

# The Ecology of National Security



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# The Ecology of National Security

- There is an “ecology” to national security
  - water
  - energy
  - food
  - atmosphere
  - climate
  - biodiversity
  - population
  - waste assimilation
  - ecosystem function
  - economics
  - ethnicity
  - politics . . .
- Well functioning ecosystems and ecosystem services are an important foundation for national security.
- The decline of ecosystem function and ecosystem services represents a long-term US national security threat comparable to the threat of war and violent conflict.
  - Conflict is an acute threat
  - Ecosystem decline is a chronic threat (unless it contributes to conflict)



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# The Ecology of National Security

- Ecosystem decline exacerbates threats of human violence and conflict, which can lead to further ecosystem decline.
- Ecosystem decline affects US national security in two ways
  - directly, by affecting US territories, population and economies
  - indirectly, by creating instability and conflict around the world
- Some national security issues must be addressed from the top down, but **many others** are best addressed from the bottom up



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# The Ecology of National Security

- Integrated, multi-system responses and solutions that address fundamental, root causes and relationships are better than dis-integrated solutions that treat each crisis as if it was isolated and unrelated to the others.
  - leverages costs, proactive rather than reactive
  - helps identify unintended consequences
  - reduces suffering, death, conflict, etc.
- We now have tools, processes and knowledge for better understanding and working on these issues: **collaborative systems modeling**



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# Ecosystem services

- Services provided free-of-charge to the human economy by well-functioning ecosystems include
  - freshwater delivery
  - maintenance of atmospheric composition (fresh air, carbon cycling, climate change)
  - energy
  - waste disposal and decomposition
  - pollination, fisheries, food in general
  - public health, disease mitigation
  - production of soils, grasslands, timber, and biodiversity in general.

Costanza et al. (1997) placed the value of these ecosystem services at almost twice the value of global GDP.

MEA (2005) estimated that wetlands alone provide services worth \$200-940 billion per year.



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# Life dries up in Kenya's Mau forest

By James Morgan, BBC News, Kenya, 9/29/09

**“High in the hills of Kenya's Mau forest, some 20,000 families are facing eviction from their farms - accused of contributing to an ecological disaster that has crippled the country.”**

- Upland Kenyan forest ecosystems hold seasonal rainwater like a sponge, releasing it slowly during the dry season
- Deforestation (100 million trees on 100,000 ha) and subsequent erosion lead to wet season flooding and dry season drought
- Mau Forest rivers provide water for 10 million people, six lakes (including Victoria), \$200 million in economic activity, Tanzania's Serengeti . . .

I keep telling people, that if you destroy the forests, the rivers will stop flowing, and you will die of hunger and starvation.” *Prof. Wangari Maathai*

“We must act now, before the entire ecosystem is irrevocably damaged.” *Prime Minister Raila Odinga*



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# Redefining National Security

- Energy & Water Security
- Energy-Water Nexus
- Climate Change
- Food Scarcity, Famine
- Disease Epidemics
- Chronic Pollutants
- Wildfire
- Increasing Population
- Increasing Resource Consumption
- Increasing Resource Scarcity

“To promote the national security by providing for a Secretary of Defense; for a National Military Establishment; for a Department of the Army, a Department of the Navy, and a Department of the Air Force; and for the coordination of the activities of the National Military Establishment with other departments and agencies of the Government concerned with the national security.”

*National Security Act of 1947*



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# We must find a way . . .

- To better understand, quantify, and make explicit the linkages between
  - population growth
  - consumption growth
  - ecosystem decline
  - resource scarcity
  - political, economic and social stability
  - national security
- To communicate it all to policy makers and the public



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# The transition is occurring

“Energy, food and water crises, climate disruption, declining fisheries, ocean acidification, emerging diseases and increasing antibiotic resistance are examples of serious, intertwined global-scale challenges spawned by the accelerating scale of human activity. These issues are outpacing the development of institutions to deal with them and their many interactive effects. *Walker et al., Science 325, 11 Sept 2009*

**Could Food Shortages Bring Down Civilization?** 29 Sep 2009

**CIA Opens Center on Climate Change and National Security** 25 Sep 2009

**Natural disasters displacing millions - U.N. study** 22 Sep 2009

**Beetle Attack Will Change our World** 21 Sep 2009

**Failure to attack climate change spells global health catastrophe, experts warn** 16 Sep 2009

**Lieberman: Climate Change Threatens National Security** 8 Sep 2009

*The big threat of the 20<sup>th</sup> century was global superpowers. The big threat of the 21<sup>st</sup> century will be state failure. Lester Brown*



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# Collaborative, Stakeholder-Driven Resource Modeling and Management

- Systems modeling with multi-disciplinary, multi-sector partners
  - water, energy, food, environment, security
  - build user-friendly models for use by policy makers, academics, students, the public
  - construct future scenarios, simulate and evaluate tradeoffs and consequences
  - modeling and resource management are adaptive
  - approach is social & intellectual, not only technical
- This was not possible 20 years ago, but it is on the horizon now . . .



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# Action Items

- Build partnerships
- Develop NAS-, NSF-, USG- and privately funded projects
- Bridge science and policy
  - Iraq & Libya Water-Energy-Food modeling
  - Oct. 1, CSIS/SNL, Water-Energy-Food-Environment and Security
  - Atlantic Council 21<sup>st</sup> Century Marshall Plan for Water, Energy and Food in Developing Countries



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