Coping With Water Scarcity in the GCC: Aspects for sustainable water management

by

Abdin Salih

Director, Division of Water Sciences

Secretary of the International Hydrological Programme

&

Benno Böer

Ecological Sciences Advisor – Arab Region

UNESCO

10th Gulf Water Conference
22-24 April 2012, Doha, Qatar

The seriousness as reflected in the media

Rationalise use of water: Attiyah

There has been a five-fold rise in the production of water in Qatar in the last two decades, Deputy Prime Minister and Minister of Energy and Industry HE Abdullah bin Hamad al-Attiyah said.

However, the minister appealed to the people to rationalise the use of water to ensure that it would be available in adequate quantities for future generations. "The message should be conveyed to each child of the country so that they would not face any water shortage in future," he said in a statement issued on the occasion of the World Water Day, which was marked yesterday, and also as part of the GCC Water Week celebrations.

The United Nations celebrates March 22 as World Water Day to remind people of the importance of the vital resource and also to highlight the necessity of preserving it, he said.

The production of water in Qatar has gone up from 47mn gallons a day in 1990 to [illegible] gallons now.

"In addition, the storage capacity of drinking water has now reached 291mn gallons a day from 155mn gallons in 1990," an increase of [illegible]%, he said.

Help lower water costs, Attiyah tells researchers

Qatar has undertaken a campaign to create awareness among people on conserving water

By Pratap John
Chief Business Reporter

HE the Deputy Premier Abdullah bin Hamad al-Attiyah has called upon researchers to focus on methods to reduce water desalination costs, which are "expensive" and a "burden" on water-scarce countries like Qatar.

"Qatar and the Gulf countries have the poorest water resource, perhaps in the whole world. And we are 100% dependant on desalinated water for our needs," al-Attiyah told *Gulf Times* yesterday.

He said that water desalination was "very costly". Currently, it is about $1 for a cu. m. of water.

"I wish to see this dropping to 50cents for a cu m. It is a challenge, nonetheless, I wish our researchers will work on ways to achieve that," al-Attiyah said.

Realising the importance of water, Qatar has attached top priority to water conservation, the Deputy Premier said.

"Water is life. We must conserve it to the extent possible. Even countries, which have plenty of rivers and lakes and receive adequate rains, face water scarcity. We must bear this in mind whenever we use water," said al-Attiyah, also the minister in charge of electricity and water resources.

He said Qatar had undertaken a campaign to create awareness among people on conserving water.

"People must learn to conserve water and stop misusing it," he said.

Earlier, inaugurating the Global Water Sustainability Center, a joint venture between the two industry giants of ConocoPhillips and GE established within Qatar Science and Technology Park, al-Attiyah said the world energy and petrochemical industries in general and Qatar in particular would benefit from the facility's research on various desalination processes, the removal of heavy metals and hydrocarbons.

The centre's evaluation of cost-effective ways to recycle industrial and municipal water for beneficial purposes would benefit the society at large.

"I congratulate ConocoPhillips and GE for their commitment to efficient and environmentally-clean energy production and efforts to improve the stewardship of water resources," al-Attiyah said.

Recently, Economic Intelligence Unit (EIU) projected Qatar's water demand to double by the decade-end with a requirement for 104.7bn imperial gallons by 2020. Qatar's water requirement this year is estimated at 56.22bn imperial gallons.

"The growth in demand for water in Qatar is among the highest in the GCC countries," Economic Intelligence has said in a report.

The GCC region is facing potential water shortage with limited groundwater resources, which is already facing depletion because of overuse, the Economic Intelligence said. The next 10 years will see rising water demand, as the GCC's expanding middle class adopts an increasingly water-intensive lifestyle, featuring private swimming pools, gardens requiring big sprinkler systems, and even a growing interest in golf. Over the next decade, these countries will be among the world's "highest per-capita users" of water, EIU had said. Page 4

QP research centre to open next year

Qatar Petroleum's proposed research centre at the Qatar Science & Technology Park will be opened next year, HE the Deputy Premier Abdullah bin Hamad al-Attiyah has said. "We have already hired the director. The research centre is now in the design and construction phase," al-Attiyah told *Gulf Times*. Besides boosting scientific research, the QP centre would also provide opportunities for budding Qatari researchers, al-Attiyah said. While signing the agreement with QSTP in March 2008, QP had said the centre would aim to [illegible] and conducting research projects that contribute to its operational performance. It will initially address upstream oil and gas operations, carbonate reservoir research and the environment.

Boost for water conservation

HE the Deputy Premier Abdullah bin Hamad al-Attiyah inaugurating ConocoPhillips and GE Power & Water - Global Water Sustainability Center at the Qatar Science and Technology Park yesterday. HE Dr al-Sada, HE Dr Ibrahim and Dr Maini are also seen.

HE al-Attiyah and HE Dr al-Sada with HE Dr Ibrahim, Dr Brand, Furstoss and Dr Adham. **PICTURE:** Noushad Thekkayil.

The Global Water Sustainability Center will carry out research and develop innovative water solutions

By Pratap John
Chief Business Reporter

Qatar's water conservation efforts have got a major boost with the inauguration of the Global Water Sustainability Center at the Qatar Science and Technology Park (QSTP).

HE the Deputy Premier Abdullah bin Hamad al-Attiyah inaugurated GWSC, which is a co-venture between ConocoPhillips and GE Power & Water, a unit of General Electric Company. The centre will carry out research and develop innovative water solutions primarily for the petroleum and petrochemical sectors and also focus on municipal and agricultural solutions.

About 75% of the GWSC's work will focus on the petroleum and petrochemical sector and the rest on non-industrial sectors, mainly municipal and agriculture.

"This collaboration will harness our collective strengths to explore solutions that address not only the world's most pressing water challenges, but the region's as well.

On average, approximately three barrels of water are produced for every barrel of oil produced worldwide. However, this water usually contains residual components that limit its use without extensive treatment. Proposed uses for treated water could include recycling within treatment processes, industrial cooling, crop irrigation, livestock watering and wildlife habitats, potentially leaving more fresh water available for domestic use.

The GWSC will also sponsor sustainable development projects that benefit the local community such as programmes to encourage water conservation, exhibitions and public or industry workshops.

A visitor centre set up within the GWSC facilities will promote water conservation and technology applications for water scarce regions such as water conservation and municipal water recycling.

Inaugurating the facility al-Attiyah said: "I would like to thank HH Sheikha Mozah Nasser al-Misnad, Qatar Foundation chairperson, for her vision that served as the corner stone for the establishment of Qatar Science and Technology Park. The QSTP will provide Qatar with great benefits for many generations to come."

ConocoPhillips senior vice-president (Technology) Dr Stephan R Brand said: "The GWSC couples ConocoPhillips' industrial applications and field expertise with GE's leading-edge technologies in chemicals, equipment and advanced membranes to develop innovative water solutions for our operations and the communities in which we operate.

"ConocoPhillips has pledged to conserve and protect water resources, and we are proud of our substantial technological and financial commitment to water research."

Christine Furstoss, chief technology officer - Water & Process Technologies, GE Power & Water said: "GE has had a long running collaboration with ConocoPhillips for over a decade and the GWSC is a natural extension of our relationship.

"This collaboration will harness our collective strengths to explore solutions that address not only the world's most pressing water challenges, but the region's as well. With its goal of developing solutions to help meet Qatar's need for a sustainable water supply, the GWSC also reflects GE's growing commitment to invest and partner in the infrastructure development of the Middle East."

Tidu Maini, Science and Technology Adviser to HH Sheikha Mozah said: "The Qatar Science & Technology Park offers great opportunities for various technology research centres to collaborate. It is rewarding for us when major companies such as ConocoPhillips and GE Water and Process Technologies team up to create the Global Water Sustainability Centre. This indicates that industrial clusters in a science park can provide ground breaking solutions."

The inauguration was also attended by HE Dr Mohamed Saleh al-Sada, Minister of State for Energy & Industry; HE

Arab News

Apr 10, 2012

Minister of Water and Electricity Abdullah Al-Hussayen yesterday raised the alarm by saying the Arab world would witness a severe water crisis by the year 2025.

