Environmental Security & Resource Scarcity

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With thanks to Dr. Scott Hauger for permission to use and adapt his materials

Image source: AGU Eos

Agenda

- **Projecting Natural Resource Demands: Food, Energy, & Water (FEW)**
- **Resources and conflict**
- **The nemesis of climate change**
- **Managing complexity: The FEW nexus**
- **Areas for cooperation to address emerging environmental security concerns**
- **Conclusions**

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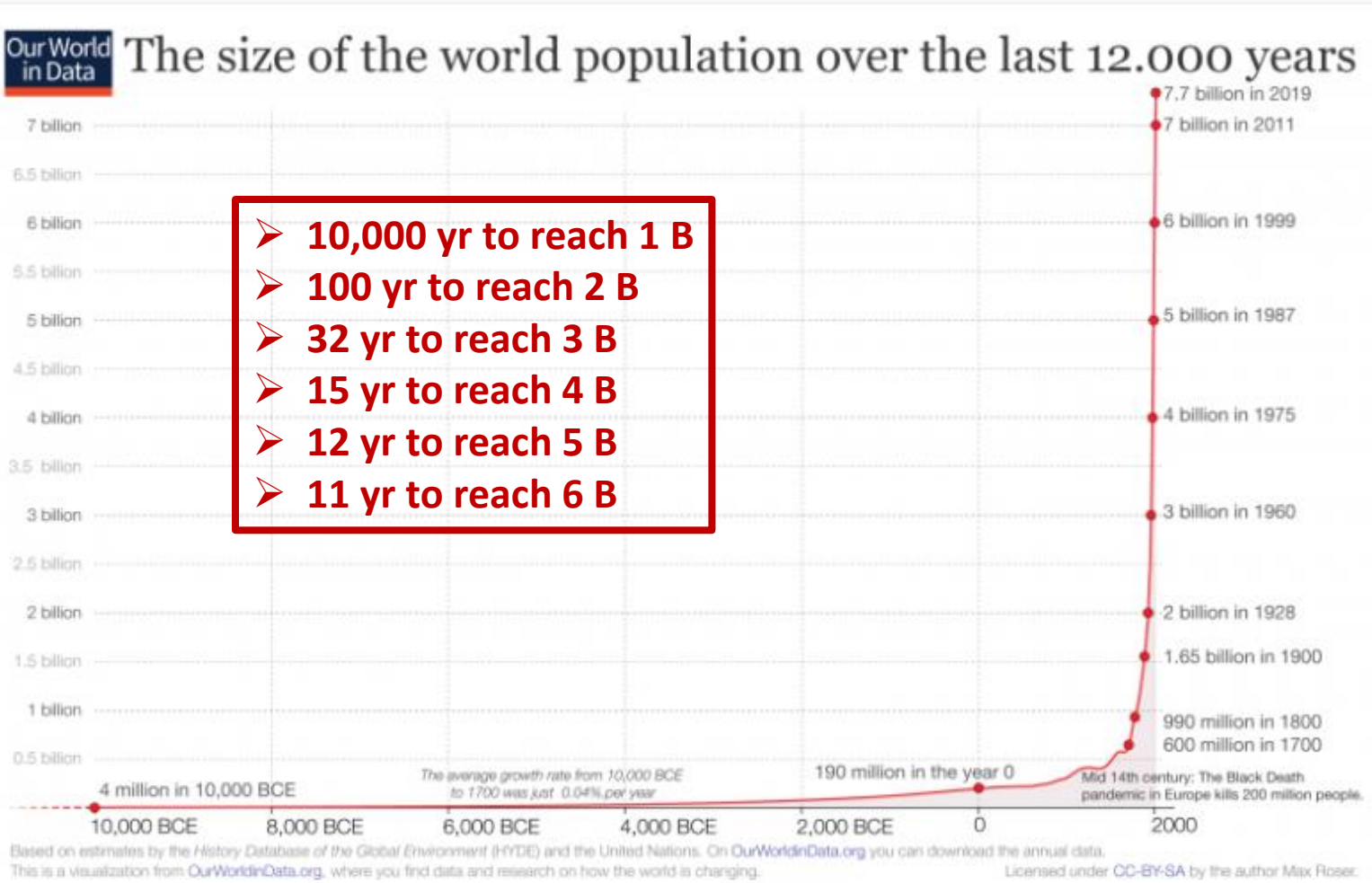
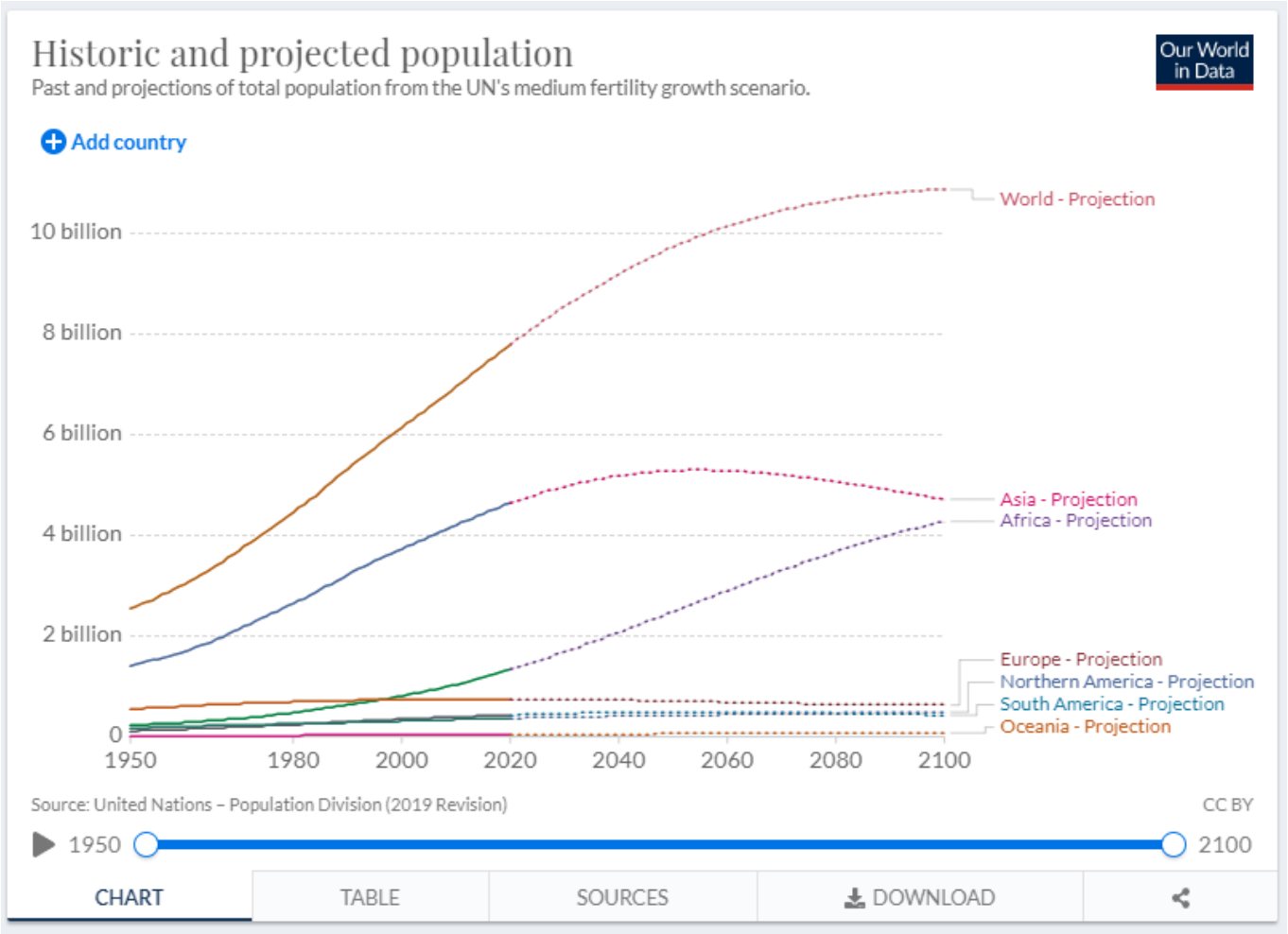
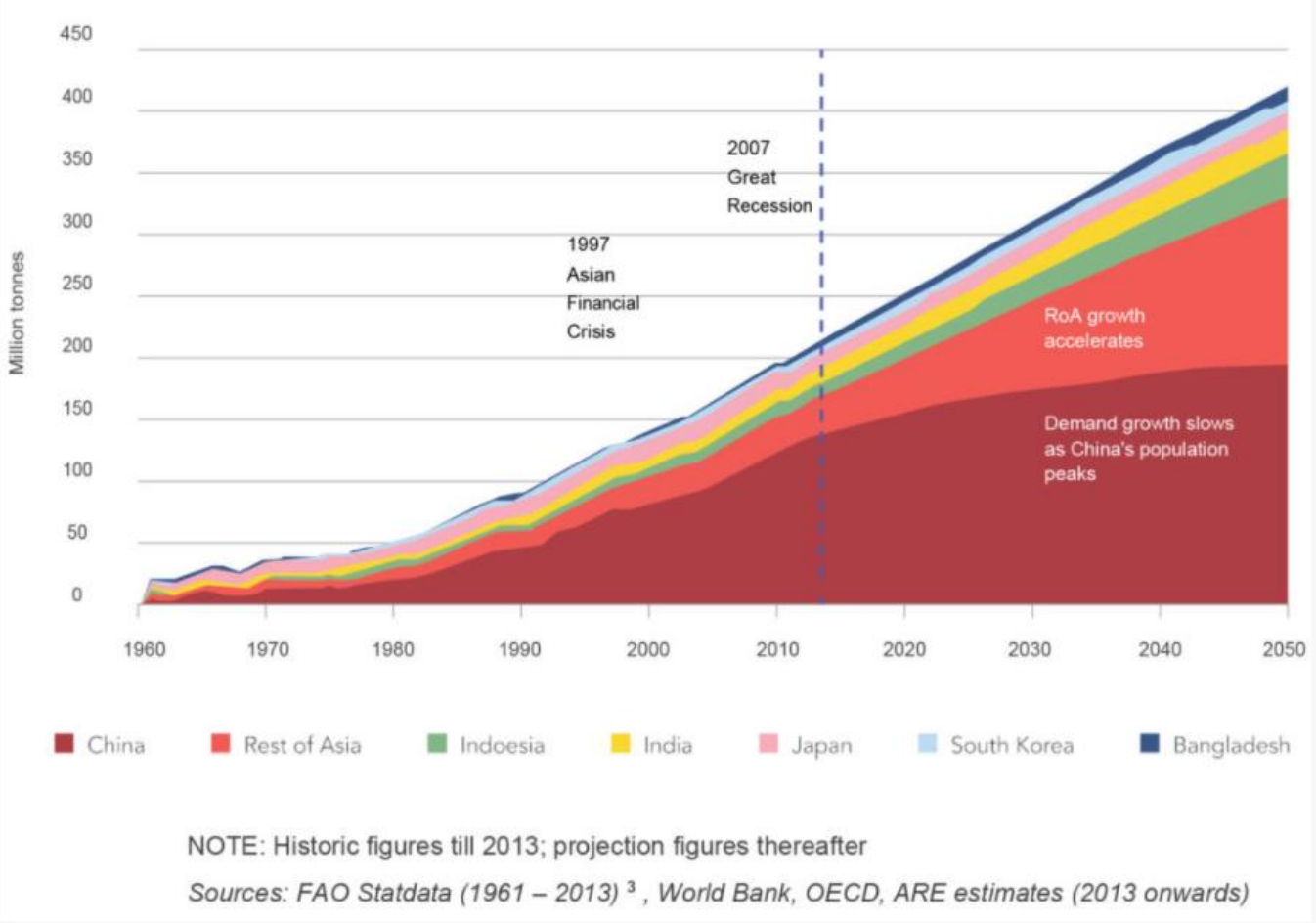

