ENVIRONMENT AND SUSTAINABILITY IN THE MIDDLE EAST

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Material prosperity is reaching planetary limits, requiring redefinition in a broader framework of human purpose and economic, social and environmental sustainability. The Middle East faces serious environmental challenges despite participating in international efforts to protect the environment. Environmental responsibility rooted in Islam can provide fundamental guiding principles and values to transform the predominant model of development. The region needs to plan an economic transition to a green economy, strengthen governance, manage water and agriculture for food security, respond to climate change, shift to sustainable production and consumption, and improve education, laying the foundation for a sustainable future for the region.

1. Prosperity, environment and sustainability

Prosperity is usually thought of in economic terms as material prosperity, enabled by adequate wealth. This is often measured by statistics such as Gross Domestic Product (GDP), a standard measure of the flow of money through the economic system. Yet it is increasingly recognized that this is not an adequate measure of what should be the result of economic activity, that is human well-being (Stiglitz et al. 2009). Increasing environmental pollution, for example, if it increases health costs and requires expensive control and clean-up measures, raises GDP while it lowers well-being. Similarly, unsustainable debt-driven consumption can increase well-being in the short term, but

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accumulating economic, social and environmental debt will ultimately reverse benefits later.

The science of complex systems has shed new light on the operation of the economy (Beinhocker 2006) and on the evolution of society in general (Dahl 1996). The human population and material civilization have rapidly expanded and globalized to the point that we are now reaching or even exceeding planetary environmental boundaries (Rockstrom et al. 2009; Wijkman 2012). Even at the regional and national levels, populations are exceeding the carrying capacity of their natural resources and are obliged to import resources (GFN 2010), which means that the wealthier countries are competing for resources with the poor in other countries. It is apparent that the kind of material growth upon which modern society is based cannot continue forever in a finite world, and could lead to the collapse of civilization if we overshoot the planetary capacity to support our material lifestyle (Meadows et al. 2004; Homer-Dixon 2006; MacKenzie 2012).

These issues are at the center of the global discussion on the environment and sustainability over the last 50 years. As the Brundtland Commission defined it: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (WCED 1987) Sustainability is usually considered to have three main dimensions: economic, social and environmental. All need to be considered together if sustainable development is to lead to continuing human well-being. Since the Rio Earth Summit in 1992, the United Nations, governments and civil society have all been designing sustainable development indicators to measure progress (Hak et al. 2007), and nations have been assessing the state of their environment and the sustainability of their societies (Dahl 2008).

Economic sustainability is perhaps the easiest to understand: more wealth needs to be created than is consumed, depreciated or destroyed. Social sustainability requires attention to human capital and social organization. Since individuals eventually age and die, it is the transmission of values, culture, science, knowledge and experience through education that ensures social sustainability from generation to generation. The institutions of society: governments, businesses, civil society organizations, communities, religions, etc. need to continue to function effectively and to adapt to ever-changing conditions. Social sustainability also depends on a certain level of justice and equity; if the benefits of the economy are distributed unfairly, social pressures will build and lead to instability.

Environmental sustainability is not just a luxury to be considered once the society is wealthy, but an essential precondition for human well-being and even survival. The environmental parameters of the planet set the outer limits on what civilization can achieve. Just as a medicine can heal if properly dosed, but kill if over-consumed, so can civilization, if carried to excess, bring about its own destruction. The watchword of a sustainable society is moderation. It is therefore necessary to consider environmental capacities and limits, nationally, regionally and globally, as the framework within which economic and social sustainability must be achieved.

Finally, sustainable development can only be understood in the context of a definition of human purpose. What is the ultimate aim of human development? Is it just to satisfy material needs, or something more? Is it to achieve human well-being and happiness? Rising GDP per capita does not equate with happiness beyond a certain level. How does

society define well-being? These questions are now being addressed at the international level (Dahl 2013b). Bhutan has spent years developing its Gross National Happiness index as a culturally- and spiritually-appropriate measure of its development (Ura et al. 2013) and a World Happiness Report is now being issued (Helliwell et al. 2013). Other countries are also preparing well-being or happiness measures, and new research is producing indicators of sustainability values at the individual and community level (Burford et al. 2013; Dahl 2013a).

