



Ecosystem Change and Human Health: An Overview of the HEAL Program

Christopher Golden PhD, MPH
Director of HEAL, Wildlife Conservation Society
Harvard School of Public Health
3-20-2015



Environmental Change as Public Health Risk



Roadmap

1. Methodological Framework
2. *Case Study:*
Wildlife Declines and Food Security
3. *Future Research*

Roadmap

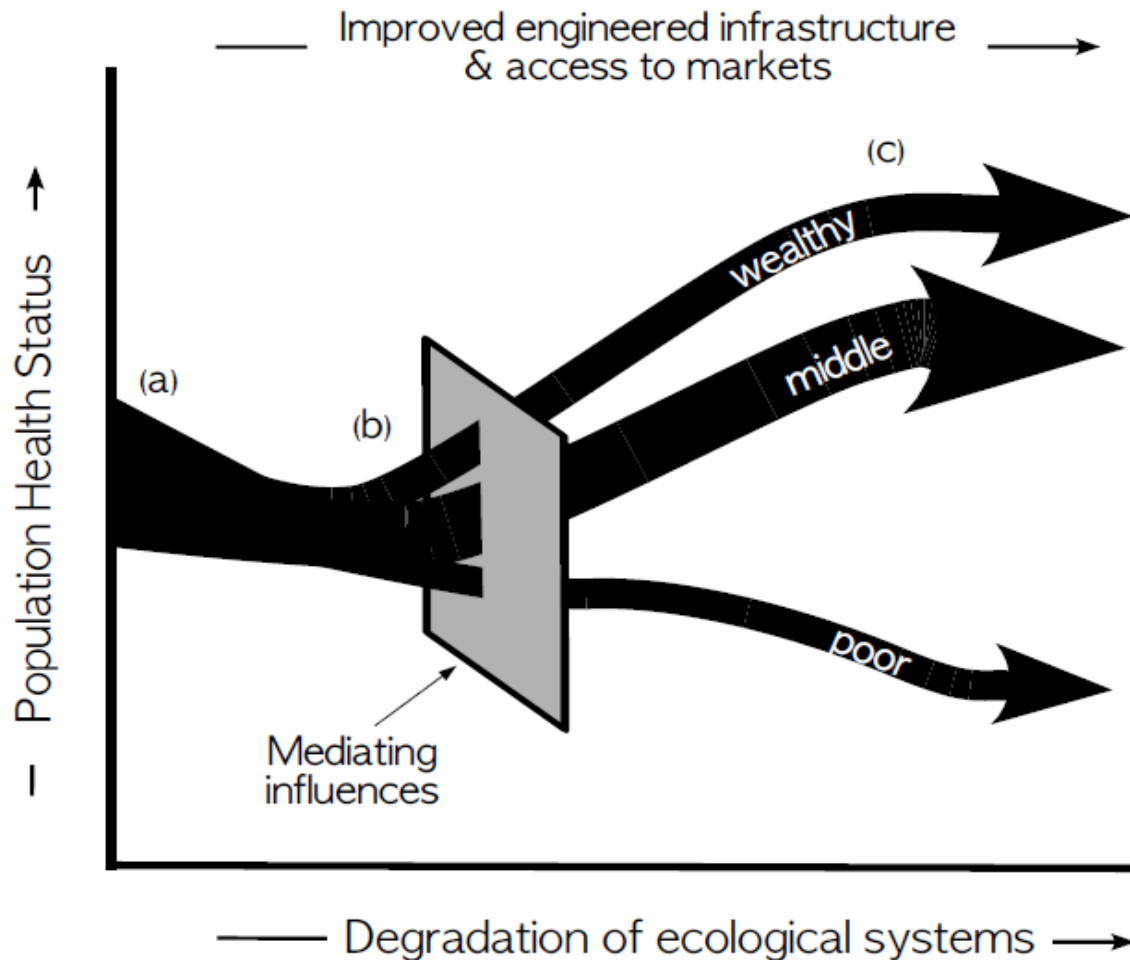
1. Methodological Framework

2. *Case Study:* Wildlife Declines and Food Security

3. *Future Research*

Human health impacts of ecosystem alteration

Samuel S. Myers^{a,b,1}, Lynne Gaffikin^c, Christopher D. Golden^b, Richard S. Ostfeld^d, Kent H. Redford^{e,2}, Taylor H. Ricketts^f, Will R. Turner^g, and Steven A. Osofsky^h



