Arab Human Development Report

Research Paper Series

THE POLITICAL ECONOMY OF CLIMATE CHANGE IN THE ARAB REGION

John Waterbury

United Nations Development Programme

Regional Bureau for Arab States

United Nations Development Programme
Regional Bureau for Arab States
Arab Human Development Report
Research Paper Series
2013

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I am grateful to Alan Richards, Jeannie Sowers, and Neda Zawahri for comments on an earlier draft of this study. They are in no way responsible for any of the views or inadvertent errors that may lie in the text.

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Executive Summary

The policy process in the Arab world is poorly understood. That observation is even more pertinent with respect to policies aimed at adapting to climate change. Nonetheless, we can draw lessons from the literature on policy-making with respect to economic reform in the Arab world that bear upon the challenges political leaders face in undertaking adaptive measures to climate change. In short, the fiscal crises of the 1980s did elicit significant policy responses but more as a result of external pressures than of concern for domestic constituencies. That is the case as well with policies aimed at addressing climate-related challenges.

The Arab region has been characterized by pervasive authoritarianism with weak institutions of political accountability. That could mean that political leaders are relatively unconstrained in taking bold policy initiatives or relatively unmotivated to take risks. The evidence over the past decades indicates that inaction rather than action was the norm.

The Arab uprisings of 2011 may have begun to alter this picture of predominant authoritarianism. It is to be hoped that greater accountability in some Arab states may bring environmental issues more squarely to the front of the policy agenda. But we are in very early days, and even in countries such as Egypt and Tunisia where greater accountability of political leadership may become manifest, dealing with short-term economic crises may push environmental concerns to the near-bottom of the list of policy priorities. What could move them up the list are environmental crises, international pressure, and financial inducements and investments. These incentives will prove operative regardless of political regime.

I assess the influence of conventional sources of pressure on the policy process: lobbies, interest groups, public opinion, economic crisis, and the military-security apparatus. All are present and sometimes active in the Arab world. With the exception of the security apparatus, they have been ignored with impunity in the past. Working in favor of the environmental agenda are interlocking, transnational networks of experts, sometimes with significant financial resources, which keep environmental issues in full policy view.

Despite the apparent urgency of the challenges facing the Arab region as a result of climate change, inaction is a viable political strategy and, in ways I attempt to specify, the most likely one. The Arab and MENA regions have long suffered from symptoms we associate with global warming. For that reason there are already in place an array of policy responses, legal infrastructure, as well as competent experts who understand the problems.

What is recommended, therefore, is to build on existing policies and expertise. Radical departures are not warranted nor feasible. Building on what exists avoids taking on the issues of authoritarianism and lack of accountability, as political leaders will be asked only to continue what they have been doing, but to do it better. If the Arab uprisings enhance accountability in specific countries, so much the better.

I identify a number of policies that have been well established and call for a careful regional assessment of their successes and failures with a view to improving them going forward. I also identify a number of policies that exist in embryonic form and need strengthening. Finally, I identify policies that are quite new, such as developing renewable energy sources, but which can be developed on the strength of existing expertise and experience. The guiding principle is to do what should be done even if there were no climate change.

It is often observed that mitigation is about energy and adaptation is about water. In the Arab region adaptation will be played out to a large extent in the agricultural sector where most of the water is used. Adaptation is also quintessentially political because it entails a range of social welfare effects. Typically a fifth or more of total employment is in the agricultural sector and the bulk of poverty is concentrated there. Political leaders may find themselves asking the poorest in their societies to bear the costs of adaptation.

It is important to remember that mitigation necessarily entails collective action if it is to have significant effects. By contrast adaptation can be undertaken at the national or even the regional level unilaterally and still have positive results. This is important for the Arab world because adaptation will be the dominant response to the challenges of global warming. Some adaptation challenges in the Arab world can only be met regionally, but the precedents for regional cooperation and trade are not encouraging. It is recommended that regional efforts be sharply focused, especially on sea level rise or desertification. Sharp focus may simplify cooperation and coordination.

Because the MENA and Arab regions are not significant contributors to GHG emissions, and because efforts they undertake to adapt to warming may be overwhelmed by the failure of the main emitters to reduce their emissions, regional stakeholders will demand compensation for their adaptation efforts. I believe that the costs of compensation in the Arab world will not be prohibitive. By the same token I cannot guarantee that compensation will always be put to the purposes for which it is intended.

I. Operating Premises and Definitions

1. I assume that climate change and global warming are real and largely anthropogenic in origin, and that both will affect the Middle East and the Arab World *adversely and disproportionately*. This premise has been advanced in a number of credible studies.[1]

2. The objective is to ascertain how and to what extent the policy-making process in the Arab world can meet the challenges of adaptation to and mitigation of climate change. There are very few empirical studies of environmental policy-making, let alone studies of policies related to climate change, in the Arab world. For that reason I will assume that we can derive lessons from analyses of the policy processes and responses to other major structural challenges, both economical and political, that Arab polities have faced in the past decades, that will help us understand the constraints political leadership and policy-makers face in dealing with adaptation and mitigation.

Political economy is the study of the extraction and use of economic resources by public authorities. Official policies define the instruments by which resources are extracted and allocated. Public authorities tax, sometimes control (some) prices and hence relative prices, sometimes set exchange rates and interest rates, and through budgets and plans set priorities for expenditures. They may and frequently do directly or indirectly own substantial assets ranging from banks and insurance companies to airlines and defense industries. It is hard enough to understand the use of these formal instruments, but the problem is compounded by the existence of informal rules and expectations, and 'red lines', frequently involving the military or security services, which are outside public scrutiny.

II. The Political Universe of the Arab World

1. Overview

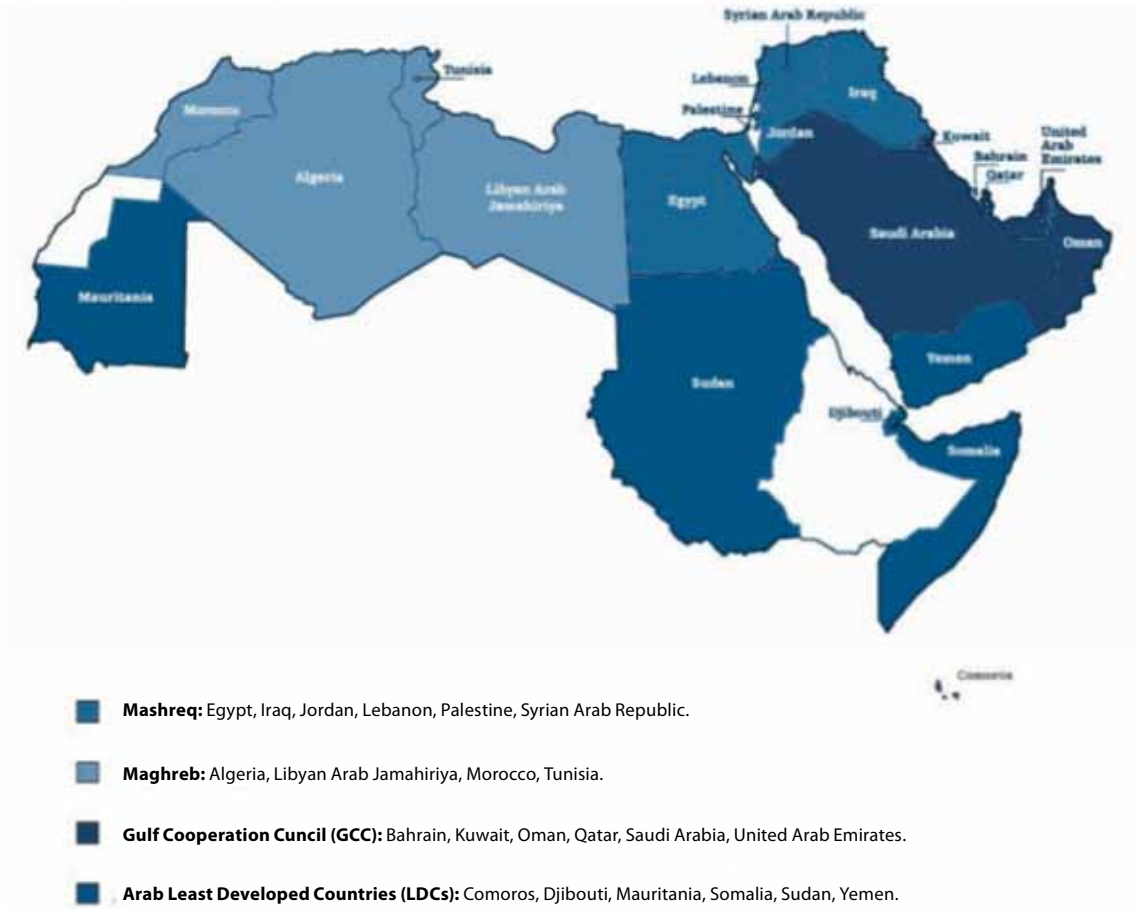
The focus of this study is on the greater Arab world, comprised of the twenty-two nations in the League of Arab States. This excludes Turkey, Iran, and Israel, countries that are highly relevant both because of their intense political interaction with their Arab neighbors and because they face similar challenges arising from climate change and global warming. For those reasons, I will make reference to these three countries where appropriate.

It is foolhardy to generalize about such a disparate and far-flung universe, stretching from the Atlantic to the Indian Ocean, from Sub Saharan Africa to the Black and Caspian Seas. This vast area was home to 128 million people in 1970, climbing to 359 million in 2010, and projected to reach nearly 600 million in 2050 (Mirkin, 2010: 11-12) Both population growth (falling from an average of 2.8% per annum in the 1970s to a projected .8% by 2050) and fertility rates are declining, but the bulge of women of child bearing age means that Arab populations will continue to grow for some time. Rapid urbanization has led urban couples to postpone conception until much later in the child-bearing years of the wife. At the turn of this century something like 20% of all Arabs were living in poverty, i.e. on less than $2 per day (Shetty, 2006: 17).

Youth unemployment at 25% is substantially higher than in other regions of the world. Moreover, unemployment is heavily concentrated among educated youth, indicating the failure of the mass education system in the Arab world. The current demographic profile, with the majority of the population aged 25 or younger should yield what is called the 'demographic dividend', that is a very large and relatively low-cost working population to support a relatively small non-working population. The fact is, however, the educational skills and aptitudes of most young Arabs are not suited to the demands of the labor markets. The demographic dividend risks being missed (Dhillon and Yousef, 2009).

Various observers have classified the constituent parts of the Arab world according to salient political and economic features (inter alia, Abdelgadir, 2009:5, Arab Human Development Report Papers, 2010:25; Henry and Springborg, 2001;Richards and Waterbury, 2008: 289-324; Rauch and Kostyshak, 2009). In terms of land surface and population, the bulk of Arabs live in large, economically-diversified states, generally with a substantial agricultural sector, a growing industrial sector, and, as in all Arab countries, a dominant service sector when the oil sector is netted out of national accounts. The large, diverse countries (Morocco, Algeria, Tunisia, Egypt, Sudan, Yemen, Jordan, Lebanon--the smallest of this group--, Syria, and Iraq) nearly all passed through decades of 'socialist' populism and centralized economic planning. Morocco, Jordan, and Lebanon did not

FIGURE 1. MAP OF THE ARAB REGION



go through this phase and fostered a certain degree of liberal political pluralism and somewhat market-friendly economic policies.

There is a group of Arab countries, mainly on the periphery, that have tried to evolve beyond an agro-pastoral past but which do not enjoy a petroleum sector. They are by no means as diversified as the first group and consist of Somalia, Djibouti, and Mauritania. They rely on aid, tourism, remittances, strategic rents, and even piracy to stay afloat.

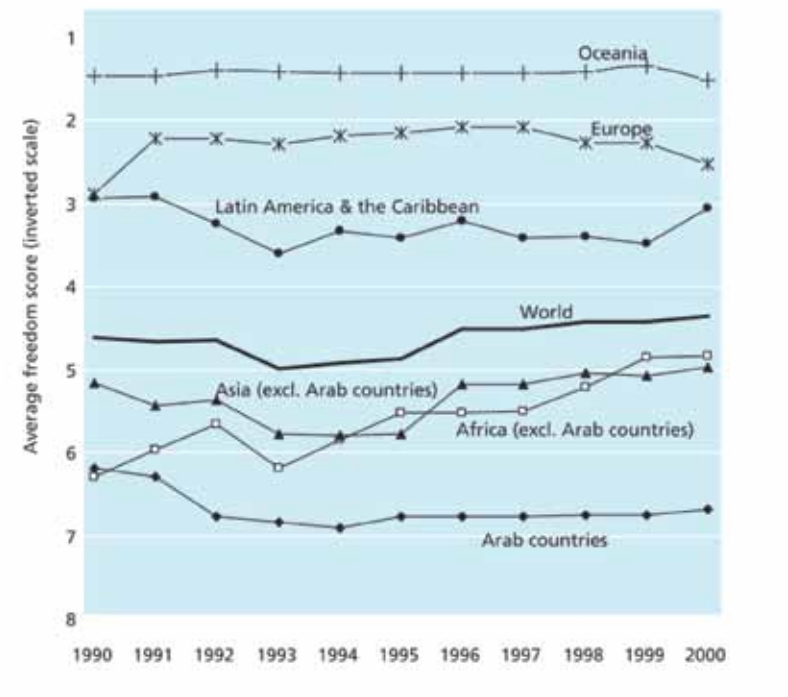
The Union of Comoros, comprised of three islands, are a case unto themselves: a tiny population of under a million, living in a high rainfall, monsoonal zone in the Indian ocean. Despite the small population the islands are densely inhabited and suffer from severe deforestation and erosion. Agriculture and fishing dominate the economy. The islands face the threat of sea level rise.

