

Rising Temperatures, Rising Tensions

Climate change and the risk of violent conflict in the Middle East

Oli Brown and Alec Crawford

iisd International Institute for Sustainable Development / Institut international du développement durable



Palestinian man standing above a village on the outskirts of Bethlehem, in the West Bank. Source: iStockphoto



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Summary

The Levant—made up of Syria, Lebanon, Israel, Jordan and the occupied Palestinian territory (oPt)—has experienced more than 60 years of bloody conflict. Despite some brief interludes of optimism in the early 1990s, the history of conflict and mistrust between and within the countries, the ongoing occupation of Palestinian territory and the Golan Heights, and periodic hostilities mean that a durable peace in the region remains a distant prospect.

Against this backdrop, the mounting scientific evidence confirming the speed and scope of climate change seems, at most, a secondary concern to be addressed once other problems have been resolved. However, climate change—by redrawing the maps of water availability, food security, disease prevalence, population distribution and coastal boundaries—may hold serious implications for regional security.

Hotter, drier and less predictable

In a region already considered the world's most water-scarce and where, in many places, demand for water already outstrips supply, climate models are predicting a hotter, drier and less predictable climate. Higher temperatures and less rainfall will reduce the flow of rivers and streams, slow the rate at which aquifers recharge, progressively raise sea levels and make the entire region more arid.

These changes will have a series of effects, particularly for agriculture and water management. Under moderate temperature increases, for example, some analysts anticipate that the Euphrates River could shrink by 30 per cent and the Jordan River by 80 per cent by the end of the century.

This report, prepared by an independent Canadian environment and development research institute, seeks to present a neutral analysis of the security threat of climate change in the region over the next 40 years (to 2050), drawn from consultations and extensive interviews with experts from across the region's political and ethnic divides. The report presents the following conclusions:

- **The legacy of conflict undermines the ability of the region to adapt to climate change**

More than 60 years of conflict have taken a heavy toll on the region's ability to cope with climate change.

Sometimes this is tangible, manifested through the physical destruction of infrastructure, the loss of forest and water resources, the expense of maintaining large standing armies, or a lack of statehood, which complicates participation in international processes. At other times, it

is more insidious, revealing itself through a steady reduction in economic opportunity, an unwillingness to cooperate over water and energy projects, or the emergence of an 'island mentality' approach to resources.

This legacy greatly complicates efforts to collaborate over shared resources, to invest in more efficient water and energy use, to share new ways to adapt to climate change and to pursue truly multilateral action on climate change. Ultimately, it means that climate change likely presents an even more serious challenge than it would otherwise.

- **Climate change poses some very real security concerns**

Security is a constant concern in the Levant. However, the security threat of climate change is rarely discussed. Public and political attention tends to focus, understandably, on the many immediate dangers that trouble the region. This is beginning to change with the growing realization among regional analysts that climate change may present a real threat to security. The Levant already struggles with scarce water, food insecurity and erratic economic growth, each of which could be exacerbated by climate change. This report argues that climate change present a security threat in six distinct ways:

THREAT 1 – Climate change may increase competition for scarce water resources, complicating peace agreements: The impact of increased water scarcity as a result of climate change may make some existing peace agreements untenable, could complicate the negotiation of new peace agreements and could be a factor in national instability.

THREAT 2 – Climate change may intensify food insecurity, thereby raising the stakes for the return or retention of occupied land: Climate change could further decrease local agricultural productivity and make global food prices increasingly volatile, further politicizing the issue of food security. As populations and demand for food grow, this could further increase domestic pressure for Syria or the Palestinian Authority to secure the return of occupied lands and shift the strategic calculations in Israel on whether to withdraw from these areas.

THREAT 3 – Climate change may hinder economic growth, thereby worsening poverty and social instability: The combination of higher unemployment, reduced government revenue and increased demands on services, as an indirect result of climate change, could weaken governments' ability to provide services and create jobs, in turn potentially creating the conditions for extremism of all kinds, increased crime and social breakdown.

THREAT 4 – Climate change may lead to destabilizing forced migration and increased tensions over existing refugee populations: Shifting rainfall patterns, spreading desertification and falling agricultural productivity are likely to undermine rural livelihoods, worsen job prospects in rural areas and accelerate migration to urban areas. This could strain services in cities and lead to increased resentment of existing refugee populations.

THREAT 5 – Perceptions of resources shrinking as a result of climate change could increase the militarization of strategic natural resources: The allocations of resources (falling in absolute terms as a result of climate change and in relative terms as a result of population growth and increased demand) could become increasingly tense. Control over them may become perceived as an increasingly key dimension of national security, and resource scarcity could be a pretext for their greater militarization.

THREAT 6 – Inaction on climate change may lead to growing resentment and distrust of the West (and Israel) by Arab nations: If the international community is unable to come to a deal in Copenhagen that shows a commitment to mitigate the effects of climate change and to help poorer countries adapt to its impacts, it may reinforce the already pervasive sense in the Arab world that many countries in West (including Israel) are not acting as 'good global citizens'.

- **There are ways to pursue peace and sustainable development despite a changing climate**

The evolving impacts of climate change will shape the progress and prospects of the region. It is possible that climate change, a shared threat like no other, may encourage countries to work together despite their political and ideological differences, to tackle the common challenge. In so doing climate change could become a vehicle for rapprochement and peacebuilding.

However, given the current political landscape, which continues to be characterized by distrust, hostility and a lack of cooperation, climate change is more likely to become an obstacle to peace. Indeed it could aggravate tensions in a number of serious ways. But it is important not to overstate the case. Climate change will not be the only factor in future conflict, just as is not the only factor in the changing availability of water resources. Ultimately the wider political situation will determine whether scarce resources or forced migration becomes a cause of conflict or a reason for better cooperation.

The challenges of climate change and security in the Middle East are daunting. Action on climate change will, of course, only ever be a small part of the whole picture. Nevertheless, there is much that national governments and authorities, civil society and the international community can do to combat climate change, adapt to its impacts, manage increasingly scarce resources and foster greater cooperation on their shared resources. With this in mind, the report concludes with four broad strategies for action:

Strategy 1 Fostering a culture of conservation

Raising awareness on climate change may help to encourage a culture of conservation and efficiency in the region. There are many gains to be had in terms of water and energy efficiency that could help offset the combined impact of growing demand, population growth and climate change.

Strategy 2 Adapting to the impacts of climate change

Adaptation projects could address core tensions through better water management, agricultural development and disaster prevention. Community-level adaptation projects can help, in a modest way, to share skills and technologies and to build understanding between previously divided communities.

Strategy 3 Avoiding dangerous climate change

Quite apart from the stand-alone rationale to reduce emissions of greenhouse gases, if Israel (as the largest per capita emitter in the Levant) and, to a lesser extent, the Arab nations were to take on commitments to tackle climate change it would be a powerful demonstration of global citizenship and solidarity. Moreover, increasing energy efficiency and moving to renewable sources of energy generation would have important economic benefits for this energy-poor region.

Strategy 4 Enabling regional cooperation and international engagement

Clearly, the challenge of climate change is one that is beyond the capacity of any one country to tackle. Its shared security implications will be best resolved through cooperation: to reduce greenhouse gas emissions; to develop comprehensive international strategies to manage forced migration; to share the most innovative approaches for adaptation; and to manage shared resources.

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Box 1: About this report

This report was written by the International Institute for Sustainable Development (IISD), an independent environment and development policy research institute, headquartered in Canada with offices in New York and Geneva. IISD has been researching various aspects of climate change and environmental security for the past 15 years.¹ IISD is not a campaigning organization, nor does it have political links in the region.

The study involved two research trips (October 2008 and January–February 2009) augmented by desk-based research. IISD's neutral position enabled the authors to hold consultations and conduct interviews on several sides of the region's many political divides; a total of eight informal and frank consultations and dozens of interviews were held in Amman, Beirut, Damascus, Jerusalem, Ramallah and Tel Aviv. More than 100 experts, academics, donor representatives, environmental activists and political figures participated.

The project was funded by the Danish Ministry of Foreign Affairs. However, this report should in no way be seen as a reflection of the position of the government of Denmark, the participants in the consultations or the reviewers. All errors of commission or omission are the responsibility of the authors who welcome comments and feedback (obrown@iisd.org; acrawford@iisd.org).

¹See more of IISD's work on climate change at www.iisd.org/climate and on environmental security at www.iisd.org/security/es

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Acronyms and abbreviations

CDM	Clean Development Mechanism
ENP	European Neighbourhood Policy
FAO	United Nations Food and Agriculture Organisation
FOEME	Friends of the Earth, Middle East
GCM	general circulation model
GDP	gross domestic product
GEF	Global Environment Facility
GWN	Good Water Neighbours Project
ICG	International Crisis Group
IDF	Israel Defence Forces
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
MENAREC	Middle East and North Africa Renewable Energy Conference
mcm	million cubic metres
oPt	occupied Palestinian territory
RCM	regional circulation model
UNEP	United Nations Environment Programme
UNFPA	United Nations Population Fund
UNFCCC	United Nations Framework Convention on Climate Change
UNRWA	United Nations Relief and Works Agency
WHO	World Health Organization

Minefields in the Levant. Source: iStockphoto



Section 1:

The Security Challenge of Climate Change

1.1 Introduction

The Levant—made up of Syria, Lebanon, Israel, Jordan and the occupied Palestinian territory (oPt)—has experienced more than 60 years of bloody conflict; civil war, foreign invasions, intifadas as well as suicide bombings, rocket attacks and reprisals beyond count. There have been some brief interludes of optimism, such as the 1993 Oslo Peace Accords and the 1994 Jordan-Israel Peace Treaty, where it seemed possible that one of the world's most intractable conflicts could be resolved. But the history of conflict and mistrust between and within the countries, the ongoing occupation of Palestinian territory and the Golan Heights, and periodic hostilities mean that a durable peace in the region remains a distant prospect.

Against this backdrop, the mounting scientific evidence confirming the speed and scope of climate change seems, at most, a secondary concern in the region to be addressed once other environmental and security problems have been resolved. However, climate change—by redrawing the maps of water availability, food security, disease prevalence, population distribution and coastal boundaries—may hold serious implications for regional security.²

The security threat posed by climate change has caught the world's attention; sparking numerous conferences, multiple reports and an April 2007 debate by the UN Security Council.³ From its humble beginnings as an environmental issue of peripheral concern, climate change has arrived in the realm of high politics. The Middle East is frequently presented as one of the regions that is most likely to erupt into conflict as a result of

climate change—a function of its existing water stress and history of conflict.⁴ But much of the discussion on the security threat of climate change has been either too abstract or too deterministic (assuming that climate change will automatically lead to conflict) to be of much use to policy-makers.

This report, prepared by an independent environment and development research institute, seeks to present a neutral analysis of the security threat of climate change in the region over the next 40 years (to 2050), drawn from consultations and extensive interviews with experts from across the region's political and ethnic divides (see Box 1).⁵

1.2 Predictions of climate change in the Levant

In a region already considered the world's most water-scarce⁶, where demand for water already outstrips supply in many places, climate models are broadly predicting a hotter, drier and less predictable climate.⁷

Relatively low rainfall each year means that the Levant is made up a mix of arid and semi-arid zones. The wettest months are between October and April, while the summer sees the rains nearly disappear; Amman, Jerusalem and Damascus receive—on average—less than a millimetre of rain from June through September. Temperatures fluctuate dramatically in an average year. In summer, they can climb to 37°C in Damascus, while snow is not unheard of in winter.

Because of the region's diverse topography (ranging from the snow-capped mountains of Lebanon to the world's lowest point on the shores of the Dead Sea), the climate is not uniform: differing vegetative cover and extremes in altitude create a number of distinct microclimates in this relatively small area. The variations are stark: for example, 43 per cent more rain falls in Beirut in January than falls in Damascus in an average year.⁸

By the middle of the century, the region is expected to get hotter across all seasons: models predict an increase of between 2.5 to 3.7°C in summer, and 2.0 to 3.1°C in

winter (see Map 2).⁹ Higher temperatures will change where rain falls, how much of it falls and how often it falls. It will also result in a global increase in **sea levels**, which are expected to rise between 0.1m and 0.3m by 2050.¹⁰ The region will get **drier**, with significant rainfall declines in the wet season outweighing slight increases during the drier summer months.¹¹ Meanwhile, the **distribution** of rains will change (moving to the north). The weather is also likely to become more **unpredictable**, with the region experiencing an increase in extreme rainfall events.¹²

Map 1: The Levant



Source: Blue Marble Next Generation, Global Modis derived image

¹See more of IISD's work on climate change at www.iisd.org/climate and on environmental security at www.iisd.org/security/es

²See for example Schubert et al., 200; CNA Corporation, 2007.

³Brown, O., Hammill, A. & McLeman, R., 2007.

⁴Freimuth, L., Bromberg, G., Mehyar, M., & Khateeb, N. Al, 2007.

⁵The report focuses on relations between and within the countries of the Levant (by which we mean Israel, Jordan, Lebanon, the oPt and Syria). We realize that the region is not a 'closed system' and the research and consultations also considered interactions with other countries beyond the immediate Levant including Egypt, Iraq, Saudi Arabia and Turkey.

⁶The Middle East and North Africa (MENA) sub-region is the world's most water scarce.

