

REGION
A R A B

ATLAS OF OUR CHANGING ENVIRONMENT

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- Abu Dhabi Global Environmental Data Initiative (AGEDI)
- eMISK
- Environment Public Authority, Kuwait
- Regional Organization for the Protection of the Marine Environment

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ARAB REGION

ATLAS OF OUR CHANGING ENVIRONMENT

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Erg Chebbi, Morocco

After a rainfall in March, a small lake rises near the Erg Chebbi sand dunes in the Sahara

Source: Alan Lieberman/Flickr.com

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The Arab region, a group of 22 member countries of the League of Arab States sharing a common language, culture and religion, is divided into three contiguous clusters falling in two continents, two hemispheres, and borders on five oceans and seas. Covering around 14 million square kilometres, the region covers 9 per cent of the Earth's total land area, with a population of over 350 million, of which 56% is urbanised.

The deserts, mountains, dunes, grasslands, forests, and marine areas that typify the region are occupied by thousands of species of plants and animals. This varied landscape contains numerous natural wonders and a wealth of resources and is also home to the vast majority of cities that claim to be the longest continuously inhabited cities in the world.

Over the last few decades, the Arab region has experienced dramatic population and economic growth. This accelerated pace of development has been a major factor in fuelling increased demands on resources and has contributed to rapidly changing land use patterns and environmental change. Although the countries of the region share common concerns about a number of critical environmental and sustainability issues, they also face tremendous differences in their challenges.

In order to better understand the unique environmental trends, concerns and challenges in a region that is witnessing such rapid development, there is demand for a dynamic and credible information base. Data and information is critical to the documentation and quantification of the environmental changes that are taking place on land, in the water, and in the air.

The United Arab Emirates (UAE) envisioned this need, and in 2002 launched the Abu Dhabi Global Environmental Data Initiative (AGEDI), a partnership between Environment Agency – Abu Dhabi (EAD) and the United Nations Environment Programme (UNEP). Since then, this collaboration has included

the Environment Outlook for the Arab Region, GEO-4, GEO-5, West Asia GEO Portal, West Asia Map Server, and the Eye on Earth Summit, the first global summit devoted exclusively to the issue of environmental and societal data access.

AGEDI is now pleased to introduce the Arab Region: Atlas of Our Changing Environment, an evidence-based publication and the first of its kind in the region. Through the use of striking satellite imagery and informative descriptions, the Atlas tells a story of prominent environmental change across 22 Arab countries over the last 50 years. It contributes to the knowledge and understanding of our unique environment that is essential for ensuring sustainable development, and it is our hope that it will support the demands for up-to-date information to inform policy at the local, regional, and international levels. It should also be of immense value to all those who want to know more about the Arab region and who care about its future.

Many experts from around the region contributed to making this publication possible, and several consultations with many stakeholders took place through meetings or by remote communications. It is of note that countries and institutions of the region contributed to the selection of the sites for analysis, prepared content and reviewed the country profiles. We would like to commend all contributors, reviewers and others who made this Atlas possible.

We are proud to lend our support to this important publication and may it inspire positive environmental action, spur further research and foster insight into this part of the world.

Razan Khalifa Al Mubarak
Secretary General,
Environment Agency – Abu Dhabi (EAD)



Von Karman Vortices

Von Karman vortices form as air flows around an object in its path, causing it to separate and create eddies in its wake. The clockwise and counterclockwise spirals in this image were created as wind blowing from the north over the Atlantic was disturbed by the Canary Island archipelago, 95 km from the Moroccan coastline (right). This is an Envisat image from 6 June 2010.

Source: European Space Agency (ESA)

Environmental change on our planet is a reality. The components of the physical environment are constantly changing as a result of both natural processes and human action. The Arab region is no exception, but the pace of change could be even faster than in other areas due to the rapid pace of development in the region. Hardly any element of the Arab environment - vegetation, soils, wildlife, surface and underground waters or the coastline - has been untouched by the purposeful or unintended effects of human activities. The Arab Region: Atlas of Our Changing Environment is a unique and powerful publication which brings to light stories of environmental change at more than 80 locations across the Arab region. Using a combination of ground photographs, current and historical satellite images, and narrative based on extensive scientific evidence, the atlas illustrates how humans have altered their surroundings and continue to make observable and measurable changes to the Arab region and its environment.