Finally, there are the states whose economies are dominated by petroleum exports and whose political systems are built around tribal monarchies. Libya fit this description under the Idrissids, but after 1969 Mu'ammar Kaddafi launched his famous *jamahuriah,* or republic of the masses,

without lessening Libya's dependence on petroleum exports. At the time of writing, Libya's post-Kaddafi future is unclear. In addition to Libya this group includes Saudi Arabia, Oman, the UAE, Qatar, Bahrain, and Kuwait. Saudi Arabia has grown to substantial size in terms of population and, as the world's leading petroleum exporter, in terms of GDP as well. In the 1970s and 80s, the Saudi government even built an agricultural sector through lavish subsidies and at the cost of depleting its aquifers. The rest are more like city-states, funded by export revenues, and dominated by their public and private service sectors. My colleague, Alan Richards, has called them the "coupon cutters" as they have sought to insure their non-oil and gas futures by investing in foreign assets through some of the largest sovereign wealth funds in the world (Richards and Waterbury, 2008: 67-69).

Until 2011, the economic diversity of the Arab world was, however, greater than its political diversity. Most Arab states clustered on the authoritarian end of any spectrum. For example Freedom House categorized all but four Arab states as "not free". The four exceptions—Morocco, Djibouti, Comoros, and Lebanon were categorized as "partly free" (along with Turkey). No Arab country was categorized as "free".[2] These categorizations are fairly crude and quite time sensitive, but they do depict an authoritarian universe in which formal checks and balances were minimal, civil rights abused, and alternance in power quite rare. These observations hold whether or not the regime is otherwise classified as conservative, moderate, or radical, pro-Western, until 1989, pro-Soviet, and perhaps now, radical Islamicist (of which Iran is the exemplar, albeit non-Arab).

FIGURE 2 - FREEDOM SCORES, WEIGHTED BY POPULATION SIZE: THE ARAB REGION AND OTHER WORLD REGIONS, 1999-2000 (AVERAGE VALUES)



Source: Building the Knowledge Society, Arab Human Development Report, 2003, p. 28.

These countries also share a high degree of vulnerability to climate change, although the oil-exporting city-states do not have to worry much about their agricultural sectors which are not economically significant. The peripheral republics are the agro-pastoral poor of the Arab world. Like the rural poor *within* each country, these societies are the most exposed to declining precipitation, exhausted aquifers, desertification, and climate-driven population displacement. If Darfour, in the western Sudan, were a country, it would join this group, but not the Southern Sudan, now an independent country, enjoying abundant water resources substantial fossil fuel deposits.

Finally, to varying degrees, they all share a commitment to social pacts or contracts, that is, a set of educational, health, consumption, and employment benefits and subsidies that dominate the political economies of the Arab world. These pacts have widely been interpreted as a kind of bargain by which citizens receive economic benefits in exchange for political quiescence. In 2011 these pacts began to break down in Tunisia, Egypt, Libya and Syria. It is not clear the extent to which Yemen ever had one. Even if there are successful transitions to greater democracy and accountability in some Arab polities, there are ingrained expectations that revised social pacts will follow. We shall have a great deal more to say about them below.

The Absence of the "Developmental State"

At the time of the first East Asian "miracles", a number of authors (e.g. Samuel Huntington, 1968; Guillermo O'Donnell, 1973; Woo-Cummings, 1999) wrote about the developmental state; authoritarian, corporatist, built on a strong public sector and industrial policies by which the authorities picked manufacturing winners. Park Chung Hee's years at the helm of South Korea epitomized this model. It had an early regional forerunner, at least in my view, in Atatürk's Turkey of the 1920s and 1930s. The main point is that the leadership of developmental states has a long-term vision of industrialization, national strength, and broad-based prosperity for its society, and the leader uses national resources in a consistent, purposeful and non-democratic manner to achieve his/her goals.

The Arab world has not had such leadership. Authoritarianism has been wedded to the distribution of economic rents to favored clients and the use of revenues to finance social pacts rather than in investment. Gamal Abdel Nasser of Egypt flirted briefly with a model similar to the Asian between 1957 and 1966, but the disastrous June War of 1967 put paid to that dream. It is a source of wonderment that neither Iraq nor Algeria, despite their great natural wealth and human potential, could come remotely close to emulating the Asian Tigers. The case can be made that Zein el-Din Ben Ali of Tunisia approximated the developmental state model, but corruption and nepotism reached heights in Tunisia that crippled the experiment and the regime.

2. The Policy Process in the Arab World

The policy process, to borrow a concept from international relations, is a two-level game. At the first level, public authorities devise and apply policies in order to shape the behavior of citizens in ways the authorities judge useful or productive. The citizens may or may not share the preferences of their leaders. Policies, in essence, structure incentives and disincentives, encouraging people to act in certain ways and punishing them if they fail to do so. A tax on gasoline may be designed to encourage public transport, discourage the use of the private automobile and punish, exorbitant outlays on gas, those who continue to drive gas guzzlers. At the second level, we must try to understand the incentive system(s) within which the policy-makers themselves function. In the macro-political sense, what are they trying to achieve, what must they avoid, and what are the rewards and punishments for each? In all respects, level two dominates or at least heavily influences level one.

When it comes to the policy process in the Arab world, the gentles objective used to describe this policy process in most Arab polities is "opaque". Rarely do we get a sense of the interplay of public opinion, interest groups, legislatures, executive authorities and international actors that set agendas, formulate policies, and apply them.[3] There are a number of reasons for this. Until 2011, various forms of authoritarian governance prevailed in the Arab world (a phenomenon that has spawned an extensive literature in its own right: see: Elbadawi and Makdisi, 2007; Ottoway, 2008; Brownlee, 2007; Baakalini et.al., 1999; Poususney and Angrist, 2005; Schlumberger, 2007, Owen, 2012; Brown, 2012;). Accountability and transparency are notable for their relative absence. Because so many regimes are dominated by stakeholders in the security and military apparatus, many policy issues are 'securitized', falling, it is claimed, into the no-go zone of national security. Indigenous scholars, concerned for their long-term survival, do not or cannot undertake research on policy issues that are deemed sensitive. The stakeholders themselves seldom write about the agenda-setting and decision-making process because to do so would be dangerous for them as well, or they do not have the habit of recording the processes in which they participated (a notable exception is Majali, Anani and Haddadin, 2006). Outsiders who may be privy to these processes, like World Bank or IMF experts, are bound by confidentiality agreements with host governments.[4] The Arab world has apparently taken to heart Bismarck's famous warning that no human should ever be obliged to observe the making of sausage or of legislation.

What we have in abundance are studies that chronicle policy changes and derive from what happened who the stakeholders were and which ones prevailed. This is quite different from and less satisfactory than direct observation or participation. Such derivations may or may not be accurate, but they do conform to the observed facts. These analyses are in essence *post hoc* rather than predictive. We also have in abundance studies that state what *should be done,* but they tend to be de-contextualized and do not suggest how the recommendations can be implemented. For example in the 2010 *World Development Report: Development and Climate Change*, the authors state:

> "Climate change requires public interventions to address the multiple market failures driving it—the failures of pricing; of research and technology development;

> and of coordination and collective action, global, national and local. As providers of public goods and correctors of externalities, governments are expected to address these market failures." (p.330)

Equally prescriptive is the EU Water Initiative report on integrated water resource management (2009: 24)

> "Lack of support and high-level leadership and commitment—often underlain by a lack of understanding as to what a strategy is and how to go about it—is the primary obstacle in getting the process off the ground. And without a broad base of support—from the prime minister down to the farmer in the field—successful implementation is unlikely".

There is an assumption in these and many other studies (see, for instance Saleth and Dinar,2004; 336) that the state must play a lead, even dominant role in the environmental and climate change policy domains. This is at odds with another major theme in the literature, that the policy process must be built on local communities with real feed back and in-put from "end users".

III. Learning from Past Reform Efforts

1. Structural Reforms and the Rise of Rentier States

To date, we have very few empirical analyses of environmental/climate change policy initiatives in the Arab world.[5] Therefore we must turn to the past and hope that it is relevant to the future.

Implicit and explicit political economy studies of the Arab world go back to the 1950s and the era of early post-colonialism. A major initial focus was on land reform and agrarian change as the region was still dominated by peasant-based agriculture with highly skewed land distribution (e.g., Egypt, Morocco, Algeria, Syria, Iraq, Iran). By breaking up landed interests, new, often military regimes, destroyed the resource base of their major adversaries, or, as in the case of Morocco, co-opted them.

These studies segued somewhat later into analyses in the spirit of the *dependencia* school of Latin America that argued that the economies of the newly independent nations (or not so new in the case of Latin America) remained enthralled to the post-industrial economies of the "north" and would not be likely to see real, diversified development whatever their national plans might say to the contrary.

The late 1970s and1980s was a watershed period for the political economy of the Arab region. On the one hand for the non-petroleum exporting countries, the bills came due on their social pacts and import-substituting industrialization strategies. Following in the footsteps of Turkey, several of the larger Arab states wrestled with fiscal crises and structural challenges in public finances (Egypt, Morocco, Sudan, Jordan, Algeria, Tunisia: Iraq spent the 1980s at war with Iran). Structural adjustment, subsidy reforms, and eventually privatization all appeared on policy to-do lists. For the petroleum-exporting states, the collapse in international prices put their public finances under severe strain and limited their ability to absorb labor from their oil-poor neighbors.

An important lesson is that in the face of prolonged economic crisis, Arab regimes did respond with policy initiatives, and they were painful. Social pacts were hollowed out, some public assets transferred to private ownership, and some timid political liberalization tolerated as a means to let off social steam.[6]

There is one clear lesson to be drawn from this period of structural reform. Decision-makers were far more responsive to external pressures than to domestic components of social pacts. The joined threats of debt default, lowered credit ratings, and hesitant private foreign investment were enough to elicit significant and difficult policy responses.

This period spawned a rich literature on rent-seeking states (for example, Luciani, 1990, Chaudhry, 1997) dealing mainly with the oil-exporting polities of the region. A fundamental proposition emerging from this literature was that states that relied on external rents (in addition to petroleum revenues, transit fees, worker remittances, strategic rents and external aid) did not develop the institutions of accountability that arise when governments rely for their revenues on taxing their citizens. Less attention was paid to domestic rent-seeking, the product of the heavy hand of the state in all parts of the economy (see Waterbury, 1993).

The first wave of 'rentier' literature stimulated a significant reaction, suggesting that the 'resource curse' does not itself produce authoritarianism and unaccountability but rather the natural resource rents are used to re-enforce existing authoritarian institutions (Ross, 2001; Herb, 2005; Lowi, 2009; Hachmaoui, 2012).

A fairly constant theme across all decades was a concern for the coalitions of interests that sustained regimes, and, in a broader sense, the public resources devoted to maintaining social pacts. With respect to the former, the key coalition interests were often seen as the military and intelligence establishments (inter alia see Droz-Vincent, 2007; Cook, 2007; Haddad, 2004 and 2012; Heydemann, 2004: 8; Roberts, 2008, Lowi, 2009). With respect to social pacts, the literature is extensive (inter alia: Heydemann, 2004 and 2007; Posusney and Angrist, 2005; Shetty, 2006; Richards and Waterbury, 2008: 344-61; Wurzel, 2004). Within this literature there has been considerable attention paid to organized labor as part of corporatist authoritarian structures (Aidi, 2009; Paczyñska, 2009) and to business interests (Catusse, 2008; Bellin, 1991; Sowers, 1999; Perthes, 1992), and to agrarian constituencies (Binder, 1978, Leveau, 1985; Sadowski, 1991, Swearingen, 1987; and Hinnebusch, 1990; Beinen, 2012). A common effect of social pacts was to placate urban constituencies. That lead to a kind of pricing vicious circle: the price of water to farmers had to be kept low to off-set the low producer prices paid to farmers which in turn allowed cheap agricultural products to find their way to urban consumers (Shetty, 2006: 9). Charging "fair value" for water would undermine this set of incentives and its major beneficiaries.

The erosion of social pacts and the opening up of the economies to private foreign and domestic investment led to a spate of literature on what is best called crony capitalism. As the energy of the socialist-populist regimes ebbed and their public finance base eroded, the move toward market liberalization in the 1980s and 1990s gave rise to rigged markets and rent-seeking opportunities bestowed upon favored private sector actors and key regime props in the military and security establishment. Social pacts were maintained, accounting on average for 25% of government expenditures (Abdel Gadir, 2009: 16), but the quality of social services in health, education, housing, and transportation steadily deteriorated and the value of consumer subsidies inflated away. At the same time new regime "cronies" fully understood that the price of their good economic fortune was political docility.[7]

2. Lessons Learned

Understanding the dynamics of accountability is essential to understanding the structure of first level incentives for political leaders. The strong and persistent trend toward authoritarianism in the Arab world means the formal mechanisms and institutions through which citizens may hold their political leaders and authorities accountable are weak. Formal instrumentalities include legally recognized lobbies and interest groups, elected legislatures with defined powers to check the executive, an independent judicial system, an independent central bank, public opinion, compliance with international agreements and conventions, and conditionalities placed on external assistance or investment. I will give explicit consideration to some but not all of these instrumentalities below.

There are always present *informal mechanisms* of accountability, but they do not have predictable effects and generally bear high transaction costs. Typical among them are non-compliance with rules and regulations, (including the development of parallel and black markets), untaxed informal sectors, out-migration of skilled and unskilled human resources, and capital flight.

Weak accountability is a two-edged sword. It may afford political leaders the ability to take bold and sometimes unpopular actions (Saddam Hussein was proficient at that) or to remain relatively passive even in the face of discontent or immanent crisis. I argue that weak accountability in the Arab world is more likely to lead to passivity than to bold action.

In the sections below I will try to relate the principle forces of accountability to parts of the climate change policy agenda.

2a. The Role of Interest Groups and Advocacy

Lobbies and interest groups exist in the Arab region. Some are officially recognized, indeed created by the political authorities (trade unions, agricultural cooperatives, business associations, etc.) and form part of the corporatist infrastructure of the state. Alongside and sometimes overlapping with these organizations are the networks of 'cronies' specialized 'mafias', and rent-seeking public officials often closely wedded to the military and security apparatus (inter alia, Haddad, 2012).

