



SECURITY & SUSTAINABILITY FORUM

Convening Global Experts to Guide Decision Making

**International Environmental
Security Webinar Series
October 2013 through February,
2014**



National Council for Science and the Environment
Improving the scientific basis for environmental decisionmaking

**ANTIOCH
UNIVERSITY**
NEW ENGLAND

Session 2 International Water Security

Water Resources in Yemen
November 5, 2013

***Moderator: Dr. Elizabeth Chalecki
Visiting Research Fellow
Environmental Security Program
Stimson Center***



CADMUS

**Gehrlicher
Solar**



EATON



SECURITY & SUSTAINABILITY FORUM

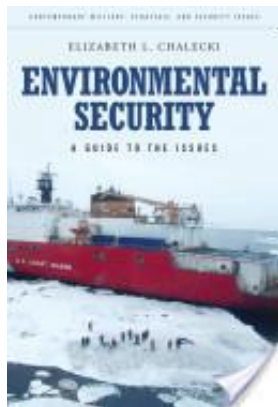
Convening Global Experts to Guide Decision Making

[Preparing the Nation for Change: Building a Sustained National Climate Assessment Process](#)

November 6, 2013

1:15 to 2:45 PM

International Environmental Security Webinar Series October 2013 through February, 2014



By
Elizabeth Chalecki
[on Amazon](#)

[International Public Health](#)

December 3:

1:15 to 2:15 pm EST

Hypothetical Scenario: A new mosquito-borne disease out of Asia/Africa

Register @ www.ssfonline.org

Hold the dates

January 7: panel on food security

Hypothetical Scenario: A Middle East nation leases agricultural land in Ethiopia

February 4: panel on geo-engineering

Hypothetical Scenario: India decides to deploy aerosols to combat warming

All opinions and ideas expressed in this webinar belong to the individuals in question, and do not necessarily represent the official view of any government agencies, universities, corporations, or branches of service.



SECURITY & SUSTAINABILITY FORUM
SECURITY & SUSTAINABILITY FORUM

Convening Global Experts to Guide Decision Making

CONVENING GLOBAL EXPERTS TO GUIDE DECISION MAKING

Gehrlicher Solar
Imagine the Energy



Thank You to our Sponsors & Partners



ANTIOCH UNIVERSITY
NEW ENGLAND



solutionsmapping



THE AMERICAN INSTITUTE OF ARCHITECTS

Energy Efficiency Program Design, Marketing & Communications



- **Why You Should Care:**

- Rising energy demands threaten energy security, economic growth, and the environment
- Energy efficiency provides a low-cost, diverse, stable, and environmentally sound resource base
- Consumers often don't embrace the need to reduce energy use and don't know how to do it

- **What Are Your Next Steps:**

- Tailored energy saving programs that benefit the economy, reduce supply uncertainties, and mitigate climate change
- Marketing that touches consumers, helps transform the marketplace for energy efficient products

- **Cadmus Can Help:**

The Cadmus Group, Inc.:

- Facilitates collaborative decision-making among multiple agencies and stakeholders
- Factors in cost-effectiveness, economic stimulus, and reduced greenhouse gas emissions
- Conducts market research to inform program design and consumer marketing
- Orchestrates communications campaigns to produce sustained energy efficient choices
- Evaluates the effectiveness of program and marketing initiatives

- **Contact:**

- Linda [Dethman](mailto:Linda.Dethman@cadmusgroup.com) | Linda.Dethman@cadmusgroup.com | (503) 467-7146



SOCIALLY RELEVANT, PRACTICE-ORIENTED, GRADUATE STUDY

- MBA in Sustainability
- MS & PhD in Environmental Studies
- Sustainable Development & Climate Change
- MEd in Educating for Sustainability
- Resource Management and Conservation
- Environmental Education or Science Teaching
- Advocacy, Conservation Biology, and more

You can now choose a Professional Science Master's option for all our Environmental Studies Master's Degrees!



LOCAL SOLUTIONS: Northeast Climate Change Preparedness Conference

May 19, 20 and 21st 2014

The Center of New Hampshire • Manchester, NH

Local Solutions (Days 1 & 2)

Educators' Summit (Day 3)

www.antiochne.edu/climate-prepare

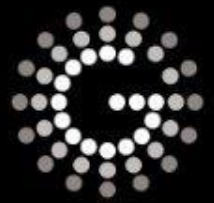
Building  **Climate Solutions**
January 28 - 30, 2014
Washington, D.C. 14th National Conference and Global Forum
on Science, Policy and the Environment

www.ncseonline.org

Develop practical solutions to minimize the consequences of climate change in the areas of the built environment and food and natural resources.

