### Climate change and health





a new vision for health

November 2007 - March 2008

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### Content



### Climate change is happening

Climate change affects health

Action is needed "now"

## The Intergovernmental Panel of Climate Change (IPCC) (and Nobel Piece price winner)



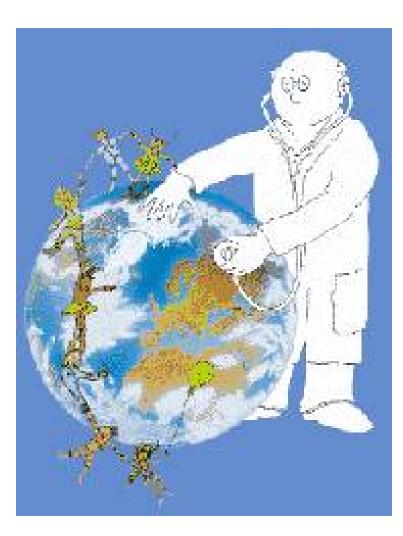
2500 scientific expert reviewers
900 contributing authors
450 lead authors from
130 countries
6 years

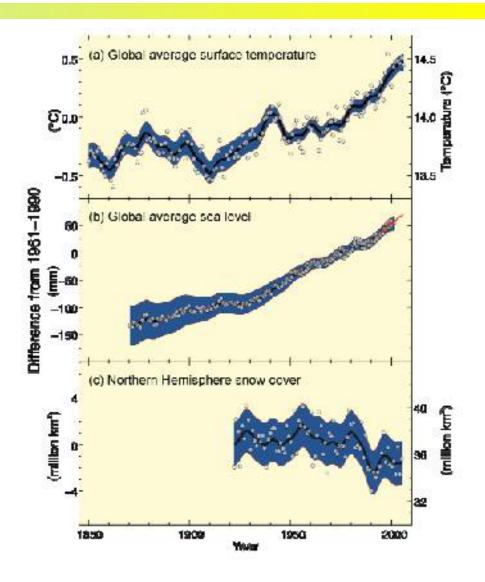
1 report

4 governmental approval sessions

### Global temperature breaks record







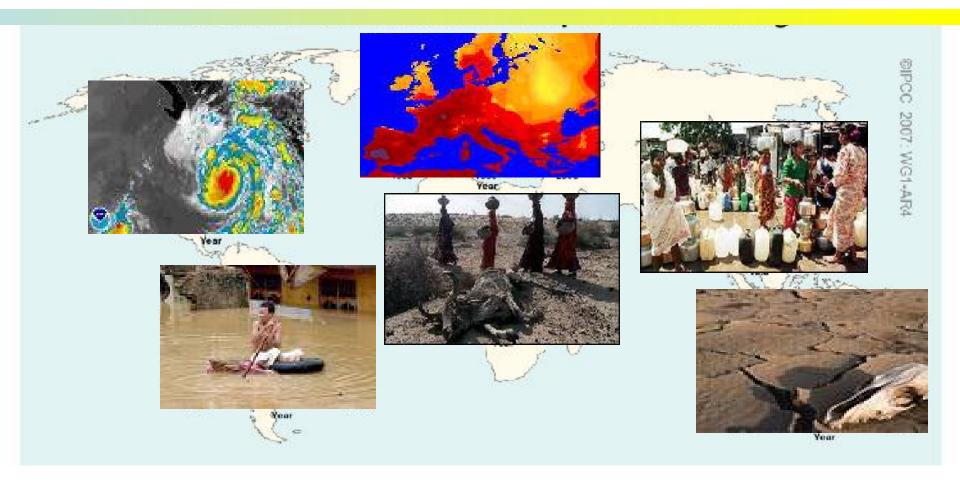
### Temperature increases everywhere





#### **Extreme weather events increase**

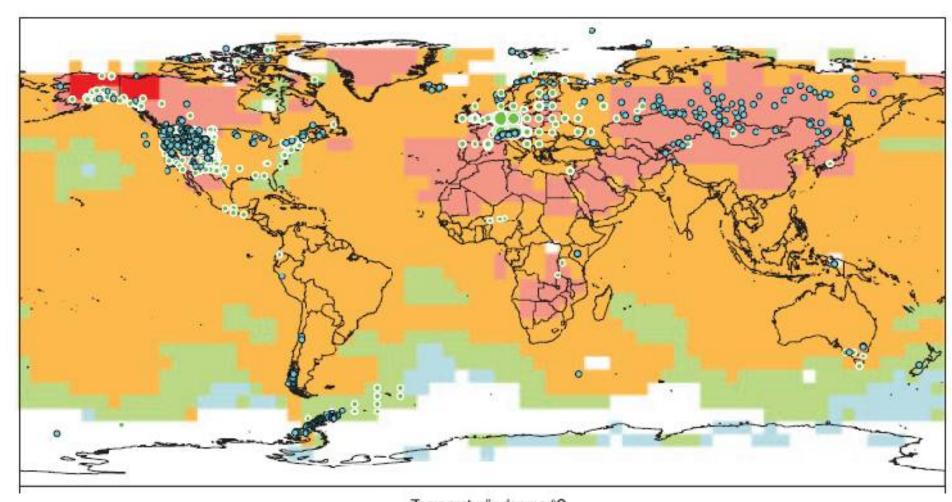


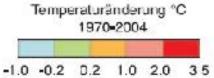


Adapted from IPCC (2007) Summary for Policymakers. IN SOLOMON, S., D. QIN, M. MANNING, Z. CHEN, M. MARQUIS, K.B. AVERYT, M.TIGNOR AND H.L. MILLER (Ed.) Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, United Kingdom and New York, NY, USA, Cambridge University Press.

