

ENVIRONMENTAL SECURITY AND REGIONAL STABILITY IN THE PERSIAN GULF

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Climate change is the defining human development issue of our generation. All development is ultimately about expanding human potential and enlarging human freedom. It is about people developing the capabilities that empower them to make choices and to lead lives that they value. Climate change threatens to erode human freedom and limit choice. It calls into question the Enlightenment principle that human progress will make the future look better than the past.

— *United Nations Human Development Report 2007/2008, page 7*

As environmental issues exert an increasing impact on Persian Gulf security and stability, the region offers lessons on the prospects for adapting to and mitigating the effects of a hostile environment. While, on the one hand, the steel and glass towers of Abu Dhabi, Riyadh and Doha are the envy of developing states around the world, the glass towers of these states form only the most visible parts of a massive environmental mitigation and adaptation program that has stretched back many decades in one of the world's most inhospitable regions. However, the ability of the Gulf states to continue this expensive effort depends on the continued expansion of world petroleum markets — markets that are dumping carbon emissions largely from the developed world into the atmosphere. These emissions must be controlled if the world is to credibly address climate change. Hence, the challenge of climate change is inextricably intertwined

with the functioning of the world petroleum markets on which the Gulf states depend for their environmental mitigation and adaptation efforts. If these efforts fail, societies throughout the Gulf will be negatively affected, and regional stability will surely be compromised.

This article concerns the challenge posed by climate change and environmental security to the Persian Gulf region: Iran, Iraq, Saudi Arabia and the smaller states of Bahrain, Kuwait, Qatar, the United Arab Emirates and Oman. All largely depend upon the predictable functioning of international energy markets to continue their economic growth. These markets have also provided these states with the means to delay political reforms while they maintain traditional forms of government. The cascades of cash dumped into the coffers of the regional elites by their customers have, in turn, allowed the elites to “buy off” their populations through expensive and inefficient subsidy and welfare programs. In the

Gulf, the security of the governing elites is thus inextricably intertwined with the orderly functioning of international energy markets. Those market functions must be addressed as the global consensus slowly coalesces around what to do about global climate change. This article will summarize the challenges facing the ruling elites as they seek to continue their grip on political power while simultaneously dealing with the politics of climate change and the severe environmental stresses throughout the Gulf region.

ENVIRONMENTAL STRESS

The Persian Gulf and the wider Middle East exist in what all statistical indicators suggest is one of the hottest, most water-starved environments on the planet. With the exception of Iraq and Iran, most states in the Gulf suffer from an acute fresh-water scarcity, defined by the World Bank as access to less than 1,000 cubic meters a year. This scarcity promises to become more acute as the world’s temperature rises and the demand for fresh water increases due to population growth. Domestic water demand is projected to double in the Gulf by 2025; the demand for water required for industrial uses will increase threefold over that period.¹ As indicated in Figure 1, the baseline of renewable fresh-water availability in today’s Gulf is already an environmental crisis.

Figure 1
Annual Fresh-Water Availability
 (cubic meters per capita, 2005)²

Bahrain	157	Iran	1,970
Iraq	2,920	Kuwait	8
Oman	340	Qatar	86
Saudi Arabia	96	UAE	49

The United Nations identifies fresh-water scarcity as a critical risk factor in all societies, contributing to such systemic problems as poverty, unplanned urbanization, environmental degradation and stress on fragmented institutional governing structures where shortages are particularly acute.³ Water security is now deemed essential to societal growth, development and stability.⁴ Water scarcity is perhaps the most serious of the direct environmental impacts in the Gulf that will result from increasing temperatures over the next 20 years. The World Bank projects that, by 2050, per capita annual water availability throughout the Middle East and North Africa will decline from today’s 1,000 cubic meters to 500. In contrast, by 2050, when the world’s population will reach nine billion, average per capita annual water availability will average 6,000 cubic meters.⁵

