, and Zaïre). Various environmental opportunities and problems relating to maritime issues also lend themselves well to bilateral or other regional cooperation (Westing 1989b, 1992, 1994). And here two excellent cases in point are the Baltic Sea (involving Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russia, and Sweden) and the Aral Sea (involving especially Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan).

Cross-border and other regional cooperation on environmental matters can be built up in stages. Such cooperation might begin with interim memoranda of understanding that establish exchanges of technical information, coordination of surveys, and joint evaluation of the opportunities and problems in question. In due course, bilateral or other regional commissions can be established having equitable representation (including provision for non-governmental input) that could, as they gain in experience and stature, act with increasing levels of independence. Joint monitoring systems can be established to uncover and examine, as they arise, problems with a potential for conflict. And, in time, specific non-violent means of regional conflict resolution - mediation, arbitration, and so forth - can be instituted.

A legitimate question in the present context is the extent to which well-functioning regional cooperation on environmental issues can be expected to translate into wider political cooperation among the states in question. The question can be restated in terms of the extent

to which interstate interactions involving the 'low politics' of environmental issues will influence interstate interactions involving the 'high politics' of traditional security issues. A definitive answer to this question is not as yet available, although beneficial ramifications from environmental cooperation appear possible if not likely (Brock 1991, Westing 1989b, 1989d). But what is definitively clear is that environmental cooperation confers immense benefits in its own right.

6. Conclusion

In the final analysis, sustained sub-national and other regional peace and security - including non-violent regional conflict resolution - are attainable only if basic societal and environmental demands have been satisfied, that is, only within the framework of comprehensive human security (Westing 1989a, 1989d). As difficult as this is sure to be for most regions - with or without exogenous infusions of technical or financial assistance - to achieve comprehensive human security requires the satisfaction of both its two intertwined components: social (societal) security and environmental security. On the one hand, social security demands basic economic guarantees, a functioning legal system, participatory governance (both locally and nationally), access to education, the provision of fundamental human rights, amicable international relations, and protection (by non-provocative means) from outside aggression. And on the other hand, environmental security demands the utilization of natural resources at levels absolutely no higher than sustainability, the discard of wastes at levels absolutely no higher than sustainability, and the adequate protection of biodiversity, that is, the protection of an adequate fraction of the biosphere on behalf of the other living things on earth.

To recapitulate, social security cannot be achieved and sustained within a region without environmental security, environmental security cannot be achieved and sustained within a region without social security, and a pacific region - one in which the inevitable numerous conflicts are resolved without resort to violence - cannot be achieved and sustained without the existence of both social and environmental security.

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Negotiation Strategies in International Disputes

This paper specifies the negotiation strategies available to stakeholders which are in competition over resources, jurisdiction, sovereignty or other rights. Illustrations are chosen from the management of internationally shared water resources, especially those that were under chronic dispute in the nearly half century long Arab-Israeli war. A choice of one or a combination of the following six options is available to policy makers:

1. Negative non-zero sum games, or "Lose-Lose" solutions
2. Unilateral creation of new facts
3. Zero-sum games or "Win-Lose" negotiations
4. Positive non-zero sum games or "Win-Win" negotiations
5. Conflict and threats of violence
6. No action, causing opportunity costs from neglect and/or delay

International Disputes over the management of environmental problems arise within an anarchistic framework. Each nation is sovereign, a law unto itself. Even when an applicable treaty exists, each side can choose to interpret terms as it pleases, in ways that other stakeholders might regard as a violation. This paper reviews the use of alternate negotiation strategies in the area of transboundary water management in the Middle East, plus illustrations from North America and the Indian sub-continent. A choice of one or a combination of six strategies is available to policy makers:

1. Negative non-zero sum games, or "Lose-Lose" solutions
2. Unilateral creation of new facts
3. Zero-sum games or "Win-Lose" negotiations
4. Positive non-zero sum games or "Win-Win" negotiations
5. Conflict and threats of violence
6. No action, causing opportunity costs from neglect and/or delay

"World Government" advocates share as their goal the adoption of an international body of laws. Their dream of a better world includes the adjudication of disputes between

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states about environmental pollution or water rights by international courts which arbitrate or enforce international conventions and standards. But such a peace committed world does not yet exist. No member of the United Nations has as yet been willing to accept significant reduction in their sovereign powers, as did the 50 sovereign states which compose the United States. A dispute over water rights between the state of California and Arizona can be adjudicated and thus settled by the United States Supreme Court. Mexico and the United States are not bound by such a World Federalist order. They have to negotiate their differences politically without referral to a supra-national authority.

