



# Extreme Weather Events and Health

**Climate change impacts on tourism**

**CLITOP**

**Lisbon, 7-8 September 2007**

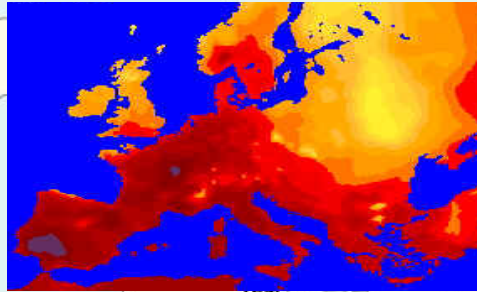
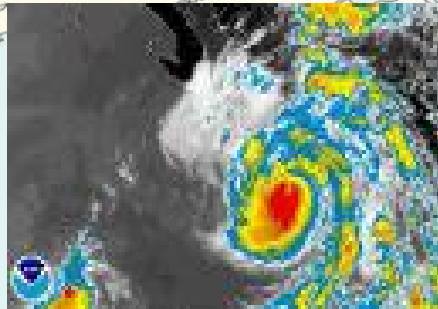
**Franziska Matthies**



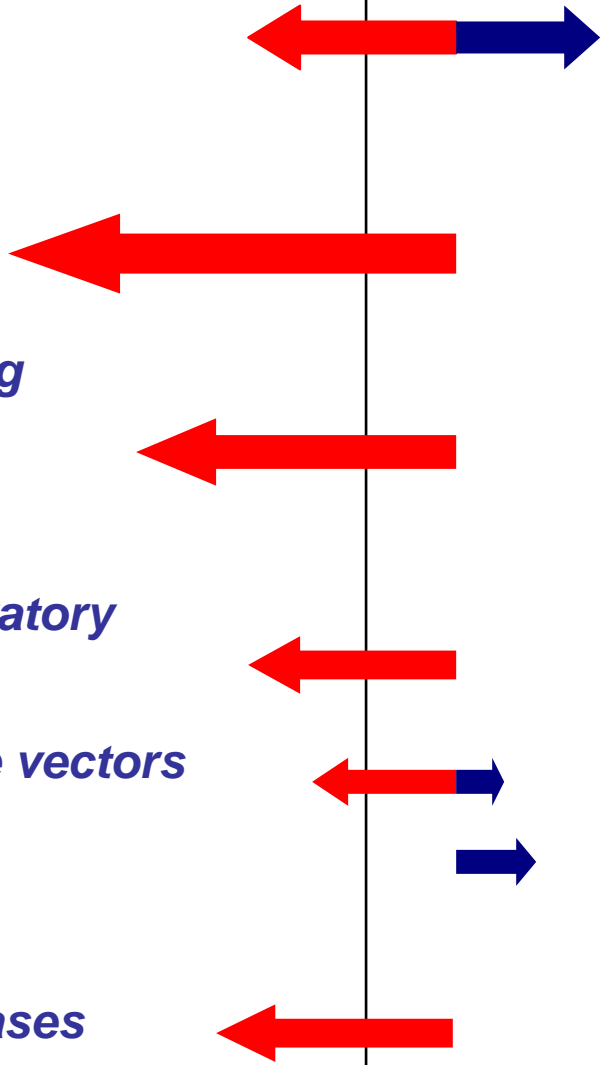
**Table SPM.2.** Recent trends, assessment of human influence on the trend and projections for extreme weather events for which there is an observed late-20th century trend. [Tables 3.7, 3.8, 9.4; Sections 3.8, 5.5, 9.7, 11.2–11.9]

| Phenomenon <sup>a</sup> and direction of trend   | Likelihood that trend occurred in late 20th century (typically post 1960) | Likelihood of a human contribution to observed trend <sup>b</sup> | Likelihood of future trends based on projections for 21st century using SRES scenarios |
|--|---|---|--|
| Warmer and fewer cold days and nights over most land areas   | <i>Very likely<sup>c</sup></i>  | <i>Likely<sup>d</sup></i>   | <i>Virtually certain<sup>d</sup></i>   |
| Warmer and more frequent hot days and nights over most land areas  | <i>Very likely<sup>e</sup></i>  | <i>Likely (nights)<sup>d</sup></i>                                | <i>Virtually certain<sup>d</sup></i>   |
| Warm spells/heat waves. Frequency increases over most land areas   | <i>Likely</i>   | <i>More likely than not<sup>f</sup></i>                           | <i>Very likely</i>   |
| Heavy precipitation events. Frequency (or proportion of total rainfall from heavy falls) increases over most areas | <i>Likely</i>   | <i>More likely than not<sup>f</sup></i>                           | <i>Very likely</i>   |
| Area affected by droughts increases  | <i>Likely in many regions since 1970s</i>                                 | <i>More likely than not</i>                                       | <i>Likely</i>  |
| Intense tropical cyclone activity increases  | <i>Likely in some regions since 1970</i>                                  | <i>More likely than not<sup>f</sup></i>                           | <i>Likely</i>  |
| Increased incidence of extreme high sea level (excludes tsunamis) <sup>g</sup>                                     | <i>Likely</i>   | <i>More likely than not<sup>f,h</sup></i>                         | <i>Likely<sup>i</sup></i>  |

Table notes:



Increase of frequency of extreme weather events

| Negative Impact   | Positive Impact  |
|---|--|
| <p>Very High Confidence<br/> <b><i>Malaria: Contraction and expansion, changes in transmission season</i></b></p> <p>High Confidence<br/> <b><i>Increase in malnutrition</i></b><br/> <b><i>Increase in the number of people suffering from deaths, disease and injuries from extreme weather events</i></b><br/> <b><i>Increase in the frequency of cardio-respiratory diseases from changes in air quality</i></b><br/> <b><i>Change in the range of infections disease vectors</i></b><br/> <b><i>Reduction of cold-related deaths</i></b></p> <p>Medium Confidence<br/> <b><i>Increase in the burden of diarrhoeal diseases</i></b></p> |  |

# Differences between Northern and Southern Europe

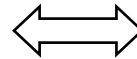


## North

## South



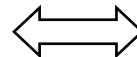
Growths of forests  
(first 30 years?)