Total water demand is projected to increase in the GCC states by 36 percent over the next decade.⁶ In addition to systemic shortages, water scarcity in the Gulf region promises, in particular, to gather momentum over the coming decades as a result of persistent mismanagement by the regional states of their limited renewable water resources. In 2007, the GCC countries extracted 19.5 million cubic meters of fresh water from underground aquifers, while the recharge of these aquifers accumulated at the rate of only 4.8 million cubic meters. These states currently extract 91 percent of their total water demand from these underground sources, with the remaining demand satisfied by desalination and treated effluent.⁷ This unsustainable practice has resulted in falling water tables, a deterioration in water quality and saline-water intrusion into the declining aquifers.⁸

Adding to this dismal situation, the GCC states have pursued a hugely inefficient policy of developing their own agriculture — in effect, exporting water. A whopping 85 percent of the ground water in the GCC states is used for producing a food supply that could be imported much more cheaply.⁹ Moreover, the disproportionate investment of their limited fresh-water assets in agriculture has had a negligible impact on their economies, contributing on average less than 1 percent of GDP throughout the region.¹⁰ During the 1980s, Saudi Arabia became the sixth-largest wheat exporter in the world (with production reaching nearly five million tons in the early 1990s) courtesy of non-renewable ground water provided through inefficient irrigation systems.¹¹ In belated recognition of this folly, Saudi Arabia announced plans in early 2008 to reduce annual grain production by 12.5 percent and halt all production by 2016.¹²

Another egregious example of the region's misguided agricultural policy is presented by Saudi Arabia's Al Safi Dairy Farm, identified in the *Guinness Book of World Records* as the largest integrated dairy farm in the world. The farm, located about 60 miles outside Riyadh, covers 14 square miles and supplies approximately one-third of the country's dairy needs. The farm's 29,000 cows produce an estimated 122,000 gallons per day, with each cow needing up to 30 gallons of fresh water daily to drink and stay cool (about 80 degrees) in temperatures that can reach as high as 115 degrees Fahrenheit in the summer. Water for the entire operation is pumped from a depth of 6,000 feet underground. In addition to cooling down the cows, the water is used to grow their feed.¹³

All the GCC states have taken dramatic steps to address chronic fresh-water shortages by building desalination plants.

The region today boasts the most developed infrastructure for fresh-water production in the world. Desalinated water is extremely expensive to produce, costing on average \$.50-.60 per cubic meter.¹⁴ The Gulf states today operate over half of the world's estimated 10,400 desalination plants, which produce over 35 million cubic meters of water per day around the world. Saudi Arabia's Saline Water Conversion Company (SWCC) is the largest desalinated-water company in the world, producing approximately 3 million cubic meters per day and 5,000 megawatts of power, representing 50 percent of the kingdom's drinking water and 20 percent of its power generation. In March 2006, SWCC Governor Fehied al Shareef indicated that the kingdom would need an additional six million cubic meters of water and 30,000 megawatts of power-generation capacity to meet anticipated demand.¹⁵

The scale of the joint desalination/electrical-power projects under consideration throughout the region is staggering. In August 2007, the French company Veolia Water Solutions and Technology announced it had launched an \$805 million project to build a desalination plant in Fujairah, in the UAE, that will produce 590,000 cubic meters of water per day when it is completed in 2010. The same company also received a \$1.4 billion contract in June 2007 to build what will be the world's largest desalination plant in Jubail, Saudi Arabia, to produce 800,000 cubic meters of water per day.¹⁶ In December 2006, Saudi Arabia began studying a potential \$5.3 billion "Water Bank" project in Tihama that will add significant desalination capacity for the entire country.¹⁷ Demand for desalinated water in the region is projected to grow at an annual rate of six percent and may

require an investment of over \$100 billion in new capacity over the next decade to meet demand growth.¹⁸

The fresh-water shortage will be the Gulf states' critical environmental stress for the foreseeable future, exacerbated by a burgeoning population and the economic expansion to sustain it. As indicated in Figure 4, the regions population is expected to grow from 117 million in 2000 to 219 million by 2050, an increase of over 85 percent.