Distinguished international experts have adopted guidelines on how to manage transboundary water resources, the *Helsinki Declaration* and the *Seoul Rules.* But they include some mutually exclusive general principles. For example, consider Turkey's unilateral decision to impound behind newly constructed dams within its sovereign territory a portion of the flow of the Euphrates River to irrigate its Southeast Anatolia region. This so-called "GAP Project" will ultimately include a coordinated network of 22 dams and 17 hydroelectric power stations. As a result, the volume of Euphrates River water available to the lower riparian nations, to Syria and Iraq, will be reduced permanently. Turkey's strong defense force makes it unlikely that either Iraq or Syria can use military force to reverse this reduction of their previously available share of the river. Nor does any international body have jurisdiction. Disputes such as these can be dealt with only on the basis of the abovementioned negotiation strategies.

Option 1: Lose-Lose Solutions or Negative Non-Zero Sum Games

Groundwater management in the Rio Grande/Rio Bravo Basin along the border of Texas and Mexico poses particularly difficult policy challenges because of the technical uncertainties and laissez-faire water right standards within both nations[73]. The quality and quantity of groundwater in the border area's high-growth centers are already diminishing because each land owner is free to pump as much water as he or she wants from a well on their property, although they share a common aquifer. In the absence of joint planning and control of this limited natural resource, the population growth on both sides of the border will increasingly exacerbate water shortages on both sides of the border. Estimated withdrawals from the aquifers are twice the recharge rate, which consequently will deplete the recoverable storage over time.

Each country's legal inability to limit withdrawal of sub-surface waters by property owners is leaving them without domestic power to adopt a joint policy. Compounding the problem is that the two countries have different domestic laws governing groundwater use. Any agreement that is fair bilaterally would require one or both nations to strike down state laws and local precedent for allocating withdrawal rights, which would become politically controversial. The Texas Water Development Board predicts a sharp decline in the amount of water withdrawn from the El Paso aquifers. While the United States and Mexico are able to cooperate in the multilateral negotiations to phase out the use of ozone-depleting chemicals, they are unable to address the need to assure their next generation a sustainable supply and quality of water in the aquifers under their shared

[73] This section is composed of material from the text of Chapter 3 of Eaton and Hurlbut (1992).

border. They appear to be locked into a "lose - lose" negative non-zero sum game process.

Option 2: Creating New Facts

By creating facts a sovereign nation can act unilaterally in what it believes to be its interest. Turkey's GAP Project, as discussed above, is an illustration of unilateral action by a nation that creates a new hydrologic reality. Another illustration is Syria's construction of small dams along the tributaries of the Yarmouk River which originates within its boundaries. These dams have the combined capacity to withhold a major portion of the winter rains before they flow into Jordan, where this high quality source of fresh water is Jordan's principal source of irrigation water.

After many of these Syrian dams were completed, a treaty was negotiated between Syria and Jordan in 1987 in which the already established dams were accepted as no longer subject to negotiation. Jordan could not demand that the dams be destroyed or be kept empty, even though Syria now retains a larger portion of the Yarmouk River water than its prior entitlement which had been informally negotiated in 1953 under the auspices of Ambassador Eric Johnston, an American mediator.

Creating facts was a favored strategy during the Cold War. Both the Soviet Union and the United States took provocative actions short of war and then forced their adversary to adjust to unilateral change of the status quo, such as the construction of the Berlin Wall or the adoption of the Marshall plan to give economic development aid to the western portion of occupied Germany but not to the Eastern portion, the so-called German Democratic Republic.