Increased frequency  
of forest fires



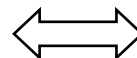
Increase in water  
availability



Reduction of water  
availability  
(bis 2070er ca. ↓ 1/3)



Increase in crop  
availability  
(first thirty years)



Reduction in crop  
availability



# Health in some national assessments is a key vulnerable sector

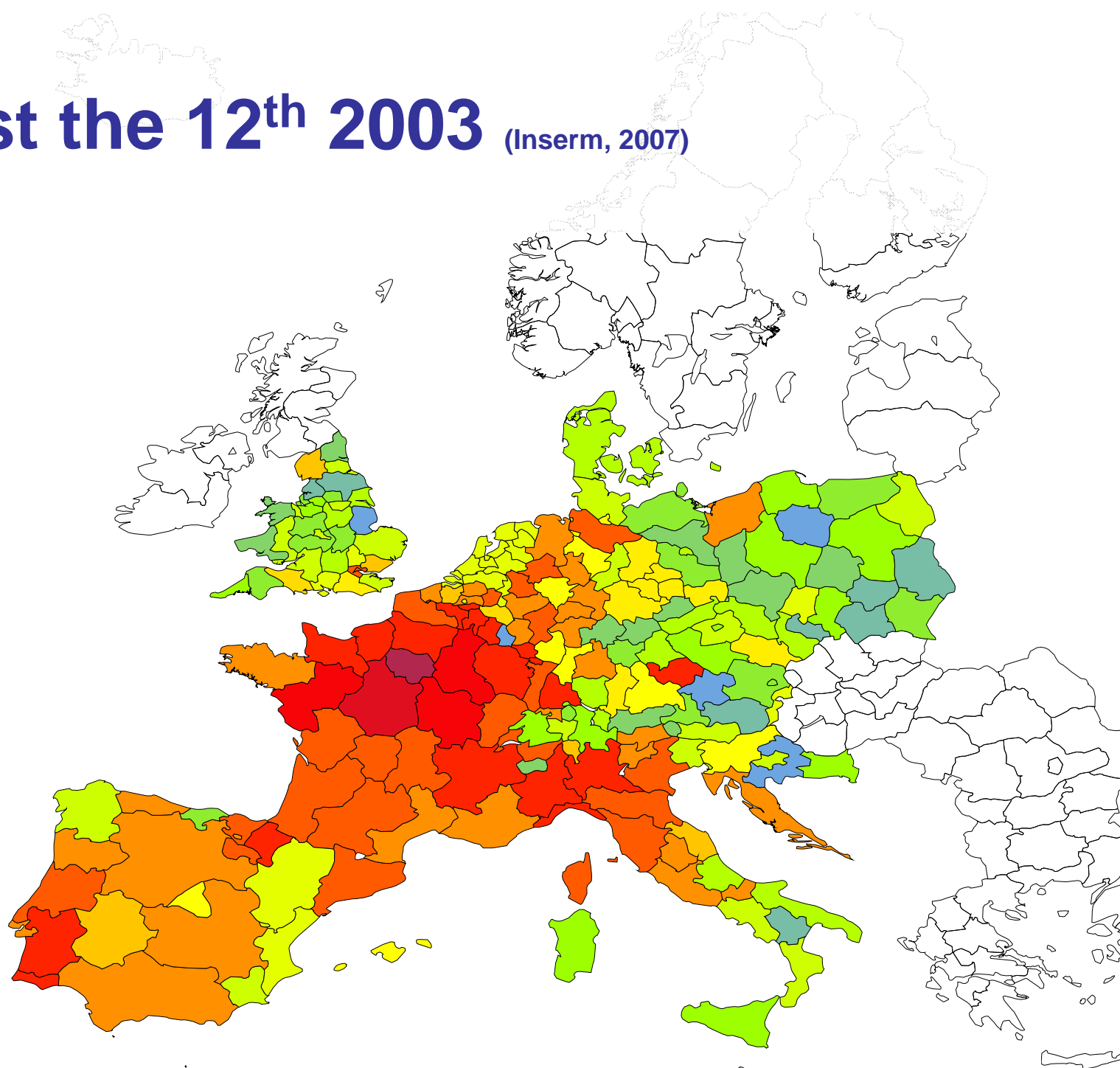
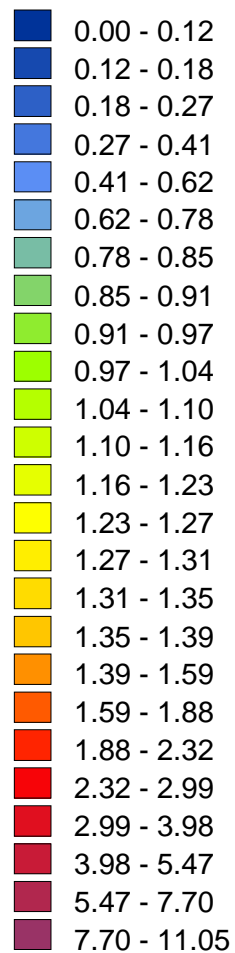
| Country   | Heat related mortality | Allergic disorders | Vector borne diseases | Increase medical visits | Air pollutants | Food poisoning | Flood impacts |
|---|------------------------|--------------------|-----------------------|-------------------------|----------------|----------------|---------------|
| Finland<br>(Carter et al. 2005)   | ++                     | +                  |                       | +                       |                |                |               |
| Germany<br>(Zebisch et al. 2005)  | ++                     |                    | +                     |                         |                |                |               |
| Netherlands<br>(Bresser 2006)   | ++                     | +                  |                       |                         | +              | +              |               |
| Portugal<br>(Casimiro and Calheiros 2002; Calheiros and Casimiro 2006)                                | ++                     |                    | ++                    |                         |                | ++             |               |
| Spain<br>(Moreno 2005)  | ++                     |                    | +                     |                         | +              |                |               |
| Switzerland<br>(Thommen Dombois and Braun-Fahrlander 2004)  | ++                     |                    | +                     |                         |                |                |               |
| United Kingdom<br>(Department of Health and Expert Group on Climate Change and Health in the UK 2001) | ++                     |                    |                       | +                       |                |                | +             |