Figure 2
Population in Gulf Region¹⁹

(in millions)

Country	1950	2000	2050
Bahrain	0.116	0.650	1.17
Iran	16.900	66.001	100.17
Iraq	5.300	25.020	61.90
Kuwait	0.152	2.200	5.20
Oman	0.456	2.400	4.60
Qatar	0.025	0.617	1.30
Saudi Arabia	3.200	20.800	45.03
Totals	26.150	117.787	219.37

Regional economic growth to accommodate this increased population must be fueled by world petroleum markets. Without these revenues, the Gulf states face the prospect of declining per capita GDP, economic stagnation and political uncertainty. The future for these markets, however, appears bright for regional regimes as they seek to preserve their "rentier" model of redistributing energy-market proceeds. The U.S. Energy Information Administration (EIA) forecasts that the world will need 40 percent more oil than it is using today by 2030, when global demand will increase from approximately 85 million barrels per day (2008) to 118-120 million barrels per day (mb/d).²⁰ The United States

is anticipated to need an additional 10 mb/d by 2030, taking its consumption to 28-30 mb/d by 2030. Asia will be the Gulf's most important market over the period; its anticipated resumption of economic expansion will be fueled by increased Gulf production of gas and oil. Net oil imports in China and India jump from 5.4 mb/d in 2006 to 19.1 mb/d in 2030. Gulf producers must nearly double production to keep pace with anticipated growth in demand and will face particular pressure after 2020, when non-OPEC suppliers are projected to plateau. The EIA projects that the Persian Gulf share of worldwide petroleum exports may reach 66 percent by 2025.²¹

The paradox of the Gulf states' situation is that their continued ability to adapt and mitigate the impact of environmental stresses for their growing population depends upon the functioning of markets that must somehow be artificially restrained if the world is to successfully regulate carbon emissions. This fundamental contradiction lies unaddressed by all the major energy-market participants. Both suppliers and consumers of fossil fuels continue to believe that the future will be like the past. That the Gulf states are planning their future based on the premise of continued unrestrained revenue growth is not in question. The recent past suggests their reasons for optimism. Revenues from the increase in oil prices have delivered a veritable waterfall of cash. According to a recent Kuwaiti economic report, regional oil revenues surged from \$364 billion in 2007 to an estimated \$630 billion in 2008.²² The world's economic slowdown has seen Gulf oil revenues decline to an estimated \$280 billion in 2009.

Despite the global economic slump of 2008-09, the future for economic growth and development looks bright in the Gulf states. As many regions stagger through the

world's economic crisis, Gulf economies continue to grow — albeit at slower rates. The World Bank estimated that the Gulf economies would grow at 3 percent in 2009, with a growth rate of 4.5 percent expected by 2011.²³ Despite the world's economic problems, the region today remains among the fastest-growing in the world. A reduction in oil revenues has definitely hurt the Gulf states, with GCC energy-export-related income declining from \$630 billion in 2008 to an estimated \$280 billion in 2009. Contrary to popular perception, while economic growth in the Gulf states is solely dependent on energy markets, non-oil-sector growth is an equally important factor in driving economic growth.²⁴ The GCC has taken steps to open its markets to outside investors over the last decade and is becoming steadily more competitive, according to World Bank figures. The region boasts an estimated \$2 trillion in ongoing development projects, \$1.3 trillion of which is in construction and \$266 billion in energy infrastructure.²⁵

While the long term looks bright, however, a period of economic retrenchment is definitely underway. The bursting of the region's real-estate bubble has littered Dubai's landscape with partially completed projects. Nearly half of the UAE's estimated construction projects, valued at over \$580 billion, have been either put on hold or canceled.²⁶ In March 2009, the Al Nahyans of Abu Dhabi reportedly agreed to purchase \$10 billion in bonds to help refinance Dubai's estimated \$80 billion debit. Dubai may imminently need another \$10 billion in bailout assistance from Abu Dhabi. Other aggressive development projects, however, are still underway. In early 2008, Abu Dhabi broke ground on Masdar City, a \$22 billion project, six-square-kilometers designed to house 40,000 residents in a carbon-free city.