Roadmap

1. Methodological Framework
2. ***Case Study:***
Wildlife Declines and Food Security
3. *Future Research*

Environmental Change

- Wildlife population collapse

Changes in Food Supply

- Reduced access to animal-source foods

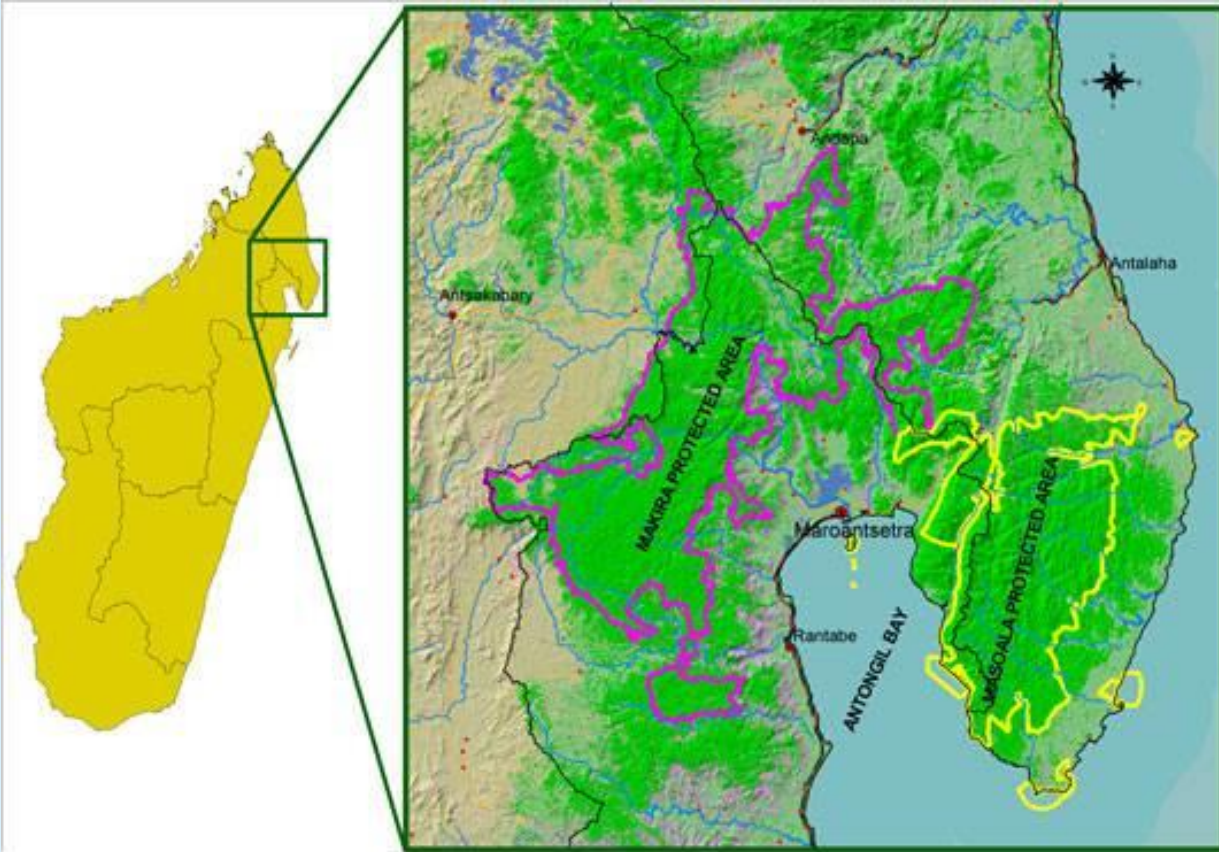
Changes in Nutrient Intake