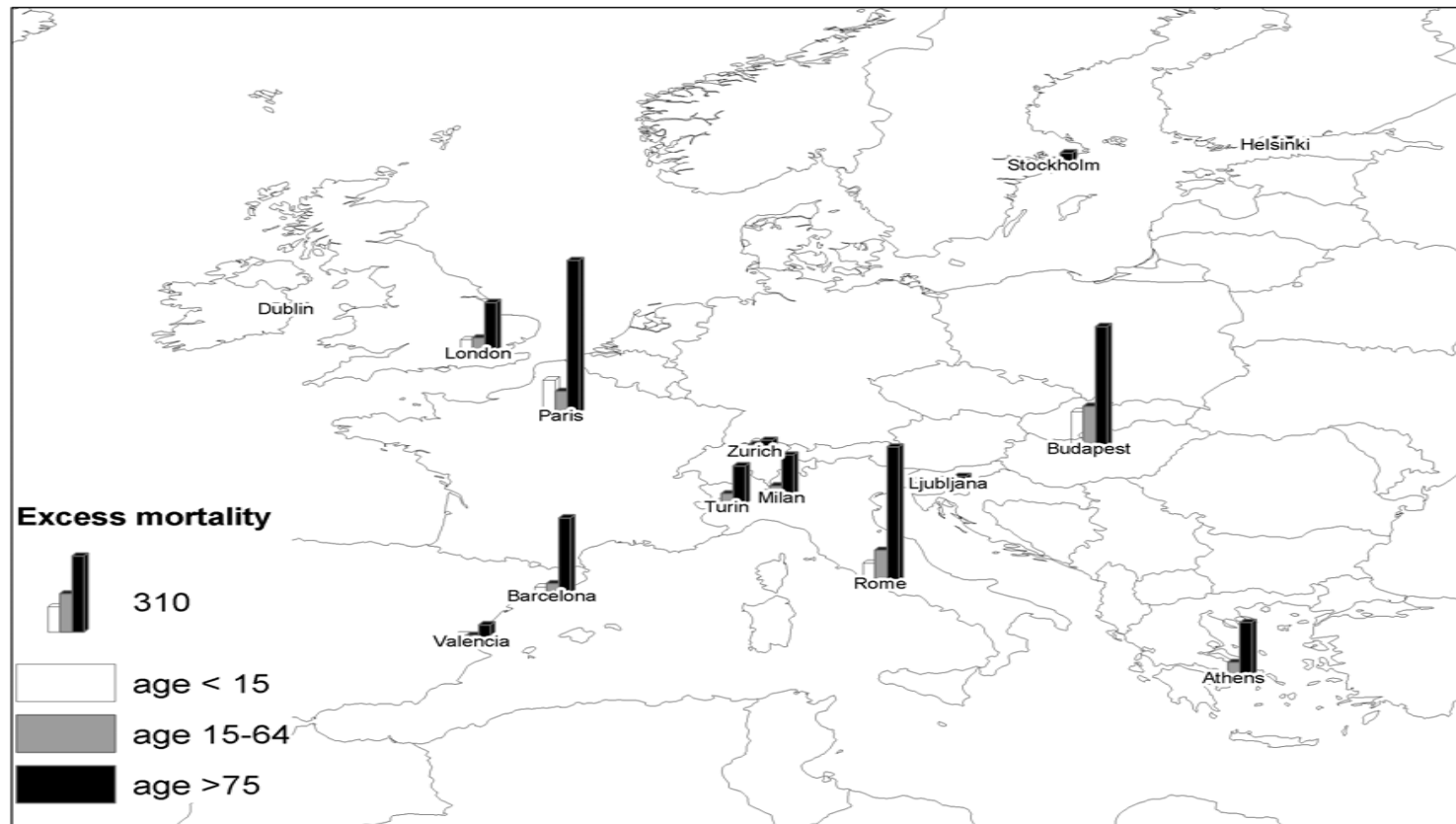
IPCC, 2007, WG II, Chapter 8

# August the 12<sup>th</sup> 2003 (Inserm, 2007)

Percentage  
Mortality exceedance

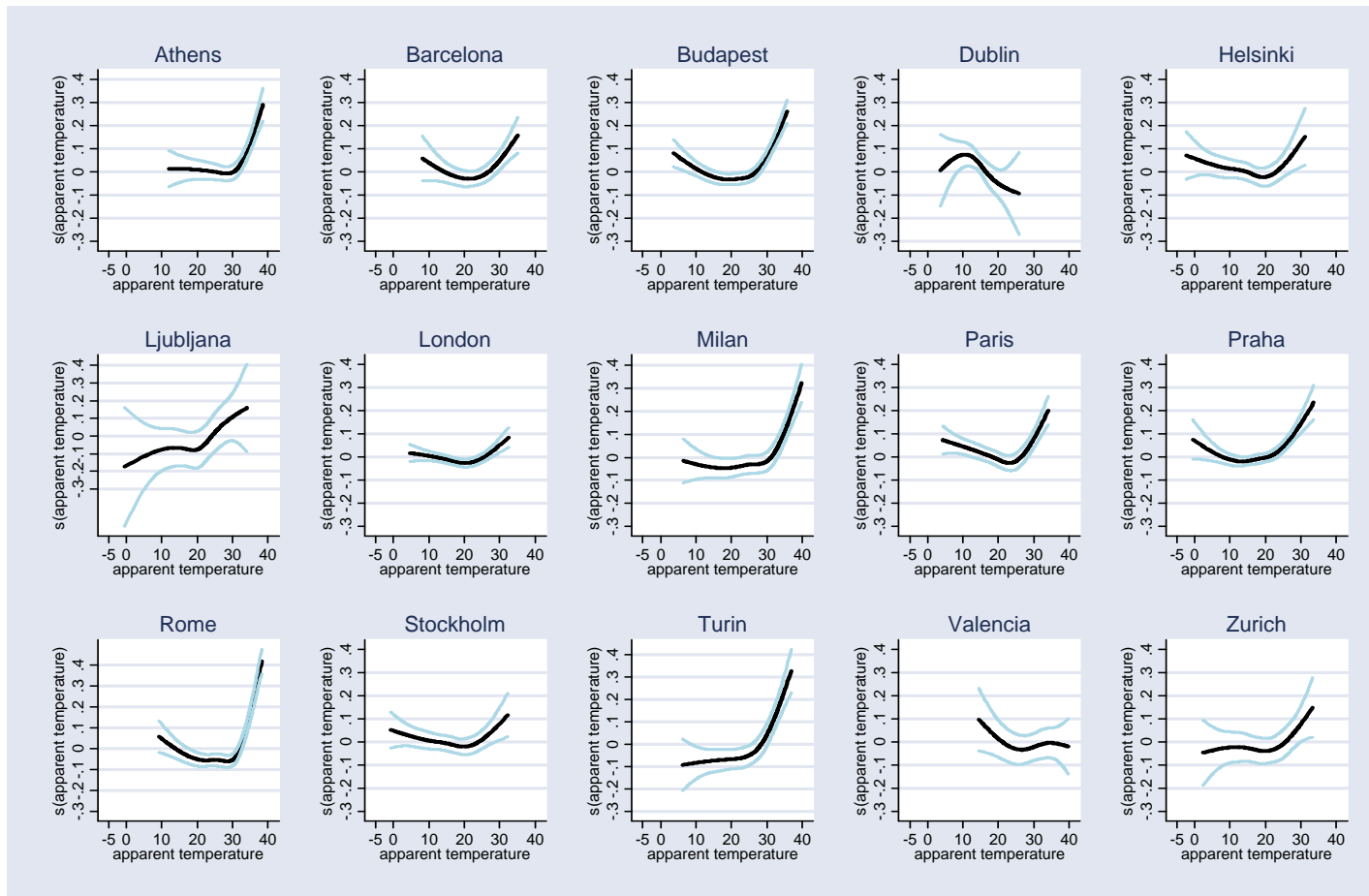


# Heat deaths in 2030 in European cities



Estimated excess mortality for 2030 in 15 European cities

# Mortality varies with temperatures



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

**PHEWE, forthcoming**

## Health impacts of heat

- Sun stroke
- Cramps
- Heat exhaustion
- Heat stroke



## Risk factors

- **Elderly:** Greatest effects of heat and humidity were in the elderly but important interactions with many other factors, particularly gender.
- **Adults:** Excess mortality observed during extreme heat -waves. Mental illness/disability and occupational exposures explain some of the risk in adults.
- **Children** are at risk of heatstroke mortality in very severe heat-waves.

