SSF’s Adaptation and Security Webinar Series
Session 4: Climate Change and Health -- Risks, Preparedness and Transformation

Moderator: Jonathan Patz
Director of The Global Health Institute at the University of Wisconsin in Madison
Founding President of the International Association for Ecology and Health

Co-Produced by the American Public Health Association

UPCOMING - SESSION 5: Economic Vitality in a Changing Climate
March 22, 2012  1:15 – 2:45 PM EST
www.securityandsustainabilityforum.org
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  – Evaluates the effectiveness of program and marketing initiatives

• Contact:
  – Linda Dethman | Linda.Dethman@cadmusgroup.com | (503) 467-7146
Antioch University New England provides transformative education through scholarship, innovation, and community action for a just and sustainable society.
SSF Adaptation and Security Series - Session 4: Climate
“Change and Health -- Risks, Preparedness and Transformation”

Jonathan Patz
Director of The Global Health Institute at the University of Wisconsin in Madison
Founding President of the International Association for Ecology and Health
Introduction to the Panel: Jonathan Patz
Moderator Opening Remarks: Jonathan Patz -- Interdependencies
Panel Presentations
- **Alistair Woodward**: Topic - Update on IPCC Health/Climate studies
- **Ann Lion**: Topic - The role of health systems strengthening in maximizing the impact and sustainability of investments in health programs and Health Systems 2020
- **Diarmid Campbell-Lendrum**: Topic – Current WHO research and Health in a Low Carbon Economy
- **Andy Haines**: Topic - Health Co-Benefits of the Low Carbon Economy
Panel Discussion: (Two panel questions)
Audience Q&As (Send through question box)
Summary Points: Jonathan Patz
Thank you (please fill out the audience survey)
**Dr. Alistair Woodward** is the Head of the School of Population Health at the University of Auckland, New Zealand. He is Chair of the Public Health Research Committee of the New Zealand Health Research Council, and convening Lead Author for the health chapter of the UN IPCC.

**Dr. Ann Lion** is Abt’s project director for USAID's flagship health systems strengthening project, Health Systems 20/20. Previously, she was the Global Fund Technical Support coordinator for the Office of the U.S. Global AIDS and Coordinator and Senior Health Advisor for Human Resources for Health for USAID’s Office of Population and Reproductive Health.

**Dr. Diarmid Campbell-Lendrum** is the World Health Organization epidemiologist responsible for the WHO reports; “Climate change and human health - risks and responses” and “Ecosystems and human well-being - health synthesis”

**Sir Andy Haines** is Professor of Public Health & Primary Care and past Director of the London School of Hygiene and Tropical Medicine. He is a co author of the important Lancet papers on health co-benefits of policies to tackle climate change
# Health Effects of Climate Change

<table>
<thead>
<tr>
<th>Effects</th>
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<tbody>
<tr>
<td>Temperature Rise</td>
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<tr>
<td>Sea Level Rise</td>
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<tr>
<td>Hydrologic Extremes</td>
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<tr>
<td>Urban Heat Island Effect</td>
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<tr>
<td>Air Pollution &amp; Aeroallergens</td>
</tr>
<tr>
<td>Vector-borne Diseases</td>
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<tr>
<td>Water-borne Diseases</td>
</tr>
<tr>
<td>Water resources &amp; food supply</td>
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<tr>
<td>Mental Health &amp; Environmental Refugees</td>
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</table>
Today we will hear about:

- An update on climate-health risks
- Health preparedness and adaptation
- Health “co-benefits” from greenhouse gas mitigation and a Green Economy
Policy makers argue the COSTS of addressing global climate change

…but could health “Co-Benefits” actually make combating climate change **Free** …or better
Climate Change and Health – An update on the science

ALISTAIR WOODWARD
SCHOOL OF POPULATION HEALTH,
UNIVERSITY OF AUCKLAND
The Inter-governmental Panel on Climate Change
Climate change and health: why an extra degree or two (or 4 or 5) matters

- Variability and frequency of extreme events at least as important as a change in average conditions
'Mega-heatwaves' such as the 2003 and 2010 events broke the 500-yr long seasonal temperature records over approximately 50% of Europe. According to regional multi-model experiments, the probability of a summer experiencing 'mega-heatwaves' will increase by a factor of 5 to 10 within the next 40 years. Barriopedro et al Science 21 March 2011 10.1126/science.1201224

Russia 2010:
1 month heatwave (38 degrees+)
54,000 excess deaths (cf 2009)
Hotter future. The Black Saturday bushfires of 7 February 2009 resulted in Australia’s highest ever loss of life from wild fires. 173 people died and 414 were injured as a result of the fires, with economic damage conservatively estimated at Aus$4.4 billion.
Thai floods, late 2011. Worst for 50 years, 350+ deaths, following severe dry period.
Climate change and health: why should an extra degree or two (or 4 or 5) matter?

