

# The Ecology of National Security



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# The Copernican Revolution

- Copernicus removed the Earth from the Center of the universe
- Humanity and its interests have forever remained there
- Time has come to complete the revolution

*Be fruitful and increase, fill the earth and subdue it, rule over the fish in the sea, the birds of heaven, and the every living thing that moves upon the earth . . .*

Genesis

*If your train's on the wrong track, then every station you come to is the wrong station.*

Bernard Malamud



# Why a revolution?

- Three big trajectories are driving dynamics on Earth right now . . .
  - Increasing population
  - Increasing resource consumption
  - Decreasing resource availability
- Science and technology have brought us to a unique moment in history in which we can see these trajectories
- Linear, incremental measures are not getting us where we need to be
  - Millenium Development Goals are slipping
  - Absolute number in poverty is increasing
  - Big trajectories are playing out . . .



# Ecology of National Security

The decline of ecosystem function and ecosystem services represents a *long-term* US national security threat comparable to the threats of terrorism, WMD, war.

## Two meanings . . .

### 1. There is an “ecology” to national security

- water
- energy
- food
- atmosphere
- climate
- biodiversity
- population
- waste assimilation
- ecosystem function
- economics
- ethnicity
- politics . . .

### 2. Well functioning ecosystems and ecosystem services provide the foundation. *Ecology is the unifying framework.*



# Why ecology?

- Consider a farm pond
  - Ag runoff adds fertilizer
  - Algae blooms, cutting off light
  - Other plants die
  - Dying algae pile up on the bottom
  - Microbial populations expand to decompose algae
  - Microbes consume all the oxygen
  - Pond ‘dies’
- Consider Thomas Park
  - Early ecologist, 1940s
  - Set up 20 jars of flour
  - Introduced predator beetles and prey beetles
  - Predators always ate all the prey, then died
  - Introduced hiding places, and equilibrium occurred

Fossil fuels caused a human bloom . . .

Resources can't hide from human technology

Beetles don't observe their trajectories



# 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 (fuel wood)
  - waste disposal and decomposition
  - pollination, fisheries, food in general
  - public health, disease mitigation
  - production of soils, grasslands, timber, biodiversity in general.

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



# Cause, Effect, and Feedbacks

- 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
- Ecosystem decline exacerbates threats of human violence and conflict, which can lead to further ecosystem decline.
- An ecosystems approach can't solve all the problems
  - Despotic dictators
  - Ethnic or religious extremists . . .



# Integration vs. Dis-integration

- Integrated, multi-system responses and solutions addressing root causes and relationships are better than dis-integrated solutions that treat each crisis as 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**



# We are everywhere . . .

Projected climate change poses a serious threat to America's national security."  
"Climate change acts as a threat multiplier for instability in some of the most volatile regions of the world." **CNA** Report, 2007

Climate change could threaten domestic stability in some states, potentially contributing to intra- or, less likely, interstate conflict, particularly over access to increasingly scarce water resources. **Fingar**, Congressional testimony, 2008

Experts currently consider 21 countries, with a combined population of about 600M, to be either cropland or freshwater scarce. Owing to continuing population growth, 36 countries, home to about 1.4B people, are projected to fall into this category by 2025. **NIC**, *Global Trends 2025*, 2008

In the 21<sup>st</sup> century, the security of nations will increasingly depend on the security of natural resources, or "natural security." **Burke**, *Center for a New American Security*, 2010

Heightened regional and global instability stemming from tightening energy markets and environmental repercussions of accelerating global temperature increases contain the potential for unprecedented strategic challenges for US national security over the next 20 years. **Dumaine**, *National Security for a Planet in Crisis*, 2010

The ecological crisis has already reached the point where it is impacting directly on an increasing number of citizens and voters in the world's wealthiest societies. . . . We could witness increasingly severe conflicts between states and societies insisting on the need to protect ecoassets and services . **Ries**, *Swedish National Defence College*, 2010