⁷General Circulation Models (GCMs) and Regional Circulation Models (RCMs) are computer-driven weather forecasting tools used to understand current climate conditions and project future climate change. These models are frequently based on the emissions scenarios laid out by the IPCC's Special Report on Emissions Scenarios (SRES, 2000); using these future emissions scenarios, they model the expected climate based on the physical, chemical and biological properties of the climate system, along with its interactions and feedback processes (IPCC, 2007). The models are

improving, but are not yet perfect. Regional climatic changes are more uncertain than global mean values, as regional climates are more heavily influenced by atmospheric and ocean circulation patterns (WGBU, 2007). In addition, many unknowns remain in the science of complex climate systems. Feedback loops, both positive and negative, add another level of uncertainty. For example, meteorologists do not yet fully understand the extent to which higher atmospheric CO₂ levels will increase vegetative cover through a process known as carbon fertilization, which might in turn affect the hydrological cycle.

⁸WMO, 2009, www.worldweather.org/, accessed March 2009

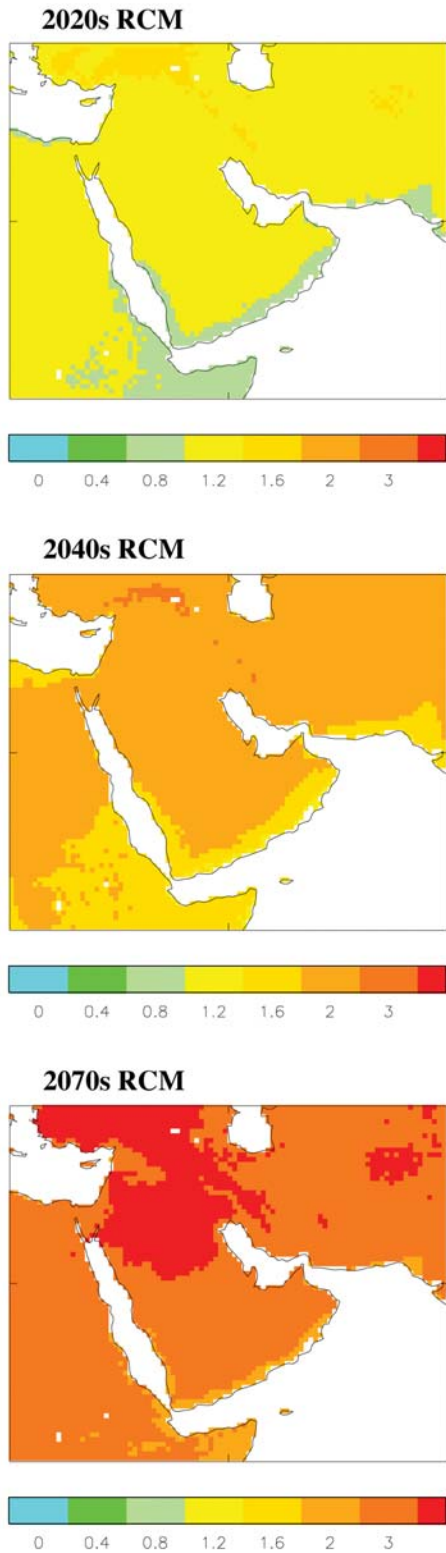
⁹Cruz, R.V., Harasawa, H., Lal, M. & Wu, S., 2007.

¹⁰Cruz et al., 2007. The sea level rise witnessed in the last century was for the first time observed to be driven primarily by human-induced warming. An increased infusion of meltwater into the world's oceans and a thermal expansion caused by warming sea temperatures both contributed to the rise, which since 1993 has averaged 3mm per year (with variations) (WBGU, 2007).

¹¹Cruz, R.V., Harasawa, H., Lal, M. & Wu, S., (2007) predict nine per cent decreases in the rainy season vs 29 per cent increases in the dry season.

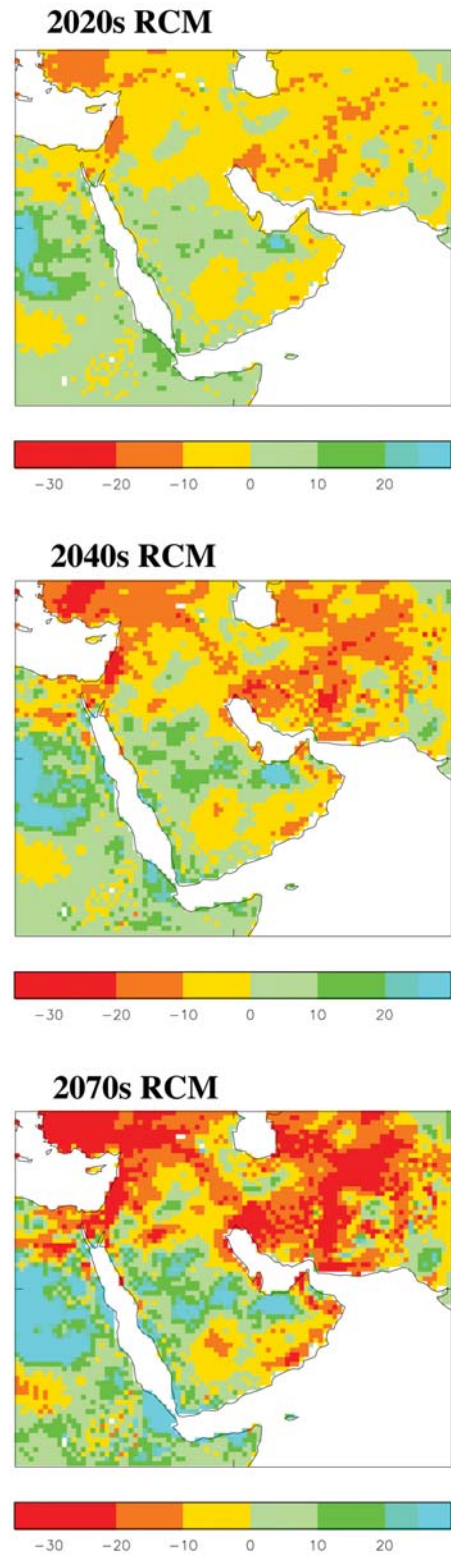
¹²Alpert, P., Krichak, S.O., Shafir, H., Haim, D. & Osetinsky, I, 2008.

Map 2: Regional Climate Model projections of average temperature changes (°C) across the Gulf region for the 2020s, 2040s and 2070s, relative to the 1990s¹³



Source: Hemming D, Betts R, & Ryall D. 2007.

Map 3: Regional Climate Model projections of precipitation changes (%) across the Gulf region for 2020s, 2040s, and 2070s, relative to the 1990s



Source: Hemming D, Betts R, & Ryall D. 2007.

These changes will have a series of consequences in the region, particularly for agriculture, river flows and the rate at which groundwater aquifers can replenish. Higher temperatures and less rainfall will **reduce the flow of rivers and streams**. Under moderate temperature increases, the Euphrates River would carry 30 per cent less water than it currently does and the Jordan River could shrink by up to 80 per cent by the end of the century.¹⁴ Israel's own National Communication warned that water supply may 'severely decrease' falling by 60 per cent of 2000 levels by 2100.¹⁵ More intense rain storms, erosion and runoff may mean that **aquifers do not recharge at their natural rates**.¹⁶ Increased runoff could also affect dams, which may fail due to flooding or suffer a decrease in storage capacity due to increased sedimentation.¹⁷

Declines in the amount of precipitation (both snowfall and rain) will reduce the overall availability of water, but factors such as the **timing** of the first rains (which affects when crops are planted) and the **frequency** of rains within the growing season, are equally important to the success of farming and the recharge of the groundwater aquifers.¹⁸ Longer growing seasons may initially be to the advantage of local farmers (who could export early season crops to Europe), but these will be outweighed by increased evaporation rates, reduced soil moisture, increased soil degradation and spreading desertification. These will combine to **reduce agricultural yields and increase the demand for water** for irrigation. A rise in temperatures of just 1.5°C is expected to shift the Mediterranean climate zones (or biomes) 300–500km northwards, making the region as a whole more arid.¹⁹

Sea level rise will impact infrastructure, increase coastal erosion and **increase saltwater intrusion** into coastal aquifers; of particular concern is the Gazan coastal aquifer, upon which 1.5 million Palestinians depend for their drinking water. This aquifer is particularly vulnerable to seawater intrusion as a result over-pumping (both inside and outside of Gaza), which has lowered the water table.²⁰ Any added salinity from a rise in sea level will only further compromise the **water quality** in the aquifer, which is already very polluted.²¹

The risk of surprises

Climate change is typically discussed in terms of a linear progression of rising temperatures, falling rainfall and so on. However, as temperatures warm beyond 2–3°C, there is a growing risk that the climate system will pass critical thresholds. Positive feedback loops could then trigger runaway changes to our climate—so called '**non-linear events**' or 'climate surprises', such as the melting of the Greenland ice sheet or large-scale die back of the Amazon rainforest.²²

Though many of the potential non-linear events may seem outside of the immediate concern of the region, all carry significant global consequences. Should the Greenland ice sheet melt, for example, global sea levels could rise by seven metres with serious consequences for the entire region (every country of which has a densely populated coastline).²³

1.3 Research aims

The scientific community is in broad agreement on the causes of climate change. However, the debate on the security implications of climate change has tended to focus on creating a security 'hook' to invest the climate change negotiations with a greater sense of urgency. This has not really translated into a more detailed understanding of how climate change might interact with existing vulnerabilities to exacerbate tensions and trigger conflict. Consequently, this research project focused on four questions:

1. What are the economic, environmental and social implications of climate change in the region?
2. Does the legacy of conflict in the Levant undermine the region's ability to adapt to these challenges?
3. To what extent will the impacts of climate change in the Levant affect the likelihood or longevity of violent conflict?
4. Could the shared challenge of climate change somehow lead to new ways to address present and potential tensions?

The terms 'conflict' and 'security' are, of course, loaded and loose concepts. They are open to multiple interpretations and definitions. In this report, 'violent conflict' is understood as a dispute or incompatibility between two opposing sides where the capacity to mediate incompatible interests breaks down and those interests are pursued through violence, either at a community, national or international level. For purposes of brevity, the word 'conflict' is frequently used as shorthand for 'violent conflict'.

Likewise, there are different scales of security (from individual to global) and many different ideas on what constitutes security. At the risk of generalization, in some Levantine Arab circles, 'security' is often understood as 'security from Israel', while 'stability' might be understood (possibly negatively) as the perpetuation of an existing regime. On the other hand the Israeli concept of security seems to revolve around security from acts of terrorism and concerns over the actions of hostile neighbours while 'stability' requires continued Israeli military predominance.²⁴ In this report, we use the term 'security', to describe a condition where the challenges and internal pressures that all countries experience can be managed in a non-violent way.

The content of the report is spread over the following three sections. Section 2 assesses the impact of the legacy of conflict in the region on the countries' ability to adapt to the growing impacts of climate change. Section 3 presents six areas of concern that we believe arise as a result of climate change. Section 4 concludes with an analysis of possible responses from within and outside the region, investigating whether tackling climate change might give rise to better cooperation and discussing what the international community and countries in the Levant might do to help prevent climate-induced conflicts.

¹³Hemming D, Betts R, & Ryall D. 2007.

¹⁴Mrasek, V., 2008.

¹⁵Ministry of Environment (Israel), 2007.

¹⁶Bou-Zeid, E. & M. El-Fadel, 2002.

¹⁷Bou-Zeid, E. & M. El-Fadel, 2002.

¹⁸Simms, A., 2005.

¹⁹Freimuth, L, G. Bromberg, M. Mehyar & Al Khateeb, N. 2007.

²⁰Interviews with the Palestinian Water Authority & Qahman, K.A. & Zhou, Y, 2001.

²¹Fifty per cent of Gaza municipal wells sampled in 1998/1999 failed the WHO drinking water acceptable level for chlorides. This was confirmed in 2000 (UNEP, 2003).

²²WBGU, 2007.

²³WBGU, 2007.

²⁴From various consultations and interviews.

A scene from the heavily bombed southern suburbs of Beirut in 2006. Source: UNEP, 2007



Section 2: The Legacy of Conflict

More than 60 years of conflict have taken a heavy toll on the region. Tens of thousands of lives have been lost; roads, wells and power grids have been destroyed; businesses, schools and hospitals have closed. Farmers have been cut off from their fields. Products cannot reach market, and trade between some countries is impossible. Vast sums of money have been spent on weapons and armies that might otherwise have been spent on clinics or schools.

The legacy of conflict has, in turn, compromised the ability of communities and countries to cope with climate change. Sometimes this is tangible, manifested through the physical destruction of infrastructure, the expense of maintaining large standing armies, or a lack of statehood, which complicates participation in international processes. At other times it is more insidious, revealing itself through a steady reduction in economic opportunity, an unwillingness to cooperate over water and energy projects, or the emergence of a zero-sum approach to resources.

For the countries of the Levant, as for other regions, the disruptive impact of climate change will be determined by their vulnerability to climate change and their ability to adapt to its impacts. This vulnerability—of human, physical and financial capital—is a function of the character, scale and rate of climate change to which they are exposed, and how well they are able to adapt to the impacts.²⁵ As Ayman Khalil, Director of the Arab Institute

of Security Studies, notes, “Conflict worsens the impact of climate change, and reduces [our] adaptive capacity.”²⁶

‘Adaptation’ is a broad concept that implies a process of adjustment to survive and, ideally, thrive in the face of change.²⁷ The ‘adaptive capacity’ of communities in the Levant trying to deal with climate change will be determined by a host of factors: access to capital and information; managerial skills; the effectiveness of institutions and infrastructure and so on. At a national level it will also be determined by how countries can manage population growth, their environmental resources (such as its water and energy sources) and their economies.²⁸

The Middle East is the world’s youngest region.²⁹ Nearly half of the population of the oPt and more than a third of the Syrian population are under 15 years of age, with other states not far behind. This young population is both a cause and a consequence of **rapid population growth**. The combined population of the Levant will grow to 71 million by 2050, from 42 million in 2008.³⁰ Syria’s population is predicted to increase by nearly 70 per cent (nearly 15 million people) over the next four decades, while it is estimated that the population of the oPt will more than double over the same period (for UN figures on population growth, see Graph 1). Population growth is fundamentally changing the facts on the ground, increasing the demand for water, food and shelter and adding thousands of new job seekers every year.

