© 2008, United Nations Environment Programme

ISBN: 978-92-807-2871-2

Job Number: DEW/1000/NA

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

United Nations Environment Programme Division of Early Warning and Assessment-North America 47914 252nd Street, USGS, The Earth Resources Observation and Science (EROS) Center Sioux Falls, SD 57198-0001 USA Tel: 1-605-594-6117 Fax: 1-605-594-6119 info@na.unep.net www.na.unep.net

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

UNEP (2008), "Africa: Atlas of Our Changing Environment." Division of Early Warning and Assessment (DEWA) United Nations Environment Programme (UNEP) P.O. Box 30552 Nairobi 00100, Kenya

This book is available from Earthprint.com, http://www.earthprint.com. Printed by Progress Press Co. Ltd., Malta Distribution by SMI London

The following organisations collaborated on this Atlas:

- The African Ministerial Conference on the Environment (AMCEN)
- United Nations Environment Programme (UNEP)
- Group on Earth Observations (GEO)
- Southern African Development Community (SADC)
- Regional Centre for Mapping of Resources for Development (RCMRD)
- Environmental Information Systems Africa (EIS Africa)
- African Association of Remote Sensing of the Environment (AARSE)
- Belgium Development Fund
- United States Geological Survey (USGS)
- United States Agency for International Development (USAID)
- World Resources Institute (WRI)
- South Dakota State University (SDSU)
- University of Maryland (UMD)

The funding support for this Atlas was provided by UNEP, Belgium Development Fund, and USAID. USGS EROS, the host of UNEP/GRID-Sioux Falls, provided all the necessary support needed for visiting scientists and production of this Atlas.

Special thanks are extended to the National Aeronautics and Space Administration (NASA), the US National Geospatial-Intelligence Agency (NGA), DigitalGlobe, and GeoEye for providing access to satellite data, and Environmental Systems Research Institute (ESRI) for software support.





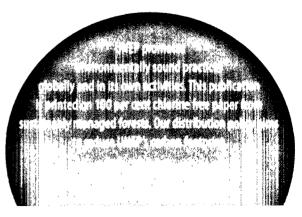
DISCLAIMER

The views expressed in this publication are not necessarily those of the agencies cooperating in this project. The designations employed and the presentations do not imply the expression of any opinion whatsoever on the part of UNEP or cooperating 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 the United Nations Environment Programme. 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.

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

ii 🕊



.

AFRICA ATLAS OF OUR CHANGING ENVIRONMENT













Table of Contents

🕊 v

асе		•••
word		•••
ler's Overview		•••
APTER 1: A	frica	
	Introduction	•••
1.1: Africa	's Geography	
	The Land	
	Soils	
	Deserts	
	Mountains	
	The Great Rift Valley	
	Coasts	
	Water Resources	
	Rivers	
	Lakes	
	Wetlands	•••
	Climate Zones	•••
	The Plants and Animals	•••
	People	•••
1.2: Africa	's Changing Environment	•••
	Natural Change and Population	
	Changing Population	
	Urban Population	
	Coastal Population	
	Air and Atmosphere	
	•	
	Land Cover and Land Use	
	More People, More Trees: Success Story in Niger	
	Land Conversion	
	Deforestation	
	Changes in Land Productivity	••
	Land Degradation	, .
	Desertification	•••
	Water	••
	Freshwater	•••
	Freshwater Fish	•••
	Wetlands	•••
	Coastal and Marine Environments	
	Benguela Current Large Marine Ecosystem	
	Biodiversity	
	8 Biological Hotspots of Africa	
	A Few African Animals Extinct in the Wild	
1.3: Farth	Observations	
Ami th		
	Africa at Night	
	Africa – Lightning Centre of the World	
	Gas Flaring in the Niger Delta	
	Global Land Surface Temperature	
	Flooding in Mali	
	Africa and Ultra Violet (UV) Exposure	
	Global Phytoplankton Distribution	
	Phytoplankton Bloom off Namibia	•••
	Crater Highlands, United Republic of Tanzania	•••
	Global Sea Surface Temperature	•••
	Botswana Salt Pans	
	Saharan Dust has Chilling Effect on North Atlantic	
	Soil Moisture Monitoring in Southern Africa	
	Smart Sensing of Volcanoes	
Reference	ss	

CHAPTER 2: Transboundary Environmental Issues

Across Countr	ry Borders	
2.1: Transboundary Ecosy	ystems and Protected Areas	
Ecosystems an	d Protected Areas	41
Iransb	oundary Ecosystems The Congo Basin Forests	49
Transh	boundary Protected Areas	
1141130	Maasai Mara – Serengeti Protected Areas in East Africa	
	W-Arly-Pendjari Parks Complex	
	The Great Limpopo Transfrontier Park	
	Mountain Gorilla Conservation in the Virunga Heartland	
	Southern Sudan: A Survival Surprise	
2.2: Transboundary Wate	r Resources	
Transboundar	ry River Basins	
	Lake Victoria: Africa's Largest Freshwater Lake	
	Historical water level elevations of Lake Victoria	
	High population growth rate around Lake Victoria	
	Lake Victoria's Winam Gulf	
	Water Hyacinth in Lake Victoria, 1995-2001	
	Lake Chad: Africa's Shrinking Lake	
	Declining Water Levels in Lake Chad, 1972-2007	53
	Okavango: The World's Largest Inland Delta	
2.3: Transboundary Movement of People		
Conflicts and	Refugees	
	Dadaab Refugee Camp	
	The Parrot's Beak Region	
	Darfur Conflict	60
2.4: Transboundary Move	ement of Pollutants	61
•	nd Fires	
Dust st	torms	
	Dust Storm in the Bodele Depression	
Aerosc	bls	
	Smoke Spreading From Greece to Africa	68
Fires		
	Biomass Burning in Africa	
	Seasonal Pattern of Wildland Fires	
Carbo	n Monoxide Pollution: A Result of Biomass Burning	
	Widespread Fires Release High Levels of CO	
	Southern Africa: Hotspot for Nitrogen Dioxide (NO2)	
2.5: Conclusion		

CHAPTER 3: Tracking Progress Towards Environmental Sustainability

3.1 United Nations Millennium Development Goals—The Millennium Declaration7	3
3.2 Country Profiles and Images of Our Changing Environment7	6

Epilogue	354
References	
Acronyms and Abbreviations	
Annex I: Changes in MDG Goal 7: Environmental Sustainability Indicators	
About Remote Sensing Images and Aerial Photographs Used in this Publication	
Index	
Acknowledgements	

vi 🕊

.