Option 3: "Win-Lose" Negotiations or Zero Sum Games

In some negotiations material concessions by one party result in an equivalent gain by other partners. This approach can be the preferred negotiation model when one side believes itself to be powerful relative to other stakeholders. This "Win-Lose" strategy involves the transfer of assets from one party to another without compensation. It was the basic principle of the Versailles Peace Treaty after World War I. The two defeated nations, Germany and Turkey, had to yield territory to the victors in return for peace. In addition, Germany was required to pay heavy reparations.

Ambassador Itamar Rubinstein, a participant-observer of secret peace explorations between Israel and its Arab neighbors between 1948 and 1952, attributes the failure of these efforts to the expectation by King Abdallah of Jordan, General Husni Zaim of Syria, and various Egyptian political leaders that Israel would be amenable to a zero-sum game strategy. They proposed several schemes under which Israel would have to surrender some of its limited territory and water resources in return for diplomatic recognition by its Arab neighbors. The Israelis thought the territorial concessions were too severe and the quality of "peace" that was being offered too circumscribed.

In the current post-Madrid peace process the zero-sum strategy continues to be preferred by the Palestinians. Their representatives have sought voluntary re-distribution of the existing regional water supply in their favor, rationalized on the much higher *per capita* supply of water for Israelis and the Palestinians in the occupied territories. The Israeli government defends this status quo in part on the basis of prior use - rights acquired

through governmental concessions during the period when all of Palestine was ruled by Great Britain under a League of Nations Mandate. Since then Israel has invested much of its capital in technological hydrological innovations, while investment in the infrastructure of the West Bank and the Gaza strip were held back by the high priority assigned by Arab and Palestinian leaders to maintenance of a never-ending armed struggle strategy against the very existence of the Jewish State.

After King Hussein publicly announced the end of Jordan's state of war with Israel in Washington, D.C. on July 25, 1994, Prime Minister Rabin ordered a one time unilateral transfer of about 2 - 3% of its traditionally available volume of fresh water for the benefit of Jordan, where water shortages in the cities during the summer limit the running water supply to a few hours a week. In the subsequently signed peace treaty, positive non-zero sum game or "Win - Win" transactions were dominant.

There always is a normative dimension when people negotiate. Stakeholders rarely evaluate their respective concessions equally. For the Israelis, the transfer of water was a zero sum game "good will" concession. Jordan's increased supply required an equivalent reduction of Israel's volume. Arab factions opposed to the peace process viewed the agreement also as a zero sum game concession, but in Israel's favor. A one season reduction of 50 Million Cubic Meters of fresh water by Israel was dismissed by them as an inconsequential gesture in return for de jure political acceptance of Israel's right to exist. For the Arabs, this was a major concession, while the Israelis took their right to statehood for granted. It was seen as dependent on Arab acknowledgment.

Option 4: "Win-Win" Negotiations or Positive Non-Zero Sum Games

"Win-Win" types of agreements can lead to better feelings among negotiating partners because each side views itself as better off under the agreement than without it. Positive non-zero sum solutions, or "win-win" agreements offer gains to both sides with few or no concessions which one of the sides would regard as a "loss."

This is the strategy most favored by the American Foreign Aid Program. Technical assistance and economic as well as military aid have been offered to countries in return for their support of American foreign or economic policies.

In the Arab - Israeli conflict, the positive non-zero sum strategy model was temporarily made operative in the Emir Feisal-Chaim Weizman agreement at the 1919 Paris Peace Conference. The heads of both the Zionist and the Pan-Arab national movements pledged to support each other's aspirations. Both leaders hoped this coordination would advance their respective demands for territorial control over parts of the Middle East which the Ottoman Turks had been forced to evacuate. The agreement became moot when the British and French governments failed to live up to what the Pan Arab movement believed to be its entitlement to sovereignty over most of the territories liberated from Ottoman rule. They felt betrayed when French troops drove King Feisal and his supporter from Damascus, where he had been installed as ruler of an independent state.