²⁵Parry M.L. et. al., 2007.

²⁶Consultation in Amman, 12 January 2009.

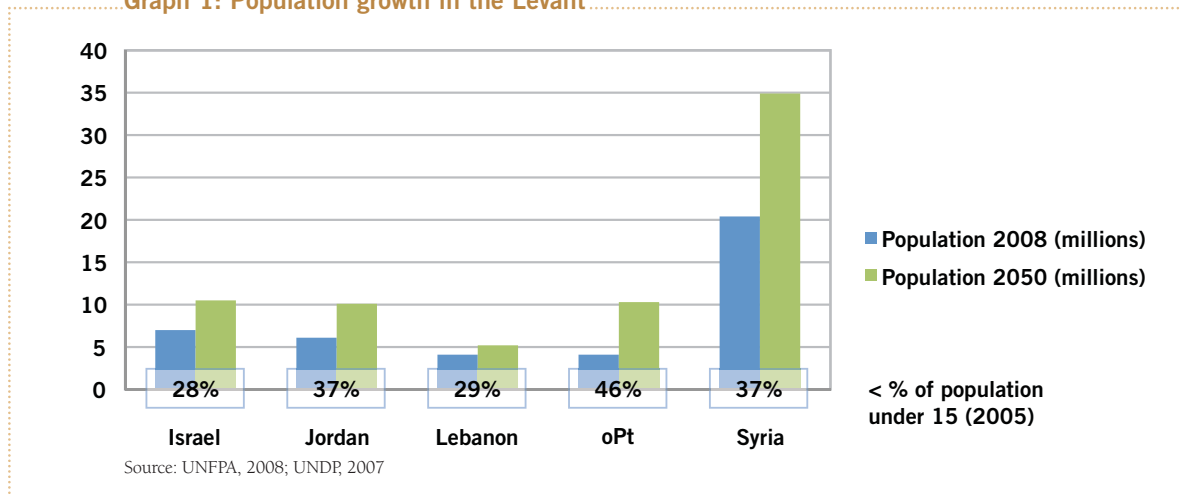
²⁷Parry, M.L. et al., 2007.

²⁸Smit, B. & J. Wandel, 2006.

²⁹Dhillon, N., 2008.

³⁰UNFPA, 2008.

Graph 1: Population growth in the Levant



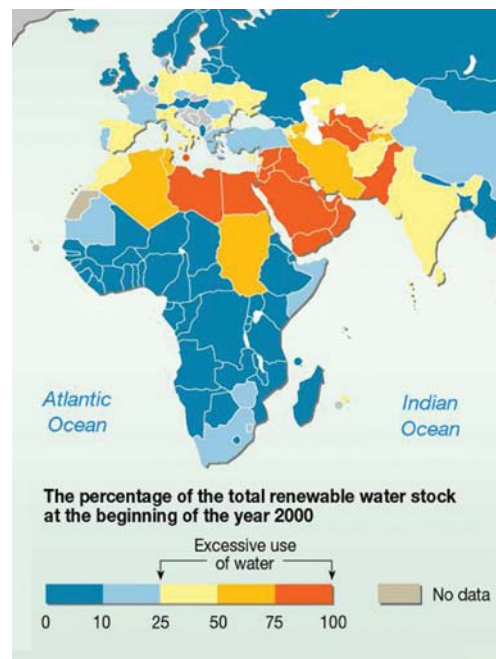
In addition, climate change is happening within an **environmental context of existing water shortages, deforestation, overgrazing, recurrent drought and poor surface management of cultivated lands.**³¹ These impacts have already served to increase runoff rates and soil erosion, worsen water quality and slow the rates at which the groundwater aquifers can recharge.

Jordan, Israel and the oPt all fall well below the accepted threshold for **water scarcity** of 1,000 cubic metres per person per year: according to the IPCC, Israel has available natural renewable water resources of 265 m³, Jordan 169 m³ and the oPt 90 m³.³² Only Lebanon, with 1,220 m³, and Syria, with 1,541 m³, fall above the water scarcity threshold. Countries already are using a very high percentage of their available water resources. The Middle East as a whole withdraws the world's highest proportion of its total renewable water resources (75 per cent; South Asia comes a distant second with 25 per cent).³³ The relative lack of rainfall means there is a heavy reliance on groundwater³⁴ and manufactured (i.e., desalinated) water.

The impacts of climate change on the water sector, in combination with increased demand and population growth, will compound problems of water scarcity. Already there are serious water shortages in the oPt and Jordan.³⁶ By 2020 it is predicted that water shortages will be the norm, with water requirements projected to be 130 per cent of renewable supplies for Israelis, 120 per cent for Jordanians and 150 per cent for Palestinians.³⁷ In Lebanon water demand is expected to outstrip supply by 2015.³⁸ This means that without large-scale desalination,

improved water efficiency or possibly international transfers of water, the region's renewable water resources will be unable to provide for everyone's needs, let alone their aspirations.

Map 4: Withdrawal of total renewable water resources in 2000



Source: (UNEP/GRID Arendal, 2007)³⁵

³¹Karam, F., 2002.

³²Boko et al., 2007.

³³Raphaeli N., 2007.

³⁴The former Jordanian Minister of Water, Munther Haddadin, estimates that Jordan is using its groundwater at around 200 per cent of its sustainable capacity (Haddadin, 2002).

³⁵Map is drawn from data in UNEP Grid-Arendal using data from FAO and Aquastat, Philippe Rekacewicz <http://www.grida.no/publications/vg/water2/page/3241.aspx> accessed 14 April 2009.

³⁶Munther Haddadin, the former Minister of Water in Jordan estimates (2002) that groundwater resources are being used at 200 per cent of their sustainable capacity. Meanwhile Syria is currently using 95 per cent or more of its annual renewable freshwater supply, and is expected to experience shortages in 2020 (Cruz, R.V., Harasawa, H., Lal, M. & Wu, S. 2007).

³⁷Wolf, A.T., 2000.

³⁸Baaklini, S., 2005.

The situation is complicated by two factors. First, a high proportion of water in the region is **transboundary**. The Jordan River, which is a crucial water source for Israel, the oPt and Jordan, is supplied by tributaries in Lebanon and Syria.³⁹ More than four-fifths of the renewable water resources in Syria originate from outside of its borders.⁴⁰ Jordan shares the Azraq Aquifer with Syria and the Disi Aquifer with Saudi Arabia.⁴¹

While surface waters have historically attracted the most political attention, groundwater supplies much of the drinking water for Jordanians, Palestinians and Israelis.⁴² Israel and the West Bank of the oPt share the Mountain Aquifer's three basins: the Western mountain, the Eastern mountain and the Northeastern basins.⁴³ Eighty per cent of the natural replenishment of the

aquifer takes place within the West Bank, but as the natural flow of the groundwater is from the West Bank towards Israel, the majority of the water withdrawal takes place in Israeli territory (in addition to the water use by settler communities inside the West Bank of the oPt).⁴⁴ The Coastal Aquifer, which follows the coastal plain of Israel and Gaza, is also shared, but is the only source of drinking water for the 1.5 million people of Gaza (see Map 5). **Water quality** in the Coastal Aquifer is already abysmal; well samples in Gaza indicate that intensive agriculture and inadequate waste management have contaminated the groundwater supply with levels of chlorides, nitrates, pesticides, bacteria and raw sewage far above those considered safe by the World Health Organization (WHO).⁴⁵

Map 5: The shared aquifers of Israel and the oPt



Source: ArcWorld, UN Cartographic Section, DCW, Palestinian Environmental Quality Authority

Second, the region is not only water scarce but also **poor in energy**, which constrains its ability to secure more water. Acquiring and distributing water is energy intensive: in the West Bank town of Nablus, an estimated 80 per cent of the cost of water is associated with pumping water from an aquifer 700–900 metres underground.⁴⁶ Wealthy and oil-rich countries can—to some degree—defer their water shortages with desalination ('manufacturing' water) or importing food (buying 'virtual' water). These options are less available in much of the Levant. They are very expensive and can swap a dependence on transboundary water for a dependence on transboundary energy supplies—unpalatable options for the regions' strategists.⁴⁷

³⁹It should be noted that the oPt currently has no access to the waters of the Jordan River.

⁴⁰Raphaeli, N., 2007.

⁴¹Freimuth, L., Bromberg, G., Mehyar, M., & Khateeb, N. Al, 2007.

⁴²Freimuth, L., Bromberg, G., Mehyar, M., & Khateeb, N. Al, 2007. Palestinians, for example, have no access to the Jordan River.

⁴³Weinthal, E. & Marei, A. 2002.

⁴⁴Weinthal, E. & Marei, A. 2002. According to Morel, A. & Morel, B. (2006), Israeli settlers in the West Bank constitute 10 per cent of the population but consume 30 per cent of the water resources.

⁴⁵Fifty per cent of Gaza municipal wells sampled in 1998/1999 failed the WHO drinking water acceptable level for chlorides. This was confirmed in 2000. (UNEP, 2003)

⁴⁶Consultation in Ramallah, 2 February 2009.

⁴⁷According to Clive Lipchin (2008), Israel's "reliance on desalination leaves Israel's water management policy a captive of the availability of energy and its fluctuating price."

Damage from a Hizbollah rocket in Haifa, Israel, 2006.

Source: iStockphoto



2.1 The physical impacts of conflict leaves communities more vulnerable to climate change

Violent conflict is not only devastating in human terms, but has also undermined the long-term prospects for much of the region; it is, in effect, “development in reverse.”⁴⁸ Communities need functioning roads, power grids and waterworks to sustain their livelihoods and maintain connections to markets and the outside world.

The repeated destruction of **infrastructure** sets back economic development, serves as a disincentive to invest in the region’s more conflict-prone areas (such as Gaza and southern Lebanon), and reconstruction uses up funds that could otherwise be spent on domestic needs like health and education.

During the Lebanese Civil War, for example, the economy collapsed, unemployment rose steeply, the Lebanese pound depreciated dramatically, deficits rose and GDP declined. Closures of the airport and seaports, combined with Syrian trade restrictions, halted international trade and commerce. The economic decline was reflected in Lebanon’s infrastructure.⁴⁹ Nearly two decades after the Civil War ended, construction crews are still rebuilding central Beirut and the scars of the Civil War remain visible throughout the city. The Israel-Lebanon war of 2006 was another serious blow: destroying or badly damaging an estimated 30,000 housing units in southern Beirut; contaminating the coastal line with a 15,000 tonnes of oil; and leaving an estimated 100,000 unexploded cluster bombs across southern Lebanon.⁵⁰

Beyond the direct damage to infrastructure, conflict in the Levant has **limited or severed entire communities’ access** to land. The physical legacies of conflict such as unexploded cluster bombs in southern Lebanon as well as the restrictions, checkpoints and curfews that the Israeli government has imposed on Palestinians have substantially constrained many communities’ access to land. This, in turn, severely limits economic opportunities for those communities –in southern Lebanon, in the Golan and in the West Bank – that rely on agriculture for their livelihoods.⁵¹

⁴⁸Collier, P., 2003.

⁴⁹Even before the end of the conflict in 1991 the World Bank estimated in 1987 that it would take US\$12 billion to rebuild the country (Roberts, J., 1987).

⁵⁰UNEP, 2007; In the final days of the 2006 conflict between Israel and Hizbollah, the IDF dropped over a million cluster bombs on southern Lebanon. According to the UN, approximately 100,000 of these cluster bombs did not detonate on impact; instead, they litter the ground as dangerous unexploded ordnances that have continued to take the lives of peacekeepers and farmers long after the conflict finished. Because of the bombs, a quarter of a million Lebanese were unable to return to their homes, businesses and farmland, impacting livelihoods and incomes across the area. The effects were long-lasting; according to Jan Egeland, Under-Secretary-General for Humanitarian Affairs at the time, the cluster bombs “will be with us

for many, many months, possibly for years.” (See UN News Centre, 2006, ‘Israel’s ‘immoral use of cluster bombs in Lebanon poses major threat – UN aid chief’ <http://www.un.org/apps/news/story.asp?NewsID=19670&Cr=Leban&Cr1> accessed March 2009)

⁵¹We recognise that there is much dispute over where the responsibility lies for the restrictions on Palestinians. The Israeli government argues that it is the responsibility of those committing terrorist acts (without which there would be no need for the separation barrier, checkpoints and so on), The Palestinian Authority argues that Israel is committing unjustified collective punishment on the Palestinian people as a whole. We make no judgement here but merely note that it has a negative impact on the ability of communities in the oPt (and Israel) to adapt to climate change.