**Tourists?**

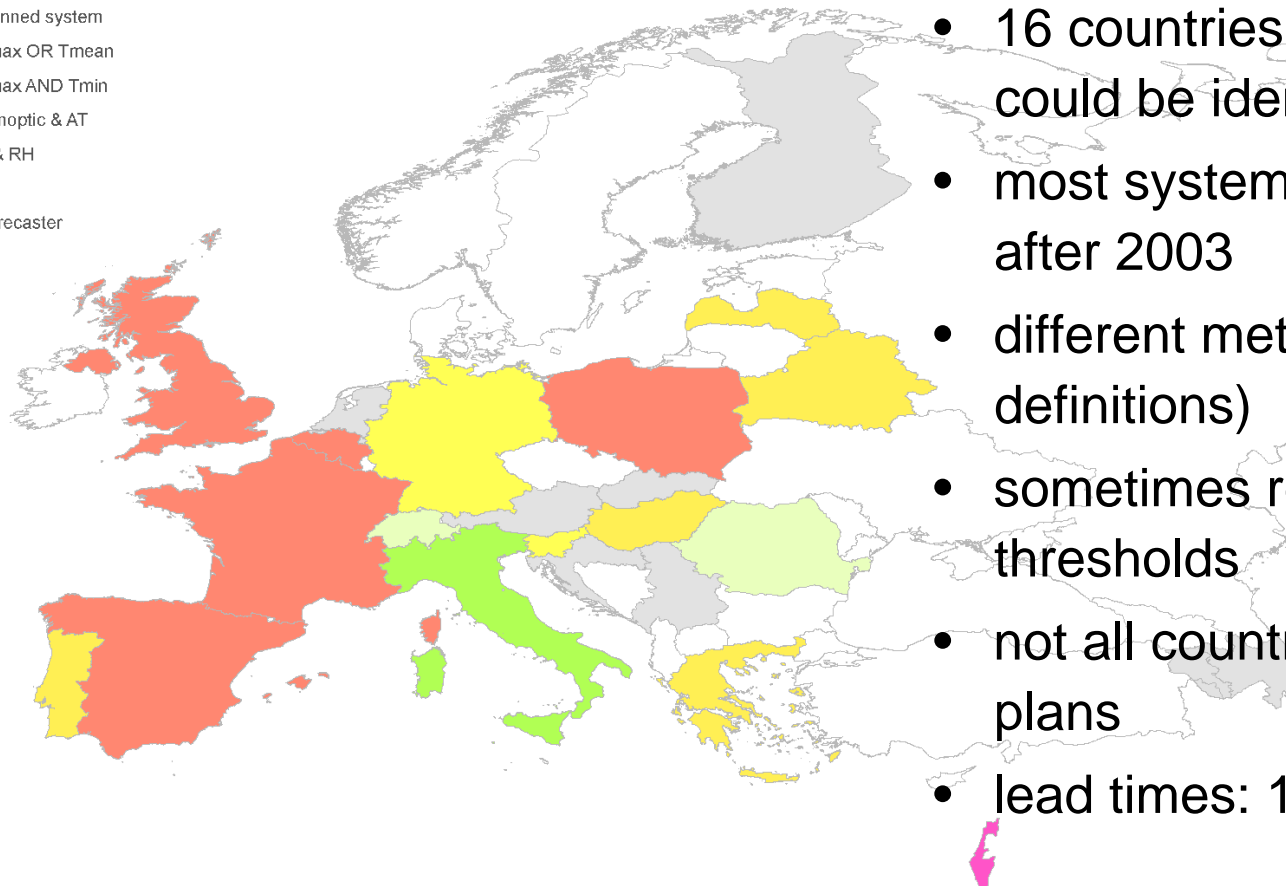
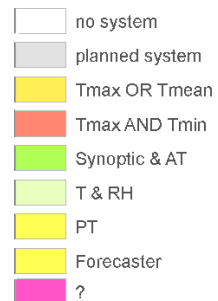
# Integrated management of chronic disease

## Summary of epidemiological evidence

| Disease                                | Risk of heat related death |
|--|----------------------------|
| COPD                                   | ++                         |
| Asthma                                 | +                          |
| Neurological damage, Parkinson' s, etc | +++                        |
| Schizophrenia, psychotic illnesses     | ++                         |
| Dementia, Alzheimer' s                 | +++                        |
| Diabetes, renal disease                | +++                        |
| Previous stroke                        | ++                         |
| Ischaemic Heart disease                | ++                         |