2. State of the Environment

The most critical issue in the Middle East is **water management**. With only 1,000 m3 per inhabitant per year, Arab countries are now among the most water-scarce in the world. Groundwater is being over-extracted, causing saline intrusion into coastal aquifers, and often polluted as well (UNEP ROWA 2014). Libya has invested enormous sums in the exploitation of fossil groundwater reserves in the Sahara that are not sustainable. Climate change is expected to reduce rainfall and aggravate the water problems in the region in the years ahead.

Political tensions over water are illustrated by the Tigris and Euphrates river basin shared between Turkey, Iraq, Syria and Iran. While there have been bilateral agreements since the 1920s, and a joint committee for information exchange since 1982, attempts starting in the 1960s to negotiate an equitable sharing of water in this basin have failed, as Turkey claims the sovereign right to use the water in its territory. Extensive dam-building in Turkey, where most of the water originates, cuts off water from states downstream. Syria has also constructed many dams on the Euphrates, and reduced water flow from Turkey has cut its electric power generation. Tensions have been high, including troop movements to the borders (Mimura 2010). Saddam Hussein even used the draining of the Iraqi Marshlands as an act of aggression against the Marsh Arabs. Syria, Jordan, Israel, Palestine and Lebanon also share transboundary water basins. Egypt faces problems with the water from the upper Nile basin. One particularly contentious issue in the Israeli-Palestinian conflict is access to water resources in the Jordan Valley and the Golan Heights.

Among the key factors causing **land degradation** are serious overgrazing, inefficient erosion control and loss of soil productivity which have been aggravated by climatic factors, population growth, urbanization and clearing vegetation for agricultural (UNEP ROWA 2014). Soil loss is an insidious problem because it occurs gradually, the degradation is cumulative and difficult to reverse, its primary impact is on poor rural populations, and it undercuts a nation's future . Most past civilizations collapsed because of land degradation, and 35 per cent of all the world's arable land has been degraded in the last seventy years (Montgomery 2007).

Human activities are causing **coastal degradation, marine pollution and fishery decline**. Pollution, excessive urbanization and unsustainable tourism have irreparably damaged much of the region’s coastline, while at sea overfishing, oil spills and pollution from maritime transport have led to deterioration in fish stocks, the primary source of protein and income in some of the Arab countries. Food security is further undermined and coastal communities reliant on fishing face a real risk of impoverishment (UNEP ROWA 2014).

Loss of biodiversity and habitat destruction result from development pressures. In the past thirty years, overexploitation of ecosystems in the region has destroyed habitats, especially coastal and wetland habitats. This has caused a decline in numbers and variety in many species, with more than a thousand endangered species, and has changed their natural territorial distribution (UNEP ROWA 2014).

Chemicals and wastes are an important issue in the region with hazardous substances used in a variety of agricultural, industrial and medical applications, and the management of these as well as more general wastes requiring environmental safeguards (UNEP ROWA 2014). **Urban air pollution** is also a problem in most cities.

Behind these environmental problems are some significant development issues for the region. For many Middle Eastern countries, the export of oil and gas provides the principal source of revenue. Yet, from an environmental perspective, the future of the petroleum industry is at risk. **Climate change** is driven largely by carbon dioxide released by burning fossil fuels, and by methane which can escape during natural gas production and use. The carbon contained in existing fossil fuel reserves already being exploited is already five times the remaining capacity of the atmosphere to absorb it without serious risk of a climate catastrophe (McKibben 2012). With Arctic ice melting much faster than anyone expected, the urgency of making the transition away from fossil fuels has increased (World Bank 2012). A recent study of large methane releases due to Arctic warming suggested that the tipping point could be advanced by at least 15 years, causing $60 trillion in damages, equivalent to the present global GDP (Whiteman et al. 2013).

Since we have not found a cost-effective technology to capture a significant part of the carbon released and return it to permanent storage, scientists say the only realistic way to prevent such a climate catastrophe would be to leave 80 per cent of the remaining oil, gas and coal in the ground. The fundamental conflict between this scientific reality and the essential interests of the traditional fossil-fuel economy, oil companies and petroleum-producing countries is a defining issue of our era. The pressures on Middle Eastern petroleum exporting countries to move away from their major source of revenue will increase, and there could be threats of liability claims for climate change damage caused by the oil they produced. The countries of the region should therefore plan to move away from their dependency on oil as rapidly as possible towards a green economy and knowledge-based development. The regional potential for renewable energy is of obvious interest where early investment now could lead to a competitive advantage. Such a fundamental transition requires international collaboration and assistance, and the region should actively support intergovernmental action in this direction.