The bio-geophysical setting of the Gulf and desalinization plant density

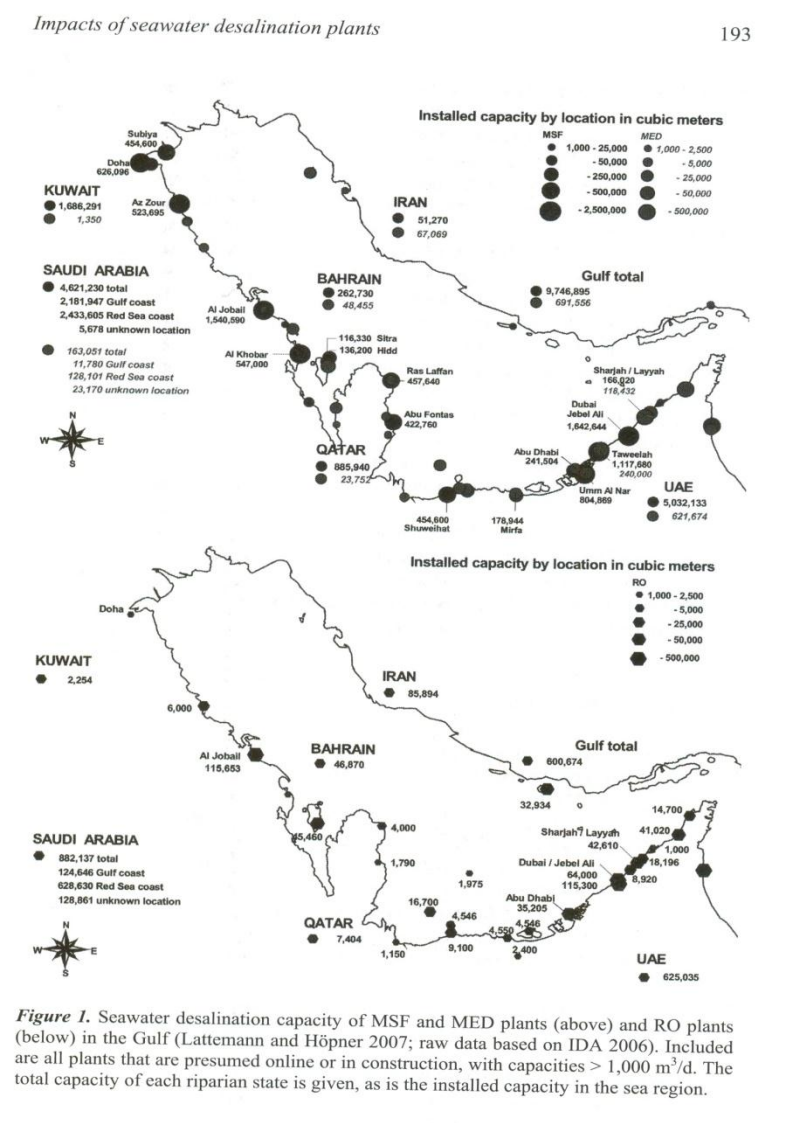
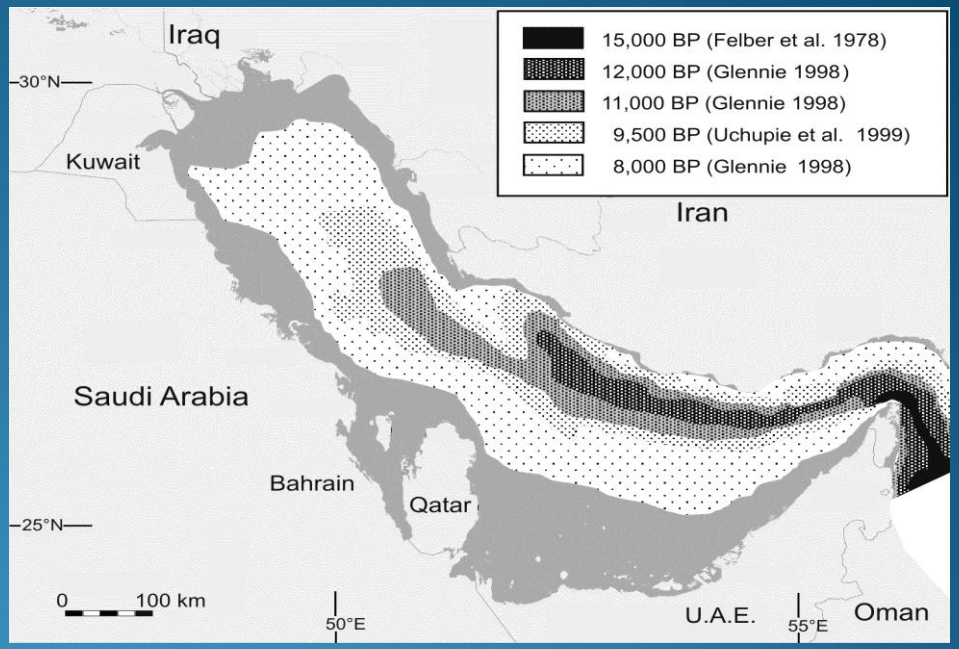


Figure 1. Seawater desalination capacity of MSF and MED plants (above) and RO plants (below) in the Gulf (Lattemann and Höpner 2007; raw data based on IDA 2006). Included are all plants that are presumed online or in construction, with capacities > 1,000 m^3/d. The total capacity of each riparian state is given, as is the installed capacity in the sea region.

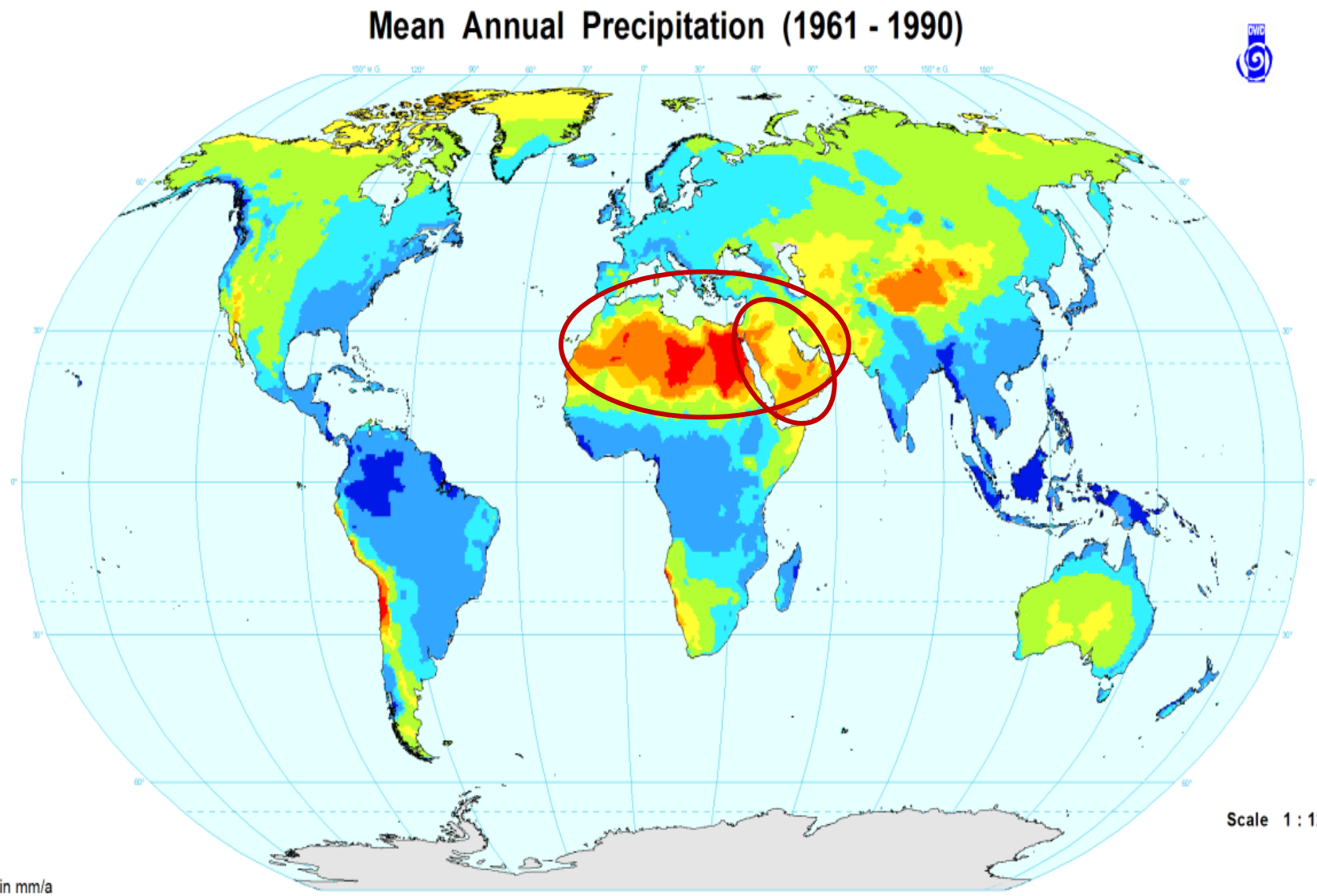


80 mm/sqm precipitation and >2000 mm/sqm evaporation makes the Gulf naturally climatically vulnerable

