



# *Climate Change, Water Wars, and Other Scary Stuff*

---

***W. Chris King, Ph.D. P.E.***

Brigadier General, US Army retired

Professor of Environmental Engineering, USMA

Dean Emeritus, US Army Command and General Staff College

Judge © 2011 HANS KUCHT 10/11



"OK, SO WHAT LEFT-WING, BLEEDING-HEART LIBERAL GROUP IS GOING ON ABOUT CLIMATE CHANGE NOW?"



## *Outline of this evening's discussion*

---

- Militarism (guns versus butter)
- Concept of Environmental Security
- Environmental security threats
- Climate Change
- Water as a scarce resource
- Summary



# Militarism in Today's World

---

- The Elements of National Power
  - Military
  - Diplomatic
  - Economic
- National Security Strategy
  - National Military Strategy
    - Impacts of climate change on military strategy and operations (environmental security)
  - Department of State Diplomacy
  - Other Departments

# Environmental Security *is not A New Idea!*

---

“ ...national security is not just about fighting forces and weaponry. It relates to watersheds, croplands, forests, genetic resources, climate and other factors that rarely figure in the minds of military experts and political leaders,”

Norman Myers, *The Environmentalist*, 1986

“The only thing harder than getting a new idea into the military mind, is getting an old one out.” B.H.Liddell Hart



# *The Concept of Environmental Security*

---

Peace is not the absence of conflict, but the maintenance of a safe and secure environment capable of providing for people's **basic human needs** in a sustainable way. Today there are human induced changes in the environment of such a dire impact that they pose threats to stability in many places in the world.

# Science of Environmental Security

- Water as a Scarce Resource
  - Fresh Water
  - Oceans
- Air
  - Climate change
  - El Nino / La Nina
  - Ozone depletion in the stratosphere
  - Toxic air pollutants
- Land Use – *protection of Arable lands*
  - Deforestation-- Biodiversity and the rainforests
  - Desertification
  - Waste disposal – hazardous and solid wastes





# Where is most of the world?

---

Where within the 'Hierarchy of Human Need' do people live today?

Where will 9 billion people be in 2050?

Where will 10.4 billion people be in 2100



# Climate change is real, that is an irrefutable fact.

(data based on 1880-1950 base data)

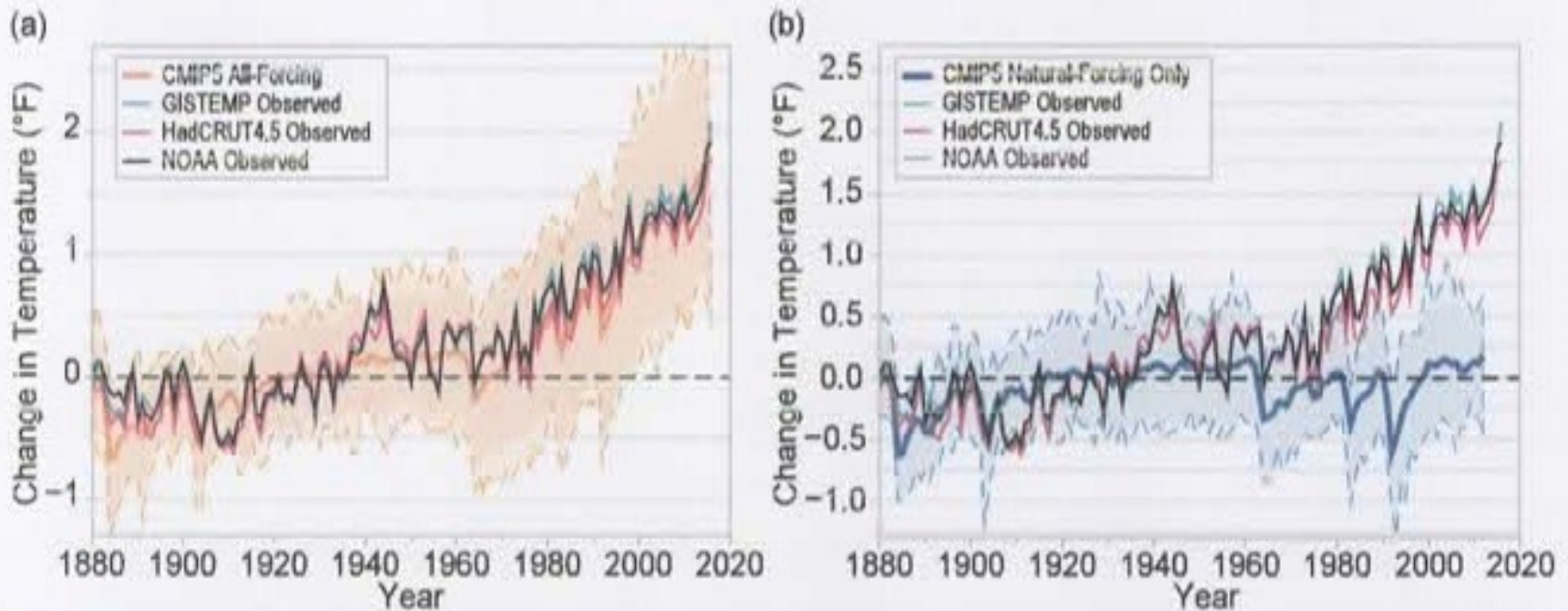
- Atmosphere
  - 1.59 ° C increase over land, 2011-2020
  - Human caused increase- 1.07 ° C
- Ocean
  - 90% of the additional heat has gone into the oceans
  - 0.88 ° C increase
  - pH dropping
  - Oxygen levels have decreased.
  - Sea level rise, 0.2 M, Rate has increased 3-fold in the last 20 years
- Cryosphere (ice and snow)
  - 40% loss in September Arctic sea ice since 1979.
  - Rate of ice loss from Greenland accelerated
  - Human influence caused continued decrease in snow cover
  - Loss of permafrost
- Extreme Weather- droughts, hurricanes, floods, fires