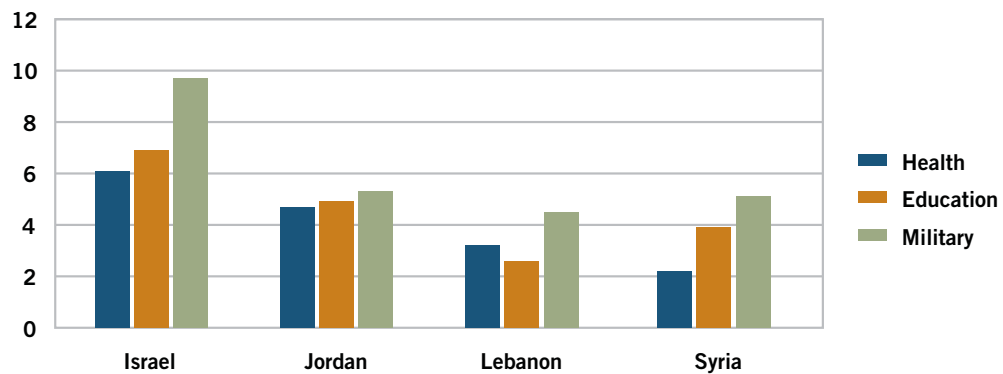
The same is true in terms of **access to water**, which is very unevenly distributed among the people of the Levant. The issue of Palestinian access to water is one of the most bitterly contested aspects of this. An April 2009 report by the World Bank points out that Israelis have access to four times more water than Palestinians, for which it blames poor Palestinian management and Israeli restrictions which have, “impaired Palestinian access to water resources, infrastructure development and utility operations.”⁵² Following the 1967 war Israel declared all water resources under military administration. Subsequently, Israel restricted Palestinian water use and exploitation by limiting the number of wells that Palestinians could dig: between 1967 and 1994 the Israeli authorities issued only approximately 38 permits for drilling new wells or to replace existing wells.⁵³ Academics Erika Weinthal and Amer Marei argue that, in short, “Israeli water policy in the occupied territories has limited the development of self-supply of water to the Palestinians while demand has increased.”⁵⁴

Meanwhile, tens of thousands of olive trees have been uprooted as part of the Israel Defence Forces’ (IDF) policy of collective reprisals on the families of those involved in terrorist attacks against Israeli citizens and to

construct the separation barrier in the West Bank.⁵⁵ Restricted mobility in the West Bank has meant that transportation costs have increased and markets and processing facilities have become difficult to access. Blocked access to the Gaza Strip meant that, during the 2006/2007 harvest year, a surplus of 7,000 metric tonnes of olive oil, worth US\$28 million, could not reach the Gaza market from the West Bank. As export options are minimal, the oil went unsold, and as a result prices fell below cost and farmers were heavily affected.⁵⁶

Conflict has also restricted the **labour migration** that used to be a mainstay of the Palestinian economy.⁵⁸ Prior to 1994, 200,000 Palestinians travelled into Israel each day for work and their wages supported around one million people.⁵⁹ Since the second intifada of 2001, this daily migration into the wealthiest economy in the region is now severely restricted. This obviously deeply affects those who have lost their jobs but also undermines economic growth and wealth creation in both Israel (which has lost a cheap source of labour) and the oPt (which has lost an important source of revenue). The broader conflict means that regional labour mobility is minimal. Israelis and Syrians, for example, cannot set foot inside each other’s countries, let alone work in them.⁶⁰

Graph 2: Health, education and military spending in the Levant as % of GDP



Source: UNDP, 2007; Syrian education spending - nationmaster.com

⁵²World Bank, 2009.

⁵³Weinthal, E. & Marei, A., 2002.

⁵⁴Weinthal, E. & Marei, A., 2002.

⁵⁵UN OCHA, 2009: A report by Hilmi, S. & Isaac, J. (2007) argued that the Separation Barrier has cut off access to 29 wells and 32 springs.

⁵⁶UN OCHA, 2009.

⁵⁷ICJ, 2004, ‘Legal Consequences of the Construction of a Wall in the Occupied Palestinian Territory’ <http://www.icj-cij.org/docket/index.php?pr=71&rp1=3&rp2=1&case=131&rp3=6> accessed 14 April 2009

⁵⁸UNCTAD, 2005.

⁵⁹Wise, T. & Jumal, N., 2009. Neither Peace Nor Security in the West Bank and Gaza Strip Grassroots International Delegation and Program Trip Report <http://www.umassd.edu/specialprograms/mideastaffairs/grassroots.htm> accessed March 2009

⁶⁰The same is true for Lebanese in Israel and vice versa. Likewise, Palestinians have great difficulties travelling between the Gaza Strip and the West Bank, and to Jordan.

The separation barrier constructed by Israel in the West Bank of the oPt has been described by the International Court of Justice as “contrary to international law.”⁵⁷ Source: iStockphoto



Finally, there are tremendous **opportunity costs** associated with high levels of military spending. Israel spends nearly 10 per cent of its GDP on the military each year, the highest rate among developed countries, and maintains a standing army of 168,000 soldiers. Syria’s army is nearly double that size, at 308,000 soldiers. In each of the countries (excluding the oPt), military expenditures exceed those for health and education, and armed forces personnel make up more than five per cent of the total labour force. This represents a massive diversion of resources, effort and energy, a portion of which—in a context of a wider peace settlement—could be used otherwise (including adaptation projects). As Iyad Abu Rdeineh of the Friends of the Earth Middle East (FOEME) noted, “If even a small percentage of the money spent on weapons in the region was spent on fighting climate change and desertification, we could make great strides. But the current conflict situation will not allow this diversion of funds to happen.”⁶¹

2.2 Distrust reduces cooperation and makes adapting to climate change more difficult and expensive

A second legacy of the conflict—less tangible but equally profound—is the **deep distrust** that exists between (and often within) the countries of the region. This distrust reduces the scope for collaboration and impedes adaptation by reducing the ability of governments to plan and cooperate; promoting a zero-sum approach to resources; limiting and politicizing the data available on natural resources; reducing the incentives to invest in more efficient agriculture, energy and water systems; and encouraging expensive, national-level solutions to ‘manufacture’ water.

Perhaps most obviously, **governments are unwilling to work with each other** to find innovative solutions to their regional water and energy problems. As with regional trade, countries that do not cooperate with each

⁶¹Consultation in Ramallah, 2 February 2009.

other cannot maximize their comparative advantages. Lebanon will not sell its excess water to Israel, and as a result, the freshwater of the Litani River flows unused into the Mediterranean during the wet season. Israel cannot sell its desalination technology and expertise, and Jordan cannot take advantage of its sparsely populated desert and plentiful sunshine to export solar energy throughout the region. This applies within nations as well: the ongoing struggle for power and influence between Hamas and Fatah, and the oPt's lack of geographic continuity, undermine the scope for Palestinian action on climate change.

The countries of the Levant are unwilling to rely on each other for key resources. A history of competition and conflict over natural resources has meant an 'island mentality' has emerged where the division of resources is seen as zero-sum game (to be secured at the expense of one's neighbours) and the mutual benefits of co-management are rarely considered.⁶² Resources are still seen as national assets, rather than being considered in the regional context.⁶³ As Odeh Al-Jayyousi, the Regional Director of the International Union for Conservation of Nature, puts it, the legacy of conflict means that countries are unwilling to recognize that "we all live downstream."⁶⁴

This 'island mentality' extends to the transparency of data of all kinds, but particularly on natural resources and, in Lebanon, population distribution. There have been some important collaborative scientific efforts, such as the GLOWA project—a multi-year research project that since 2001 has involved scientists from Israel, Jordan, the Palestinian Authority and Germany in

interdisciplinary projects to assess the vulnerability of water resources in the Jordan River basin.⁶⁵ However, at the state level, **countries rarely collaborate on research**, and do not always **share national data** within the region (or even within administrations).⁶⁶ In Lebanon, for example, no official census has been taken since 1932 for fear that common knowledge of the population breakdown of the country's 18 sects—which dictates the make-up of the government—could upset the fragile political balance in the country. This means that there is no solid baseline from which to judge change, and that across the region perceptions, rather than facts, tend to influence politics.

Because of the prevailing atmosphere of distrust, no country is willing to cede control over its resources to a neighbour: for example, a 'water grid' among the countries in the region is unthinkable at present.⁶⁷ This encourages **expensive, national-level projects** to resolve supply problems. Jordan has peaceful relations with Israel, a world leader in desalination technologies. Yet rather than investing in water efficiency, conservation programs, transport networks or the purchase of desalinated water from Israel, Jordan is moving forward on two projects aimed at increasing domestic supplies of water, which critics argue will impose considerable financial and environmental costs: the construction of the Disi Aquifer pipeline (see Box 2), and the Red-Dead Canal.⁶⁸ Meanwhile, Israel is in the process of building a series of desalination plants along its Mediterranean coast, including the world's largest at Ashkelon.⁶⁹

⁶²It also results in a different approach to solving water problems. Erika Weinthal and Amer Marei (2002) argue that there are very different perceptions of water use, "The Palestinians tend to focus on the issue of water rights and compensation for water used by the Israelis during the occupation and the Israelis instead tend to minimize issues related to international law and emphasize technical solutions for future water sharing."

⁶³Lipchin, C., 2008.

⁶⁴Consultation in Amman, 12 January 2009.

⁶⁵See http://www.glowa.org/eng/jordan_eng/jordan_eng.php

⁶⁶Claussen, J., Daibes, F., Halwani, J., Hansen, S., Salameh, E. & Weinthal, E. (2004) describe the difficulties experienced in trying to facilitate dialogue between national actors who are unwilling to share key data.

⁶⁷Although Israel and Jordan do indeed exchange water in summer and winter as a part of the 1994 peace treaty.

⁶⁸A canal between the Red and Dead Seas (the Red Sea, Dead Sea Water Conveyance Project) in Jordan is currently the focus of a World Bank-funded feasibility study (the terms of which were agreed by Jordan, Israel and the Palestinian Authority in 2005). The proposed canal would pump water from the Red Sea coast near Aqaba north to the Dead Sea. After hydropower generation and desalination the remaining water would be allowed to flow into the Dead Sea, in theory slowly reversing the precipitous decline in its level over the last few decades.

⁶⁹The desalination plant at Ashkelon can produce 110 mcm of fresh water per year or roughly five to six per cent of Israeli national demand. The plant is part of a 'Desalination Master Plan' released in 2000, which establishes the objective of producing 750 mcm of desalinated water annually by 2020. (See <http://www.water-technology.net/projects/israel/>).

Box 2: The Disi Aquifer Pipeline

Jordan is among the world's driest countries. Ninety-two per cent of its surface is considered desert, and its cities, increasing in size, are now struggling to meet their demand for water. With low yearly rainfall and transboundary rivers increasingly diverted to meet demands from agriculture and industry, cities like Amman, Zarqa and Irbid are now drawing their water from a variety of different sources, and from further afield.

The Disi Aquifer is one such source. The Disi is a shared water resource lying underneath the Jordan-Saudi Arabia border. It is a non-renewable aquifer that has traditionally been used to supply water to private farms in the area, as well as to the southern coastal city of Aqaba. Saudi Arabia also uses water from the Disi.

In 2007, the Jordanian government announced plans to fast-track further development of the Disi Aquifer to address water shortages in Amman. Water, it was envisaged, would flow through a pipeline from the aquifer to the capital, transporting 100 mcm of freshwater per year a distance of 325 kilometres.⁷⁰ The pipeline is designed to relieve immediate scarcity, not solve longer-term freshwater shortages in Amman; as a non-renewable water resource, the Disi Aquifer would be depleted within 50 years if its water was pumped to the capital—and if agriculture was stopped immediately.⁷¹ The project would also incur significant costs (US\$600 million), including infrastructure investments and energy requirements.

In February 2009, the French Development Agency and the French private sector announced a loan of US\$200 million to provide capital to support the project's development. Unfortunately, in the same month, research findings suggested that the groundwater being extracted by Jordan from the aquifer contained levels of radioactivity 20 times those considered safe for drinking water. This water could be made safe for consumption, but only with significant additional expense.⁷²

Finding pastureland for livestock will become increasing hard in Syria as precipitation decreases. Source: iStockphoto



⁷⁰Mahsaneh, D., 2007.

⁷¹Mahsaneh, D., 2007.

⁷²Vengosh, A. et al., 2009.

Likewise, the political environment inherently discourages more **efficient water management**. Because of the shared nature of water resources, if one nation conserves transboundary water, the common perception is that any gains will have to be shared with rival neighbours. As Danish Ambassador to Jordan Thomas Lund-Sørensen puts it, one of the fundamental issues in the region is that, “there are limited water resources, and these you have to share with people you don’t trust.”⁷³

For Palestinians, for example, the ongoing occupation has means that a first priority is to establish their rights over water: there is less political willingness to tackle water and energy efficiency out of a concern that greater water efficiency might lower their allocations in the event of an eventual water deal with Israel.⁷⁴ Meanwhile, Professor Tony Allan of Kings’ College London describes how drought in the late 1980s encouraged an effective environmental campaign that reduced Israel’s water use from two billion cubic metres per year in 1986 to 1.6 billion cubic metres by 1992, showing that Israel could run its economy efficiently using 20 per cent less water. However, heavy rains in 1993 reduced the immediate pressure on water resources and the prospect of a permanent peace deal coming out of the Oslo talks encouraged greater use of water which would set the ‘benchmark’ for future allocations: water use in Israel quickly exceeded its previous peak.⁷⁵

At the moment, necessary but politically difficult reforms to enable the more efficient use of water and energy allocation and use are avoided because of the perceived political costs of introducing them.⁷⁶ According

to Hazem Nasser, the former Minister of Water, Jordan currently loses 51 per cent of its water to ageing infrastructure, a lack of social awareness in conservation and water theft.⁷⁷ But instead of focusing on greater water efficiency there tends to be a focus on increasing the domestic water supply—policy-makers across the region seem to have decided it is easier to ‘manufacture’ water than to negotiate it.