Another challenge across much of the region is the intensive and perhaps excessive **urbanization** funded by petroleum wealth. This not only has direct environmental impacts, but it risks being unsustainable and becoming an economic liability when the oil wealth that supports it runs out. Coastal developments like artificial islands may not survive many decades with the projected rise in global sea level of perhaps 1 meter in this century. A much longer term planning horizon will be necessary to avoid many mistakes being made now, and the available wealth would be better channeled into investments that will ensure sustainability well into the future.

The Middle East is unfortunately subject to repeated **wars and armed conflict** which, on top of the enormous human suffering and loss of life, the destruction of property and infrastructure, and population displacements, also cause great environmental destruction and the pollution of water supplies, soils and coastal areas. Land mines, unexploded munitions and cluster bombs can leave significant areas uninhabitable. Armour-piercing shells made with depleted uranium can also leave behind worrisome contamination. Sunken ships can continue to pollute years later. Wars leave a long-lasting heritage of environmental destruction which will continue to haunt the region and weigh on its development potential.

3. Awareness and responsibility towards protection of the environment

The countries of the Middle East have not ignored their environmental problems. All of the countries of the region have prepared or commissioned State of the Environment Reports, but only six countries issue them regularly. In addition, UNEP has prepared post-conflict environmental assessments for Iraq, Palestine and Yemen to assist with planning for environmental reconstruction (Dahl 2008).

However, even the best efforts of a national government to protect its environment and manage its natural resources are inadequate in a globalized world hitting planetary boundaries. Global problems like climate change require global solutions, and these can only be found when all nations unite in an effort to work together in the best interests of all humankind.

There has been progress. The Middle East has accompanied the rest of the world in its involvement in international debate and action on the environment, starting with participation in the United Nations Conference on the Human Environment in Stockholm in 1972. The second Executive Director of the United Nations Environment Programme (UNEP) was the Egyptian microbiologist Dr. Mostafa K. Tolba, who served for 17 years, and UNEP maintains a Regional Office for West Asia which supports the Council of Arab Ministers Responsible for the Environment (CAMRE). Beginning in 1974, UNEP organized Regional Seas Programmes for states around a shared sea area, starting with the Mediterranean Action Plan under the Barcelona Convention, and extending to the Kuwait Convention and Action Plan, and the Jeddah Convention and Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA), with all the Middle Eastern countries as active participants in one or more of these programmes.

Other regional intergovernmental organizations are active on environmental issues. The Islamic Educational Scientific and Cultural Organization (ISESCO) (http://www.isesco.org.ma/) has issued publications analyzing environmental problems from an Islamic point of view, and with reference to the Qur'an and the Sunna, and exploring sustainable development from an Islamic perspective (Ar-Raïsouni et al. 1999; Jamil 1999; ISESCO 2002). The Organization of the Islamic Conference, an intergovernmental organization of 57 states established in 1969, organized the First Islamic Conference of Environment Ministers in 2002 and adopted the Islamic Declaration on Sustainable Development, followed by a second session in 2006 which adopted the Jeddah Commitments for Sustainable Development. There are regional environmental research centres, such as the Arab Center for the Study of Arid Zones and

Dry Lands (ACSAD), set up by the League of Arab States in 1968, and the Centre for Environment and Development for the Arab Region and Europe (CEDARE).

The international environmental role of the Middle East, and particularly of countries where oil and gas are significant resources, has not always been constructive. In a world of sovereign states, where priority is given to the defence of national interests, some countries and the Organization of Petroleum Exporting Countries have obstructed international action on climate change that might lead to the replacement of fossil fuels by renewable energy sources. The two years when the UN Commission on Sustainable Development failed to adopt any decisions were both due to issues from the Middle East on which consensus proved impossible.

4. Dynamic interaction between the environmental and socio-cultural values in the region

Environmental problems do not exist in isolation. They often are the consequence of the socio-cultural values of a society. If material wealth is highly valued, anything that creates wealth and profit has high priority, regardless of the environmental consequences, especially if the consequences fall on the poor, on other regions, or on future generations.

Science is now demonstrating the linkages between the environment, the economy and social values. One lesson from systems science is that there is no steady state equilibrium in complex systems; they are constantly changing, evolving, adapting, and throwing up new challenges that require new solutions. The needs of this age of globalization cannot be addressed by returning to the remedies of previous times. Socio-cultural values must similarly evolve to adapt to the needs of the present, including environmental needs (Dahl 1996). While science can inform us about the state of the environment and the workings of the biosphere, it does not tell us how to use this knowledge. Science requires the force of spiritual commitment and moral principle to ensure its appropriate application.