It is generally proposed that because of the authoritarian nature of the state, formal and informal lobbies tend to try to shape policy ***after*** it has been announced, rather then trying to influence the initiation and formulation of policy before it is announced.[8] The avenues for *ex ante* lobbying may be closed save to a select few on the inside. *Ex post* lobbies can ignore, distort or bend policies more in their favor. *Ex post* influence takes the form of trading for exceptions and exemptions (including using bribes), and ignoring the policy and paying weak penalties. For example, Lebanon has strong laws regulating private quarries that are routinely violated by quarry owners. Zoning laws, especially on the development of sea front properties are likewise frequently ignored or subject to exemptions. Some environmental problems, such as municipal waste, are hardly regulated at all (Armstrong, June 16, 2012).

Epistemic Communities

The intersection of international organizations, part of whose mission is to affect climate change and environmental sustainability, with national bureaucracies and NGOs with similar mandates, may lead over time to the formation of what Peter Haas (1993) called "epistemic communities". These are interest groups or lobbies of a very special kind. They often share professional training, organizational mission, access to funding, and a certain level of legitimacy through international conventions. They form loose international networks that overcome any sense of isolation individual units might feel, and they keep all members up to date, fortified with the latest analyses and news. Unlike, farmers, business persons, and line bureaucrats, they have not been around in many instances for more than two or three decades, but they can act as persistent advocates within the policy-making confines of individual states. Significantly, they do act *ex ante*, attempting to shape policies before and as they are made.

Their professional *raison d'être* is to pursue a set of environmental goals and to build indigenous capacity and expertise. Their performance is judged by their success, and they are paid accordingly.

The list of acronyms in any publication focusing on climate change in the Middle East (or elsewhere) gives a sense of the size and scope of the epistemic community that is taking root. When backed, as is often the case, by multi-lateral or bi-lateral sources of assistance and finance, and in conjunction with national actors, local and regional NGOs, these organizations, over time, may produce an expert community with the resources, the analyses, and the leverage to extract policy initiatives from decision-makers who might otherwise focus on other priorities. *The epistemic communities assembled around environmental issues is increasingly large and influential and is reflected in UN agencies, bi-lateral aid groups, and NGOs. Because, so far, they have not been regarded as politically threatening, they are having increasing influence over policy-making in the environmental area*.

Salwa Gomaa (1997) has written one of the rare empirical analyses of how environmental policy is made, in this instance in Egypt. The long process that lead to the National Environmental Action Plan in 1992 was orchestrated and choreographed by the World Bank, strongly assisted by national experts, like Mostafa Tolba, the first director of UNEP. Jeannie Sowers (2007, 2008, 2012 and forthcoming) has presented a nuanced analysis of contemporary environmental policy making in Egypt that stresses ad hoc alliances of government agencies, NGO-s, "bi-lateral activists" linking governmental agencies to donors and NGO-s, and mobilized civil society organizations, brought together by specific projects. By the same token, Sowers suggests, once the project is completed or defeated, the glue for the coalition dissolves. The sum of the parts she analyses is less than what Haas and others consider to be epistemic communities but nonetheless significant and occasionally effective.

Mohammed Doukkali (2005) provides a less detailed analysis of Morocco where the process has advanced further since he wrote. On July 30, 2009, King Mohammed VI, in his speech from the throne, called for a national charter for the protection of the environment and natural resources (Touahri, 2009). His call was prompted by a report of the High Commissioner for Water, Forests and Anti-Desertification that warned that global warming was causing annual losses to the

Moroccan economy equivalent to 2% of GDP (*al-Hayat*, Aug. 20, 2009). This high-level commitment came through the cumulative process of expert communities presenting a convincing argument for change. In *Making the Most of Scarcity* (2007: 118) the World Bank authors summarized the process across the MENA region:

> "Since 2002, local and international experts, in collaboration with the Mediterranean Environmental Technical Assistance Program and the World Bank, have calculated the costs of environmental degradation in several MENA countries, combined them, and expressed them as a share of each country's GDP. They presented these results to the Ministries of Finance and Economy as well as relevant line ministries... These simple but powerful messages have been one factor tor catalyzing important changes. After seeing these figures, the government of Algeria increased its budget for environmental protection by US$450 million and revised its environmental investment priorities."

Public Opinion and Awareness

For policy advocates in the communities analyzed above, there is the assumption that public awareness of environmental issues is low, but that, with time, informed public opinion can play a positive role in moving decision-makers to take action. If true, this could have three effects. 1) to persuade individuals to change their own habits in ways that serve adaptation and mitigation 2) to make the public more receptive to policies for environmental protection and to measures of adaptation, and 3) to exert public pressure on political authorities to take such measures.

The most fine-grained study of public opinion on environmental issues that we have is Hopkins (2001)--a survey of over 2,300 Egyptians in four locales—three in or around Cairo and one, semi rural in the Delta (see especially Chapter 7 "The Politics of Environmental Action"). Table 38 in that study showed that a majority of all respondents (73% in the rural site) felt the government has done nothing to clean up the environment; 60% felt that those they know, including themselves, were very or to some extent concerned by environmental issues (Table 39) and around 70% felt that there is really no one who can help with an environmental problem. There was evidence in all locales of self help efforts and fund-raising to remove garbage, repair water infrastructure, improve street lighting, etc. (135). Of the 2,300 sampled only 91 had ever filed a complaint about pollution, and of those only 16 said they had received positive action (141).

The environmental issues most talked about, understandably, are the most palpable, visible, and bothersome: noise, garbage, polluted water, air pollution, industrial dumping, rodents and insects. The common denominator is the ability of all these symptoms to affect one's health negatively. People believed that they have a "right" to clean air and water (157). This focus on the immediate and the local means that the 'cause' is seen as other people, not anything so amorphous or abstract as GHG emissions or global warming. Ultimately they see solutions lying in correcting their own behavior (164). Obviously, many problems cannot be dealt with locally, but demands to public officials for action will be evoked by 'crises' that impinge on daily life. Anecdotal evidence from Syria shows that for some climate change is as relevant as two planets colliding in outer space

(Qabbani, 2010) IBy contrast, in the summer of 2010 frustrated Iraqis went into the streets of Basra after repeated power outages. They demanded continuous supply of power, not measures to protect the environment or reduce GHG emissions.

In general, the problem is not lack of information. Tolba and Saab (2006: 37) reporting results from a pan-Arab survey, note that 89% of respondents believe that humans are a primary cause of climate change; 51% believe that governments are not doing enough to meet the challenge; 93% proclaimed willingness to take personal action (but not including paying additional taxes). Awareness, in the absence of positive or negative economic incentives, will not lead to public pressure for policy change. [9]

The Military/Security Sector

The military/security sector is frequently the locus of policy-deliberation and policy-making in the Arab world. It is the mother of opaqueness, so we do not really know if there are established processes for policy assessment and decision-making. We do know that the stakeholders in this sector tend to throw a security blanket over almost all policy-making. That would seemingly present an opportunity for getting the stakeholders' attention to issues of climate change if its effects have security implications, as it surely does (Brown and Crawford, 2009: 9-15; Trondalen, 2009?; Eckstein, 2010). In 2003 US Dept. of Defense officials saw sudden climate change as having a direct, negative effect on US security and described Darfour as the first climate war. Tom Friedman tried to link the Arab uprisings to climate change (Friedman, 2012), citing the multi-year Syrian drought as a cause of the Syrian civil war. Some advocacy groups must hope that the defense/security establishments of the Arab world could be drawn to similar conclusions (mass migrations, collapsing agricultural production, over-loaded power grids, etc.) thereby wedding the *mukhabarat* with the tree-huggers.

Examining the climate change-conflict linkage, Bernauer, et.al. (2010) posit a causal sequence of climate change impacting economic welfare negatively, leading to conflict. Although they accept the "stylized fact" that poverty breeds conflict and war (10) they find no statistically significant correlations for that proposition. Subsequent statistical analyses in *The Journal of Peace Research* (Gleditsch, 2012; Koubi, 2012) confirmed the absence of any firm correlations between climate variability and the incidence of violence or armed conflict whether domestic or inter-state.

Because the processes that might threaten national security in several Arab states are already under way, the military/security sector has probably already demonstrated the level of concern that we can expect in the future. Indeed the Government of the Sudan has allegedly done much to exacerbate security problems in the Darfour region, and the decades-long civil war it fought with the Southern Sudan resulted in that region's independence and untold environmental destruction.

Orenstein, Jiang and Hamburg (2011) have argued that demographic engineering in several states, both in and outside the MENA, have aimed at moving portions of majority populations into sparsely-settled, semi-arid peripheral zones inhabited by ethnic or religious minorities, at the expense of the environment and in contradiction in some instances to national legislation (both

Israel and China). In these instances security concerns are in direct contradiction to environmental policy and trump it.

Unanticipated population movements might be the single most important security threat, especially if such movements are across borders. These may be caused by drought, famine, or sea level rise. By definition, to deal with them would require coordination with other states in the neighborhood, but heretofore the record for such coordination has been meager (see Section 2b).

The most that can be said is that the military/security sector will not be hostile to adaptation measures, but it will not take the lead in advocating them. Waving the security flag has not impressed that sector in the past and is not likely to do so in the future.

Conventional Interest Groups

Those groups that have some coherence are not likely to lead the fight for policies of adaptation. The few examples we have suggest that *ex ante* policy advocacy will occur when organized interests press an agenda that brings specific and tangible benefits or wards off and dilutes policies that may be harmful. Paczyńska (2009: 7-8 and 189) documents the decade-long struggle of the Egyptian Trade Union Federation to shape the labor content of Law 203 on public enterprises. Similarly, Cammett (2004) traces the efforts of two textile business groupings in Morocco, one lobbying for protection of local industry and the other for lowering tariffs.

Agricultural lobbies represent some interests in the sector that uses the bulk of the region's water and which stands to suffer the most from global warming. In *Making the Most of Scarcity* (2007: 67), the World Bank authors note approvingly the gradual strengthening of agricultural lobbies, particularly in the horticultural export sector. They argue for a peculiar dynamic by which the state encourages the strengthening of such groups on the assumption that they will in turn lobby the public authorities for greater water efficiency (65).

The evidence to sustain this argument is weak. In the 2002 report of the Knesset on Israel's water sector (Magen, 2002), the "agricultural lobby" is singled out again and again as responsible for blocking policies to raise the cost of water to farmers as well as for routinely pumping aquifers well beyond their rate of re-charge. Shetty (2006) decries subsidies in several states that support production of rice, sugar, poultry and beef which he sees as totally inappropriate for a region that is severely water-stressed. Haddad (2004: 63) notes successful lobbying by agrarian interests in Syria for favorable exchange rate and credit policies, but observes more generally "(M)embers of these networks have not been keenly interested in policy reform as such because the existing policy environment does not constitute a barrier to them."

Recent developments in Jordan provide an important microcosm of the interplay of farm lobbies and policy makers. In 2008, after years of a region-wide drought, Jordan issued a new national water strategy to the year 2022. The most startling aspect of the strategy was the relegation of agriculture to third place in the priority of water use, after human and non agricultural needs (see Jordan Water Strategy). This strategy did not require parliamentary debate and approval. It was an

executive act, and as such a relatively rare instance of the use of authoritarian leverage for a bold initiative. It is well known that districting for parliament in Jordan favors rural constituencies, and that the commercial growers of the Jordan Valley (sometimes referred to as the Banana Kings) constitute a powerful interest as do Bedouin cultivators of the high plateau.

There is therefore skepticism that this top-down strategy will survive the *ex post* machinations of farm lobbies to dilute or circumvent it. Already efforts to meter agricultural water use and to introduce significant charges for use have met with a broad range of largely successful efforts to disable the meters or to pump above quotas (see Venot, et.al, 2007).

2b. The Role of Crisis in Policy-Making

Crises may be seen as a non-institutionalized (and generally unanticipated) mechanism to hold decision-makers to account, generally for what they failed to do. What do we know about the role of crises in moving Arab political leaders to take action?

Crises may be necessary (Saleth and Dinar, 2004: 182) but insufficient drivers of policy initiatives. One is tempted to say that in the Arab region crisis, of one kind or another, has been the norm for at least half a century. Conventional wars and civil wars have prevailed over decades and are crises in themselves. They have, in turn, triggered population movements of large proportions in short periods of time: the Palestinian refugees after 1948 and 1967, partially absorbed into the societies of Jordan, Kuwait and Syria; Yemeni and Palestinian refugees driven from Saudi Arabia and Kuwait back to Yemen or to Jordan at the time of Iraq's occupation of Kuwait; hundreds of thousands of Iraqi refugees who fled to Jordan and Syria after 2003, perhaps 400,000 to the former and 1.2 million to the latter. In 2012 tens of thousands of Syrians fled civil war in their country to seek refuge in Turkey, Jordan and Lebanon. Over decades of civil strife millions of Sudanese have sloshed about their country, often winding up in Khartoum. Both the causes and effects have imposed a heavy price on Arab regimes, but not much has been done to weaken the causes or alleviate the effects. Why, one wonders, would population movements induced by climate change elicit different policy responses?

Climate change will bring about gradual, albeit negative effects. The effects will be hard to distinguish from processes already underway and to which Arab societies have become accustomed. As we noted above, it is abrupt change that occasionally ignites the Arab 'street', and even then political authorities have not often been moved to change course.[10]

IV. The Climate Change Policy Environment

The Arab region is faced primarily with the challenge of adaptation, and only secondarily with mitigation. The region 's contribution to global GHG emissions rose from 4.5% in 1990 to 6.4% in 2005 (Babiker et.al., 2011), but it boasts some of the highest per capita emissions and the highest emissions intensity to GDP in the world. The variations with the Arab world are huge with Qatar having one of the world's largest per capita carbon footprints and Yemen one of the world's smallest. The GCC countries produce 85% of the region's GHG emissions (see Arab Human Development, 2010; OECD, CO2 Emissions, 2009).[11] Efforts at mitigation will not have a significant impact on global emission reduction.