Finally, the fact that the oPt **is not defined as a state** under international law has very real implications for its ability to get access to water, to fund adaptation projects and to participate in the debate on climate change. For example, Palestinian representatives were not involved in the peace and water negotiations between Jordan and Israel in 1994. Despite sharing the banks of the Jordan River with both countries, the oPt has no rights to the waters of the river. Meanwhile, as an observer state to the UN (rather than a member state), the oPt cannot be a signatory to the UNFCCC, nor are they even observers to the convention.⁷⁸ As such, the Palestinian Authority is unable to play a role in determining international governance on an issue which may hit the oPt particularly hard. Another consequence is that the Palestinian Authority is not eligible for international funding under instruments like the Clean Development Mechanism (CDM) or large-scale projects of the Global Environment Facility (GEF). With few resources of its own and denied access to funding through the normal channels, the Palestinian Authority has instead to try to scrape together funding indirectly through applying under the umbrella of other countries or regional arrangements.⁷⁹

⁷³Interview in Jordan, October 2008.

⁷⁴Interviews and consultations, Ramallah.

⁷⁵Allan, J.A., 2003.

⁷⁶Allan, J.A., 2003.

⁷⁷Jordan Business Magazine, 2008.

⁷⁸The Palestinian Authority does, however, have observer status in some other international instruments such as the Convention on Biological Diversity (CBD) and the UN Convention on Combating Desertification (UNCCD)

⁷⁹Interview, Environmental Quality Agency, Ramallah, 3 February 2009.

A Syrian tank abandoned in the Baniyas river of the Golan Heights after the 1967 war. Source: iStockphoto



Section 3:

Climate Change as a New Security Threat

It is against this troubled background that the impacts of climate change will increasingly be felt. Ultimately, the legacy of conflict in the region exacerbates the challenge.

There are many possible trajectories for 'the peace process' and regional security in the Levant, ranging from a dismal future of continued violence to a more optimistic scenario, where a wider political settlement could help to reduce tensions between and within countries. What comes to pass depends, of course, on a wide array of factors: world events, the state of the global economy, individual political decisions and technological advances to name just a few.

We believe the evolving impacts of climate change will also shape the progress and prospects of the region. It is possible that climate change, a shared threat like no other,

may encourage countries to work together despite their political and ideological differences. In so doing, climate change could become a vehicle for rapprochement and peacebuilding.

However, given the current political landscape, which continues to be characterized by distrust, hostility and a lack of cooperation, climate change is more likely to become an obstacle to peace and could indeed aggravate tensions in a number of serious ways.

We analyze these tensions here, not as concrete predictions of inevitable events (these are scenarios, not forecasts) but rather to identify some of the mechanisms that *could* provoke conflict in a world affected by climate change so as to prepare the kinds of action that may avert it.

THREAT 1: Climate change may increase competition for scarce water resources, complicating peace agreements

Wars over water have been predicted in the region for decades.⁸⁰ Like oil, across the Middle East, “water is a strategic commodity with a surplus in some countries and a deficit in others.”⁸¹ Water is both a vital public good (for drinking) and irreplaceable input in many industrial and agricultural products. In the 1990s the late King Hussein of Jordan warned, “Water is the one issue that could drive the nations of this region to war”⁸²—a warning that has been echoed several times since. But despite several skirmishes over attempts to divert water in the 1950s, 1960s and 1970s full-blown conflict over water has yet to come to pass.⁸³

Over the years an extensive body of literature on the role of water in conflict has emerged.⁸⁴ This analysis often descends into a somewhat sterile ‘either-or’ debate on whether water is a cause of conflict or a reason for cooperation. But it is clear that these are not mutually exclusive categories. Water can be both a cause of conflict and a reason for cooperation—and a lot more besides: it is a bargaining chip in international negotiations⁸⁵; an instrument of control⁸⁶ and patronage⁸⁷; and the wide disparities in its availability and use are a symbol of division and a proxy for the power relationships in the region.⁸⁸ Ultimately, water is a highly strategic resource that determines the success or failure of much else: agriculture, economic growth, tourism and so on. It carries a symbolic significance beyond its utilitarian value.

The division of the waters of the Euphrates River between Turkey, Syria and Iraq is already contentious, and could become more so with climate change. Source: iStockphoto



⁸⁰Wolf, A., Kramer, A., Carius, A. & Dabelko, G. (2009) ‘Peace in the pipeline’, *BBC News*, 13 February 2009 <http://news.bbc.co.uk/go/pt/ft/-/2/hi/science/nature/7886646.stm> accessed 16th February 2009

⁸¹Raphaeli, N., 2007.

⁸²National Environmental Trust (2005) *Global Warming in the Middle East and Central Asia*, Washington, DC, p19.

⁸³Between February 1951 and September 1953 Israel and Syria exchanged sporadic fire over Israeli water development works in the Huleh Basin, which lay in the demilitarized zone between the two countries. Between March 1965 and July 1966 Israel and Syria exchanged fire over an ‘all-Arab’ plan to divert the headwaters of the Jordan River, presumably to pre-empt the Israeli National Water Carrier, an out-of-basin diversion plan to take water from the Sea of Galilee south to the Negev desert. Construction of the Syrian diversion was halted in July 1966. In the summer of 1975 Syrian and Iraqi troops amassed on both sides of the border over

low river flows from the Euphrates entering Iraq: Wolf, A. 2000

⁸⁴See Medzini, A. & Wolf A. T., 2004; Raphaeli N., 2007; Frey, F. & Naff, T. 1985; Green Cross, 2000.

⁸⁵Allan, J.A., 2003. In 2008, for example, there were rumours that Turkey had offered Syria water in return for engaging in indirect peace negotiations with Israel (see http://www.jamestown.org/single/?no_cache=1&tx_ttnews%5Btt_news%5D=33679)

⁸⁶Consultation and interviews in Ramallah, Tel Aviv and Jerusalem, January-February 2009.

⁸⁷Consultation in Amman, 12 January 2009.

⁸⁸See Weinthal, E. & Marei, A. 2002; Morel, A. & Morel, B., 2006 – Israeli settlers in the West Bank constitute 10 per cent of the population but consume 30 per cent of the water resources: Hilmi, S.S. & Isaac, J., (2007) write “while Israeli settlers in the Occupied Palestinian Territories (sic) are using Palestinian water to water their gardens and to wash their cars, the Palestinian people have not even enough water to fulfil their basic needs, such as drinking and cooking.”

It is also a shared resource that demands a certain degree of collaborative management.⁸⁹ Unsurprisingly, the division of water has been a central element of nearly every peace negotiation in the region: an entire annex to the Israel-Jordan peace treaty is devoted to the issue of water. The Israeli-Syrian peace negotiations in 2000 broke down over the issue of access to the waters of the Galilee.⁹⁰ Meanwhile, the issue of water rights between Israel and the Palestinian authority proved so contentious that it has been set aside until the final negotiations on a Palestinian state. Ultimately, resolving the water issue between the Israelis and the Palestinians will be a precondition for a durable two-state solution.

The impact of increased water scarcity as a result of climate change has both international and national implications. Internationally, it may make some existing peace agreements untenable. The Jordan-Israel Peace Agreement is an example. The 1994 Wadi Araba Accords, which are a part of the peace agreement, laid out a complicated water arrangement where Israel agreed to transfer 50 mcm to Jordan in summer from the Sea of Galilee,⁹¹ in return for Jordan transferring a similar quantity from the upper Jordan during the winter.

In effect this enables Jordan to store winter runoff in the only major surface reservoir in the region (the Sea of Galilee) even though the lake happens to be in Israel. Meanwhile, it has Israel leasing wells and agricultural land on which it has come to rely from Jordan. The agreement also established a Joint Water Committee to oversee its implementation.⁹² But, creative as the treaty is, the agreement refers to transfers of a set volume of water (rather than a percentage of the available water), and does not adequately account for drought (when the available water may fall below the agreed volume).⁹³

This proved controversial when, in early 1999, the worst drought on record caused Israel to threaten to renege on its delivery schedule, which in turn caused protests in the streets of Amman, personal outrage on the part of the King of Jordan and, according to some,

threatened the stability of peace between the two nations before a resolution was found.⁹⁴

Climate change may also hinder the negotiation of future peace agreements.⁹⁵ There is currently no peace treaty or water sharing agreement between Israel and Lebanon or Israel and Syria. Meanwhile, the division of the waters of the Euphrates River between Turkey, Syria and Iraq has long been a bone of contention. A shrinking quantity of water to allocate between parties (whether as a result of reduced supply or increased demand) will almost inevitably complicate relations between countries, making it increasingly hard to negotiate new (or update existing) peace agreements.

As Nader al-Khateeb, the Director of the Palestinian branch of Friends of the Earth Middle East pointed out, "Climate change will make negotiations on both water and peace much more complicated."⁹⁶ This could, for example, have implications for the viability of an independent Palestinian state, as well as an eventual peace arrangement between Israel and Syria that involved the return of the Golan Heights. With 30 per cent of the waters of the Sea of Galilee originating in the Golan Heights, the return of the Golan to Syria and the water issues at stake are intricately linked.⁹⁷

Nationally, the ability to satisfy the needs of powerful sub-sectors (such as the agricultural lobby) has been an important element of regime stability in some countries. With climate change, population growth and increased demand progressively reducing available water supplies, governments will have to make increasingly difficult decisions on how best to allocate resources between sectors of the economy, between urban and rural areas and between different ethnic groups. Just as is the case regionally, the sharing of water within each country can be (and often is) the focus of protest and conflict. For example, in 2008, attempts by public officials to crack down on water theft in the Jordan valley saw armed locals standing in opposition and the army eventually being called in.⁹⁸

⁸⁹Two Joint Water Committees (JWC) (Israel-Jordan and Israel-Palestinian Authority) were set up in the 1990s as institutions associated with the Middle East peace process. While they have provide a channel of communication to discuss water problems, their effectiveness remains controversial. On the one hand, the Israeli-Palestinian JWC has managed to operate despite changing political circumstances, continuing to hold regular meetings even at the height of the intifada in 2001 and 2002. In January 2001, a joint statement by the Israeli Water Commissioner and the Head of the Palestinian Water Authority called on both sides to avoid damage to water infrastructure (Allan, 2003). On the other hand, Palestinian and international analysts argue that the Israel-Palestinian Authority JWC is collaborative in name only and helps to enforce an Israeli water agenda on the Palestinians. As a senior official in the Palestinian Water Authority said, "There is no 'cooperation' with Israel over water; the relationship is too unequal to be referred to as cooperation, as one party dominates" (Interview in Ramallah).

⁹⁰The talks collapsed in 2000 when Syria's late President Hafez al-Assad, father of the current president, Bashar, turned down an Israeli offer to withdraw from the Golan but keep a narrow strip on the northeastern shore of the Lake of Galilee, which Assad regarded as Syrian territory" (Oweis, 2009).

⁹¹Also known as Lake Tiberias or the Kinneret.

⁹²Medzini, A. & Wolf A.T., 2004.

⁹³Medzini, A. & Wolf A.T., 2004.

⁹⁴Medzini, A. & Wolf A.T., 2004.

⁹⁵Arnon Medzini and Aaron Wolf (2004) write, "When peace negotiations do one day resume between Israelis and Arabs, shared water resources will again take centre stage, acting both as an irritant between the parties, and as a tremendous inducement to reach agreement."

⁹⁶Consultation in Ramallah, 2 February 2009.

⁹⁷Freimuth, L., Bromberg, G., Mehyar, M., & Khateeb, N. Al, 2007.

⁹⁸Jordan Business Magazine, 2008.

THREAT 2: Climate change may intensify food insecurity, thereby raising the stakes for the return or retention of occupied land

A second concern is that agricultural yields may fall as a result of reduced and unpredictable rainfall and more frequent droughts.⁹⁹ According to the FAO a temperature increase of three to four degrees could cause crop yields to drop by 25 to 35 per cent.¹⁰⁰ Food security is already a core political concern and highly emotive issue in many countries in the region.

A severe drought across the region in 2007/8 provided a taste of what could happen in future. In Syria, the wheat harvest was less than half that of previous years, and the production of chickpeas and barley fell by a third on average and more than 75 per cent in rain-fed areas.¹⁰¹ By December 2008, there were concerns in Jordan that the entire harvest for vegetables, barley and wheat would be lost,¹⁰² cattle populations declined to 600,000 from one million, the olive harvest fell to 17,000 tonnes from 40,000 tonnes the previous year and there were reports that the government

had to ask people to stop eating mensef (a national dish) as a main meal as meat was becoming scarce.¹⁰³

Food production in the region is largely determined by the availability of water—either from rain or from irrigation. Agriculture is by far the biggest consumer of water, accounting for 84 per cent of all demand.¹⁰⁴ Complete food self-sufficiency is an unrealistic goal: one analyst estimates that the Middle East as a whole ran out of water resources to meet its full strategic needs (including producing all its own food) in 1970.¹⁰⁵ Currently the region sidesteps the problem of its inability to provide enough food for its population through imports of ‘virtual water’ in the form of agricultural goods.¹⁰⁶

Already the Middle East as a whole is the world’s most dependent region on wheat imports.¹⁰⁷ So far, this has been (relatively) affordable as a side effect of the consistent subsidization of EU and U.S. agriculture, which has served to keep international food prices low for decades.¹⁰⁸ All the countries in the region, with the occasional exception of Lebanon, import more food than they export.¹⁰⁹ In 1998, for example, this net deficit in food trade was costing Jordan US\$115 per person per year.¹¹⁰

Table 1: Agriculture in the Levant

	Area (km ²)	Agricultural land (% of land area, 2008)	Irrigated land (% of cropland, 2008)	Agricultural employment (% of total employment, 2001-03)
Israel	20,770	24	40.2	2.0
Jordan	89,210	11	29.6	3.9
Lebanon	10,452	38	31.3	—
oPt	6,263	62	6.8	14.1
Syria	185,180	76	24.3	30.3

Sources: World Bank, 2008; UNFPA, 2008; World Bank, 2007.