The images presented provide visual evidence of changes taking place in the land, water and atmosphere, and also cover transboundary issues such as river basins, transboundary conservation areas and pollutants. One of the most prominent features of this atlas is the use of paired satellite images to show site specific change over time. These “before-and-after” studies clearly demonstrate the pace of development in the region, offering compelling examples of wide-ranging environmental change, including land use change, urban growth, degradation of marine and coastal areas, altered hydrology and shrinking water bodies, loss of habitats and impacts of climate change.

In a region already confronted by extreme climate, limited natural resources, economic conditions and conflict, these images serve to highlight the distinctive environmental circumstances and challenges faced in the Arab region and the vulnerability of many Arab settlements to environmental risks and natural disasters.

Although the challenges depicted are striking, the atlas examines the opportunities that these challenges present, as well as some of the innovative responses that are being implemented in the

region. The atlas also spotlights the unique environmental issues faced by each country, and tracks the individual progress each is making towards achieving the goal of ensuring environmental sustainability as part of the United Nations Millennium Development Goals (MDG 7).

The Arab Region: Atlas of Our Changing Environment is the latest addition to a series of atlases coordinated by UNEP that began in 2005 with the launch of a global atlas - “One Planet, Many People.” This new atlas is an important addition to the growing suite of UNEP atlases able to not only fascinate and intrigue readers, but also contribute to a better understanding of the dynamics of environmental change in the Arab region in support of improved decision-making towards a more sustainable future.

UNEP would like to thank the Ministry of Environment and Water, United Arab Emirates; the Abu Dhabi Global Environmental Data Initiative (AGEDI) and the many experts and reviewers from the Arab Region for their invaluable support, expertise and collaboration on this publication.



Achim Steiner
UN Under-Secretary General and
UNEP Executive Director



Today we find ourselves faced with the imminent end of the era of cheap oil, the prospect of steadily rising commodity prices, the degradation of forests, lakes and soils, conflicts over land use, water quality, fishing rights and the momentous challenge of stabilising concentrations of carbon in the global atmosphere... In these circumstances, a return to business as usual is not an option.

- Sustainable Development Commission 'Prosperity Without Growth' (March 2008)

The Arab Region Atlas of Our Changing Environment is a unique publication that documents environmental change in the Arab region over the past several decades. This atlas uses state-of-the-art space borne and aerial images, maps, graphics, and photographs along with informative narratives to highlight natural and human-caused landscape changes in the 22 League of Arab States member countries. Earth observation (EO) technologies, which include airborne and satellite sensing systems, are playing an increasingly important role in the assessment and management of natural resources. Advances in EO technologies have improved our ability to detect, evaluate, map and monitor change at the land surface, and have become an essential element for assessing, predicting and adapting to climate change. The hundreds of visually compelling images in this atlas clearly depict landscape-level changes over time and highlight the challenges facing the region. The ability to observe large-scale phenomena to detect gradual environmental change enables us to assess the global impact of human activity and develop methods to ensure a more sustainable future.

The Arab Region: An Introduction

Throughout the ages, societies of the (Arab) region have been under constant pressure to adapt to water scarcity and heat, and have developed ... solutions and institutional mechanisms to deal with these environmental constraints.

- Inger Andersen, World Bank (2010)

Environmental change is chronicled in the 22 member countries of the League of Arab States, which is an association of independent Arab states formed in 1945 to strengthen relations in the region. The Arab region straddles the continents of Africa and Asia, with ten of the countries occurring in Africa (including the island nation of the Comoros), and the remaining in West Asia, mostly along the Mediterranean Sea and on the Arabian Peninsula. The atlas was produced before South Sudan was created, thus Sudan is discussed in pre-separation terms throughout, with exception of Chapter 3 country profile and change pairs. Arab sub-regions often referred to in this publication include the Gulf Cooperation Council (GCC) (which consists of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates), the Maghreb countries (Algeria, Libya, Morocco, Tunisia and Mauritania) and the Mashreq countries (Iraq, Jordan, Lebanon, Occupied Palestinian Territories and Syria). Arabian Peninsula is also used to refer to GCC countries and Yemen. The League of Arab States nations each exhibit unique geographical and ethnic characteristics; at the same time they share historical, cultural and religious ties and are predominantly Arabic-speaking and majority Muslim. These Arab countries are also united by the environmental challenges they face as populations in the region surge, water shortages become more acute and changes in climate exacerbate land degradation and desertification. This atlas demonstrates the ecological challenges the region as a whole faces and also provides specific examples of methods and policies being implemented as well as the opportunities these challenges present.