### Changes in systems are evident





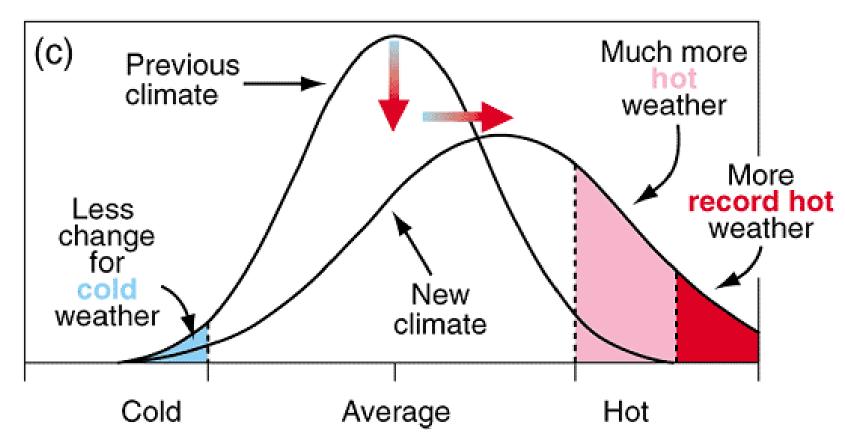


### Not just warmer, but more variable

Probability of occurrence



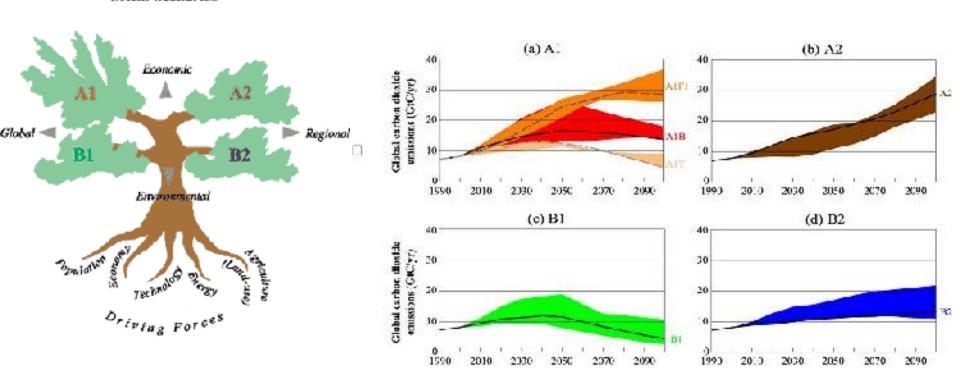
#### Increase in mean and variance



### **IPCC** scenarios



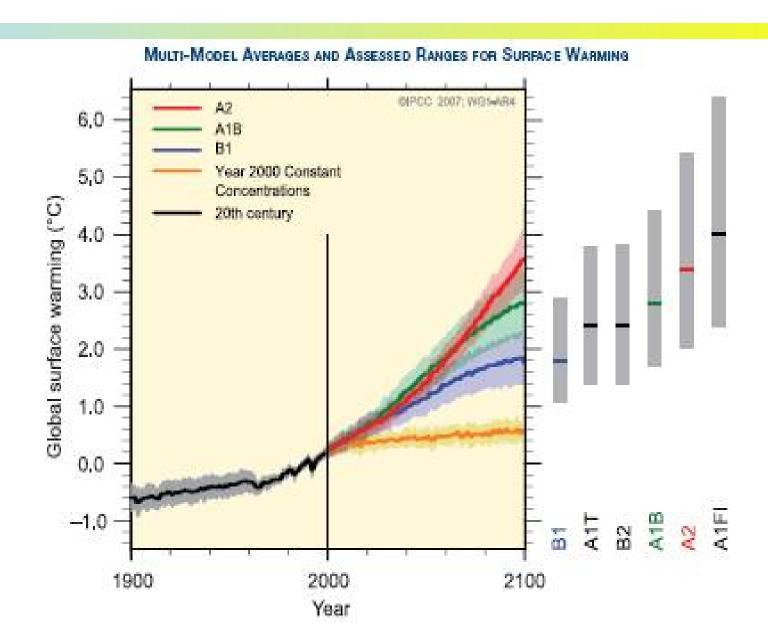
#### SRES Scenarios



Source: NAKICENOVIC, N. & SWART, R. (Eds.) (2000) *Emissions scenarios. A special report of working group III of the Intergovernmental Panel on Climate Change.*, New York, Cambridge University Press.

### **IPCC** scenarios forsee warming





### Likelihood of extremes increasing



Phenomenon, increase of	Likelihood that trend occurred post 1960	Likelihood of continuation of trend based on projections for 21st century using SRES scenarios.
days / nights with low temperatures	Very likely	Very likely
days / nights with high temperatures	Very likely	Very likely
warm spells / heat waves	Likely	Very likely
heavy precipitation events	Likely	Very likely
area affected by droughts	Likely in many regions since 1970s	Likely
number of intense tropical cyclones	Likely, since 1970	Likely
mid- & high-latitude cyclones	Likely	Likely
incidence of extreme high sea level	Likely	Likely

### Projected exposures





Water: By 2050, water availability is projected to decrease by 10-30% over some dry regions at mid-latitudes and in the dry tropics.