Adaptation will take place, either guided by public policy or in an unguided, potentially brutal fashion. What may discourage political leaders from engaging in explicit policy-making is that adaptation is micro in nature, requiring high managerial in-puts; it depends on what-if arguments; it could be costly and the costs are front-loaded; policies could fail; and, even if successful, it will be hard for leaders to take credit for what did not happen (Tolba and Saab, 2009: xii) The single most important disincentive to policy action is that such actions may be swamped by the failure of the leading global emitters to reduce their emissions sufficiently to slow global warming.[12]

1. The Feasibility of Doing Nothing

I will posit that 'going through the motions' or doing the equivalent of nothing is a viable political strategy and may be attractive *unless* there are sufficient incentives, mainly economic and financial, to induce real commitments to adaptation.

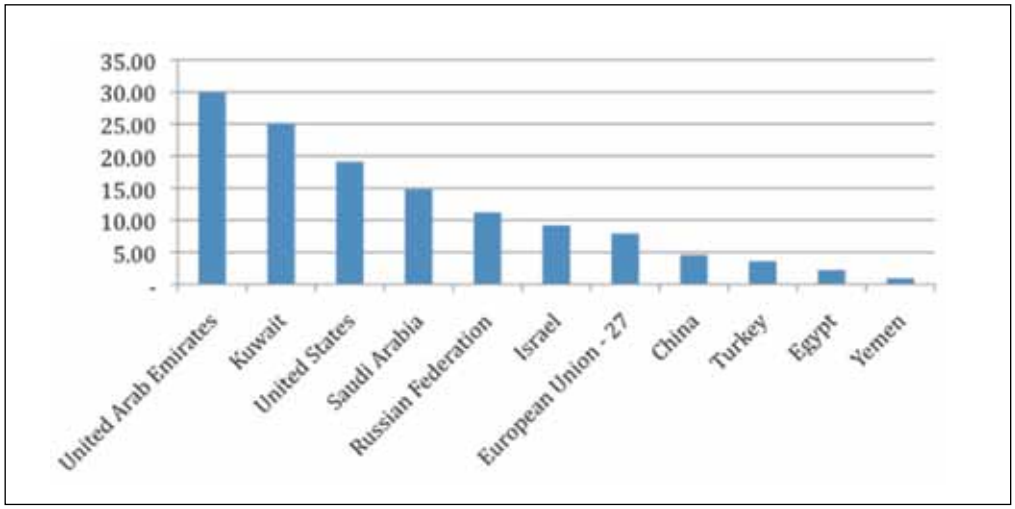
Environmental disasters unfold slowly, at least as measured by political clocks, and therefore may go without explicit policy response. One could take the desiccation of the Aral Sea, Lake Chad, or the Dead Sea as metaphors for doing little or nothing while the attendant ecological disaster has been abundantly documented and measured.[13] The process is spread over decades, and its victims are left to fend for themselves. They bear the cost of adaptation, not the decision- and policy-makers. This is not to say the crisis is ignored: to the contrary, it is talked and written about extensively, but the response is more theatrical than substantive.[14]

The NGO and donor communities, in particular, approach these environmental and human welfare crises with an understandable sense of urgency. The bibliography of this study is replete with calls for action, the prediction of dire consequences to inaction, and denunciations of business as usual. For example, the International Alliance of Research Universities in one of its six *key messages*,

warns "Inaction is Inexcusable" (Richardson, Katherine, 2009: 6). But business as usual (BAU) *is* feasible (if not excusable, the status quo *is* viable in the medium term, and the political appeal of inaction is substantial (on the bias toward the status quo, Saleth and Dinar, 2004: 105).

The attractiveness of BAU will be magnified by the likely behavior of the major GHG emitters (China and the US in particular). Annex I countries of the Kyoto Convention were to lower their emissions by 5% over the 1990 level by 2012. In fact over the period 1992-2008 global emissions of GHGs rose by 36% (UNEP, 2011). During that period China overtook the US in total GHG emissions. Copenhagen (December 2009) did nothing to improve the situation; neither the US nor

FIGURE 3 - CARBON DIOXIDE EMISSIONS PER CAPITA, 2007, FOR SELECTED COUNTRIES



Source: Figures from International Energy Agency Report, 2009. "Co_2 Emissions from Fuel Combustion," which conducts national energy emissions inventories according to IPCC guidelines.

China made explicit commitments to specific, verifiable reductions, and the US Congress, emerging from the November 2010 elections, has been in no mood for either a carbon tax or for cap and trade. It will be easy and accurate for inactive politicians in the Arab world to point fingers at the real culprits (the US and China), and, at the same time, let vulnerable populations adapt as best they can with minimal help from the state. In the extreme case, some island states and societies may simply cease to exist. The old adage—think globally, act locally—if followed, may be an exercise in futility.

Thus what we may see is a form of what Herbert Simon (1956) called "satisficing"; in return for material incentives, stakeholders do the minimum to keep the resources (inadequate to the challenges at hand) flowing and the donors 'satisfied', while the donors can claim to have done their 'duty'. Neither donors nor recipients seek to optimize. Instead they minimize political risks and discount environmental risks. I posit that the global financial crisis post 2008 has re-enforced the "satisficing" option. Not even politicians in solid democratic systems are willing to advocate mitigation or adaptation measures that can be labeled as "job killers". The Rio +20 conference in June 2012 can be seen as an exercise in "satisficing".

Below I present a matrix for assessing risks related to adaptation policies. They are meant to be illustrative, that is, how Arab decision-makers might assess the relative urgency of different courses of policy action. In the adaptation matrix, the cell of 'hi impact' and 'hi probability' is one over which Arab countries have very little influence, as opposed to China, the USA, and the OECD.[15]

FIGURE 4. RISK ASSESSMENT FOR ADAPTATION POLICIES

	Lo Probability	**Hi Probability**
Lo Impact	locust swarms in the Levant	wind erosion
Hi Impact	tsunamis	GHG emission increase/tipping points

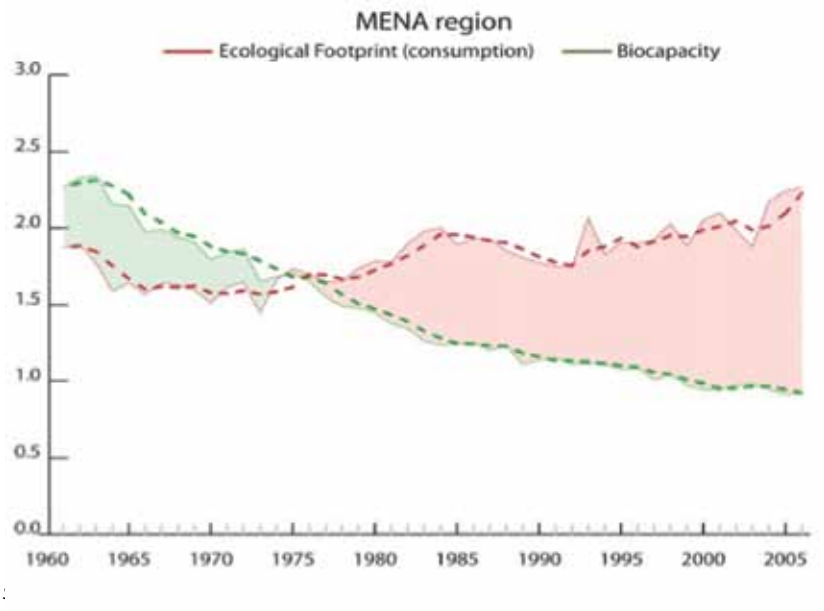
The Precautionary Principal urges those responsible to plan for the worst case or at least a bad case. If the likelihood of the worst case is small or if the costs of the worst case are to be born by future generations, then action today is unlikely. *The Arab region cannot influence the probabilities of the worst case, and its record with social pacts indicates that if favors current over future generations*.[16]

2. Adaptation: the Art of the Possible

Arab countries are not alone in this calculus of inaction, but a number of seemingly minor actors, such as Sweden and Portugal, have nonetheless implemented policies of adaptation and even of mitigation. In the Arab region, Abu Dhabi, through its MASDAR initiative (AHD, 2010; Mills, 2010), aims to reduce its GHG emissions by one third by 2020. So while I have presented the logic for doing nothing, I do not think that logic will necessarily prevail, especially because so much is already under way. Indeed, Babiker et.al. (2011) argue that inefficiencies in energy use in the Arab world are so great, ranging from 8% of total energy supply in Morocco to 17% in Saudi Arabia and 42% in Bahrain, that it would be cost-effective to pursue policies to reduce energy use. Such mitigation, however, would have marginal global impact.

The Arab world has long experience in dealing with many of the effects that we associate with climate change. They have been manifested in the Arab region perhaps longer and more obviously than in other parts of the world (although the great Sahelian drought of the late 1970s certainly rang the alarm bells in West Africa). In this sense the Arab region's misfortune is also its policy advantage.

FIGURE 5. THE ECOLOGICAL FOOTPRINT AND BIOCAPACITY OF THE MENA REGION SINCE 1961



The problem some decades ago was seen in a neo-Malthusian framework—too many people putting pressure on too few resources, especially land and water resources. Many Arab countries adopted policies to remedy the threats, if not overcome them. These policies may not have registered the successes that had initially been hoped for, but they are in place, a great deal of learning has gone on, and there is a corps of experts now in place who understand the challenges well.

Therefore in approaching climate change one should build upon what is already there. This approach has the advantage that it requires no major adjustments to the existing alignments of interest groups and key constituencies, it has low "shock" value, and it minimizes political risk. One is doing what one has done for a long time, only trying to do it better. It does not require the Arab world to solve all its accountability problems, or overcome its 'democratic deficit' before moving forward. It works within the existing incentive structures of political power-holders.[18]

Let us review challenges for which policy is already in place, areas where new policies can take off from older policies, and areas in which new initiatives are needed.

FIGURE 6. POLICY BUILDING BLOCS TO ADAPTATION

Existing Challenges	Building areas	New Challenges
sea level rise	regulating private wells	renewable energy
soil salinity	water/ fuel subsidy reform	CSS
subsidence	water user assoc.	no till agriculture
eutrophication	pricing reforms	urban energy efficiency
declining precipitation	drip irrigation	pub transp. fuel cells
declining snow pack	desalination	waste mgment./ methane
drainage water re-use		carbon sinks
waste water treatment		bio fuels
aquifer over-draft		trading CERs
transboundary water		precision agriculture
erosion/desertification		Environment taxes and abatement subsidies
ruminant management		

The issues listed in the left hand column are subject to existing policies. Systematic assessment of these policy areas should be undertaken, preferably region-wide, to determine successes and failures, and then to introduce necessary corrections.

The center column contains issues for which there is some policy in place but in which progress has been minimal. They have significant implications for adaptation and should be greatly strengthened.

Finally, in the right-hand column we have areas for which new policy is needed. This column requires some commentary.

The major oil exporters are all looking to a post-fossil fuel future, and in the meantime they see renewables (wind and solar) as tools to increase their export of fossil fuels. Saudia Arabia is interested in carbon capture and sequestration (CCS) partially because it can help in oil recovery from existing wells. Algeria has one project for carbon capture and sequestration (Carbon Sequestration, 2009) and Abu Dhabi plans to capture carbon from a steel plant and inject it in an on-shore oil field (Yee, 2012). Egypt has moved into wind farming with a 550 MW farm at Zaafran (Viney 2012) while Desertec, backed by Deutsche Bank and Munich Re, envisages a series of North African solar projects to supply up to 15% of Europe's energy needs. Turmoil in Tunisia and Libya and the economic downturn in Europe have disrupted this project (Neuhof, 2011). Syria, prior to the uprisings, committed over $1 billion for developing renewable energy sources. More such initiatives are needed, and, as we shall see below, may well be affordable and make business sense.

A few Arab countries have introduced pollution abatement subsidies (Algeria, Jordan, Morocco) and Algeria, to date is the only Arab country to tax leaded fuels, hospital waste, and storage of industrial waste (Maradan and Zein, 2011).

2a. Agriculture and land management

Water is rightly viewed as the most critical variable in the region's climate change equation. The region has long been water-stressed and in the coming decades may lose 25% of its renewable supplies as a result of climate change. Obviously the agricultural sector, using on average about 80% of available supply, is the sector in which adaptation must be focused. Relatively small gains in water use efficiency in agriculture mean huge quantitative gains that can be used in other sectors.[19] That is the logic of Jordan's water strategy mentioned above.

The basic challenge, especially in the irrigated sector, is to move to "precision agriculture" (Gebbers, 2010). This is essentially water-efficient cultivation involving covered, pressurized delivery systems, drip irrigation, and monitoring soil moisture through remote sensing, coupled with new varieties of drought-, salt-, and heat-tolerant seed (see also Assaf, 2009; Ben Gal, 2006; Godfray, 2010; Rayman, 2010; and Tal, 2006). Precision agriculture is expensive. In Israel computerized drip systems require investments of $2000-$3,000 per hectare, and the pay-back period is about seven years. (Ben Gal, 2006: 26) Precision agriculture may also involve no-tillage cultivation that keeps bio-mass in the ground and requires labor-intensive weed control. Making production more water efficient must be accompanied by improved storage and marketing infrastructure.

By some estimates if in the coming decades the lowest producing farmers of the world could attain 80% of the production levels of the highest producers, then the projected increase in world demand for agricultural products could be met (Marris, 2008: 274; Barrett, 2010). So the policy challenge is at least two-fold:

1. to elaborate agricultural strategies that combine water efficiency and high-value crops, and

2. to help marginal rural producers, especially in pastoral communities and rain-fed agriculture, to survive, if not prosper.[20]

From the point of view of political leadership, the risk is that poor farming communities will not be able to afford the investments needed to make the transition to precision agriculture or even up-graded traditional agriculture. In several Arab countries up to 20% of the labor force, and much more in Morocco, Sudan and Yemen, is employed in agriculture. In addition, most of those living in poverty are rural. In and of themselves these populations do not carry much political weight. In the past four years 1.3 million Syrians living in the northeast were severely affected by drought, 160 villages were abandoned, and 85%of local livestock lost without immediate political repercussions (Brown and Crawford, 2009: 26; Worth, 2010). It is not clear if these displaced populations played any direct role in the Syrian uprisings of 2011/12. It may be that decision-makers in Syria and elsewhere will leave these populations to pay the costs of adaptation with whatever survival strategies they can find.

