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Yemen's Developmental Present and Future:
A Workshop on the Nation's Population, Environment, and Security Challenges

Woodrow Wilson International Center for Scholars

Yemen's Water Crisis: Understanding the Causes and Designing the Solution

Prof. Dr. Mohammed Al-Eryani
Ambassador of the Republic of Yemen- Federal Republic of Germany
(Former Minister for Water and Environment)

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Outline

- Yemen- Country Overview
- The Crisis- Highlights
- The Causes- a synthesis
- The Impacts/ Ramifications
- The Solution
- Concluding Remarks

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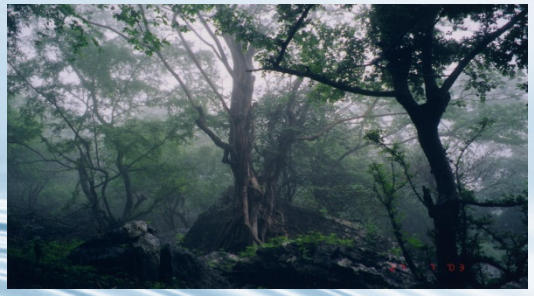
Country Overview

About 550,000 km2

Diverse physical and topographical features:

mountain chains, inter-mountain plains and wadis, coastal plains and desert areas

Varied climate and variable annual rainfall (less than 50 to near 800 mm).



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Country Overview (Continued)

Country Overview (Continued)

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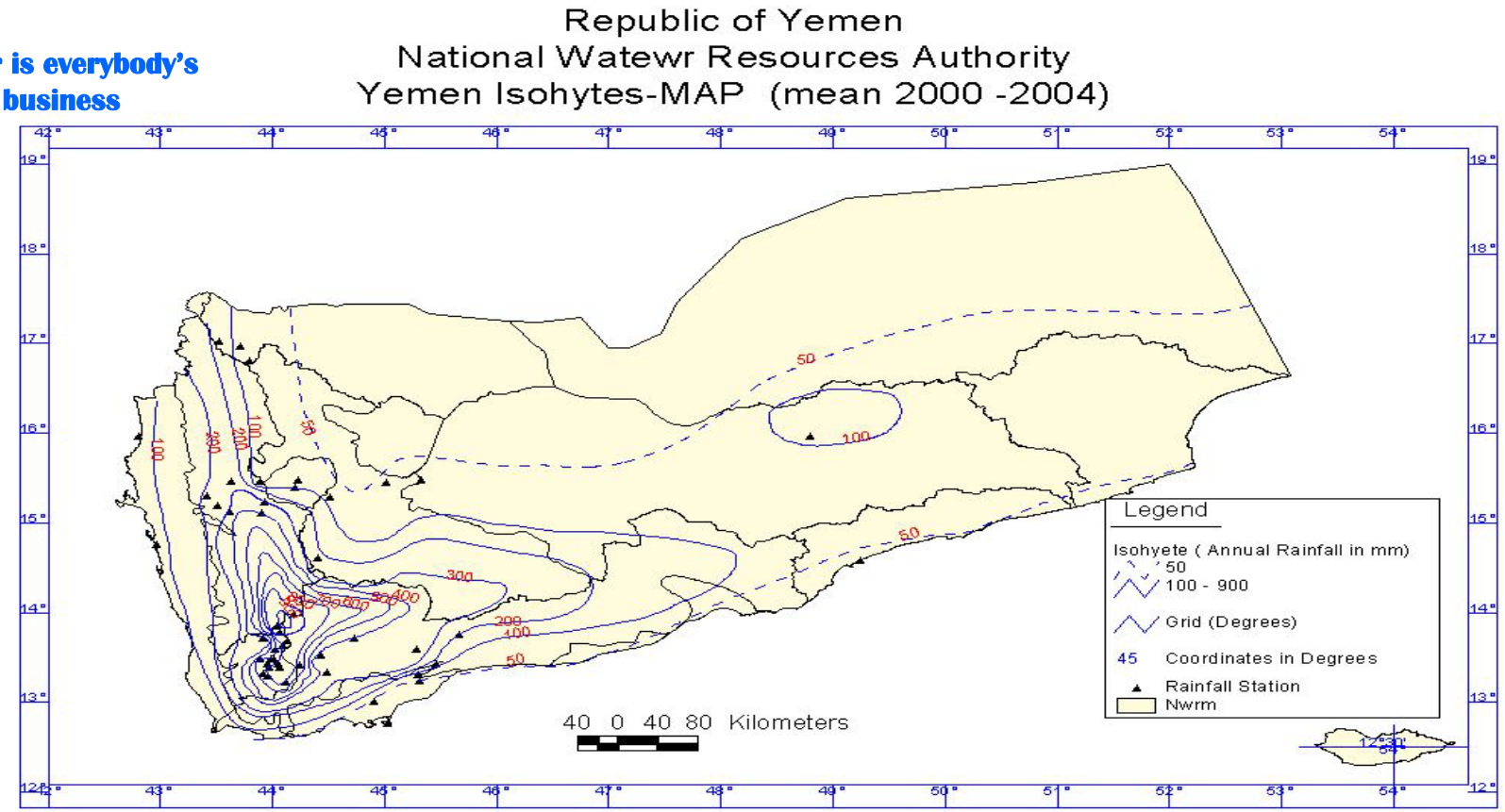