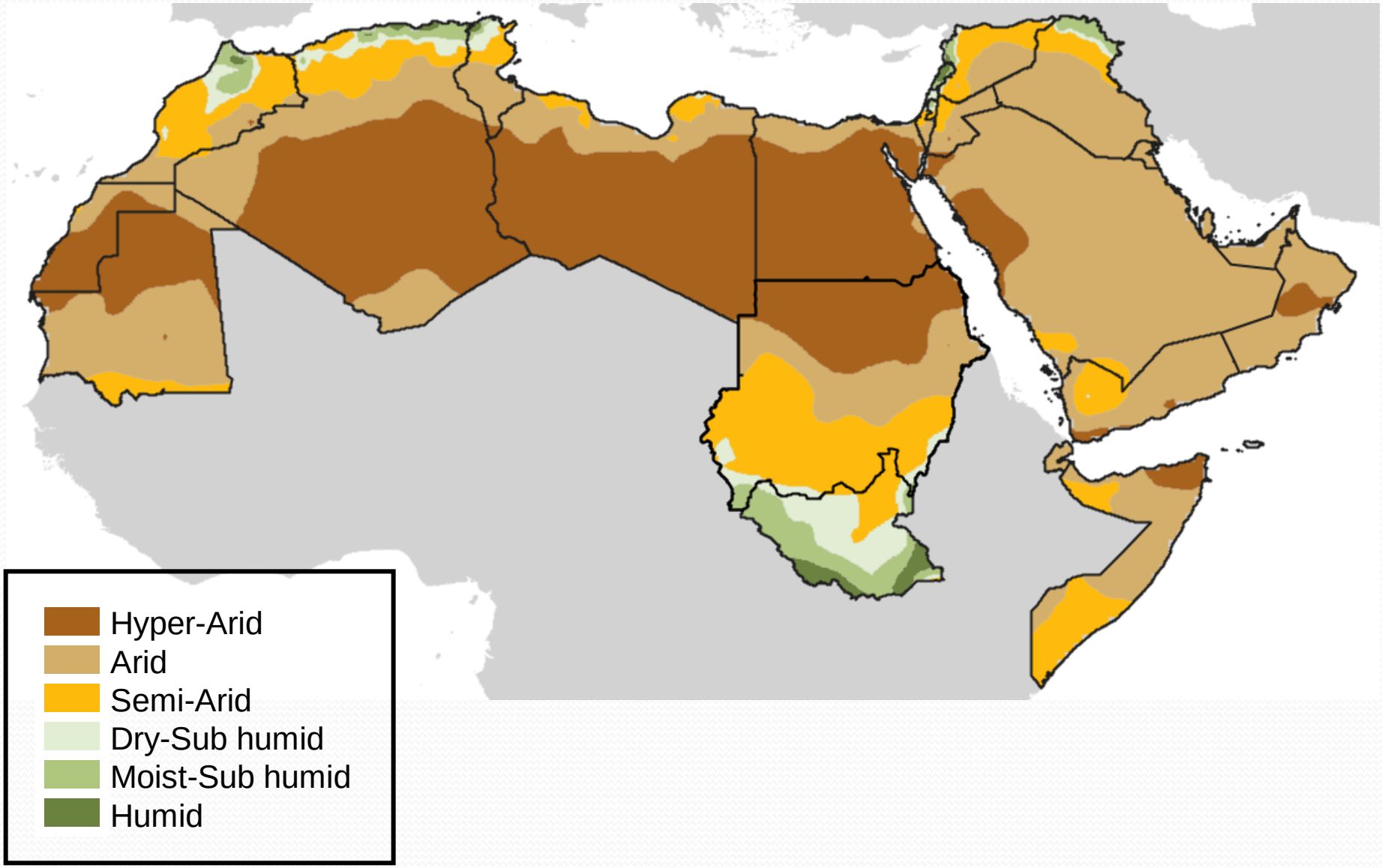
The low depth of the Gulf adds to this vulnerability