# We are everywhere . . .

- **A Climate Culprit In Darfur** *Washington Post* 6/16/07
- **Water shortage cripples Palestinian farming** *Reuters*, 9/18/08
- **The Next Great North Korean Famine** *Time Magazine*, 5/6/08
- **Could Food Shortages Bring Down Civilization?** *Scientific American* 4/22/09
- **Global crisis 'to strike by 2030'** *BBC*, 3/19/2009
- **Natural disasters displacing millions - U.N. study** *Reuters*, 9/22/09
- **Ailing planet seen as bad for human health**, *Washington Post*, 10/27/09
- **Nature's sting – the real cost of damaging planet Earth** *BBC*, 10/11/10
- **Arab world faces worsening water crisis** *Reuters*, 11/4/10
- **Yemen: Think things are bad now? Don't let it run out of water** *Christian Science Monitor* 11/30/10
- **World running out of new places to fish, study** *Reuters*, 12/2/10
- **Desertification is greatest threat to planet, expert warns** *The Guardian*, 12/16/10
- **City heading for water famine** *Deccan Herald* 12/23/10
- **Shifts in rainfall patterns and shorelines will contribute to mass migrations on a scale never before seen** *Scientific American* 1/10/11
- **Climate-induced mayhem likely to start in Bangladesh** *McClatchy/Medill Reporting* 1/10/11



# We are everywhere . . .

As the new year begins, the price of wheat is setting an all-time high in the United Kingdom. Food riots are spreading across Algeria. Russia is importing grain to sustain its cattle herds until spring grazing begins. India is wrestling with an 18-percent annual food inflation rate, sparking protests. China is looking abroad for potentially massive quantities of wheat and corn. The Mexican government is buying corn futures to avoid unmanageable tortilla price rises. And on January 5, the U.N. Food and Agricultural organization announced that its food price index for December hit an all-time high.

The unrest of these past few weeks is just the beginning. **It is no longer conflict between heavily armed superpowers, but rather spreading food shortages and rising food prices -- and the political turmoil this would lead to -- that threatens our global future.**

*Lester Brown, Foreign Policy, Jan. 2011*



# Solutions

- Family planning and education for women around the world reduces population growth.
- Cradle-to-cradle engineering and manufacturing, and co-location technologies reduces consumption.
- Proper pricing of goods (e.g., gasoline and water) and services to reflect short- and long-term environmental impacts.
- Change the corporate ethic in which capital pursues the greatest economic return, regardless of the environmental or social consequences.
- A steady-state economy, at least in developing nations, rather than the current global economic model of constant growth, would slow consumption and ecological impacts.
- Divorce quality of life from over consumption.
- Break out of our 'cognition trap'

*The idea that economies and consumption of all resources can continue growing indefinitely may be the single driver with the greatest negative impact on long-term human security for the US and all nations.*