Our World in Data
The size of the world population over the last 12.000 years
➢ 10,000 yr to reach 1 B
➢ 100 yr to reach 2 B
➢ 32 yr to reach 3 B
➢ 15 yr to reach 4 B
➢ 12 yr to reach 5 B
➢ 11 yr to reach 6 B
7.7 billion in 2019
7 billion in 2011
6 billion in 1999
5 billion in 1987
4 billion in 1975
3 billion in 1960
2 billion in 1928
1.65 billion in 1900
990 million in 1800
600 million in 1700
7 billion
6.5 billion
6 billion
5.5 billion
5 billion
4.5 billion
4 billion
3.5 billion
3 billion
2.5 billion
2 billion
1.5 billion
1 billion
0.5 billion
4 million in 10,000 BCE
The average growth rate from 10,000 BCE to 1700 was just 0.04% per year
190 million in the year 0
Mid 14th century: The Black Death pandemic in Europe kills 200 million people.
10,000 BCE
8,000 BCE
6,000 BCE
4,000 BCE
2,000 BCE
0
2000
Based on estimates by the History Database of the Global Environment (HYDE) and the United Nations. On OurWorldinData.org you can download the annual data.
This is a visualization from OurWorldinData.org, where you find data and research on how the world is changing.
Licensed under CC-BY-SA by the author Max Roser.

Changing Centers of Population Along with Growth

Due to demographic shifts



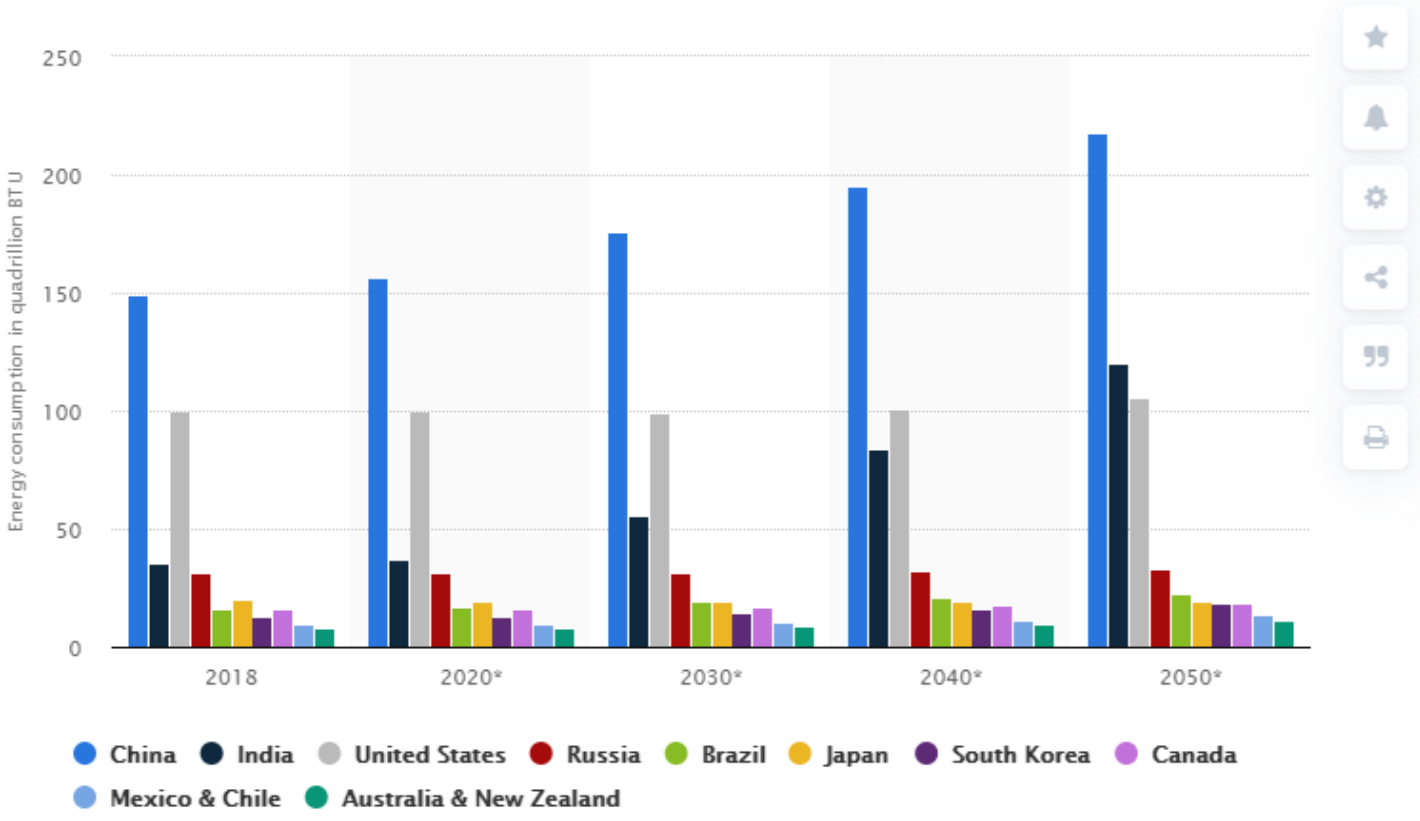
FOOD:
Asia's Historical and Projected Meat and Seafood Consumption: 1961-2050