Contracts for the project are still being awarded.²⁷ Similar aggressive development is proceeding in Doha, fueled by export revenues from the North Dome natural-gas field.²⁸ Other ambitious projects abound throughout the region. There are plans, for example, to position the region as a leading producer of aluminum in global markets. A series of huge, environmentally unfriendly aluminum smelters are underway in Kuwait, Qatar, Oman and the UAE that will boost production to 1.8 million metric tons per year by 2010.²⁹

The Saudi Arabian General Investment Authority is continuing to push its massive development plan to build six new cities that it hopes will add \$150 billion to the nation's economy, housing for 4.3 million people and jobs for 1.3 million by 2020. The King Abdullah Economic City, Knowledge Economic City in Medinah, Prince Abdulaziz bin Mousaed Economic City in Hail (500 miles north of Riyadh), Jizan Economic City and Petro Rabigh represent the regime's attempt to build an infrastructure that can absorb the wave of population growth that will be breaking over the kingdom in the next 30 years.³⁰

The World Wildlife Foundation has developed an index to measure the demand a country places on the biosphere: the area of biologically productive land and sea required to provide the resources and absorb the waste of the world's population.³¹ The index refers to the number of global hectares used per person for resource consumption in each country (see Figure 3). The ecological footprint of the region is significantly higher than global averages, particularly in countries like Saudi Arabia and the UAE. The UAE boasts the world's largest per capita ecological footprint, each citizen using a whopping 11.8 hectares for resource consumption and waste absorption.

Figure 3
Gulf State Ecological and Carbon Footprint per Person, 2003³²
 (global hectares per person)

Country	Ecological Footprint	Carbon Emissions from Fossil Fuels
Bahrain	N/A	N/A
Iran	2.40	1.52
Iraq	0.90	0.75
Kuwait	7.30	0.29
Oman	N/A	N/A
Qatar	N/A	N/A
Saudi Arabia	4.60	3.43
UAE	11.00	9.06
MENA Avg	2.20	1.36
Global Avg	2.23	1.06

ENVIRONMENTAL VULNERABILITY

The dire projections for the impact of declining access to fresh water are but one component in assessing the cumulative impact of climate change on regional states. Figure 4 summarizes the findings from the Center for International Science Information Network at Columbia University, which assesses the aggregate vulnerabilities to climate change of selected Middle Eastern states over the next 20 years.

Figure 4
Middle East Environmental-Vulnerability Snapshot³³

Country	Aggregate Vuln.	Relative Temp. Vuln.	Temp. Change	2000 Pop. w/ < 1000m ³ potable water*	2030 Pop. w/ < 1000m ³ potable water*	% Change	Agricultural Productivity
Egypt	.90	Avg.	.71	66.4	74.8	8.5	Positive
Iraq	1.06	Avg.	.74	31.5	50.1	18.6	Very Serious
Iran	.96	Avg.	.83	83.2	90.8	7.6	Serious
Saudi Arabia	.78	Avg.	.66	94.1	96.3	2.2	Moderate

*Population with access to less than 1000m³ of Potable Water Annually

The data above do not indicate a “serious” societal vulnerability to projected increases in the world’s temperature. While the data show that Iran and Saudi Arabia will see continued significant shortages of potable water, these shortages are not deemed threatening to the social fabric. As to the prospect of rising sea levels, of the four countries above, only Egypt is assessed to suffer significant impact from a one to three-meter rise. An estimated 10 percent of Egypt’s population (6 million people) would be affected by a one-meter rise in sea level, with that number increasing to 10 million people by a three-meter rise.³⁴ While none of the Gulf states in the sample (Saudi Arabia, Iran and Iraq) are assessed to have significant coastal populations that might be affected by dramatic rises in sea levels, that is not true elsewhere in the Gulf. Bahrain could lose up to 15 kilometers of coastline with significant increases in sea levels.³⁵ Moreover, the aggressive development of man-made islands off the coast of Dubai and land “reclamation” projects in Qatar and Bahrain certainly would become problematic.

REGIONAL STABILITY

Limitations of the physical environment have always been powerful, systemic factors shaping Gulf societies. In moving from agrarian to industrial economies and from rural to urban populations, the region’s ruling elites have devised sophisticated and expensive means to mitigate and adapt to the hostile environment. The environmental adaptive capacities of the Gulf states today are the most advanced in the world, although Iraq and Iran have some catching up to do. There is an admitted air of “unreality” to some of the coping measures that have been taken without regard to cost or common sense. To survive, regional

regimes must continue to fund expensive and environmentally unfriendly programs, the UAE’s Masdar project notwithstanding. Assuming that these societies can continue their aggressive investments — thanks to petroleum wealth — in fresh-water creation, power generation, housing and economic development, these efforts can go forward. Continuing down this path may mitigate the prospect of internal instability. But if the elites cannot continue to fund expensive new projects for their burgeoning populations, they all face potential problems. The politics of global climate change will affect the degree to which the Gulf states can continue their environmental mitigation and adaptation programs.

