

Impacts from Climate Change on Human Health in Sweden (and Indonesia)

Joacim Rocklöv
Associate Professor
Epidemiology & global health
Umeå University
joacim.rocklov@envmed.umu.se
www.climateandhealth.net



Climate Change and Global Health

UMEÅ CENTRE FOR GLOBAL HEALTH RESEARCH



Climate Change and Global Health Theme

- Research on health impacts, adaptation and mitigation to climate change
- Global perspectives ↔ community focus
- Rare formation of "Public Health Climatologists"



Climate Change and Global Health

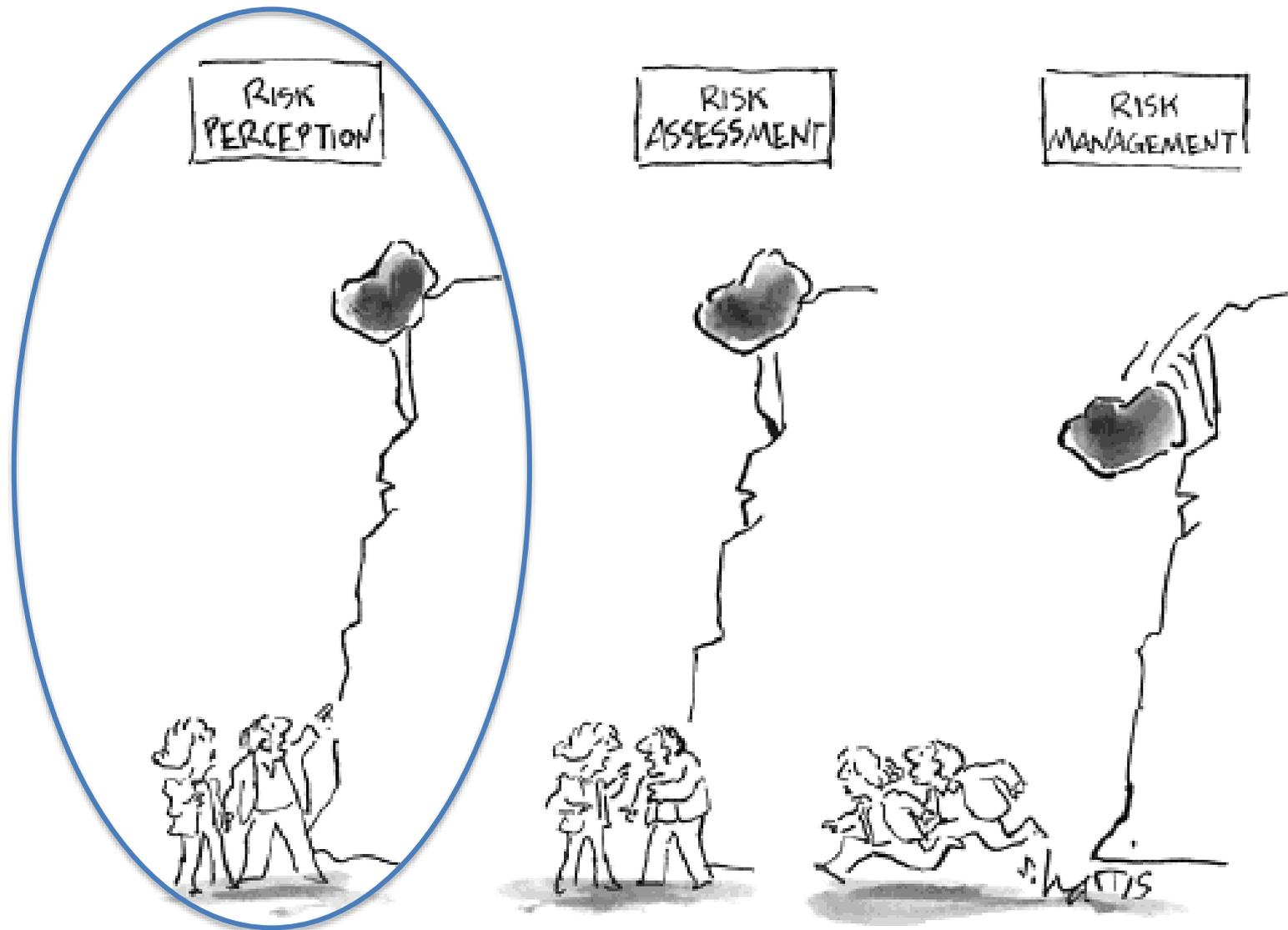
UMEÅ CENTRE FOR GLOBAL HEALTH RESEARCH



Outline

1. Weather, climate and climate change
2. Impacts
3. Health Impacts
4. Health Impacts in Sweden
5. (Health Impacts in Indonesia - Hari)

1. Weather, climate and climate change



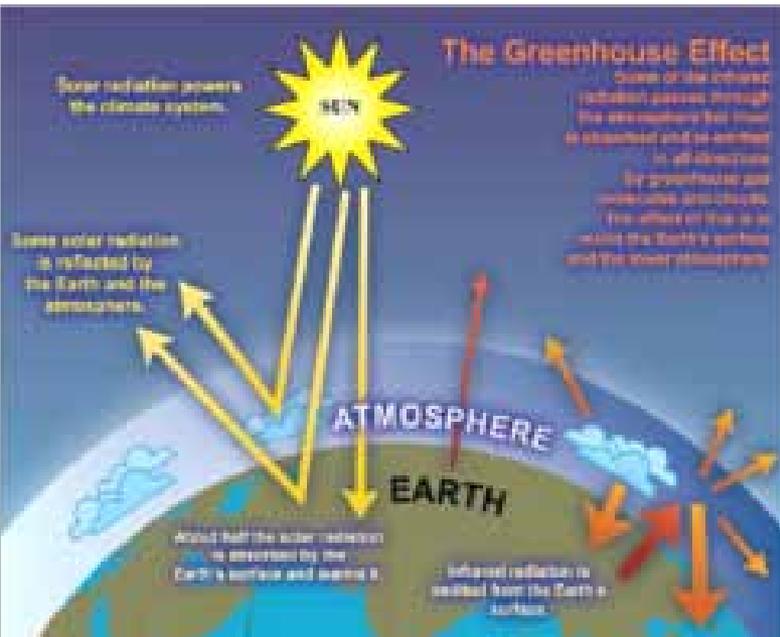
What is climate?



