

Role of Comparative Risk Assessment in Addressing Environmental Security in the Middle East

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During the 21st century, environmental challenges are likely to intensify across the world and possibly lead to violent conflicts. Strategies for conflict avoidance will be incomplete unless they recognize, discuss, and mitigate regional environmental stress factors. Comparative risk assessment (CRA) is one of the most critical tools emerging to influence modern environmental policies and is increasingly used to create a common language to help reconcile competing interests in development and environmental disputes around the world. This article considers the environmental challenges facing the Middle East in light of their “transboundary” nature and proposes CRA as a framework for setting environmental priorities and reducing tensions in the region.

KEY WORDS: Comparative risk assessment; decision making; environmental security; Middle East; risk assessment

1. INTRODUCTION

The concept of “environmental security” has emerged as one basis for understanding international conflicts.⁽¹⁻³⁾ An increasing number of scholars has concluded that large-scale, human-induced environmental pressures may seriously affect national and international security. While political and military disputes in the Middle East have thus far largely focused on disagreements over territory and sovereignty, environmental disputes have exacerbated tensions. For example, water scarcity and, to a lesser extent, water quality issues produced violent skirmishes between Israel and Syria during the 1960s.^(4,5)

The countries of the Southern and Eastern Mediterranean are located in ecologically sensitive

semi-arid and arid regions of the world. These countries are particularly sensitive to rapid changes in the demand for water and food and may also be among the first victims of global climate change.⁽⁶⁾ Addressing environmental threats and their resulting impact on security and emergency preparedness requires not only a grasp of the underlying environmental/ecological data and their associated risks but also the ability to incorporate the unique political and ecological challenges of the Mediterranean region. While clearly an ambitious undertaking, a comparative risk assessment (CRA) may well have the potential to help shape a common set of environmental priorities and cooperative ventures for a Middle East seeking a way out of half a century of violence but lacking a shared vision or agenda. Comparative risk analysis offers an objective framework for diffusing issues that may grow more explosive in the future or constitute an obstacle to general diplomatic progress and conciliation in the region.

Surprisingly, official publications about the environmental situation in Egypt, Jordan, Israel, and Palestine share many of the same findings:

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the environment is polluted, land is degrading, biodiversity is in retreat, and conditions are quickly growing worse.⁽⁷⁻⁹⁾ Mobile and stationary sources of air and groundwater pollution, pesticides, hazardous materials, drinking water treatment, and soil contamination are frequently measured at concentrations above European and U.S. standards, and anecdotal evidence exists of high incidences of environmentally related cancers and general morbidity. For instance, Palestinian experts have reported that waterborne disease (in particular, diarrheal illness) is the second greatest source of mortality and morbidity in over 50% of the Palestinian population: the children. Nitrate concentrations in Gaza Strip (and Israeli) drinking water are higher on average than WHO and EPA 10 ppm drinking water standards, with some wells exceeding these levels by an order of magnitude.^(10,11) In Israel, a recent health evaluation by the Ministry of Environment and the U.S. EPA estimates as many as 1,400 premature fatalities a year in two coastal cities alone from exposure to fine particles and other pollutants. Over 300 air pollution violations of NO_x are measured annually in Tel Aviv; Haifa's PM10 levels, on average, exceed national ambient standards.⁽¹²⁾ Beyond their intrinsic severity, such Palestinian and Israeli exposures can be traced to transboundary environmental dynamics that could be a future source of conflicts and unresolved issues.

Consultation with experts in the relevant countries at a recent regional workshop about CRA suggests that, with the exception of very incipient efforts to quantify risks from urban air pollution in Egypt⁽¹³⁾ and Israel,⁽¹²⁾ no systematic effort has been made to characterize, contrast, and rank risk levels posed by the range of environmental problems. The result is muddled by inconsistent national and regional environmental policies with priorities frequently decided according to politicians' whims, organizational leaders' fund-raising inclinations, media frenzies, and other irrational factors. The same is true of the sundry transboundary regional environmental initiatives funded or considered for funding by international donors. Mosquito control and marine parks compete with clean energy development and inter-sea canal systems for funding.⁽¹⁴⁻¹⁷⁾ A common ecological or environmental health agenda appears as improbable now as at the start of the Middle East peace process a decade ago. Yet, as negotiations supplant the recent spate of violence, the international community will inevitably invest considerable resources and efforts to promote a common regional developmental program.

