

# Ambiente, energia e salute

Comacchio, 16/09/2011

## Possibili impatti sulla salute dei cambiamenti climatici

Dott. Claudio Po

**Titolo dell'argomento trattato:** Possibili impatti sulla salute dei cambiamenti climatici

**Cosa è** (definizione dell'argomento o area tematica):

I cambiamenti climatici in atto avvengono su scala globale, producendo una catena di effetti che finisce per riguardare ogni aspetto della vita, dal bilancio del piccolo comune, ad un aumento della diffusione delle malattie infettive.

**Cosa serve** (scopo e obiettivo dell'argomento o area tematica):

Far capire quanto sia interconnesso l'uso dell'energia fossile, con il cambiamento climatico in atto, spiegandone i meccanismi di base, effetto serra, fenomeni atmosferici estremi, ecc...

**Come si applica/attua** (metodo, azioni, processi, procedure..):

Dalla globalità dei cambiamenti in atto ne scaturisce un nuovo modo per affrontare la valutazione dei rischi, affrontare i rischi per scenari, migliora le capacità di pianificazione di sanità pubblica, aiuta a ragionare non solo sulla dimensione ecologica ma anche economica del cambiamento.

**Cosa si ottiene** (risultati, esiti, miglioramenti attesi):

Gli effetti che possono emergere dalla comprensione del cambiamento climatico in atto possono aiutare a generare politiche, progetti, prodotti più amici del clima e della salute.

**Cosa consultare per approfondire** ( bibliografia, testi, siti, indicazioni normative...):

<http://chge.med.harvard.edu/programs/ccf/index.html>

<http://chge.med.harvard.edu/about/faculty/epstein.html>

<http://www.thelancet.com/series/health-and-climate-change>

[http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_080702](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_080702)

<http://www.who.int/globalchange/publications/en/>

# Contenuti

- **Clima ecologia e salute:**
  - effetti diretti (ondate di calore, picchi di freddo, qualità dell'aria)
  - eventi estremi (morti, feriti, epidemie, effetti psicologici)
  - effetti indiretti (produzione di alimenti ed energia, emigrazione, inurbamento, malattie da vettori)
- **Dimensione economica**

# QUESTO SET DI DIAPOSITIVE E' PER LA MAGGIOR PARTE TRATTO DAL CORSO SALUTE E AMBIENTE CHE SI TENE ALL' HARVARD MEDICAL SCHOOL OF PUBLIC HEALTH

The screenshot shows a Mozilla Firefox browser window displaying the website for the Center for Health and the Global Environment at Harvard Medical School. The browser's address bar shows the URL <http://chge.med.harvard.edu/index.html>. The website features a large banner image of a colorful nudibranch (sea slug) on a coral reef. Below the banner, a silhouette of a person with a spear is shown against a sunset background, with the text: "The mission of the Center is to help people understand that our health, and that of our children, depends on the health of the environment, and that we must do everything we can to protect it."

The website header includes the Harvard Medical School logo and the text "HARVARD MEDICAL SCHOOL CENTER FOR HEALTH AND THE GLOBAL ENVIRONMENT". Navigation links include "About the Center", "Publications", "For Educators", "Webcasts", "Events", and "Search".

A "PROGRAMS" sidebar on the right lists several initiatives, each with a representative image:

- Classroom Education (Image: Wind turbines)
- Policymaker Education (Image: US Capitol building)
- Biodiversity and Human Health (Image: Ocean waves)
- Healthy Ocean, Healthy Humans (Image: Ocean waves)
- Climate, Health and Energy (Image: Earth from space)
- Healthy and Sustainable Food (Image: Farm landscape)
- Scientists-Evangelicals Initiative (Image: White dove)

Below the programs list, a "NEWS" section states: "The Center's Director, Eric Chivian, and Associate Director, Paul Epstein, are now Fellows of the AAAS ...".

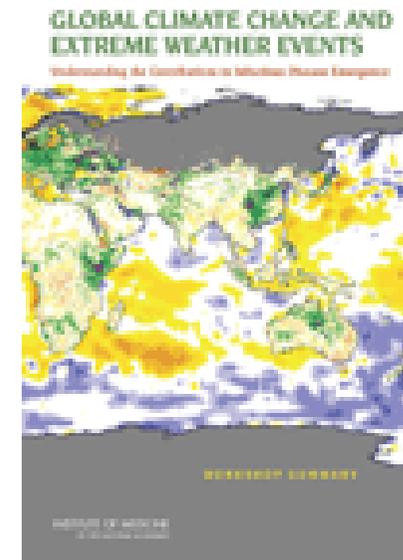
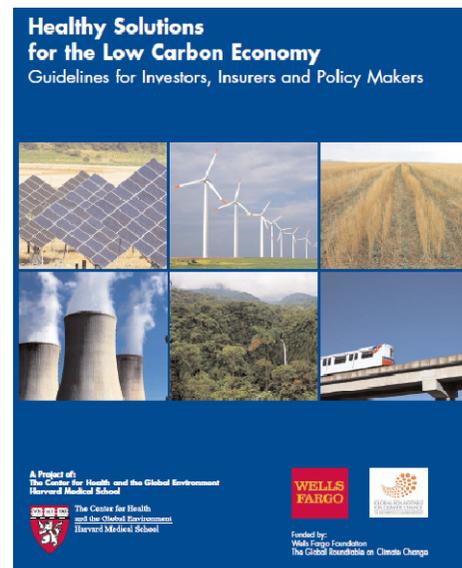
The browser's taskbar at the bottom shows the Start button, several application icons, and the system tray with the time 9:32 and the Zotero logo.

I CONCETTI E LE SPIEGAZIONI SI POSSONO TROVARE ANCHE SUL LIBRO CHE SI SCARICA AL SEGUENTE LINK [http://chge.med.harvard.edu/programs/ccf/documents/ccf\\_report\\_oct\\_06.pdf](http://chge.med.harvard.edu/programs/ccf/documents/ccf_report_oct_06.pdf)



(2005)

Altre fonti (2008):