## HHWSs in Europe

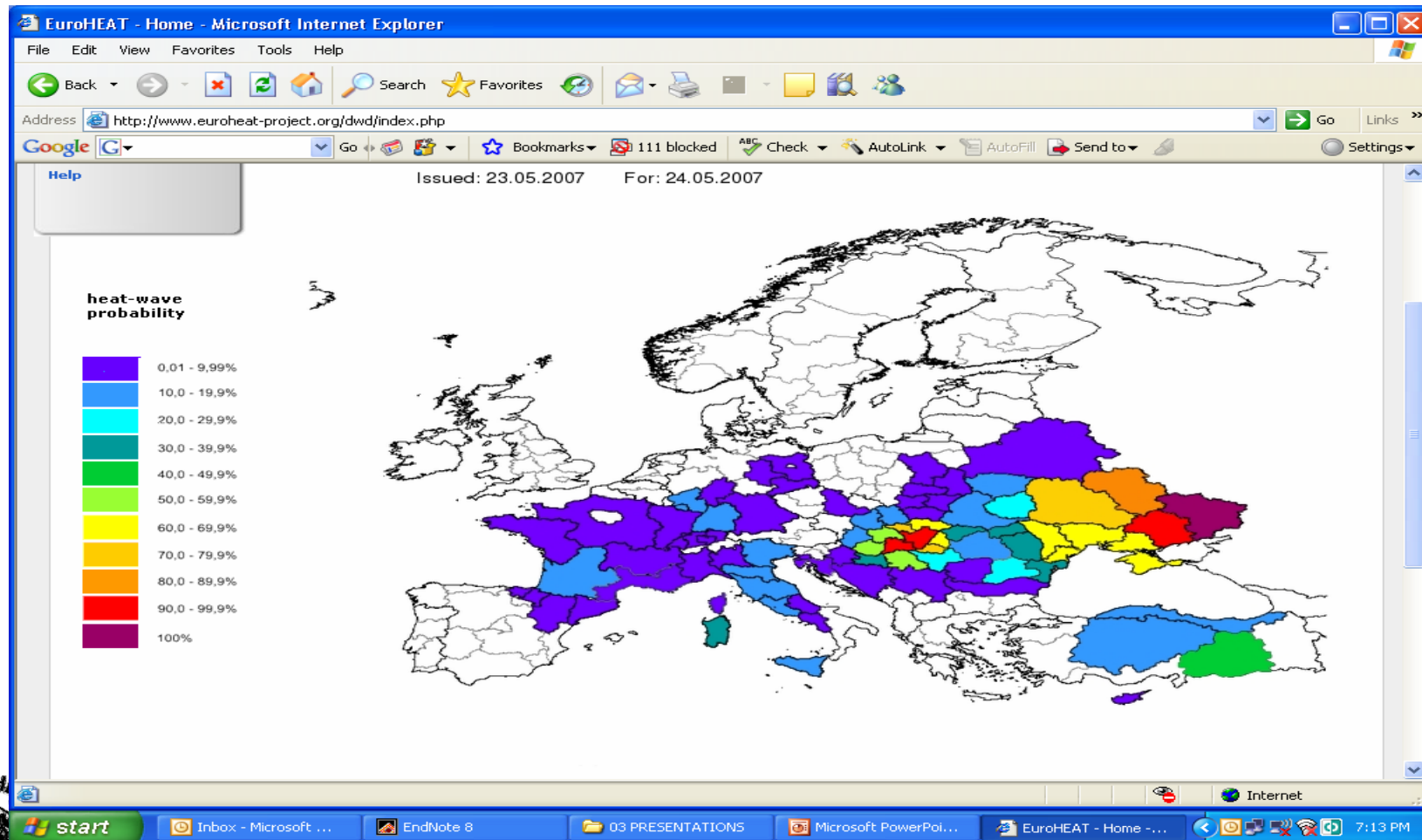
### Legend



- 16 countries with HHWSs could be identified
- most systems implemented after 2003
- different methods (heat wave definitions)
- sometimes regional specific thresholds
- not all countries have heat plans
- lead times: 1 - 3 days

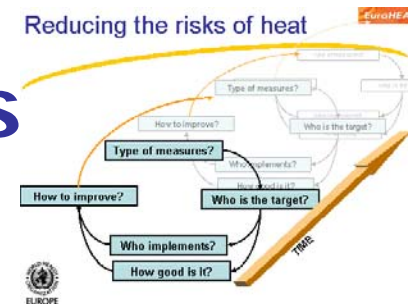


# Seasonal forecasting



<http://www.euroheat-project.org/dwd/index.php>

# Core elements of heat action plans



- Collaborative mechanisms between institutions and a lead body to coordinate emergency responses;
- Accurate and timely meteorological forecasts;
- Reduction of exposure to heat;
- Particular care for vulnerable
- Provision of health care, social services, and infrastructure;
- Risk communication mechanisms;
- Urban planning, energy and transport policies;
- Monitoring and evaluation.

**Tourists?**

# Public Health Advice

- ✓ Drink plenty of fluids
- ✓ Replace salt and minerals
- ✓ Wear appropriate clothing
- ✓ Schedule outdoor activities carefully
- ✓ Pace yourself and adjust to the environment
- ✓ Stay cool indoors
- ✓ Take care of those at risk

**For tourists:  
Knowledge  
Risk behaviour  
Language  
Access to  
information**





## **INTERSUN Goals**

to provide information, practical advice and sound scientific predictions on the health impact and environmental effects of UV exposure to encourage countries to take action to reduce UV-induced health risks, and to provide guidance to national authorities and other agencies about effective **sun awareness programmes**.