- Micronutrient and vitamin intake decreases

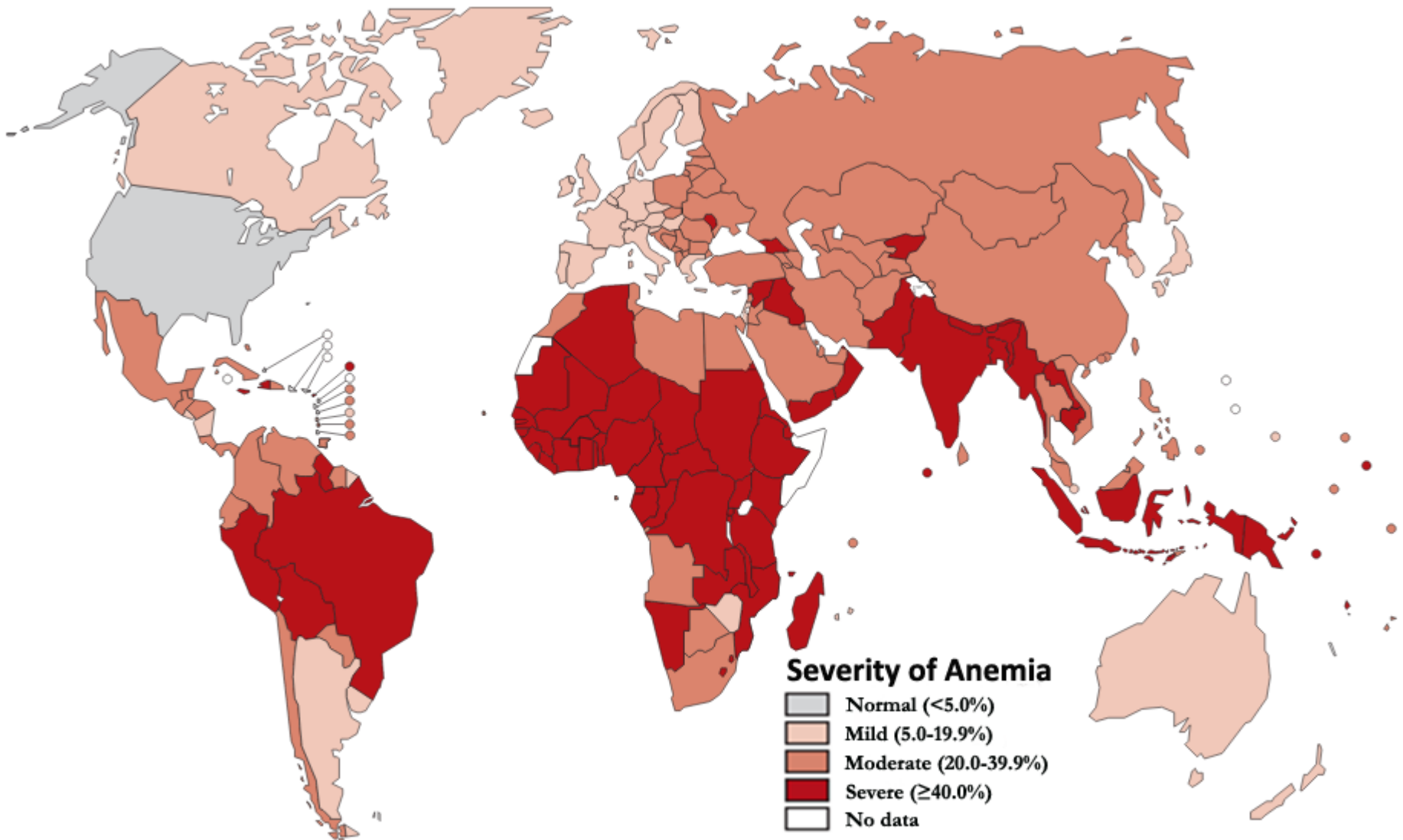
Health Impacts

- Increased incidence of anemia

Makira Region, NE Madagascar



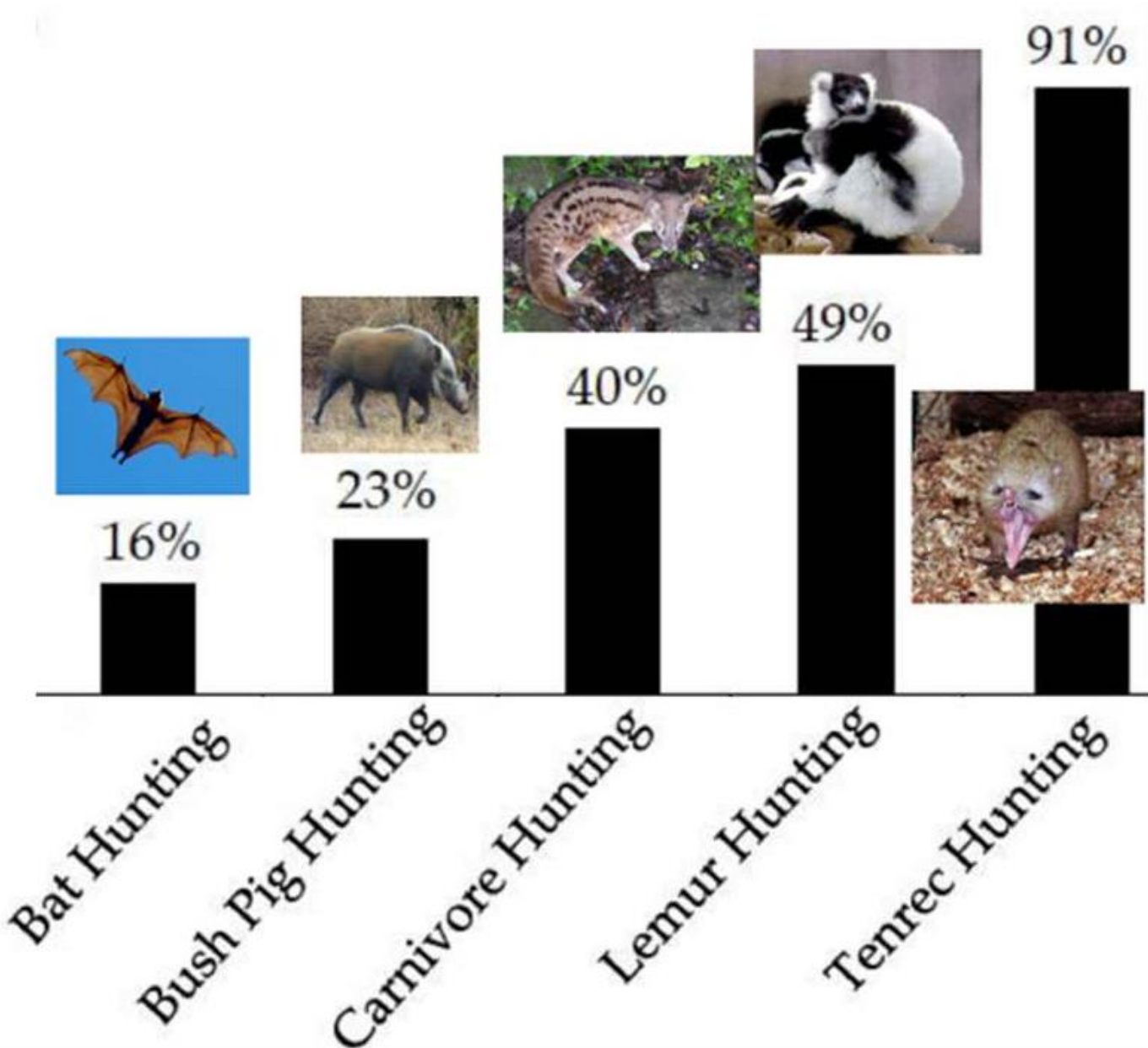
Global Prevalence of Anemia



Forest Foods

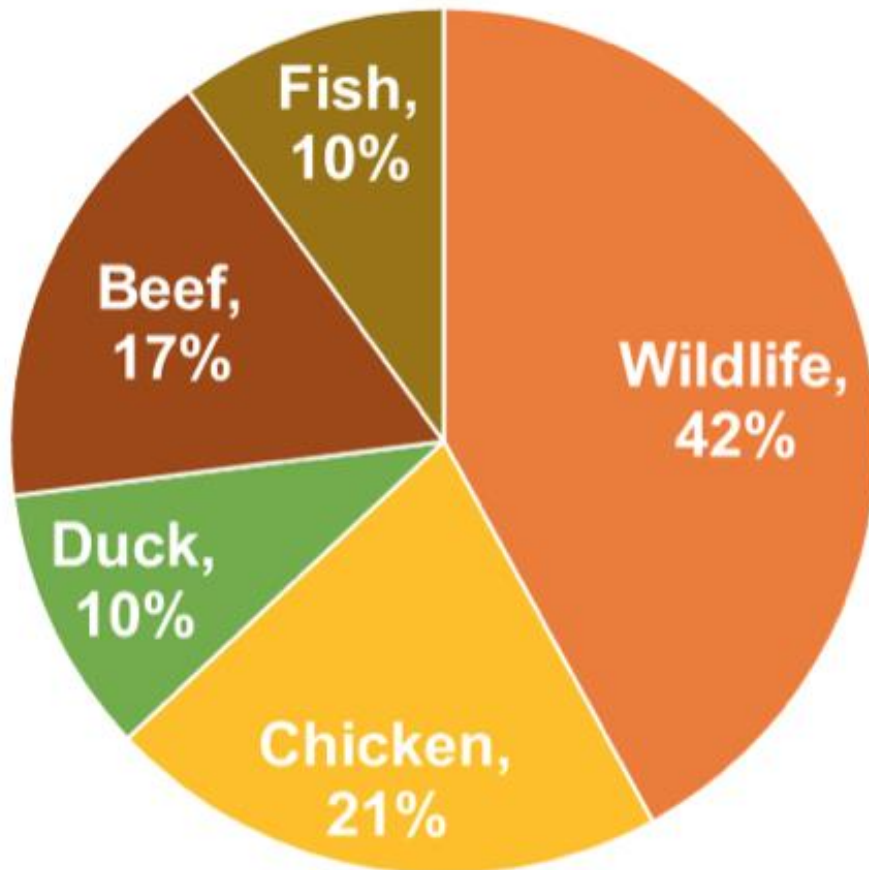


Wildlife Consumption