Develop and advance solutions that mobilize and integrate science and technology with appropriate financing, policy, and education.

Emphasize putting ideas into action – moving forward on policy and practice.



Gehrlicher Provides PV-Centric Energy Solutions©

Engineering Procurement Construction (EPC+)

- Gehrtec Engineered Solution©
- Micro-grid and storage ready

Project Finance Sevices

- Gehrlicher Finance Link©

Operations & Mainenance (O&M)

- Gehrlicher Services©



Eaton Energy Solutions

To operate in today's challenging energy environment you need a partner recognized as a global technology leader in diversified power management solutions that allow systems to operate more efficiently, effectively, safely and sustainably...

...you need Eaton

Our flexible and comprehensive approach to engineering that can help you sustain results.

- Energy Management & Strategic Planning
 - Facility Commissioning
 - Building System Optimization
 - Energy Audits/Analysis/Modeling
 - Energy/Building Master Planning
 - Water Resource Management
- High Performance Green Building Design:
 - Control, Automation & Metering
 - Retrofit & Renovation
 - LEED Certification/Consulting/Management
- Turnkey Projects:
 - Financial Solutions and Bonding
 - Power Purchase Agreements
 - Integration of Tax Credits
 - Utility Programs
- Government/Military
 - Energy Surety
 - Expeditionary



Eaton's superior performance is measured by a proven track record in the industry:

- Certified ESCO by Department of Energy and National Association of Energy Service Companies (NAESCO)
- #2 commissioning agent – Consulting-Specifying Engineers MEP Giants 2010
- 1,500 engineers, specialists, LEED certified, and technicians organized around a combination of national Innovation Centers and local operations centers.
- Over 35 years experience as a Total Energy Solutions provider and ESCO
- Eaton Electrical equipment installed in over 30% of federal buildings.



SECURITY & SUSTAINABILITY FORUM
SECURITY & SUSTAINABILITY FORUM

Convening Global Experts to Guide Decision Making

CONVENING GLOBAL EXPERTS TO GUIDE DECISION MAKING

**Sign Up for Free SSF Membership
To Access the Webinar Archives**
www.securityandsustainabilityforum.org

Moderator



Dr. Elizabeth Chalecki, Visiting Research Fellow, *Stimson Center*. Her expertise lies in the areas of climate change and security, international environmental policy, environmental terrorism, and non-traditional security threat analysis. She recently concluded a fellowship at Goucher College as the Visiting Mellon Scholar for Environmental Studies. Dr. Chalecki has published over 20 books, articles, and book chapters on diverse topics such as climate change and Arctic security, environmental terrorism, climate change and international law, public perceptions of environmental issues, and water in outer space. She has also taught at Boston College, Boston University, California State University – Hayward and the Monterey Institute of International Studies, and worked for the Pacific Institute, Environment Canada, the U.S. Department of Commerce, and the Brookings Institution.



SECURITY & SUSTAINABILITY FORUM
SECURITY & SUSTAINABILITY FORUM

Convening Global Experts to Guide Decision Making

CONVENING GLOBAL EXPERTS TO GUIDE DECISION MAKING

All opinions and ideas expressed in this webinar belong to the individuals in question, and do not necessarily represent the official view of any government agencies, universities, corporations, or branches of service.

Panel



Col. Todd Chamberlain, USA (ret.). Col. Chamberlain served for 30 years in the Army, the Army Reserve, and the U.S. National Guard. As the Chief of the National Guard's Strategic Initiatives Group from 2008-2010, COL Chamberlain explored the potential impact of climate change on the National Guard's future missions and participated on the Defense Department team which contributed the "Crafting a Strategic Approach to Climate and Energy" section of the 2010 Quadrennial Defense Review.



Dr. Mohamed Chebaane, Water for Life Solutions LLC. Dr. Chebaane is the managing director and co-founder of Water for Life Solutions. He has more than 25 years experience in integrated water resources management, transboundary river basin management, and water use efficiency. He has served with USAID, the Inter-American Development Bank, the Millennium Challenge Corporation, and private development and consulting firms in many countries around the world as a water expert, and is the lead adviser for the World Bank on the BRICKS project on sustainable land and water resources across the Sahel.