A range of partisan interests, many of which may run counter to overall regional environmental objectives, drives each country's development agenda. Examples of such interests include: official Israeli government support for extensive highway projects—literally “cementing” shared transportation interests with its neighbors—which may increase mobile sources of air pollution emissions;⁽¹⁸⁾ Jordanian support for an industrial zone whose ecological impacts were assailed by environmentalists on both sides of the Jordan River;^(19,20) and Palestinian support for a port in Gaza considered detrimental to coastal preservation efforts.⁽²¹⁾ Even the so-called “Red-Dead Canal,” a purportedly environmentally driven project to replenish the retreating waters of the Dead Sea, is increasingly challenged by the environmental community.⁽²²⁾ Yet, in the region, no formal structures or systematic procedures exist to evaluate environment and health impacts on peace-related projects.

2. COMPARATIVE RISK ASSESSMENT AND ITS APPLICATION IN THE MIDDLE EAST

The emerging practice of risk analysis increasingly influences modern environmental policies. Initially used to set standards, risk assessment has become even more broadly used for decision making with the discovery that only 18% of the U.S. EPA's budget was devoted to high-risk areas.⁽²³⁾ Developed in the United States to facilitate decision making when various activities compete for limited resources, CRA and its applications are extremely flexible. Comparative risk studies can be applied in very specific situations to rank risks associated with specific pollutants or other environmental and ecological assaults as well as in a participatory process to incorporate public and stakeholder views into decision making and promote better understanding of environmental issues.⁽²⁴⁻²⁷⁾

CRA has become an increasingly accepted global research tool, helping to characterize regional and national environmental profiles and priorities. Over 30 U.S. states⁽²⁸⁾ and Native American tribes have used comparative risk methodology to establish environmental priorities. From England and New Zealand to cities like Bangkok, Quito, Lima, Cairo, and Ahmedabad, many industrial, developing, and transition economies have used risk assessment to set priorities, recommending targeted actions such as reducing lead in gasoline, managing traffic situations, and decreasing levels of particulate matter.⁽²⁹⁾

The “World Bank Pollution Prevention and Abatement Handbook” specifically recommends comparative risk research.⁽²⁹⁾ Developing countries use CRA to efficiently allocate limited resources. For example, the Silesia project (Czech Republic and Poland) involved a quantitative “screening” risk assessment that compares risks of regional environmental problems to develop quantitative assessments for air, surface and ground water, food, hazardous waste, and occupational health.

In the Middle East, Egypt is the only country in which a comparative risk initiative has been undertaken, and this was within the narrow geographical context of Cairo, 10 years ago. In the Cairo study, a team of U.S. experts worked with local scientists for 6 weeks to consider the following problems according to their severity.⁽¹³⁾

- Airborne particulate matter
- Lead (all media)
- Microbiological diseases
- Microbiological contamination of food
- Ozone
- Other gaseous air pollutants (SO₂, CO)
- Indoor air pollution
- Drinking water (microbes, chemicals)
- Solid and hazardous wastes
- Toxic air pollutants
- Other water pathways (fish, irrigation)

Based only on existing data, the study was forced to rely primarily on qualitative estimates of estimated incidence. Even so, the report was able to identify “higher” priority issues such as air and lead particulates as well as food and water contamination from microorganisms.

Scientists, policy analysts, and even nongovernmental organization (NGO) advocates are becoming more aware of the merits of systematic, analytical exercises that evaluate and compare risks associated with chronic environmental deterioration.^(30,31) In many countries, a research initiative whose ultimate goal is the clear ranking of different levels of risk for a range of environmental problems would constitute an invaluable tool for government and nongovernment organizations as well as research institutes themselves. Based on rigorous and objective procedures, it would allow these institutions to set their own priorities and allocate appropriate resources to the most pressing environmental problems: as the title of a famous comparative risk anthology suggests, they could begin to treat “Worst Things First.”⁽³²⁾ Regionally, the results would not only provide compelling data

to support Arab-Israeli cooperation directed at the most acute environmental problems, but also clearly establish a common regional agenda for action.