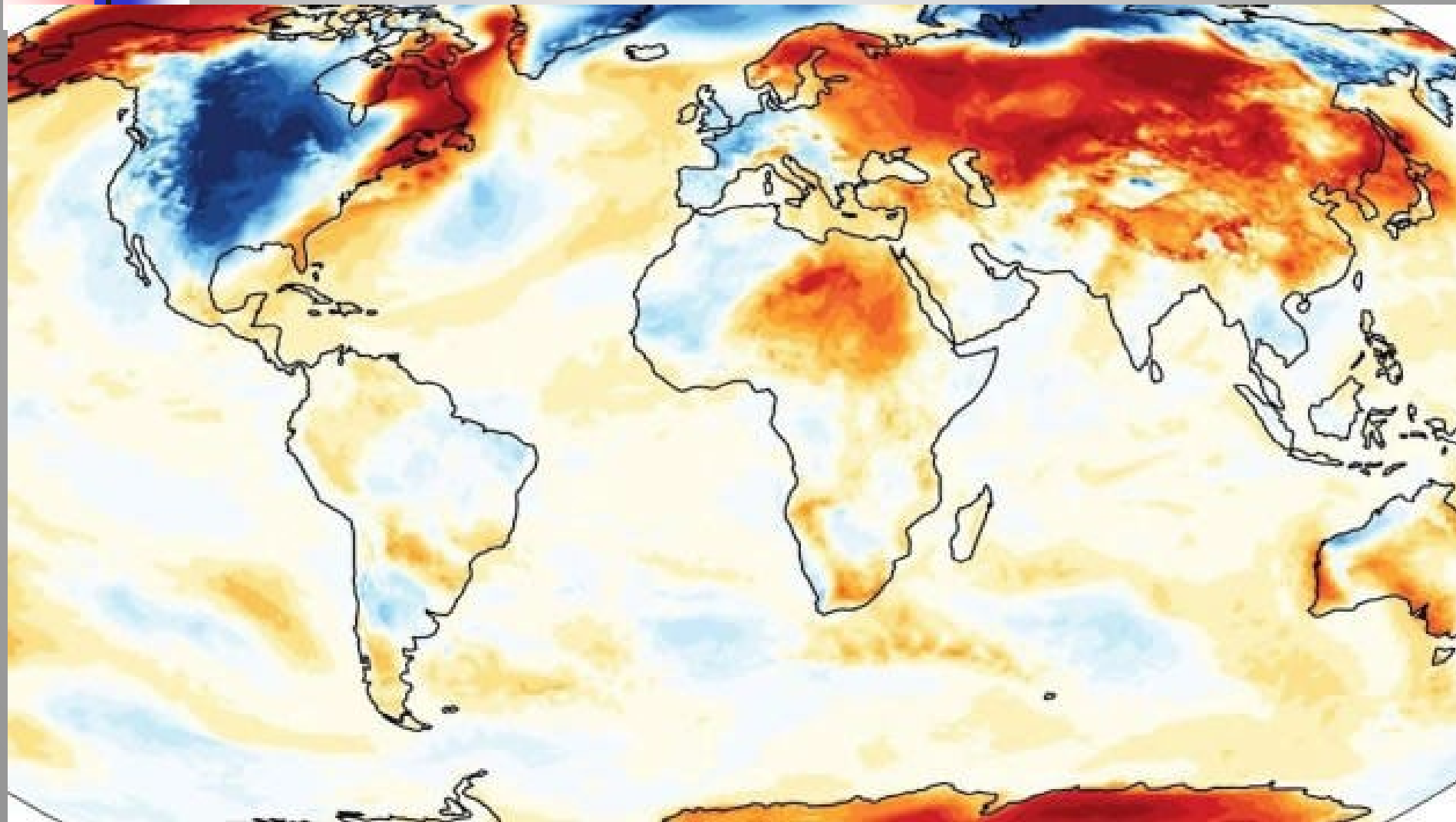
# The Proof in one Slide

## 3 | Detection and Attribution of Climate Change

### Global Mean Temperature Change



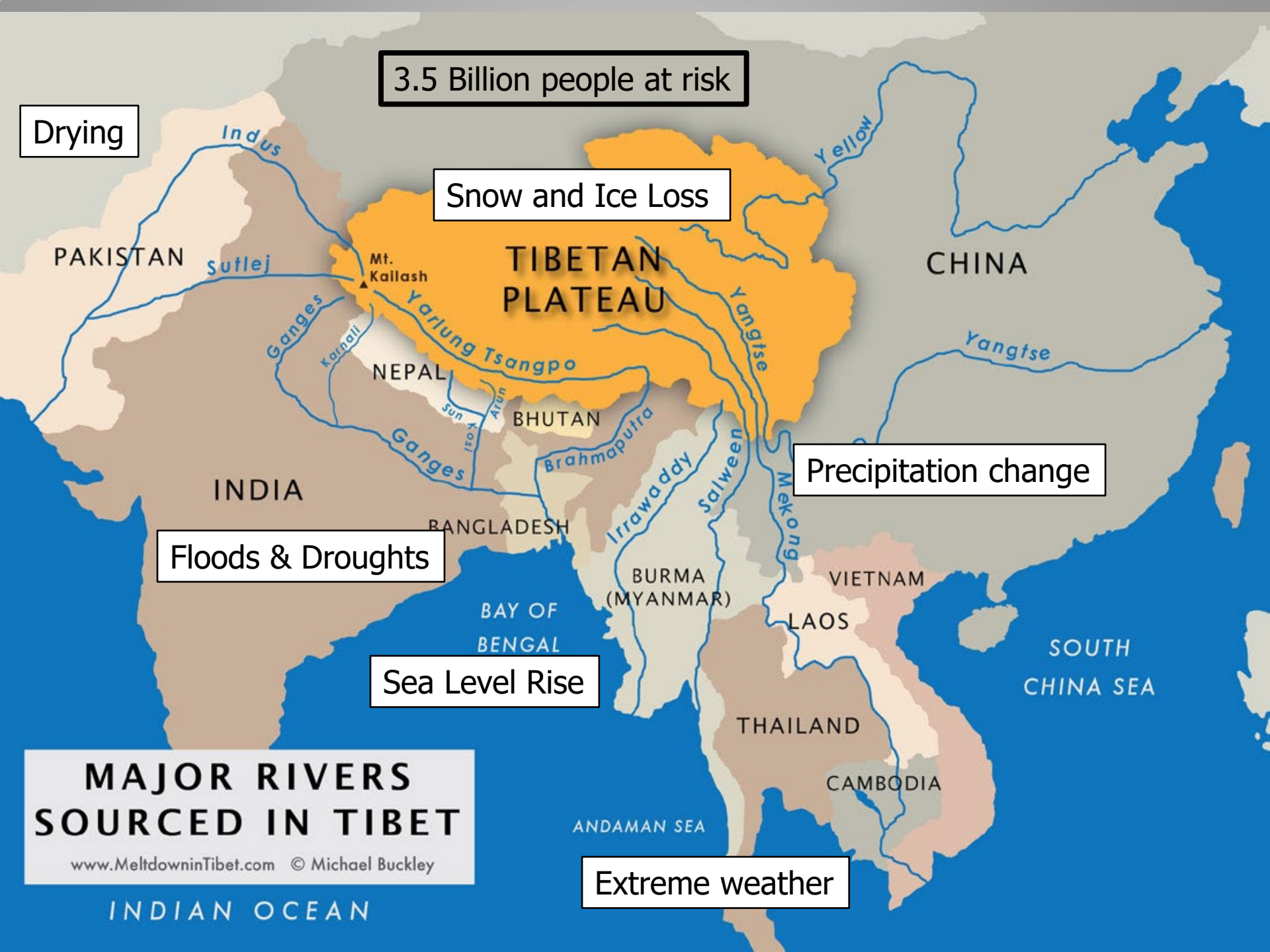
January 2025 --1.7 C warmer



*Whiskey is for Drinking- Water  
is for Fighting Over*

---





3.5 Billion people at risk

Drying

Snow and Ice Loss

TIBETAN PLATEAU

Precipitation change

Floods & Droughts

Sea Level Rise

Extreme weather

# MAJOR RIVERS SOURCED IN TIBET

[www.MeltdowninTibet.com](http://www.MeltdowninTibet.com) © Michael Buckley

INDIAN OCEAN

# Mexico City- day 0 coming soon

- In March 2024, Mexico City months away from running out of water.
- 22 million people
- 60% from closed aquifer groundwater
- No answers