Dr. Marcus King, Elliott School of International Affairs, GWU. Dr. King, the John O. Rankin Associate Professor, came to Elliott from the Center for Naval Analyses, where he led studies for the U.S. government on climate change, security and DoD energy policy. He served in the Offices of the Secretary of Energy and the Deputy Undersecretary of Defense for Environmental Security. He is the author of Water, U.S. Foreign Policy and American Leadership.

SAUDI ARABIA

OMAN



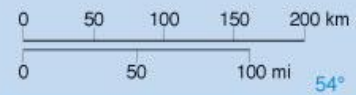
A R R U B (Empty Quarter desert)

12



YEMEN

- ☼ National capital
- ⊙ Governorate capital
- Town, village
- ✈ Airport
- International boundary
- Main road
- Secondary road
- Track



ERITREA
DJIBOUTI

SOMALIA

Qāḍub
Suqūtrā (Socotra)

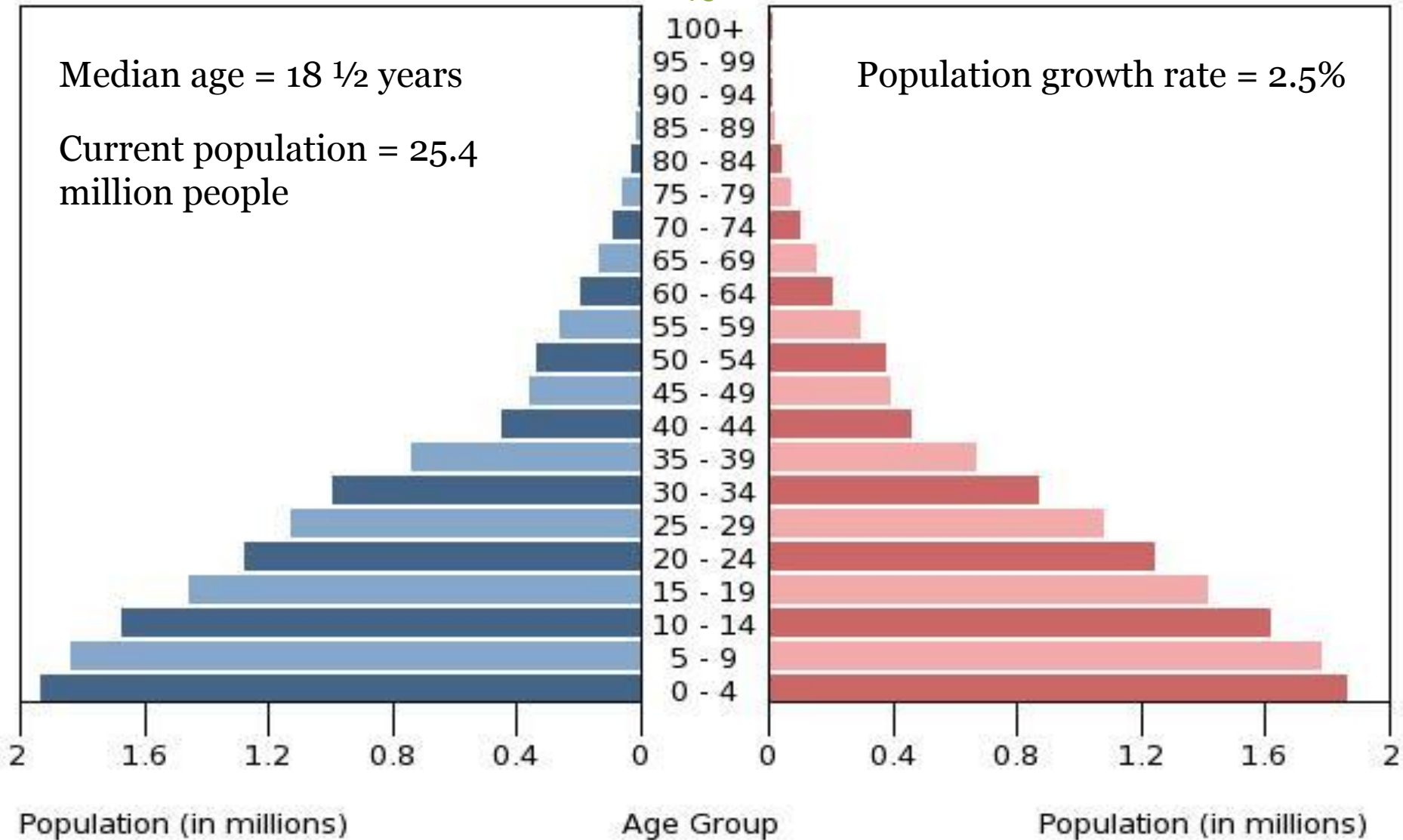
'Abd al Kūrī
Samḥah
Darsah
The Brothers

Demographic statistics

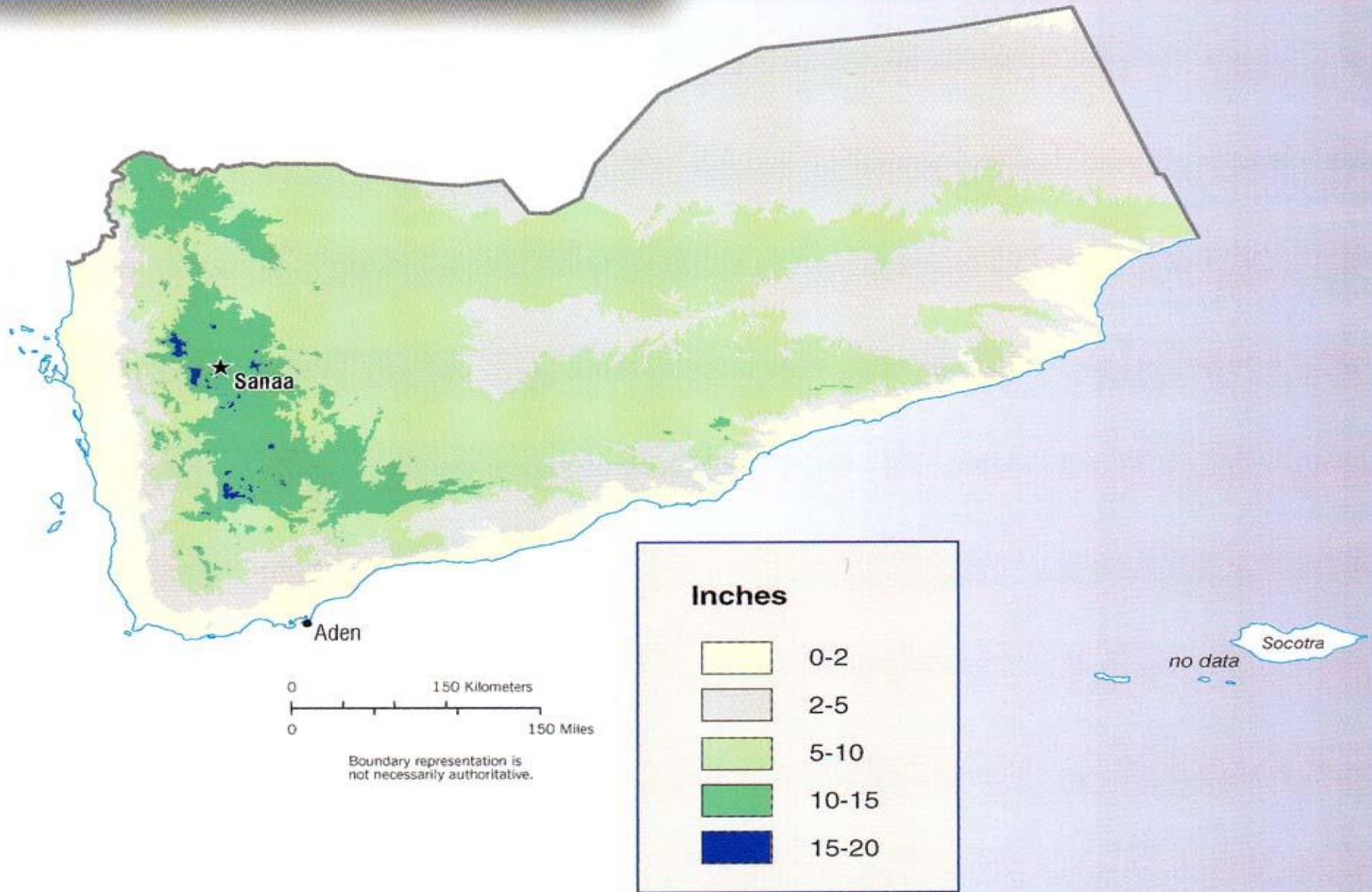
Male

Yemen - 2013

Female



Annual Rainfall



Arabia Felix?