A person's inner life is not separate from the environment outside. Our emotional and spiritual life influences our environment and is itself deeply affected by it. Our values determine how we relate to each other and to the natural environment. If we are conscious that the very earth we all walk on every day is the source of our prosperity and wealth, we will be more respectful of its requirements and take better care of its productive capacity. A more sustainable view of development should include an appreciation of the importance of agriculture, and of preserving the ecological balance of the world, its biodiversity and natural order.

The lure of urban living has isolated many people from nature and from an appreciation of the many complex ways all human beings are dependent on it. Just as the human body is a closely integrated, coherent entity, so are all living beings inseparably linked together, with higher levels of cooperation and reciprocity as systems become more highly evolved and complex. The more we understand the beauty, complexity, balance and perfection of the natural world, the more it will seem unacceptable, even unethical, to destroy that perfection. In the city we are immersed in the world of material pleasures, while the country resonates with our spirit or soul.

Environment and sustainability in Islam

Islam is the dominant religion in most of the Middle East, and it provides some essential principles for environmental responsibility. These include the unity of God (tawhid) as the source of all values and originator of the entire universe; human responsibility as trustees or stewards of the creation on behalf of God (khilafah), to be enjoyed within limits; nature having an inherent value glorifying the Creator (khalig); the importance of balance (mizan) in respecting the order and purpose of the creation; avoidance of corruption or destruction (fasad) of the creation; and the intrinsic goodness and purity of humankind (fitrah), as exemplified in the life of Muhammad through simple living, moderation, and respect and care for the environment, an example to which all humanity should return (Abdelmannan 2008; Mohamed 2012).

For example, the Quran describes the divine origin of the creation:

Not without purpose did We
Create heaven and earth
And all between! (38:27 Sad)
(Establish) God's handiwork according
To the pattern on which
He has made mankind:
No change (let there be)
In the work (wrought)
By God. (30:30 Ar-Rum - The Roman Empire)
This creation has a perfection and balance that must be respected:
And the earth We have spread out
(Like a carpet); set thereon
Mountains firm and immovable;
And produced therein all kinds
Of things in due balance. (15:19 Al-Hijr - The Rocky Tract)
Do they not look
At the sky above them?-
How We have made it
And adorned it,
And there are no
Flaws in it?
And the earth -
We have spread it out,
And set thereon mountains
Standing firm, and produced
Therein every kind of
Beautiful growth (in pairs)-
To be observed
And commemorated
By every devotee
Turning (to God). (50:6-8 Qaf)
We are responsible as trustees for this creation:

God, Most Gracious!
He has created man:
He has taught him speech (and intelligence).
The sun and the moon
Follow courses (exactly) computed;
And the herbs and the trees -
Both (alike) bow in adoration.
And the Firmament has He
Raised high, and He has set up
The Balance (of Justice),
In order that ye may
Not transgress (due) balance....
It is He Who has
Spread out the earth
For (His) creatures:
Therein is fruit
And date palms, producing
Spathes (enclosing dates);
Also corn, with (its)
Leaves and stalk for fodder,
And sweet-smelling plants.
Then which of the favours
Of your Lord will ye deny? (55:1-13 Rahman - (God) Most Gracious)
It is He Who hath made
You (His) agents, inheritors
Of the earth.... (6:165 Al-An‘am - Cattle)
Water is fundamental to the creation, and is to be shared equitably:
We made from water
Every living thing. (21:30 Anbiyaa - The Prophets)
And tell them that
The water is to be
Divided between them. (54:28 Qamar - The Moon)
Ecological communities are to be as respected as human communities:
There is not an animal
(That lives) on the earth,
Nor a being that flies
On its wings, but (forms
Part of) communities like you. (6:38 Al-An‘am - Cattle)
The Quran condemns arrogant materialists who damage the environment:
There is the type of man
Whose speech
About this world’s life
May dazzle thee,
And he calls God to witness
About what is in his heart;
Yet is he the most contentious