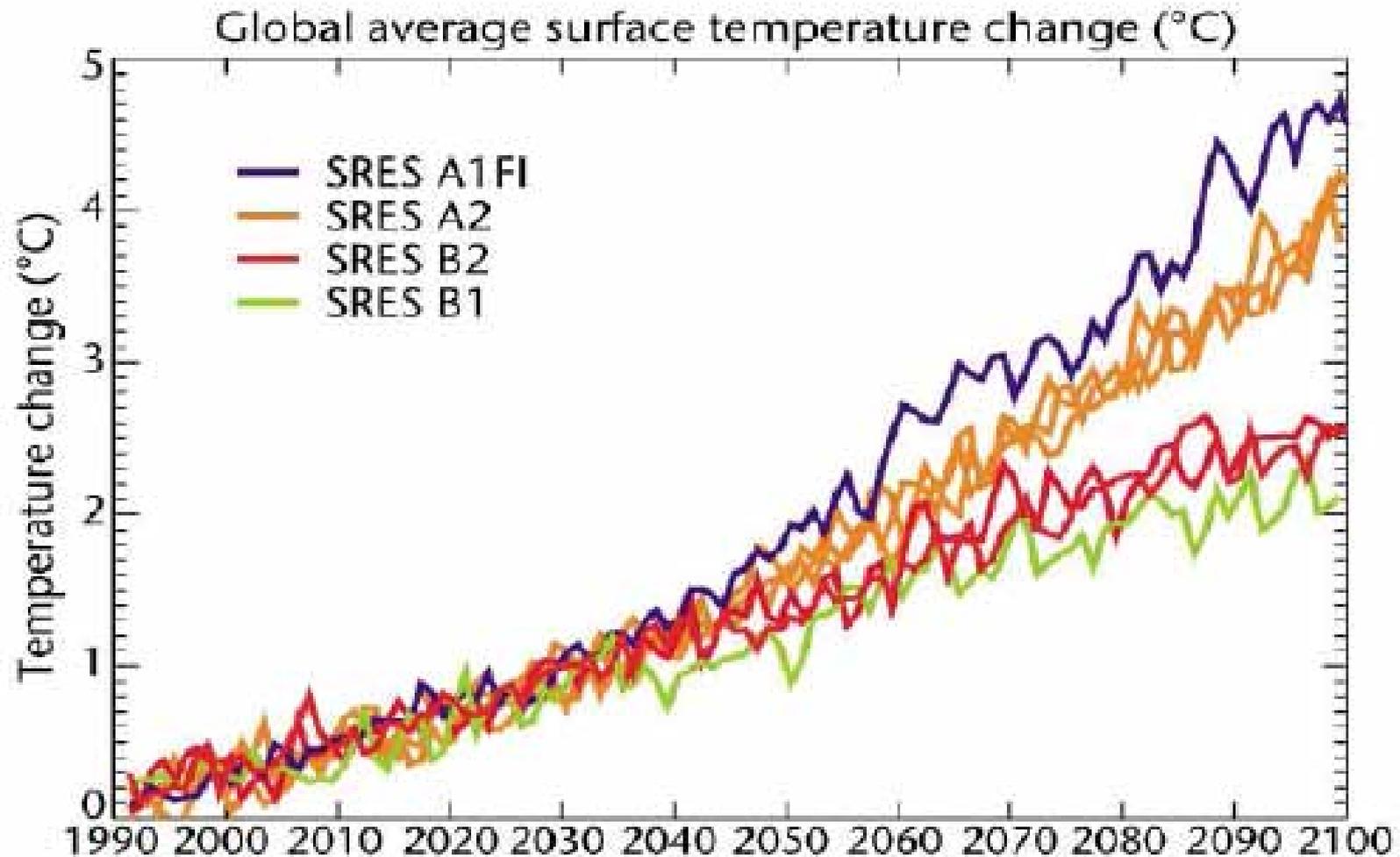
- Described by physical laws
- Complex interaction of atmosphere, sun, vegetation, oceans and humans
- Characterized by different climate types – e.g. arctic, temperate, tropical, step, monsoonal, arid...
- Realisation of weather (rain mm, sun hours, temperature, wind speed and direction, etc.)
- Statistics of weather (long term averages) describes the climate

What is climate change?