The Al Saud are ahead of the rest of the world in their thinking on the politics of climate change. Due to the fact that Saudi Arabia is already one of the most environmentally inhospitable parts of the planet, the regime has spent much of the last 50 years investing in arguably the world’s best-developed climate-related adaptation and mitigation infrastructure. An American football metaphor illustrates the Al Saud strategy. At a time when the rest of the world has yet to arrange a huddle to call plays, the Al Saud are already positioned in a “prevent defense” looking to thwart the “hail mary,” recognizing that the offense may have to give up the short gain up the middle.

This approach to the politics of climate change has earned them the ire of environmental groups, who in 2006 rated Saudi Arabia the worst country in the world at addressing climate change.³⁶ At the December 2007 UN conference in Bali, environmental groups labeled Saudi Arabia the “fossil of the day” for its reluctance to constructively support global climate-change talks.³⁷ The Saudi approach to the issue seems encapsulated, on the one hand, by King Abdul-

lah's November 2007 announcement that the kingdom would spend \$300 million to support climate-change research, and on the other, by the announcement that Prince Al-waleed bin Talal was spending \$300 million for an Airbus A380 "flying palace."

Saudi Arabia, the United States and China have united over the last eight years to water down findings of the Intergovernmental Panel on Climate Change.³⁸ The Saudi approach to the issue has been perhaps best articulated by Saudi Oil Minister Ali bin Ibrahim al-Naimi, who, in objecting to attempts by the industrialized world to restrain gasoline demand through higher taxes, told the UN General Assembly in September 2007:

Those industrialized nations are imposing more high taxes, which are... providing direct and indirect aid for the industries of coal and nuclear energy, the most polluting sources of climate and the global environment.... This affects growth rates in the world for oil demand in the coming period and contributes to the negative impact on the march of development in our country. . . . The call for moving away from fossil-fuel consumption as a way to address climate change is not a viable alternative. I can assure you that, through the use of technology solutions, the world can continue to rely on oil.³⁹

The Al Saud family does not fear the impact of climate change on their own physical environment, which will change little if the world continues to heat up. They do foresee disaster, however, in the politics and policies of climate change as the international community starts to grapple with the problem. The Gulf-state nightmare would be global agreement on a system of market-distorting forces that

produces two outcomes: (1) a reduced demand for energy, and (2) more demands that energy producers shoulder the costs for states that lack the resources to implement climate-related adaptation and mitigation measures.

This is a strategy to hold off, for as long as possible, the introduction of a system of global carbon taxes and/or mechanisms to spread the costs of adaptation and mitigation to climate change. The Al Saud and their colleagues around the region look upon this outcome as inevitable, but the longer they can avoid dipping into their own pockets as part of the market-distorting measures, the better off they will be in building their own environmental adaptation and mitigation efforts. The Al Saud are motivated by economic self-interest and, more broadly, by the recognition that the kingdom's rentier system depends upon increasing amounts of cash to cope with "traditional" sources of instability: population growth, urbanization, unemployment, lack of fresh water, and disruptive social movements that could spring from Saudi urban centers, to name but a few.

The Al Saud and the other ruling families in the Gulf have cemented their hold on their respective countries while paying close attention to a series of domestic stakeholders. In Saudi Arabia, these stakeholders include the extended royal family, the religious establishment, the merchants of the Hijaz, the new caste of dissident religious clerics who wield influence in the Nejd, Shias in the Eastern Province (still second-class citizens), and tribal and clan leaders throughout the peninsula who have been indirectly integrated into the familial structure via marriage.

Internally, each family in the Gulf states has constructed an elaborate system of political patronage and wealth redistribution

in the form of free education, cheap gas and electricity, and government jobs for a mostly underemployed male population. Continued economic growth built on the continued expansion of world demand for energy provides the means for them to continue a system that keeps their friends happy and co-opts potential internal opponents.