# POTENZIALI EFFETTI SULLA SALUTE DELLA VARIABILITA' DEL CLIMA

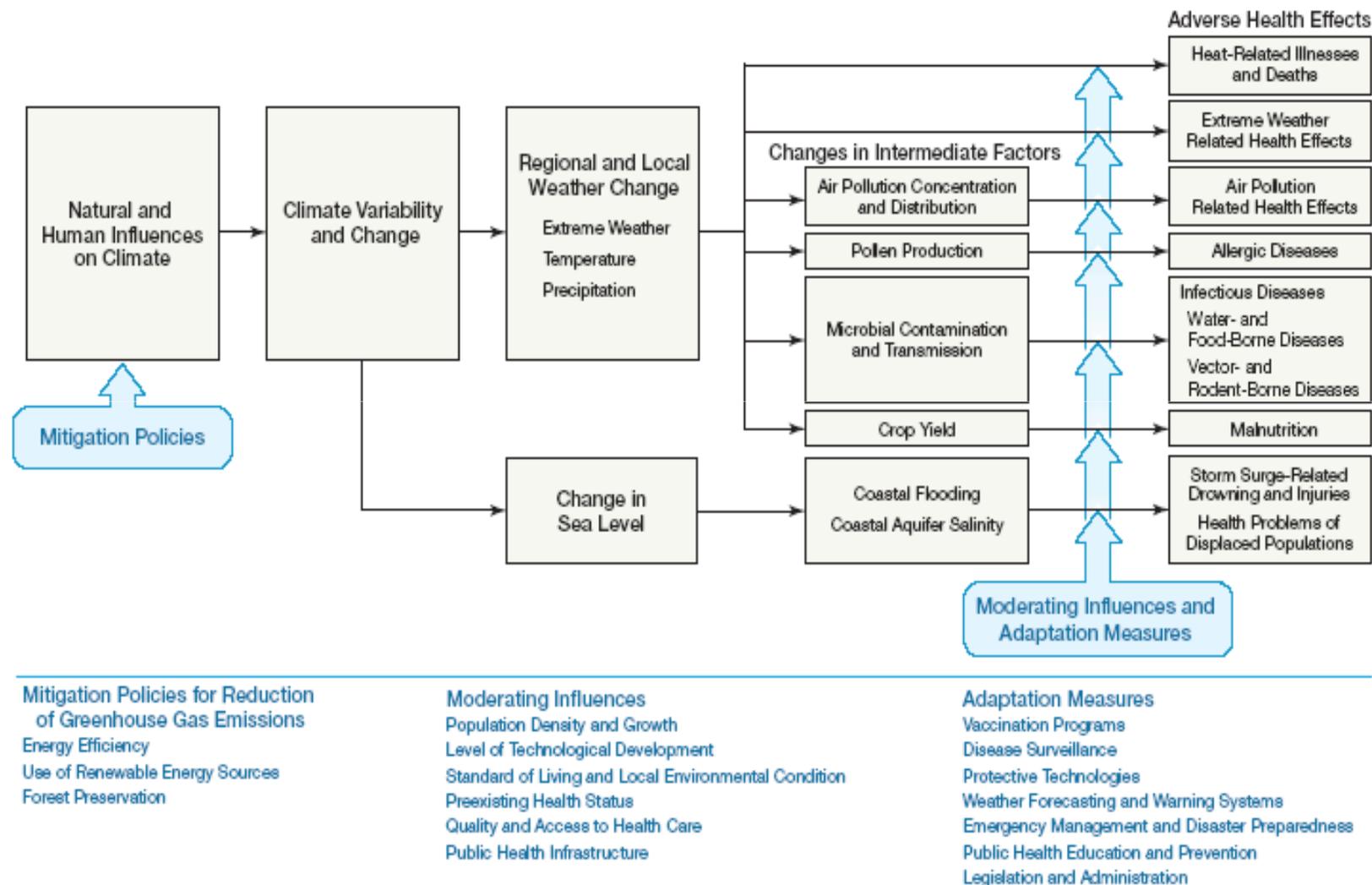
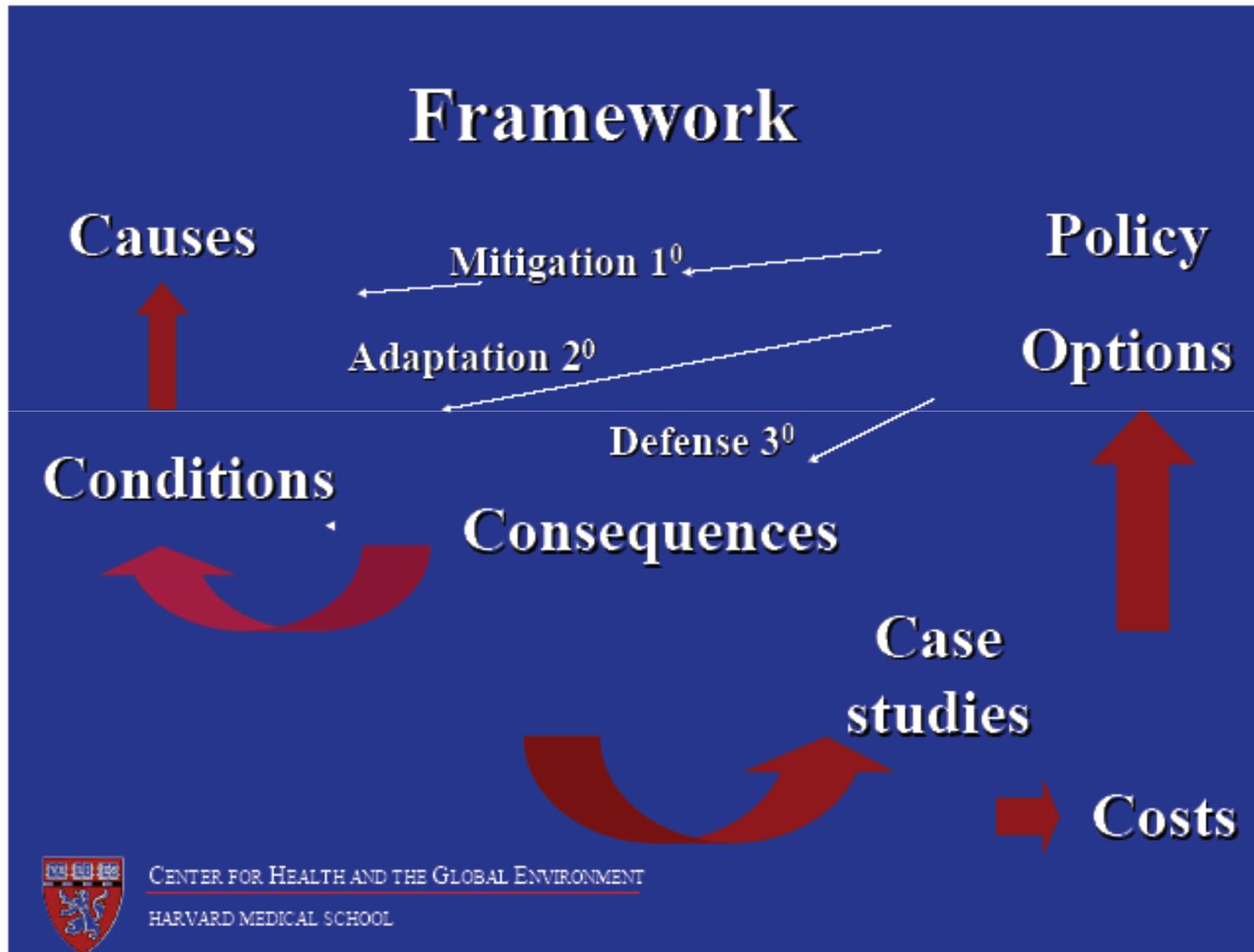


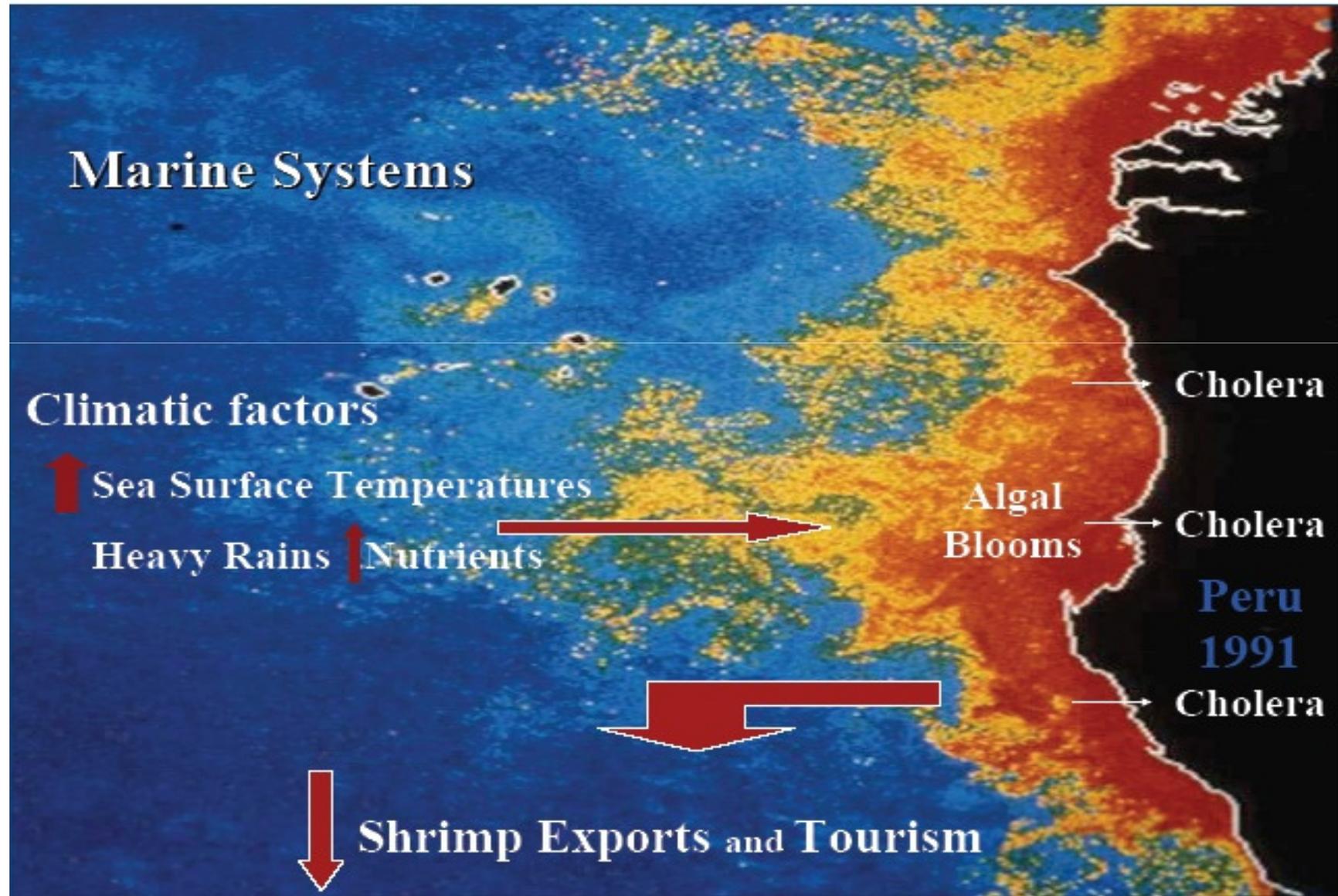
FIGURE SA-2 Potential health effects of climate variability and change.