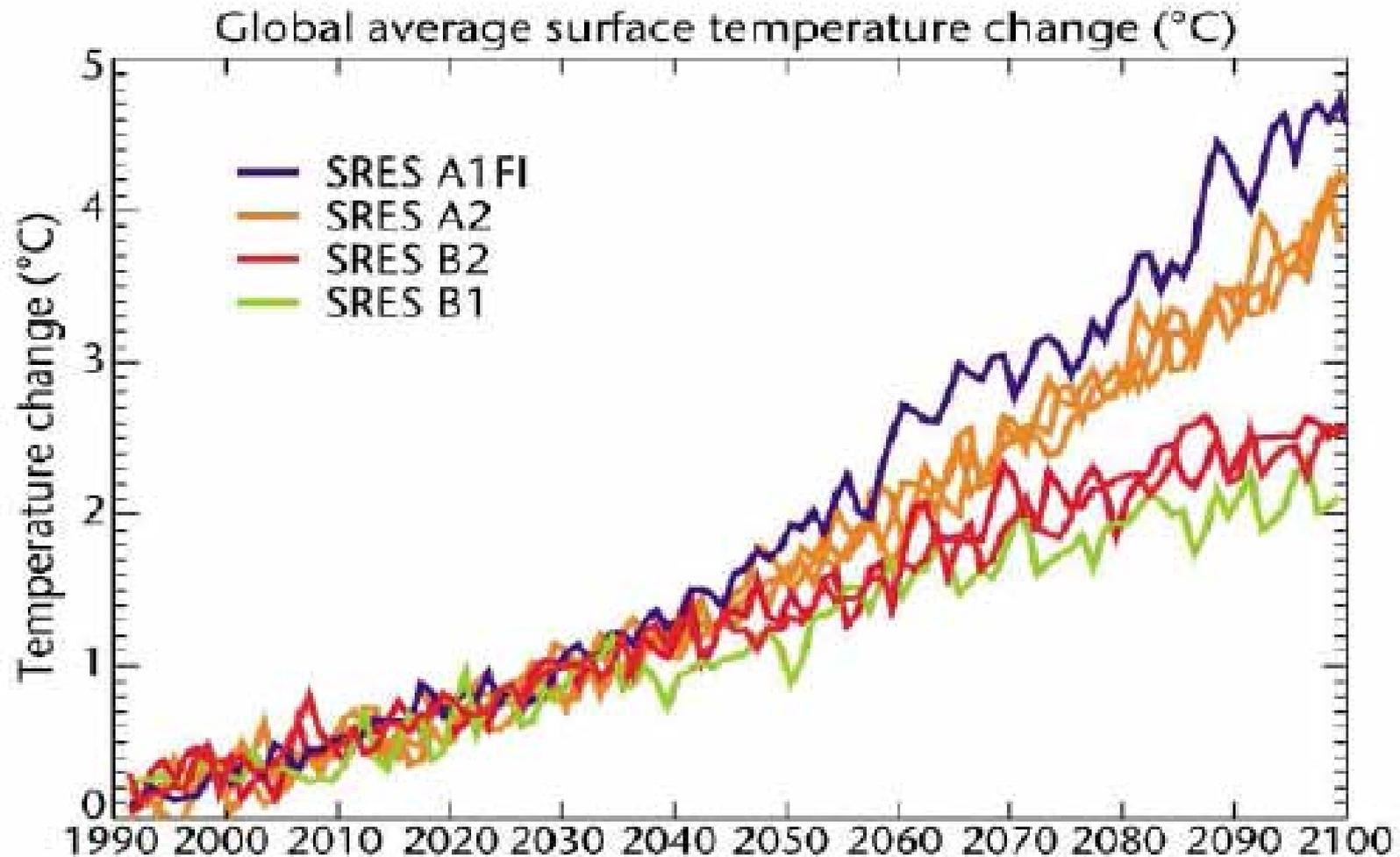
- Imbalance of energy in the climate system
- Manmade climate change is caused by greenhouse gases generated by human activities