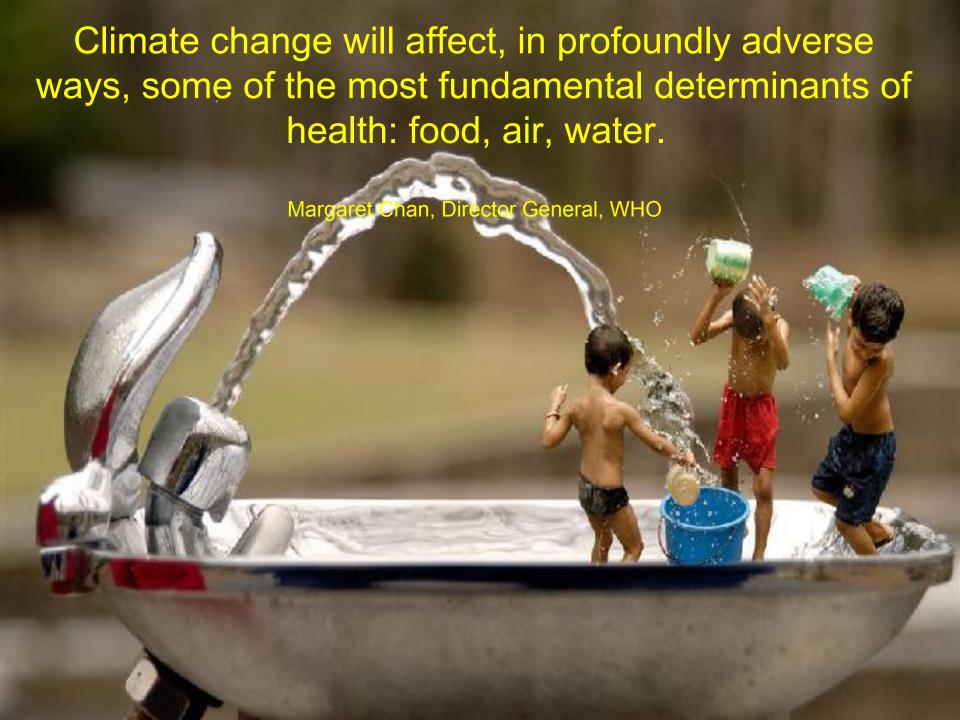


Food: At lower latitudes, especially seasonally dry and tropical regions, crop productivity is projected to decrease for even small local temperature increases (1-2°C), which would increase risk of hunger.



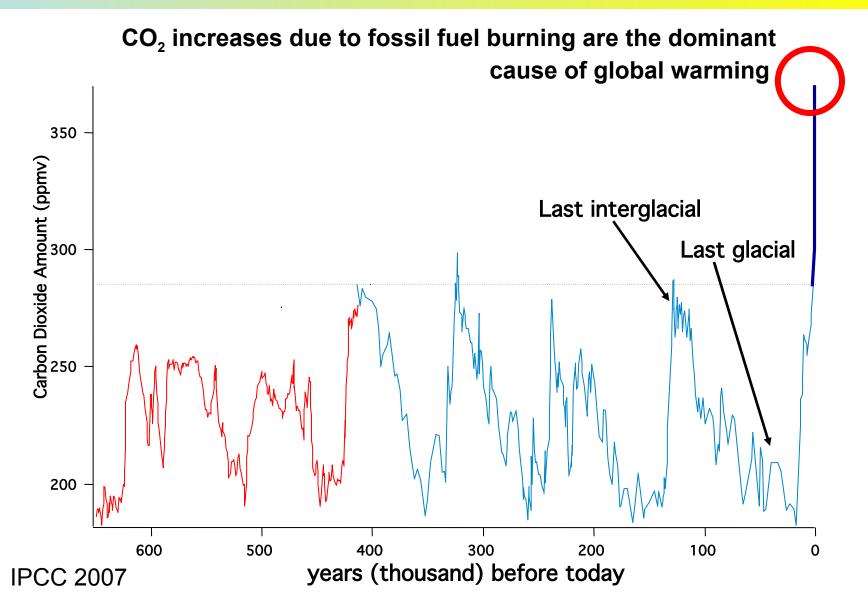
Air quality: Future climate change may cause significant air quality degradation by changing the dispersion rate of pollutants, the chemical environment for ozone and aerosol generation and the strength of emissions from the biosphere, fires and dust.

IPCC, wg II SPM, 2007



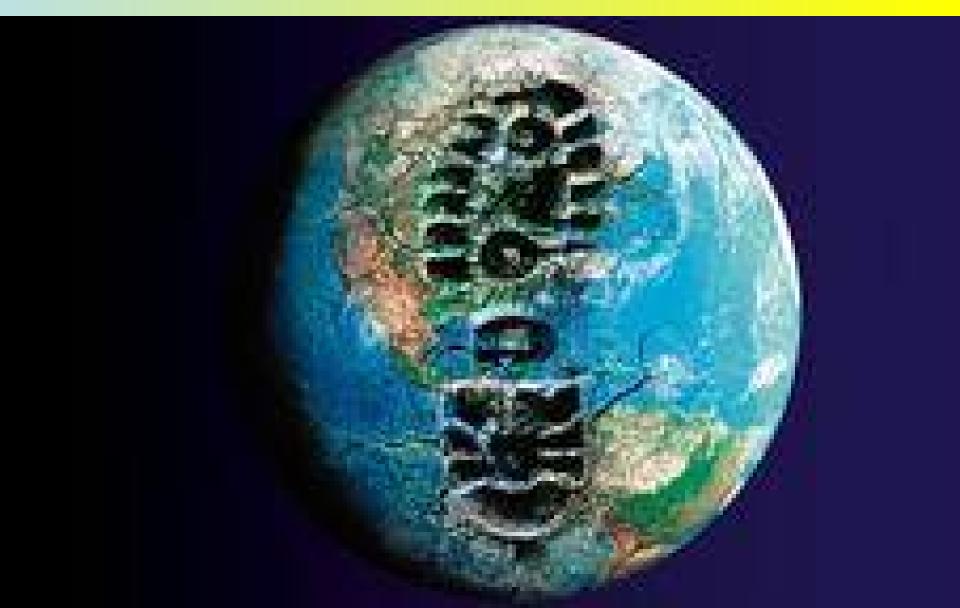
### CO<sub>2</sub> concentration breaks record





### Greenhouse gas emission increases





### Content



Climate change is happening

Climate change affects health

Action needed

### Thanks to the authors of the chapter on human health (WG II)



- Ulisses Confalonieri (Brazil),
- Bettina Menne (WHO Europe/Germany) Mozaharul Alam (Bangladesh),
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- Anthony McMichael (Australia)