SOURCE: Reprinted with permission from the American Medical Association from Haines and Patz (2004). Copyright 2004. All rights reserved; adapted from Patz et al. (2000).

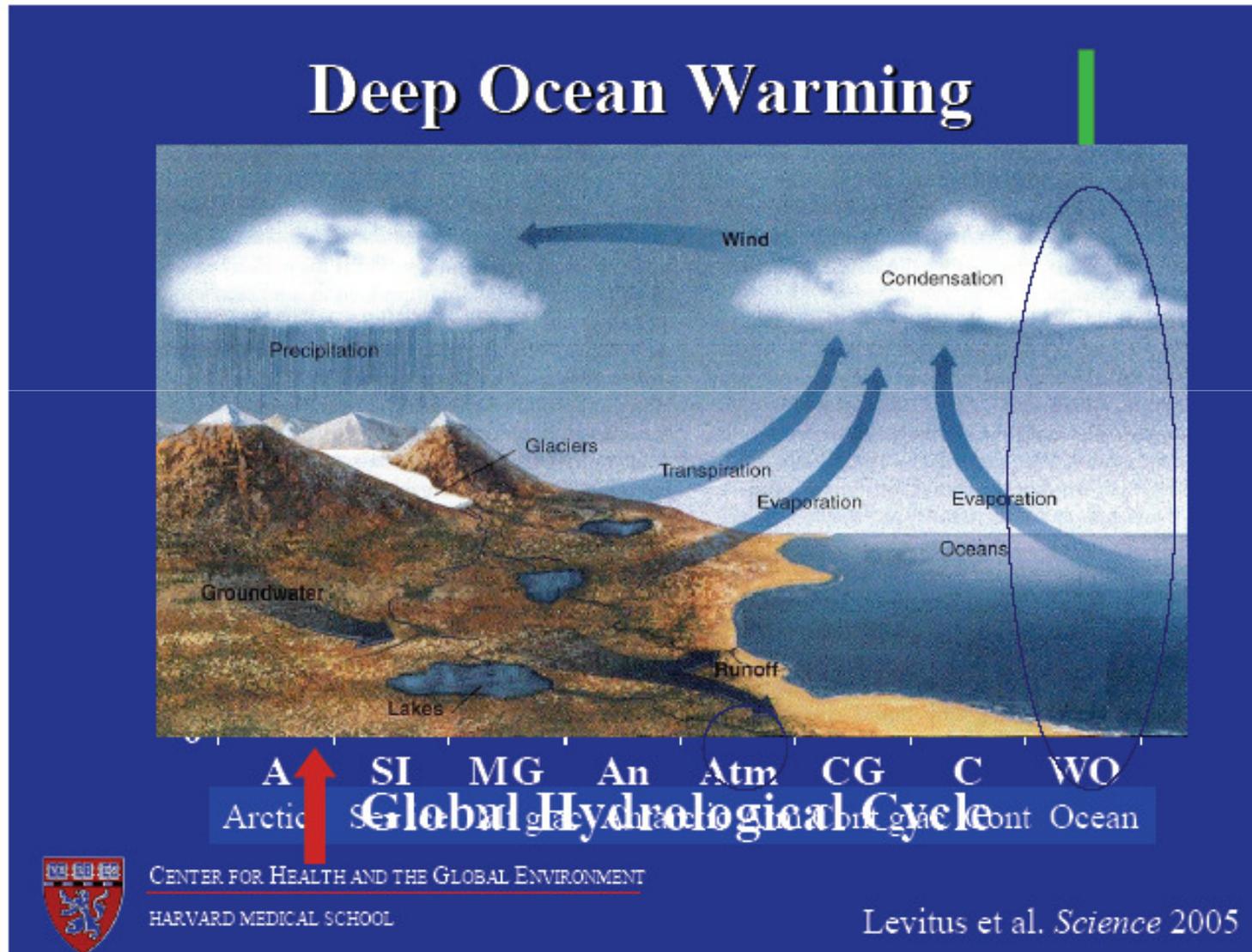
# IL QUADRO GENERALE



# Colera in Perù nel 1991 (niño)



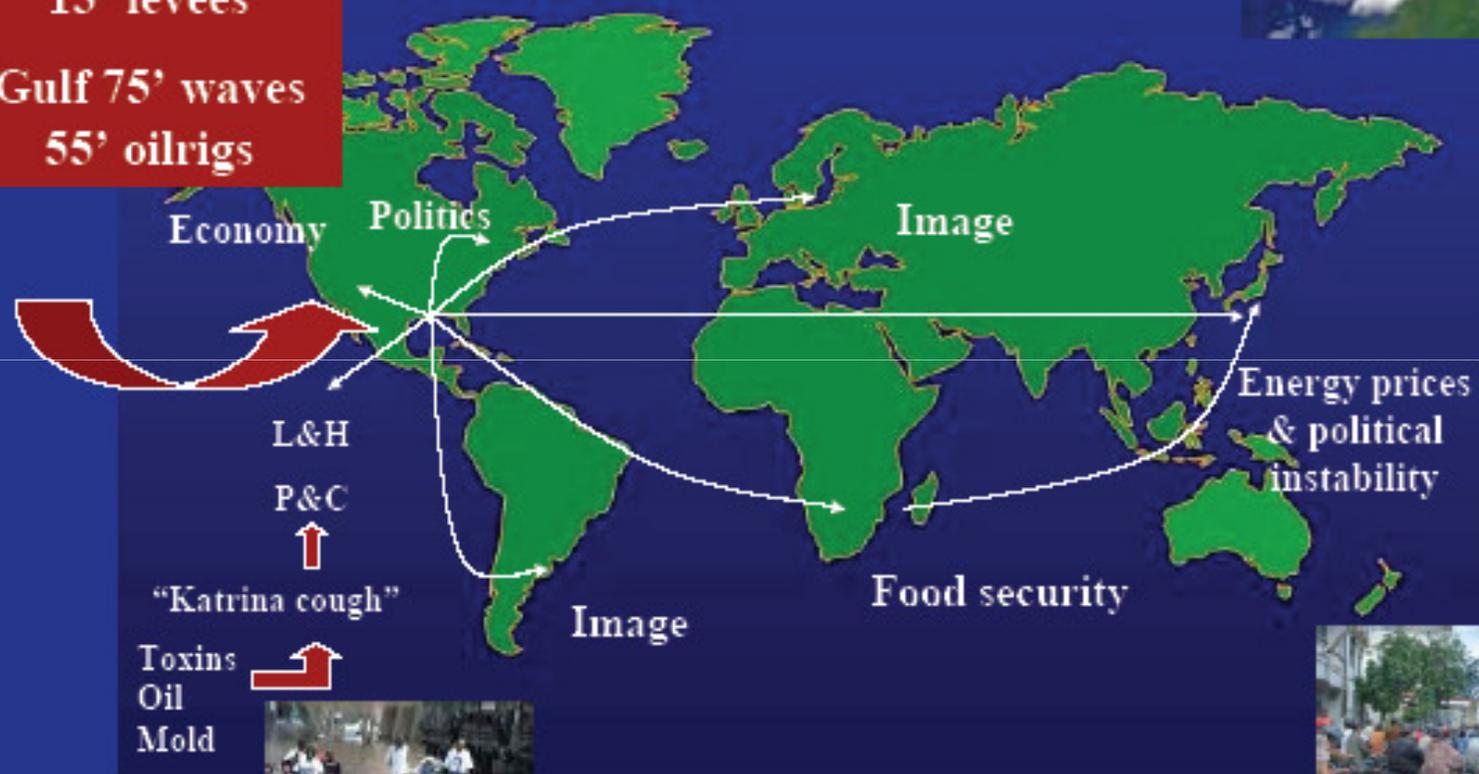
# IL CICLO IDROLOGICO GLOBALE



# Hurricane Katrina



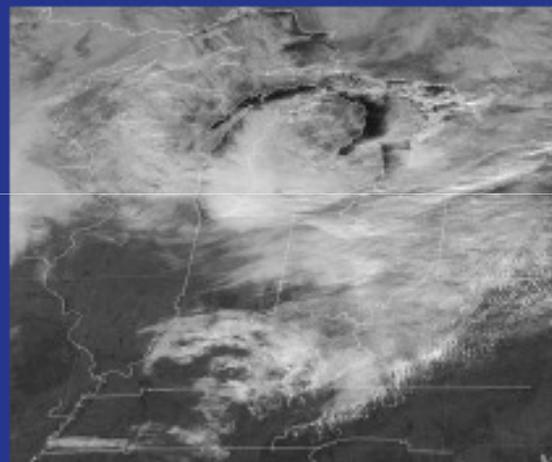
L.  
Pontchartrain  
28' high waves  
13' levees  
  