Of enemies.
When he turns his back,
His aim everywhere
Is to spread mischief
Through the earth and destroy
Crops and cattle
But God loveth not mischief.
When it is said to him,
"Fear God,"
He is led by arrogance
To (more) crime.... (2:204-207 Al-Baqarah - The Cow)
The riches of the creation are not to be wasted or consumed frivolously:
But squander not (your wealth)
In the manner of a spendthrift. (17:26 Bani Isra'il - The Children of Israel)
Eat not up your property –
Among yourselves in vanities.... (4:29 An-Nisa' - The Women)
It is He who produceth
Gardens, with trellises
And without, and dates,
And tilth with produce
Of all kinds, and olives
And pomegranates,
Similar (in kind)
And different (in variety):
Eat of their fruit
In their season, but render
The dues that are proper
On the day that the harvest
Is gathered. But waste not
By excess: for God
Loveth not the wasters. (6:141 Al-An'am - Cattle)

These principles developed into rules for utilizing environmental resources, categorized as land, water and animals, in the framework of the Islamic economy. Their aim is to ensure common access to the basis for life, private ownership of developed areas, keeping water clean and pure, respect for animals, and even establishing reserves on undeveloped land (Abdulmannan 2008). While the truth of the Quran is eternal, its application must be related to the needs of today, with environmental pressures very different from those at the time of its revelation. Spiritual principle can provide a positive guide in the modern era in finding alternatives to the materialistic consumer society and the destructive exploitation of the planet's resources. The true meaning of Islam will be expressed today not in a fundamentalist return to the past, but in a move forward towards a better balanced and sustainable future.

Similar principles of the natural world as a Divine creation, and of human stewardship and responsibility for the care of that creation, can be found in the sacred scriptures of the other religions present in the Middle East. In this context, religion can be an important force for improving environmental protection and natural resource management, as

evidenced by the religious action plans on climate change prepared at the request of UNDP and presented to the United Nations in 2009 (UNDP/ARC 2009). This led to the creation of a network of pilgrimage cities to "green" and reduce the environmental impact of the millions of pilgrims drawn to those holy places each year (ARC 2011).

Religious communities and their leaders can mobilize public opinion even in the most remote communities, giving them an inescapable and weighty role in counteracting the pressures of materialism and in encouraging the values of justice, moderation, generosity, humility, respect for the creation, and sustainability. They can educate their communities with a unifying vision of the nature and purpose of human life harmonizing the material and spiritual dimensions, build an understanding of our relationship to nature and our responsibility for its protection, and provide a scriptural basis for ethical action. This means re-examining the dichotomy between scientific and religious knowledge systems and bringing together an objective, systematic scientific approach to the environment with moral principles that motivate action for the common good.

For those with a more secular system of values, many non-governmental organizations focused on nature conservation or more sustainable lifestyles are active throughout the region. They play an important role in increasing public awareness of environmental issues.

5. Transforming the predominant model of development towards sustainability

Economy

Despite the warnings in its religious traditions, the Middle East today has largely accepted the dominant model of development where a consumer society seeks endless growth in GDP and consumption of material goods as indicators of progress and prosperity, and as sources of happiness, meaning and social acceptance. This materialistic economic system now controls the sources of power and information at the global level, leaving no voice for alternative paradigms. Its economic theory based on impersonal markets, competition, promoting self-centred actions by individuals, ignoring environmental and resource limits as externalities, and assuming an inevitable return to equilibrium while maximizing profits, is founded on false premises about human nature and purpose and the behaviour of complex systems, as recent research demonstrates (Beinhocker 2006; Nowak 2007). This system favours the concentration of wealth for the privileged few while condemning the majority to poverty, exclusion and inequality. The global crises of recent years, whether financial collapse, climate change, energy, food, water, epidemics, each reveal new dimensions of the exploitation and oppression that result from current patterns of production and consumption. The corrupting influence of this materialistic worldview has degraded human conduct, corrupted governments, disrupted families, and marginalized the poor, women, minorities and immigrants.

The tensions resulting from this materialistic economic system, the power structures behind it, and its social costs, lie behind the turmoil launched by the "Arab spring" and its aftermath. Recent research has shown that revolution is most likely not from the oppressed poor but when the concentration of wealth in a society reaches a point that even the young educated generation loses hope for any future in the system (Turchin 2010). This can only be prevented by a strong drive for social equality.

To be sustainable, the economic system needs to be placed in a larger social and spiritual context, as it was traditionally in Islam, serving people's needs rather than expecting them to adapt to some economic model. The wealth generated by the economy should provide the means for the peoples of the Middle East to achieve the real purpose of development, that is cultivating their higher human consciousness and spiritual purpose.