- Compared with human populations, physical and ecological systems are relatively open to environmental change and may be exquisitely sensitive to temperature rise
Relation between temperature and development of the malaria parasite (Extrinsic Incubation Period)

Patz PNAS 2006;103:5635
Climate change and health: why should an extra degree or two (or 4 or 5) matter?

- Sea level rise, storms, drought and crop failure may displace millions of people, causing poverty, conflict and violence
The highest point on South Tarawa 3 metres E/TA rising seas, drowning islands TCCC/UNFCCC have these islands! Yes we can
Climate change and health: why should an extra degree or two (or 4 or 5) matter?

- Responses to climate change may themselves be health-damaging
Biofuels boom in Africa as British firms lead rush on land for plantations

Controversial fuel crops linked to rising food prices and hunger, as well as increased greenhouse gas emissions

Damian Carrington and Stefano Valentino
guardian.co.uk, Tuesday 31 May 2011 21.00 BST
Article history

An Ivory Coast nursery for jatropha, a non-edible plant whose oil-rich seeds can be processed into biodiesel. Photograph: Kambou Sia/AFP/Getty Images
Opportunities?

It is possible to take health gains, early, by smart action against climate change. This applies both to adaptation and mitigation.
July 2006 heat wave in France:
Expected - 6452 excess deaths
Observed - 2065 excess deaths

Fouillet et al, 2008
Climate change and health
an update on the science

• The literature has mushroomed
• There is evidence of tipping points
• Climate volatility is a risk factor for health
• Effects extend into high-income countries
• Smart responses to climate change can bring early health gains

THE END
Climate Change and Sustainability: Importance of Strengthening Health Systems

Ann Lion, DrPH

January 2012
How Does Climate Change Affect the Need for Strong Health Systems?
Temperature, Extreme Weather

Quick statistics

- Temperature
  - The warmest years on record were 2010 and 2005 since records began in 1880.
    (NOAA, National Climatic Data Center)
  - In 2011, the country experienced the second warmest summer on record
    (NOAA, National Climatic Data Center)

- Extreme Weather and Climate Disasters
  - The U.S. has sustained 112 weather/climate related disasters over the past 31 yrs. In 2011, the U.S. sustained 12 different billion-dollar weather/climate disasters, breaking the record of 9 set in 2008.
    (NOAA)
Ice Cover Receding

- Ice Cover
  - In 2011, coverage of sea ice in the Arctic reached its second lowest extent since satellite observations began in 1979 (U.S. National Snow and Ice Data Center)
Climate Change: A Few Effects

- Higher temperature fluctuations
- Rainfall fluctuations
- Increase in severe weather

- Agriculture productivity
- Vector-borne diseases
- Increase in epidemics
Climate Change and Health

Unpredictable Affects Agricultural Productivity

Affects Nutrition

Under-nourishment
Climate Change and Health

Vector-born diseases

- Malaria
- Dengue
- Yellow fever
- Water-borne diseases
Climate Change and Health

Extreme weather events (disruption of services and increase in infectious epidemics... cholera)
Health Systems Must be Prepared

- Human Resources
- Medical Supply chain
- Information Systems
- Governance
- Service Delivery
- Financing
Climate Change and Human Resources

- Doctors
- Nurses
- Pharmacies
- Community health workers
- Traditional health care workers
Climate Change and Medicines
Climate Change and Information Systems

- Surveillance
- Monitoring
- Patient tracking
Climate Change and Governance
Climate Change and Service Delivery
What is Health System Strengthening?