Labor-intensive production processes are one way out. In East Asia the low-wage agricultural labor force provided the labor for competitive, export-oriented industries (South Korea, Taiwan, China,

Vietnam). This labor is also available for export-oriented, specialty agriculture using a blend of capital- and technology-intensive processes coupled with large labor in- puts. In the MENA region horticulture requires in some instances 120 hours/yr per hectare, ten or fifteen times the requirement of an hectare of wheat (World Bank, 2006) . [21]

- *Conservation Agriculture*

There are viable strategies for rain-fed agriculture combined with animal husbandry. R.J. Thomas of ICARDA (2008) has outlined many of the possibilities under the rubric of "conservation agriculture" which aims to improve yields while protecting the biological functioning of the soil. This includes no-tillage cultivation, supplemental irrigation at critical moments in the growing season, revised timing of tillage, revised cropping patterns (trade-offs between legumes and coarse grains), controlled grazing, water harvesting, and cultivation of scrub land as carbon sinks.

- *Regulating aquifers*

The over-pumping of aquifers and the proliferation of private, unlicensed and unmonitored wells is increasingly recognized as a major threat to sustainable agriculture in the region. Well over half of Syria's 200,000 private wells are "illegal" (Droubi, 2009: 22), and anecdotally Lebanon has at least 50,000 unregulated wells. Most Arab countries have laws on the books asserting public 'ownership" of aquifer water and stipulating that private use must be licensed and regulated (see Bruch, et. al. 2007 in general and Doukkali, 2005 on Morocco). A major adaptive step would be to recruit the personnel to inventory, license and monitor private wells (not an easy task as Jordan's experience has shown: Venot, et.al. 2007)

2b. Sea Level Rise in Egypt (SLR)

Various parts of the Arab region are threatened by sea level rise, but nowhere more so than in the Egyptian Delta. Depending on the actual rise until 2100, perhaps varying between a half and a full meter, 7 to 11 million Egyptians may be negatively affected. Two million may be forced to move. The affected populations are mainly in farming communities. More than 12% of Egypt's best agricultural lands in the Nile Delta is at risk from SLR of 1 meter (El Raey, 2006; Nicholls and Cazenave, 2010: 1516). As important as SLR is the phenomenon of subsidence in coastal and deltaic areas in Egypt and world-wide. The over-pumping of coastal aquifers leads to subsidence and, although not climate-related, this is a policy area ripe for adaptation (Nicholls and Cazenave, 2010: 1519). The combination of three decades of SLR and subsidence has led to the retreat of the Nile delta at Rosetta of three kilometers (Ghoneim, 2006: 39-40).

The threat to the Nile Delta exemplifies the kind of adaptive policy choices that will face Arab leadership across a broad range of issues. Does one devote scarce resources to protecting the Delta (what we might call the Dutch solution) or does one plan for abandoning parts of the Delta and moving its population elsewhere? Omran Fihry (2003) is one of the least alarmist analysts of the threats to the Delta. He anticipates no sudden catastrophe and forecasts a rise of about 50 cms by

2100. He believes that jetties, groins, and sea walls can contain the problem (130). By implication Ghoneim and El Raey foresee more dramatic effects, including significant population movements.

2c. Prices and Subsidies

This is one of the hoariest and most politically-fraught policy areas. Arab governments have been grappling for decades with the distortions in market signals provoked by administrative prices and producer and consumer subsidies. The implications of changes in existing policies go well beyond adaptation to climate change, but further 'corrections' will be essential to successful adaptation.

Charging directly or indirectly for water in the agricultural sector will lead to reduced use, the adoption of conserving technologies, a shift to more water-efficient crops, and a shift to higher value crops (Shetty, 2006: 8-9). In urban areas in the Arab world "free" municipal water ranges from 60% of total supply in the West Bank to a low of 25% in Tunis (World Bank, 2007: 52). Typically 30-40% of municipal supply is lost in the delivery system.

Fuel subsidies also run in the face of adaptation efforts and mitigation as well. The impact of fuel subsidies on gasoline consumption is striking. The World Resource Institute shows that in 2003 in Iran, where gasoline sold for $US.05 a liter, average per capita consumption was 286 liters per year, while for all middle income countries the average price per liter was $US.52 and average per capita consumption 96 liters.

The value of imported fuel to Lebanon in 2004 was $1.5 billion, or 7.5% of GDP. The transport sector accounted for 42% of the total. Conversion of public transport to hybrid technology and fuel cells, coupled with urban metros and inter city rail service could be important steps in adaptation. The public authorities might well want to take these measures regardless of climate change.

As cost of living protests in several countries have shown, tampering with prices and subsidies is a walk in a mine field. Political leaders worry especially about urban constituents who occupy strategic space in capital cities and ports (see Richards and Waterbury, 2008: 264-88). Their protests may not only cripple economic life, they will be visible to the international media as well. Many of the needed reforms in prices and subsidies will tend to increase the cost of living for urban dwellers, so political leaders may choose to procrastinate (Richards, 2008; Shetty, 2006: 30).

2d. Renewable Sources of Energy

This represents the area of the most radical departures from current policies. At present the oil and gas sector of the Arab region accounts for 40% of total regional gross product (Tolba and Saab, 2009: 15). Fossil fuels have created the symbiotic relations between the labor-scarce, oil exporters of the region with its labor-rich, oil-poor neighbors. As we shall see in the following section, the region's and the world's leading oil producer, Saudi Arabia, while anticipating its own post-oil future, is in no hurry to reach it.[22]

There may be no region of the world better suited for the production of wind and solar power than the Arab world. The bulk of its surface consists in wind-swept, sun-soaked expanses. Morocco and Egypt have taken important steps into wind farming while Syria plans to explore alternative energy sources. By contrast Iraq has set its sights on rivaling Saudi Arabia in petroleum production. The basic point is that the Arab region appears to have a bright future in renewable energy (but **not** including bio-fuels which are water-intensive).

V. Supranational Challenges

The conventional wisdom on the need for regional/international cooperation is well-articulated by Brown and Crawford (2009: 33; see also Daoudy, 2010):

> "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."

International cooperation does not come instinctively or in light of a convincing cost/benefit analysis. It comes primarily in three ways: *after* some sort of cataclysm like World War II; in the face of an apocalyptic threat like nuclear warfare; or when the stakeholders are paid sufficient inducements to overcome their fear of or indifference to cooperation. At present Arab actors are susceptible only to the third.

Even with material inducements, the Arab region will be particularly resistant to supra-national cooperation. Decades-old rivalries have lost little of their relevance in the new millennium. Malcolm Kerr's seminal book, *The Arab Cold War*, appeared in 1965 but remains pertinent today (see also Ajami, 1978/79). Leaving aside the Arab-Israeli conflict which has poisoned the region since 1948, nearly all major Arab states are embedded in multi-state rivalries, some including non Arab antagonists, like Iraq and Iran or Egypt and Ethiopia. There has been a tendency among decision-makers to see the strength of their nation enhanced by the weakness of its neighbors. Cooperation is rooted in the notion of mutual benefit, and while that logic may be recognized in the abstract, it comes up against the thick wall of regional business as usual (Varis and Abou Zeid, 2009: 514-18).

There are a number of areas in which little or no progress toward adaptation can be made without regional cooperation: desertification; watershed management, including reforestation; transboundary management of surface and ground water; sea level rise, air quality including industrial pollution and dust storms. These are areas in which national adaptive measures can be easily swamped by the inaction of one's neighbors.

To be sure, there will be regional organizations to provide fora for discussion, such as the Council of Arab Ministers Responsible for the Environment (CAMRE), established in 2007, and the Center for Environment and Development in the Arab Region and Europe (CEDARE), now over ten years old and headquartered in Egypt (for other regional organizations see Arab Human Development

Report Papers, 2010). There will be some success in exchanging data as has been the case with the Nile Basin Initiative since 1999. Going beyond data exchange and discussions will be difficult.

The Arab world has under-achieved in scientific research in all domains, and research devoted to climate change offers no exception. There are two significant regional scientific research organizations that partially fill the gap: the International Center for Agricultural Research in the Dry Areas (ICARDA), established in Aleppo, Syria in 1975, and the International Center for Biosaline Agriculture, based in Dubai and now over a decade old.

These few efforts will not be sufficient to counter the dominant strategy of unilateral, national policy initiatives. Again, the art of the possible should be deployed. Regional coordination might best be served by highly specific projects and programs. For example, the Intergovernmental Authority on Drought and Development (IGADD) was founded in 1986 to plan for and contain desertification, locust swarms, and recurrent famine in the Horn of Africa.

The fairly narrow, initial focus of IGADD is something to be emulated. Similarly, the successful containment of a pest ravaging the cedars of Tannourine in Lebanon was partially funded by the FAO with the aim of protecting similar cedar stands in Turkey, Algeria, Morocco and Cyprus. Iraq has suffered for decades from severe soil salinity in the lower reaches of the Tigris-Euphrates rivers. As Syria and Turkey exploit the upper reaches more intensively the problem will worsen. Jon Martin Trondalen (2008) has proposed a desalination plant on the Euphrates in Syria but designed to help Iraq. Sea level rise, likely to affect ca. 40 million people in the region and damage ca. 46,000 km2, would be a good candidate area for a regional consultative and scientific organization to devise adaptive measures and policies.

1. Trade

We may take intra-regional trade as emblematic of the difficulties facing regional cooperation more generally. The Arab region exhibits low levels of intra-regional trade and investment despite decades of trying. Formal efforts have so far come to naught or to very little. An Arab Common Market was founded in 1965 but failed to achieve much integration. The Arab Maghreb Union of 1989 has been no more successful. It may be too early to tell if the Pan Arab Free Trade Area established in 1998, and the elimination of tariffs on intra-Arab merchandize trade in 2005, will bear more fruit. In 2004, only four Arab countries had more than 10% of their total trade with other Middle Eastern countries (Noland and Pack, 2007: 216):

- Jordan 31% (mostly oil imports)
- Lebanon 15%
- Syria 12%
- Yemen 13%

Only one, Jordan, has more than 6% of total exports to other Arab countries. (Jordan 13%, Syria 6%).

The major integrative force in the Arab region has been migrant labor, first unleashed after the surge in petroleum prices in 1973. The oil-exporting Arab states, including Libya, imported hundreds of thousands of Arab workers to build infrastructure they had never before enjoyed. Now Egyptians, Palestinians, Lebanese, Sudanese, Yemenis and others are present in all economic sectors along side Pakistanis, Indians, Philippinos, etc. In 2009, Saudi Arabia alone had around 5.5 million guest workers out of a total workforce of 8 million (IMF, 2011). However, when regional political tensions intensify Arab guest workers may be the first to be sent home. This was the fate of Yemenis in Saudi Arabia and Palestinians in Kuwait in 1991 when Iraq invaded Kuwait, and in Libya during the violence of 2011.

The Gulf Cooperation Council (GCC: grouping Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the UAE), founded in 1981, has been somewhat more successful in regional cooperation than the Arab world as a whole, establishing a customs union in 2003 but not yet a common currency. The Euro crisis, beginning in 2010 and intensifying in 2012, has re-enforced the overall mood of caution in the GCC. The oil economies of the region are the GCC's motor, spewing out investment through sovereign wealth funds and regional development funds, and generating high demand for goods and services.

1a. Trade and Precision Agriculture

Virtual Water

Figure 5 shows the growing deficit in the region's bio-capacity. Only two countries, Egypt and the Sudan, have positive bio-capacity. The regional bio-capacity deficit is largely determined by the region's deficit in agricultural production. Regional food imports are currently well over $20 billion per annum (Jayoussi, 2012). That deficit will grow significantly with global warming which will impact the Mediterranean basin and the Middle East severely (Cline, 2007; Knox, J.W et.al. 2011). Grain crops will be particularly hard hit with rice and sugar cane less so. So called carbon fertilization resulting from increased GHG loads will off set production losses to some extent, but that positive effect disappears if warming is more than 2 degrees Celsius.

Trading in agricultural products will be an essential part of adaptation to climate change in the Arab world. The basic rule of thumb is that wet regions will become wetter and dry regions drier. Agricultural trade between the wet and dry regions is critical to survival. Still, Cline offers a gloomy warning (2007: 33):

> "Reduction in global average yields from climate change cannot be offset by recourse to trade at the global level."

The Arab world as a whole will have to undergo an uneven transition to water-efficient cultivation of high-value crops, a significant portion of which will be destined for export. The transition has been underway for some time in many parts of the region. Referring to the Agadir region of

Morocco and the west Delta of Egypt, the authors of *Making the Most of Scarcity* (World Bank, 2007: 50) note:

> "In both examples, farmers are growing high- value crops for export and are willing to pay tariffs at full cost recovery levels for reliable, good-quality water services. These tariffs, in turn, enable private operators to recover investment costs through cash flow."[23]

The region will seek to achieve food security by importing grains, poultry and beef from the wet regions. Tony Allan (1998) coined the term 'virtual water' to describe the water embodied in any unit of agricultural produce. The Middle East has long been a net importer of virtual water. In the past decade the annual net import has been equivalent to 30 billion m3 (bcm), or nearly as much as the average annual flow of the Euphrates. Egypt alone imports around 20 bcm-s which is close to half of its annual claim on the Nile. Jordan remarkably imports the equivalent of nearly five times its annual, renewable water supply. Of the region's total virtual water imports, about 12 bcm come from North America (El Fadel and Maroun, 2008: 101)

FIGURE 7. VIRTUAL WATER IMPORTS FOR 2003

Country	Annual import of virtual bcm-s
Algeria	11
Egypt	19
Iran	7
Iraq	1.4
Saudi Arabia	13
UAE	4.1
Morocco	5.8
Jordan	5
Syria	-4.1

Source: World Bank, 2007: 144.