The climate impact of 2030 represents an appreciable risk factor for the Gulf states that could potentially add to traditional risk factors: population growth, unemployment, social movements and urbanization. The Saudis and their Gulf state partners greatly fear the impact that climate change could have on the orderly functioning of global markets for petroleum, and that the politics of the issue may result in market-distorting forces. Both issues could lead to a drop in revenue and mitigate the regime's ability to address traditional sources of risk.

CIVIL CONFLICT, EXTERNAL AGGRESSION, EMIGRATION

The stresses stem not from the environment per se, but from the regime's ability to continue the process of adaptation and mitigation to an already stressed environment. If the regimes cannot continue to produce this artificial construct, the basis of the rentier system comes unglued, since domestic constituencies can no longer be co-opted. In such a scenario, the regional regimes would devolve openly into *mukhabbarat* (police) states. The consequences could be catastrophic over the long term. In Saudi Arabia, the most serious near-term political threats that could be energized by market-disrupting forces are the dissident populist clerics who operate outside the confines of the government-sanctioned religious establishment. This group is highly xenophobic and virulently anti-Shia and anti-Western.

SYSTEMIC RISKS TO REGIONAL SECURITY

The analysis presented here assumes that regional security will not be seriously threatened by climate change per se through 2030, as climate change and other factors will not lead to systemic changes in international energy markets. Climate change is not forecast to gather momentum until the second half of the twenty-first century. The regional regimes above all seek to ensure their security and continued political and economic ascendance. As previously indicated, we can expect all the Gulf leaders to manage threats to their states that stem from market-distorting forces. As long as world demand for energy continues on its inexorable path, regional regimes have the means to stave off stresses to the state stemming from environmental and climate-related forces.

It is worth noting, however, that the climate-change models do not account for disruptive, cascading events that can dramatically alter orderly political and economic interactions between and among global actors. In other words, the cumulative impact of climate change may produce unanticipated incremental changes that can materialize into much more serious problems. Surprises happen. Climate change *will* affect economic development around the world and make it more difficult for various states — particularly in Asia — to sustain a predictable path of economic development. The continuation of economic expansion in Asia is vitally important to Saudi Arabia as a market for its oil exports.

The latent reserves of social and political resilience are proportionate to latent reserves of oil and natural gas. If the oil runs out or markets fundamentally change due either to a sustained global economic slowdown or to successful energy-demand

mitigation efforts around the world, it is doubtful that today's residents of the Gulf will willingly and peacefully return to the nomadic existence of their pre-oil ancestors. The U.S. Geological Survey estimates that the kingdom may have as much as 1 trillion barrels in recoverable reserves of all kinds of oil, and no amount of demand mitigation will dry up the world's thirst for petroleum.

It is unlikely that Saudi Arabia, for example, will ever be a preferred destination for migrants or refugees, unless they are perhaps Muslim religious refugees fleeing persecution. This is not necessarily the case in the more socially relaxed Bahrain, Qatar and the UAE. In the UAE and Qatar, expats already outnumber the host nationals. Saudi vulnerability stems from the functions of international energy markets and faith, or lack thereof, in these markets. This is a phenomenon that could be described as the "militarization of energy security," a situation in which states lose confidence in market's ability to deliver a reversion toward the mean in energy pricing. Alternatively, states judge that successively higher cost plateaus in energy pricing are unacceptable, tipping the cost-benefit calculus towards using force. Such a scenario is not difficult to imagine if "peak oil" becomes a reality or if the world's advanced states decide that rising oil prices are politically and economically unacceptable. In such an environment, the Gulf states — and most particularly Saudi Arabia — become subject to intimidation and coercion by military powers. The potential of armed aggression directed at Saudi Arabia stems not from climate-related issues, but from a loss of confidence in international energy markets.

POLICY OUTLOOK

As previously noted, regional regimes will seek to mitigate developments in global politics that distort the functioning of international energy markets. To do this, the regimes must engage with a variety of actors, both states and international organizations. This engagement is necessary to forestall the development of market-distorting forces and delay having to pay for adaptation and mitigation costs elsewhere. They are amenable to western interests as a function of maintaining good customer relations with countries that possess military capacities that are useful to the Gulf producers. The Saudis have assiduously avoided offending their erstwhile protector (the United States), and they have built close political relationships with European states, both as a counter to U.S. hegemony and as another source of protection against external threats. There is no reason to suggest that the Al Saud will alter this approach over the forecast period, unless revolution threatens to replace them with Islamist populism.