Gulf 75' waves  
55' oilrigs



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A turning point

# Precipitation over the Continental U.S



**Rain**

**7%**

**>2"/d**

**14%**

**>4"/d**

**20%**

**Snow in Buffalo**  
**12-14 feet**

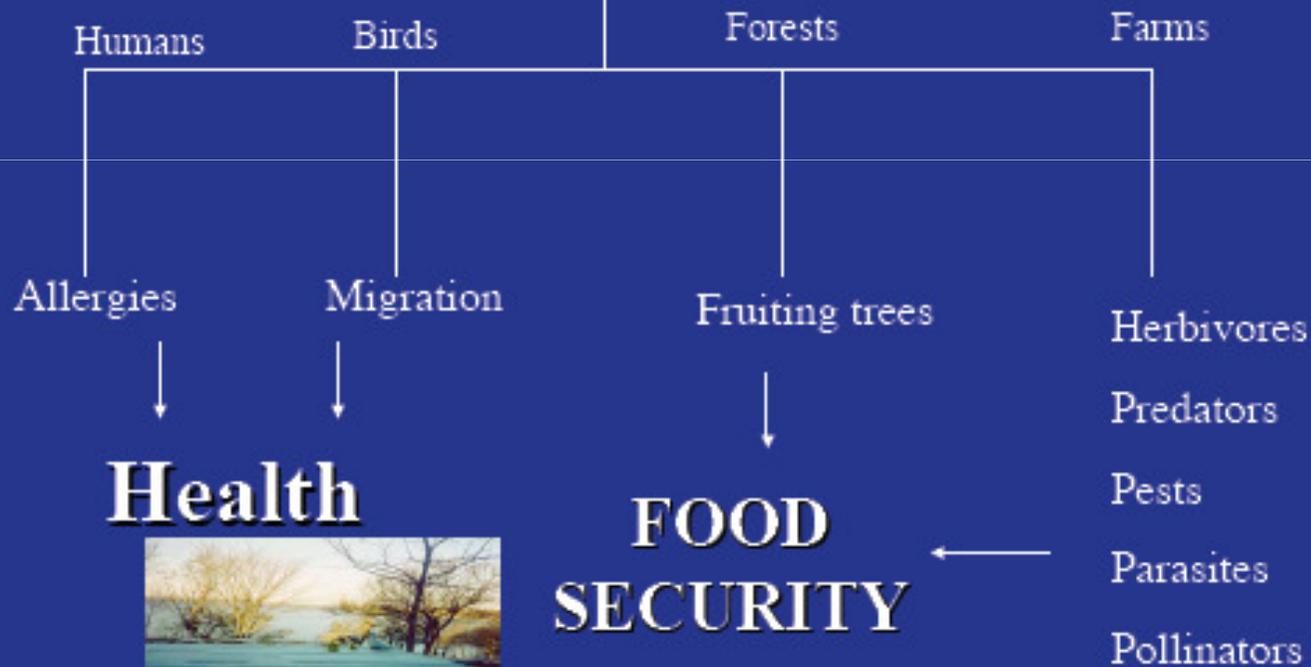


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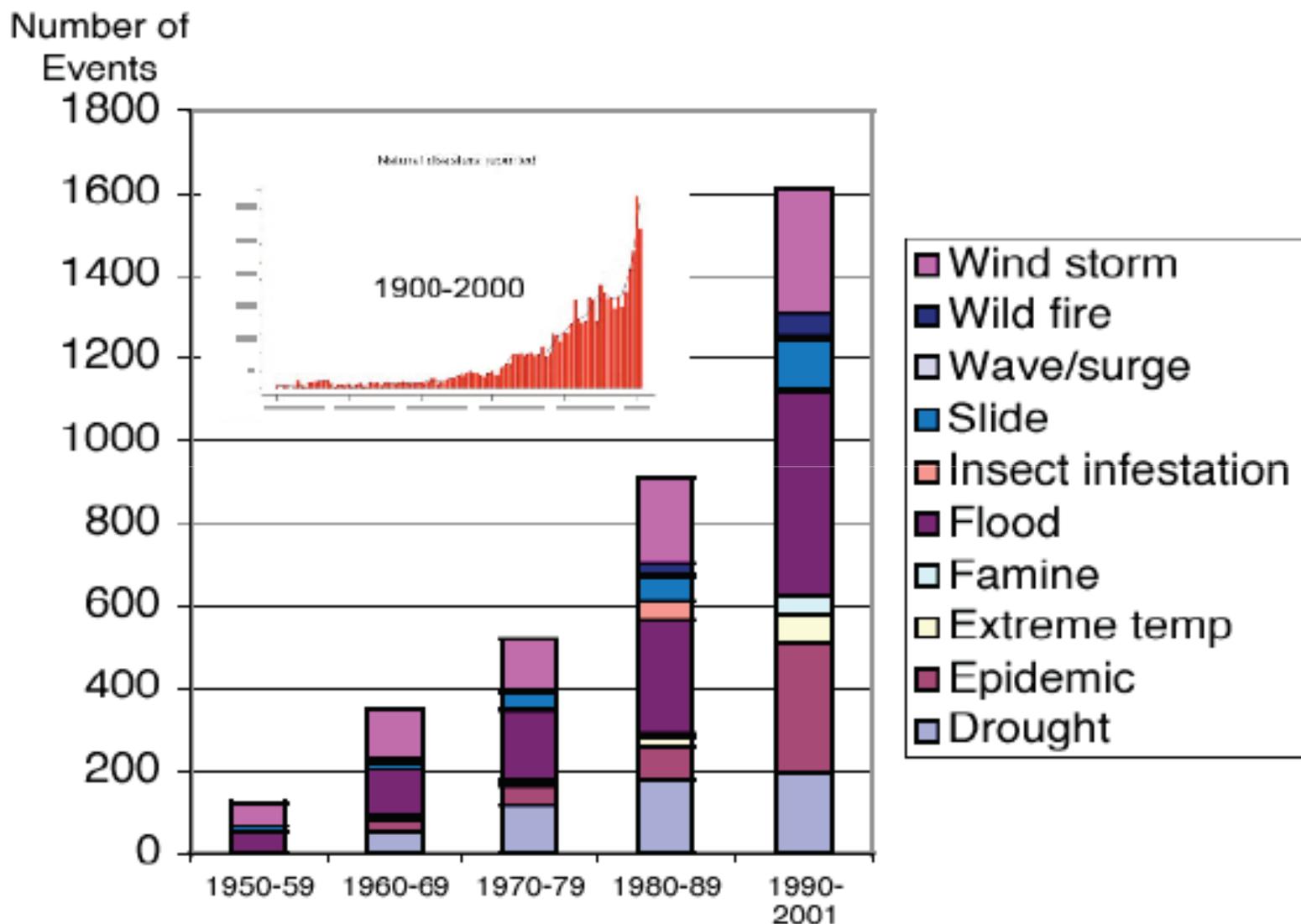
# Freeze-Thaw



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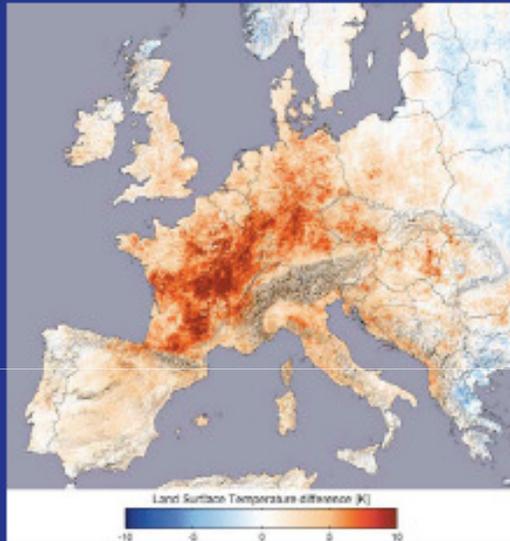
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## Changing Nature and Structure of Events