**For tourists:  
Behaviour  
Knowledge  
Language  
Access to  
information**



<http://www.who.int/uv/intersunprogramme/en/>

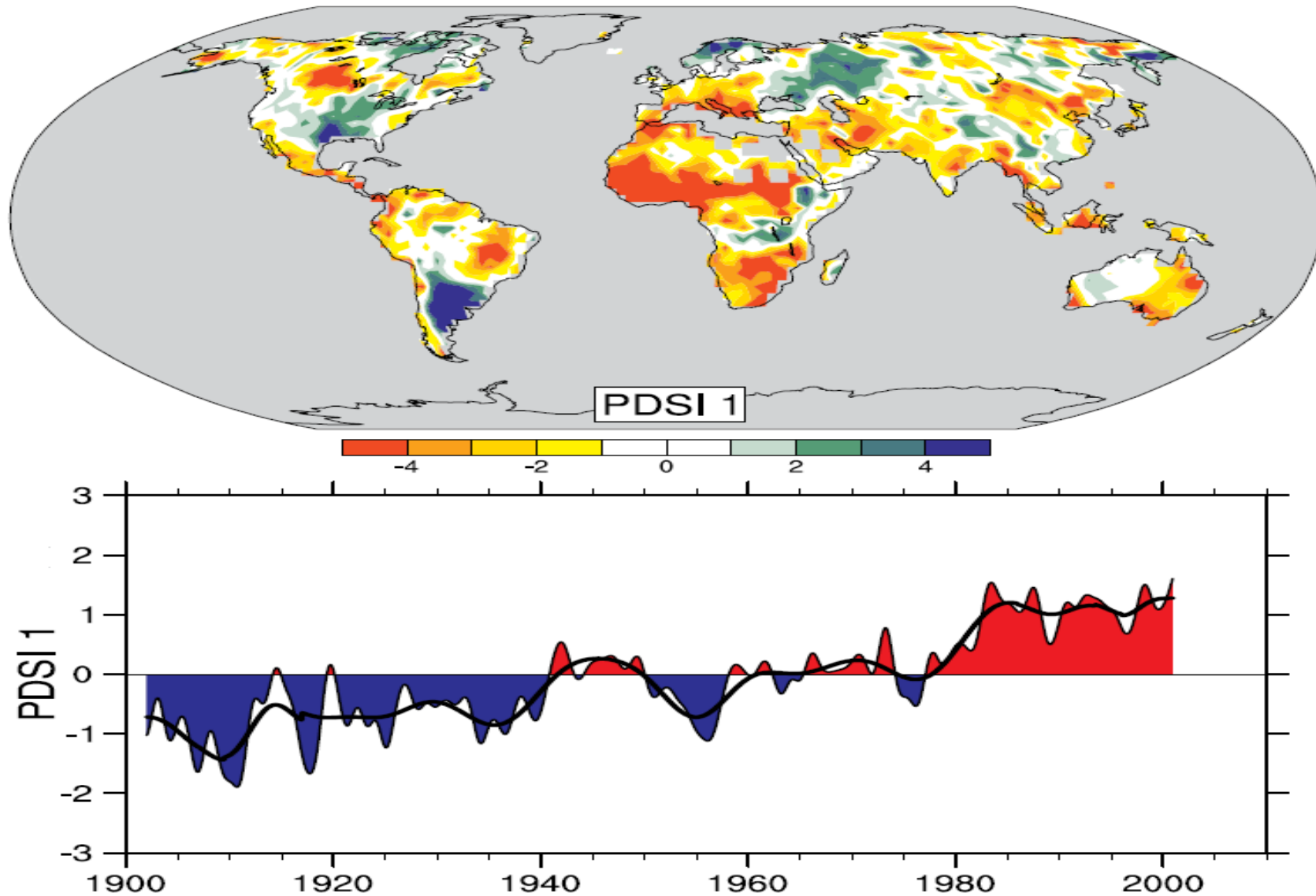


100 000 bottles (0,5 l) was prepared and propositioned on possible crises points (tunnels, highway exits, border crossings, etc)..



**Red Cross, Croatia, 2007**

# Drought severity index is increasing





WHO

**For tourists:  
Alert  
Language  
Rescue  
Location of facilities  
But also  
Risky behaviour!**



**Red Cross, Croatia, 2007**



Red Cross, Croatia, 2007

# Flooding



## Direct effects:

Drowning, injuries, health implications due to contact with (cold, polluted ) water, cardiovascular incidents and psychosocial disturbances.

## Indirect effects:

- Waterborne infections;
- vector-borne diseases;
- food shortage;
- health effects of chemical pollution;
- decrease of health care and emergency service;
- psychosocial disturbances.



# Summary

TABLE 2. HEALTH-SPECIFIC INTERVENTIONS TO REDUCE THE POTENTIAL IMPACTS OF FLOODS

| Health outcome and preventive measures                   | Intervention  |
|--|---|
| Pre-flood  | Pre-flood awareness-raising campaigns, with messages targeted to different groups<br>Emergency planning<br>Inter-institutional coordination activities  |
| During floods  | Treatment of respiratory problems and skin rashes<br>Treatment for mould and other exposures<br>Treatment for strains and other effects of physical exertion<br>Vaccination (e.g. hepatitis A) of general population<br>Boil water notices and general hygiene advice<br>Outbreak investigations where appropriate<br>Enhanced surveillance |
| Mental health outcomes<br>(anxiety and depression, etc.) | Post-flood counselling<br>Medical assistance<br>Visits by health workers or social workers to vulnerable people   |

Source: (18)



WHO, 2005, cCASHh Summary for Policy Makers

# Sea level rise - small island states and coastal settlements

- Retreat, adaptation or defence
- Urban planning
- Food security
- Social and demographic disruption
- Issues of justice

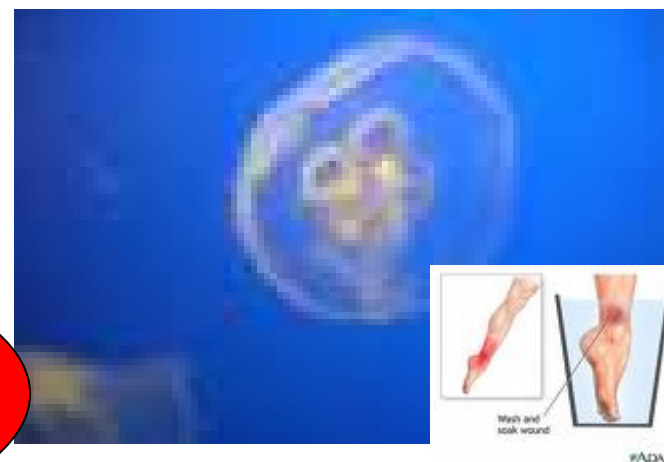


# Coasts

- Increases in sea surface temperature of about 1-3°C are projected to result in more frequent coral bleaching events;
- Coastal wetlands including salt marshes and mangroves are projected to be negatively affected by sea-level rise.
- Many millions **more** people are projected to be flooded every year due to sea-level rise by the 2080s.
- The numbers affected will be largest in the mega-deltas of Asia and Africa while small islands are especially vulnerable.