Government

Where governments are weak, prone to informal arrangements or nepotism, overladen with inefficient bureaucracy, or lack the confidence of the population, corruption can become a major brake on the economy as wealth leaks out of the formal system. This not only contributes to the unsustainability of the economy and loss of government revenues (Lopez-Claros 2013) as well as increasing social inequality, but also can undermine the adoption and implementation of environmental regulations. Environmental management works best when the government sets the goals for environmental protection and sustainable use of resources through suitable regulations, and business innovates and invests to meet these goals in the most effective way possible. A study by the World Economic Forum found that the most economically competitive countries and companies were also the most environmentally responsible, with business leaders calling for strict environmental regulations, fairly enforced (Dahl 2004).

Economic prosperity in the Middle East has come at a tremendous cost to its natural environment. This legacy of significant environmental damage affects the security and well-being of its own populations and those of many other nations. The growth-driven economic paradigm rooted in national interests at the expense of social and environmental variables and international well-being is unsustainable. Challenging ethical questions of resource distribution and responsibility for damages will force governments to develop institutional mechanisms and implement policies that consider the prosperity and health of the global community and that of future generations. Global institutions are needed to link environmental issues to social and economic priorities, for none of these can advance in isolation.

The necessary transition to a more just, peaceful and sustainable society will require a balancing of the material and spiritual (or ethical) dimensions of human life and civilization, as called for in the sacred scriptures. New economic models should support a more just and dynamic social order, be altruistic and cooperative in nature, foster innovation and empowerment, provide meaningful employment for all, and reduce poverty. Rather than focusing on material growth, such a society should generate knowledge, cultivate trustworthiness and collaboration, eradicate racism and violence, and promote art, beauty and science. Strong institutions are needed for the peaceful resolution of conflicts, especially across the sectarian religious divides that continue to plunge the Middle East into chaos. This would liberate constructive forces to build a more moderate and sustainable economy and society.

6. Emerging challenges and framework for action

Guiding principles and values

Faced with climate change, environmental degradation, extremes of wealth and poverty, excessive consumerism, and the competition, violence, conflict and insecurity of an ailing

social order, a major effort is needed to make the transition towards sustainability. This will require not only informed policies and 'green technologies', but a review of the cultural frameworks driving the institutions of government, business, education and the media in the region. A consensus must be sought on human nature and purpose, and what is natural and just.

In a region sorely in need of peace, the environment can be an important force for peace and reconciliation. Even opposing sides in a conflict can recognize their common interest in preserving their shared environment. The UNEP Regional Seas Programmes were able to maintain their dialogue on marine pollution control and environmental protection in the region even among states at war. Shared environmental actions can help to build trust and confidence that can then be carried over to more sensitive issues.

The concept of trusteeship or stewardship common to the major religions applies to the planet's resources and biodiversity. We are responsible to use the earth's renewable and non-renewable natural resources in ways that ensure sustainability and equity far into the future. We should consider the potential environmental consequences of all development activities in a spirit of moderation and humility. Both science and religion will help us to understand the natural world as the foundation for our material and spiritual development, not just as an economic resource to be exploited for short-term gain. Sustainable environmental management is not just one of several competing priorities, but a fundamental responsibility essential for both our physical and spiritual development.

Justice should be the guiding principle for defining progress. It is unjust to sacrifice the well-being of all the people, and even of the planet itself, to the advantages which modern technological discoveries bring to privileged minorities. Only solutions that meet people's real needs for food security, energy access, shelter, health for all, and are seen as being just, equitable, and accessible to all, will receive the commitment of the masses essential for their implementation. The collective goals of sustainability and planetary environmental protection must be reflected in standards and generate benefits that apply to everyone, while respecting planetary boundaries and maintaining ecosystem services. When every member and every component group of society can trust in these goals, this will bring out the necessary qualities of honesty, a willingness to work, and a spirit of cooperation. Business similarly needs a clear definition of collective goals and a level playing field of regulations and obligations, including the creation of wealth for all of society, to free up its capacity for innovation and efficiency in the common good.

Economic transition to a green economy

There are no technological or resource barriers to eliminating poverty. The problems lie with vested interests, social inertia, and a lack of commitment and political will, as well as the necessary transformation of values described above. Communities cannot develop when they are confronted with environmental degradation, poor governance, ethnic and religious antipathy, marginalization and unemployment, all symptoms of an ethical deficit. The solutions lie in encouraging moral reasoning, removing prejudices of religion or race, and facilitating group decision-making. Everyone should be implicated in constructing a more just economic and social order.