Sources: OFDA / Center for Research in the Epidemiology of Disasters (CRED) Intl database of Disasters

# Heatwaves: Europe 2003



- Deaths: 21-35,000
- Crops & livestock:  
US\$12.3 billion
- Wildfires:  
1.2 million acres
- Nuclear plant shutdowns
- Hydropower reduced
- Alpine glaciers: 10% lost



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**in Italia, stima 7659 decessi (ISS)**

Fires and floods

## Part of the main

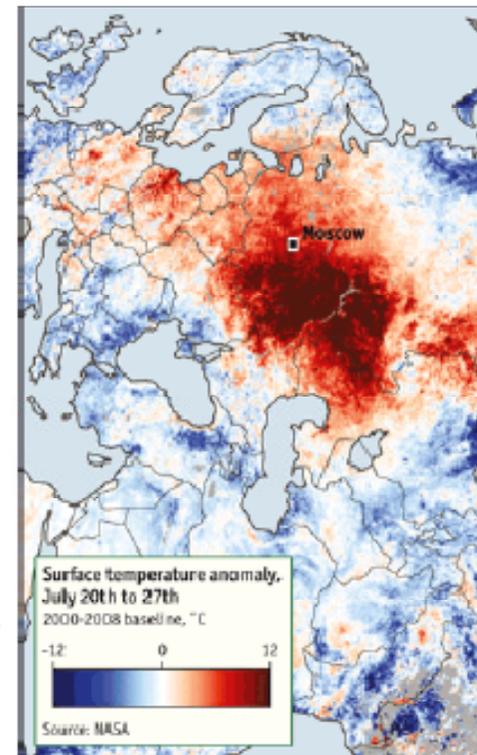
### How the heatwave in Russia is connected to floods in Pakistan

Aug 12th 2010

AS RUSSIA burns to a crisp, thousands of kilometres to the south-west torrential storms visit unprecedented flooding on Pakistan. Both events can be attributed to the same large-scale pattern of atmospheric circulation. They are also both the sort of thing climate scientists expect more of in a warming world.

The upper atmosphere (the part through which the jet streams run) is gently rocked by what are known as Rossby waves—movements of air towards and away from the poles. These waves usually travel east or west, depending on various conditions. But they can also stand still, trapping the weather beneath them.

According to Brian Hoskins, a climate scientist at the University of Reading, this year's anticyclones in the Atlantic have produced just such a gridlock in the world of the Rossby waves, with persistent troughs of low pressure over western and central Europe, a ridge of high pressure over Russia, and lows again farther east. The air itself doesn't necessarily sit still, but the pressure patterns which dominate the weather persist. The troughs have seen



# Health impacts are unfairly distributed



Cumulative emissions of greenhouse gases, to 2002

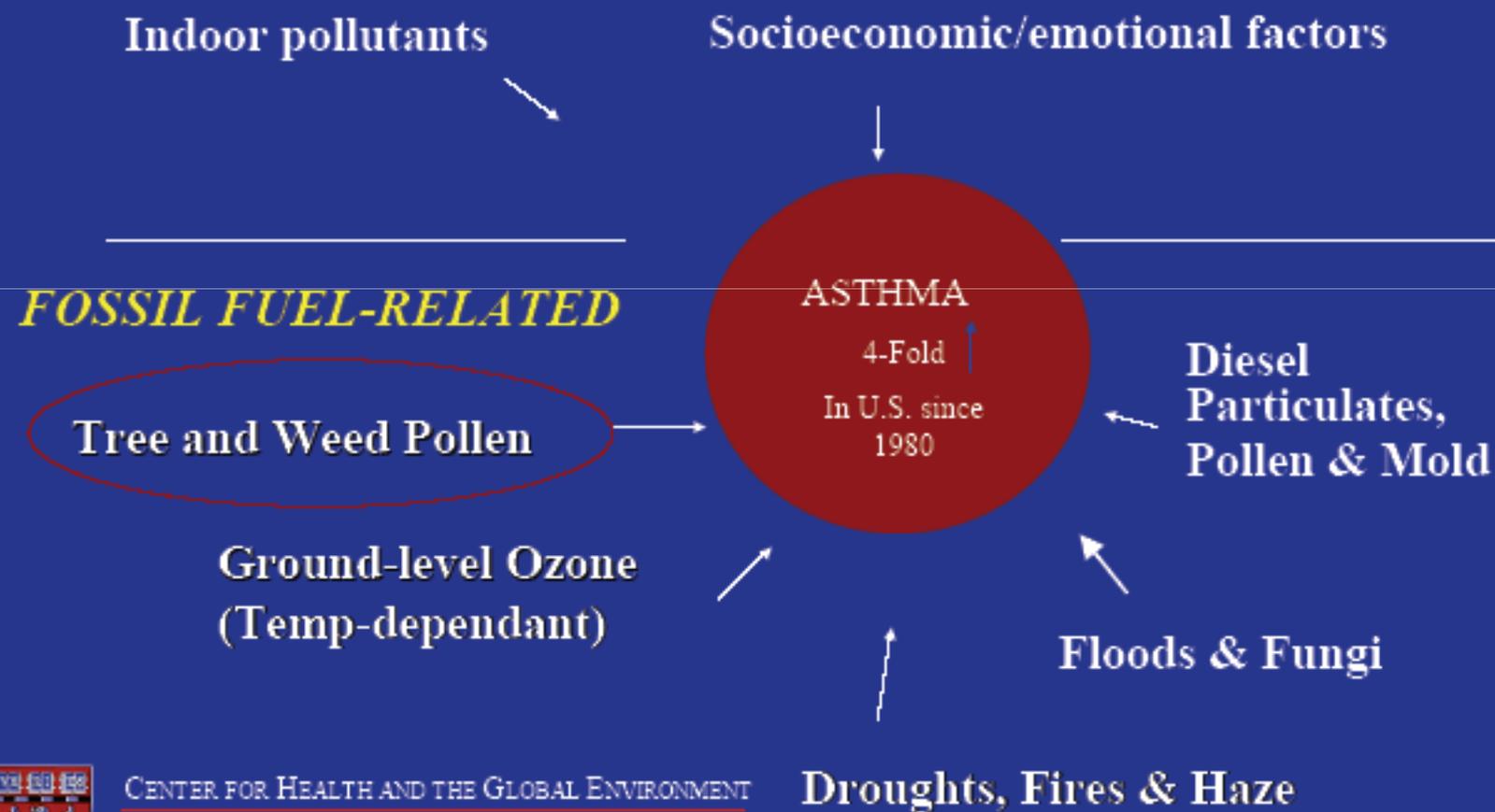


WHO estimates of *per capita* mortality from climate change, 2000

Map projections from Patz et al, 2007; WHO, 2009.