⁹⁹See Fleischer, A., Lichtman, I. & Mendelsohn, R., 2007.

¹⁰⁰Cited in Euro-Med, 2008.

¹⁰¹From <http://ochaonline.un.org/cap2005/webpage.asp?Page=1700>.

¹⁰²IRIN News, 2009, ‘JORDAN: Persistent drought could devastate crops’ 25 December 2008, available at <http://cgi.wn.com/?action=display&article=81075422&template=worldnews/paidnews.txt&index=recent>.

¹⁰³Consultation in Ramallah, 2 February 2009.

¹⁰⁴Bou-Zeid, E. & El-Fadel, M., 2002.

¹⁰⁵Allan, J.A., 2003.

¹⁰⁶Allan, J.A., 2003. It is important to note that at the same time some countries in the region are exporting ‘virtual water’ in the form of water-intensive vegetables and fruit. In 2001 it was estimated that roughly one third of Israel’s produce was exported. See <http://www.waterfootprint.org/?page=files/Israel>

¹⁰⁷Cullen, H., Haggard, S., & Magaloni, B. 2009.

¹⁰⁸Allan, J.A., 2003.

¹⁰⁹Haddadin, M.J., 2002.

¹¹⁰Haddadin, M.J., 2002.

Agriculture in the Jordan Valley. Source: iStockphoto



Over the long term, climate change could fundamentally alter the distribution of world agricultural output and exacerbate the volatility in prices. The IPCC argues that the implications for food prices are clear: decreased climatic stability will be associated with more frequent spikes in food costs, especially as the increase in extreme events coincides with a decrease in overall climate predictability.¹¹¹

Securing food supplies is ultimately about land (on which to grow food) and water (with which to grow it); as one participant in the Ramallah consultation noted, “whoever controls the land, controls the water.”¹¹² If climate change begins to reduce agricultural yields at the same as international food prices rise (as a result of the impact of global climate change or reduced agricultural subsidies elsewhere) food insecurity, both perceived and real, will increase - making food security an even more politicized

issue. This, in turn, could alter the economic and strategic balance in every country in the region - intensifying the highly emotive issue of the return or retention of occupied land. As Canadian security analyst and journalist Gwynne Dyer notes, “Eating regularly is a non-negotiable activity, and countries that cannot feed their people are unlikely to be ‘reasonable’ about it.”¹¹³

Domestic food shortages could elevate existing tensions and feelings of historical injustice and further increase domestic pressure for Syria or the Palestinian Authority to secure the return of occupied lands. Equally, while no one seriously argues that the occupation of the West Bank and the Golan was driven by Israeli concerns over food security, reduced agricultural productivity in Israel could shift the strategic calculation on whether to withdraw from such areas.

¹¹¹IPCC, 2007.

¹¹²Consultation in Ramallah, 2 February 2009.

¹¹³Dyer, G., 2008.

THREAT 3: Climate change may hinder economic growth, thereby worsening poverty and social instability

The availability of water is a determining factor in economic growth in the region. Lower agricultural yields, rising sea levels, more frequent natural disasters, and accelerated desertification might have the net effect of constraining economic growth and increasing poverty across the region. As the former Minister of Water in Jordan, Hazem Nasser, argues, “without a sustainable water sector, our economy will not be sustainable.”¹¹⁴

Climate-dependent sectors of the economy (such as agriculture and tourism) are important. Tourism is a particularly important source of revenue and employment in Jordan, Israel and Lebanon. Meanwhile, agriculture plays a big role across the region: 23 per cent of Syria’s economic output and 30 per cent of its workforce are employed in the sector.¹¹⁵ Although its contribution to GDP in other countries is relatively slight (it accounts for just two per cent of Israeli GDP), across the region the agricultural sector carries an ideological and political significance far greater than its economic importance.

A 2006 study commissioned by the U.K. government and carried out by Sir Nicholas Stern, the former chief economist of the World Bank, estimated that the economic cost of climate change at a global level could rise to between five and 20 per cent of global GDP if no action is taken.¹¹⁶ In the Levant this could manifest itself in several ways.

First, climate change could damage the productivity or profitability of the agricultural sector. Economic modelling in Israel suggests that by 2050, even under optimal management, there will be drops of around 10 per cent in agricultural revenues across the country.¹¹⁷ According to a paper prepared for the 2008 Euro-Med conference in 2008, “Climate change poses indeed the risk of further depressing the agricultural sector’s economic performance through accelerated desertification, yield reductions and increased volatility (especially in cereals), of threatening rural jobs, increasing the fiscal burden of government intervention in support of the sector, and thwarting efforts to improve access to foreign markets for high value crops.”¹¹⁸

Second, climate change could close off previously viable economic activities, such as the export of water-intensive crops.¹¹⁹ In 2008, for example, the Syrian government decided that it could no longer afford to devote scarce water resources to cotton destined for export and instead decided to scale back cotton production to solely meet domestic demand.¹²⁰ Sixty per cent of Lebanon’s economic activity takes place in a narrow coastal strip along the Mediterranean and could be susceptible to flooding and erosion as sea levels rise.¹²¹

Third, it could also inhibit the growth of the tourism industry in a number of ways: bleaching corals in the Red Sea¹²²; reducing the length of the skiing season in Lebanon; and, more broadly, by constraining water supplies.¹²³ Meanwhile, the Dead Sea is sinking at a rate of one metre a year as a result of evaporation and

Table 2: Economic indicators

	GDP (PPP US\$ billions 2005)	GDP per capita (PPP US\$ 2005)	Youth unemployment rate (% age 15–24, 2005)
Israel	179.1	25,864	18
Jordan	30.3	5,530	30
Lebanon	20.0	5,584	—
oPt	—	—	40
Syria	72.5	3,808	26

Source: UNDP, 2007; World Bank, 2007.

¹¹⁴Jordan Business Magazine, 2008.

¹¹⁵World Bank, 2007.

¹¹⁶Stern, 2006.

¹¹⁷Kan, I., Rapaport-Rom, M. & Shechter, M., (undated).

¹¹⁸Euro-Med, 2008.

¹¹⁹Consultation in Tel Aviv, 5 February 2009.

¹²⁰Interview in Damascus, 21 January 2009.

¹²¹Bou-Zeid, E., & El-Fadel, M., 2002

¹²²Cruz, R.V., Harasawa, H., Lal, M., & Wu, S., 2007.

¹²³Cruz, R.V., Harasawa, H., Lal, M., & Wu, S., 2007.

Tourism in Jordan will be particularly hard hit by declining precipitation rates. Source: Alec Crawford



excessive water withdrawal of the rivers and streams that feed it. Climate change could accelerate the process and make reversing it more difficult.

Fourth, the impacts of climate change and increasing demand for food around the world could lead to sharp increases in food prices, which disproportionately affect the poor as they tend to spend the highest percentage of their income on food. In fact, the IPCC estimates that global cereal prices may increase three-fold by the 2080s as a consequence of a decline in net productivity as a result of climate change.¹²⁴ A recent study of 55 major cities in Africa and Asia between 1961 and 2006 argued that international food prices have been a significant determinant of the incidence of protest and riots, even when controlling for aggregate economic performance and other economic shocks such as changes in the overall price level.¹²⁵

These trends could prove to be important as the region needs to maintain economic growth to (try to) provide jobs for its expanding population. Overall unemployment in the region is already very high (between nine and 27 per cent across the region)¹²⁶ and youth unemployment (15–24 years old) is higher: around 40 per cent in the oPt and 30 per cent in Jordan.

A general link between a country's level of economic development and its propensity for conflict is widely acknowledged.¹²⁷ Participants in the consultations agreed: "economic performance plays a major role in the stability of every country. And of the region."¹²⁸ A testing combination of higher unemployment, reduced government revenue and increased demands on services could weaken governments' ability to provide services and create jobs, in turn potentially creating the conditions for extremism of all kinds, increased crime, social breakdown and so on.

¹²⁴Cruz, R.V., Harasawa, H., Lal, M., & Wu, S., 2007.

¹²⁵Cullen, H., Haggard, S., & Magaloni, B. 2009.

¹²⁶The unemployment rate as a percentage of the labour force between 1996 and 2005 was 12.4 per cent in Jordan, nine per

cent in Israel, 26.7 per cent in the oPt and 11.7 per cent in Syria (UNDP, 2007).

¹²⁷See for example, Collier, P. & Hoeffler, A., 2004.

¹²⁸Consultation in Ramallah, 2 February 2009.

THREAT 4: Climate change may lead to destabilizing forced migration and increased tensions over existing refugee populations

Shifting rainfall patterns, spreading desertification and falling agricultural productivity are likely to undermine rural livelihoods, worsen job prospects in rural areas and accelerate migration to urban areas. This could strain services in cities and lead to increased resentment of existing refugee populations.

Although a relatively high proportion of the region's population already lives in urban areas¹²⁹, many cities in the region are growing rapidly. The current population of Amman, for instance, is over 2.5 million, but the Mayor of Amman, Omar Al Maani, expects the population to hit 6.4 million by 2025.¹³⁰ Higher rates of urbanization may, of course, help to offset some problems such as providing health and

education services, but if unplanned and unregulated, such urbanization may leave areas more prone to natural disasters such as landslides and add to urban poverty, the fragmentation of urban areas, and an increased risk of social breakdown, crime and extremism.¹³¹

The 2007/8 drought caused significant hardship in rural areas of Syria. In the northeast of the country, a reported 160 villages have been entirely abandoned and the inhabitants have had to move to urban areas.¹³³ In addition, there may be pressure from migrants escaping the impacts of climate change elsewhere. It is estimated, for example, that between two and four million people could be displaced from the Nile delta as a result of a sea level rise of just 50 centimetres.¹³⁴

Perceptions of shrinking resources and increasing migrant or refugee populations could increase resentment over existing refugee populations—an issue that is already highly sensitive. The region already hosts millions

Table 3: Refugee populations in the Levant

	Internally displaced people (thousands, 2006)	Refugees (country of asylum, thousands, 2006)	Refugees (country of origin, thousands, 2006)
Israel	150–420	1	1
Jordan	—	500	2
Lebanon	216–800 ¹³²	20	12
oPt	25–57	—	334
Syria	305	702	12

Source: UNDP, 2007.

¹²⁹82.3 per cent in Jordan, 91.6 per cent in Israel, 71.6 per cent in the oPt, 86.6 per cent in Lebanon and 50.6 per cent in Syria (UNDP, 2007).

¹³⁰www.ammanplan.gov.jo/arabic/industry/Press_E.doc

¹³¹Consultation in Damascus, 22 January 2009.

¹³²We recognize that the designation of the Palestinian population in Lebanon as IDPs and not refugees (as the table implies) is controversial but we have chosen to follow the UNDP's definition for lack of clearer estimates.

¹³³Consultations and interviews in Damascus, February 2009.

¹³⁴Freimuth, L. et al., 2007.

Urban sprawl in Tripoli, Lebanon. Tripoli's population has grown from 300,000 in 1996 to an estimated 500,000 today. Source: iStockphoto



of Palestinian refugees from the 1948 and 1967 wars and, more recently, millions Iraqi refugees from the Gulf Wars (see Table 3).¹³⁵ Already there are serious tensions between the 350,000–400,000 Palestinian refugees in Lebanon¹³⁶ and the rest of the Lebanese population where, according to the International Crisis Group, “the refugee question lies at the heart of politics, a recurrent source of passionate debate and occasional trigger of violence.”¹³⁷

In an influential report produced by a group of retired U.S. generals and admirals released before a UN

Security Council debate on climate change in April 2007, General Anthony Zinni argued that migration, extreme natural events and the economic impact of climate change could help set the stage for social instability and radicalism: “If the government there is not able to cope with the effects, and if other institutions are unable to cope, then you can be faced with a collapsing state. And these end as breeding grounds for instability, for insurgencies, for warlords. You start to see real extremisms. These places act like Petri dishes for extremism and for terrorist networks.”¹³⁸

¹³⁵Estimates of the numbers of Iraqi refugees resident in Jordan, Syria and Lebanon vary widely. In 2007, UNHCR estimated that 1.5 million were in Syria, and 20–50,000 in Lebanon. Other estimates have put the number of Iraqi refugees in Jordan at 450,000–500,000 in 2007. The ICG (2008) notes, “Statistical variations and uncertainties aside, the number clearly is huge and represents one of the world’s largest conflict-induced displacements of people.”

¹³⁶According to the UN Relief and Works Agency (UNRWA), though these figures are disputed and other estimates are lower (ICG, 2009).

¹³⁷ICG, 2009.

¹³⁸CNA Corporation, 2007.

THREAT 5: Perceptions of resources shrinking as a result of climate change could increase the militarization of strategic natural resources

The tendency in the region to assume that local water availability is the basis of economic and strategic security has, according to Professor Tony Allan of King's College London, “underpinned all hydro-political discourse among the riparian states.”¹³⁹ As the impacts of climate change gather pace, it is likely that these shrinking resources will become increasingly politicized, either as a result of actual or predicted reductions in their availability.