# CASE STUDY -- North Korean Famine: Conventional Wisdom

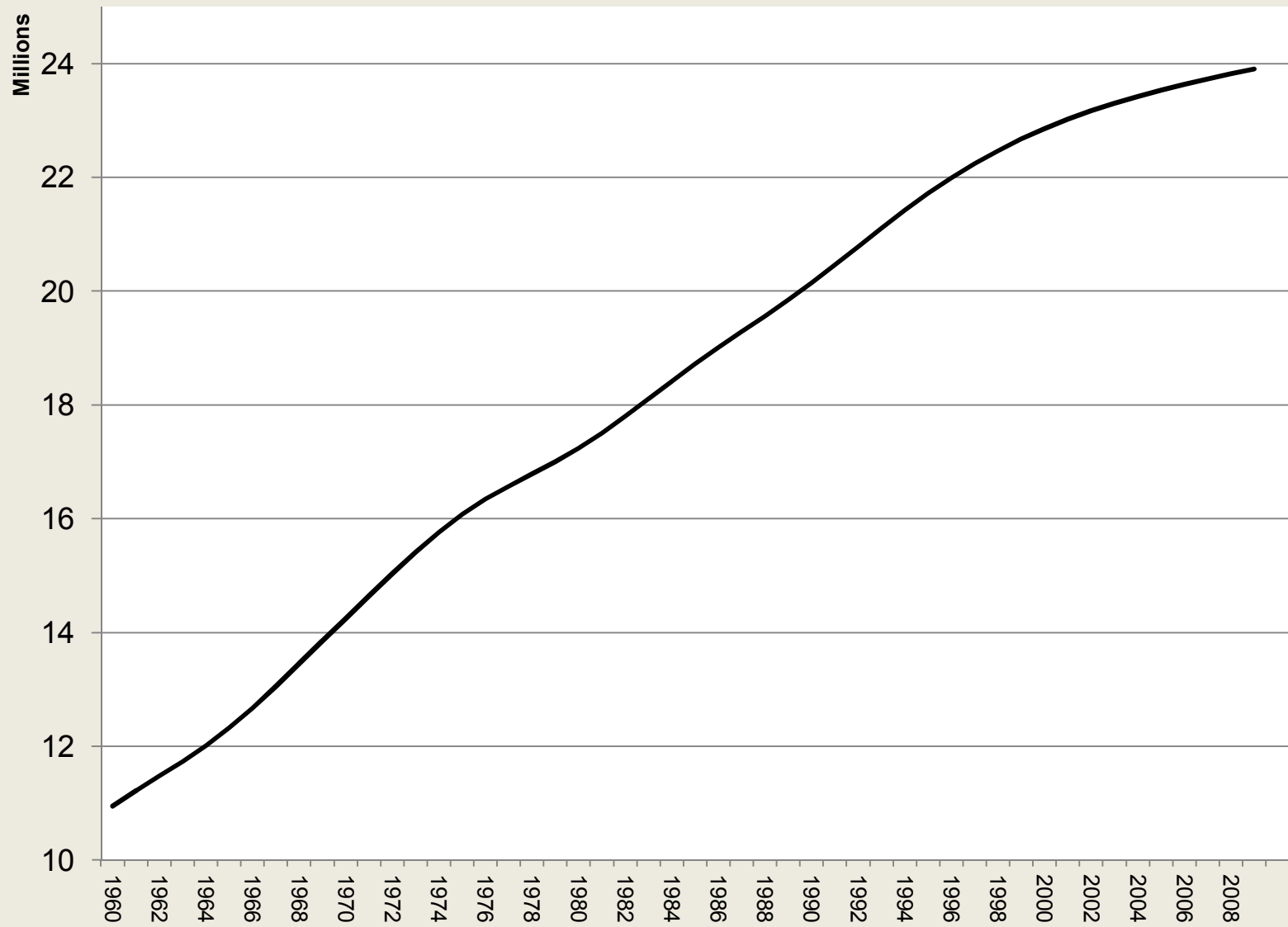
- Collectivization after Korean War eliminated personal incentives for production and led to food shortages.
- Problems that NK faced in the 1990s were the result of policy choices the regime made with respect to ag that increased the risk of production shortfalls and weather-related shocks.
- “Natural causes – even ones such as the weather – often gain their force because of prior political and policy choices. NK did experience severe floods in 1995 and a succession of natural disasters thereafter as well. But the country’s vulnerability to those conditions was exacerbated at every point by decisions the government made that compounded risk.”
- End of Soviet Union and drop in Chinese trade interrupted food imports and fuel imports, which impaired fertilizer production
- “The dominant approach of the government was to focus on technological fixes that reflected a continuation of past policy . . .”
- “Famines are complex political and social as well as economic events.”

Haggard & Noland 2007. Famine in North Korea; Markets, aid and reform. Columbia Univ. Press.