# RESPIRATORY & CARDIOVASCULAR DISEASE

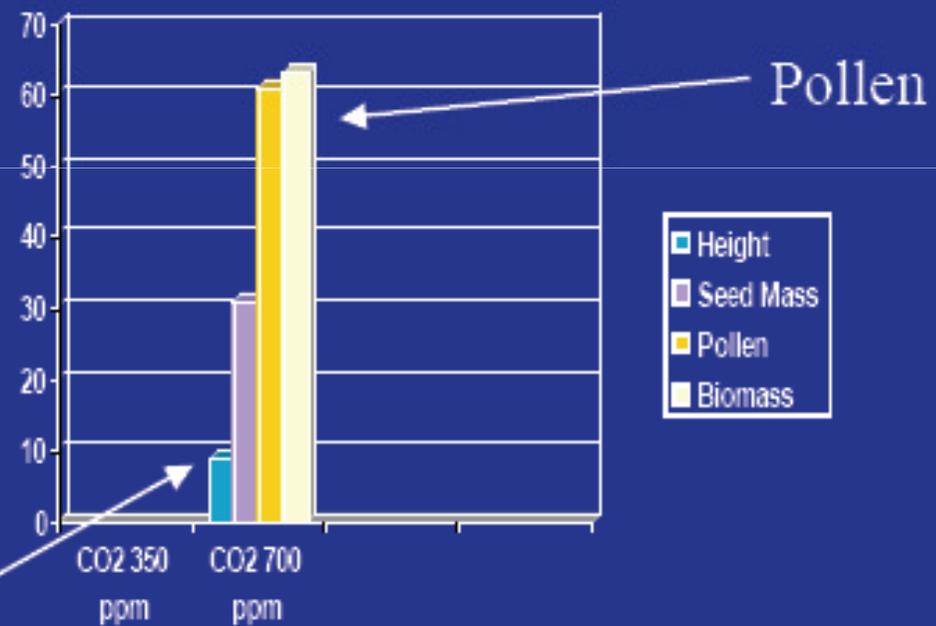




# Asthma and CO<sub>2</sub>

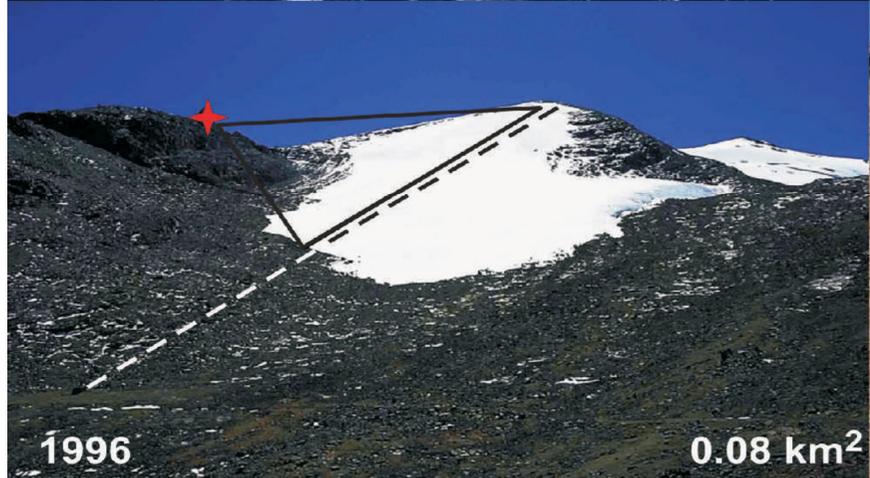
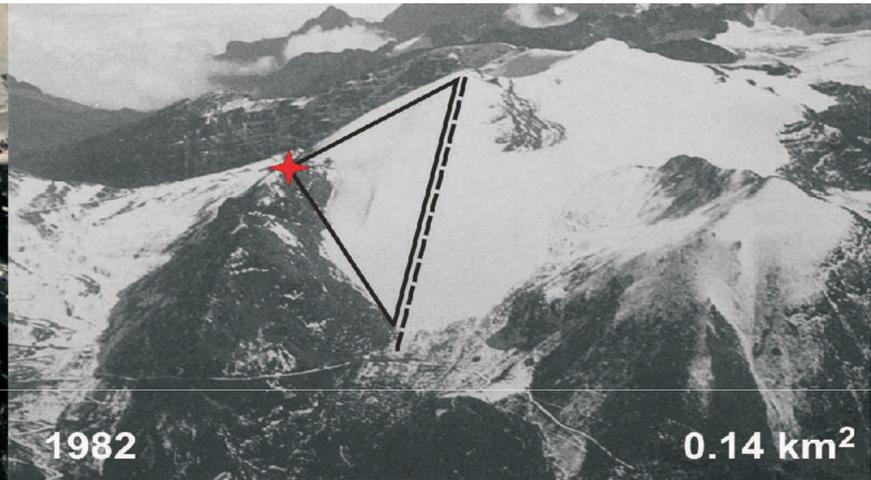
## Ragweed Growth Under Double CO<sub>2</sub>

- Illness
- School absences
- Productivity losses
- Sixth leading cause of chronic disease



Stalks



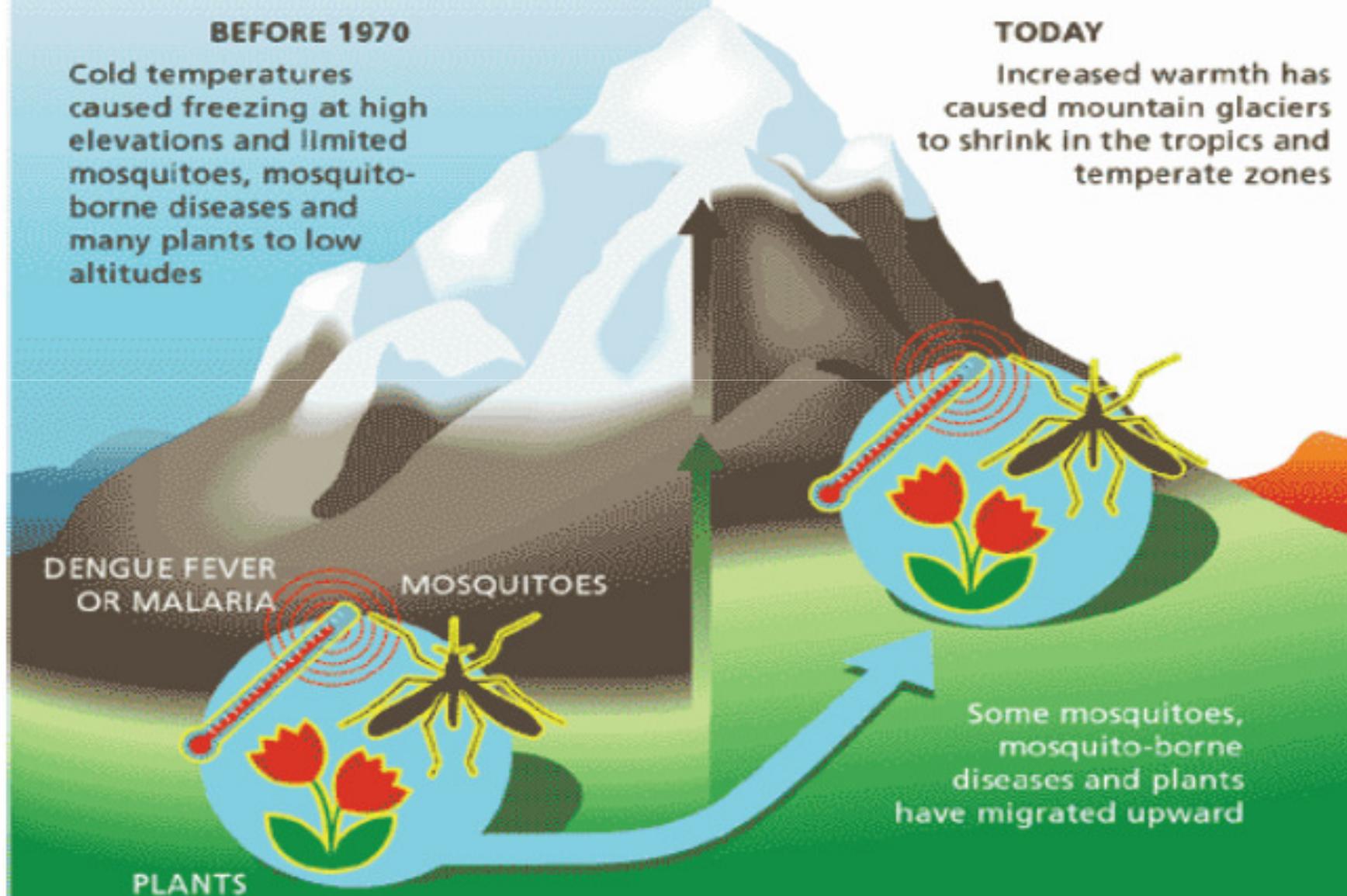


### BEFORE 1970

Cold temperatures caused freezing at high elevations and limited mosquitoes, mosquito-borne diseases and many plants to low altitudes

### TODAY

Increased warmth has caused mountain glaciers to shrink in the tropics and temperate zones