In 1953, President Eisenhower appointed Mr. Eric Johnston as a special U.S. Ambassador to defuse Middle East tensions. He was able to broker a *de facto* water allocation agreement between technical personnel representing Jordan, Israel, Egypt and Syria. The Arab negotiators acquiesced to Israel's plan to pump Jordan River water into its National Water Carrier to provide drinking water to some of its cities and to irrigate the arid

Negev (southern) region. Jordan was permitted to build the Ghor Canal to irrigate large areas of land and also to supply some of its hill district towns, including Amman, its capital. U.S. aid funds helped to finance both projects. The conflicting parties, officially at war with each other, temporarily agreed to cease interference with each other's water diversion projects.

Another case of "Win-Win" negotiations is the effort during the last few years of environmental non-governmental organizations in Israel, Jordan and Egypt to cooperate under auspices of the Environmental Law Institute in Washington, D.C. They have agreed to pool information to facilitate a joint approach to protect the sensitive Red Sea ecosystem against pollution, as well as to encourage trade, employment, and tourism. A major first step to implement this positive non-zero sum solution that leaves all sides better off was taken when King Hussein and Prime Minister Rabin (with the encouragement of Hosni Mubarrak, the Egyptian Prime Minister) agreed to open an available road linking Egypt with Jordan via Israel and to permit two-way tourist and commercial traffic between the neighboring towns of Elath and Aquaba.

The terms of the PLO-Israeli interim agreement for peaceful co-existence concluded in September, 1993 to establish a Palestinian Interim Self Government Authority also include many a "win-win" provision, including a commitment to cooperation for enhancement of the available supply of water. While the details were not spelled out, they are likely to include proposals discussed at the 1993 conference between Palestinian and Israeli water specialists in Zurich, Switzerland. The participants informally identified a number of "win-win" water management suggestions which were to be further explored. A few are listed below:

- Recharge of ground water by collecting winter rains that now flow unused into the Mediterranean or the Dead Sea.
- Desalination of brackish water in the coastal regions of Gaza, Israel, Egypt, and Jordan to increase the region-wide supply of fresh water.
- Purchase of fresh water as a market commodity from any nearby country with a surplus.

The "Win - Win" approach was even more pronounced in the Peace Treaty between the State of Israel and the Hashemite Kingdom of Jordan signed on October 26th 1994. For instance, Israel agreed to acknowledge Jordanian sovereignty over near borderline wells, which Israeli farmers had drilled on Jordanian territory during their 46 years of being officially at war. But Jordan agreed to rent them back to leave the operations of the Israeli farmers undisturbed. Under Article IV of their treaty, the formerly hostile countries adopted the following "Win - Win" regulations regarding their operation and maintenance:

- "Operation and maintenance of the wells and systems on Jordanian territory that supply Israel with water, and the electricity supply shall be Jordan's responsibility. The operation and maintenance of these wells will be contracted at Israel's expense to authorities or companies selected by Israel."
- "Jordan will guarantee easy unhindered access to personnel and equipment to such wells and systems for operation and maintenance. This subject will be further detailed in the agreements to be signed between Jordan and the authorities or companies selected by Israel."

Such cooperative arrangements were made within the context of a bi-national "Joint Water Committee" to develop plans "for purposes of increasing water supplies and improving water use efficiency, within the context of bilateral, regional or international cooperation". The two countries also agreed to minor rectification of their common border under circumstances to "eliminating or mitigating effects on their respective economies" and "giving each other enough time to make the necessary adjustments."

Option 5: Conflict or Threats of Violence

Breakdown of peaceful negotiations can be followed by a stalemate or acts of conflict, including armed struggle. An intransigent stakeholder or one unwilling to accept a concession or sharing a transboundary water resource might seek a militarily-imposed outcome. Force can bring about the desired outcome, but it also involves the risk of incurring losses, including a catastrophic defeat. The infra-structure of both Iraq and Kuwait were terribly damaged after Saddam Hussein’s troops invaded Kuwait because its ruler was not willing to make the concessions which Iraq had demanded.