Future temperature according to different scenarios

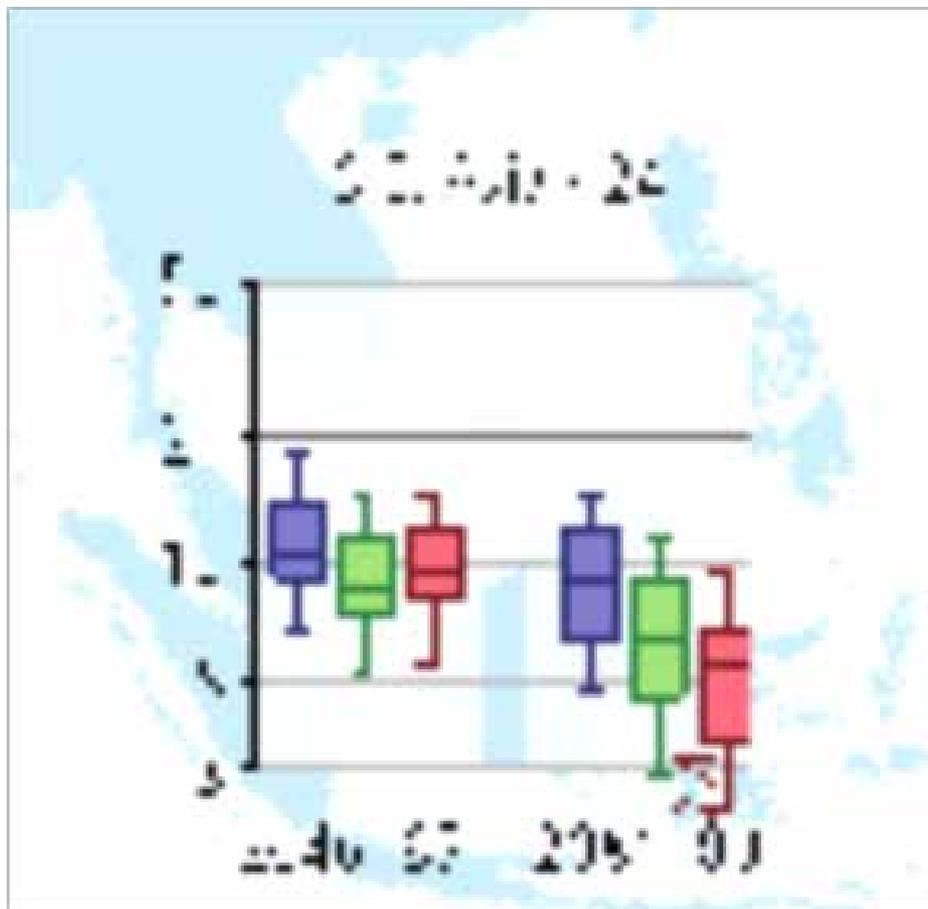


Future temperature according to different scenarios

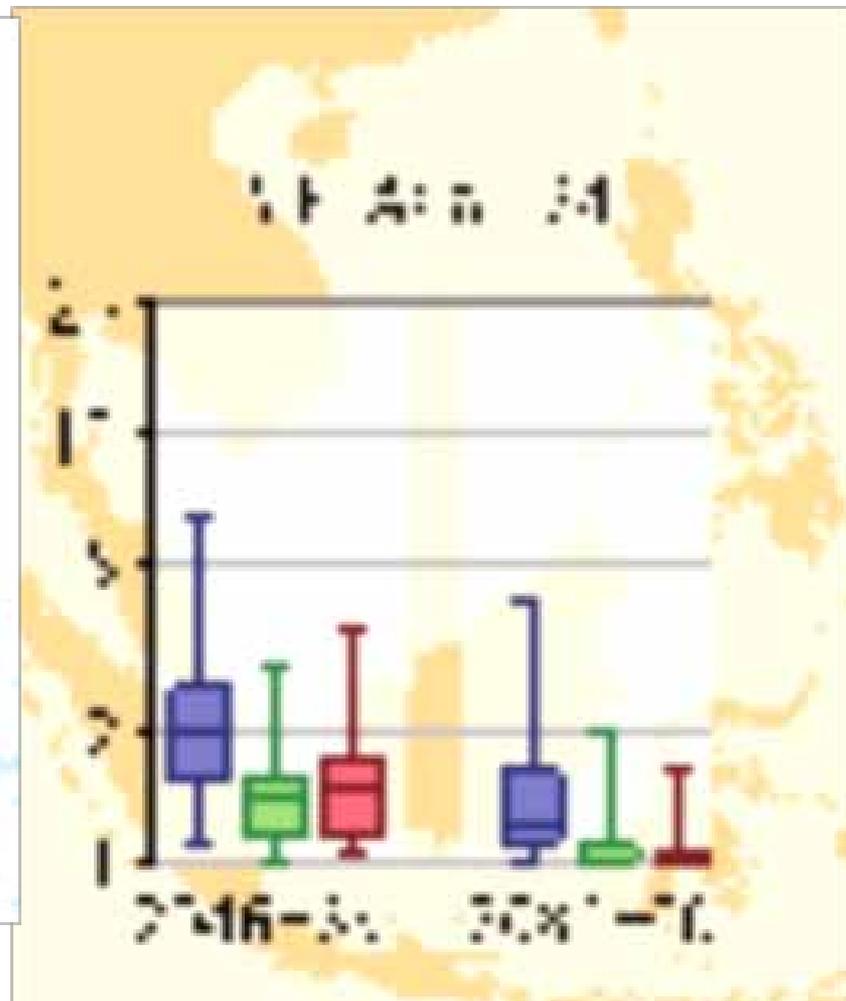


2. Impacts

Heavy Rain



Extreme Heat



Projected Impacts of Climate Change

Global temperature change (relative to pre-industrial)

0°C

1°C

2°C

3°C

4°C

5°C

Food

Falling crop yields in many areas, particularly developing regions

Possible rising yields in some high latitude regions

Falling yields in many developed regions

Water

Small mountain glaciers disappear – water supplies threatened in several areas

Significant decreases in water availability in many areas, including Mediterranean and Southern Africa