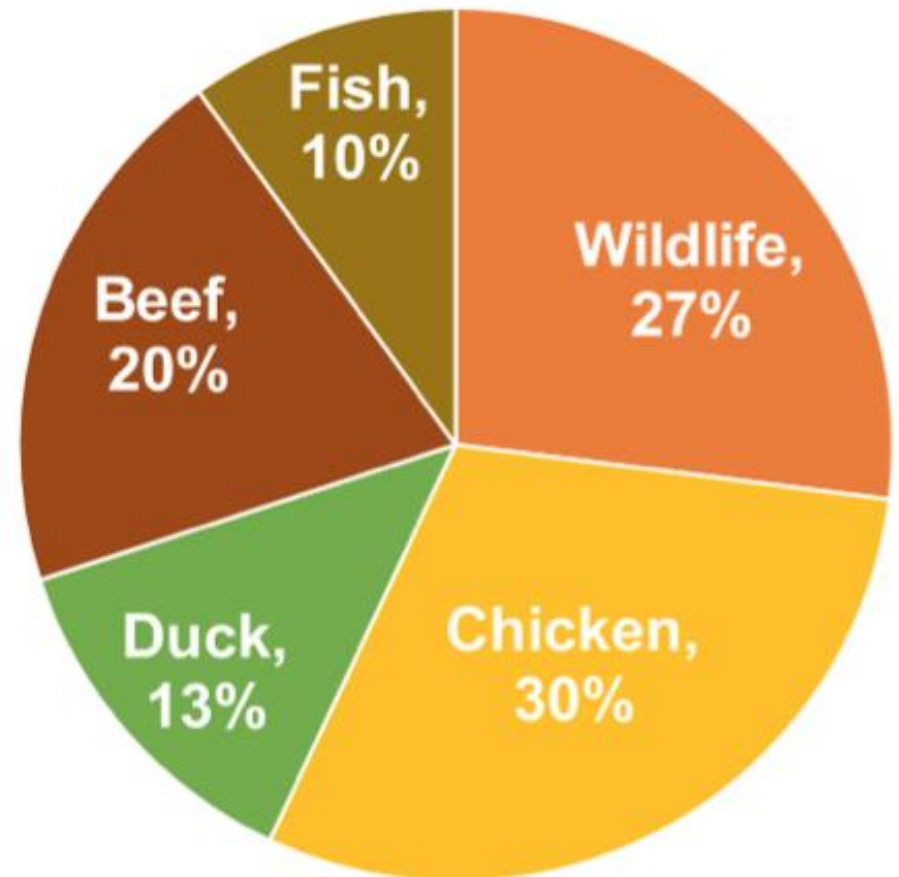


Reliance on Animal Source Foods

Poor Households

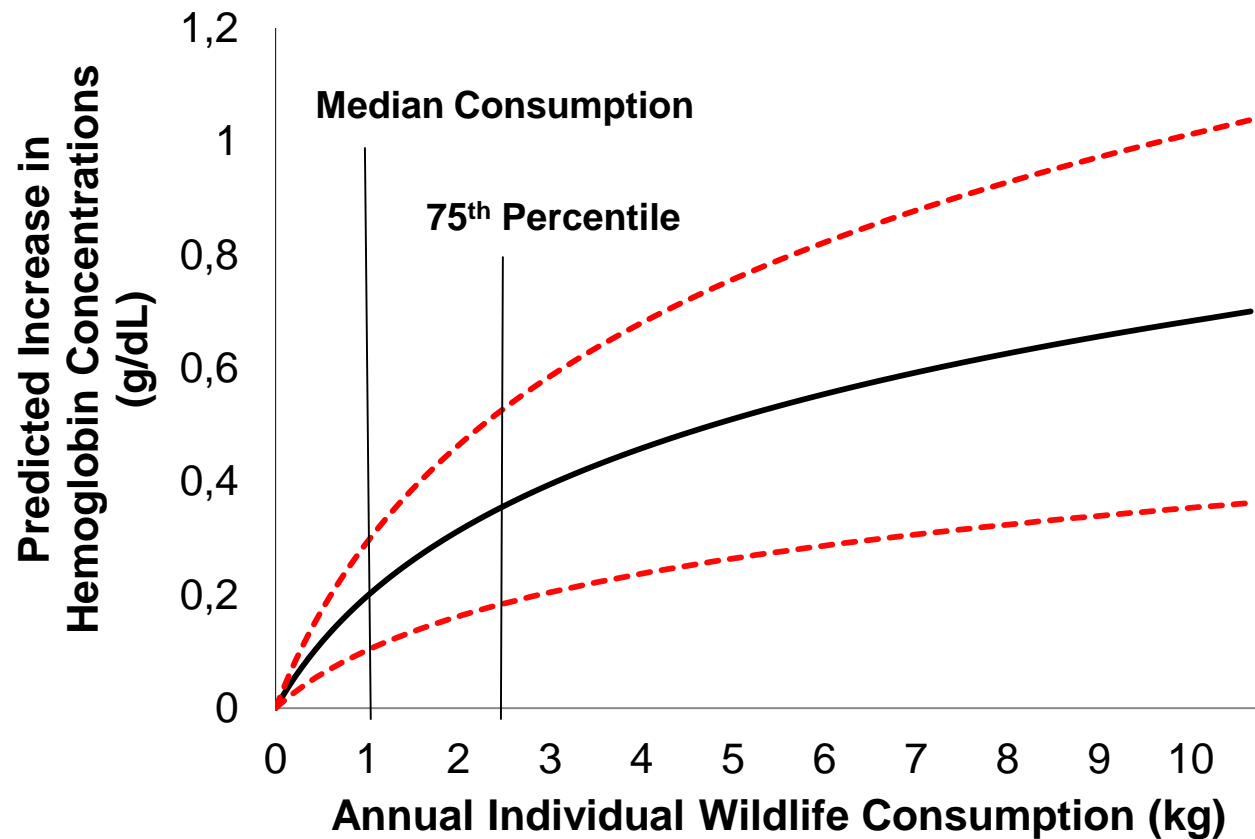


Rich Households



Benefits of wildlife consumption to child nutrition in a biodiversity hotspot

Christopher D. Golden^{a,b,c,1}, Lia C. H. Fernald^b, Justin S. Brashares^c, B. J. Rodolph Rasolofoniaina^d, and Claire Kremen^c