Population growth adds even more

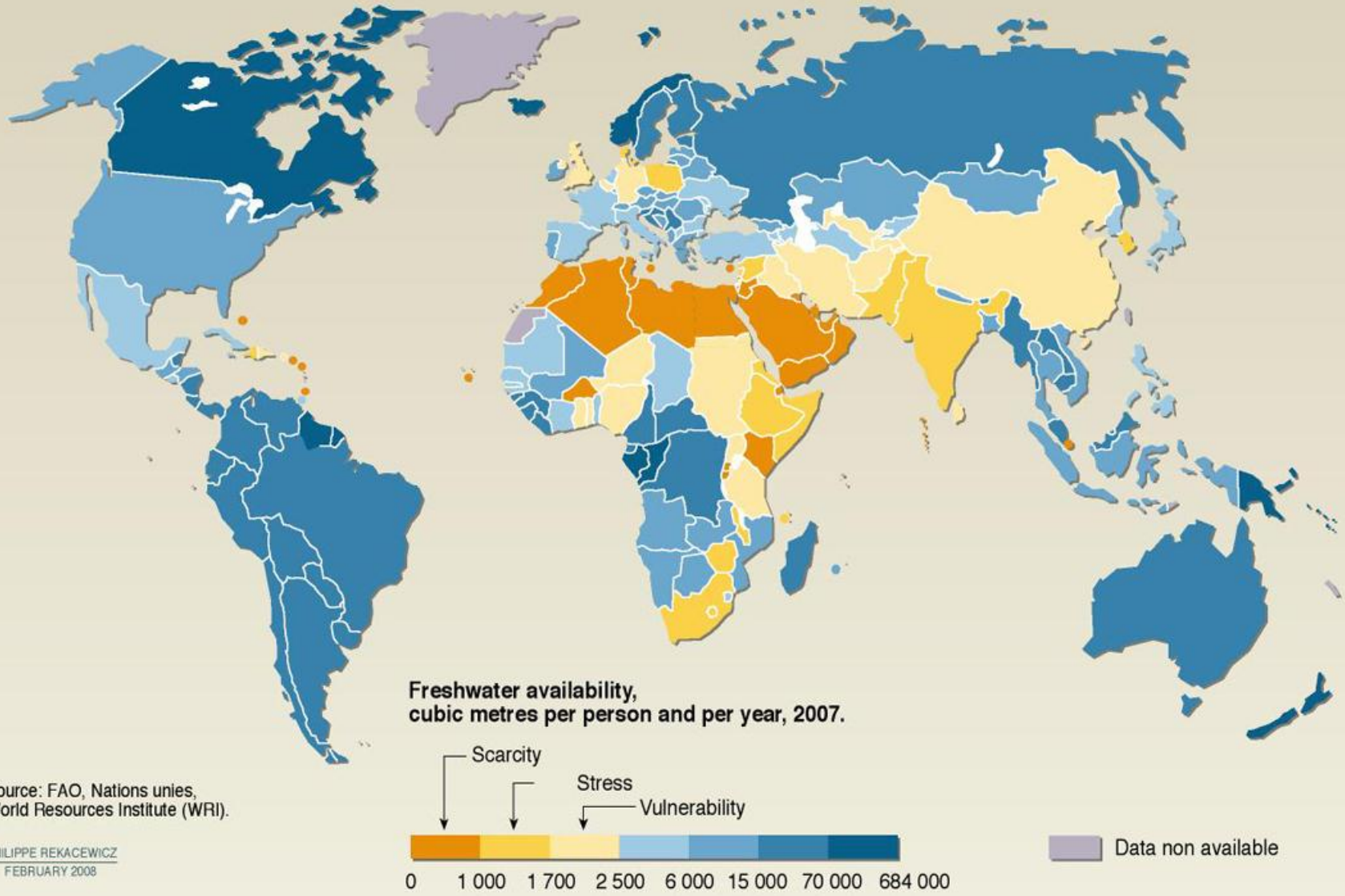
Precipitation



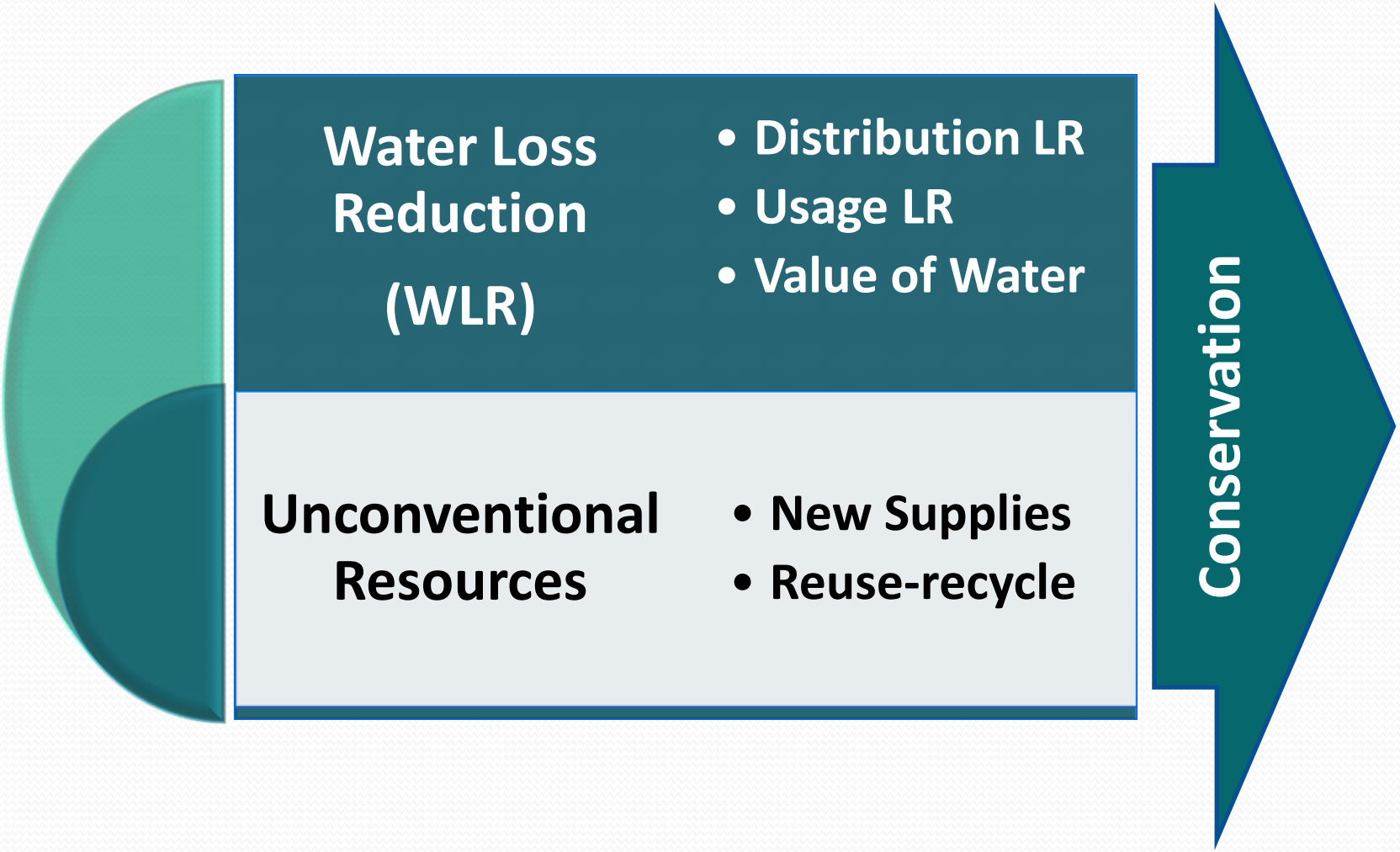
Aridity


Hyper-Arid
Arid
Semi-Arid
Dry-Sub humid
Moist-Sub humid
Humid

Most of the Arab countries suffer water scarcity

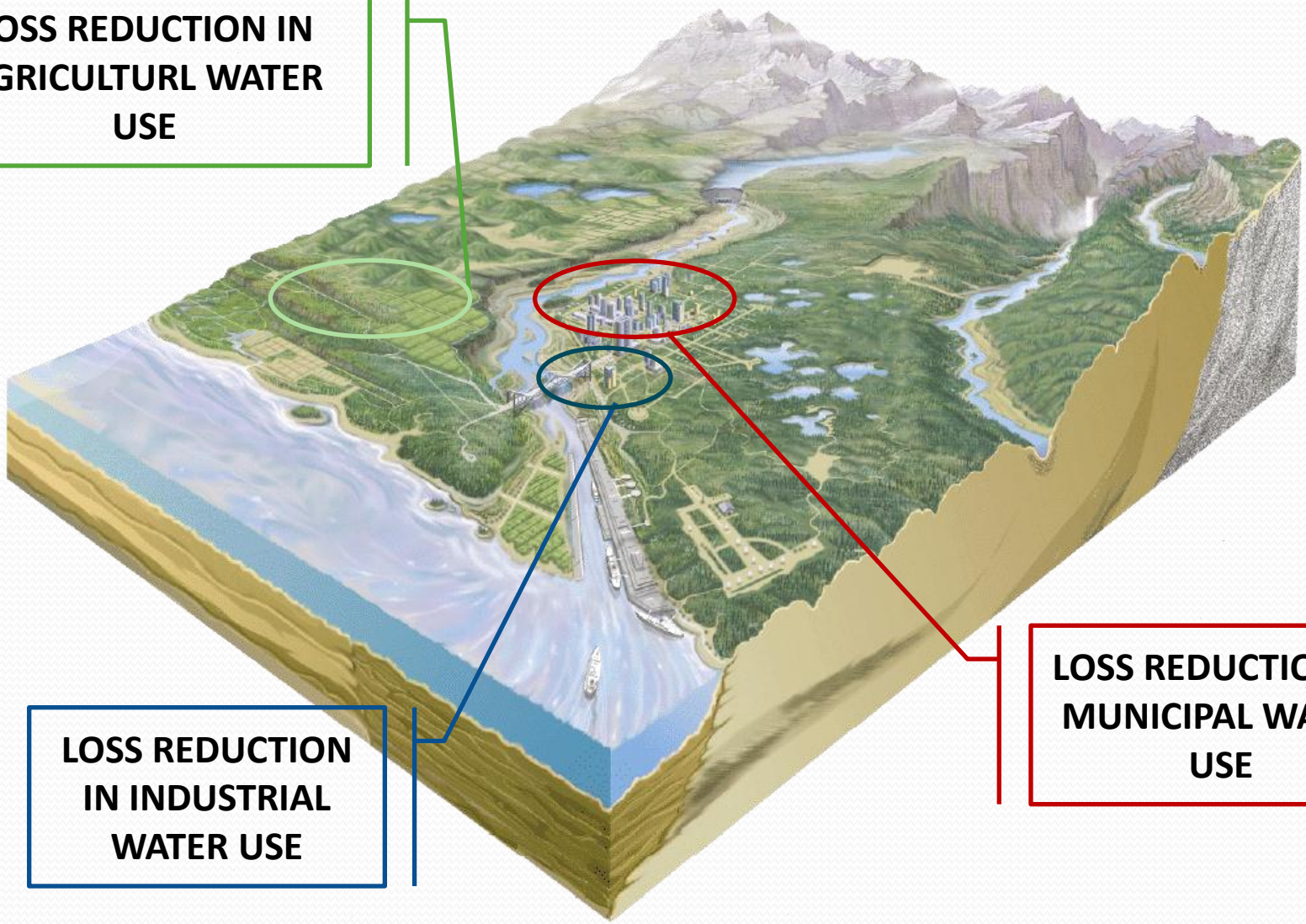


Elements of Conservation



Loss reduction –Multiple Aspects

LOSS REDUCTION IN AGRICULTURL WATER USE



LOSS REDUCTION IN INDUSTRIAL WATER USE

LOSS REDUCTION IN MUNICIPAL WATER USE

Towards a new paradigm in urban water management

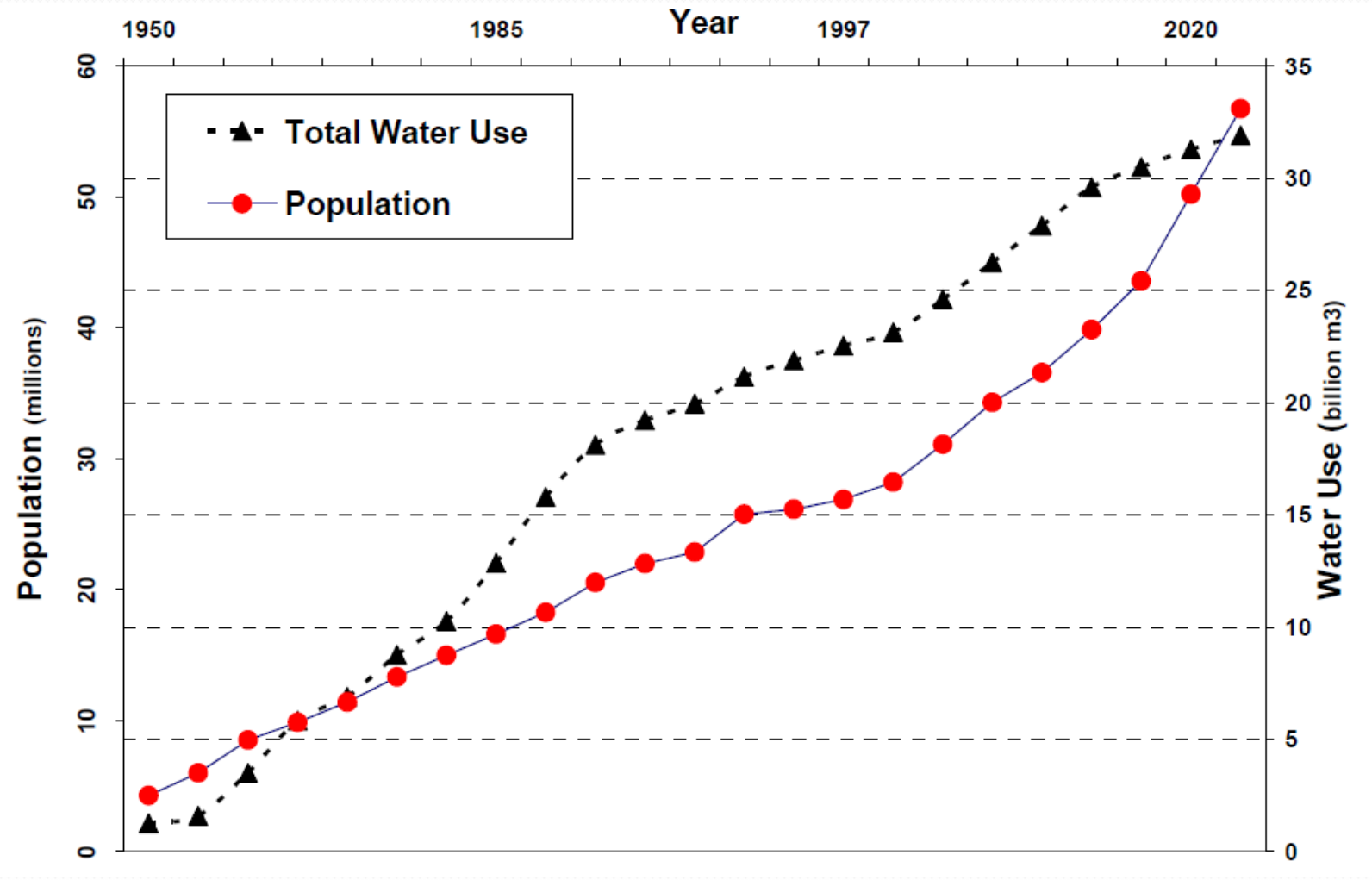
Integrated Systems

In the past, siloed bureaucracies have built centralized infrastructure in drinking water, wastewater, stormwater, transportation, and energy.

In the future, smart networks of centralized and decentralized infrastructure, built at the building, neighborhood and watershed scales will provided synergies of design, cost savings, as well as green spaces, restoration of waterways, clean air, and green jobs.

Water Alliance

Sustainability Challenge: Increasing Population



GCC Countries Population and Water Use 1950-2025

Source: Dawoud and Abderrahman, 2006

Sustainability Challenge: Increasing Water Demand

Projected water demand in selected GCC countries, millions of imperial gallons, 2000-20

Country	2000	2002	2004	2006	2008	2010	2012	2014	2016	2018	2020
Saudi Arabia	170,476	188,604	216,205	225,479	240,206	246,065	266,656	290,081	315,564	343,286	373,444
Bahrain	27,930	30,387	33,877	36,664	43,181	43,181	43,181	43,181	43,181	43,181	43,181
Qatar	32,303	34,843	34,918	36,116	48,643	56,222	65,111	75,406	84,206	94,116	104,780