- Variable annual rainfall (less than 50 to near 800 mm)

- The annual per capita share of Renewable WR is about 120m3, decreasing annually with the growing population.

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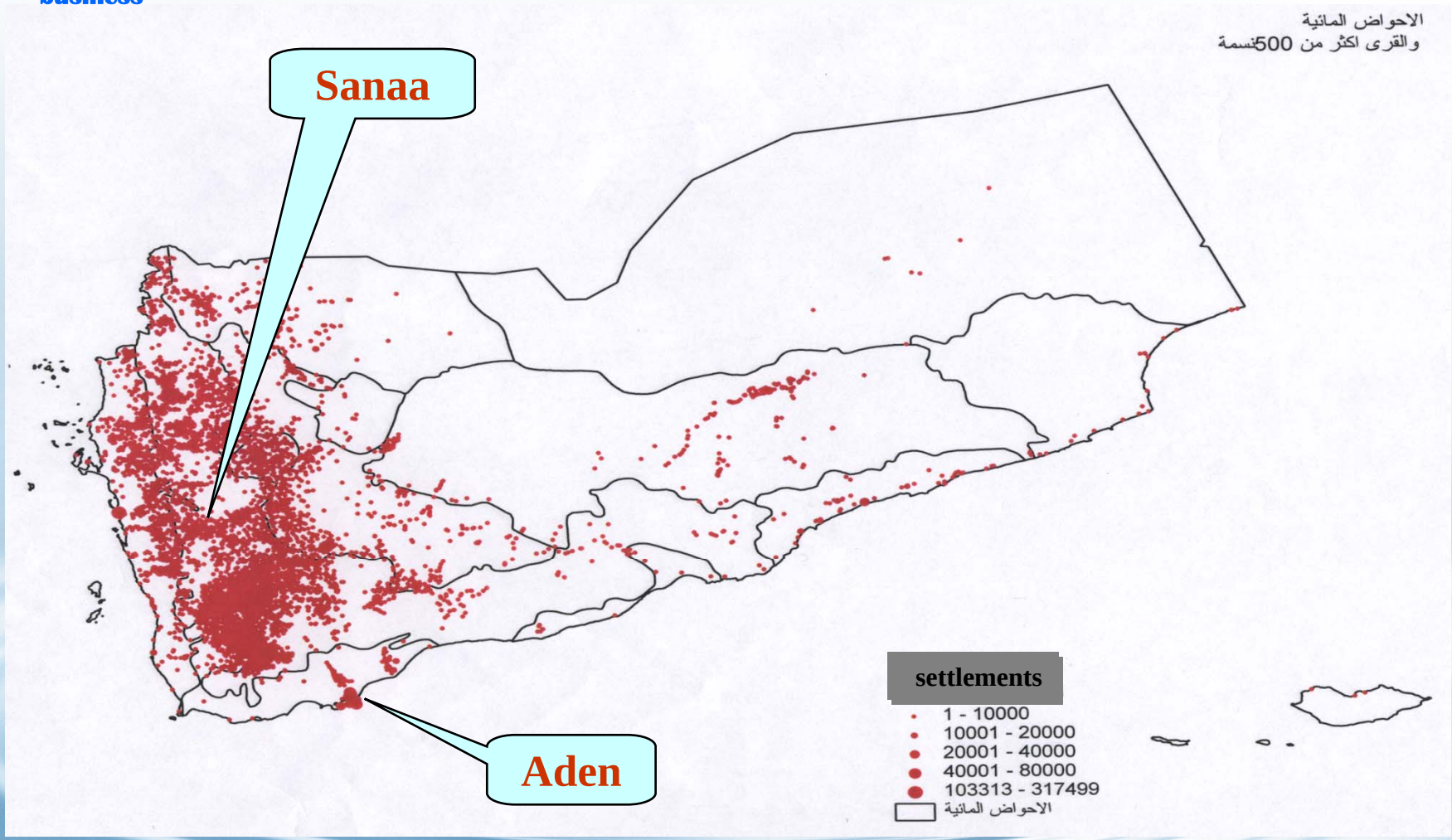
Country Overview (Continued)