An observer might justifiably ask why the first comprehensive, international CRA should be in a region as turbulent as the Middle East. Beyond the inherent methodological conundrums and conventional problems that arise in comparative risk exercises (availability of data sets, contrasting health goals, calibrating experts, etc.), the additional political complications of historic mistrust and ongoing terror and military occupation might well sabotage implementation. To this, a few responses can be offered:

1. The inherent severity of the environmental problems and resource scarcity in the Middle East mandate increasing efficiency. Understanding comparative risk is crucial for all sides, who remain publicly committed to better use of limited resources to protect the environment and can be a necessary instrument to that end.
2. Fragile environmental conditions themselves and the absence of any available margin of error in key media, such as water contamination, make the context more compelling than in North America or Europe where baseline risk numbers are far lower.
3. International funding has thus far proven sufficiently attractive to the parties involved to inspire them to pursue joint environmental initiatives in spite of other pressures.
4. In contrast to the political community, environmental communities in the area have remained in constant contact during the past 3 years of violence thanks to ongoing support for transboundary research, personal contacts established during earlier more optimistic negotiations, and, of course, the miracles of the Internet. Experience based on dozens of joint Israeli-Arab research projects has led to a culture of scientific cooperation in the environmental field between professionals and academics that may be more collegial than the dynamics and suspicions among stakeholders in past successful international comparative risk initiatives.
5. Considerable funds have been directed toward environmental protection projects and, presumably, environmental infrastructures will be part of the aid packages accompanying any final political settlements. Given present

levels of confusion, even imperfect comparative analysis will improve the ultimate impacts of such investments.

6. As environmental cooperation in the region is inevitable, given the prevalence of shared watersheds, air sheds, wildlife, etc., the familiarity and empathy that such projects would engender may be the most important benefits of all. A transboundary comparative risk project forces all stakeholders to consider a full portfolio of risks in the region studied and to compare their own challenges with those of their neighbors. Even risk-trained professionals find it difficult to make a serious commitment to other countries' environmental problems, let alone acknowledge that they may be more severe and deserving of attention than their own. A comparative risk project can expedite this intellectual transition.

3. ESTABLISHING A REGIONAL ENVIRONMENTAL AGENDA USING COMPARATIVE RISK ASSESSMENT

The present, national focus of CRA around the world can be attributed to any number of logistical, political, and cultural obstacles: language barriers, incompatible data sets, political enmity, and diverging visions of "quality of life." Yet, from a strictly ecological, hydrological, or public perspective, the transboundary nature of environmental problems will undermine a narrow, domestic CRA approach in the individual countries of the Middle East, especially in the area surrounding Israel and its neighbors; and may lead to skewed overall results from the vantage point of public health. The cumulative impact of an environmental hazard, when the populations of three or four nations are totaled, may warrant higher ranking than impact on a single country. A domestic CRA effort contrasts the relative severity of different health risks but does not consider risk-management strategies dependent on interventions from neighboring countries. Data may not be available to enable an individual country to fully characterize its risk portfolio for many years; Palestinian environmental researchers have claimed that their efforts are stymied by data available only in Hebrew or not at all.

The historic issue of Palestinian data may raise questions among some observers about the availability of Palestinian stakeholders to fully participate in such an initiative. It should not. While technically not yet an independent state, the Palestinian Authority has run an independent environmental bureaucracy

for almost a decade; Palestinian universities have boasted environmental science and engineering departments for many years. So many Palestinian NGOs exist that an umbrella group coordinates them; the West Bank and Gaza Strip have received considerable attention and been the subject of extensive environmental monitoring in reports prepared by various countries and international agencies; and, as part of their aid packages, the World Bank, the Dutch government, and a variety of other nations have supported research initiatives to characterize environmental conditions.^(33,34) Hence, even if none of the studies were prepared using risk levels as the salient indicator, a surprisingly good database for the Palestine area exists today. Finally, the very small size of the lands involved—including Israel, which is roughly the size of New Jersey—make such analysis somewhat easier.

A risk assessment considering river contamination and restoration would be instructive. Within Israel and the Palestinian Authority, 15 streams cross the Palestinian/Israeli border. Twelve of these are major streams flowing west year-round toward the Mediterranean Sea. All originate in watersheds in the Palestinian Authority (or lands that will eventually be outside Israeli jurisdiction) and then flow into Israel. Three major streams originating in Israel and crossing into the Palestinian Authority flow east to the Dead Sea or Jordan River. Part of each of these streams can be defined as highly polluted, posing a health hazard to users, endangering flora and fauna, and leaving them unfit for recreational or consumptive uses.⁽³⁵⁾ Their restoration must be considered in a multilateral context.