Dubai	41,354	49,081	58,357	72,588	91,653	98,178	108,964	123,355	133,361	143,970	155,109

Sources: Saline Water Conversion Corp (Saudi Arabia); Electricity and Water Authority (Bahrain); Qatar Statistics Authority; Dubai Water and Electricity Authority, EIU estimates and forecasts

Source: Economist Intelligence Unit, 2010

Main reasons for the escalating and exaggeration of urban water demands in GCC

Focus on the "**Supply-Side" of water** management

Absence of proper "**Demand Management"**

Economic tools; non-existent of pricesignaling mechanism: metering & pricing, subsidies

Technological tools: water-saving devices

Legislative tools: building codes and bylaws

Inadequate public awareness of the Water scarcity and situation in the region

Source: Al-Zubari, 2011

Consensus about water use by agriculture in the Arab Region

- ***Inefficient*** **use of water resource in the agricultural sector**
- **Such a wasteful use of *scarce* water resources *should not continue***
- ***More efforts*** **should be directed towards water *conservation practices*.**

Improve irrigation methods

To

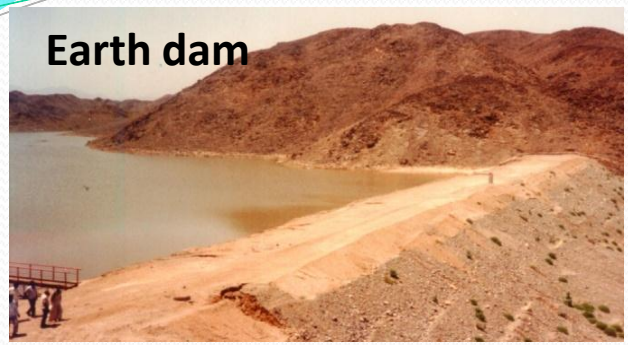
Potential for water harvesting in Arab Countries

Country	Volume in BCM		Utilization as % of rainfall
	Rainfall	Utilization	
Jordan	8.5	0.425	5
Tunisia	36	0.936	2.6
Sudan	400	4	1.6
Syria	85	2	2.4
Morocco	150	20	1.3
Yemen	68	6.12	9
N. Libya	30	0.9	3
Algeria	192	5.76	3
Mauritania	175	4.37	2.5
Egypt	15	0.225	1.5

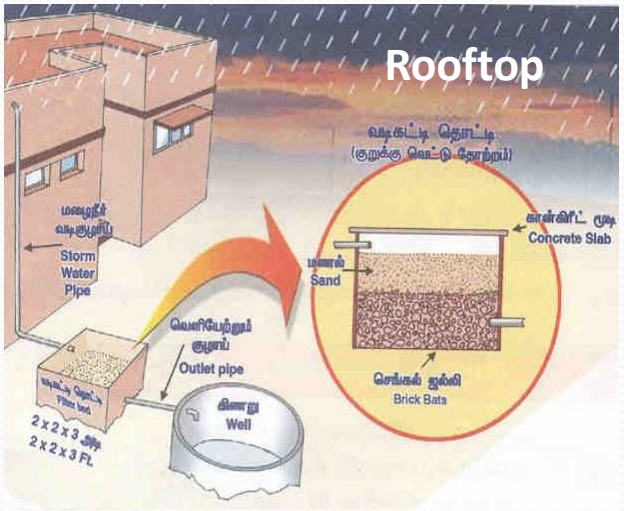
(AOAD, 2002)

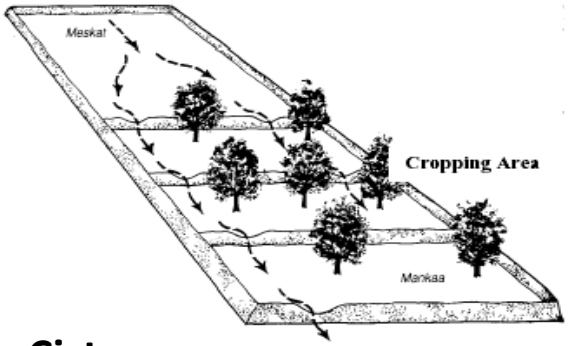
Water Harvesting Tradition in the Arab Region