Health Methodology

CONTINUOUS

1

- Dietary calendars
- Socio-economic surveys
- Pharmaceutical use records

NIGHT BEFORE

2

- Current health status
- Anthropometry
- Fingernail samples

CLINICAL VISIT

3

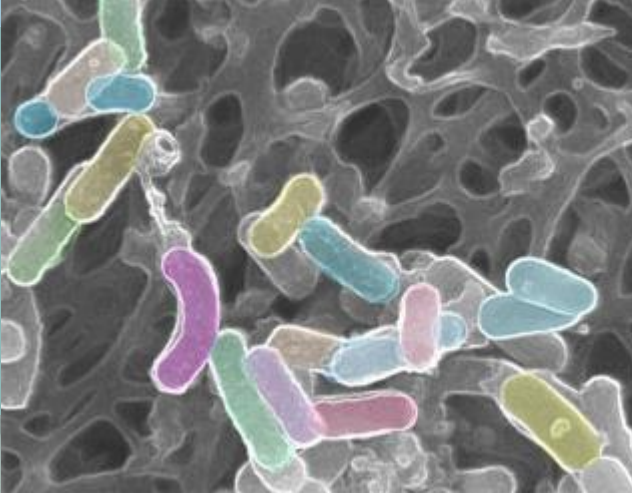
- Blood samples (fasted)

FIRST / LAST

4

- Fecal samples
- Breast milk samples (fasted)

Biological Samples






Zoonotic Disease Sampling



21 November 2014 Last updated at 22:38

Madagascar plague outbreak kills 40, says WHO



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THE WONDER LIST

WITH BILL WEIR

Go there. Before it's gone.