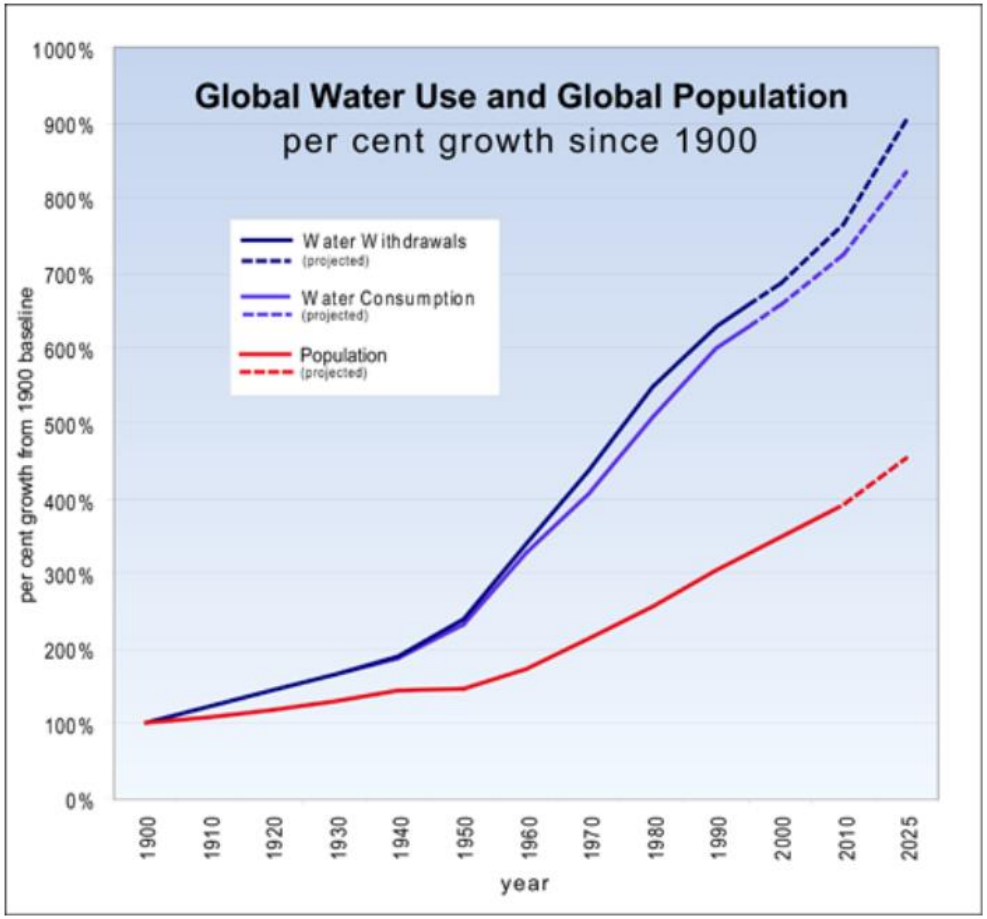
NOTE: Historic figures till 2013; projection figures thereafter

Sources: FAO Statdata (1961 – 2013) [3] *, World Bank, OECD, ARE estimates (2013 onwards)*

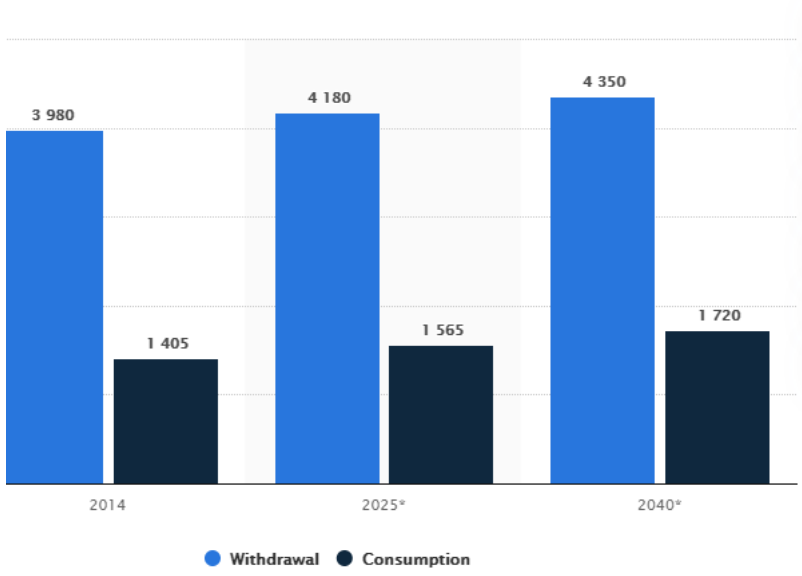
Growing Energy Consumption in Upcoming Decades



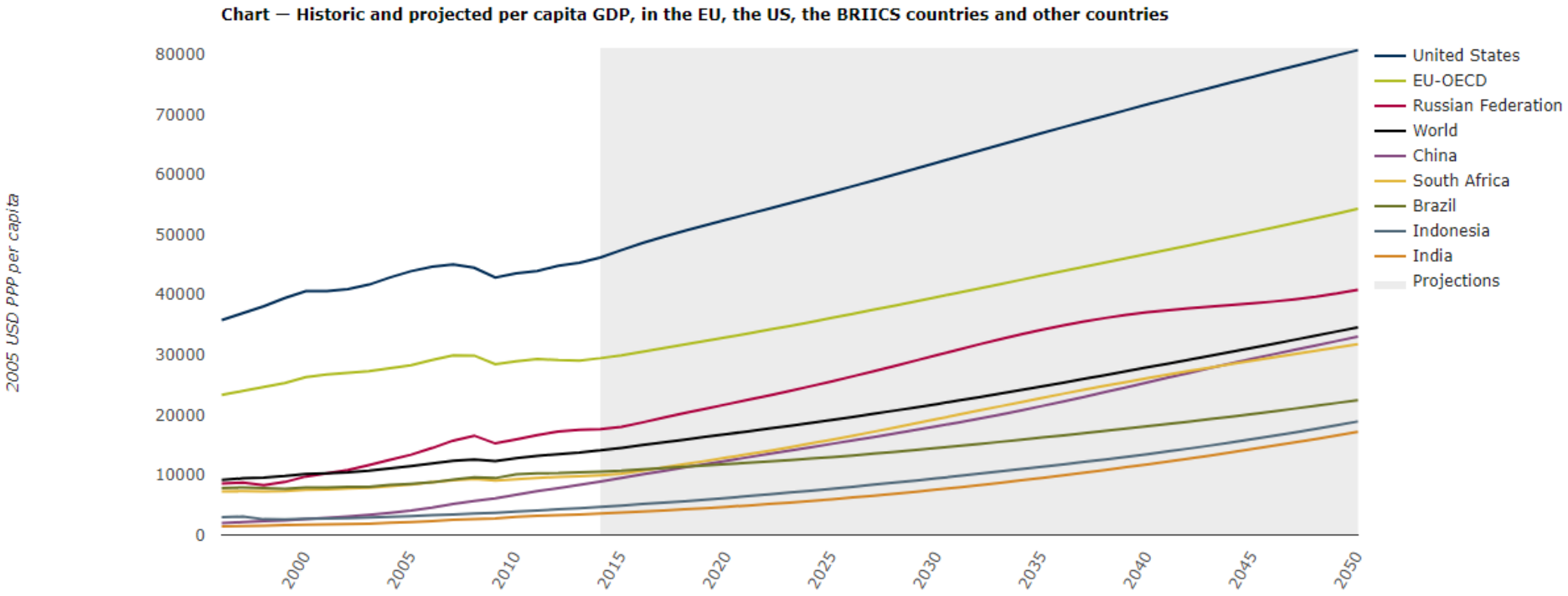
Historical and Projected Global Water Usage



The rate of growth in freshwater withdrawal and consumption has been even more rapid than global population growth. Sources: Shikomanov 1999, US Census Bureau 2011 [14].