Chapter 1 begins with a detailed discussion and accompanying illustrations of the region's natural characteristics. The Arab region covers an area of about 14 000 000 km², including over 30 000 km of coastline, and boasts some of the Earth's most unique geographical features, including: the massive Sahara Desert, which covers most of North Africa; the Nile River, the longest river in the world, with its imposing Aswan Dam; the Dead Sea, which is the lowest elevation on the Earth's dryland surface and one of the world's most saline bodies of water; and the Rub Al Khali Desert on the Arabian Peninsula, which is one of the largest sand deserts in the world that also contains the largest oil fields.

This region also includes the northernmost tropical sea (the Red Sea), and the Socotra archipelago, a group of islands in the Indian Ocean that has one of the highest rates of plant endemism in the world. The geographical biomes and rich biodiversity represented in the region are vitally important to each country's heritage and economic and social well-being. These marine and land resources are increasingly under threat due to population growth, urbanisation, desertification, overexploitation and climate change.

The region incorporates the flora and fauna of the Arabian Peninsula, Africa, Asia and Europe and contains rich biological diversity. Countless locally and regionally endemic species are also represented. The rich biodiversity in the region has exceptional value when considering the variability of ecological, chemical and genetic characteristics. Preservation of these biological resources through designation of marine and terrestrial protected areas has had varied success in the region — over 300 internationally recognized protected areas have been designated and include national parks, marine reserves, grazing reserves and game sanctuaries. Though governments recognize the need for additional protected areas, referred to as 'hema' in Arabic, and the need to conserve and wisely use scarce renewable resources, the number and the extent of protection varies greatly. The North African countries tend to have a higher number of protected areas;

for example, Algeria has an extensive protected area system, with 11 national parks, five nature reserves, 42 Ramsar Wetland Sites of International Importance and 6 biosphere reserves. However, protection of these areas is still hampered by a variety of factors such as lack of technical and financial resources, low participation among local populations and poverty. Moreover, they are under threat by civil unrest, encroachment and the introduction and spread of invasive species. There is a clear need for regional approaches to biodiversity conservation and sustainable resource use to protect each country's natural heritage.

The Arab region further represents an economically diverse region that includes the oil-rich economies of the GCC countries and the more resource-scarce countries (in relation to population) such as Yemen, Egypt and Morocco. Oil wealth has catapulted the standard of living in many of these countries and spurred increased resource consumption, exerting greater pressures on natural resources. Though the hydrocarbon sector continues to serve as the backbone of many of the countries' economies (especially the GCC countries and some of the North African countries), these nations are attracting foreign and domestic investments outside the energy sector and investing heavily in developing other sectors—the tourism industry is now the fastest growing sector in the region.



Notwithstanding the diversity of landscapes in the region, from the snow-capped peaks of the Atlas Mountains to the sand desert of the Arabian Peninsula, most of the region suffers from resource deficits, most critically, water. Most of the Arab region is categorized as hyper-arid to arid and many of the countries are water scarce (with yearly per capita water availability falling below 1 000 m³), whereby the lack of water hampers economic development and human health and well-being. The very low and highly variable annual rainfall makes the region especially vulnerable to climate change impacts—per capita water availability in the region is expected to fall by half by 2050. These decreases in precipitation coupled with increases in temperature will intensify pressures on natural and physical systems. Given the extreme aridity, most of the agriculture in the region is irrigated—approximately 80 per cent of the available water supplies are used by the agricultural sector. Future water deficits will make food systems in many of these countries more vulnerable. Water scarcity is addressed throughout this atlas and is presented in Chapter 2 as a prominent transboundary issue—it is also featured in Chapter 3 under the country profiles, illustrating both the unique challenges and the shared concerns the region faces with respect to its water resources.

Land degradation resulting from human activities and natural environmental factors is acute in many areas of the Arab region. Drought coupled with overgrazing, uncontrolled cultivation, fuelwood gathering, wind-blown erosion, inefficient and inappropriate use of irrigation water, sprawling urbanisation, and sand encroachment all contribute to the process of land degradation. The already limited fertile land is also being lost to alternative land uses. The region’s population is expected to grow to 385 million by 2015, up from the current figure of about 352 million—as stated by Mr Hafedh Chekir, the Arab Office Director for the UN Population Fund, ‘strategic thinking and planning among Arab governments is needed to avert future hardships’; or as Ms Amat al Alim Alsoswa, UNDP Regional Director, Bureau of Arab States warns: ‘urgent action is needed to put the region on a development path which is... sustainable’.