NEW EPISODE INDIA

SUNDAY 10 P ET/PT



Experts raise alarm as plague kills dozens in Madagascar

By [Faith Karimi](#) and Emil Hellerud, CNN
 Updated 9:15 AM ET, Sat January 31, 2015



SUNDAY 23 NOVEMBER 2014

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Plague in Madagascar has killed 40 people out of 119 cases: WHO



Roadmap

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Wildlife Declines and Food Security
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Infectious disease

**Non-communicable
disease**

**HEALTH & ECOSYSTEMS:
ANALYSIS OF LINKAGES**

Nutrition

Mental health



Harvard University
Center for the Environment



Infectious disease

Non-communicable
disease

HEALTH & ECOSYSTEMS: ANALYSIS OF LINKAGES



Nutrition



Mental health



The
UNIVERSITY
of VERMONT



Environmental Change

- Climate change and fishery collapse

Changes in Food Supply

- Change in the size and location of the fishery

Changes in Nutrient Intake

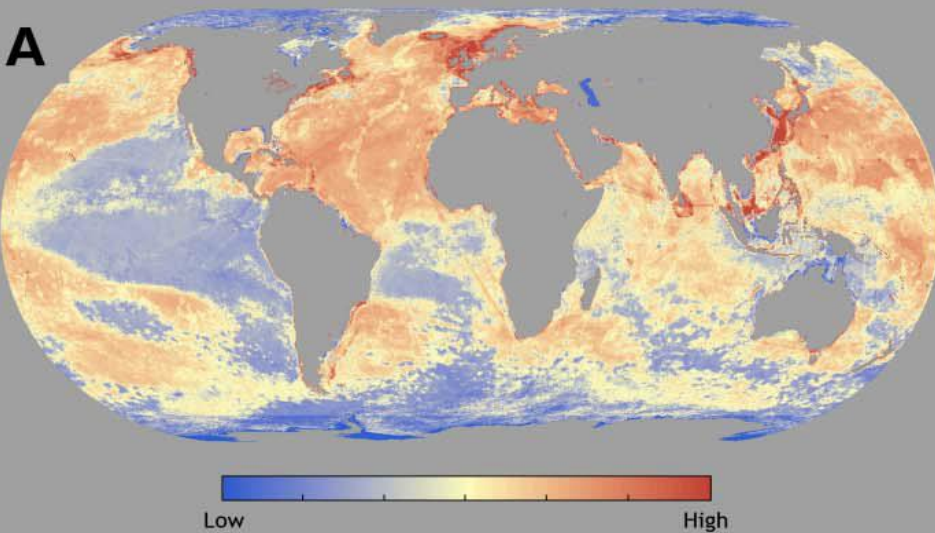
- Micronutrient and vitamin intake decreases

Health Impacts

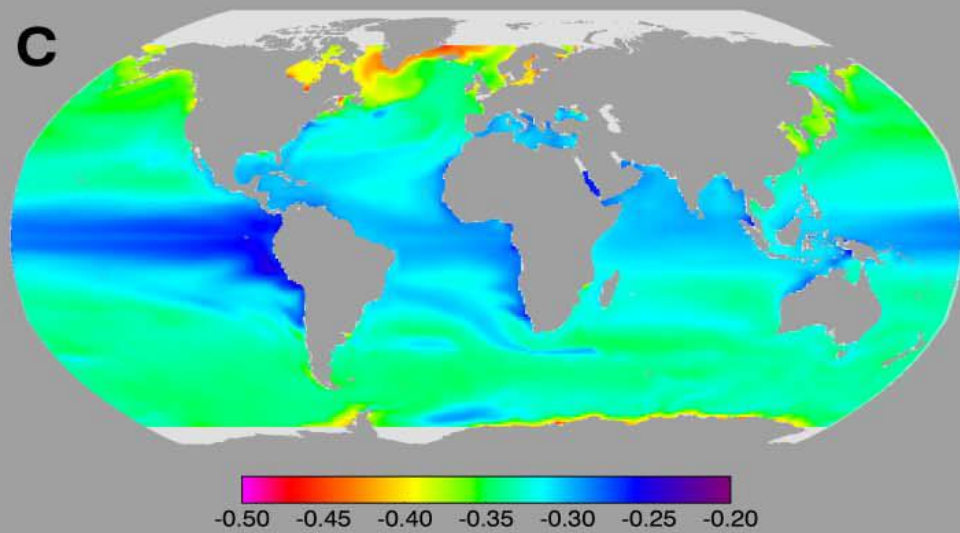
- Increased micronutrient deficiencies and metabolic diseases