Sea level rise threatens major cities

Ecosystems

Extensive Damage to Coral Reefs

Rising number of species face extinction

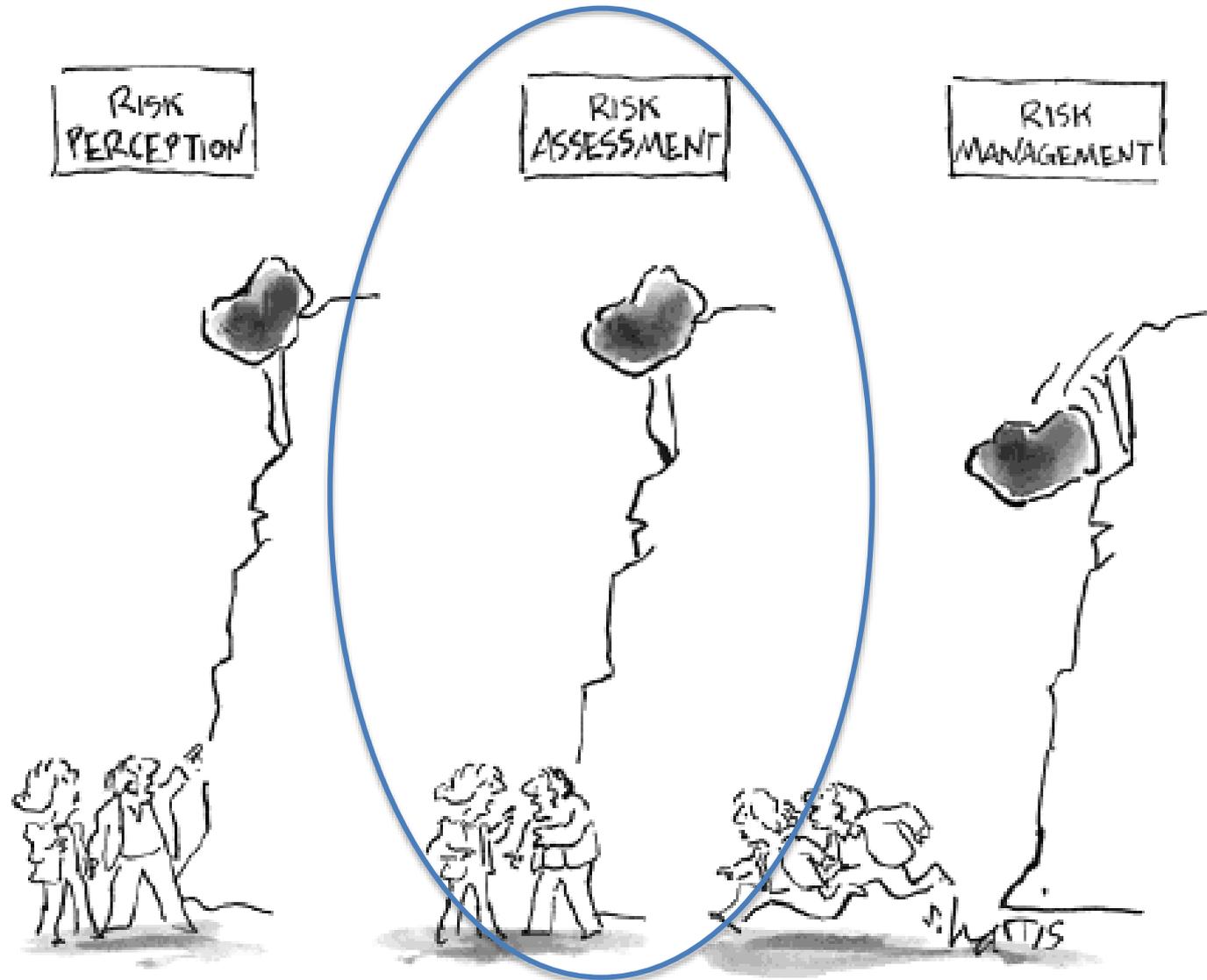