National wealth should be measured in social value rather than financial statistics like GDP. A developed society should be one in which every human being is able to realize his or her potential and to contribute to society (Dahl 2013b). It is urgent that Middle Eastern countries begin their transition to a green economy while they still have the benefit of wealth from their past exploitation of petroleum, which must be phased out. The transformation of their economies will not be easy, but will be much less traumatic if planned in advance rather than being forced upon them by global crises.

The extremes of wealth and poverty in the region also need to be reduced if social stability is to be achieved. While legislative and tax measures can help to address the problem, voluntary sharing by the rich should also be encouraged for its spiritual as well as material benefits.

Water, agriculture and food security

Looking to the future, one underestimated challenge is the importance of agriculture. While the world population is set to increase by at least 2 billion people by 2050, including significant numbers in Middle Eastern countries, we have already hit planetary limits to food production in 2008 and 2012, and technological improvements may not be able to overcome the continuing degradation of soil and water resources and the impacts of climate change. The economics of food production and distribution, and the role of the farmer in food and economic security need to be reevaluated.

No country today can ignore the challenges of food security, and the Middle East, despite large areas of desert and its soil and water problems, needs to reduce its vulnerability as much as possible. This will require a reform of agricultural policies and processes. While farming has been devalued in comparison with resource extraction, manufacturing and urbanization, agriculture still represents the fundamental basis of economic and community life. To overcome the poverty often concentrated in rural areas, investments are needed in information, infrastructure and natural resources management. The farmer must be accorded his or her rightful place in the processes of development and civilization building, and villages reconstructed. Local and even urban agriculture can be a part-time occupation compatible with other kinds of employment, and should be encouraged and valued as such.

Water will continue to be a critically-limited resource which must be managed and shared at the scale of watersheds and river basins, most of which cross national boundaries in the Middle East, raising delicate political issues which must be resolved through consultative mechanisms applying justice and equity. Most groundwater resources are also being overexploited and becoming a major source of conflict. Ambitious strategies and actions must be developed to conserve water resources. The water efficiency of irrigation needs to be improved. Turkey is the major agricultural producer in the region and highly dependent on irrigation. As an example of best practice, its decentralization of irrigation water management to local water user organizations has greatly increased efficiency of water use (Burak 1999).

Climate change mitigation and adaptation

Climate change has become a defining challenge for the recognition that all human beings share the same planet and must recognize their oneness and their shared

responsibility for action. We are all connected to each other and share the common fate of the planetary system now subject to rapidly rising levels of greenhouse gases, largely from fossil fuels. This challenge requires that we replace the worldview of national sovereignty, ascendancy and competition with one of responsibility and global solidarity, with all nations cooperating in accordance with their means. No nation or community can solve this problem alone. Our individual and national interests are best served by our common interest, leading us to understand our purpose and responsibilities in an interconnected world.

Extracting fossil carbon can no longer continue at its present rate, and experts say we should aim for a zero carbon economy by 2050. The Middle East, as a major petroleum-producing region, should collaborate in global efforts to make the transition to other energy sources, while building its own capacity to capture renewable energy as a replacement. Adaptation to the coming environmental changes will also be important, with much of its coastal infrastructure at risk, low-lying areas like the Nile delta facing submersion by the inevitable rise in sea level, and reduced rainfall further aggravating water shortages. Planned adaptation rather than crisis responses will both save money and reduce human suffering.

Sustainable production and consumption

As non-renewable resources are depleted or phased out, it is renewable resources that will return to a central place in the economy. The Middle Eastern region is fortunate to be well endowed in solar energy, and developing stable renewable energy supplies for local use and export will be critical to economic progress.

As with all regions of the world, development brings with it waste and pollution challenges from both industrial and agricultural production processes, and from consumer wastes. Since pollution often ends up in water supplies and ground water, it also impacts on human health and water availability. Salinity and pollution from Turkish agriculture, for example, affects the water quality and uses in downstream riparian states. Pollution control and waste management represent continuing environmental challenges for the region that can best be managed by changing production processes to reduce the problem at source.

In the long term, as non-renewable resources like petroleum run out or must no longer be exploited, and even renewable resources like soil and water reach limits, the real development potential of the Middle East lies in its human resources. The ultimate measure of successful development should be the extent to which each individual is enabled to fulfil his or her potential as a productive member of society building a just and peaceful social order. The processes of sustainable production and consumption should provide for the material, social and spiritual needs of each generation.