Transboundary Issues and Challenges

Chapter 2 describes the changing nature of transboundary environmental issues in the Arab region and provides specific examples of issues that transcend national borders. The most prominent transboundary issues involve water resources, land, migrating animals and people and pollutants. The impacts of climate change are also addressed that consider the effects of sea level rise, increased temperatures and decreased precipitation in the region. Several images display the effects on the Nile

Delta under different sea level rise scenarios; the challenges of a changing climate to island nations such as the Comoros are also highlighted. Other case studies are examined in this chapter that highlight emerging issues as well as opportunities for cooperation and management in a region that includes almost 50 shared borders (Arab and non-Arab states).

Though as a whole, the Arab region contributes only 4.7 per cent (EOAR 2010) of total global Green House Gas (GHG) emissions (North America and Europe each contribute 23 per cent of total GHG emissions), there are large discrepancies in the region, with oil and gas producing countries contributing a larger proportion of GHG emissions. These same countries are also making large investments in solar power and other green technologies to tackle climate change and transfer to a lower-carbon sustainable economy that is more secure and tenable.

Tracking Progress Towards Environmental Sustainability

Chapter 3 includes visually compelling graphics and descriptive narratives that highlight environmental changes in each of the 22 Arab League nations. For each country, maps and brief country descriptions are provided, followed by a summary of the three most pressing environmental issues. Progress towards ensuring environmental sustainability (UN Millennium Development Goal [MDG] 7) is also tracked and summarized using data over a twenty-year time period. For each of the Arab countries, satellite images are used to showcase change over time—the changes depicted may have occurred rapidly in response to a localized event (for example, the impacts of Cyclone Gonu in Oman or the eruption of the Karthala Volcano in the Comoros), or the change may have occurred more gradually, such as urbanisation (Tripoli, Libya; Cairo, Egypt; Aqaba, Jordan, for example), the shrinking of the Azraq wetland in Jordan, or the erosion of the Rosetta Promontory at the mouth of the Nile Delta in Egypt. These images provide visual confirmation of the rapid development this region has undergone in just a few decades—the subsequent imprint on the landscape will not only interest readers of this atlas but also promote their understanding of the challenges faced by the Arab region.

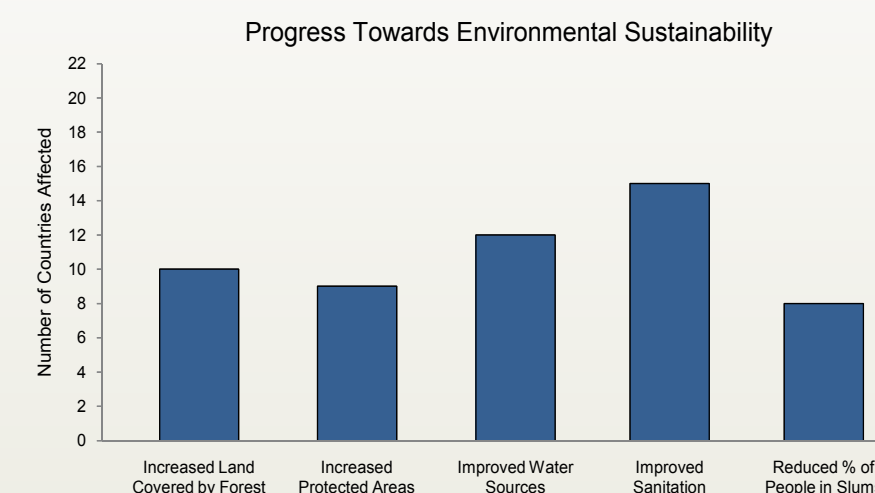
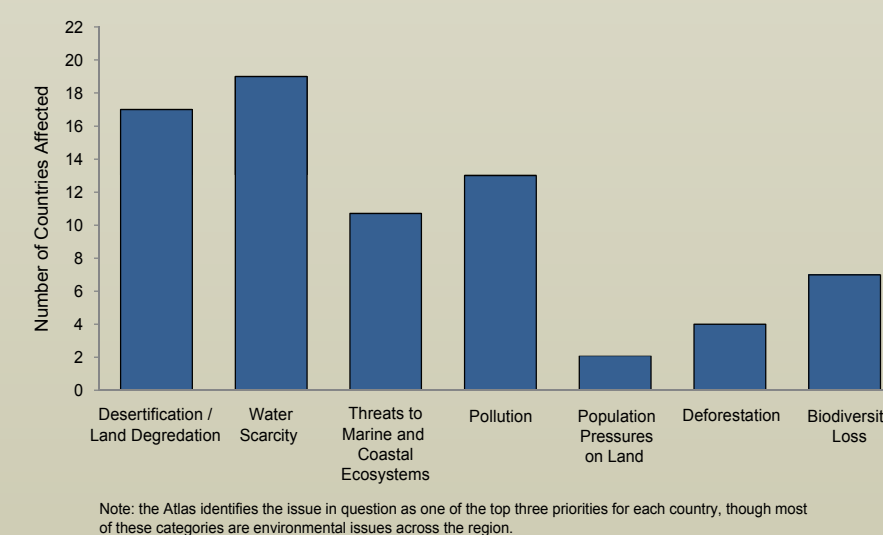
The measures of progress towards meeting environmental sustainability under MDG 7 are tracked from 1990 to present using five indicators: proportion of forested lands, number of urban slum dwellers, access to improved water sources, access to improved sanitation and proportion of protected areas. Though progress has been made towards meeting targets for some of these indicators, it has been slow and uneven across the Arab countries. Obstacles to meeting targets include shortcomings