Extreme Weather Events

Rising intensity of storms, forest fires, droughts, flooding and heat waves

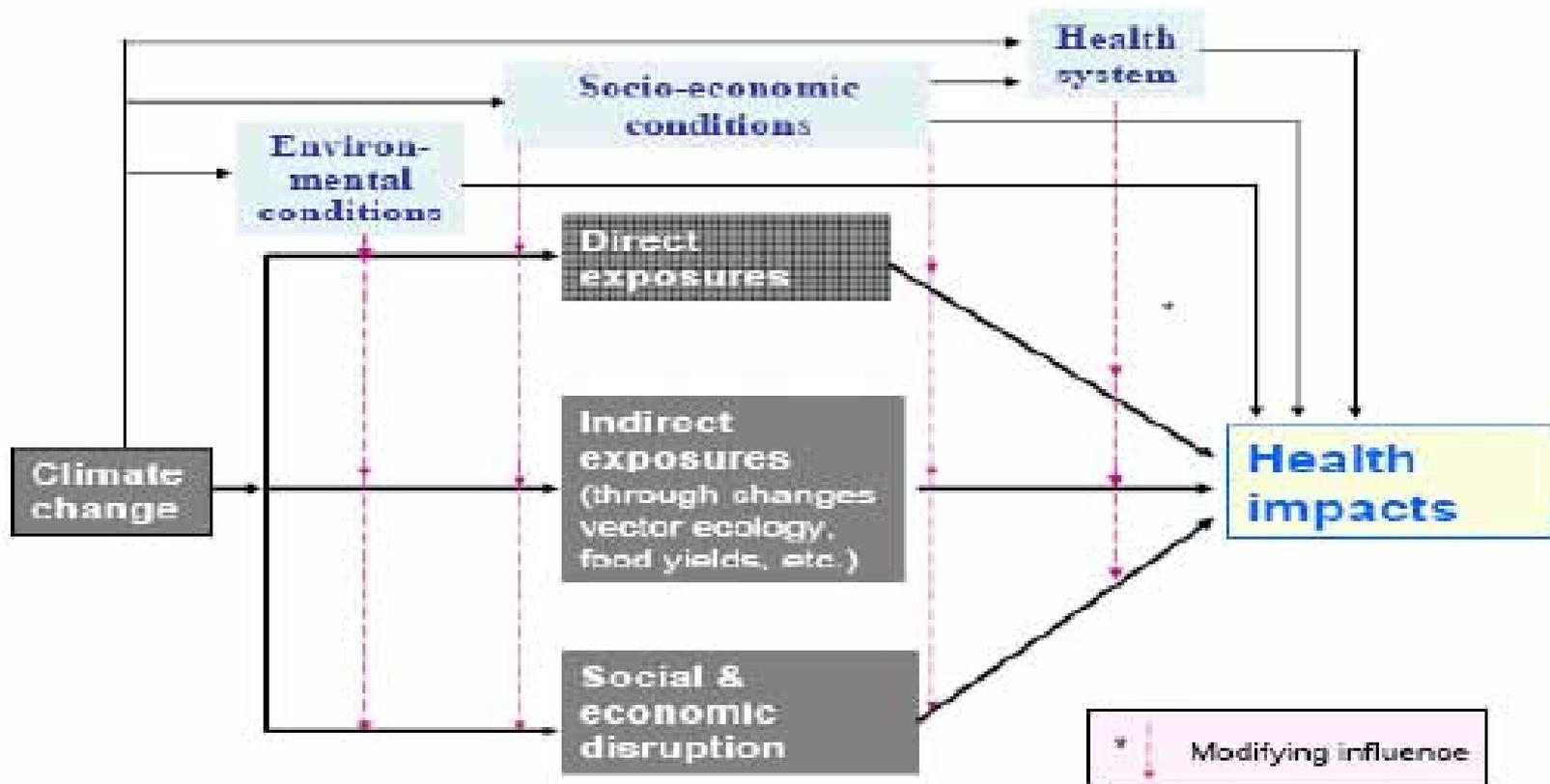
Risk of Abrupt and Major Irreversible Changes