# Mexico City Not Alone \_ World Cities at Risk



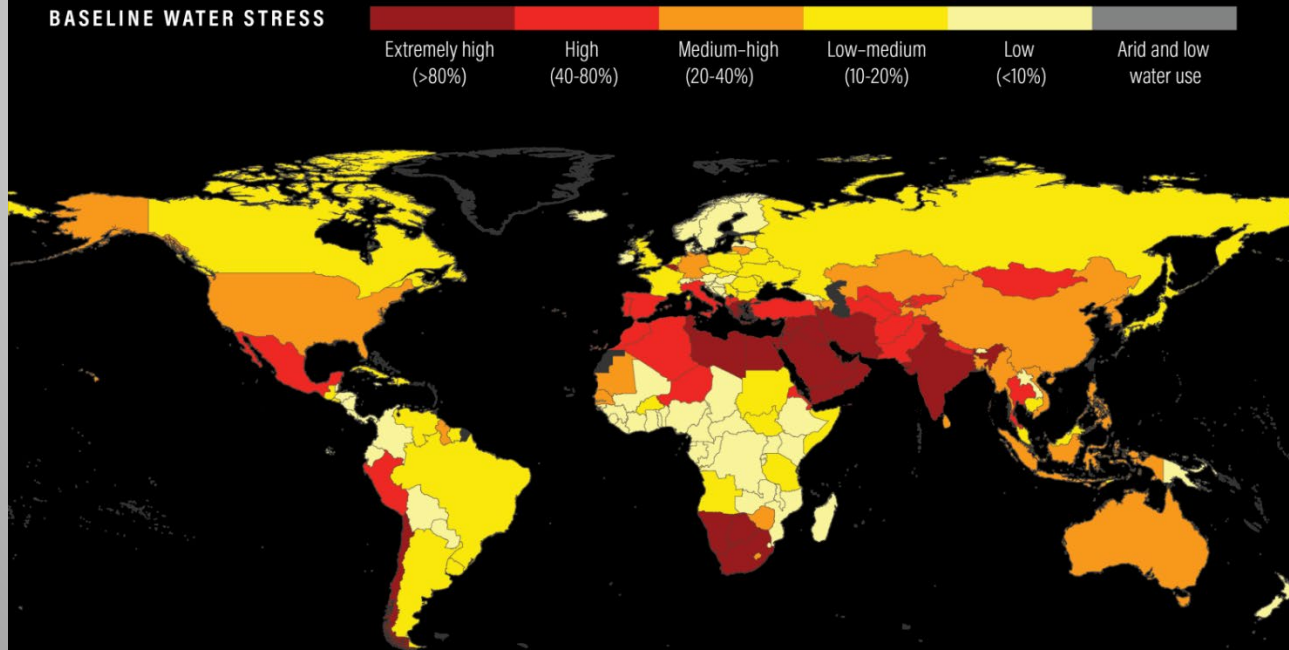
---

- 105 Articles in the last month!!! Quality and quantity challenges and misuse.
- Bogota Colombia started rationing for the first time ever this month.
- Crisis cities includes Sydney, Melbourne, Cape Town, Istanbul, Santiago, Singapore, Dehli, Beijing, Jerusalem, Dubai, Barcelona, Rome
- US cities: Denver, San Diego, Phoenix, Baltimore, NYC, San Francisco, LA