4. COMPARATIVE RISK ASSESSMENT IN THE MIDDLE EAST: SPECIFIC OBJECTIVES AND ADVANTAGES

What, then, should be the objectives of a regional CRA in the "peace region" of the Middle East involving transboundary pollution in Jordan, Israel, Palestine, and Egypt (and possibly Lebanon and Syria)? Several objectives stand out:

1. Collecting a wide variety of data on critical environmental exposures in the participating countries.
2. Identifying gaps in existing knowledge that must be filled in to fully evaluate environmental and ecological risks, and conducting preliminary monitoring to address them.

3. Characterizing associated environmental risks in each country and impacts on human health, ecological conditions, and socioeconomic factors.
4. Comparing relative risks within each country to better establish coherent public policy priorities.
5. Comparing risks within each country with those associated with transboundary environmental exposures to help define a coherent regional environmental agenda and rank the relative severity of a variety of environmental problems.
6. Designing a "risk-management" strategy to reduce these risks with an eye toward directing international investment in projects that produce optimal results.

A CRA in the Middle East could generate several types of benefits. A regional CRA producing a baseline CRA in the Middle East will, for the first time, allow scientists and decision makers to fully consider their common environmental challenges based on empirical, systematic analysis. Such a project would also constitute the first-ever international, comprehensive, transboundary CRA. Notwithstanding diverse cultural perspectives and national interests, other countries facing a range of transboundary environmental challenges could use resulting protocol and management models to evaluate and rank many multilateral environmental problems. The tense political background would make such methodological frameworks advantageous: the high sensitivity required by such an exercise and need to formally recognize tensions and create procedures that leave all sides with a sense of "fair play" may be particularly valuable in less-explosive international contexts that ignore such factors.

The potential contribution of such a scientific initiative to the fragile fabric of cooperation in this volatile region cannot be underestimated. A CRA project would offer a unique opportunity for scientists in the "peace region" to convene in an apolitical framework and undertake a comprehensive evaluation of their common problems with the goal of forging a shared environmental regulatory and research agenda. Egyptian, Palestinian, Jordanian, and Israeli researchers and graduate students who would ultimately work together on the project could continue to serve as a cadre of risk assessors in their own countries to formulate a rational public health and environmental agenda.

Comparative risk studies are certainly not the only means for defusing tensions and addressing environmental security problems.⁽³⁶⁾ Economists have their own methodological notions about solutions, especially when problems are linked to resource scarcity.⁽³⁷⁻³⁹⁾ Yet, conventional methods of negotiations addressing environmental issues tend to be asystematic, amorphous, and often unsuccessful at producing meaningful progress.⁽⁴⁰⁻⁴²⁾ Certainly, in the Middle East, environmental agreements have been characterized as somewhat arbitrary and lacking in rigorous environmental vision, much less successfully designed to actually reduce risk levels.^(43,44)

Environment and human health have not benefited appreciably from peace accords among Israel, Egypt, and Jordan,⁽⁷⁻⁹⁾ not surprising in that the goal of negotiators was often to reach symbolic agreement on these matters without any pressure from heads of state to achieve real progress in eliminating health or ecological hazards. Comparative risk offers a new approach, presumably one providing a more objective, focused basis for agreements and a greater opportunity to break through barriers: NGO participants may find they have more in common with their counterparts in "hostile" nations than with their own governments.

The Society for Risk Analysis has much to offer Mediterranean countries. A regional CRA study need not "reinvent the wheel" and can rely heavily on comparative risk protocols and risk-assessment methods developed in the United States and Europe^(25,26,45) as well as recommendations and recent experience reported by the World Bank⁽²⁹⁾ and U.S. EPA.⁽²⁷⁾ An SRA-supported workshop, "Comparative Risk Assessment and Environmental Decision Making," organized by Drs. Linkov and Ramadan in 2002 was the first step in this process.^(46,47) An effort is now underway to establish a regional chapter of the Society for Risk Analysis, with another workshop, "The Role of Risk Assessment in Environmental Security and Emergency Preparedness in the Mediterranean Region," planned for 2004-2005.

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