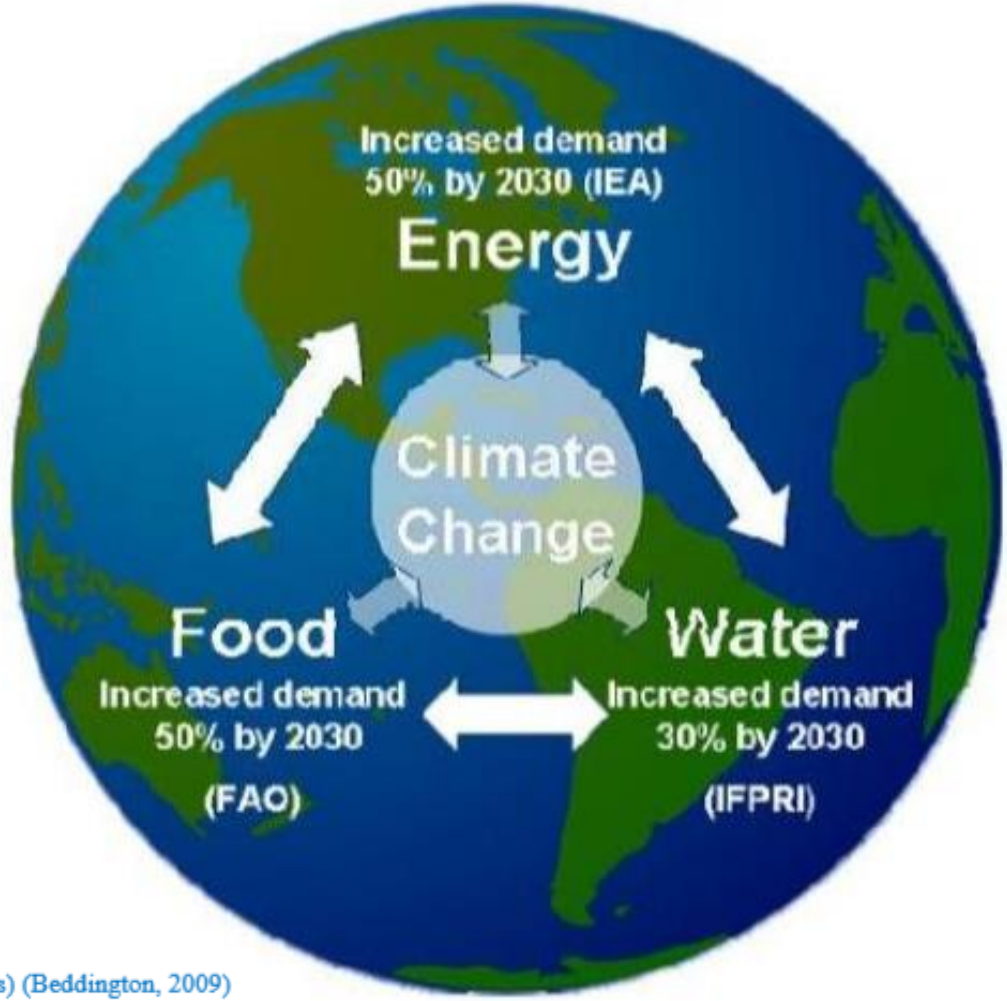


Growing GDP per capita in Upcoming Decades



Estimated Demand for Resources

Source: Hassan Tolba Aboelnga. 2018. *Water Energy Food Security Nexus*. Bonn: Nexus Regional Dialogue Programme. P. 8.



Water, energy and food projections (increases on 2009 levels) (Beddington, 2009)

Food, energy, and water security are all interdependent on land, energy, and water resources, as well as on one another

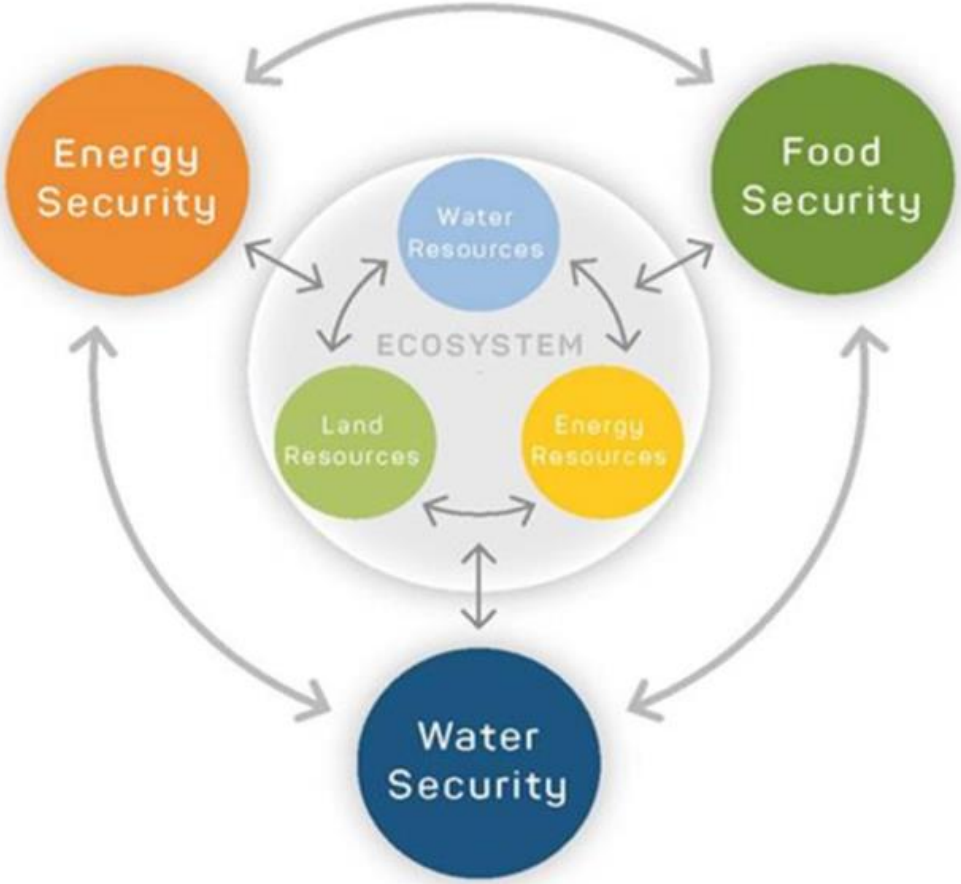


Figure 2: The WEF Nexus from the ecosystem perspective (GIZ, 2016)

Source: Hassan Tolba Aboelnga. 2018. *Water Energy Food Security Nexus*. Bonn: Nexus Regional Dialogue Programme. P. 9.

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Drivers of Resource Conflict

- Competition over increasingly **scarce** resources
- **Poor governance** of renewable natural resources and environment
- **Trans-boundary** natural resource dynamics and pressure

Climate change compounds each of these drivers

UN Interagency Framework Team for Preventive Action. 2012, *Renewable Resources and Conflict*. pp 9-11.

Conflict over Food Resources

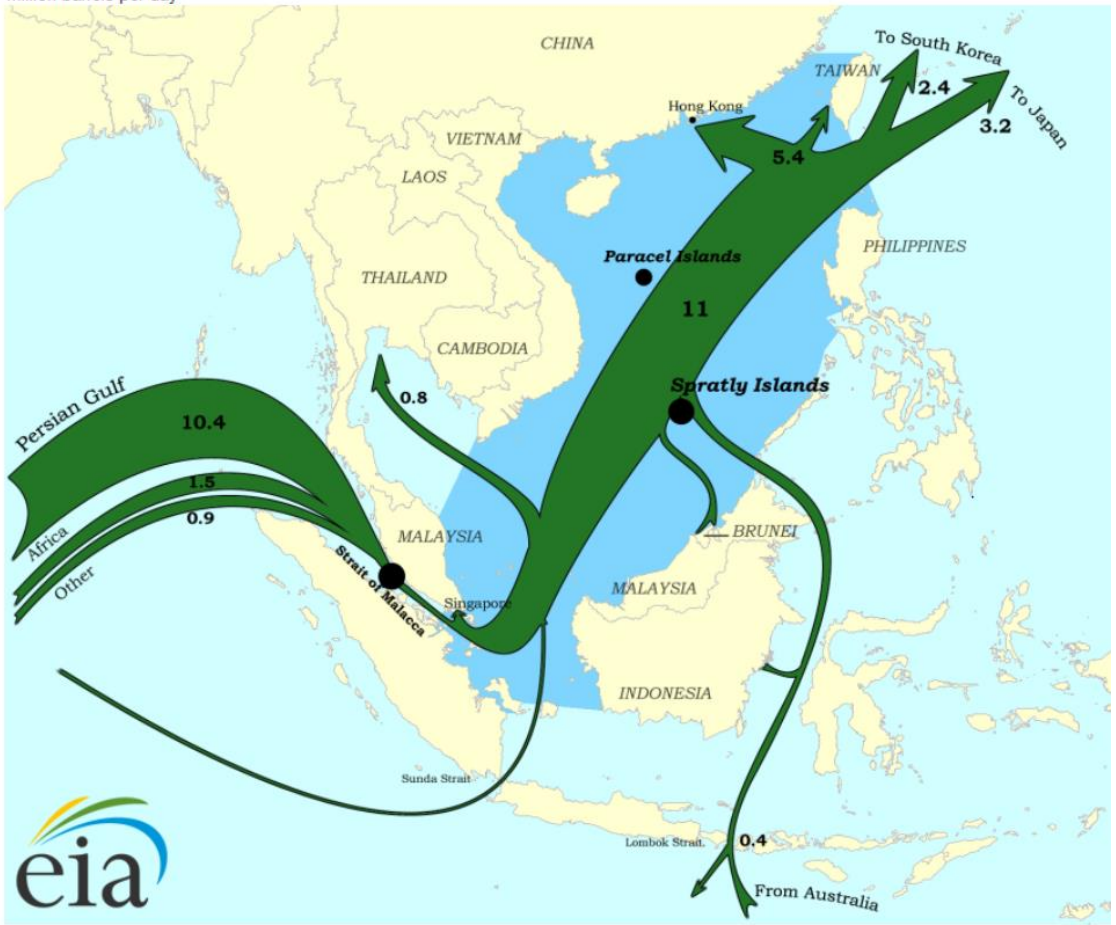
Indonesia blows up 23 fishing boats from Viet Nam and Malaysia caught poaching in Indonesian Waters
April 2016