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- Bernard Clot (Switzerland),
- Chris Furgal (Canada),
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- Christina Tirado (Spain),
- Madeleine Thomson (UK),
- Tanja Wolf (WHO Europe/Germany)

### **Health topics in AR4**

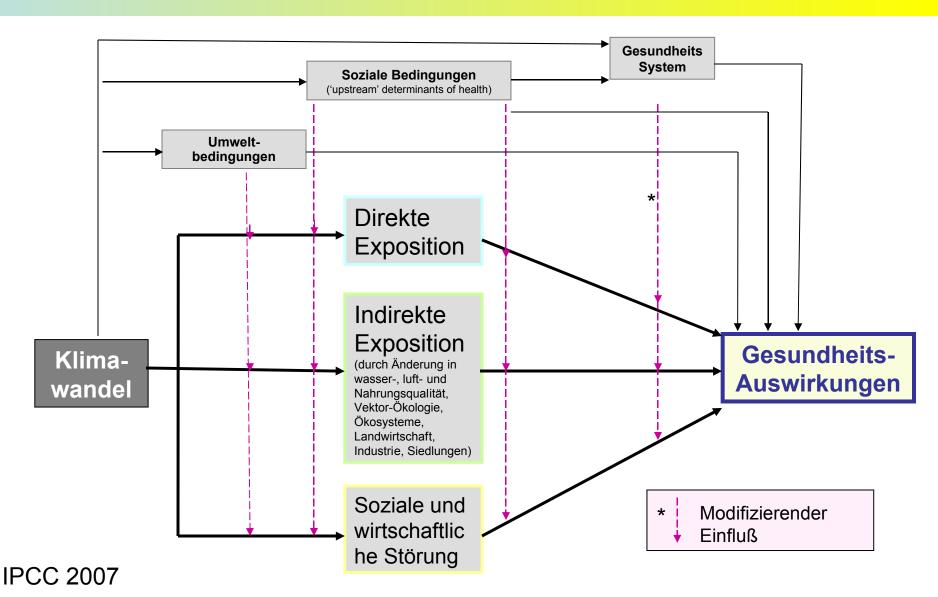


- Effect of heat and cold
- Windstorms and floods
- Drought, food security
- Vectorborne and other infectious disease
- Occupational health
- UV radiation
- Migration, refugees
- Food quality
- Water and health
- Air quality



# Pathways of climate change influencing human health

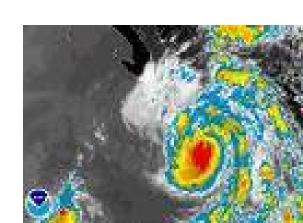




# Complexity: different types of evidence for health impacts



- Health impacts of single extreme weather events (heatwaves, floods, storms, droughts);
- Spatial (ecological) studies with climate as explaining factor for distribution of diseases or their vectors
- · Cohort studies,
  - Variability from year to year,
  - Shortterm weather changes
  - Longterm climate changes.
- Experiments in the field or the lab



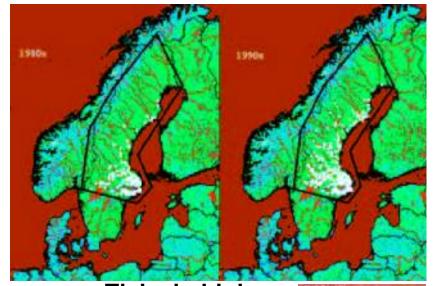
## Health impacts have already been observed





Allergies: Earlier, longer, more intensive

... gradually through INDIRECT impacts: Infectious diseases, allergies, food, water,....