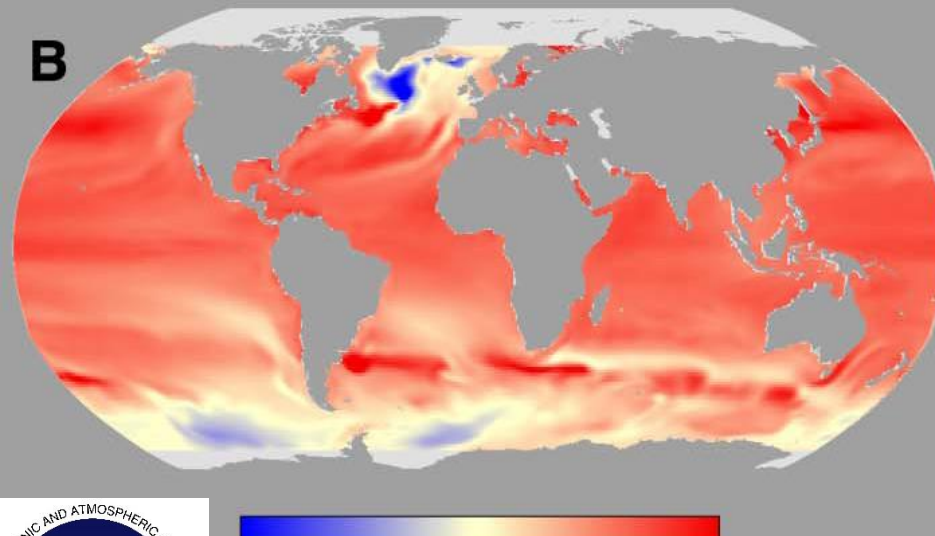
Our Future Oceans



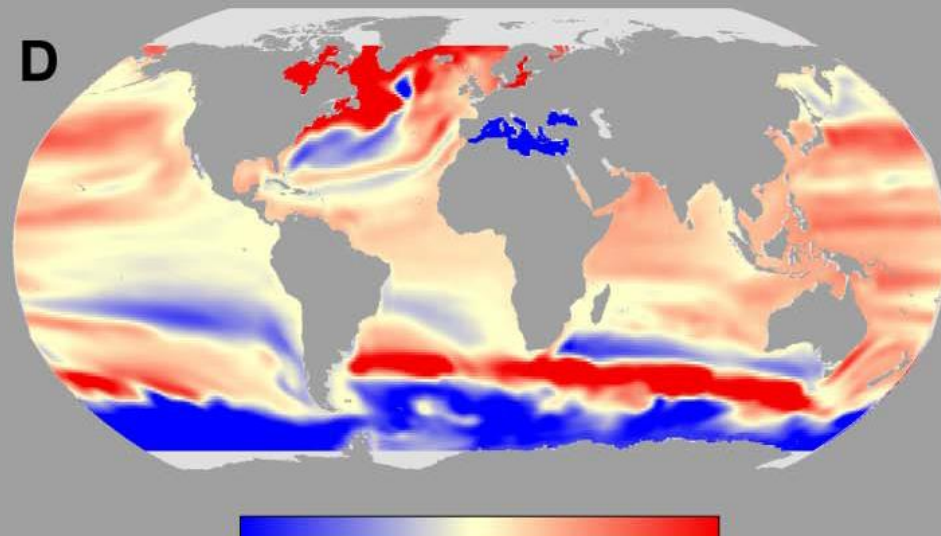
Overfishing



Ocean Acidification



Temperature Rise



Sea Level Rise

Environmental Change

Wildlife Population Collapses

Climate Change and Fishery Collapse



Changes in Food Supply

Reduced access to ASF

Change in amount and location of fishery



Changes in Nutrient Intake

Reduced Fe, Zn, fatty acids, Vit. A & B12



Health Impacts

Increased micronutrient deficiencies

Increased micronutrient deficiencies
and metabolic diseases

Policy Impact



Intergovernmental Platform on
Biodiversity & Ecosystem Services



Convention on
Biological Diversity



World Health
Organization



Thank You!

- Sam Myers, Walter Willett, Anu Shankar
- Danny Milner, Sarah Volkman, Dan Hartl, Ben Rice
- Wendy Garrett, Curtis Huttenhower, Xochitl Morgan
- Lia Fernald, Kirk Smith, Claire Kremen, Justin Brashares
- Evelin Jean Gasta Anjaranirina
- Herlyne Ramihantaniarivo