Armed struggle dominated the Arab - Israeli negotiating process for over 45 years. All Arab regimes, including the Palestine Liberation Organization, were dictatorships which could impose their view that Israel could be destroyed. For instance, in 1964, a little more than a decade after the abovementioned Eric Johnston formula for the peaceful (and "Win - Win") distribution of the waters of the Jordan-Yarmouk rivershed had been informally adopted by the area's stakeholders, the Arab League nations met in Cairo to cancel this arrangement. Under strong Syrian pressure, the assembled heads of Arab states agreed to finance the diversion of Banias Springs, which originate in Syria about 1 kilometer above the Israel border. This source of about 25 percent of the upper Jordan River water would have been diverted in a new channel to empty into the Yarmouk River, far from Israel's control.

The Banias diversion project never got off the ground. Israeli artillery destroyed the earth moving equipment shortly after it had been brought into the area. Intermittent artillery fire in the area continued until June 1967, when the authoritarian rulers of the Arab nations believed they had acquired the power to wipe Israel off the map. This was a gross miscalculation.

During the Six Day War, Syria was evicted by Israeli troops from its position in the Golan Heights overlooking the Jordan Valley. The upper Jordan and its sources came exclusively under almost total Israeli sovereignty, with the exception of the headwaters of the Hasbani River in Lebanon. Israel occupied the West Bank and Gaza strip, giving it control of their underground aquifer. Israel also doubled its presence on the northern shore of the Yarmouk River to 12 instead of 6 kilometers. This boundary change made Jordan's use of the Yarmouk River waters from the southern shore more dependent on Israeli goodwill.

The defeat of the combined Arab League forces in the Six Day War produced no change in their long range "eternal war" strategy. Their leaders knew that the Soviet Union would provide new weapons and might intervene militarily in the future if Israeli troops moved towards one of their capitals to impose a peace agreement. The heads of the Arab League States at conference at Khartoum in 1967 felt sufficiently confident of these geopolitical realities to refuse to accept UN Security Council Resolution 242, replacing it

with an Arab-Moslem nation commitment that there be "no negotiation, no recognition, no peace" with Israel.

The stalemate ended in 1991. The invasion of Kuwait by Iraq divided the previously unified international policy of the Arab League states. The most powerful and wealthiest Arab countries invited the United States to lead them in evicting the Iraqis by armed force, which was achieved in a 100-hour electronic war. But most Palestinian leaders had sided with Iraq's brutal dictator. One result is that Palestinians were perceived as a potentially subversive element in the more conservative Arab countries, which had provided them with financial and political support. Saudi Arabia, the Gulf states, and Kuwait ousted most persons of Palestinian origin, including some who had played a major and constructive role in the modernization and in the economic and social development of these oil-rich nations. In the United States and the West, Palestinians are carefully watched by security services because of a belief that significant Palestinian and Moslem fundamentalist factions are committed to terrorism. Armed struggle has done very little to limit Israeli primacy over the shared water resources of the region.

Option 6: No Action and Opportunity Costs of Delay

Failure to act is a common negotiation option. When agreement is impossible, both sides decide to maintain the status quo. But this strategy often exacts heavy opportunity costs. For instance, delay in the establishment of a regional water management authority in the Ganges / Brahmaputra / Meghna Rivers in South Asia (the Basin) continues to subject the population of the region to periodic natural disasters. Unlike the Indus basin, which India divided with Pakistan in 1960, the Ganges-Brahmaputra/Meghna system is not regulated by a treaty. Nepal, Bhutan, India, and China are upper riparians. India is a middle riparian and both Bangladesh and India are lower riparians. About 450 million people, or an eighth of mankind, live within the Basin where annual monsoons create huge rivers as they strike against the Himalayan mountains.

The drop in altitude from mountains to sea creates an hydroelectric energy potential of in the order of 200,000 megawatts. But the water and power potential has yet to be tapped. Monsoon rains drain destructively as floods carrying run-off and erosion of topsoil to the sea, while in the dry season the farmers clamor for water. Rapid population and livestock growth contributes to the destruction of forests and fields, leading to ecological degradation. Over-pumping of ground water during the dry season leads to desertification, and receding spring levels in the hills.

Water resource specialists in Nepal, India, and Bangladesh believe that sustainable water resource development is possible and necessary in the Basin. Each country recognizes that alone it cannot fully control its rivers or resolve its water problems. Each agrees that political understanding must precede a definition of mutual interest, which in turn can be followed by technical planning.