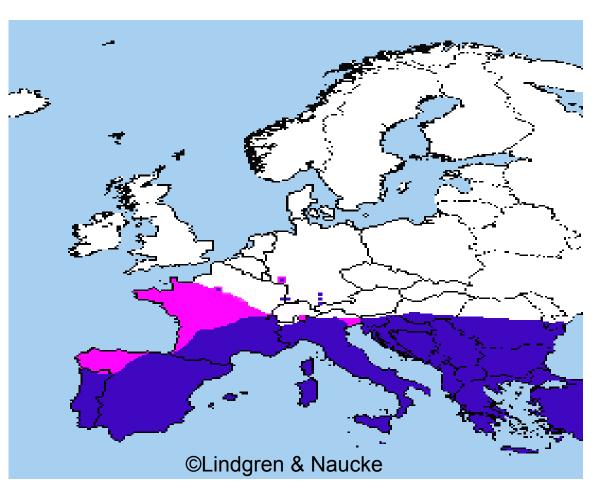


Ticks in higher latitudes and altitude



# Some examples for indirect health impacts





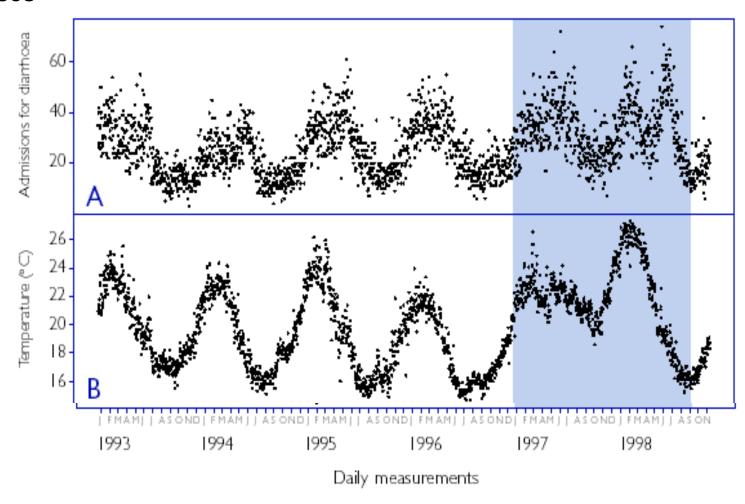


Sandfly and leishmania

## Some examples for indirect health impacts



#### Diarrhea diseases

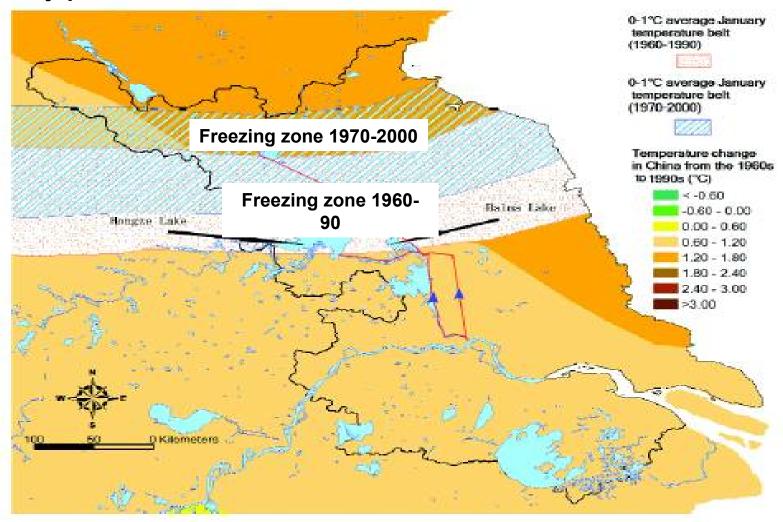


Source: Checkley et al, Lancet, 2000

## Some examples for indirect health impacts



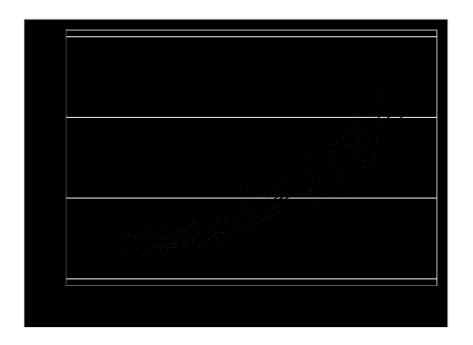
#### Schistosoma japonicum



Source: Yang, Vounatsou, et al. 2005

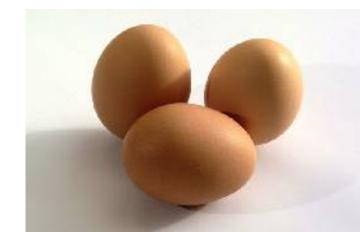
### Some examples for indirect health impacts: Food safety





% increase in salmonella cases per degree increase in ambient temperature in Wales

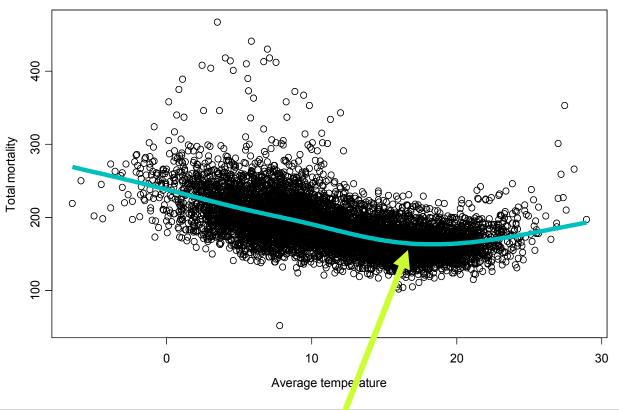
- Temperature influences the transmission of salmonella in 35% of the cases in UK, Poland, the Netherlands, Czech Republic, Switzerland and Spain (Kovats et al).
- In some countries the total number of cases in decrease: prevention measures are effective!



