



# ARAB REGION

Atlas of Our Changing Environment



REGION  
ARAB  
ATLAS OF OUR CHANGING ENVIRONMENT

© 2013, United Nations Environment Programme

ISBN: 978-92-807-3158-3

Job Number: DEW/1378/BA

This publication may be reproduced in whole or in part and in any form for educational or non-profit purposes without special permission from the copyright holder, provided acknowledgement of the source is made. UNEP and the authors would appreciate receiving a copy of any publication that uses this report as a source.

No use of this publication may be made for resale or for any other commercial purpose whatsoever without prior permission in writing from the United Nations Environment Programme.

United Nations Environment Programme

PO Box 30552, Nairobi 00100, Kenya

Tel: +254 20 7621234

Fax: +254 20 7623943/44

<http://www.unep.org>

For bibliographic and reference purposes this publication should be referred to as:

UNEP (2013), “Arab Region: Atlas of Our Changing Environment.”

United Nations Environment Programme (UNEP)

P.O. Box 30552

Nairobi 00100, Kenya

The following organisations collaborated on this Atlas:

- The Environment Agency-Abu Dhabi (EAD), United Arab Emirates
- United Nations Environment Programme (UNEP)
- Abu Dhabi Global Environmental Data Initiative (AGEDI)
- eMISK
- Environment Public Authority, Kuwait
- Regional Organization for the Protection of the Marine Environment

The funding support for this Atlas was provided by EAD, UNEP, and Qatar.

## DISCLAIMER

The views expressed in this publication do not necessarily represent those of the agencies collaborating on this project. The designations employed and the presentations do not imply the expression of any opinion whatsoever on the part of UNEP or collaborating agencies concerning the legal status of any country, territory, city, or area of its authorities, or the delineation of its frontiers or boundaries.

Mention of a commercial company or product in this report does not imply endorsement by UNEP. The use of information from this publication concerning proprietary products for publicity or advertising is not permitted. Trademark names and symbols are used in an editorial fashion with no intention of infringement on trademark or copyright laws.

This book is available from [Earthprint.com](http://Earthprint.com), [www.earthprint.com](http://www.earthprint.com)

Printed by Emirates Printing Press

Distribution by SMI London

We regret any errors or omissions that may have been inadvertently made.

*Front Cover Photo: Dennis Stauffer/Flickr.com*

*Back Cover Photos (left to right): Cernavoda/Flickr.com; ethnobofin/Flickr.com; NASA ISS/Flickr.com;*

*Michael Gwyther-Jones/Flickr.com; Stefan Geens/Flickr.com*

UNEP promotes environmentally sound practices globally and in its own activities. This publication is printed on 100 per cent chlorine free paper from sustainably managed forests. Our distribution policy aims to reduce UNEP's carbon footprint.

# ARAB REGION

---

## ATLAS OF OUR CHANGING ENVIRONMENT

---





Erg Chebbi, Morocco

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

# TABLE OF CONTENTS

PREFACE	VII
FOREWORD	IX
READER'S OVERVIEW	X
<b>CHAPTER 1. THE ARAB REGION</b>	<b>1</b>
1.1 GEOGRAPHY	2
CLIMATE	4
GEOMORPHOLOGY	6
GEOLOGY	7
LAND USE AND LAND COVER	10
SOILS	11
HYDROCARBON RESOURCES (OIL AND GAS)	12
MINERAL RESOURCES	13
WATER RESOURCES	14
NATURAL HAZARDS	16
1.2 POPULATION, ECONOMICS, CULTURAL RICHNESS	19
POPULATION CHARACTER	20
URBAN POPULATION AND SOCIAL VULNERABILITY	22
POLICY DIMENSIONS FOR HUMAN SECURITY	24
ECONOMIC CONTEXT	25
CONSUMPTION CHARACTER AND GDP	28
HUMAN AND CULTURAL RICHNESS	28
1.3 BIODIVERSITY	31
BIODIVERSITY HOTSPOTS	32
MANGROVE ECOSYSTEMS	34
IMPORTANT BIRD AREAS	34
MIGRATORY BIRDS	35
BIODIVERSITY THREATS AND CONSERVATION	36
THREATENED SPECIES	38
INVASIVE SPECIES	39
1.4 CHALLENGES AND OPPORTUNITIES	41
1.5 EARTH OBSERVATIONS	45
ENVIRONMENTAL MONITORING AND MODERN TECHNOLOGY	45
<i>Global Land Surface Temperature</i>	46
<i>Global Sea Surface Temperature</i>	47
<i>Remote Sensing in Oil and Groundwater Exploration</i>	47
<i>Monitoring Land Use Change in Coastal Areas</i>	48
<i>Remote Sensing in Monitoring Desertification</i>	49
<i>Gas Flaring</i>	49
REFERENCES	50
<b>CHAPTER 2. TRANSBOUNDARY ENVIRONMENTAL ISSUES</b>	<b>53</b>
2.1 GLOBAL CHALLENGES	57
CLIMATE CHANGE	57
2.2 WATER	61
WATER RESOURCES AND POLLUTION	61
WATER RESOURCES	62
<i>Euphrates River Basin</i>	64
<i>Tigris River Basin</i>	65

<i>Nile River Basin</i>	66
<i>Asi-Orontes River Basin</i>	67
AQUIFERS IN THE ARAB REGION	68
<i>QaDisi Aquifer</i>	68
<i>Nubian Sandstone Aquifer</i>	69
<i>North Sahara Aquifer System</i>	70
DESALINATION	71
2.3 ATMOSPHERE	73
AIR POLLUTION, AND WEATHER PATTERNS	73
DUST AND SAND STORMS	76
2.4 SEAS	81
RED SEA, MEDITERRANEAN AND ROPME SEA AREA	81
OVERFISHING	82
MARINE ECOSYSTEM TYPES	83
LOSS OF ECOSYSTEMS AND BIODIVERSITY	84
INVASIVE SPECIES	85
MARINE POLLUTION AND HOTSPOTS	86
2.5 CONFLICT	91
CONTENTION, STRIFE AND HUMAN MIGRATION	91
REFERENCES	100
<b>CHAPTER 3. COUNTRY PROFILES</b>	<b>103</b>
3.1 TRACKING PROGRESS TOWARDS ENVIRONMENTAL SUSTAINABILITY; MILLENNIUM DEVELOPMENT GOALS	103
3.2 COUNTRY PROFILES AND IMAGES OF OUR CHANGING ENVIRONMENT	106
ALGERIA	106
BAHRAIN	114
COMOROS	122
DJIBOUTI	130
EGYPT	138
IRAQ	148
JORDAN	156
KUWAIT	164
LEBANON	172
LIBYA	180
MAURITANIA	188
MOROCCO	196
OCCUPIED PALESTINIAN TERRITORIES	204
OMAN	212
QATAR	220
SAUDI ARABIA	228
SOMALIA	236
SUDAN	244
SYRIA	252
TUNISIA	260
UNITED ARAB EMIRATES	268
YEMEN	276
REFERENCES	284
EPILOGUE	295
ACRONYMS AND ABBREVIATIONS	296
ANNEX I	297
ABOUT REMOTE SENSING IMAGES	298
INDEX	299
ACKNOWLEDGEMENTS	302

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)