# World Problem – this does not tell the whole story – Look at US

## 25 COUNTRIES ARE CURRENTLY EXPOSED TO EXTREMELY HIGH WATER STRESS ANNUALLY

### BASELINE WATER STRESS



Source: [wri.org/aqueduct](http://wri.org/aqueduct).  
23.08.02

 AQUEDUCT™

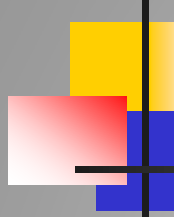
 WORLD RESOURCES INSTITUTE



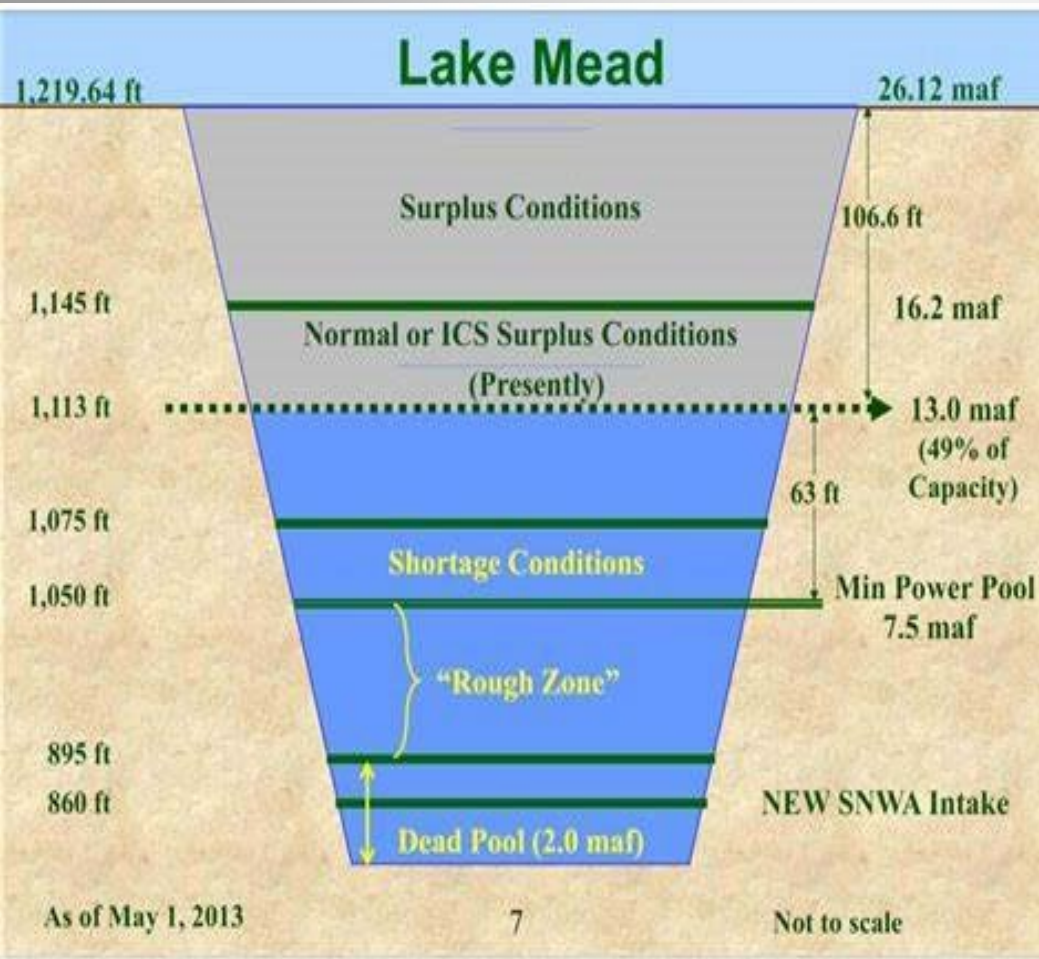
# Closer to Home the Colorado River

*The problem—less water and higher demand*





# Lake Mead



- Water for 25 Million in CA, NV, and AZ
- 2022 historic low at 1040 ft
- Full 1,229 ft MSL
- 1075 ft = Mar2024
- 1068 = Feb 2025



# US Agriculture

---

- **Imperial Valley**
- **San Joaquin Valley's groundwater-dependent irrigated agriculture**
- **Republic River Basin in Colorado – Only solution is to farm less, but who???**
- **Rio Grande Valley at historic lows**