### "Direct" effect: temperature



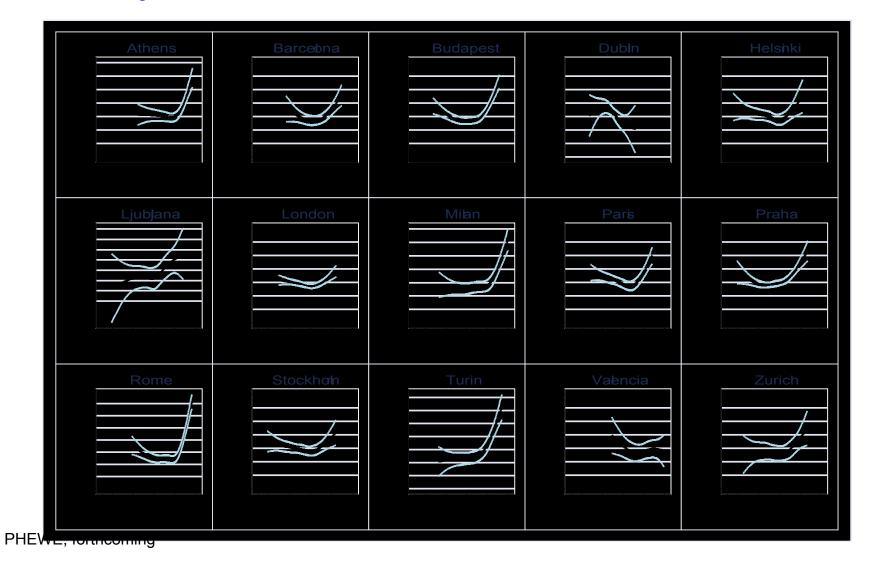




### "Direct" effect: temperature



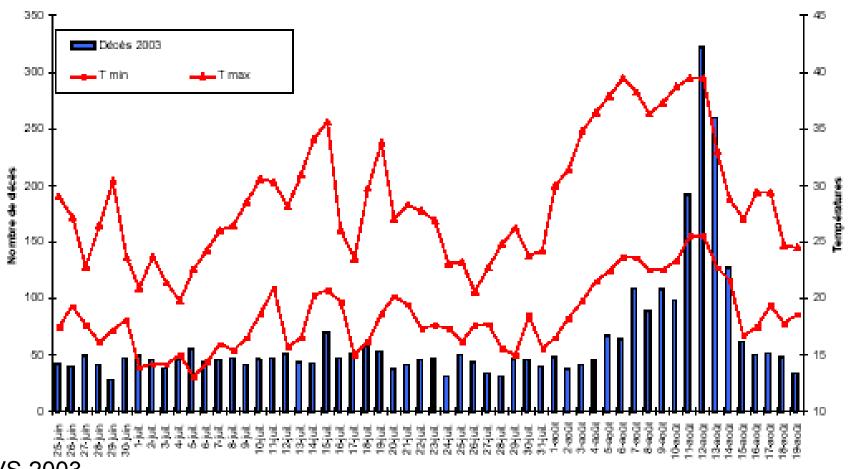
Time series: Maximum Apparent Temperature lag 03, All natural deaths - Summer analysis



### The heatwave 2003



Graphique n°1 : Nombre de décès journaliers à Paris et températures minimales et maximales entre le 25 juin et le 19 août 2003



**INVS 2003** 

### Other extreme weather events





## Main causes of deaths globally are climate sensitive



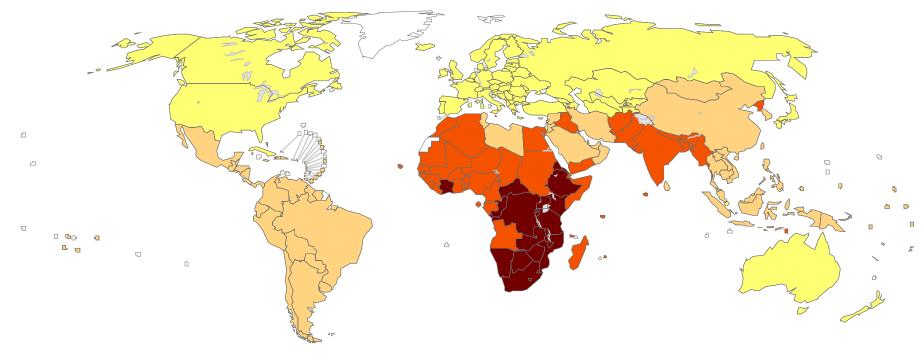
- Each year people are killed:
  - 3.7 million from malnutrition
  - 1.8 million from diarrhoea
  - 1.1 million from malaria

These diseases react to changes in temperature and precipitation

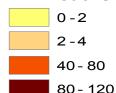
# Contribution of climate change to morbidity and mortality by 2000



#### 150.000 deaths and more than 5 million DALYs



#### CC Deathshillion



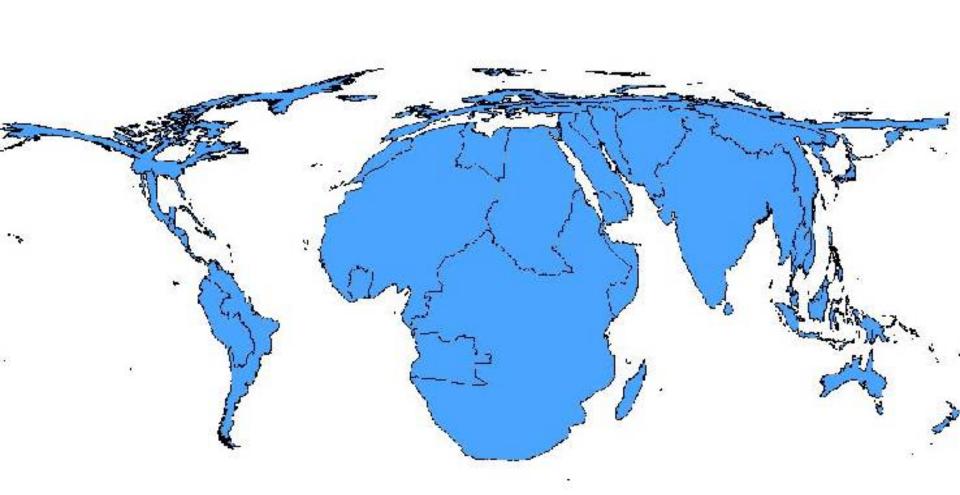
## Direction and magnitude of change in the future



	Negative Impact	Positive Impact
Very High Confidence  Malaria: Contraction and expansion,  changes in transmission season		
High Confidence Increase in malnutrition		
Increase in the number of people suffering from deaths, disease and injuries from extreme weather events		
Increase in the frequency of cardio-respiratory diseases from changes in air quality		
Change in the range of infectious disease vectors Reduction of cold-related deaths	s	
Medium Confidence Increase in the burden of diarrheal diseases		