in aid or assistance, the current global economic crisis, local environmental conditions brought about by climate change and lack of effective governance.

Most of the countries focused on improving those elements of the environment that have direct consequences to human health such as improved sanitation and access to improved water sources. The indicator with the highest number of countries showing progress is improved sanitation, with 15 of the 22 indicating positive change from 1990 to present. In contrast, the number of countries that showed progress in reducing the proportion of urban slum dwellers was only 8 of 22; less than half of the Arab countries showed progress in increasing protected areas and increasing land covered by forest, while half of the Arab countries showed progress in improving water sources. Challenges to reducing the number of people residing in urban slums are a direct result of recurring drought in the region or migrations due to conflict. Chapter 3 includes more detailed information on meeting targets for these indicators and provides a measure of how the region is doing as a whole relative to the global community.

The most pressing environmental issues faced by each of the Arab countries were identified using peer reviewed reports and public information and confirmed by official representatives of each country. Those identified include: water scarcity, desertification and land degradation, threats to marine and coastal ecosystems, pollution, population pressures on the land, deforestation and biodiversity loss. Water scarcity is a key environmental issue in 19 of the 22 countries, followed by desertification and land degradation, which afflicts 17 of the countries; pollution is another key issue in 13 Arab nations.

Important Environmental Issues in the Arab Region



Many of these major issues are interrelated and most are a direct consequence of increasing populations and environmental conditions associated with climate change.

Images of a Changing Environment

With nearly 140 paired satellite images showing change over time (change pairs) in each of the Arab countries, this Atlas provides visual evidence of sometimes drastic change occurring in the region over a relatively short span of years. Landscape changes that are noteworthy and common to many of the countries include: the greening of the desert from increased irrigated agriculture; expansion of oil fields; deforestation and vegetation loss due to fires, insect infestations or harvesting for fuelwood; unbounded urbanisation, development of coastal areas and impacts from severe weather events. The development of countless mega-cities in the Arab region is one of the most striking impressions these images provide—Cairo, Algiers, Beirut, Casablanca, Amman, Sana’a, Riyadh, Baghdad, Mogadishu and Nouakchott have all experienced extensive and rapid development of their urban areas. Associated with this urban expansion is the increase in unauthorized settlements at the cities’ fringes with little to no basic services, inadequate waste disposal, intense air pollution, and contamination of soil and groundwater resources, to name but a few impacts.

Alongside the challenges portrayed herein, some of the change pairs also present evidence of innovative responses around the region to a changing climate, water shortages, population pressures and shifts in the economy. The greening of the desert shown in images of Al Ain(UAE) and the Kuwait-Iraq Separation Border displaying Kuwait’s conservation and resource protection are testament to efforts in the region to improve environmental conditions and conserve water resources.