# Vectors



- Mosquitoes



- Bats



- Ticks



- Rodents

- Snails



- Kissing bugs



- Fleas



- Lice



- Tsetse flies

- Plankton



- Water-borne

- Food-borne

- Air-borne

- Person-to-Person

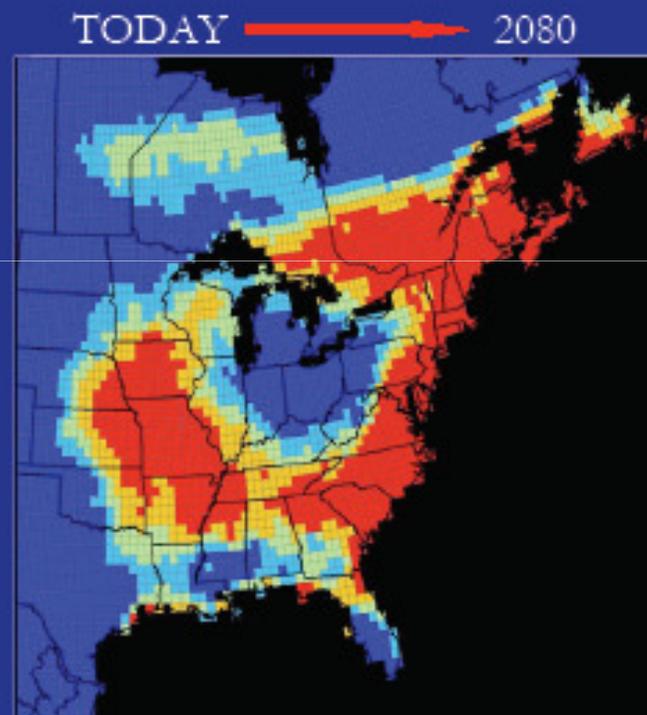


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# Lyme Disease

## Suitable range of vector

- % Change in suitable area by 2080:  
North America: +69%  
United States: +28%  
Canada: +213%



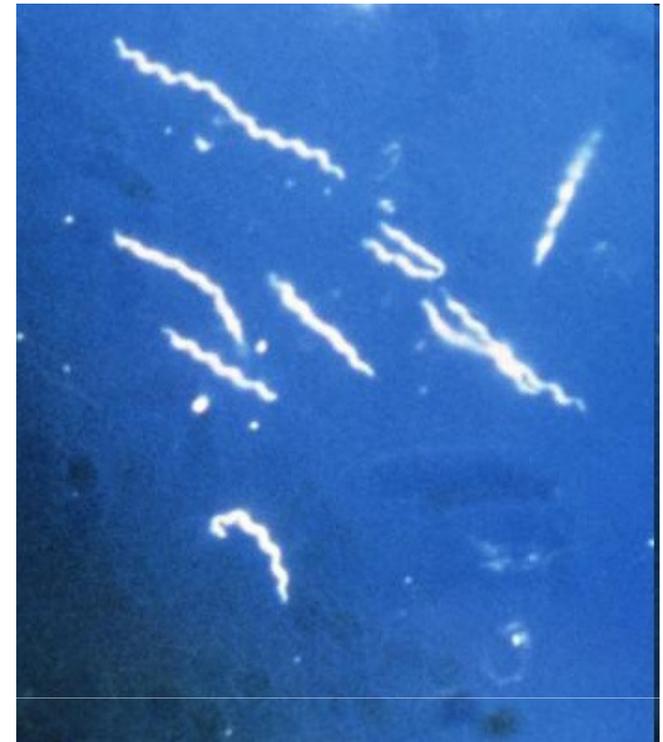
Brownstein et al., 2005



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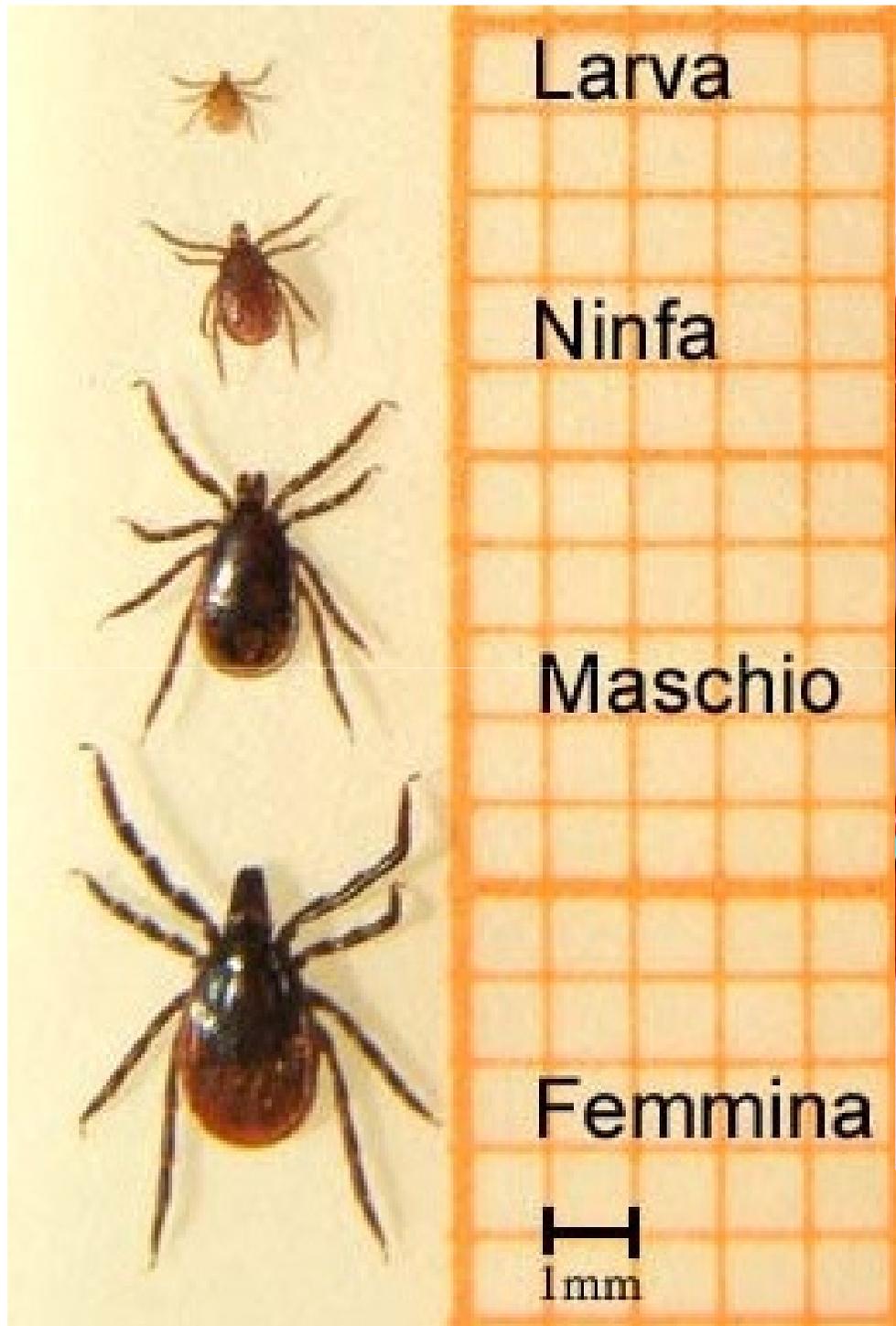
# MALATTIA DI LYME

(in E-R 80 casi/anno,  
FO, RE; dal 2004)