In 2003 only Syria in the Arab region was a net exporter of virtual water.

One cannot underestimate the enormity of the gamble the Arab world is obliged to make. To a large extent its fate is now cast in global agricultural markets. The oil-rich, through their sovereign wealth funds, are seeking to lock in agricultural produce by leasing or buying land in Ethiopia, the Sudan, Madagascar, Pakistan, Thailand and elsewhere (Jones, 2011). Even Jordan has joined this group with projects in the Sudan.

The oil rich countries of the Arab world went through a similar exercise after 1973, focusing mainly on the Sudan. For a host of reasons it failed to bear fruit. Similarly today there is evidence that the concerns over "land grabs" in Africa and Asia may be premature. Despite press releases, little has so far happened on the ground (Verhoeven and Woertz, 2012). In any event, it may be expected that if global commodity markets tighten, as they did in the spring of 2008, the countries hosting Arab agro-investments may place export restrictions or bans on their own agricultural sectors.

2. Compensation

Because the Arab world can play no meaningful role in mitigation, and because its efforts at adaptation may well be overwhelmed by the failure of the major emitters to reduce the release of GHGs, the only incentive for Arab stakeholders to take significant adaptive action is compensation.

The Arab states are well aware of that fact. They joined African states in November 2009, in the run up to the Copenhagen conference, in demanding (AHD Paper, 2010: 44):

> "legally binding terms…for Annex 1 countries to reduce their GHG emissions by at least 40% below 1990 levels by 2020 and at least 80% to 95% below 1990 levels by 2050. It was also decided that compensation would have to be legally binding and should be equal to 0.5% of GDP of developing countries."

The compensatory challenge for the Arab region appears feasible. The World Bank (2010: 4) estimates the costs of adaptation for the MENA region at $3-4 billion per year. There are a number of instruments by which such compensatory flows could be generated. There are Annex 1 pledges of $30 billion to help developing countries adapt up to 2020 with long term pledges of $100 billion after 2020 (UNDP, 2010). The Global Environment Facility (GEF) has been in place since 1991 and has disbursed nearly $40 billion on environmental projects in 180 countries. The World Bank has established the Climate Investment Fund at $1.6 billion. A 2% tax on the Clean Development Mechanism (see below) could add $300-$600 million to the Adaptation Fund, established in December 2007. There are several more funds (see Harrison, 1999; El Ashry, 2009: 156, World Bank, WDR, 2010: 263 for a detailed list).

The global emissions trading market in 2006 was worth $30 billion (AHD 2010: 50), although Arab countries did not have a significant presence in it. There is the possibility of trading Certified Emissions Reductions (CERs) under the Clean Development Mechanism (CDM) that emerged from the Rio conference in 1992 and Kyoto Conference in 1997. World Bank forecasts to 2012 anticipate the MENA region registering only 15 CERS, valued at $182 million, or only 1% of the projected total (World Bank, WDR, 2010: 262)

There are functioning cap and trade experiments under way in the EU, the northeast United States, Japan, and New South Wales (see Reinaud and Philibert, 2007). It is worth considering whether or not the Arab region or the MENA region might consider its own cap and trade initiative. The disparities in energy intensity per unit of GDP in the Arab world are enormous, corresponding to the disparities in national wealth. Cap and trade would seem to offer attractive opportunities for transferring some wealth from rich to poor.

All these speculations run up against the reality that the oil exporters in the Arab world, foremost among them Saudi Arabia, have been at best skeptical about the Kyoto-Copenhagen agenda. OAPEC countries have advocated since the drafting of the Kyoto Protocol that oil-producing countries receive compensation for losses to the oil trade sustained because of climate change policies (Dolsak, 2001: 418;; UNDP, 2010: 13).

The deep ambivalence manifested by Saudi Arabia for several years, one that lead it along with China, Russia and the US to water down the findings of the 2007 IPCC report, may cast its shadow across the Arab landscape. The UNDP (2010; see also *Gulf Times* November 2011) report on Copenhagen observed:

> "In summary it could be said that Arab states were largely mute and voiceless in Copenhagen. This could depict the political fragmentation across the region or a general indifference to climate change. This lack of engagement is a pity specially when there is so much energy potential across North Africa and the Middle East, particularly sun and wind power."

Nonetheless, the UAE, which had the largest per capita ecological footprint in the world, in 2006 launched *al Basma al Bi'a* (the Environmental Footprint) in an effort to monitor itself. Abu Dhabi launched Masdar City and the Masdar Institute for Science and Technology to showcase sustainable urban development and energy use. Masdar City has become the world headquarters for the International Renewable Energy Agency (IRENA) (Conroy, 2011).

In the run-to Rio+20 in June 2012 there is some evidence of a change of heart in Saudi Arabia. The Kingdom has recognized that developing alternative fuel sources will actually free up more petroleum and gas for export. Ali al Naimi, Saudi Arabia's oil minister, who had once described renewable energy as a "nightmare", proclaimed in London in January 2012 that Saudi Arabia must lead on global warming issues and in developing renewable energy sources.

VI. Conclusion

We have tried to assess the possibilities for policy action in adaptation to climate change within the context of the prevalent political structures of the Arab region. Those structures have been shaken if not broken in a few countries (it is still too early to tell). To date, pressures generated by interest groups and lobbies, public opinion, or the security/military establishments themselves are either not present, ineffective, or in the case of the security apparati, neutral in terms of environmental advocacy.

Weak accountability in the region could mean that political authorities are able to take unpopular measures in adaptation, if needed. It is not likely they will do so. Policy responses in the past, especially those stemming from the fiscal and structural crises of the 1980s, indicate that threats to state finances, more than threats to social welfare, will elicit policy action. Nonetheless, at the forefront of any policy calculus is how likely it is to impact the social contracts that are at the heart of the fundamental political bargain: a modicum of social welfare for a great deal of political docility.

In this respect, in the countries where the Arab uprisings have led to significant change—Egypt, Tunisia, Libya, and Yemen—the immediate pressures on new leaders will be for enhancing welfare and generating or protecting jobs. If environmental policies run counter to these pressures, environmental policies will lose.

The Arab region has been perversely blessed with the negative symptoms of climate change for decades. Population growth and poverty were seen as the proximate causes of these symptoms some decades ago, but the region has the good fortune of having long-standing policies in place, with the skilled personnel, resources, and experience to support them, on which effective responses to climate change can be built. Moreover renewed efforts at applying and enhancing existing policies do not raise issues that further threaten the political structures in place. Some may lament that fact, but not those who recognize that the clock of political change is not on the side of dealing effectively with global warming.

In earlier structural reform and environmental policy initiatives, extra-regional third parties, in coordination with local NGOs and governmental agencies have been able to shape the policy agenda. When backed by multi-lateral and bi-lateral aid agencies, they have registered significant achievements. These epistemic communities are very much present, active, and effective in the Arab region.

Some policy challenges will require regional cooperation, and with respect to sea level rise the solution, if any, is not within the Arab region's grasp. Here again the prospect of meaningful action is not great, but if issues are sharply focused and agendas simple, then intra-regional cooperation on desertification, watershed management, and handling of refugees, inter alia, could well be possible.

Because the Arab region cannot significantly influence the global emissions of GHGs, and because its adaptive measures may be exercises in futility if the major emitters do not achieve very substantial reductions, whatever adaptive measures are taken will require compensation from the Annex I countries. Estimates of likely adaptive costs indicate that such compensation should be feasible.

Many environment-friendly, adaptive measures make economic sense in their own right. Greater fuel efficiency measures make sense for importers of fossil fuels, and resort to renewable energy sources makes sense for fossil fuel exporters. Regional trading in carbon permits would also appear to have a solid economic rationale. Ratcheting up the sophistication of the Arab world's farmers is not a choice but a necessity if that sector is to survive. So too are all measures to promote efficient water use, including enhanced transboundary cooperation. The Arab world has been grappling with these problems for a long time, and it has the human resources to address them. The missing ingredient is political leadership with the will to put them to effective use. .

List of Acronyms

AFED	Arab Forum for Environment and Development
BAU	business as usual
bcm	billions of cubic meters
CAMRE	Council of Arab Ministers Responsible for the Environment
CSS	Carbon Sequestration and Storage
CDM	Clean Development Mechanism
CEDARE	Center for Environment and Development of the Arab Region and Europe
CER	Certified Emissions Reduction
ESCWA	Economic and Social Commission for West Asia
FAO	Food and Agriculture Organization
GCC	Gulf Cooperation Council
GHG	green house gases
ICARDA	International Center for Agricultural Research on the Dry Areas
IGADD	Inter-Governmental Authority on Drought and Development
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
KAUST	King Abdullah University for Science and Technology
MENA	Middle East and North Africa: for the World Bank MENA excludes Turkey and Israel but includes Iran
OAPEC	Organization of Arab Petroleum Exporting Countries
OECD	Organization for Economic Co-operation and Development
OPEC	Organization of Petroleum Exporting Countries
SLR	sea level rise
UAE	United Arab Emirates

Endnotes

[1] Cline, 2007; Brown and Crawford, 2009; Richardson, 2009; Sowers and Weinthal, 2010; Tolba and Saab, 2009; World Bank, 2007; Hreiche, 2009; Balgis, 2010; Zereini, 2008; Droubi, 2009; Kitoh, 2008; Ônol 2009; Frihy, 2003; Conway, 2005; El Raey, 2007; AFED, 2012; Sakman, Susan, et.al., 2011.

[2] The Arab Human Development Report Paper 10.02 (2010) had labeled Egypt as a "democracy", Morocco as a "monarchy", while Jordan as a "parliamentary monarchy".

[3] Two good regional overviews are World Bank, 2007 and EU Water Initiative, 2009, but their findings pertain to the water sector only.

[4] In the World Bank study (2007) *Making the Most of Scarcity*, the authors refer to Mexico's policy response to the prospects of NAFTA as driving reform in the water sector. They imply that similar pressures from regional or global markets *might* have the same effect in the MENA countries, but there is no explicit analysis of the stakeholders in the MENA region.

[5] There are a few exceptions. With respect to environmental policy see Doukkali, 2005; Gomaa, 1997; Magen 2002; Shetty 2006; Sowers 1999, 2007 and forthcoming; and Swearingen 1987.

[6] Inter alia: Harik and Sullivan, 1992; Henry and Springborg, 2001;Richards, 1991; Waterbury, 1993; Richards and Waterbury, 2008; Baakalini, et.al., 1999; Aidi, 2009; Paczyñska, 2009; Wurzel, 2004; Schlumberger, 2007; Ottoway, et.al., 2008; Noland and Pack, 2007)

[7] On cronyism see: Bellin, 1991; Cammett, 2004; Catusse, 2008; Haddad, 2004; Henry and Springborg, 2001; Hibou, 2004; Perthes, 1992; Sadowski, 1991; Sfakianakis, 2004; and Sowers, 1999.

[8] Sowers, 1999, gives examples of *ex ante* lobbying in Egypt. The passage of legislation banning leaded gasoline gave an exclusive import permit of catalytic converters to the Osman Group and a monopoly on local manufacture of catalytic converters to the National Authority for Military Production. She and al-Musa (2009) document the broad-based civil society protest of a cement factory in Damietta.

[9] Behavioral economists George Lowenstein and Peter Ubel argue that posting calorie content at fast food restaurants will not reduce consumption of calories, only the relative prices of healthy food vs calorie-rich food will (NYT July 15, 2010) So to the extent that individual behavior can affect adaptation, public authorities need to look at the relative prices of relevant goods such as fuel, electricity, wood, charcoal, public vs. private transport, etc. People will not change their behavior simply because they understand the consequences of their actions. That is the message of Hardin's tragedy of the commons.

[10] Sudden changes in prices, often resulting from structural adjustment reforms, have provoked mass, sometimes violent, protests. The Casablanca riots of 1965 thrust Morocco into a five-year state of emergency with suspension of parliament; the 1977 "food riots" in Egypt led to a deceleration of a timid political liberalization; the 1977/78 "bazaar" protests in Iran contributed to the downfall of the Shah. Yemen witnessed price riots in 1995 and 2005. The cost of living protests in both Jordan and Algeria in 1988 led to open elections in both countries, but in Algeria the second round of the elections was aborted leading to a decade of civil war. It is not clear if the global financial crisis of 2008/09 prepared the ground for the Arab uprisings of 2011/12. For a skeptical view, see Aly and Strazicich (2011).

[11] In the MENA region only Iran, in tenth place, ranks in the top global emitters.

[12] Nineteen countries account for 80% of global GHG emissions (UNEP, 2011)

[13] In fairness, it should be noted that some efforts, notably driven by the World Bank, have been taken to stabilize the northern sector of the Aral Sea (Dinar, et. al., 2007: 300), and a project to restore the level of the Dead Sea using water brought from the Red Sea is under study by the World Bank.

[14] The Arab Forum for Environment and Development (AFED) held a conference in Beirut, Nov. 4-5, 2010, to examine the sustainable management of water resources. The conference was well attended with scores of high-level government officials from various countries. They generated a real sense of urgency, advocating water tariffs, water-efficient agriculture, and equitable-use solutions for transboundary water sources. It remains to be seen if this forum generates real policy output.

[15] For useful general approach to such assessments, see Dolsak, 2001.

[16] The proper discount rate for assessing the costs of mitigation is at the heart of the debate between Nicholas Stern (2006) and William Nordhaus (2008) with Stern valuing the welfare of future generations as equal to the welfare of current generations and Nordhaus assuming that future generations are likely to be better off than current ones and therefore using a higher discount rate than Stern.

[17] "The ecological footprint is how much productive area it takes to produce what a population consumes and [to] absorb its waste, using prevailing technologies." It measures demand on available environmental resources. Biocapacity measures available supply. The MENA region went into deficit decades ago. See Sakman et.al. 2011 and AFED, 2012.