- **Strengthening** health systems goes beyond supporting the system
  - Supporting focuses on filling gaps to produce better **short term outcomes**
  - Strengthening is about making the system function better in the **long term**
A “Cube” View of the Health System

<table>
<thead>
<tr>
<th>WHO Building Blocks</th>
<th>Health Programs</th>
<th>Performance Drivers</th>
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<tbody>
<tr>
<td>Agriculture</td>
<td>Vector-borne Diseases (Malaria)</td>
<td>Extreme Weather</td>
</tr>
<tr>
<td>Health Workforce</td>
<td>Healthcare workers</td>
<td>Inputs</td>
</tr>
<tr>
<td>Pharma &amp; Med Tech</td>
<td>ACT medication</td>
<td>Policies &amp; Regulation</td>
</tr>
<tr>
<td>Information</td>
<td>Surveillance systems</td>
<td>Organizational Structures</td>
</tr>
<tr>
<td>Leadership &amp; Governance</td>
<td>Malaria management</td>
<td>Behavior</td>
</tr>
<tr>
<td>Service Delivery</td>
<td>IRS/Nets</td>
<td>Adhering to protocols</td>
</tr>
<tr>
<td>Financing</td>
<td>Free services</td>
<td>Rational drug use</td>
</tr>
</tbody>
</table>

- Health Programs
- Performance Drivers
- Inputs
- Policies & Regulation
- Organizational Structures
- Behavior
- Adhering to protocols
- Rational drug use
- Incentives
- Accountability
- Quality assurance
- Care seeking
- Service vouchers
- Data-based planning
- Timeliness, quality
- National health budget
- Provider payment
- Service vouchers
- Accreditation, performance review
- Pre- and in-service training standards
- Logistics systems
- Health information systems (various levels)
- Roles & responsibility
- Protocols and guidelines
- Accountability
- Quality assurance
- Care seeking
- Incentives
A “Cube” View of the Health System
Inputs vs. Other Key HSS Performance Drivers

[Diagram showing a 3D matrix with categories such as Health Workforce, Pharma & Med Tech, Information, Leadership & Governance, Service Delivery, Agriculture, Vector-borne Diseases (Malaria), Extreme Weather, Inputs, Policies & Regulation, Organizational Structures, Behavior, Training, Pre- and in-service training standards, Procurement and Logistics system, Logistics systems, Management, Roles & responsibility, Accountability, Incentives, Health Information systems (various levels), Data-based planning, Timeliness, quality, External funding, National health budget, Provider payment, Service vouchers, Free services, External funding, National health budget, Provider payment, Service vouchers.]
The Connection Challenge

- Awareness!
- Measurement
  - Monitoring
  - Reporting
  - Verification
  - Attribution
Resilience

- Healthy health systems are like healthy ecosystems
- Health systems must be dynamic, resilient to respond to new challenges
Thank you!

Photos by: www.beeherd.biz, and Abt Associates Inc.
What do we need to do to protect health from climate change?

Diarmid Campbell-Lendrum
Team Leader, Climate Change and Health, Public Health and the Environment Department, WHO Geneva
Without effective responses, climate change will compromise:

- **Water quality and quantity**: Contributing to a doubling of people living in water-stressed basins by 2050.

- **Food security**: In some African countries, yields from rain-fed agriculture may halve by 2020.

- **Control of infectious disease**: Increasing population at risk of malaria in Africa by 170 million by 2030, and at risk of dengue globally by 2 billion by 2080s.

- **Protection from disasters**: Increasing exposure to coastal flooding by a factor of 10, and land area in extreme drought by a factor of 10-30.
Global agreements cover climate-health links

Health in sustainable development and climate treaties:

- Article 1 of the 1992 Rio Declaration: affirms centrality of human beings, and health, in sustainable development
- Article 1 of the UNFCCC: Places health as a priority alongside ecosystems and economic development
- Article 4.1 (f): commits countries to assess health implications of climate polices

Climate change in health treaties:

- 2008 World Health Assembly Resolution commits counties, and WHO, to assess evidence and strengthen health systems to respond to climate change.
The public are particularly engaged with the health dimension of climate change

Globescan poll in 30 countries (UNDP 2007):

“Now I would like to ask you some questions about climate change, which is sometimes referred to as global warming or the greenhouse effect. Which ONE of the following possible impacts most concerns you personally, if any?”
We have effective "adaptation" interventions, at least in the medium term

We have proven interventions for climate-sensitive risks (vector control, water and sanitation etc.) – we need to expand coverage, and ensure that they are climate resilient.

Change in malaria endemicity class, 1900-present: (Gething et al, Nature, 2010)
Expanding technical resources, capacities and experience

The health and environment communities already have:

- A wealth of evidence and technical guidance, from vulnerability assessment to adaptation planning.
- Regional frameworks for health and climate implementation.
- Major projects on health adaptation to climate change, in 16 countries, in all regions of the world.