# Summary

---

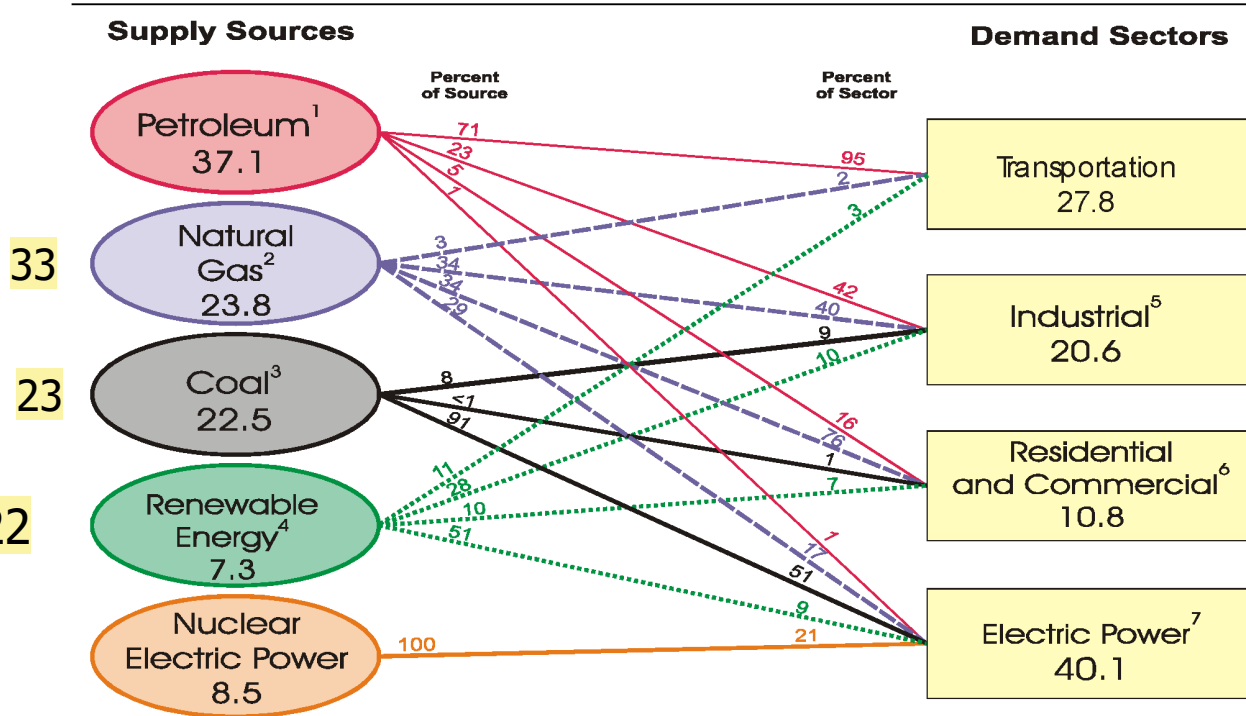
- Security is a much larger issue than wielding military power
- Peace is not the absence of war, but the existence of stable human communities who have their basic needs satisfied
- Protecting peace means assuring regional stability
- Environmental degradation is a major threat to peace and stability in the world
- Solutions must work toward curing the basic problems not treating symptoms -
  - Climate Change
    - We are going to adapt to the consequences of GHG emissions
    - How we mitigate the impacts of future climate change will alter our future security
    - Climate change is truly a world scale issue where win together or everyone loses; however, the weakest nations suffer most.
- [WENDELLCKING@YAHOO.COM](mailto:WENDELLCKING@YAHOO.COM)