So why the delay in coordinated water management? One reason is the inadequate financial and technical resources, which constrain what the co-riparians can do. Nepal and Bangladesh are among the world's ten most impoverished countries, and half of India's 844 million people live in poverty. Political sensitivities also have been important factors limiting the scope and pace of water resource cooperation. Beyond the human constraints, the magnitude of nature's challenges - floods, droughts, erosion, siltation, and other physical processes - overshadows each nation's unilateral efforts.

As George Verghese has written: "The Himalaya, a geologically young and fragile mountain chain, is being skinned alive. A vicious cycle of erosion, floods, loss of productivity, and migration threatens the future of scores of millions. This damage to the Himalaya is a common danger, because what happens in Nepal or India affects Bangladesh."

Disparities in size, economic strength, and states of development of the countries within the Ganges-Brahmaputra basin have not made cooperation in water resource development any easier. There are risks in partnership for the newly-emerging and very poor nations with the nearby Indian giant. Development problems in Nepal and Bhutan are accentuated by the fact that these nations are landlocked. Bangladesh can do very little to control its water resources since over 90 percent of its stream flow originate in India. India's rich northeast is also nearly land-locked, but for a narrow corridor between Nepal and Bangladesh which links this region with the Indian heartland. There is no escape from either of these geopolitical or hydrological realities. Historically, the Brahmaputra and Barak were the natural arteries of communication from Assam, Manipur and Tripura to Calcutta, with Chittagong providing an outlet to the sea. Partition of British India after World War II severed these symbiotic links. They have yet to be meaningfully restored.

Conclusions

The choice of negotiation technique is always controversial and subject to political considerations. Preferences depend on the balance of power among transboundary stakeholders and the perceived cost of concessions to each of the stakeholders. The more powerful and wealthy can resort to the creation of facts with minimal risks of counteraction by weaker and impoverished neighbors. They also can afford to make gestures of friendship through "Win-Lose" agreements in the interest of enhancing regional stability. "Win-Win" solutions may not always be sufficient when naturally limited water resources are under consideration.

In the retrospect of history since 1948, the armed struggle strategy has turned out to be counter-productive when it was applied by the Arab League to impose a significant reduction of the previously available fresh water resources on Israel. During the 1967, 1973 and 1982 wars, Israel was able to gain control of most of the disputed sources of fresh water to which Arab countries were upper riparians.

A significant proportion of the Palestinian nation and of Pan Arab countries have begun to rely on peaceful negotiation strategies, in response to which the World Bank and donor nations have pledged to provide investment capital for regional projects. If the Madrid peace process continues to reduce past hostilities, significant improvements to the regional infra-structure and level of prosperity of the former belligerents are likely to occur. But such a shift in favor of negotiated solutions to transnational problems continues to be opposed by Muslim fundamentalists like the Hamas and Hezbollah factions and a number of Islamic nations ruled by uncompromising military cliques, including Syria, Libya, Sudan, Iraq and Iran.

There also are the parliamentary opposition parties in Israel which take the position that the withdrawal of some Israeli settlements in the Golan Heights, the West Bank or Gaza strip in return for a full peace treaty and the end of economic boycott of Israel by most Arab League nations would be dangerous Zero-sum game concession. They believe that

future Arab leaders would abrogate their peace treaties - "a mere piece of paper", once Israel had completed such proposed territorial withdrawals.

Negotiated agreements are inherently unstable unless it remains in the interest of all parties to adhere to them. Long range security guarantees are not easily engineered, not in transnational conflict, not in labor negotiations or in business contracts. But even with this in-built element of uncertainty, conflict resolution by negotiation is generally preferred to reliance on war and armed struggle or on ignoring the problem - where negative consequences tend to be immediate and devastating. There are risks in every negotiated solution between sovereign powers whose rulers can abrogate agreements made by their predecessors, but such risks are widely believed to be reduced if the agreements are made under the active sponsorship of the major world powers, as is the case in the current Madrid negotiation process between Israel and its Arab neighbors.

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