Population Distribution
(population is about 22 M)



80 % of the population over 20% of the land

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Yemen's Water Crisis- Highlights

Basically, a severe imbalance between

Annually Renewable WR's (Supply)- **and**

Annual Water Use (DEMAND) **…**

- **A water deficit which**
  - **continues to grow annually,**
  - **is met by GW over-exploitation (> 90% is used for irrigation)**
- **Limited success in controlling / managing this imbalance**

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The Causes - a synthesis

The imbalance or crisis is due to/ aggravated by many factors, including:

- **Natural Water Scarcity- Yemen is one of the most water stressed countries in the world.**
- **The annual per capita of RWR is less than 120m3… and decreases annually with population growth.**
  - **More than 1000 m3/ year for the MENA region**
  - **More than 7000 m3/ year global average**
  - **At least 1000 m3/ year required for domestic uses & food production**

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The Causes - a synthesis (Continued)

- Growing demand (domestic & irrigation) driven by:
  - Population growth. Water for:
    - domestic use, and
    - irrigation (from 40,000 ha in 1970 to 400,000 ha today)
  - Failure to develop alternative economic activities (other than farming)
  - Adverse macro-economic policies (incentives for water inefficiency and disincentives for conservation)

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The Causes - a synthesis (Continued)

- Unregulated access to drilling and pumping technologies… institutional and legislative vacuum… not introduced in-time

- Poor governance: institutional and legislative weaknesses- the government has limited influence over access to water and water use… it is mostly in farmers' hands

- Common- pool dilemma

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The Causes - a synthesis (Continued)

- Climate change-
  - More variability (frequency & intensity) of storms, floods & droughts; causing huge eco., social and env. costs which impacts development.
  - More variability of crop yields… undermines food security and contributes to poverty and malnutrition.
- Very low irrigation water efficiency (20-40%)– traditionally rain-fed agriculture
- Water quality degradation (sea water intrusion) & pollution (mainly municipal)
- Inadequate investment… water saving technologies, desalination, stakeholders mobilization

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The Impacts/ Ramifications

- **Rapidly depleting/ exhausted aquifers---**
  - **GW levels in the Sana'a Basin are dropping by an average of 6 m annually. And many GW basins/ aquifers are already exhausted.**
  - **Chronic water shortages in most major cities and urban areas in general. This despite the low access to water services. According to the 2007 data**
    - **56% of the urban population have access to networked WS,**
    - **45% of the rural population have access to safe water.**
  - **Loss of livelihoods and investments in rural areas-**
    - **depleting aquifers seriously threaten the livelihood, income, food, shelter and investments of large numbers of people.**
  - **Severe reduction of agriculture output--- A 2010 WB study states that "GW reserves are likely to be mostly depleted by 2025- reducing agriculture output by 40%"**

The Impacts/ Ramifications (Continued)

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- GW depletion
  - adds to the already acute problem of unemployment and
  - increases income poverty problems (Yemen is a largely agricultural economy – 55% of the workforce)
- It also leads to higher cost of water in all use sectors (domestic, irrigation, etc.)
- And triggers more Internal migration–
  - rural-urban. Urbanization rate in Yemen is second only to Qatar among Arab countries (Sana'a is the 3rd. fastest growing city in the world). Urbanization pressures public infrastructure/ services
  - rural-rural … internally displaced persons
- Creates more competition, among farmers and between cities and surrounding farming communities.
- Induces more conflicts, violence & unrest in rural areas…over drilling rights, inter-basin water trade/hauling, grazing rights,...