In the context of continuing distrust and political tension it is possible to imagine that allocations of resources could become increasingly tense. Control over them may become perceived as an increasingly key dimension of national security, and resource scarcity could be a pretext for their greater militarization. We see three potential dimensions to this:

First, as discussed already, the expectation that water resources are going to get scarcer subtly changes the dynamics of negotiation. It may reduce the space for cooperation and make countries even less willing to be reliant on resources shared across international borders. Jordan and Syria, for example, have an ongoing quarrel over the allocation of the waters of the Yarmouk River (which forms the border between the countries for 40 kilometres before flowing into the Jordan river) which could become more heated if the river flow reduces further.¹⁴⁰ Jad Isaac, the Director General of the Applied

Research Institute in Jerusalem points out, “everyone wants his hand on the tap.”¹⁴¹

A second, and linked, concern is that the expectation of shrinking resources could result in their becoming even more militarized—forcibly secured in anticipation of conflict over them: “there will be 20 soldiers over each well” predicted one participant in the Ramallah consultation.¹⁴² Participants in the consultations worried that climate change could be used by opportunistic politicians as a political vehicle or by armed groups as a pretext to justify their continued existence and relevance.¹⁴³

A third concern, by far the most dramatic, is that it could increase the chances of the ‘pre-emptive’ seizure of resources. This could be in any number of different directions: by Israeli settlers in the oPt, between Turkey, Syria and Iraq over the division of the Euphrates and so on. In a sense climate change conflict could become a self-fulfilling prophecy—the expectation of coming environmental wars might imply that the way to deal with shrinking resources is to increase military control over them.

This is a charged issue and emotions already run high. According to one international development professional based in the oPt, “Israel is already using climate change as an excuse to increase their control over the water resources in the region. They will use it as another tool to put pressure on the denial of rights to the Palestinian people, whose ability to adapt and cope is going to decrease even further.”¹⁴⁴

A tank in the Golan Heights. Source: iStockphoto



¹³⁹Allan, J.A., 2003.

¹⁴⁰Namrouqa, H., 2009.

¹⁴¹Consultation in Ramallah, 2 February 2009.

¹⁴²Consultation in Ramallah, 2 February 2009.

¹⁴³Consultation in Damascus, 20 January 2009.

¹⁴⁴Interviewee's name withheld at their request.

Better regional cooperation could help reverse the decline of the Dead Sea; overuse of its tributaries means that the Sea is sinking at a rate of one metre per year. Source: Alec Crawford



THREAT 6: Inaction on climate change may lead to growing resentment and distrust of the West (and Israel) by Arab nations

Developed nations have, of course, produced the vast majority of the greenhouse gases that are causing climate change. It is one of the great injustices that poorer developing countries with less capacity to adapt to the impacts of climate change are likely to be more affected than the rich countries by a problem that is fundamentally not of their making.

In December 2009, the Danish government will host the fifteenth Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) in Copenhagen, where it is hoped that a successor to the Kyoto Protocol will be negotiated to further reduce global emissions of greenhouse gases once Kyoto expires in 2012. The UN Secretary General, Ban Ki-moon has emphasised the importance of the Copenhagen meeting arguing, “2009 must be the year of climate change. That means reaching a comprehensive agreement in Copenhagen by year’s end.”¹⁴⁵

As a region, the Levant produces a tiny fraction of global emissions (less than one percent of the world total),¹⁴⁶ but on a per capita basis Israel’s emissions (11.8 metric tonnes per capita) exceed the European average (10.05 tonnes) and are multiples of the carbon emissions of Lebanon (5.2 tonnes), Jordan (4.9 tonnes), Syria (4.0 tonnes) or the oPt (0.2 tonne).¹⁴⁷

If the international community is unable to come to a deal in Copenhagen that shows a commitment to mitigate the effects of climate change and to help poorer countries adapt to its impacts, it may reinforce the already pervasive sense in the Arab world that many countries in West are not acting as ‘good global citizens’. And if Israel does not play an active part in the negotiations, it is likely that Israel will be regarded in the same light. This may exacerbate the existing deep mistrust of the West (including Israel), which would be seen as causing a problem that it is unable or unwilling to resolve. This could widen an existing fracture line in international politics.

¹⁴⁵<http://en.cop15.dk/news/view+news?year=2009&month=5&newsid=874>

¹⁴⁶UNDP, 2004.

¹⁴⁷WRI, Climate Analysis Indicators Tool, <http://cait.wri.org/> Data for oPt from 2004 - HDR, 2007/2008 see http://hdrstats.undp.org/countries/country_fact_sheets/cty_fs_PSE.html accessed 29 March 2009.

A Palestinian boy playing in the rubble of one of the disengaged settlements in Gaza. Source: UNEP, 2006



Section 4:

Strategies for Conflict Prevention in a Changing Climate

Security is a constant concern in the Levant. However, the security threat of climate change is rarely discussed.¹⁴⁸ Public and political attention tends to focus, understandably, on the many immediate dangers that trouble the region—war, civil war, rocket launches, terrorist attacks, invasion and occupation—rather than the distant, less tangible challenges described above. “While your house is burning you can’t think about what is going to happen next week,” is the view taken by many, according to Professor Pinhas Alpert of Tel Aviv University.¹⁴⁹

Perhaps unsurprisingly public awareness of climate change has been low. “The climate security debate, and climate change more broadly, is seen by many as an issue for the rich, those who have nothing else to worry about,” argues Yasar Qatarnah of the Regional Centre on Conflict Prevention at the Jordan Institute of Diplomacy.¹⁵⁰ Adapting to climate change and reducing greenhouse gas emissions have not been political priorities.

This may be beginning to change, with the growing realization among analysts in the region that climate change may present a real threat to security. Already the region struggles with scarce water and food resources and erratic economic growth. Climate change presents governments in the region with a range of daunting challenges: how to meet the water and food needs of a growing population; how to increase communities’ resilience to drought and floods; how to expand economies in spite of potentially more adverse and unpredictable weather; and how to divide increasingly scarce resources among countries and different sectors of society and the economy.

The legacy of conflict, in particular the lack of cooperation and the prevailing attitude of deep distrust between (and sometimes within) countries, exacerbates the challenges of climate change. It impedes greater efficiency, undermines innovative solutions to regional problems and fosters a zero-sum approach to sharing scarce resources.

¹⁴⁸This sentiment was echoed in all consultations, see also Hamdan, 2007.

¹⁴⁹Consultation in Tel Aviv, 5 February 2009.

¹⁵⁰Consultation in Amman, 12 January 2009.

In this context, and in our opinion, climate change is clearly a potential factor in future conflict in the region for six specific reasons:

- First, it threatens to undermine existing peace agreements and to complicate the conclusion of new ones.
- Second, by intensifying problems of food insecurity it may change the political calculations (and raise the stakes) over the return or retention of occupied land.
- Third, by impeding economic growth it threatens to worsen poverty and trigger social instability thus helping to create the conditions for extremism of all kinds.
- Fourth, it could lead to destabilizing forced migration and exacerbate existing tensions over current refugee populations.
- Fifth, the expectation of resources shrinking as a result of climate change could increase the militarization of strategic resources.
- Finally, all of these impacts could lead to a growing resentment of the West and Israel if they are perceived to be shirking their responsibility to reduce greenhouse gas emissions.

But it is important not to overstate the case. Climate change is not the only factor in future conflict, just as it is not the only factor in the changing availability of water resources. Over the short term, population growth (currently between 1.3 and 3.7 per cent) will probably

reduce the per capita allocation of water at a faster rate than the impacts of climate change.¹⁵¹ Environmental stress can increase the severity, duration and collateral damage of a conflict, but environmental factors are rarely, if ever, the sole cause of a conflict.¹⁵² Instead climate change is best seen as a ‘threat multiplier’ that exacerbates existing problems and vulnerabilities.¹⁵³ As the academics Jon Barnett and Neil Adger argue, “the set of climate change factors does not cause violent conflict, but rather merely affects the parameters that are sometimes important in generating violent conflict.”¹⁵⁴

Ultimately the wider political situation will determine whether scarce resources or forced migration becomes a cause of conflict or a reason for better cooperation. Repeatedly, the participants in the interviews and consultations emphasized that, in the context of a wider political arrangement, many of the challenges of climate change would be solvable. “Peace provides the potential for solutions while conflict kills opportunity,” suggests Jad Isaac, the Director General of the Applied Research Institute in Jerusalem.¹⁵⁵

The challenges of climate change and security in the Middle East are daunting. Action on climate change will, of course, only ever be a small part of the whole picture. Nevertheless, there is much that national governments and authorities, civil society and the international community can do to combat climate change, adapt to its impacts, manage increasingly scarce resources and foster greater cooperation on their shared resources. With this in mind, the report concludes with four broad strategies for action.

Syria’s population will grow dramatically over the next 40 years; job creation and the provision of social services will have to keep pace. Source: Alec Crawford



¹⁵¹UNDP, 2007.

¹⁵²Brown, O., Hammill, A., & McLeman, R., 2007.

¹⁵³CNA, 2007.

¹⁵⁴Barnett, J. & Adger, N., 2005.

¹⁵⁵Consultation in Ramallah, 2 February 2009.

Strategy 1: Fostering a culture of conservation

Countries in the Levant could make much better use of their limited water and energy resources. Dr. Yeshayahu Bar-Or, the chief scientist of the Israeli Ministry of the Environment, argues that everyone needs to “do more with less.”¹⁵⁶ Israel, for its part, may be a world leader in terms of water efficient technologies, “yet in the domestic sector Israel is lagging behind on efficiency, with the overall water economy not being managed in a sustainable manner, including the over exploitation of shared water resources at the expense of both her Palestinian neighbours and the needs of nature,” says Gidon Bromberg, Director of the Israeli office of Friends of the Earth Middle East.¹⁵⁷ Historically, for example, the Israeli government has supported farmers with subsidized water and other payments. This has made the sector so attractive that it has shifted from producing for local consumption to growing water-intensive vegetables and fruit for export: arid Israel now exports roughly one third of its produce to other countries—in effect exporting ‘virtual water’.¹⁵⁸

Raising awareness on climate change may help to encourage a culture of conservation and efficiency in the region. There are many gains to be had in terms of water and energy efficiency that could help offset the combined impact of growing demand, population growth and climate change.¹⁵⁹ These may in themselves hold significant economic benefits. “It is absolutely necessary to teach our kids at the elementary level that we are a water-scarce country,” says Hazem Nasser, former Minister of Water in Jordan.¹⁶⁰

By investing in better infrastructure and building public awareness of the need to reduce water and energy use, the region could get more use out of its scarce resources. Increasing the efficiency of infrastructure and

encouraging conservation through appropriate and equitable water pricing would, in effect, increase the supply of the resources. Yasar Qartaneh, the Director of the Regional Centre on Conflict Prevention at the Jordan Institute of Diplomacy, argues there is a need to develop indigenous forms of knowledge and understanding of the issues, not only because they are most in tune with the local context, but because that will also build up a constituency for action.¹⁶¹ There are some innovative initiatives underway, such as a modernization program for the Syrian water sector¹⁶² and energy efficiency programs in Lebanon¹⁶³ but much more needs to be done.

Recommendations

To national governments and authorities:

1. Raise awareness on the need to conserve and recycle scarce water and increase energy efficiency.
2. Invest in efficient water infrastructure, develop and implement ways to protect existing water resources from agricultural and industrial pollution.
3. Re-assess government support for water-intensive agricultural and industrial activities.
4. Appropriately price water to encourage its conservation, recycling and efficient use.
5. Increase support for small-scale innovations such as rainwater harvesting and domestic solar panels.

To the international community:

6. Provide support, skills and technology to enable the dissemination and uptake of water- and energy-efficient technologies through the creation of a Regional Centre for Adaptation to Climate Change (see Strategy 2).

¹⁵⁶Personal communication, April 2009.

¹⁵⁷Consultation in Tel Aviv, 5 February 2009.

¹⁵⁸See Water-footprint <http://www.waterfootprint.org/?page=files/Israel> accessed 15 April 2009. However, Dr Bar-Or argues that over the past 20 years the freshwater allocation to Israel’s farmers has decreased by more than 50 per cent, while the amount of reused treated wastewater has increased steadily and is now equivalent to that of freshwater use for agriculture (350 million m³).

¹⁵⁹The need for greater water and energy efficiency is, of course, well known to every country in the region. A detailed examination of the numerous on-going initiatives that are working to develop and disseminate water and energy efficient technologies and spread

access to renewable energies is beyond the scope of this short report. However, it is worth noting, for example, that on 26 January 2009, Israel, Jordan and Syria became founding members of the newly established International Renewable Energy Agency (IRENA). (See <http://www.irena.org/>). And in June 2007, Syria hosted the 4th Middle East and North Africa Renewable Energy Conference (MENARC). (See <http://www.menarc.org/index.html>)

¹⁶⁰Jordan Business Magazine, 2008.

¹⁶¹Consultation in Amman, 12 January 2009.

¹⁶²See <http://www.water.co.sy/index.php?m=179>

¹⁶³<http://www.undp.org.lb/ProjectFactSheet/projectDetail.cfm?projectId=6>

Strategy 2: Adapting to the impacts of climate change

The inherent inertia of the climate systems (where past emissions will cause future warming) means that a certain amount of climate change is 'locked in'. Thus the region will need to adapt to the changes that a warming climate will force on them. As befits an issue such as climate change that touches on many aspects of economic and social life, the scope of the adaptation agenda is massive. It has been dealt with extensively elsewhere¹⁶⁴ and this report cannot do justice to its breadth and complexity.