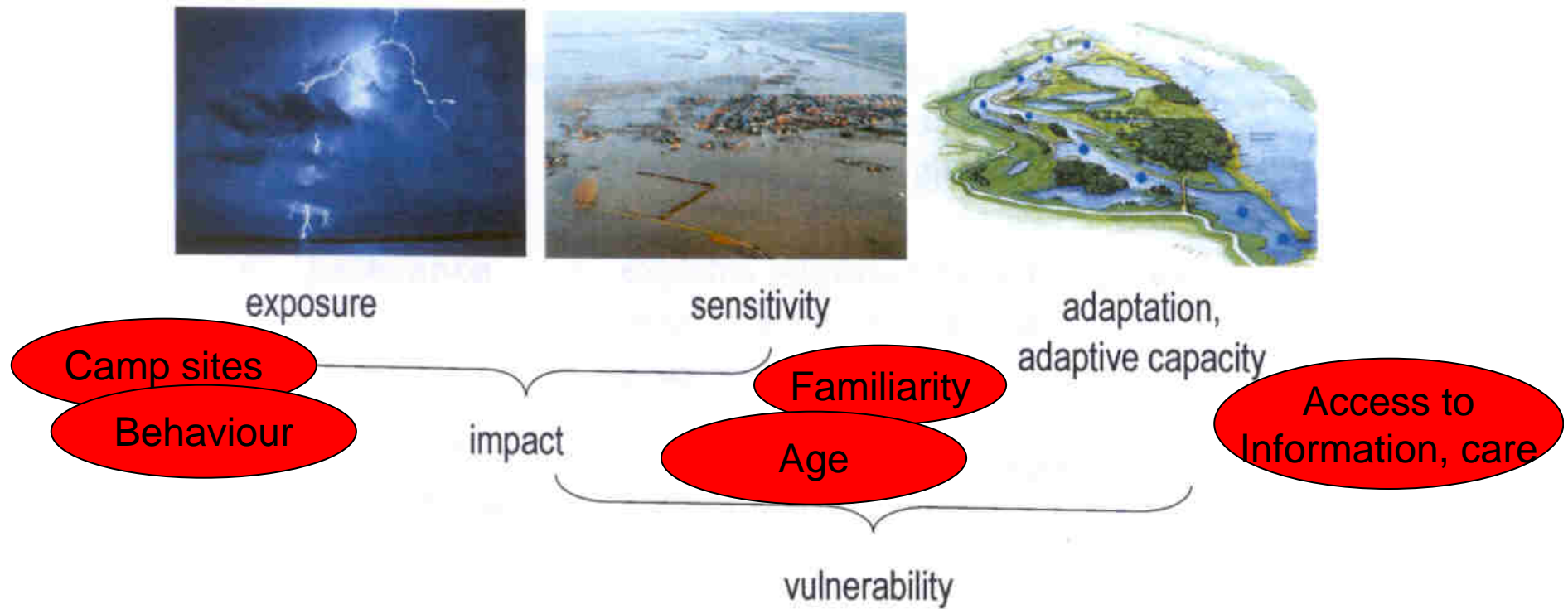


# Algae blooms and jelly fish



**Bathing water quality**  
**Food poisoning**  
**Injuries**

# Impact, Adaptation, Vulnerability



# Key questions for the health sector

- Are the measures, policies and strategies currently available sufficient?

Early warning systems, preparedness, surveillance and response – intersectoral linkages?

- What needs to be strengthened?

For local population and tourists; collaboration?

- What needs to be developed?

Information materials, communication channels, training?



**Tourists**

Specific targeting:  
Specific vulnerability

Information and  
Preparedness at home

Economic loss  
Poverty and  
Vulnerability

**Public health  
interventions**

Tourism as a driver  
(Water, food, transport, ...)  
Sustainable  
development and  
Integrated, multisectoral  
planning

**Local Population:**

**Livelihoods**

**Economics**

**Health**

Training of medical

Professionals

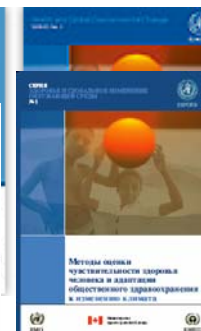
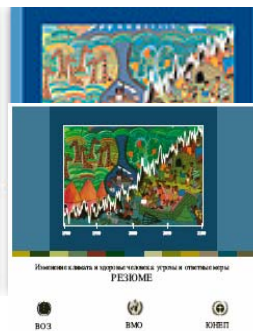
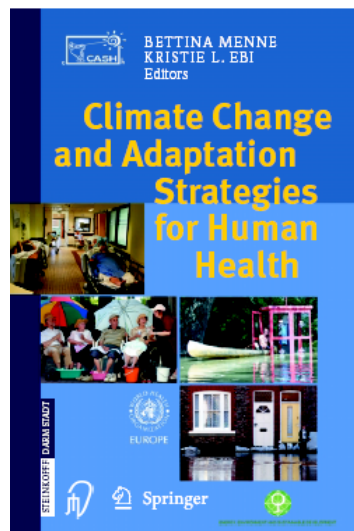
Information, education and  
preparedness

Balance - Win Win Solutions

Costs?

**Local  
Environment**





<http://www.euro.who.int/globalchange>

[bme@ecr.euro.who.int](mailto:bme@ecr.euro.who.int)

[evm@ecr.euro.who.int](mailto:evm@ecr.euro.who.int)

## WHO Euro activities

**Providing leadership on matters critical to health and  
engaging in partnerships where joint**

**Two Ministerial Environment and Health Conference  
Declarations**

**RC resolution:**

**Shaping the research agenda**

**Articulating ethical and evidence-based policy  
options**

**Providing technical support**

**Monitoring the health situation**





WHO