WHO projects on health adaptation to climate change
"Health benefits from reduced air pollution as a result of actions to reduce greenhouse gas emissions... may offset a substantial fraction of mitigation costs" – IPCC, 2007
Economic evidence for more coherent climate change and health policy

McCollum et al, Nature Climate Change, October 2011
BUT: We are not yet converting this into consistent operational support

- Almost all countries now identify health as a priority for climate change, but less than 30% of least developed countries have adequate health vulnerability assessments and health adaptation plans.

- International investment in health adaptation is currently less than 0.5% of expected health damage costs.

- Of the 13 main economic models informing mitigation decisions, only one takes account of health cobenefits.
We are not yet serious enough about sustainable, preventive public health

Each year from 2000-2008:
- life expectancy rose 0.5%
- health costs rose 6%

Factors influencing health:
- Environment
  - Illicit drugs
  - Physical Inactivity
- Tobacco
- Alcohol
- Unsafe Sex
- Other

World-wide health expenditures:
- Treatment & Overhead
- Prevention < 5%

Source: Estimated from OECD, WHO, and Prevention Institute data
**Baseline Capacity and Risk Assessments:**
- Climate and health vulnerability and adaptation assessments
- Assessments of programme capacity
- Definition of monitoring and evaluation frameworks

**Integrated Environment and Health Surveillance:**
- Risk mapping and establishment of early warning systems for climate sensitive risks:
- Integration of environment and health monitoring, and response plans

**Environmental Management:**
- Health impact assessment for decisions in other sectors
- Management of ecosystem services, and risk factors to health

**Scale-up and climate proofing of interventions for climate-sensitive health impacts:**
- Integrated vector management for vector-borne disease
- Water treatment and safe storage
- Legislation and enforcement for air quality

**Strengthening of health capacities in disaster management**
- Inclusion of health in DRR and response plans
- Resilient and sustainable provision of energy and water to health facilities

<table>
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<tr>
<th>Multisectoral Governance and coordination:</th>
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<tbody>
<tr>
<td>Health input on env., climate, devp, Policy, and vice versa.</td>
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<table>
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<tr>
<th>Capacity building:</th>
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<tr>
<td>Institutional, professional capacity, and resource mobilization in response to local assessment</td>
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<table>
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<tr>
<th>Research:</th>
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<tr>
<td>Stakeholder driven research, focusing on cost effectiveness, equity, and sustainability</td>
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<th>Awareness raising and social mobilization:</th>
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<tr>
<td>Communication for behavioural impact from national to community level</td>
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**Become more operational:**
WHO "minimum package" for health resilience to climate change
Ensure that green growth also enhances health

"while the climatic effects of mitigation measures are long-term and dispersed throughout the world, the health benefits are immediate and local" – WHO Director General Margaret Chan, 2009
Conclusions

- Climate change is a clear and present danger to health.
- In the short-term, protecting health from climate change is "preventive public health + “.
- Early and strong mitigation is essential to safeguard health in the long term, and bring immediate benefits as well.
- We have a lot of the necessary evidence, experience, and mechanisms to address this challenge.
- We need to build this into a more positive, coherent, and sustainable vision of global health.
More information:

World Health Organization
http://www.who.int/

Public Health and Environment
http://www.who.int/phe/en/

Global Environmental Change
http://www.who.int/globalchange/

Climate Change
http://www.who.int/globalchange/climate/

campbellllendrumd@who.int
Health Benefits of the Low Carbon Economy

Professor Sir Andy Haines
Health co-benefits from the ‘low-carbon’ economy (Haines et al Lancet 2009)

Through policies in several sectors e.g.

- Housing
- Transport
- Food and agriculture
- Electricity generation
Health and GHG benefits of Indian improved stove programme - 150 m over 10 years

Wilkinson P Smith KR et al 2009

- 2 Million premature deaths averted (mainly women and children)
- **Reductions** in black carbon, methane, ozone precursors ~ 0.5-1.0 billion tonnes of CO$_2$ eq over the decade

Cost <$50 per household every 5 years
### Benefits of household energy efficiency in the UK
(combined insulation and ventilation control improvements)  
(Wilkinson et al 2009)

<table>
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<tr>
<th>Impacts</th>
<th>Reduced exposures e.g. to fine particles, radon, cold, mould, tobacco smoke</th>
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<tbody>
<tr>
<td>Premature deaths averted</td>
<td>~ 5400/ year</td>
</tr>
<tr>
<td>Mt-CO$_2$ saved (vs 1990)</td>
<td>55</td>
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Urban Transport Pathways modelled: London and Delhi (Woodcock et al. 2009)
## Health effects of sustainable transport strategy: by disease (Delhi)