### Health impacts of climate change

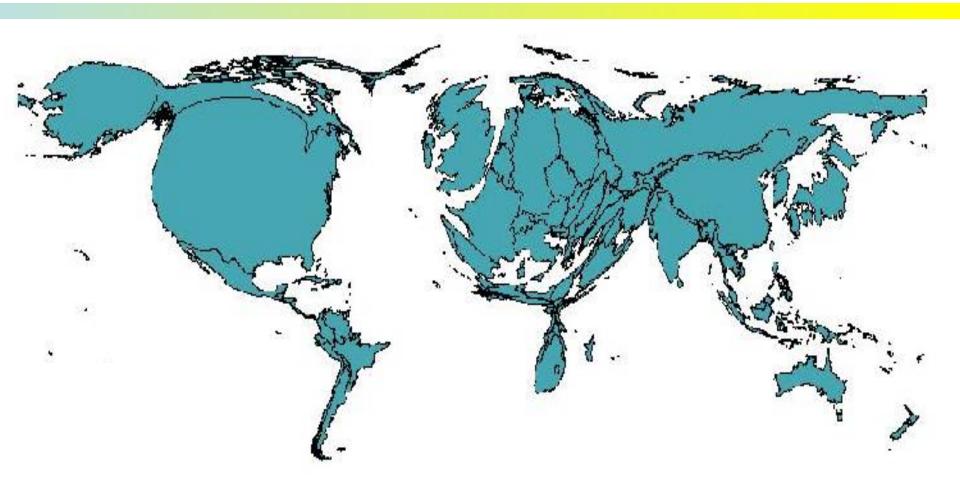




Density equalling cartogram. WHO regions scaled according to estimated mortality (per million people) in the year 2000, attributable to the climate change that occurred from 1970s to 2000. Gibbs et al, in prep.

### **Emission of greenhouse gases**





Density equalling cartogram. Countries scaled according to cumulative emissions in billion tonnes carbon equivalent in 2002. Gibbs et al, in prep.

### Content



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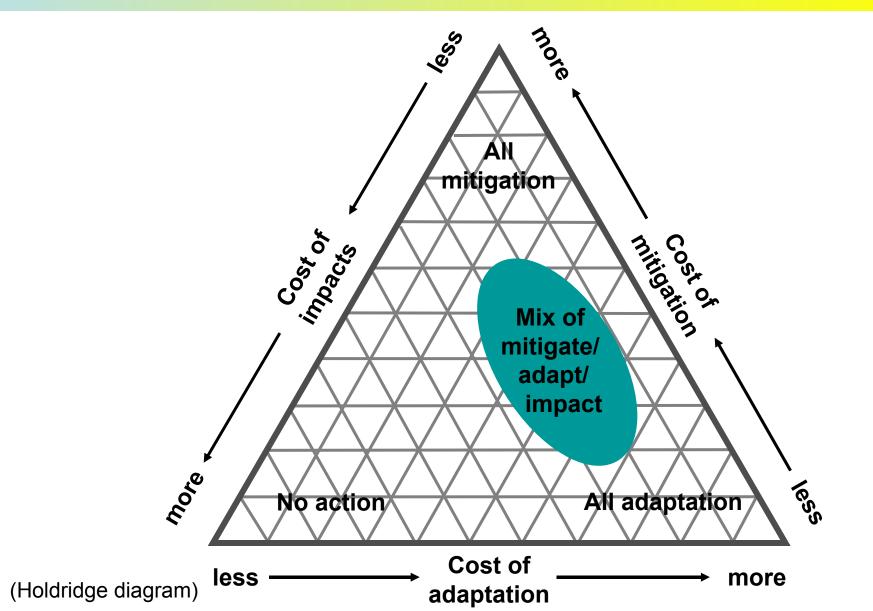
### **Key messages**



- Health models and scenarios show: the Age of diseases from man made climate change has arrived
- Besides sustainable mitigation, adaptation is necessary everywhere;
  - education
  - health system development, access to health services, water and sanitation
  - information, surveillance, early warning
  - new partnerships

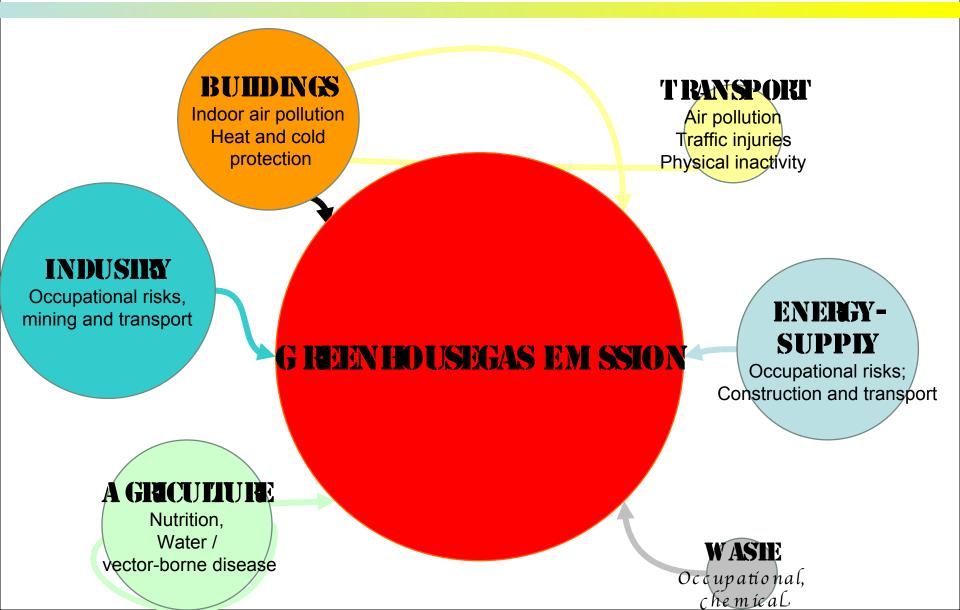
#### Find the mix of mitigation and adaptation





### **Health protection and Mitigation**



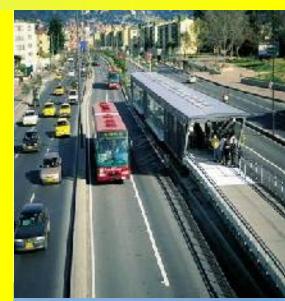


#### Mitigation has positive "side effects"



Health options for energy and transport do not only reduce greenhouse gas emission, but could help avoiding some of the

- 800,000 deaths per year from urban air pollution,
- 1.5 million deaths per year from indoor air pollution
- 1.2 million deaths per year from accidents,
- 1.9 million deaths from lack of physical activity