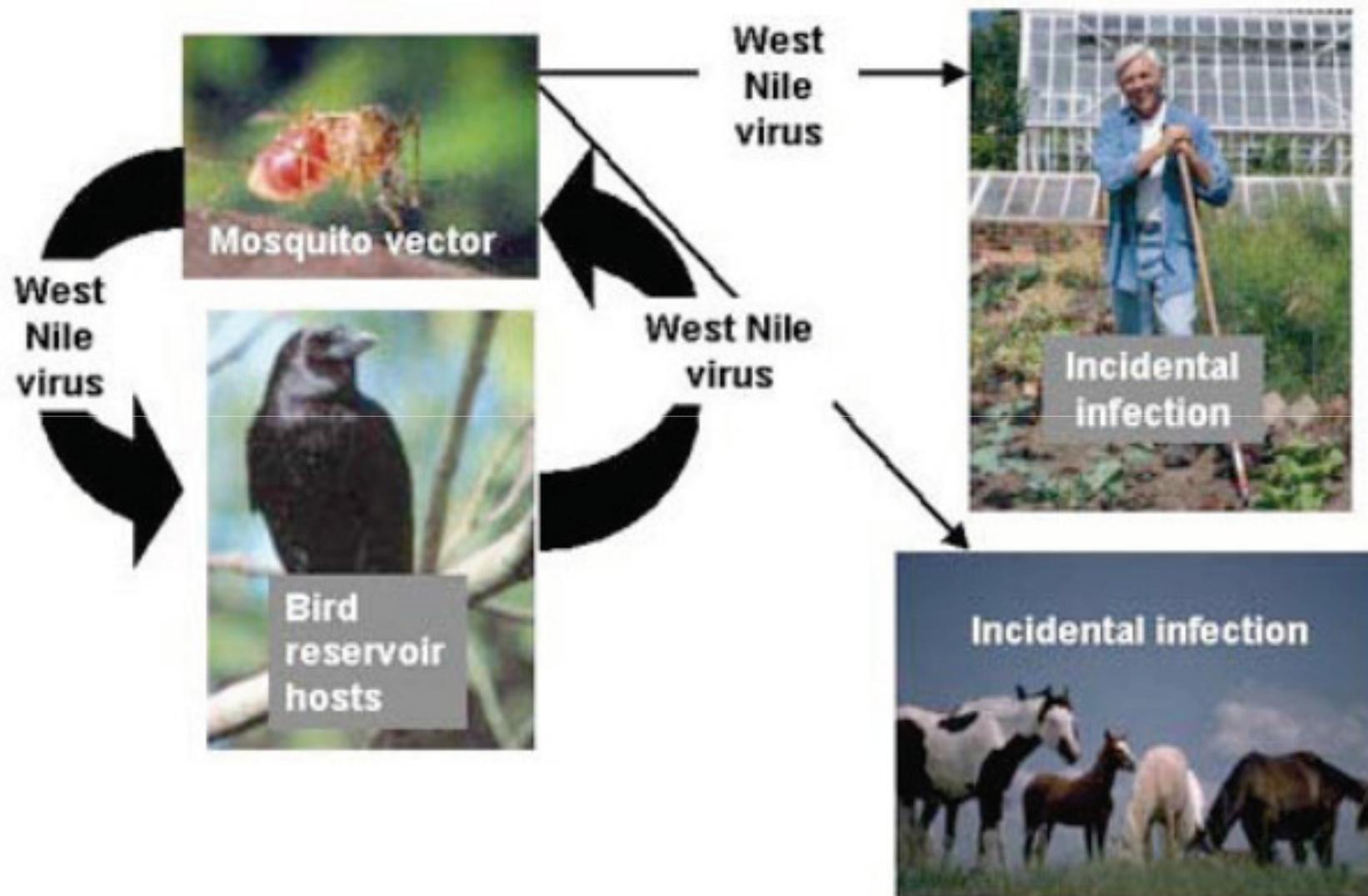


# RIMOZIONE ZECCA





# West Nile Virus Transmission Cycle



**CDC**

**in Italia dal 1998, focolaio 2009 in E-R**

# Potential Ecological Ripples of West Nile

↓ Raptors



↑ Rodents



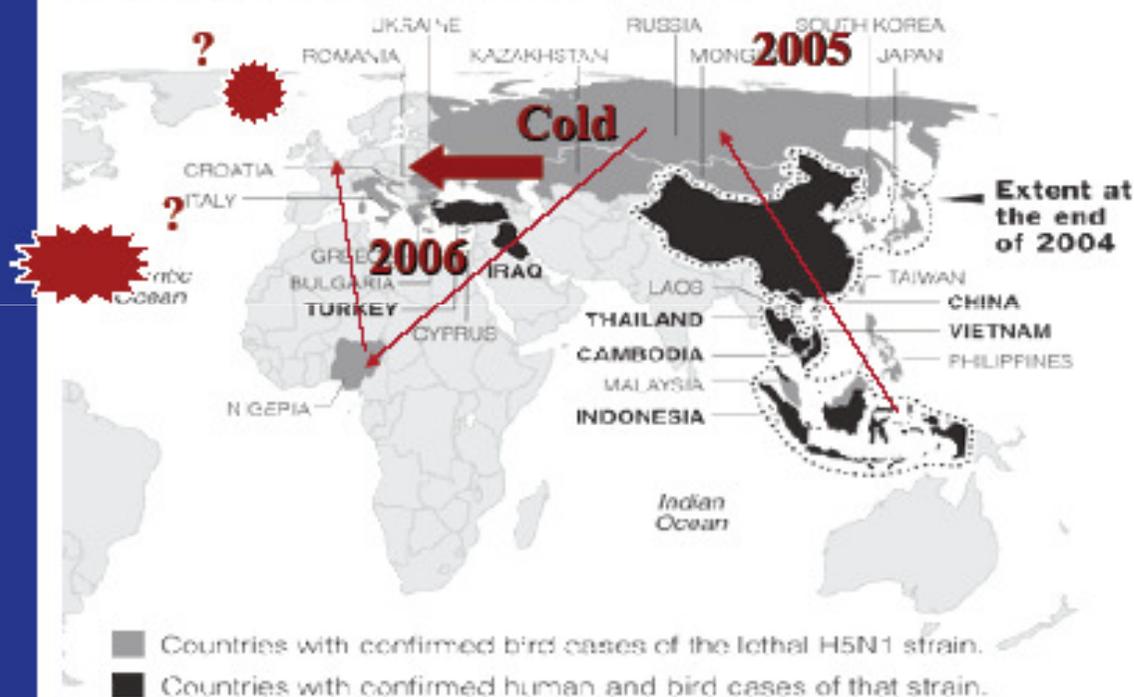
Lyme disease  
Hantaviruses  
Arenaviruses  
Leptospirosis  
Toxoplasmosis  
Plague  
Food security



# AVIAN FLU and BIRD MIGRATION



## Worldwide Avian Flu Cases



Sources: World Health Organization, World Organization for Animal Health

## Avian Pandemic

- Travel
- Business
- Poultry prices
- Livelihoods
- Food security
- H5N1 in humans



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# Birds killed or culled: 230 million

# Climate Change Futures



## Infectious and Respiratory Disease

Malaria	3,000 children/day	5-17.4% GDP 1.3 growth rate % pts./yr
West Nile virus	Wildlife	\$500 million/yr for S&R
Lyme disease	25,000 cases/yr	\$2.5 billion/5 years
Asthma	Fourfold increase in US	\$16 billion

## Extreme Weather Events

Heat waves 2003 summer	Mortality, crops, forests, Alps	Over \$15 billion
Floods 2002 summer	Drownings, WBDOs, VBDs	Over \$16 billion



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Swiss Re and UNDP

# Climate Change Futures

## Natural and Managed Systems



Forests Beetles and wildfires	Millions of acres, timber industry, watersheds, wildlife, carbon pulse	\$3 billion in 2003 in US
Agriculture EWEs		
Pests, pathogens and weeds	Food security	Over \$120 billion/yr
Marine systems Coral	Food, barriers, salination, livelihoods, insured property	\$800 billion
Bivalves	Food, filtering	\$75-150 million
Water Quality and quantity	Agriculture, health, hydropower	\$10-40 billion in the US projected



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# The Stern Review

**The Costs of Climate Change**



**Damages**

**5-20% global GDP**

**Includes non-linear impacts**

**Adaptation**

**Hundreds of Sbillions**

**Mitigation**

**1% of GDP/yr**

**Could be an underestimate**



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# Health system strengthening: Estimation of required resources for health adaptation

**Estimated global annual cost of climate change adaptation (US\$ billion):**

Sector	World Bank (2005 prices)	UNFCCC (2007 prices)
Period or time point	2010-2050	2030
<b>Health sector</b>	<b>2.0</b>	<b>3.8 - 4.4</b>
Water supply	13.7	9.0 - 11.0
Agriculture, forestry and fisheries	7.6	14.0
Extreme weather	6.7	-
<b>Total health-related</b>	<b>30.0</b>	<b>26.8 - 29.4</b>
<b>Total (all)</b>	<b>89.6</b>	<b>56.8 - 193.4</b>
<b>% health-related</b>	<b>33.4%</b>	<b>13.8 - 47.1%</b>

**All estimates derived by applying unit costs to WHO estimates of health impacts of climate change**

# Azioni possibili



Health Effects of Climate Change in the UK 2008  
An update of the Department of Health report 2001/2002

Edited by Sari Kovats



**Putting health at the heart of the climate change agenda**

**Strengthening public health systems**

**Choosing healthy paths to a low-carbon future**  
(green and safe health services)

**Mobilizing the strength of the health community**

**Stima degli impatti dei CC sulla salute in UK**  
(Costruzione di scenari e stima quantitativa degli impatti economici sul National Health Service - NHS)



**NHS**

**Sustainable Development Unit**

**GRAZIE PER L'ATTENZIONE**

Claudio Po

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