Education

The key to social and economic advancement and sound environmental management is universal education. Information technologies expand access to knowledge, but education is essential to make use of that knowledge. Public access to environmental information is essential to protect human health and to encourage sustainable resource management. Curricula must seek to develop a sense of responsibility towards the natural environment

as well as to foster a spirit of inquiry and innovation so that the diversity of human experience can be brought to bear on the challenge of creating an environmentally sustainable development pathway.

A lifelong process of education should give people the knowledge, values, attitudes and skills necessary to contribute to communities founded on justice, equity and unity. They should be grounded in the local but with a vision of the whole world. Education should go beyond the technical to cultivate virtue as the basis of individual and collective well-being, to promote a spirit of service to the community, and to provide inspiration through the arts and contact with the natural environment.

The greatest source of untapped potential in the Middle East is women and girls. Women's distinct knowledge and needs complement those of men. Their responsibilities in families, in communities, as farmers and as stewards of natural resources make them uniquely positioned to develop strategies for adapting to changing environmental conditions and for adopting sustainable lifestyles.

In a world where technology has become a powerful driver for development, but often responding to market forces rather than people's needs, the region needs to build its own capacity for technological innovation and adaptation responding to its own needs, with regional centres for research and training assisting local populations to create and apply knowledge relevant to their own situations.

There is no single solution to the challenges of sustainability, and each community is unique in its endowment of resources and capacities. Progress is best driven from the local level rather than through externally-imposed projects. Educational programmes can build local awareness of environmental challenges and possibilities and of their capacity to respond. Each community can then determine its goals and priorities, and explore different approaches to the environment appropriate to its capacity, resources and the rhythm of life in the community.

Scenarios for the future

While it is not possible to predict the future, it can help to construct scenarios of likely possible futures using a variety of assumptions. The baseline is usually business as usual, showing how the future may play out with no changes from the present system. There are a variety of such exercises, such as those used by the Intergovernmental Panel on Climate Change (IPCC 2013) or the UNEP Global Environment Outlook reports (UNEP 2012). Environmentally, business as usual is not very encouraging, as it leads to resource depletion, food shortages, increasing natural disasters from runaway climate change, and the probable collapse of civilization (Meadows et al. 2004; MacKenzie 2012).

However, scientific studies show that alternative paths to a more sustainable society are possible, even if rather traumatic in the short term (Homer-Dixon 2006; Jackson 2009). It is technically possible to replace all use of fossil fuels with renewable resources in 20 to 40 years, without recourse to nuclear power, or biofuels that compete with food production (Jacobson et al. 2011). Intensive organic agriculture will be the most effective way to increase food production and to economize on water use (UNCTAD 2013). Solar energy is more distributed, so human communities may likewise be developed at a more decentralized and human scale. Production and consumption will adopt closed cycles for

scarce materials, aiming for long product life and efficient recycling. Above all, a new ethical perspective of responsibility will be expressed in moderate, sustainable lifestyles, community solidarity, and an emphasis on the intangible dimensions of human well-being.

It is generally acknowledged that the defective and unsustainable society of today requires systemic change, which cannot be imposed from without, but should result from a public dialogue among everyone, urban and rural, rich and poor, young and old, men and women, on the ethical foundations of that change. This would address many of the issues underlying the tragic violence endemic in the region. A sustainable social order should include an ethic of reciprocity and balance at all levels of human organization, just as the human body lives through the collaboration of cells, tissues and organs with diverse forms and functions. Justice is embodied in the recognition that the interests of the individual and the community are inextricably linked, guiding collective decision-making and leading to unified thought and action.

The result should be an organic change in the structure of society itself reflecting interdependence both within society and with the natural world that sustains it. This should be developed within the Middle East, and more broadly with the whole world, leading to a world federal system, global responsibility for the management and equitable distribution of the earth's resources, reduction of military expenditures, and all the other measures necessary for a just peace at the world level, from which the region would also benefit.

Based on a clearer understanding of environmental capacities and limits in the region and a broader vision of human purpose, a new set of cultural norms for justice and sustainability should be developed by governments, businesses, religious organizations, education, the media and civil society in general. The pathway to sustainability will involve empowerment, cooperation, and continuing processes of questioning, learning and action. Women, men and children, rich and poor, the governors and the governed, should all be enabled to play their rightful role in this process of building a new society in the region. Then consumerism, excessive consumption, poverty and marginalization will be replaced by communities expressing justice, reciprocity and happiness in a sustainably-productive environment.

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