Earth dam



Rooftop





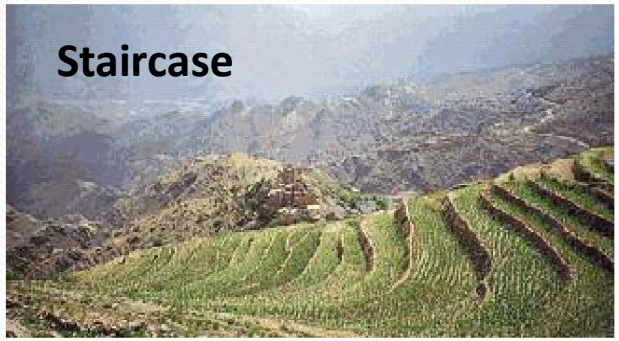
Cistern

Hafir

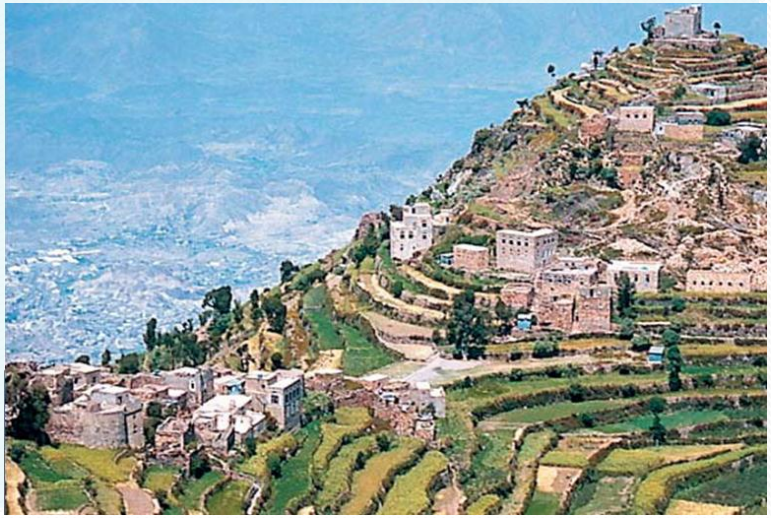
Yard Collector

Flooding

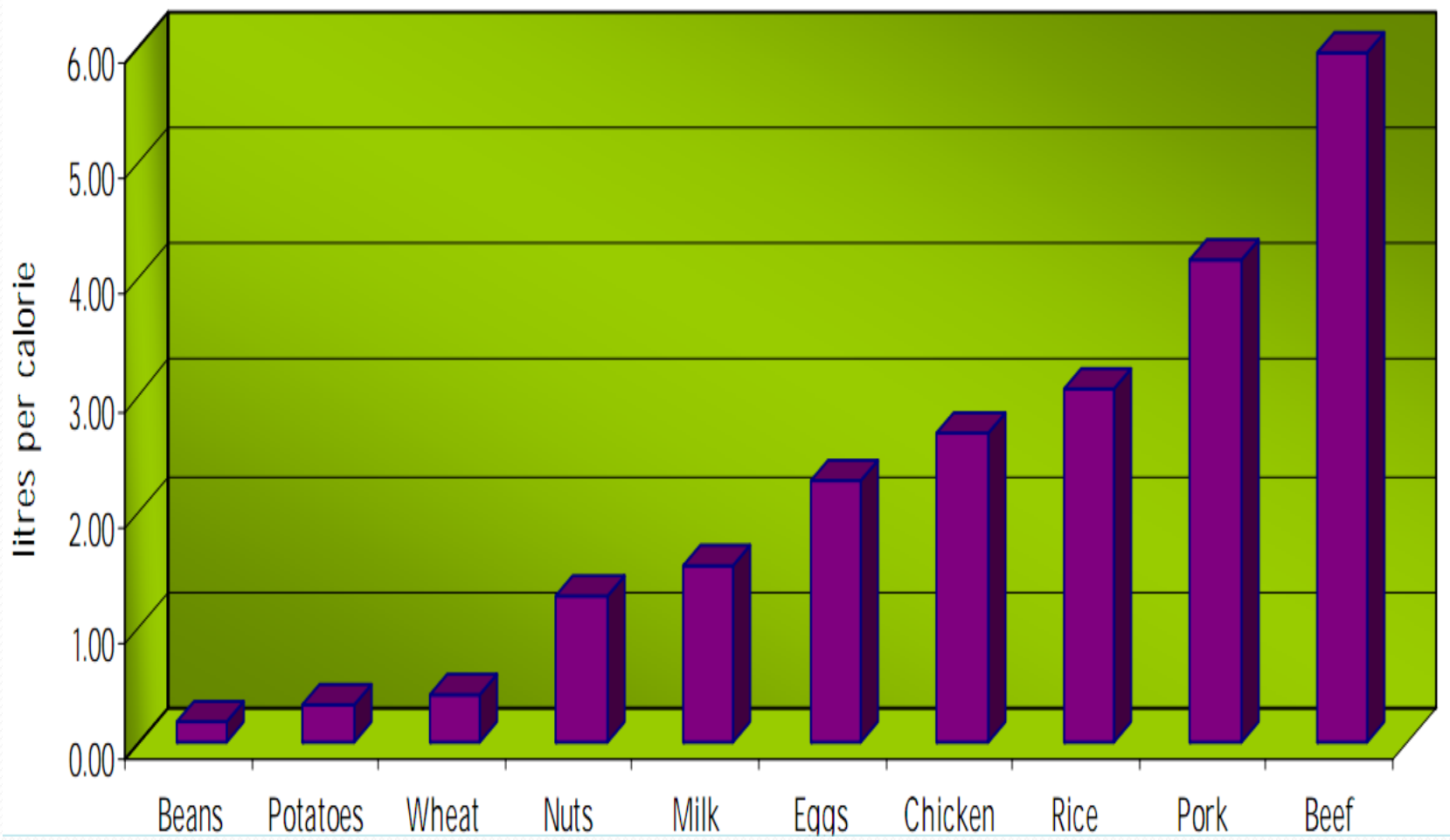
Staircase



Rainwater harvesting techniques and management practices used in Yemen

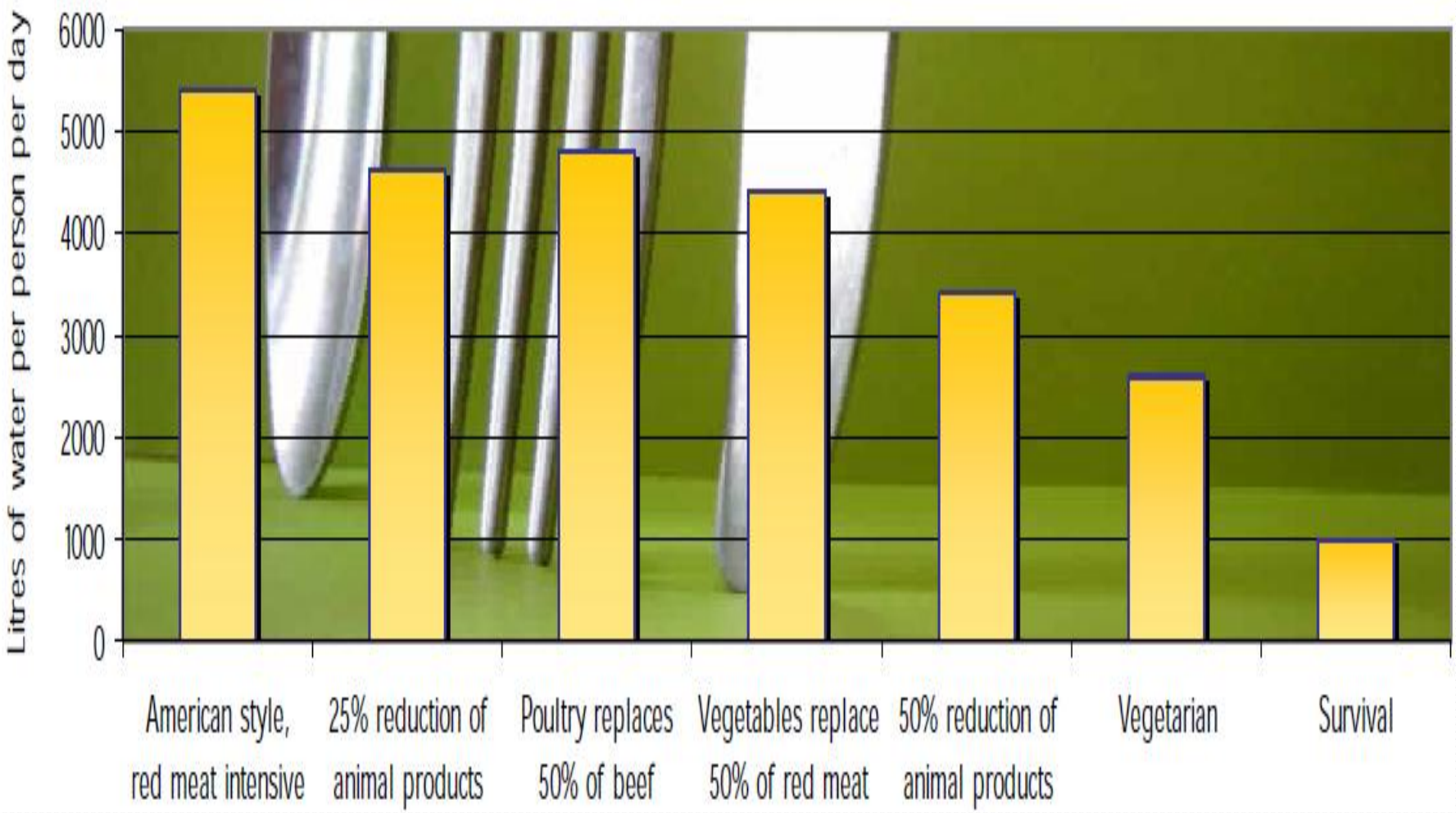


Global Average Embedded Water Litres/Calorie for different food products



Source: Zygmunt, 2007.
Data from Chapagain and Hoekstra 2004 and the author's own calorie estimates