YO! AMIGO!!  
WE NEED THAT TREE  
TO PROTECT US FROM  
THE GREENHOUSE EFFECT!

DEVELOPED  
COUNTRIES

# Why is this so hard?

Figure 2.0 Primary Energy Consumption by Source and Sector, 2008  
(Quadrillion Btu)



33

23

8.4 in 2022

<sup>1</sup> Does not include the fuel ethanol portion of motor gasoline—fuel ethanol is included in "Renewable Energy."  
<sup>2</sup> Excludes supplemental gaseous fuels.  
<sup>3</sup> Includes less than 0.1 quadrillion Btu of coal coke net imports.  
<sup>4</sup> Conventional hydroelectric power, geothermal, solar/PV, wind, and biomass.  
<sup>5</sup> Includes industrial combined-heat-and-power (CHP) and industrial electricity-only plants.

<sup>6</sup> Includes commercial combined-heat-and-power (CHP) and commercial electricity-only plants.  
<sup>7</sup> Electricity-only and combined-heat-and-power (CHP) plants whose primary business is to sell electricity, or electricity and heat, to the public.  
 Note: Sum of components may not equal 100 percent due to independent rounding.  
 Sources: Energy Information Administration, *Annual Energy Review 2008*, Tables 1.3, 2.1b-2.1f, 10.3, and 10.4.

RAINFALL

0 in/yr

10 in/yr

20 in/yr

30 in/yr

40 – 80 in/yr



YEARLY FLOW

*At Aswan  
91 BCM*

*Atbara R  
12 BCM*

*Blue Nile  
75 BCM*

*White Nile  
28 BCM*



# Water Demands and Population in the Nile River Basin

Country	Per capita (M3 Per Person Per Year)	Population in 2011 (millions)	Projected Population in 2050	Current Water Demand	Projected Water Demand 2050
Burundi	37	8.383	27.149	0.3 BCM	1 BCM
Egypt	1,013	81.121	137.873	82 BCM	140 BCM
Ethiopia	40	82.950	278.283	3.3 BCM	11 BCM
Rwanda	10	10.624	27.506	0.1 BCM	0.3 BCM
South Sudan*	1,879	8 to 15.	30.0	22 BCM	56 BCM
Sudan	1,879	34.000	67.000	63 BCM	126 BCM
Uganda	13	33.425	128.008	0.4 BCM	1.7 BCM
<b>totals</b>		265.503	696.781	171.1 BCM	<b>336 BCM</b>

Source: World Bank. "Africa Development Indicators," 2004, <http://publications.worldbank.org/> (accessed 27 March 2011). Population data and growth rates from CIA Fact Book.

Note: DNI study uses 1,000 M<sup>3</sup> / person/ yr as demand factor



# Don't Mess with Texas

---



- Considering a State of Disaster in the Rio Grande Valley
- Reservoirs at historic lows
- Agri Businesses closing because of water shortages