The centre-pivot irrigation systems appear as verdant points in the desert landscape—though most of the irrigation water relies on limited groundwater supplies, some countries are using alternative water sources, including reused wastewater and desalinated water, to supplement the mostly non-renewable groundwater resources. Wafra Farms in Kuwait has expanded their food production to include aquaculture of Nile tilapia in order to supplement the fish industry, and has established greenhouses to improve crop production. Greenhouse agriculture has been implemented at a large scale in Syria—the growth of this controlled agriculture was catapulted by recurring drought, the need to improve agricultural efficiency and to meet increased demands for food production internally and abroad. Construction of water conveyance and storage systems across the region has also fueled the growth in agriculture, providing irrigation waters for agricultural production in countries such as Morocco, Tunisia, Sudan, and Mauritania.

The development of the tourism industry in the region as a means to diversify the economies of many of the countries bordering the Regional Organisation for the Protection of the Marine Environment (ROPME) Sea Area and the Mediterranean are evident in many of these satellite images. The opulent development of artificial island complexes to provide luxury residential and tourist resorts has transformed the coastlines of the UAE, Bahrain and Qatar. Coastal developments such as Mesaieed Industrial City (Qatar), Aden (Yemen), and Qatif and Tarut Islands (Saudi Arabia), have transformed the coastal and marine environments, with, at times, grave consequences (oil pollution, destruction of coral reefs, mangroves and seagrass ecosystems, to name a few). On the other hand, images of a converted landfill along the coastline of Tunisia show the benefits of transforming an urban wasteland into a green area that provides both recreation opportunities and habitat. The Taparura Project in Sfax, Tunisia, is a poignant example of projects that are being launched in the region to revive urban areas and reintegrate their coastlines.

Finally, conflict is not new to this region—the images from the Jiyeh Power Plant bombing by the Israeli Air Force in 2006 and its resultant oil spill in Lebanon and the oil fires in Kuwait as a result of the 1990 invasion by Iraqi forces, vividly show the environmental impacts of conflict. Though not evident from these images, conflict has other indirect effects, causing displacement and migration, which leads to population pressures in localized areas and abandonment of farmlands and contamination of soils that can interrupt or halt agricultural production. The development and expansion of Israeli colonies in the West Bank is borne out of decades of conflict and is forcing the Palestinians to reside on more marginal lands, impacting their access to rangelands and affecting their water availability.

Perhaps the most compelling story of environmental change is the revitalization of the Mesopotamian Marshlands, which suffered a tragic loss of wetlands from 1950 through 1990. The images in Chapter 3 show the decrease in the extent of wetlands from 1984 to 2000—beginning in 2003, however, the marshlands began to fill again with water as impoundments were lifted and floodgates opened, and by 2006, 58 per cent of the marshlands had been inundated. The ongoing success in rehabilitating the Arab region’s most vital wetlands is largely due to involvement by local communities and support of governments and international organizations.

Other striking images that show visible and at times large-scale landscape change are the fire scars in Latakia, Syria spurred by drought and high temperatures; the seismic grid lines from oil surveying in the Libyan desert; and the drying of lakes, seas and marshes due to diversions, draining and reclamation activities in Iraq, Egypt and the West Bank. The impacts of overgrazing in Jonglei, Sudan, flooding in Yemen in 2008 caused by Tropical Cyclone 3B, and phytoplankton blooms off the coast of Algeria due to urban runoff and heavy nutrient loads, are also revealed. All of these images tell a story of change and the accompanying narratives provide the necessary background and details to understand the trends that are visually evident in the Arab region.

and regional scales to address challenges that climate change, population pressures and changing demographics are presenting. The region’s progress in meeting the United Nations Millennium Development Goals can also be gauged in these pages to determine the strides that countries are making in providing an adequate quality of life and assuring a more sustainable future.

This publication carries a realistic message about the changes and challenges that the Arab region faces. The most durable asset of this region is its natural ecosystems. This atlas offers readers an awareness of these most vital life-sustaining resources so that mechanisms can be established to better manage and conserve these systems. New approaches to natural resource management and energy production, collaboration, economic efficiency, poverty reduction, enforcement of environmental regulations, and institutional changes are just some of the ways the Arab League nations are responding to challenges. Strengthening technical and financial cooperation among the Arab countries is also critically needed. The Arab region will benefit by collectively approaching these shared challenges, and empowering local communities to take ownership in the protection of life-sustaining natural resources and important ecosystems and habitats. The leaders of the Arab region must seize this opportunity by offering effective leadership for the 21st century that emphasizes coordination and collaboration within the region and prioritizes environmental stewardship and conservation.