15

- Agriculture consumes an estimated 90% of water withdrawals, 40% of that to grow qat
- Sana'a: 2.2 million people, but the water table is falling (estimates range from 6.6 to almost 20 feet/yr).
- Taiz: access to public water tanks only allowed once every 45 days



Vulnerability to climatic desiccation in the MENA region

Relative vulnerability according to various relevant indicators (scale of 1-3, 1 = highest): access to improved water source (IWS), population undernourished (FI), renewable water resources per capita (WR), water stress (WS), percentage of population in agriculture, Climate Vulnerability Index score (CVI), average score (Ave.), number of indicators with score of 1 indicating highest vulnerability (N)

Country	IWS	FI	WR	WS	% in ag	CVI	Ave	N
Yemen	1	1	1	1	1	1	1	6
Djibouti	1	1	1	n/a	3	2	1.6	3
Mauritania	1	2	3	n/a	1	2	1.8	2
Palestinian Territories	2	1	1	n/a	3	2	1.8	2
Tunisia	2	3	1	2	2	2	1.8	1
Jordan	3	2	1	1	3	2	2	2
Egypt	3	3	2	1	2	2	2.2	1
Morocco	2	2	2	3	2	2	2.2	0
Syria	2	3	1	2	2	3	2.2	1
Algeria	2	3	2	3	2	2	2.3	0
Iran	2	3	3	2	2	3	2.5	0
Lebanon	3	3	3	3	3	2	2.8	0
Iraq	n/a	n/a	3	n/a	3	n/a	3	0

Source: Brooks, N., 2009.

No relief nearby

- Saudi Arabia and Oman face the same hydrological conditions as Yemen
- Yemen and Saudi Arabia have a long, complicated history
- Over 2 million Yemeni workers in Saudi Arabia illegally
- Saudis building border fence



Who are the key players?

18

Arabian Peninsula

- Yemen



- Saudi Arabia



- Oman



World

- United States



- Japan



- Netherlands



- Germany



- World Bank



- Private water companies



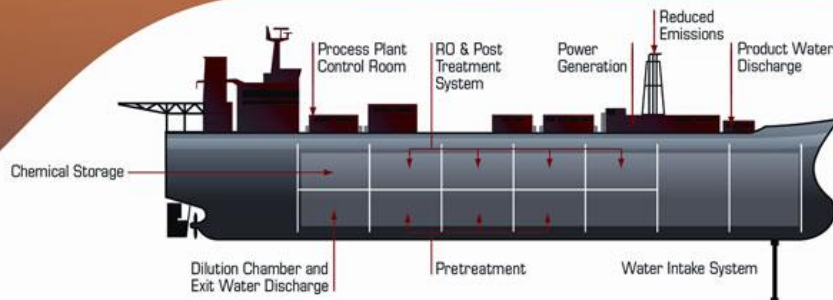
Hypothesis: Yemeni government announces strict water rationing