Water Intensity in Comparison to Various Diets



Source: Zygmunt, 2007. After: Renault and Wallender 2000

The challenge we all have

How to put water in the minds of people?

United Nations
Educational, Scientific and
Cultural Organization

Organisation
des Nations Unies
pour l'éducation,
la science et la culture

Organización
de las Naciones Unidas
para la Educación,
la Ciencia y la Cultura

Организация
Объединенных Наций по
вопросам образования,
науки и культуры

منظمة الأمم المتحدة
للتربية والعلم والثقافة

联合国教育、
科学及文化组织

Water at UNESCO

International Hydrological Programme
Water research, management, education

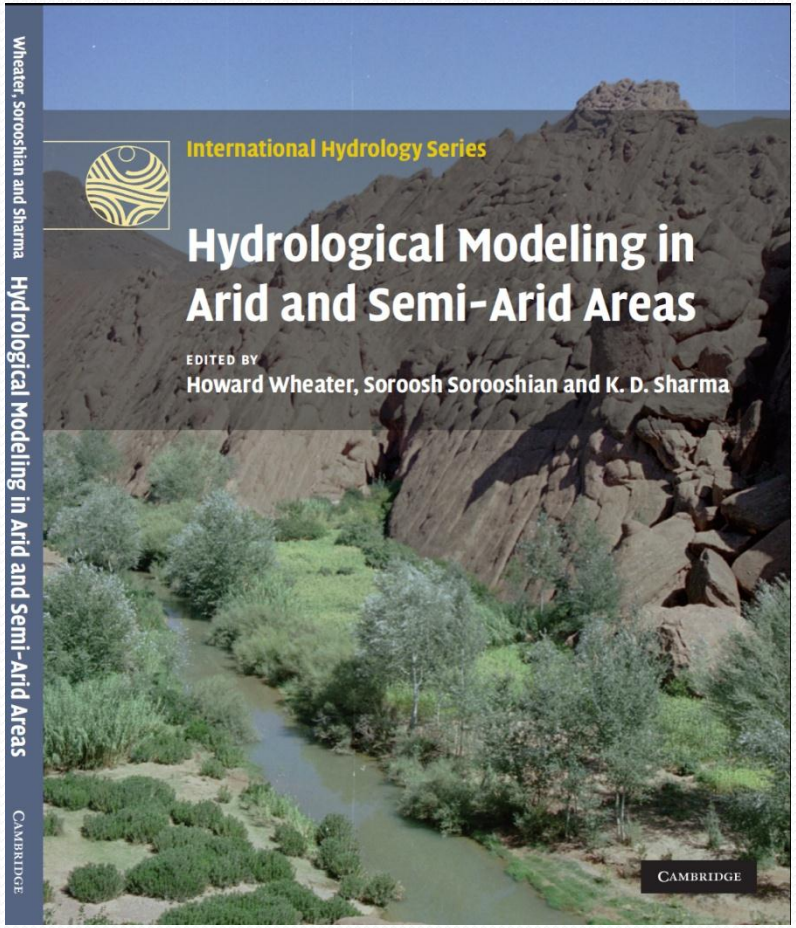
UNESCO-IHE Institute for Water Education:
postgraduate education for water professionals +

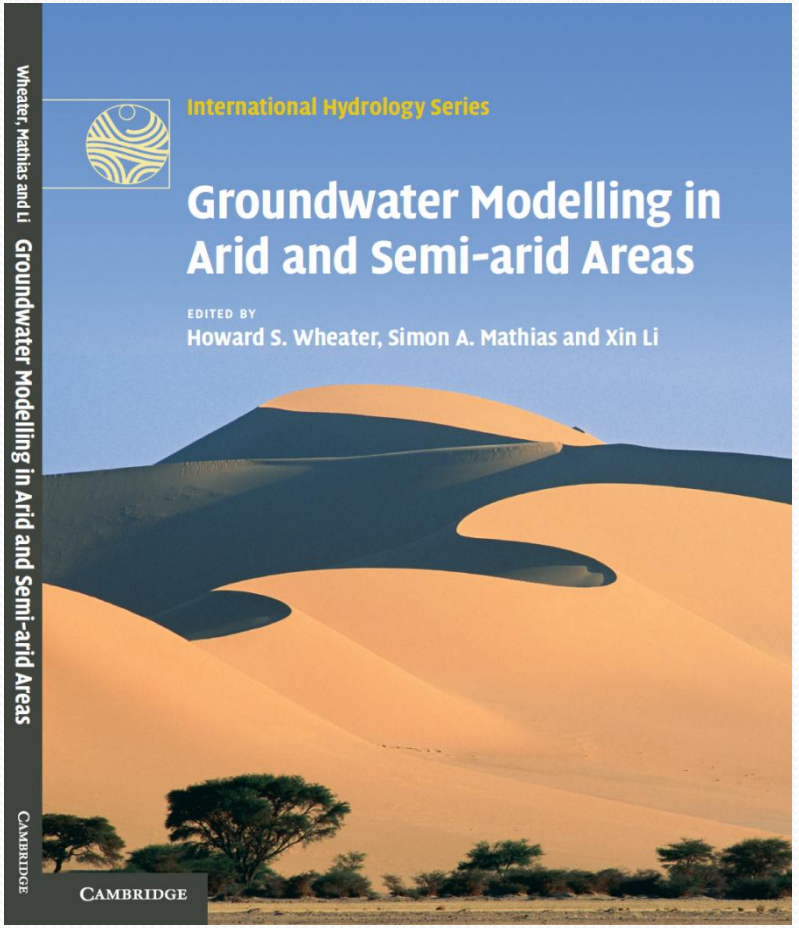
World Water Assessment Programme:
compilation of the World Water Development Report

