

Management and Improvement of Desert Resources

Edited by Samira A.S. Omar, Raafat Misak, Dhari Al-Ajmi & Nader Al-Awadhi

2

SUSTAINABLE DEVELOPMENT IN ARID ZONES VOL. 2: MANAGEMENT AND IMPROVEMENT OF DESERT RESOURCES

PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON DESERT DEVELOPMENT IN THE ARAB GULF COUNTRIES

Sustainable Development in Arid Zones

Volume 2: Management and Improvement of Desert Resources

Edited by

SAMIRA A.S. OMAR, RAAFAT MISAK, DHARI AL-AJMI & NADER AL-AWADHI

Kuwait Institute for Scientific Research, sustainable development in arid zones



A.A. BALKEMA / ROTTERDAM / BROOKFIELD /1998

The international conference on desert development in the Arab Gulf countries

Sponsored by

Kuwait Institute for Scientific Research (KISR)

Supported by

The Kuwait Foundation for the Advancement of Sciences (KFAS)

Environment Public Authority (EPA)

Kuwait Finance House (KFH)

Public Authority for Assessment of Compensation for Damages Resulting from Iraqi Aggression (PAAC)

United Nations Development Programme (UNDP)

Gulf Cooperation Council (GCC)

Organizing committee		Scientific committee	
Dhari Al-Ajmi	Chairman	Samira Omar	Chairperson
Mane Al-Sudairawi	Rapporteur	Raafat Misak	Rapporteur
Abbas Alikhan	Member	Mohammed Abdur Razzaque	Member
Khalid Al-Muhailan	Member	Mane Al-Sudairawi	Member
Nader Al-Awadhi	Member	Andrews Kwarteng	Member
Mahdi Abdal	Member	Riyadh Al-Hawagi	Member
Samira Omar	Member	Sameeha Zaman	Member
Raafat Misak	Member		
Ghadeer Abdulaziz Al-Matar	Member		

Authorization to photocopy items for internal or personal use, or the internal or personal use of specific clients, is granted by A.A. Balkema, Rotterdam, provided that the base fee of US\$1.50 per copy, plus US\$0.10 per page is paid directly to Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, USA. For those organizations that have been granted a photocopy license by CCC, a separate system of payment has been arranged. The fee code for users of the Transactional Reporting Service is: 90 5410 452 X/98 US\$1.50 + US\$0.10.

Published by

A.A. Balkema, P.O. Box 1675, 3000 BR Rotterdam, Netherlands

Fax: +31.10.4135947; E-mail: balkema@balkema.nl; Internet site: http://www.balkema.nl

A.A. Balkema Publishers, Old Post Road, Brookfield, VT 05036-9704, USA

Fax: 802.276.3837; E-mail: info@ashgate.com

Complete set of two volumes: ISBN 90 5410 452 X

Volume 1: ISBN 90 5410 456 2 Volume 2: ISBN 90 5410 457 0

©1998 A.A. Balkema, Rotterdam

Printed in the Netherlands

Contents

ession

rson teur r

ľ

of specific r copy, plus , Danvers, by CCC, a l Reporting

Preface	IX
Recommendations and Resolutions Committee	X
Rangelands: assessment, management and improvement	
The rangelands of the arid and dry semi-arid areas – Challenges and hopes for the 2000s Sidahmed Ahmed	359
Restoring structure and function of degraded rangeland ecosystems Joseph L. Schuster	373
Rangeland change and desertification – A remote sensing viewpoint Paul T. Tueller	383
Kuwait rangelands status, development and research priorities Samira A.S. Omar & Sameeha Zaman	403
Vegetation indicators of incipient change in Chenopod Arid Shrublands – A case study for grazing management G.A. Heshmatti, J.G. Goran, J.M. Facelli & V.R. Squires	421
Status of vegetation and an assessment of the impact of overgrazing in an Area North of Jubail, Saudi Arabia Hans-Jörg Barth	435
Rangelands as feed resources in the Egyptian desert – Management and improvement Hassan Mohamed El Shaer	451
Vegetation of Tabuk-Duba Area, Saudi Arabia M.E. Abu Ziada	461

The international conference on desert development in the Arab Gulf countries

Sponsored by

Kuwait Institute for Scientific Research (KISR)

Supported by

The Kuwait Foundation for the Advancement of Sciences (KFAS)

Environment Public Authority (EPA)

Kuwait Finance House (KFH)

Public Authority for Assessment of Compensation for Damages Resulting from Iraqi Aggression (PAAC)

United Nations Development Programme (UNDP)

Gulf Cooperation Council (GCC)

Organizing committee		Scientific committee	
Dhari Al-Ajmi	Chairman	Samira Omar	Chairperson
Mane Al-Sudairawi	Rapporteur	Raafat Misak	Rapporteur
Abbas Alikhan	Member	Mohammed Abdur Razzaque	Member
Khalid Al-Muhailan	Member	Mane Al-Sudairawi	Member
Nader Al-Awadhi	Member	Andrews Kwarteng	Member
Mahdi Abdal	Member	Riyadh Al-Hawagi	Member
Samira Omar	Member	Sameeha Zaman	Member
Raafat Misak	Member		1110111001
Ghadeer Abdulaziz Al-Matar	Member		

Authorization to photocopy items for internal or personal use, or the internal or personal use of specific clients, is granted by A.A. Balkema, Rotterdam, provided that the base fee of US\$1.50 per copy, plus US\$0.10 per page is paid directly to Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, USA. For those organizations that have been granted a photocopy license by CCC, a separate system of payment has been arranged. The fee code for users of the Transactional Reporting Service is: 90 5410 452 X/98 US\$1.50 + US\$0.10.

Published by

A.A. Balkema, P.O. Box 1675, 3000 BR Rotterdam, Netherlands

Fax: +31.10.4135947; E-mail: balkema@balkema.nl; Internet site: http://www.balkema.nl

A.A. Balkema Publishers, Old Post Road, Brookfield, VT 05036-9704, USA

Fax: 802.276.3837; E-mail: info@ashgate.com

Complete set of two volumes: ISBN 90 5410 452 X

Volume 1: ISBN 90 5410 456 2 Volume 2: ISBN 90 5410 457 0

©1998 A.A. Balkema, Rotterdam Printed in the Netherlands