19



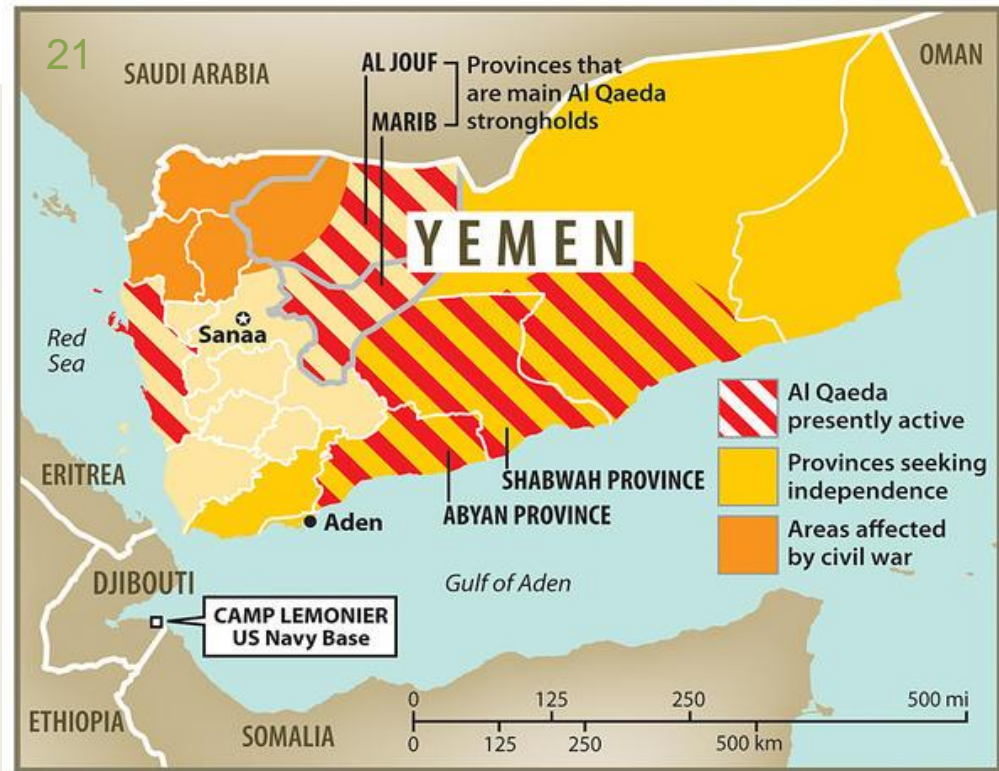
Development #1: Offshore desalination feasible?



- Possibilities: offshore or coastal installations
- Expensive
- Sanaa's wells predicted to run dry by 2017
- Will this be enough to stave off state failure?

Development #2: AQAP attacks infrastructure

- In a bid to destabilize the Yemeni government, AQAP attacks the offshore desal plants
- Cooperating with Somali pirates in the Gulf of Aden



SOURCE: Graphic News

RICH CLABAUGH/STAFF



- AQAP already killed hundreds of Yemeni soldiers and police
- Military forces on alert

Possible future developments. . .

22

- Yemenis migrate in large numbers into Saudi Arabia (water table won't be replenished for centuries)



- AQAP might get bolder
- Fearing another Somalia, the developed world might walk away from Yemen...



A Hard Limit on Water

23

- Water shortages affect agricultural production
- If food is limited, civil unrest can follow
- Drought can be irrevocable, if it goes on long enough



Arabian peninsula

- Already one of the driest places on earth, with annual rainfall in mm

Climate change

- Expected to increase variability of precipitation (amount and timing)

Yemeni concerns

- Practices and policies will exacerbate water shortages





SECURITY & SUSTAINABILITY FORUM

SECURITY & SUSTAINABILITY FORUM

Convening Global Experts to Guide Decision Making

CONVENING GLOBAL EXPERTS TO GUIDE DECISION MAKING

Gehrlicher
Solar

Imagine the
Energy



Thank You to our Sponsors & Partners



solutionsmapping



THE AMERICAN INSTITUTE OF ARCHITECTS



SECURITY & SUSTAINABILITY FORUM
SECURITY & SUSTAINABILITY FORUM

Convening Global Experts to Guide Decision Making

CONVENING GLOBAL EXPERTS TO GUIDE DECISION MAKING

All opinions and ideas expressed in this webinar belong to the individuals in question, and do not necessarily represent the official view of any government agencies, universities, corporations, or branches of service.

Audience Questions



Col. Todd Chamberlain, USA (ret.).



Dr. Mohamed Chebaane, Water for Life Solutions LLC.



Dr. Marcus King, Elliott School of International Affairs, GWU.



Dr. Elizabeth Chalecki, Visiting Research Fellow, *Stimson Center.*



SECURITY & SUSTAINABILITY FORUM

Convening Global Experts to Guide Decision Making

Preparing the Nation for Change: Building a Sustained National
Climate Assessment Process

November 6, 2013

1:15 to 2:45 PM

Thank you for joining us!

For free archive access, please join
The Security and Sustainability Forum
www.securityandsustainabilityforum.org/membership

International Environmental Security Webinar Series

Join us for the next webinar on **December 3, 2013**
Scenario: Infectious Disease & Security
Register @ www.ssfonline.org