Source: Foreign Policy.com
Image credit: SEI
RATIFA/AFP/Getty Images
April 7, 2016

Example: Chinese vessel rams Filipino fishers in Philippines EEZ

3 April 2019: Eight fishermen left in water near Parcel Islands after their boat was rammed by a Chinese vessel

Conflict over Energy Resources



Chinese and Vietnamese coast guard ships are patrolling near the Haiyang Shiyou oil rig, seen to the rear

Source: U.S. Energy Information Administration

Examples: Chinese Efforts to Control Energy Resources in S. China Sea

Dec, 2013: Chinese vessels cut cables of Petro-Vietnam vessel dong seismic oil exploration in Vietnam's EEZ.

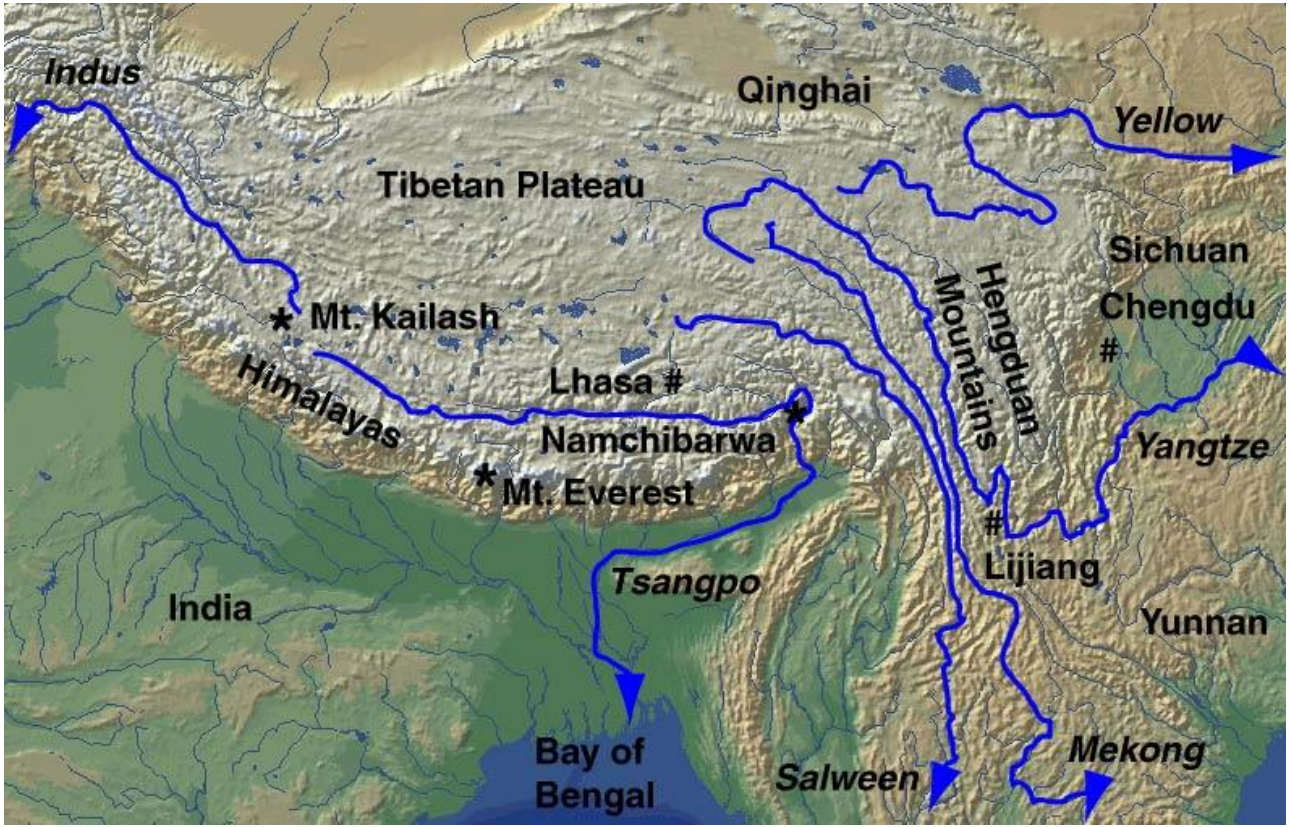
April, 2018: China threatened Spanish partner to PetroVietnam, effectively stopping exploration in Repsol blocks within Vietnam's EEZ.

July - Oct, 2019: Chinese Coast Guard (CCG) vessel Haijin 3511 repeatedly harassed Japan's survey rig Hakuryu-5, chartered by out by Rosneft and Petro-Vietnam, during hydrocarbon surveying in Vanguard bank, within Vietnam's EEZ.

During the same period, China sent its own survey vessel, Haiyang Dizhi 8, to same area, with heavy CCG escort, with the HD8 coming within 65 nautical miles of the Vietnam coast.

China has also harassed energy exploration efforts in Malaysian waters.

Conflict over Water Resources



China controls the headwaters of 10 of the 11 major rivers in Asia, and has built > 87,000 damns over the past 70 years, yet about half of its population lacks access to clean drinking water.

Source: B. Chellaney. 2007. "China-India Clash over Chinese Claims to Tibetan Water. The Asia-Pacific Journal 5:7.

Example: Pakistan

"Consider what will happen in water-distressed, nuclear-armed, terrorist-besieged, overpopulated, heavily irrigation dependent and already politically unstable Pakistan when its single water lifeline, the Indus river, loses a third of its flow from the disappearance from its glacial water source.“

Steven Solomon

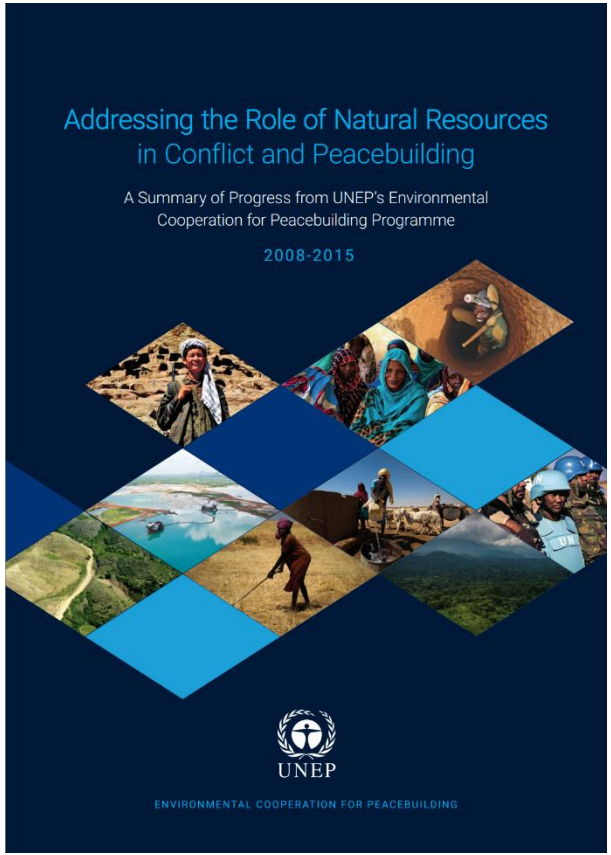
Water: The Epic Struggle for Wealth, Power and Civilization (2010)

“The wars of the twenty-first century will be fought over water.”