<table>
<thead>
<tr>
<th>Disease</th>
<th>Change in disease burden</th>
<th>Change in premature deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ischaemic heart disease</td>
<td>11-25%</td>
<td>2490-7140</td>
</tr>
<tr>
<td>Cerebrovascular disease</td>
<td>11-25%</td>
<td>1270-3650</td>
</tr>
<tr>
<td>Road traffic crashes</td>
<td>27-69%</td>
<td>1170-2990</td>
</tr>
<tr>
<td>Diabetes</td>
<td>6-17%</td>
<td>180-460</td>
</tr>
<tr>
<td>Depression</td>
<td>2-7%</td>
<td>NA</td>
</tr>
</tbody>
</table>
Predicted Healthcare Savings - England and Wales - from increased active travel (cumulative, discounted) (Jarrett et al forthcoming)

- Diabetes
- Dementia
- CHD
- Cerebrovascular disease
- Breast cancer
- Colorectal cancer
- Depression
- RTIs
- TOTAL
80% of total emissions in sector from livestock production, technological improvements necessary but insufficient.

Reducing animal source saturated fat by 30% in the UK could reduce heart disease deaths by ~15% (~18,000 premature deaths) and a similar % in São Paulo, Brazil.
Air pollution impacts vs CO$_2$ emissions

Source: Markandya A, Wilkinson P. Lancet 2007 71
Premature Deaths Avoided in 2030 from reduced particulate air pollution due to lower carbon electricity generation

(Markandya et al 2009)
Simultaneously mitigating near–term climate change and improving health and food security  
Shindell et al Science 2012

- **Identified 14 measures** to target black carbon and methane to reduce warming by ~ 0.5°C by 2050
- **Avoids 07-4.7 million deaths** annually from outdoor air pollution
- **Reduced ozone improves annual crop yields** by 30-135 million metric tons p.a. by 2030
- **Marginal abatement costs** $250 /metric ton
- **Benefits of methane reductions** $700-5000/metric ton
Climate change has far reaching adverse impacts on health but low carbon policies can improve health and the economy. 

*Health professionals have a role in promoting healthy low carbon policies*

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**CO-BENEFITS RESEARCH WAS SUPPORTED BY A CONSORTIUM OF FUNDING BODIES LED BY THE WELLCOM Trust AND PUBLISHED IN THE LANCET 2009 INVOLVING 55 RESEARCHERS FROM UK, USA, INDIA, CANADA, AUSTRALIA, SPAIN, FRANCE, NEW ZEALAND, WHO GENEVA**

**ECONOMIC IMPACTS RESEARCH COMMISSIONED AND FUNDED BY THE POLICY RESEARCH PROGRAMME IN THE DEPARTMENT OF HEALTH. THE VIEWS EXPRESSED ARE NOT NECESSARILY THOSE OF THE DEPARTMENT RESEARCH TEAM: ANDY HAINES (CHAIR), RICHARD D SMITH, MARCUS KEOGH-BROWN, HENNING TARP JENSEN, ZAID CHALABI, ALAN DANGOUR, MIKE DAVIES, PHIL EDWARDS, TARA GARNETT, MOSHE GIVONI, ULLA GRIFFITHS, IAN HAMILTON, JAMES JARRETT, IAN ROBERTS, PAUL WILKINSON, JAMES WOODCOCK,**
1. Why have politicians, the climate community, and some economists apparently been reluctant to make stronger climate impact connections & policies on the basis of health implications -- what it would take to change the conversation, and whether/how this may benefit climate policy?

2. What needs to be done to develop public health systems that are resilient to climate change?
Summary Points

- Climate volatility is a risk factor for health and effects extend into high-income counties
- Climate change has far reaching adverse impacts on health but low carbon policies can improve both human health and the economy
- Smart responses to climate change can bring early health gains
- We have proven interventions for climate-sensitive risks (vector control, heat wave early warning systems, sanitation etc.) – we need to expand coverage, and ensure that they are resilient to more extreme weather events
- In the policy arena, decisions about mitigating climate change are currently too focused on the costs of energy alternatives – it is essential now to include health benefits from a green economy for the complete objective assessment
- Focusing on strengthening health systems, we will need systems resilient to climate and other disruptions, and far better integrated with other sectors
- We need to build all of this to a more positive, coherent, and sustainable vision of global health
Audience

QUESTIONS & ANSWER SESSION

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