[18] None of the adaptation policies raise "line in the sand" issues with Islamicist groups.

[19] Droubi (2009: 32) estimates efficiency in Syria's irrigated agriculture at 30%.

[20] Venot, et.al. (2007) show that Bedouin producers in the plateau of Jordan are capable of generating fairly high family income based on fruits and nut cultivation, animal husbandry, and vegetables.

[21] This is one facet of what is called the demographic dividend; that is, predominantly young populations in a position to work and support relatively small, older age cohorts.

[22] The much-publicized opening of the King Abdullah University for Science and Technology (KAUST) outside Jeddah is premised on the need for the Kingdom to prepare itself for a post-oil era. The seeds for this project go back to the 1980s, during the relative collapse in world oil prices. Significantly Saudi Aramco, the state oil producer, has served as project manager for KAUST.

[23] Returns to a m^3 of water show that vegetables at US 50 cents return six times as much as wheat at US 8 cents, or beef (using vastly more water than wheat or vegetables) at 5 cents. (World Bank, 2007: .63) But vegetables need to be cultivated near markets or near reliable transportation to markets. They are not ideal, say, for the Upper Nile basin or eastern Syria. See also Venot (2007) on relative returns to crops in Jordan.

Select Bibliography

AFED (2010), "Sustainable Management of Water in the Arab World" annual conference, Beirut, Nov. 4-5 (http://www.afedonline.org/en/inner.aspx?contentID=549).

AFED (2012) "Ecological Footprint and Sustainability Options in the Arab Countries", *al Bia wal Tanmia*, June.

Aidi, Hisham (2009) *Redeploying the State: Corporatism, Neoliberalism,and Coalition Politics*, MacMillan, Palgrave, NY.

Ajami, Fouad (1978/9) "The End of Pan Arabism", *Foreign Affairs*, winter.

Ali Abdelgadir, Ali (2009) "The Political Economy of Inequality in the Arab Region and Relevant Development Policies", *Economic Research Forum*, working paper no. 502, Cairo.

Allan, J.A. (1998) "Watersheds and problemsheds: Explaining the absence of armed conflict over water in the Middle East", *Middle East Review of International Affairs* 2(1).

Altinbilek, Dogan (2010) "Adaptation to Climate Change in Turkey: Floods and Droughts", Harvard Climate Adaptation Workshop, Belfer Center, JFK School, 3-4 May.

Aly, Hassan and Mark Strazicich (2011) "Did the Global Financial Crisis and Recession Contribute to the Uprisings in North Africa?", *Economic Research Forum,* Working Paper 651, December .

Arab Human Development Report (2003) *Building the Knowledge Society*, UNDP, AFESD, New York.

Arab Human Development Report Papers (2010) *Mapping Climate Change Issues, Initiatives and Actors in the Arab Region,* paper 10,02, UNDP Regional Bureau for Arab States, January, place?

Armstrong, Martin (2012) "Lebanon's Waste Problem: A Ticking Time Bomb", *The Daily Star*, June 16.

Assaf, Hamid. (2009). Climate Change: Potential Impact on Water Resources in the Middle East and Adaptation Options. Research and Policy Memo #2, Research and Policy Forum on Climate Change and Environment in the Arab, Issam Fares Institute for Public Policy and International Affairs, American University of Beirut (AUB), Lebanon.

Baakalini, Abdo, Guilain Denoeux, and Robert Springborg (1999) *Legislative Politics in the Arab World: the Resurgence of Democratic Institutions*, Lynne Rienner, Boulder CO.

Babiker, Mustafa Hussein and Mohammed A. Fehaid (2011) "Climate Change Policy in the MENA Region: Prospects, Challenges, and the Implication of Market Instruments", *Economic Research Forum,* Working Paper 588, May.

Barrett, Christopher (2010) "Measuring Food Insecurity", *Science*, v.327, 825-30.

Battisti, David and Rosamond Naylor (2009) "Historical Warnings of Future Food Insecurity with Unprecedented Seasonal Heat", *Science*, v.323, Jan. 9, 240-44.

Beinen, Joel (2012) "The Rise of Egypt's Workers", *Carnegie Paper* (Carnegie Endowment for Peace), June.

Bellin, Eva (1991) "Tunisian Industrialists and the State", in I. William Zartman (ed.) *The Political Economy of Reform*, Lynne Rienner, Boulder CO.

Bellin, Eva (2012) "Reconsidering the Robustness of Authoritarianism in the Middle East: Lessons from the Arab Spring", *Comparative Politics*, January, 127-49.

Ben Gal, Alon, Alon Tal, Naomi Tel-Zur. (2006) "The Sustainability of Arid Agriculture: Trends and Challenges", *Annals of Arid Zone Agriculture*, v.45, 1-31.

Bernauer, Thomas, et.al. (2010) "Climate Change, Economic Growth and Conflict", International Studies Association, New Orleans, Feb. 16-20.

Binder, Leonard (1978) *In a Moment of Enthusiasm: Political Power and the Second Stratum in Egypt*, Chicago U.P., Chicago.

Brown, Oli and Crawford, Alec (2009) *Rising Temperatures, Rising Tensions: Climate Change and the Risk of Violent Conflict in the Middle East*, IISD.

Brownlee, Jason (2007) *Authoritarianism in an Age of Democratization*, Cambridge U.P. New York.

Bou-Zeid, Elie., and Mutasem. El-Fadel (2002) "Climate Change and Water Re- sources in the Middle East: A Vulnerability and Adaptation Assessment."

Journal of Water Resources Planning and Management, 128 (5): 343–55.

Brown, Nathan (2012) *When Victory is not an Option: Islamist Movements in Arab Politics*, Cornell U.P., Ithaca and London.

Bruch, Carl et.al. (2007) "Legal Frameworks Governing Water in the Middle East and North Africa", *International Journal of Water Resources Development*, v.23, n.4, December, 595-624.

Cammett, Melanie (2004) "Challenges to Networks of Privilege in Morocco" in Heydemann, Steven (ed) 245-79.

"Carbon Sequestration and Storage" (2009) *Science*, special section, v. 325, September 25, 1641-64.

Catusse, Myriam (2008) *Le temps des entrepreneurs? Politique et transformations du capitalisme au Maroc*, Maisonneuve et Larose, Paris.

Chaudhry, Kiren Aziz (1997) *The Price of Wealth: Economics and Institutions in the Middle East*, Cornell U.P. Ithaca.

Cline, William (2007) *Global Warming and Agriculture: Impact Estimates by Country*, Peterson Institute, Washington DC.

Conroy, Erin (2011) "Masdar to Lead Gulf in Clean Energy Network", *The National*, March 3.

Conway, Declan (2005) "From headwater tributaries to international river: Observing and adapting to climate variability and change in the Nile basin", *Global Environmental Change Part A*, 15, 2, July, 99-114.

Cook, Steven (2007) *Ruling but not Governing: the Military and Political Development in Egypt, Algeria, and Turkey*, Council on Foreign Relations Book, Johns Hopkins University Press, Baltimore.

Daoudy, Marwa (2010 draft) "Regional and International mechanisms for Adaptation: Conceptual and Empirical Implications", Harvard Climate Adaptation Workshop, Belfer Center, JFK School, 3-4 May.

Dhillon, Navtej and Tarik Yousef (eds) (2009) *Generation in Waiting: the Unfulfilled Promise of Young People in the Middle East*, Brookings Institution Press, Washington DC.

Dolsak, Nives (2001) "Mitigating Global Climate Change: Why are some Countries more Committed than Others?" *Policy Studies Journal*, 29, 3, 414-36.

Doukkali, Mohammed (2005) "Water institutional reforms in Morocco", *Water Policy,* 7, 71–88.

Droubi, A. (2009) "Syria: Country Study", Climate Change, Water, and the Policy-making Process in the Levant and North Africa Conference, Issam Fares Institute for Public Policy and International Affairs, the American university of Beirut, August 4.

Droubi, A. and Wolfer, J. et.al. (2008) "A Decision Support System for Water Resource Management: Design and Results from a Pilot Study in Syria" in Zereini, Fathi and Heinz Hötzl (eds) 195-225.

Droz-Vincent, Philippe (2007) "From Political to Economic Actors: the Changing Role of Middle Eastern Armies" in Schlumberger, Oliver (ed) 195-211.

Eckstein, Gabriel (2010) "Water Scarcity, Conflict and Security in a Climate Change World: Challenges and Opportunities for International Law and Policy", *Wisconsin international Law Journal*, v.3, 4, 410-61.

El-Ashry, Mohammed (2009) "International Negotiations for a Post Kyoto Regime", in Tolba, Mostofa K. and Najib Saab (eds) (2009) *Arab Environment: Impact of Climate Change on Arab Countries*, AFED, Beirut, 129-42.

Elbadawi, I., and S. Makdisi. 2007. "Explaining the Democracy Deficit in the Arab World." *Quarterly Review of Economics and Finance* 45 (5): 813-833.

El-Fadel, Mutasem and Rania Maroun (2008) "Virtual Water Trade as an Adaptation Demand Management of Climate Change Impact on Water Resources in the Middle East", in Zereini, Fathi and Heinz Hötzl (eds) 93-108.

Elmusa, Sharif and Jeannie Sowers (2009) "Damietta Mobilizes for its Environment", *Middle East Report Online*, October 21.

El Raey, Mohammed (2007) "Climate Change and Egypt", *Al –Ahram Weekly On-Line*, November 29-Dec. 5: *http://weekly.ahram.org.eg/2007/873/index.htm*.

El Raey, Mohammed (2009) "Impact of Climate Change: Vulnerability and Adaptation", in Tolba, Mostofa K. and Najib Saab (eds) *Arab Environment: Impact of Climate Change on Arab Countries*, AFED, Beirut, 47- 62.

ESCWA, League of Arab States (n.d. 2005?) *Arab Region State of Implementation on Climate Change*, Beirut?

EU Water Initiative (2009), *Integrated Water Resource Management: Overview of MEDA Countries,* Athens.

Frihy, Omran (2003) "The Nile Delta-Alexandria Coast: Vulnerability to Sea Level Rise, Consequences and Adaptation", *Mitigation and Adaptation Strategies for Global Change*, v.8, 115-38.

Gebbers, Robin, et.al. (2010) "Precision Agriculture and Food Security", *Science*, v.327, 828-30.

Ghoneim, Eman (2009) "A Remote Sensing Study of Some Aspects of Global Warming on the Arab Region", in Tolba, Mostofa K. and Najib Saab (eds) (*Arab Environment: Impact of Climate Change on Arab Countries*, AFED, Beirut, 31-46.

Gleditsch, Nils Petter (2012) "Whither the weather? Climate change and conflict".

Journal of Peace Research, 49: 3-9 *http://jpr.sagepub.com/content/49/1/3.*

Friedman, Thomas (2012) "The Other Arab Spring", *New York Times*, April 8.

Godfray, H. Charles, et. al. (2010) "Food Security: the Challenge of Feeding 9 Billion People", *Science*, v.327, 812-18.

Gomaa, Salwa (1997) *Environmental Policy Making in Egypt*, University of Florida Press, Gainesville FL.

Gulf Times (2011) "Saudi Seeks to Ensure Climate talks won't Hurt OPEC Income", Nov. 26.

Haas, Peter (1990) "Epistemic Communities and the Dynamics of International Cooperation", in Volker Rittberger (ed) *Regime Theory and International Relations*, Clarendon Press, Oxford UK, 168-201.

Hachemaoui, Mohammed (2012) "La rente entrave-t-elle vraiment la démocratie? Réexamen critique des théories de « l'État rentier » et de la « malédiction des ressources ", *Revue française de science politique, v.62, 207-30.*

Haddad, Bassam (2004) "The Formation and Development of Economic Networks in Syria: Implications for Economic and Fiscal Reforms, 1986-2000", in Heydemann, Steven (ed.) 37-76

Haddad, Bassam (2012) *Business Networks in Syria: the Political Economy of Authoritarian Resilience*, Stanford U.P., Stanford.

Harik, Ilya and Denis Sullivan (eds) (1992) *Privatization and Liberalization in the Middle East*, Indiana U.P., Bloomington.

Harrison, Kathryn and Lisa Sundstrom (2007) "The Comparative Politics of Climate Change", *Global Environmental Politics*, v.7, n.4 (November): 1-18.

Harrison, Neil (1999) "Joint Implementation of Climate Change? Distortions in Practice and Effects on Developing Countries", in Wehrmeyer, Walter and Yacob Mulugetta (eds) *Growing Pains: Environmental Management in Developing Countries*, Greenleaf Publishing, Sheffield UK, 46-57.

Henry, Clement and Robert Springborg (2001) *Globalization and the Politics of Development in the Middle East*, Cambridge University Press, Cambridge UK.

Herb, Michael (2005), "No Representation without Taxation ? Rents, Development, and Democracy", *Comparative Politics*, 37 (3), 297-316.

Heydemann, Steven (ed) (2004) *Networks of Privilege in the Middle East: the Politics of Economic Reform Revisited*, Macmillan, Palgrave, New York.

Heydemann, Steven (2007) "Social Pacts and the Persistence of Authoritarianism in the Middle East" in Schlumberger, Oliver (ed) 21-38.

Hibou, Béatrice (2004) "Fiscal Trajectories in Morocco and Tunisia", in Heydemann, Steven (ed) 201-22.

Hinnebusch, Raymond (1990) *Authoritarian Power and State Formation in Ba'thist Syria: Army, Party, and Peasant*, Westview Press, Boulder CO.

Hopkins, Nicholas ., Mehanna, Soheir., and el-Haggar, Salah. (2001) *People and Pollution: Cultural Constructions and Social Action in Egypt*, American University in Cairo Press Cairo, New York.

Hreiche, Antoine (2009) "Climate Change in the Levant and North Africa Region: An Assessment of Implications for Water Resources, Regional State Awareness, and Preparedness", Climate Change, Water, and the Policy-making Process in the Levant and North Africa, ppt. Issam Fares Institute for Public Policy and International Affairs, the American university of Beirut, August 4.