Ismail Serageldin

Founding Director, Bibliotheca Alexandrina (the new Library of Alexandria); member, Advisory Committee, World Social Science Reports, 2013 & 2016, and UNESCO-supported World Water Scenarios

Resources & Conflict



"Resolving natural resource conflicts is a defining peace and security challenge of the 21st century. The geopolitical stakes are high as the survival or authority of states may depend on securing access to key natural resources."

UNEP. 2015, Addressing the Role of Natural Resources in Conflict and Peacebuilding, p 1.

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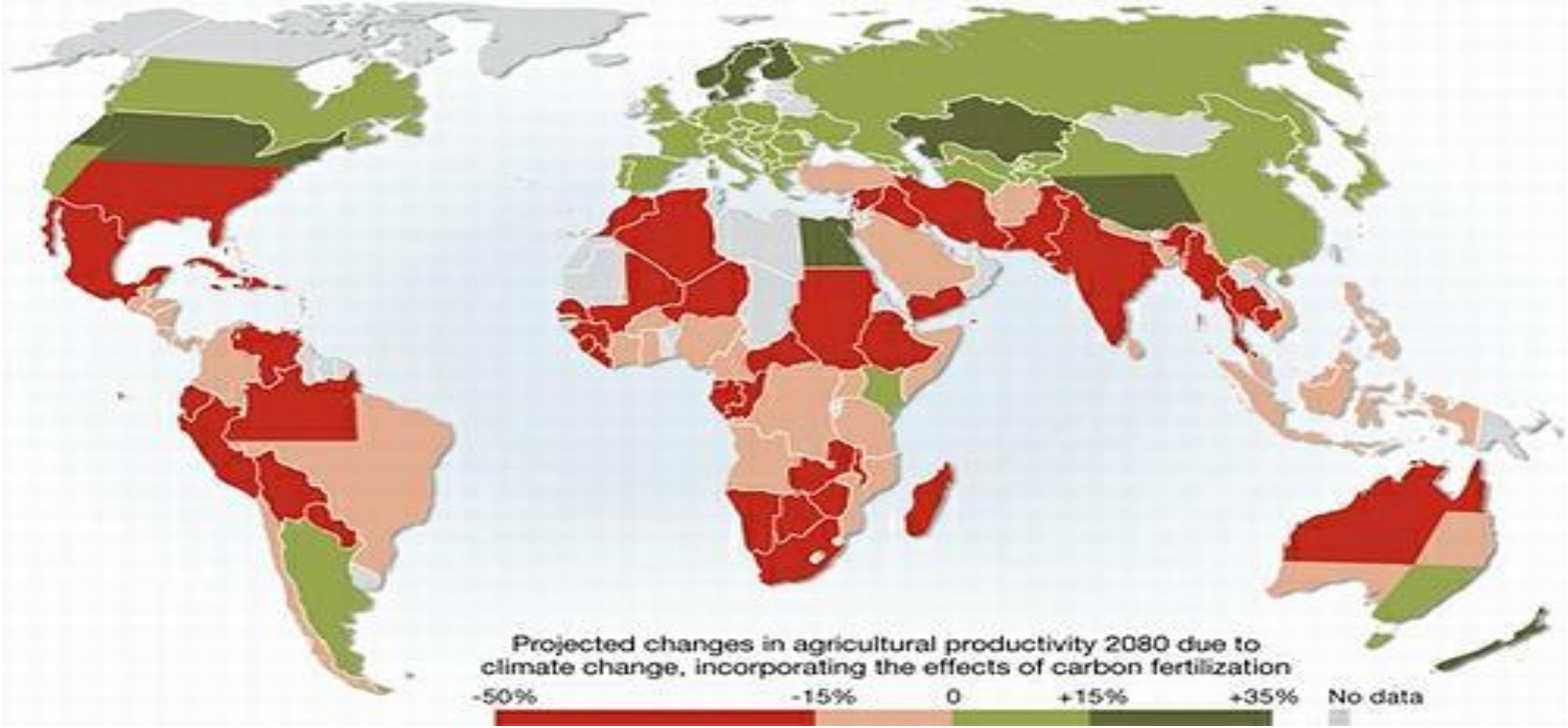
Environmental Impacts of Climate Change:

- **Higher ocean temperatures**
  - Evaporation, precipitation
  - Tropical cyclones
  - Rising sea levels
- **Higher air temperatures**
  - Ice melt / snow runoff
  - More extreme weather
- **Higher ground temperatures**
  - Desertification
  - Permafrost melting
- **Ocean acidification**
  - Reef and marine life stress

Image source: Philippines Atmospheric, Geophysical and Astronomical Services Administration

Example: Projected Climate Impacts on Agricultural Productivity

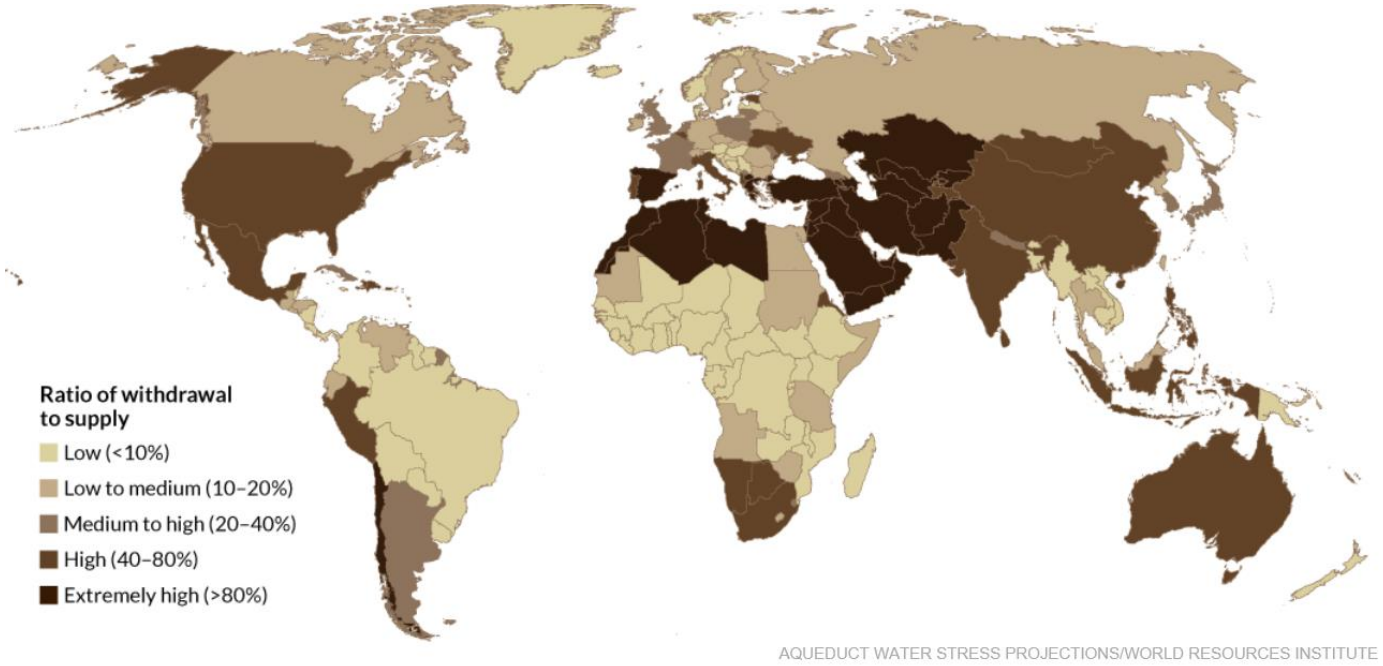


Source: [UNEP The Environmental Food Crisis 2008](). Map by William Cline.