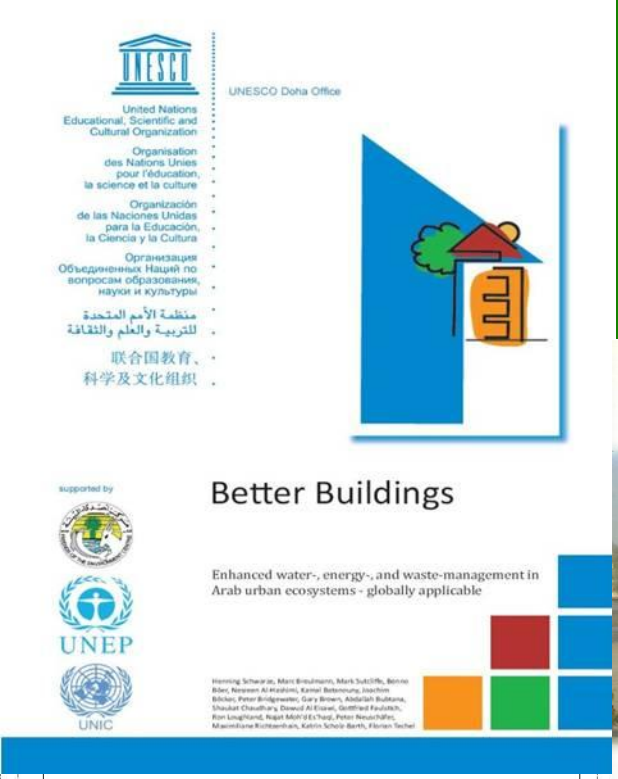
Unesco Water Chairs

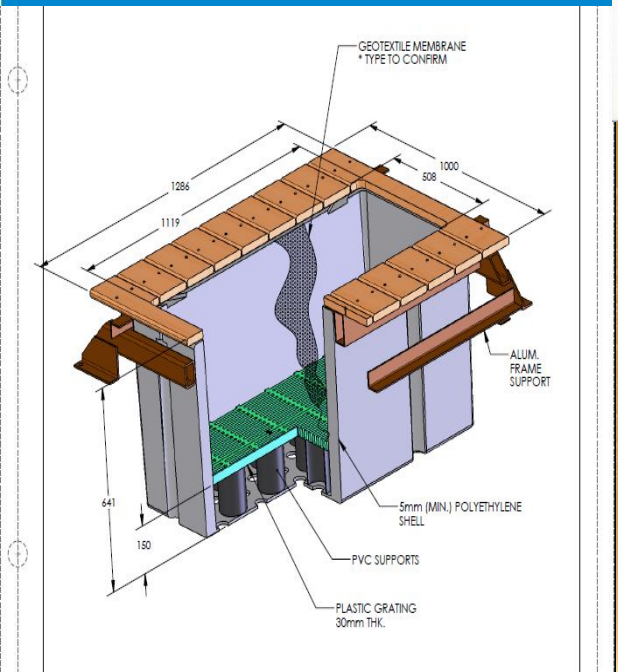
Biosphere Reserves:
places for nature conservation & sustainable development, including ecosystem and water management

Recent GWADI books

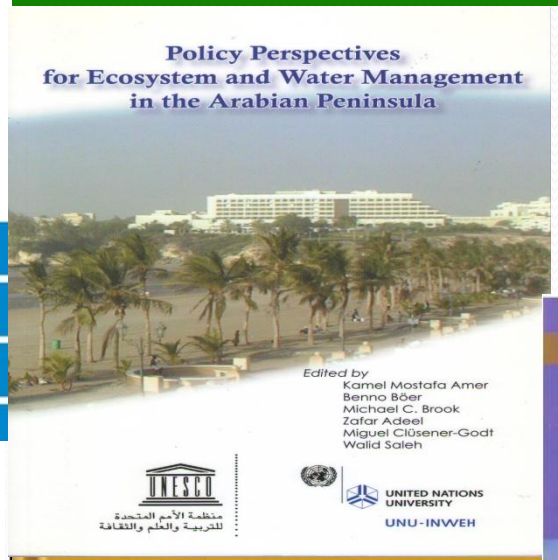


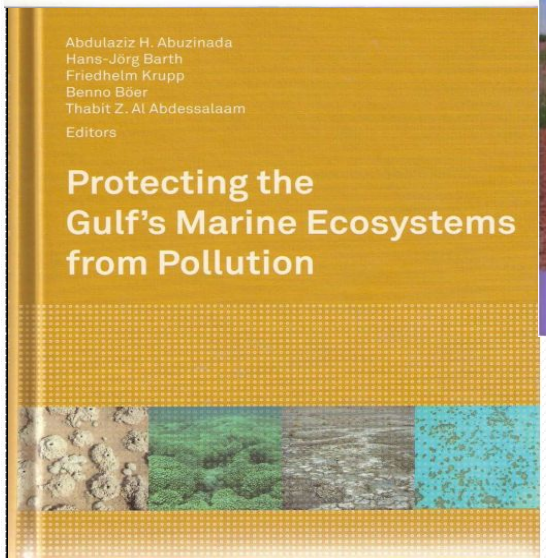



UNESCO
United Nations Educational, Scientific and Cultural Organization
Organisation des Nations Unies pour l'éducation, la science et la culture
Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura
Организация Объединенных Наций по вопросам образования, науки и культуры
منظمة الأمم المتحدة للتربية والعلم والثقافة
联合国教育、科学及文化组织
UNESCO Doha Office
supported by
UNEP
UNIC
Better Buildings
Enhanced water-, energy-, and waste-management in Arab urban ecosystems - globally applicable

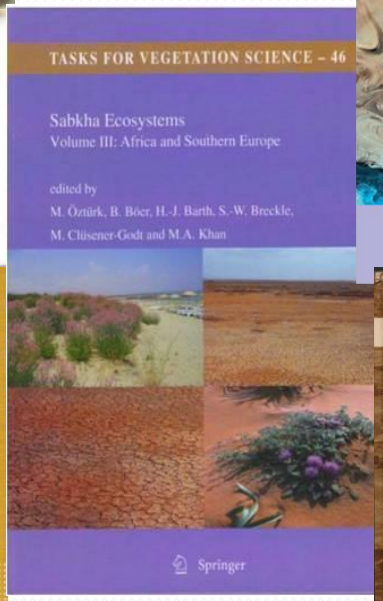

GEOTEXTILE MEMBRANE
* TYPE TO CONFIRM
1286
1119
1000
508
ALUM. FRAME SUPPORT
641
150
5mm (MIN.) POLYETHYLENE SHELL
PVC SUPPORTS
PLASTIC GRATING
30mm THK.

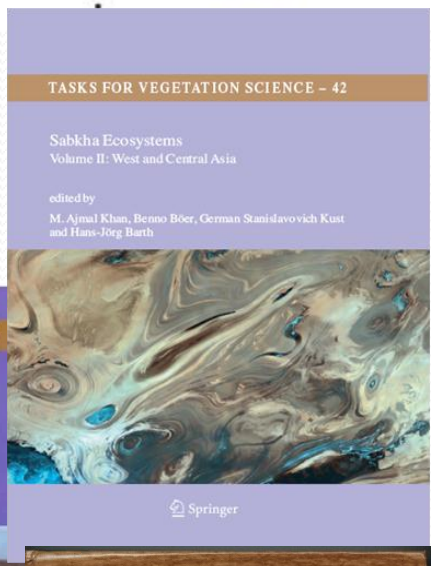

المبادرة العربية لاعادة التدوير
THE ARAB RECYCLING INITIATIVE

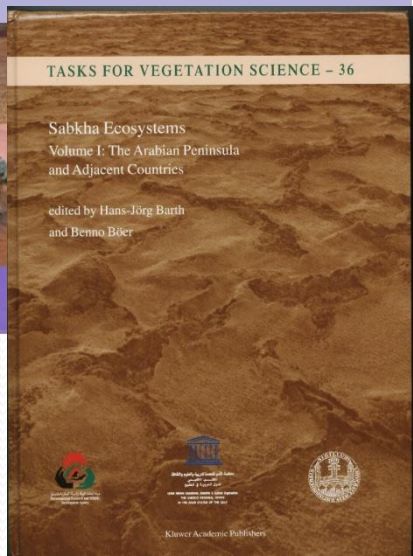

Policy Perspectives for Ecosystem and Water Management in the Arabian Peninsula
Edited by
Kamel Mostafa Amer
Benno Böer
Michael C. Brook
Zafar Adeel
Miguel Clüsener-Godt
Walid Saleh
UNESCO
منظمة الأمم المتحدة للتربية والعلم والثقافة
UNITED NATIONS UNIVERSITY
UNU-INWEH


Abdulaziz H. Abuzinada
Hans-Jörg Barth
Friedhelm Krupp
Benno Böer
Thabit Z. Al Abdessalaam
Editors
Protecting the Gulf's Marine Ecosystems from Pollution


UNESCO
United Nations Educational, Scientific and Cultural Organization
BIG TREE SOCIETY
Doha


TASKS FOR VEGETATION SCIENCE – 46
Sabkha Ecosystems
Volume III: Africa and Southern Europe
edited by
M. Öztürk, B. Böer, H.-J. Barth, S.-W. Breckle, M. Clüsener-Godt and M.A. Khan
Springer


TASKS FOR VEGETATION SCIENCE – 42
Sabkha Ecosystems
Volume II: West and Central Asia
edited by
M. Ajmal Khan, Benno Böer, German Stanislavovich Kust and Hans-Jörg Barth
Springer


TASKS FOR VEGETATION SCIENCE – 36
Sabkha Ecosystems
Volume I: The Arabian Peninsula and Adjacent Countries
edited by Hans-Jörg Barth and Benno Böer
Kluwer Academic Publishers

We need to apply and catalyze existing ideas and encourage the youth to develop even better ideas – examples:

Why don't we harvest water from roofs and sealed surfaces in winter rains ?

Why don't we recycle our black-water entirely in decentralized systems ?

Why don't we harvest air-humidity based on solar energy ?

Why not using more beach wells to reduce pressure on marine environments and energy consumption for cooling water ?

What to do with marine discharge water ?

How much can bio-saline agriculture contribute to redress the pressure on freshwater ?

Do we need an "Arid Land Water Technology Exhibition" ?

Thank you