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The Impacts/ Ramifications (Continued)

- Other "indirect" impacts, on:
  - Household budget– more expenditure on water… poverty
  - Health… through access to clean domestic water
  - Girls education
  - Society peace and security
- *Mounting day-to-day challenges* faced by GW users in the various sectors… who often cry for government intervention to regulate access to GW.

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The Solution

- There can be no one single action to take that would solve the crisis,

- Rather the solution will be a mix of many actions spanning the macro-economic, social, financial, institutional, legal, and other fields…. A comprehensive, integrated approach … IWRM

- > 90% of the water is used for irrigation, hence, farmers control the water… their role is instrumental in any reforms and they will be the victims if no change takes place.

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The Solution (continued)

- The thrust of the solution is CHANGE, in the following directions
  -
  - From supply-led to demand-led management
  - From waste & inefficiency to conservation & efficiency
  - From top- down to bottom-up management
  - From users' ignorance to governance
  - From users' competition to community cooperation.
  - From command and control to participatory management
  - From fragmented institutions and policies to integrated ones.

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The Solution (continued)

- **Supply Oriented Measures**
  - **Tapping into the huge reserves of fossil GW in the east…**
  - **Sea water desalination … in the coastal areas**
  - **Brackish water desalination in the appropriate urban basins**
  - **Rainfall harvesting…. for domestic and irrigation uses**
  - **Recycling… re-use**

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The Solution (continued)

- **Demand Oriented Measures**
  - More **efficient use** of GW water (thru improved extension services, modern irrigation systems, water-saving devices, drought-resistant crop varieties, etc…)
  - More **investment** in water infrastructure and more water efficient irrigation systems
  - Economy **diversification**- away from water-intensive activities
  - **Community engagement**, participation, partnerships,…
  - Gradually eliminating the **incentives** for water wastage and the **disincentives** for conservation

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The Solution (continued)
Demand-oriented measures

- Population re-distribution- planning for new urban centers in coastal areas and in areas rich with fossil GW
- Introducing incentives for population and industries to relocate to less water stressed basins.
- Forging partnerships, coalitions, and alliances with the various stakeholders and embracing decentralized management.
- Building the capacity for implementation – institutional and human

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Concluding Remarks

- The country's development failures have been and remain, partly and temporarily, paid off / covered-up by the widespread mining of its precious GW.

- This cannot continue for long. Already, some rural economies are collapsing (Haima-Taiz, Mawya, Bani Khawlan, Saadah, …), pausing serious threats to social peace and security.

- Nevertheless, more than 55% of the population continue to depend on agriculture and water scarcity continues to threaten Yemen's stability and development.

- The battle to strike a sustainable balance between population growth and sustainable water supplies has been lost many years ago.

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Concluding Remarks (Continued)

- Therefore, diversification of the national/ rural economy, away from water-intensive economic activities, is crucial to Yemen's stability and development.
- Qat is a real challenge which requires bold decisions which can only be taken in parallel with conducive macro-economic policies.
- Solutions should come as piecemeal and in the form of many actions in various directions. Command and control measures will not work. Farmers have to be engaged in all steps.
- Water and food stresses lead to more poverty and more radicalization. But deteriorating security also limits the economic opportunities. The damage to the tourism sector in Yemen exemplifies this reciprocal relationship very well.
- NWSSIP… a roadmap for sector reform

The National Water Sector Strategy and Investment Program- NWSSIP

Republic of Yemen • Ministry of Water and Environment

National Water Sector Strategy and Investment Program, 2005-2009 (NWSSIP)


Thank You for Your Attention