Example: Climate and Energy

Source: Union of Concerned Scientists

Example: Projected Water Stress, 2040



Source: Alexandra Witze. 2018. "More than 2 billion people lack safe drinking water. That number will only grow," in Science News (August 16)

Security Impacts of Climate Change

Environmental Impacts

- Increasing:
  - Sea levels & temperatures
  - Ocean acidification
  - Floods
  - Droughts
  - Tropical cyclones
  - Riverine & coastal erosion

Human Security Impacts

- Reduced:
  - Freshwater access
  - Food production
- More:
  - Disease outbreaks
  - Migration
  - Infrastructure destruction

Traditional Security Impacts

- More likely conflicts over:
  - Resources
  - Migration
  - Maritime boundaries
- Increased stress on weak governments

Crises Interact, Cascade, and Multiply

"These crises are all the more dangerous because they are interwoven and self-perpetuating: water shortages can lead to food shortages, which can lead to conflict over remaining resources, which can drive human migration, which can create new food shortages in new regions."

John Podesta & Peter Ogden (2008) The Security Implications of Climate Change, *Washington Quarterly*, 31:1, 115-138, DOI: 10.1162/wash.2007.31.1.115

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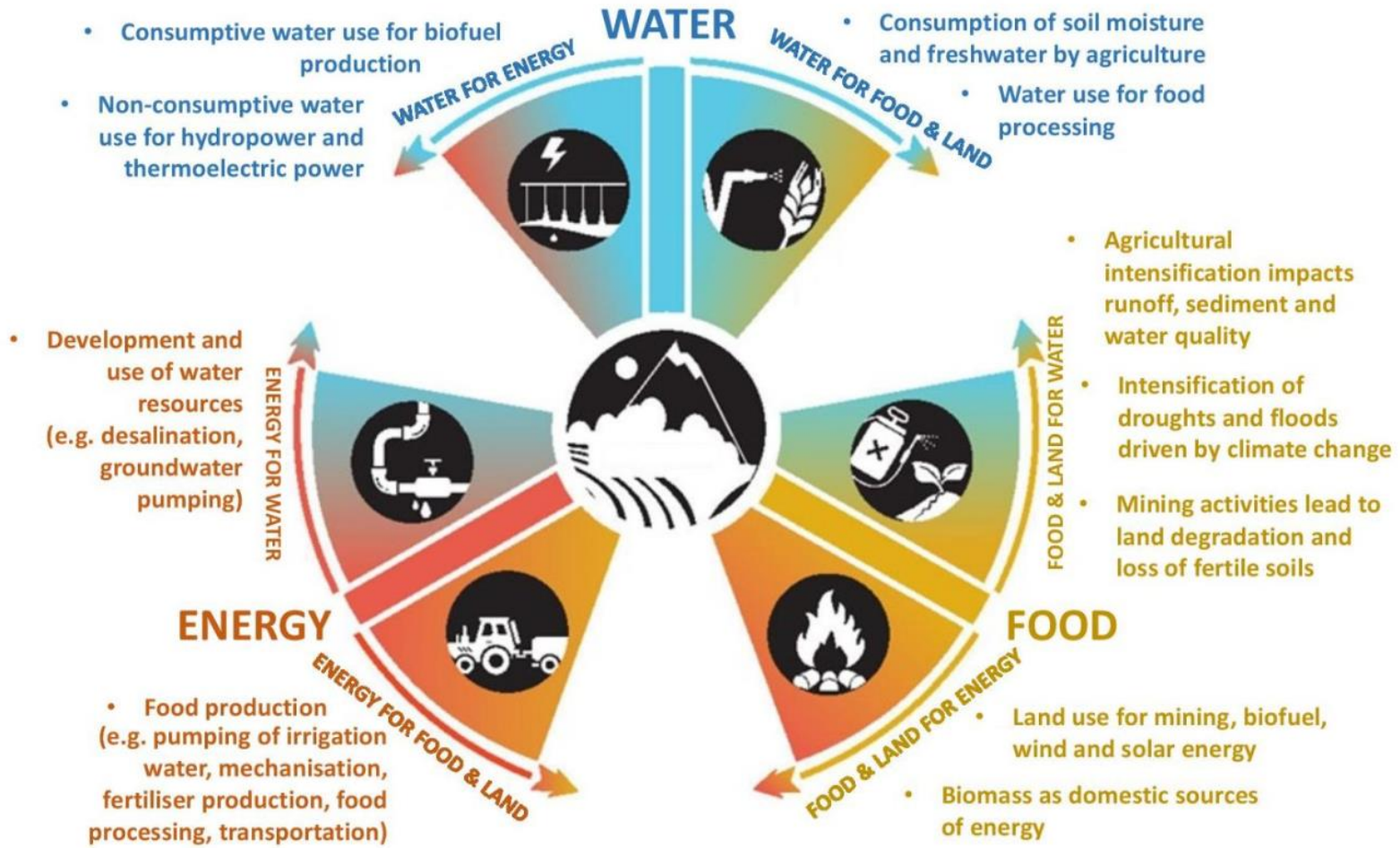
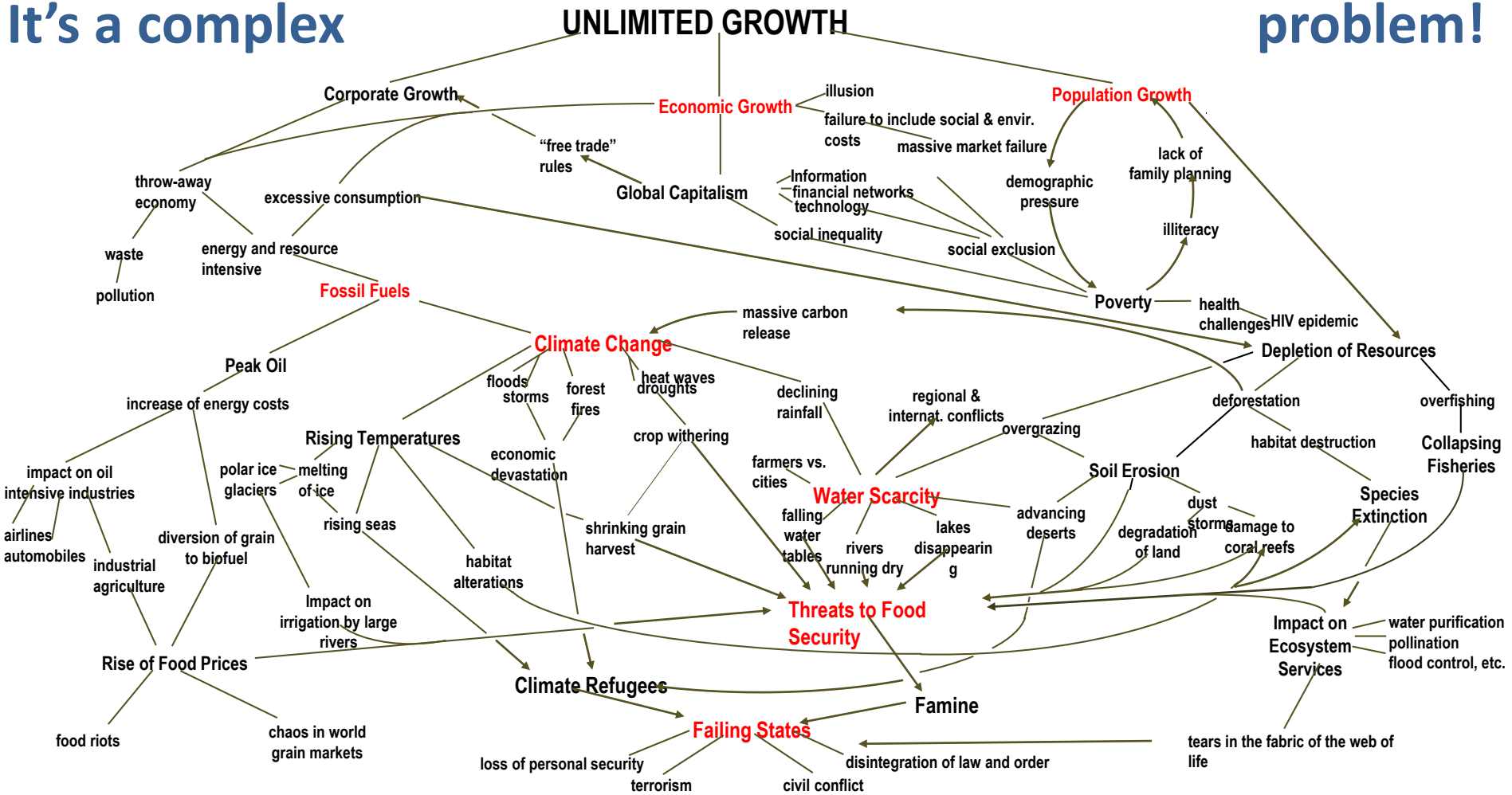
The Food-Water-Energy Nexus



Source: [Future Earth]

It's a complex problem!