Building adaptive capacity to climate change and wider peacebuilding are inherently linked. Adaptation projects could address core tensions through better water management (strengthening water management mechanisms, promoting water conservation and efficiency); agricultural development (providing supplementary irrigation using treated waste water); and disaster prevention (spreading drought-resistant crop varieties). Community-level adaptation projects can help, in a modest way, to share skills and technologies and to build understanding between previously divided communities.

A 2007 report by the British conflict NGO International Alert argued that adaptation presents a "unified solution" to both climate change and conflict in that they are both essentially the same activity, "involving the same kinds of methods of dialogue and social engagement, requiring from governments the same values of inclusivity and transparency."¹⁶⁵ Governments and authorities in the region are already working to understand the potential impacts of climate change and prepare adaptation programs. Israel, Jordan, Lebanon and Syria have submitted (or are about to submit) National Communications to the UNFCCC that assess the potential impacts, detail an inventory of greenhouse gas emissions and outline plans for adaptation.¹⁶⁶ Israel has recently convened a high-level committee to prepare the country for future climate change.¹⁶⁷ Meanwhile, the Palestinian Authority has been working with the United Nations to assess the challenge of climate change in the oPt. However, there is much more that can be done.

Recommendations

To national governments and authorities:

1. Generate a better understanding of successful adaptive strategies occurring at the local level.

2. Share strategies for 'best practice' adaptation locally and regionally.
3. Integrate the impact of climate change into national development strategies and existing policies, including security risk assessments.
4. Support rural adaptation programs including the adoption of drought-resistant crops and drip-irrigation.
5. Undertake climate sensitive urban planning and the construction of climate-resilient infrastructure (drainage, housing, transport systems, etc.).
6. Ensure that adaptation strategies are conflict sensitive by undertaking careful assessment of their potential political and strategic implications. Adaptation projects should not undermine adaptive strategies elsewhere or adversely affect access other communities' access to natural resources.

To civil society and the private sector:

7. Engage in the debate to raise awareness on climate change and develop innovative ways to increase the efficiency of water and energy use.

To the international community:

8. Establish a Regional Centre for Adaptation to Climate Change that can develop and disseminate innovative ways to deal with drought and maximize water and energy efficiency.
9. Mainstream adaptation to climate change into development planning and programming.
10. Provide support from development partners to help meet the additional costs of adaptation, including the development of climate-related information and early warning systems.
11. Build the capacity of national governments to address climate risks, by inter alia, ensuring better water management, promoting agricultural development and developing more effective disaster management and early warning systems.
12. Develop mechanisms that enable and fund adaptation projects in the oPt, and try to ensure that these are implemented without undue external interference.
13. Support cooperative adaptation projects that also have a peacebuilding role (see Box 3).

¹⁶⁴See IIED, 2008; Smith and Vivekananda, 2007; Boko et al., 2007.

¹⁶⁵Smith, D. and Vivekananda, J., 2007.

¹⁶⁶See http://unfccc.int/national_reports/items/1408.php

¹⁶⁷Consultation in Tel Aviv, 5 February 2009.

Box 3: The Good Water Neighbours project¹⁶⁸

EcoPeace/Friends of the Earth Middle East (FOEME) established the Good Water Neighbours (GWN) project in 2001. The project focuses on local-level, cross-border cooperation among communities in Israel, Jordan and the oPt, and seeks to foster long-term trust building based on the shared interests of communities across political borders.

At its inception, the GWN project focused on 11 communities from across the three countries; this expanded to 17 communities as the project entered its second phase in 2005 and in 2009 is expanding to 25 communities. Communities on opposite sides of political borders that share a water source are partnered together; the GWN project then works to educate and raise awareness on the regional water situation within these communities, and through dialogue and cooperation works to solve problems on the ground at the community level and encourage sustainable water management at the regional level.

Through the project, FOEME has been able to build up a degree of trust and dialogue among the participating communities. The project has achieved a number of positive peacebuilding impacts at the local level: cross-border meetings have contributed to changing attitudes towards a perceived 'enemy'; local field staff have implemented environmental projects in their communities and raised awareness on water issues; mayors from all three countries have committed to working together across political borders; and an Israeli community organized a petition drive opposing the construction of the separation barrier between their village and that of their GWN counterpart in the oPt.¹⁶⁹

**Strategy 3:
Avoiding dangerous climate change**

Ultimately, the security impacts of climate change will be determined by the extent of future warming. That, in turn, is a result of how much greenhouse gas builds up in the atmosphere. The debate on reducing global greenhouse gas emissions is not the focus of this report, but its conclusions underscore the need for an ambitious reduction in global emissions.

Quite apart from the stand-alone rationale to reduce emissions of greenhouse gases as a way of combating climate change, if Israel (as the largest per capita emitter in the Levant) and, to a lesser extent, the Arab nations were to take on commitments to tackle climate change it would be a powerful demonstration of global citizenship and solidarity.

Moreover, increasing energy efficiency and moving to renewable sources of energy generation would have important economic benefits for this energy-poor region. First, it would help to tackle the long-standing energy crisis affecting the region. Second, reducing the amount of energy produced from fossil fuels would help address local air pollution, which is one of the most visible environmental problems in many urban areas.

However, any future agreement to limit greenhouse gas emissions will entail a series of geo-political and economic consequences that may generate their own security implications. If renewable energy sources become more

valuable as a result of an ambitious post-2012 climate agreement, then the political economy of energy and the geo-politics of the region could shift dramatically. It is conceivable, for example, that there could be a growing rift between the oil-producing and non-oil producing Arab states in the Middle East over collaborative action on reducing greenhouse gas emissions.

Recommendations

To the international community:

1. Facilitate an ambitious and determined shift in the way the world produces and uses energy.
2. Ensure global agreement on stronger commitments to reduce greenhouse gas emissions at the COP-15 meeting in Copenhagen while recognizing the legitimate development needs of those countries producing fewer greenhouse gas emissions.
3. Enable the Palestinian Authority to engage meaningfully in the international debate on climate change and to participate in processes such as the COP-15 meeting in Copenhagen in December 2009.

To national governments and authorities:

4. Develop national policies, strategies and regulations that promote the production and use of renewable energy and energy efficient technologies.
5. Engage in international efforts to reduce greenhouse gas emissions.

¹⁶⁹Kramer, A., 2009.

Box 4: Best practices in managing transboundary water resources

Around the world, most water-related interactions between states sharing water basins have tended to be cooperative rather than conflictual.¹⁷⁰ Despite often being shared between hostile neighbours, for many of these rivers and lakes the risk of conflict is often reduced by agreements between riparian countries on how to manage the river basin. Such agreements are fairly widespread along the world's major river systems. Examples include the Indus Water Treaty (1960); the Interstate Commission for Water Coordination in the Aral Sea Basin (1993); the Mekong River Commission (1995); and the Nile Basin Initiative (1999). However, no comprehensive agreement between all the riparian states governs the waters of the Jordan River.

Agreements on the management of transboundary water resources can help prevent conflict in a number of ways: they develop trust and political cooperation between states; they open up opportunities for 'win-win' water resource management; they offer more sustainable solutions to shared environment and resource concerns; they can attract international donor support and engagement; and they reduce the chances of countries undertaking unilateral actions that can lead to tensions.¹⁷¹

But establishing transboundary water regimes is a slow process and needs to be tackled in stages: from the initial sharing of technical information and joint fact-finding on shared water resources through joint monitoring and capacity-building projects to the signing of treaties on water resources and agreements on joint management.¹⁷²

A 2005 state-of-the-art review argued that successful regimes share the following characteristics: they are voluntary; they are based on the equitable distribution of water resources; they are flexible and periodically revised; they include the obligation among signatories to cause no significant harm to the other riparian states; and they require the exchange of information on shared water resources and early notification of problems.¹⁷³

Strategy 4: Enabling regional cooperation and international engagement

Clearly, the challenge of climate change is one that is beyond the capacity of any one country to tackle. Its shared security implications will be best resolved through cooperation: to reduce greenhouse gas emissions; to develop comprehensive international strategies to manage forced migration; to share the most innovative approaches for adaptation; and to manage shared resources (Box 4).

There are existing mechanisms through which better collaboration could be pursued, such as the Arab League,

the Euro-Mediterranean Partnership (Euro-Med)¹⁷⁴ and the European Neighbourhood Policy¹⁷⁵ (which overlaps with Euro-Med). As Professor Mordechai Shechter of the University of Haifa notes, "solutions are cheaper and more efficient when done together—and this should be proven and communicated." Hans Günther Brauch of the Peace Research and European Security Studies Institute argues that it may be possible to "gradually overcome the cycle of violence in the Middle East by increasingly recognizing the common regional impacts of global environmental change by addressing them jointly through a network of coordinated functional cooperation of water, soil, food, energy and health specialists" of all countries.¹⁷⁶

¹⁷⁰Wolf, A.T., 2005.

¹⁷¹Raadgever, G.T. & Mostert, E. 2005.

¹⁷²Wolf, A., Yoffe, S. & Giordano, M. 2003.

¹⁷³Raadgever, G.T. & Mostert, E. 2005.

¹⁷⁴The Euro-Mediterranean Partnership: In November 1995, following a European Council decision, a Euro-Mediterranean Conference of Foreign Affairs Ministers was held in the Spanish city of Barcelona. It marked the starting point of the Euro-Mediterranean Partnership, also known as the Euro-Med Partnership or, as the Barcelona Process. It was the EU's first comprehensive policy for the region. It promotes three partnership areas: a political and security dialogue to achieve a common area of peace and stability based on respect for human rights and democracy; an economic and financial partnership and the gradual establishment of a free-trade area to create a zone of shared prosperity and to support economic transition in the partner states; and a social, cultural and human partnership to encourage

understanding between peoples and cultures and exchanges between civil societies. Israel, Syria, Lebanon, Jordan and the oPt are all partners (see <http://www.euromedinfo.eu>)

¹⁷⁵The European Neighbourhood Policy (ENP): is one of the European Union's newest external relations policies, aiming to bring Europe and its neighbours closer, to their mutual benefit and interest. It was conceived after the 2004 enlargement of the EU with 10 new member countries, in order to avoid creating new borders in Europe. The ENP supports political and economic reforms in 16 of Europe's neighbouring countries as a means of promoting peace, stability and economic prosperity in the whole region. It is designed to give greater emphasis than previously to bilateral relations between the EU and each neighbouring country. Israel, Syria, Lebanon, Jordan and the oPt are all partners. (see <http://www.euromedinfo.eu>). Israel, Syria, Lebanon, Jordan and the oPt are all partners.

¹⁷⁶Brauch, H. G., 2006.

Climate change provides a strong rationale for better cooperation over resources. But we should not be naïve: there are limits to how far climate change can be used as a vehicle to foster dialogue and rapprochement in the region. The multiple causes of conflict in the region (occupation, refugees, existential threats from hostile neighbours and so on) need a much wider political solution. In fact over-emphasizing the need for cooperation as ‘the solution’ might backfire and undermine wider action on climate change. Already, participants in the consultation in Amman warned that there is a common perception in Jordan that climate change might be the product of “European exaggeration to encourage Arab nations to cooperate with Israel”.¹⁷⁷

Ultimately, the “scarcity of dialogue” is as serious a problem as the “scarcity of water” according to Odeh Al-Jayyousi, the Regional Director of the International Union

Fragile fruit: the olive harvest in the oPt. Source: iStockphoto



for Conservation of Nature.¹⁷⁸ This is not just the case between Israel and the Arab nations, but also among and within the Arab nations. Given events in Gaza in early 2009, it may seem unrealistic to think that climate change will now provide a rationale for cooperation that somehow transcends decades of Arab-Israeli conflict, but there are other dimensions of regional cooperation that can be explored sooner.

Recommendations

To national governments and authorities:

1. Develop regional scenarios that weigh and incorporate the economic and environmental benefits of collective action on water and energy issues.
2. Create and support technical mechanisms for the sharing of information and the dissemination of best practices for regional resource management (see Box 4).
3. Create, support or strengthen regional mechanisms for the management of shared resources and ensure that such mechanisms are adaptable to changing situations.

To the international community:

4. Provide a non-partisan forum for sharing data on climate change among the countries in the region.
5. Investigate opportunities for an UN-based, enforceable arbitration mechanism for the resolution of transboundary water disputes.
6. Encourage regional organizations like the Arab League and mechanisms such as Euro-Med and the ENP to strengthen their conflict prevention and peacebuilding mechanisms and ensure that an understanding of foreseeable climate change is integrated into their strategies.
7. Ensure that negotiations in other areas such as trade and investment complement mechanisms to deal with climate change (particularly in terms of removing impediments to trade in water and energy efficient technologies).
8. Encourage cooperative water management and energy links among countries and communities in the region.

¹⁷⁷Consultation in Amman, 12 January 2009.

¹⁷⁸Consultation in Amman, 12 January 2009.

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In a region already considered the world's most water scarce and where, in many places, demand for water already outstrips supply, climate models are predicting a hotter, drier and less predictable climate in the Middle East. By redrawing maps of water availability, food security, disease prevalence, population distribution and coastal boundaries, climate change may hold serious implications for regional security.

This report examines whether the legacy of conflict in the Levant undermines the ability of the region to adapt to climate change, outlines the threats that climate change could pose to regional security, and suggests strategies that can be pursued for peace and sustainable development despite a changing climate.

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