#### Adaptation to direct and indirect threats



#### Climate sensitive infectious diseases:

- Surveillance and monitoring
- Microbiological risk assessment
- Risk management
- Risk communication

#### **Extreme events:**

Anticipation: Early warning systems

**Early detection:** Real time health information

**Prevention:** National plans, structural and non

structural measures, etc

**Response:** Preparedness planning, guidance

on health impact assessment,

treatment, ect

### **Healthy cities!**



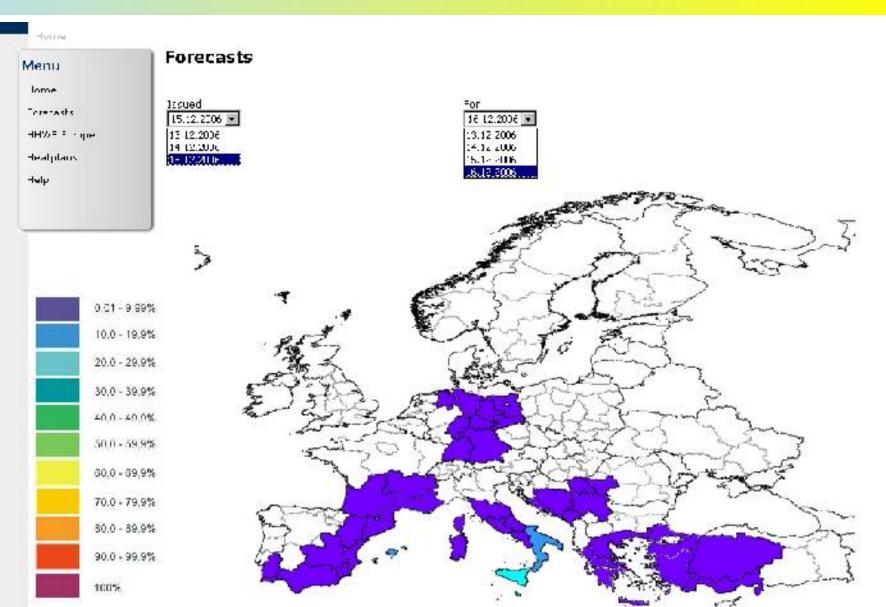


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# **Early warning through webtool** (**EuroHEAT**)





#### What do / do?





Kompensations Code: myclimate\_6397245

Datum: 30.01.2008

Kompensation CO2-Emissionen	Menge CO2	Projekt Portfolio	Preis
Flug von Roma (IT) FCO nach Belfast (GB) BFS via London (GB) LHR Retour, Economy Class, 3'897 km , 1 Reisender	0,847 t	myclimate CHF 40.32 / t	CHF 34.00
Total	0,347 t		CHF 34.00

### Apply the precautionary principle



"All scientific work is incomplete - whether it be observational or experimental. All scientific work is liable to be upset or modified by advancing knowledge. This does not confer upon us a freedom to ignore the knowledge that we already have, or to postpone the action that appears to demand at a given time"

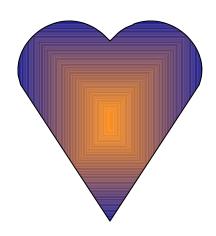
Hill, A.B. The environment and disease: association or causation? Proceedings of the Royal Society of Medicine 58: 295-300 (1965).

"Having unintentionally initiated a global experiment, we cannot wait decades for sufficient empirical evidence to act. That would be too great a gamble with our children's future". Brundtland, G.H, Ex-Director General, World Health Organization. World Ecology Awards Ceremony, St Louis, Missouri, USA, 27 June 2001.

#### Health at the heart of prevention



- Health system stewardship: collaboration with climatologists and planners in land use and urban design
- Advocacy of "healthy" adaptation and mitigation measures
- Information and awareness rising (foodborne diseases, allergic disorders, and some vector and rodent-borne diseases)



- Systematic collection of information
- Sharing of lessons learnt
- Political will and support for public health approaches are a prerequisite for reducing any health risks and instability resulting from climate change!

# Climate change as next great medical advance!?



- It would not be the first time that environmental policy had substantial benefits for health.
- Could tackling climate be the next great medical advance?

Editor later expresent the publishes of the authors and not reviewably ribose of the RM or BMS.

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#### The economics of tackling climate change Don't ears realth benefits out of the equation



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involved more walking and evolve would out startfully benefithenth "Fourtheffe nights account for 12 million dea have of sheids each your and 10 times as many enten ajusta. That incidence is a function of the use of least tuels by the managers sector" Attenual, the binomic charge that broads har count some with average course from the dramical energy stored in the two tank, the burning of water emile carbon clouds. Death rates for personnessed cycles edible steno social gradents, and probability deally, womans and selects would has a aque tan equip anythere as "Ulber et pollorentument of which is added to common turning a herber (1000) promainso deaths sorm year! Walking ording, or using public images: introductionaling by the world reduce the use of energy from total finite its oul falso reduce traffic injuries and air pollution. By increasing any studentieth it would make the octour ede of the personal energy balance equation, again with angleranner for elegan-

Improvement in the chickensy is leave energy will necro meetally are medicily than the extense of bestern coldend melone the volumebility of the sour to Industrians in the prince of energy. "Greater are of necrosials energy sources will also individually mentally collected, in community obsticities the converse sources."

#### Key messages



#### The climate is changing

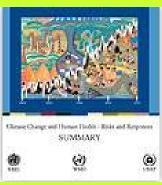
- It has already affected health;
- All regions in the world are affected;
- Projected climate change-related exposures are likely to affect the health status of millions of people

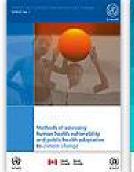
## Adaptive capacity needs to be improved everywhere;

- Critically important will be education, health system development, access, information etc
- Review, development or adjustments of public health activities are necessary















#### Thanks for your kind attention

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