Source: Interconnectedness of World Problems. A Conceptual Map by Fritjof Capra.


SUSTAINABLE DEVELOPMENT GOALS
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS

Good Governance Can:

Anticipate emergent problems

Alleviate environmental stressors

Innovate resource alternatives

Cooperate interagency, internationally, cross-sectorally

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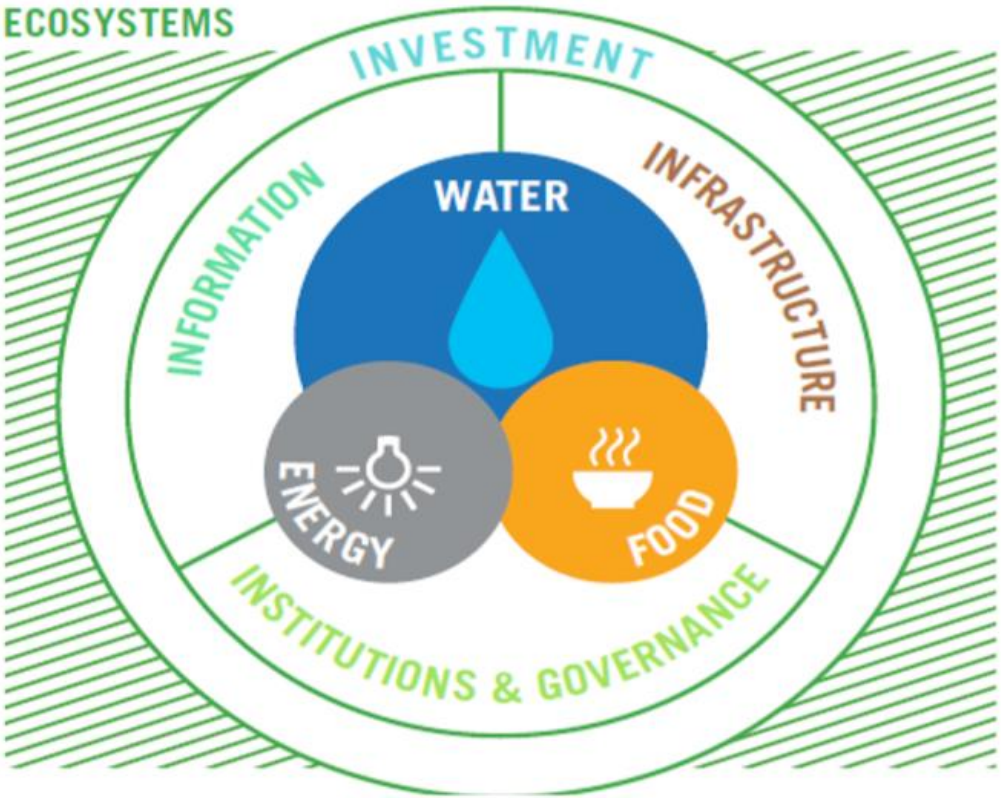
Key Influencers of FEW Security



WEF Nexus approach illustration in Latin America (Miralles-Wilhelm & Muñoz-Castillo, 2018)

How can security leaders prepare for resource scarcity?

Anticipate:

Learn more about how environmental trends impact security

Alleviate:

Reduce potential security stressors in complex environments

Innovate:

Build better regional security sector norms & institutions to:

- address slow-motion emergent crises
- support comprehensive and collaborative systems approaches to emergent transnational problems

Cooperate:

Link knowledge communities:

- Researchers, policy makers, and security practitioners
- Economic development and environmental protection
- International collaboration for sharing knowledge and resources

Join and lead inter-agency and whole-of-society efforts to ensure human security

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Summary

- **Global trends are increasing demands on natural resources.**
- **The Food-Energy-Water nexus generates complex, interlinked security issues.**
- **Resolving natural resource conflicts will be a defining peace and security challenge for the 21st century.**
- **Climate change is and will be a "threat multiplier."**
- **Security governance must anticipate, innovate, and cooperate to manage potential conflict over resources.**

Mahalo!

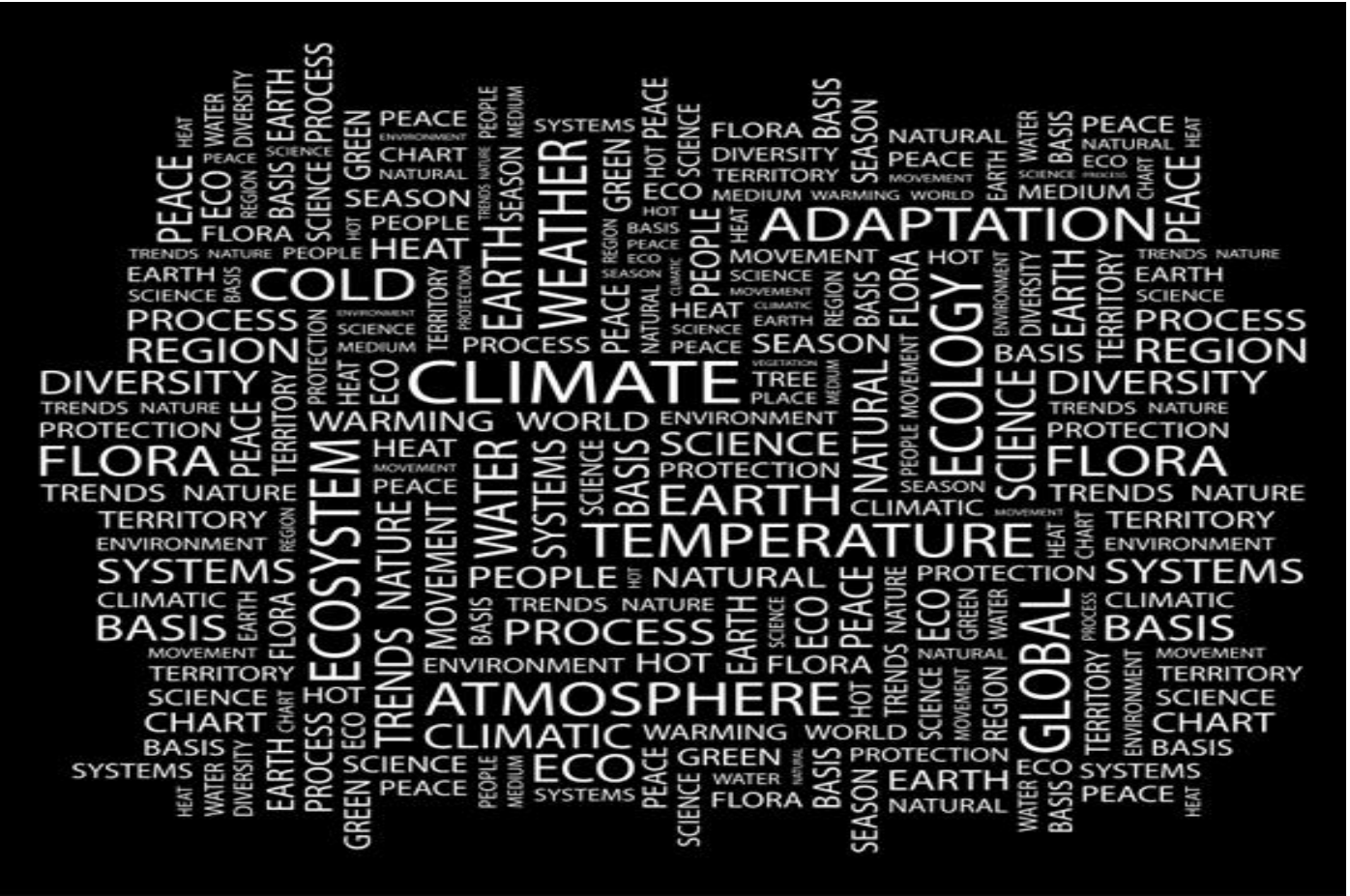

Image source:
[Risk Management Monitor]

Suggested Reading:

Adam Day, *Climate Change and Security: Perspectives from the Field*
(United Nations University: New York, 2020)

http://collections.unu.edu/eserv/UNU:7818/UNU-ClimateChangeandSecurity.pdf

Questions for Discussion

- What are the most likely crises at the food-water-energy nexus that will impact Thailand (and when)?
- Should the security sector take a proactive role in advocating environmental security? Why or why not?
- What is one collaborative step that security professionals can take to improve prospects for environmental security?