[The Arab region] ...is a region rich in its natural resources [oil, gas, and minerals], but more importantly in history, culture, and human potential. It is a region that can – and should – play a larger role in the global economy. This is necessary if the Arab World is to offer greater opportunities to its own citizens – especially young people. But it is also necessary if international partners are to make progress on shared challenges, from assisting fragile and post-conflict states, to promoting peace, to addressing climate change.

- Robert B. Zoellick, World Bank Group President, 2009

Important Environmental Issues in Arab Countries

Algeria	<ul style="list-style-type: none"> •Desertification •Water Scarcity •Pollution 	Morocco	<ul style="list-style-type: none"> •Desertification and Land Degradation •Water Scarcity and Drought •Pollution of Freshwater and Marine Environments
Bahrain	<ul style="list-style-type: none"> •Water Quantity and Water Quality •Degradation of Coastal and Marine Ecosystems •Threats to Biodiversity 	Occupied Palestinian Territories	<ul style="list-style-type: none"> •Water Scarcity •Environmental Pollution-Air and Water •Population Pressures on Land
Comoros	<ul style="list-style-type: none"> •Threats to Coastal and Marine Resources •Deforestation and Soil Erosion •Threats to Biodiversity 	Oman	<ul style="list-style-type: none"> •Water Scarcity and Water Use •Soil and Groundwater Salinity •Threats to Coastal Areas and Marine Biodiversity
Djibouti	<ul style="list-style-type: none"> •Water Scarcity •Desertification and Land Availability •Marine Resources and Pollution 	Qatar	<ul style="list-style-type: none"> •Water Scarcity •Desertification and Land Degradation •Threats to Marine and Coastal Ecosystems
Egypt	<ul style="list-style-type: none"> •Water Scarcity and Pollution of the Nile River •Solid Waste •Loss of Biodiversity 	Saudi Arabia	<ul style="list-style-type: none"> •Water Scarcity and Water Demand •Desertification and Land Degradation •Oil Contamination of Coastal Zones
Iraq	<ul style="list-style-type: none"> •Conflict-related Contamination and Pollution •Ecosystem Degradation •Destruction of Mesopotamian Marshlands 	Somalia	<ul style="list-style-type: none"> •Water Scarcity and Drought •Desertification, Overgrazing and Deforestation •Threats to Biodiversity
Jordan	<ul style="list-style-type: none"> •Water Scarcity •Desertification and Land Degradation •Threats to Biodiversity 	Sudan	<ul style="list-style-type: none"> •Land Degradation and Soil Erosion •Water Scarcity and Desertification •Loss of Biodiversity
Kuwait	<ul style="list-style-type: none"> •Water scarcity and Groundwater Salinity •Land Degradation and Desertification •Pollution and Impacts of the Gulf War 	Syria	<ul style="list-style-type: none"> •Water Scarcity and Water Quality •Land Degradation and Desertification •Deforestation
Lebanon	<ul style="list-style-type: none"> •Deforestation •Management of Urban Environment •Coastal and Marine Pollution 	Tunisia	<ul style="list-style-type: none"> •Water Scarcity •Air and Water Pollution •Land Degradation and Desertification
Libya	<ul style="list-style-type: none"> •Water Scarcity •Arable Land Availability and Desertification •Oil Development and Pollution 	United Arab Emirates	<ul style="list-style-type: none"> •Water Demand and Water Scarcity •Land Degradation and Desertification •Threats to Coastal and Marine Ecosystems
Mauritania	<ul style="list-style-type: none"> •Desertification •Water Scarcity in Nouakchott •Overfishing of Coastal Waters 	Yemen	<ul style="list-style-type: none"> •Water Scarcity and Water Quality •Population and Pressure on Land •Soil, Water and Wind Erosion

The Future

Societies have adjusted to change for millennia. The material, social and cultural life of the Arab region must adapt to the environmental conditions that exist in order to ensure a sustainable future. This atlas, through the use of striking images and summaries, presents a case of rapid change to the Arab landscape that has numerous implications to the region’s biodiversity, air and terrestrial and marine environments. It also offers examples of policies that are being enacted in the Arab region and programmes that are being implemented at local