Huntington, Samuel (1968) *Political Order in Changing Societies*, Yale U.P., New Haven CT.

IPCC. 2007. "Summary for Policymakers", in Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.). *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, UK and New York.

Jayousi, Odeh al-(2012) "Reflections on Water Governance-Revolve", *Water Around the Mediterranean*, Union for the Mediterranean, Feb. 20.

Jones, Rory (2011) "African Farmland a Draw as Prices Rise", *The National* (Abu Dhabi) March 27.

Jordan Water Strategy to 2022. Chapter 1 Executive Summary.

Jordan Water Strategy to 2022. Chapter 2 Water demand.

Jordan Water Strategy to 2022. Chapter 3 Water Supply.

Jordan Water Strategy to 2022. Chapter 4 Institutional reform.

Kerr, Malcolm (1965) *The Arab Cold War, 1958-1964*, Oxford U.P., New York, London.

Kitoh, Akio, Akiyo Yatagai and Pinhas Alpert (2008) "First super-high resolution model projection that the ancient "Fertile Crescent" will disappear this century", *Hydrological Research Letters*, 2, 1-4.

Knox, J.W., T.M. Hess, A. Daccache and M. Perez Ortola (2011) *What Are the Projected Impacts of Climate Change on Food Crop Productivity in Africa and South Asia?*, DFID Systematic Review Final Report, Cranfield University, March 31.

Koubi, Vally, Thomas Bernauer, Anna Kalbhenn and Gabriele Spilker (2012) "Climate variability, economic growth, and civil conflict", *Journal of Peace Research* 49: 113-127 http://jpr.sagepub.com/content/49/1/113.

Leveau, Rémy (1985) *Le fellah marocain: défenseur du trone*, Presses de la FNSP, 2d ed., Paris.

Lowenstein, George and Peter Ubel (2010) "Economics Behaving Badly", *New York Times*, July 15, 2010.

Lowi, Miriam and Brian Shaw (eds) (1999) *Environment and Security: Discourses and Practice*, St. Martins Press, New York.

Lowi, Miriam (2009) *Oil Wealth and the Poverty of Politics: Algeria Compared*, Cambridge U.P. New York.

Luciani, Giacomo (ed) (1990) *The Arab State*, UC Press, Berkeley.

Luciani, Giacomo and Ghassan Salamé (1990) "The Politics of Arab Integration" in Giacomo Luciani (ed) 394-420.

Magen, David (2002), *Parliamentary Committee of Inquiry on the Israeli water Sector*, June.

Majali, Abdul Salam, et.al. (2006), *Peacemaking: the Inside Story of the 1994 Jordanian-Israeli Treaty*, University of Oklahoma Press, Norman OK.

Maradan, David and Karim Zein (2011) "Regulating Industry Emissions: Assessing the Moroccan Cement Experiences", *Economic Research Forum*, Working paper 598, July.

Marris, Emma (2008) "More Crop per Drop", *Nature*, v.452, March, 273-77.

Mills, Andrew (2010) "Masdar Institute: on the Way to be Part of the Energy Solution", *Chronicle on Higher Education*, August 2.

Mirkin, Barry (2010) *Population Levels, Trends and Policies in the Arab Region: Challenges and Opportunities*, UNDP, Arab Human Development Report Paper 01.

Neuhof, Florian (2011) "Shadow Cast over Big Solar Project", *The National* (Abu Dhabi), Nov. 6.

Nicholls, Robert and Anny Cazenave (2010) "Sea-Level Rise and its Impact on Coastal Zones", *Science*, v.328, June 1517-19.

Noland, Marcus and Howard Pack (2007) *The Arab Economies in a Changing World*, Peterson Institute, Washington DC.

Nordhaus, William (2008) *A Question of Balance: Weighing the Options on Global Warming Policies*, Yale UP, New Haven CT.

O'Donnell, Guillermo (1973) *Modernization and Bureaucratic Authoritariansim*, Studies in South American Politics, Institute of International Affairs, University of California, Berkeley.

OECD, IEA (2009) *CO2 Emissions from Fuel Combustion: Highlights*, Paris.

Ônol, Baris and Frederick Semazzi (2009) "Regionalization of Climate Change Simulations over the Eastern Mediterrannean", *Journal of Climate*, v.22, 1944-61.

Ottoway, Marina and Choucair-Vizoso, Julia (eds) (2008) *Beyond the Façade: Political reform in the Arab World*, Carnegie Endowment for International Peace, Washington DC.

Owen, Roger (2012) *The Rise and Fall of Arab Presidents for Life*, Harvard UP, Cambridge MA.

Paczyńska, Agnieszka (2009) *State, labor, and the Transition to a Market Economy: Egypt, Poland, Mexico, and the Czech Republic* University Park, Pa. : Pennsylvania State University Press, 2009.

Perthes, Volker (1992) "The Syrian Private Commercial and Industrial Sectors and the State", *International Journal of Middle East Studies*, v.24, 2, 207-30.

Posusney, Marsha and Michele Angrist (eds) (2005) *Authoritarianism in the Middle East*, Lynne Rienner, Boulder CO.

Qabbani, Abdulhamid (2010) "State of Denial on Climate Change" *Syria Today*, n.66, November.

Rauch, James E. and Scott Kostyshak (2009), "The Three Arab Worlds", *Journal of Economic Perspectives,* V. 23, Number 3,Summer, 165–188.

Rayman, Noah (2010) "Drought-plagued Israel Ready as Global Heat Soars", *Jerusalem Post*, July 20.

Reinaud, Julia and Cédric Philibert (2007) *Emissions Trading: Trends and Prospects*, OECD, IEA, Paris.

Republic of Lebanon, Ministry of Environment and the Issam Fares Institute for Public Policy (n.d., 2009?) *Country Brief, Lebanon: National Economic, Environment and Development Study (NEEDS) for Climate Change Project*, Beirut.

Richards, Alan (1991) "The Political Economy of Dilatory Reform: Egypt in the 1990s", *World Development*, 19, 12, 1721-30.

Richards, Alan (2008) "Human Capabilities in the Maghreb: Challenges and Opportunities", Keynote Address to Symposium, Maghreb Development, Strategic Resources and the Environment in a Globalized World, Maghreb Center Georgetown University, April 21.

Richards, Alan and John Waterbury (2008) *A Political Economy of the Middle East*, Third Edition, Westview Press, Boulder CO.

Richardson, Katherine, et.al. (2009) *Climate Change: Global Risks, Challenges and Decisions*, International Alliance of Research Universities, March, Copenhagen.

Roberts, Hugh (2008) "Demilitarizing Algeria" in Marina Ottoway and Julia Choucair-Vizoso (eds) *Beyond the Façade: Political Reform in the Arab World*, Carnegie Endowment for International Peace, Washington DC, 137-60.

Ross, Michael (2001) "Does Oil Hinder Democracy?", *World Politics*, 53, April, 325-61.

Sadowski, Yahya (1991) *Political Vegetables: Businessman and Bureaucrat in the Development of Egyptian Agriculture*, Brookings Institute, Washington DC.

Sakman, Susan, Mathis Wackernagel, Alessandro Galli and David Moore (2011) "Sustainable development and Environmental Challenges in the MENA Region: Accounting for the Environment in the 21st century", *Economic Research Forum*, Working Paper No. 592, June.

Saleth, R. Maria and Dinar, Ariel (2004) *The Institutional Economics of Water: A Cross-Country Analysis of Institutions and Performance*, The World Bank, Elgar pub. UK and Northampton MA.

Sayyid, Mustapha (2007) "The G8 and the External Efforts at Political Reform" in Schlumberger, Oliver (ed) *Debating Arab Authoritarianism: Dynamics and Durability of Nondemocratic Regimes*, Stamford U.P., Stamford CA, 215-30.

Schlumberger, Oliver (ed) (2007) *Debating Arab Authoritarianism: Dynamics and Durability of Nondemocratic Regimes*, Stamford U.P., Stamford CA.

Sfakianakis, John (2004) "The Whales of the Nile: Networks, Businessmen, and Bureaucrats during the Era of Privatization in Egypt", in Heydemann, Steven (ed) 77-100.

Shetty, Shobha. (2006) *Water, Food Security and Agricultural Policy in the Middle East and North Africa Region*, World Bank, Washington DC.

Simon, Herbert. A. (1956). "Rational choice and the structure of the environment". *Psychological Review*, 63, 129-138.

Sowers, Jeannie (1999) "Just Green Marketing? State, Business and Environmental Management in Egypt" in Wehrmeyer, Walter and Yacob Mulugetta (eds) *Growing Pains: Environmental Management in Developing Countries*, Greenleaf, Sheffield UK, 160-71

Sowers, Jeannie, Weinthal, Erika, and Vengosh, Avner (2010) "Climate change, water resources, and the politics of adaptation in the Middle East and North Africa. *Climatic Change*, on line.

Sowers, Jeannie (2010) "Greening Authoritarianism?: Networks, Narratives, and Environmental Politics in Egypt," Paper presented at the New England Middle East Politics Workshop, Harvard University, March 19-21.

Sowers, Jeannie (2007) "Nature Reserves and Authoritarian Rule in Egypt: Embedded Autonomy Revisited" *The Journal of Environment Development*; 16; 375.

Sowers, Jeannie (forthcoming January 2013) *Environmental Politics in Egypt: Activists, Experts and the State*, Routledge Studies in Middle East Politics, Routledge, London, New York.

Sowers, Jeannie (2012) "Institutional Change in Authoritarian Regimes: Water and the State in Egypt" in Steinberg, Paul and Stacy Van Deveer (eds) *Comparative Environmental Politics*, MIT Press, Cambridge, 231-53.

Stern, Nicholas (2006) *The Economics of Climate Change: the Stern Review*, Cambridge UP.

Swearingen, W. D. (1987) *Moroccan Mirages: Agrarian Dreams and Deceptions, 1912–1986*, Princeton University Press, Princeton, New Jersey.

Tal, Alon (2006) "Seeking Sustainability: Israel's Evolving Water Management Strategy", *Science*, v.313, Aug. 25, 1081-84.

Thomas, R. J. (2008) "Opportunities to reduce the vulnerability of dryland farmers in Central and West Asia and North Africa to climate change", *Agriculture, Ecosystems & Environment,* V. 126, Issues 1-2, June Pages 36-45.

Tolba, Mostofa K. and Najib Saab (eds) (2009) *Arab Environment: Impact of Climate Change on Arab Countries*, AFED, Beirut.

Tolba Mostafa K. and , Saab, Najib (2006) Arab public opinion and the environment conference report of 18 country survey. June 2006 http://www.afedonline.org/en/inner.aspx?contentID=88.

Touahri, Sarah (2009) "Morocco Prepares "Green" Charter for 2010", *Magharabia.com*, October 1.

Sowers, Jeannie (forthcoming 01/2013) *Environmental Politics in Egypt: Activists, Experts and the State*, Routledge Studies in Middle East Politics, Routledge

Sowers, Jeannie (2012) "Institutional Change and Environmental Governance in Authoritarian Regimes: Water and Authority in Egypt" in Steinberg, Paul and Stacy Van Deveer (eds), *Institutional Change in Authoritarian Regimes*, MIT Press, Cambridge, 232-53.

Trondalen, Jon Martin (2008) *Water and Peace for the People: Possible Solutions for Water Disputes in the Middle East*, UNESCO, Paris.

Trondalen, Jon Martin (2009?) *Climate Changes, Water Security, and Possible Remedies for the Middle East,* UN World Water Assessment Program, Paris.

UNDP, AFESD (2003) *Building the Knowledge Society*, Arab Human Development Report, New York.

UNDP (2010) *The Outcome of Copenhagen: The Negotiations and Accord*, New York.

UNEP (2011) *Keeping Track of Our Changing Environment: from Rio to Rio+20*, Nairobi.

Varis, Olli and Khaled Abu-Zeid (2009) "Socio-economic and Environmental Aspects of Water Management in the 21st Century: Trends, Challenges and Prospects for the MENA Region", *International Journal of Water Resources Development*, 25, 3, 507-22.

Venot, Jean-Phillippe, François Molle, Yousef Hasan (2007) "Irrigated Agriculture, Water Pricing, and Water Savings in the Lower Jordan River Basin", *Research Report 18*, International Water Management Institute, Sri Lanka.

Verhoeven, Harry and Eckart Woertz (2012) "Mirage in the Desert: the Myth of Africa's Land Grab" Marketplace Africa, CNN, July 9.

Viney, Steven (2012) "A Visit to Egypt's largest Wind farm Shows an Industry Getting on its Feet", *Egypt Independent*, June 24.

Waever, Oli et.al. (2009) *Climate Change: Global Risks, Challenges, and Decisions; Synthesis Report*, International Alliance of Research Universities, Copenhagen University, Copenhagen.

Waterbury, John (1993) *Exposed to Innumerable Delusions: Public Enterprise and State Power in Egypt, India, Mexico, and Turkey*, Cambridge U.P., New York.

Waterbury, John (2002) *The Nile Basin: National Determinants of Collective Action*, Yale U.P., New Haven.

Woo-Cummings, Meredith (1999) *The Developmental State*, Cornell U.P., Ithaca.

World Bank (2007) *Making the Most of Scarcity: Accountability for Better Water Management in the Middle East and North Africa*, MENA Development report, Washington DC.

World Bank (2010) *Development and Climate Change*, World Development Report, Washington DC.

Worth, Robert (2010) "Parched Earth where Syrian Farms Thrived", *New York Times*, October 14.

Wurzel, Ulrich (2004) "Patterns of Resistance: Economic Actors and Fiscal Policy Reform in Egypt in the 1990s", in Heydemann, Steven (ed) 101-31.

Yee, April (2012) "Green Light for Carbon Capture Enterprise", *The National* (Abu Dhabi), January 19.

Zereini, Fathi and Heinz Hötzl (eds) (2008) *Climatic Changes and Water Resources in the Middle East and North Africa*, Springer-Verlag, Berlin.