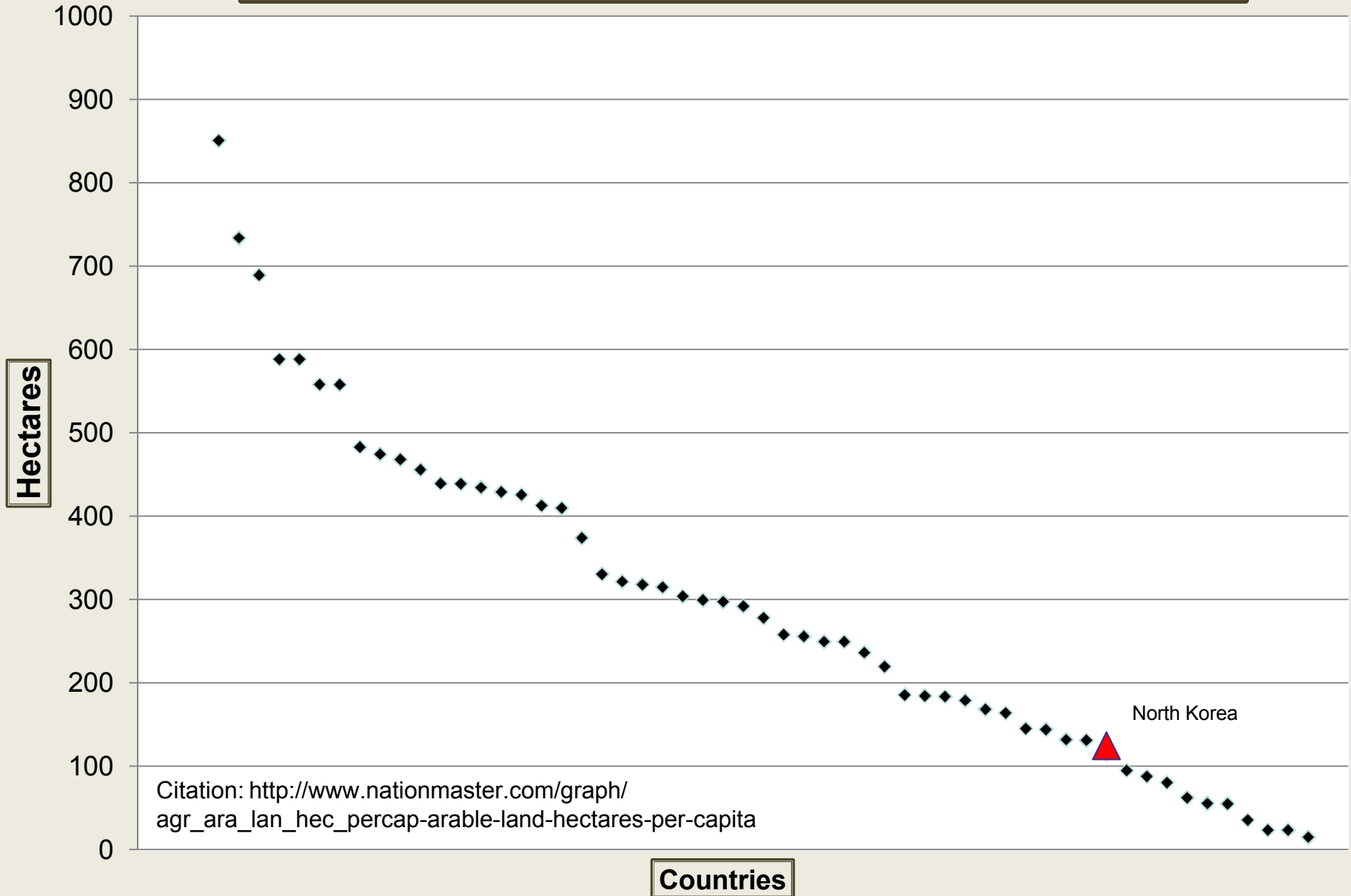
# North Korea Population

Population



Citations: [http://www.google.com/publicdata?ds=wb-wdi&met=sp\\_pop\\_totl&idim=country:PRK&dl=en&hl=en&q=population+of+north+korea](http://www.google.com/publicdata?ds=wb-wdi&met=sp_pop_totl&idim=country:PRK&dl=en&hl=en&q=population+of+north+korea)

# Hectares of Arable Land Per Capita for Countries Above 38 degrees North and below 38 degrees South



Citation: [http://www.nationmaster.com/graph/agr\\_ara\\_lan\\_hec\\_percap-arable-land-hectares-per-capita](http://www.nationmaster.com/graph/agr_ara_lan_hec_percap-arable-land-hectares-per-capita)

# CASE STUDY -- North Korean Famine: Ecological perspective

- Food shortages and growing pop. after Korean war led NK government to:
  - Expand cultivation to include marginal, hillside land
    - Increased soil erosion, runoff, contributed to flooding
  - Increase fertilizer use to increase productivity
    - Increased acidification of soil, soil breakdown, erosion, and loss of productivity
- Timber harvest and fuel wood gathering in growing pop. of poor led to deforestation
  - Soil erosion, runoff, flooding



1990 fuel wood harvest: 3M m<sup>3</sup>

1996 fuel wood harvest: 7.2M m<sup>3</sup>

1990 total ag production: 9.1M tonnes

1998 total ag production: 3.02M tonnes

# Political and Security implications of the famine

- Attempted Coup
  - Possible Chinese intervention
  - Martial Law
  - Dissatisfaction with Government
  - Refugees
  - Public executions
  - Outlaw gangs
  - Intrusion by foreigners
  - Disease and poor health/physical development
  - Emotional depression
  - Corruption/theft
  - Civil war
- But quantification of relationships between causes and effects is very difficult . . .

**Natsios 2001.** The Great North American Famine; Famine, Politics and Foreign Policy, US Institute of Peace;



# Questions

1. Is 'the ecology of national security' a useful framework?
2. Are case studies useful? What are the best case studies for illuminating these arguments?
3. What are other kinds of data and research that can make linkages more explicit?
4. What are ALL the countries and/or regions in the world where decline of ecosystems has a sufficiently direct link to human security and U.S. national security?
5. How important is it that we be able to make quantitative links between causes and effects?
6. To what extent would computer simulation modeling that explored the quantitative links and allowed users to simulate different future scenarios be useful?
7. Do you wish to contribute to this effort as it proceeds?





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