CONCLUSION

Despite the Gulf regimes' prudent steps to mitigate and adapt to environmental stress, they all remain vulnerable to fluctuations in global energy markets. A sudden drop in demand or a sustained drop in price will negatively affect their ability to continue their mitigation and adaptation efforts. The global politics of climate change threaten to alter the dynamics of international energy markets in ways that redound to the disadvantage of the Gulf producers. They will thus continue to publicly embrace "green" development policies at home while joining together with other states to forestall a global system that

limits emissions and, hence, demand for energy. Moreover, they will seek to avoid schemes that distribute their wealth to the less-developed world to pay for the climate-related mitigation and adaptation efforts that they themselves have built

their modern societies around. Any global system that comprehensively addresses climate change will have to incorporate the needs and interests of the energy-producing states of the Persian Gulf.

* The views in this paper are those of the author.

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²⁸ For a summary of the largest of these regional reports, see SAMBA report above, Appendix 1, Selected GCC Projects, May 2008, p. 18.

²⁹ "Gulf States Plan Higher Aluminum Output," *Engineering and Mining Journal*, September 2004; online at www.findarticles.com/p/articles/mi_qa5382/is_200409/ai_n21357315?tag=untagged.

³⁰ Jad Mouawad, "The Construction Site Called Saudi Arabia," *The New York Times*, January 20, 2008, at www.nytimes.com/2008/01/20/business/worldbusiness/20saudi.html; Raid Qusti, "Saudi Arabia to Build Two More Economic Cities This Year," *Arab News*, April 27, 2009, at www.arabnews.com/?page=6§ion=0&article=95554&d=29&m=4&y=2007.

³¹ *Living Planet Report 2006*, World Wildlife Fund, p. 14. The WWF defines the footprint as follows: "The footprint of a country includes all the cropland, grazing land, forest, and fishing grounds required to produce the food, fibre and timber it consumes, to absorb the wastes emitted in generating its energy uses, and to provide space for its infrastructure. People consume resources and ecological services from all over the world, so their footprint is the sum of these areas, wherever they may be on the planet."

³² *Living Planet Report 2006*, World Wildlife Fund, p. 30. The measurement tool for this is Figure 3 is a "global hectare," which is a measure of biocapacity. As noted in the report on p. 14 "The Ecological Footprint measures humanity's demand on the biosphere in terms of the area of biologically productive land and sea required to provide the resources we use and to absorb our waste." In 2003 the global Ecological Footprint was 14.1 billion global hectares, or 2.2 global hectares per person (a global hectare is a hectare with world-average ability to produce resources and absorb wastes). The total supply of productive area, or biocapacity, in 2003, was 11.2 billion global hectares, or 1.8 global hectares per person.

³³ Data drawn from model on anticipated climate change by year 2030 prepared by Marc Levy and the Center for International Earth Science Information Network (CIESIN) at Columbia University.

³⁴ CIESIN data.

³⁵ Mohamed A. Raouf, "Climate Change Threats, Opportunities, and the GCC Countries," *The Middle East Institute Policy Brief No. 12*, April 2008.

³⁶ "U.S., Saudi, China Rank among Worst on Climate Change: Group," Agence France Presse, November 14, 2006. The report by the German environmental group Germanwatch rated Sweden as best, with the United States, China and Saudi Arabia at the bottom of the heap.

³⁷ "Saudi Arabia Tops the Roll of Dishonour," One World Net, December 5, 2007, at www.uk.oneworld.net/article/view/155885/1/.

³⁸ As noted in "Billions Face Climate Change Risk," *BBC News* April 6, 2007, at www.news.bbc.co.uk/2/hi/science/nature/6532323.stm.

³⁹ Remarks as reported in Andrew Leonard, "Don't Cry for Saudi Arabia," *Salon.com*, September 27, 2007, at www.salon.com/tech/htww/2007/09/27/saudi_arabia_oil/.