Increasing risk of dangerous feedbacks and abrupt, large-scale shifts in the climate system

3. Climate change and health

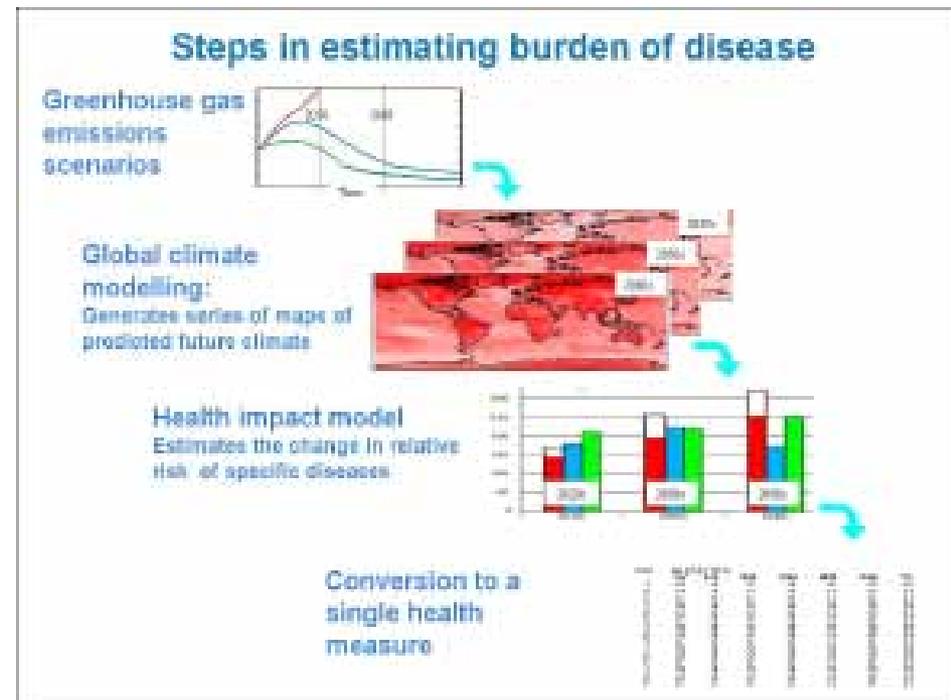


Pathways/processes by which climate change affect human health



Epidemiologic research tasks

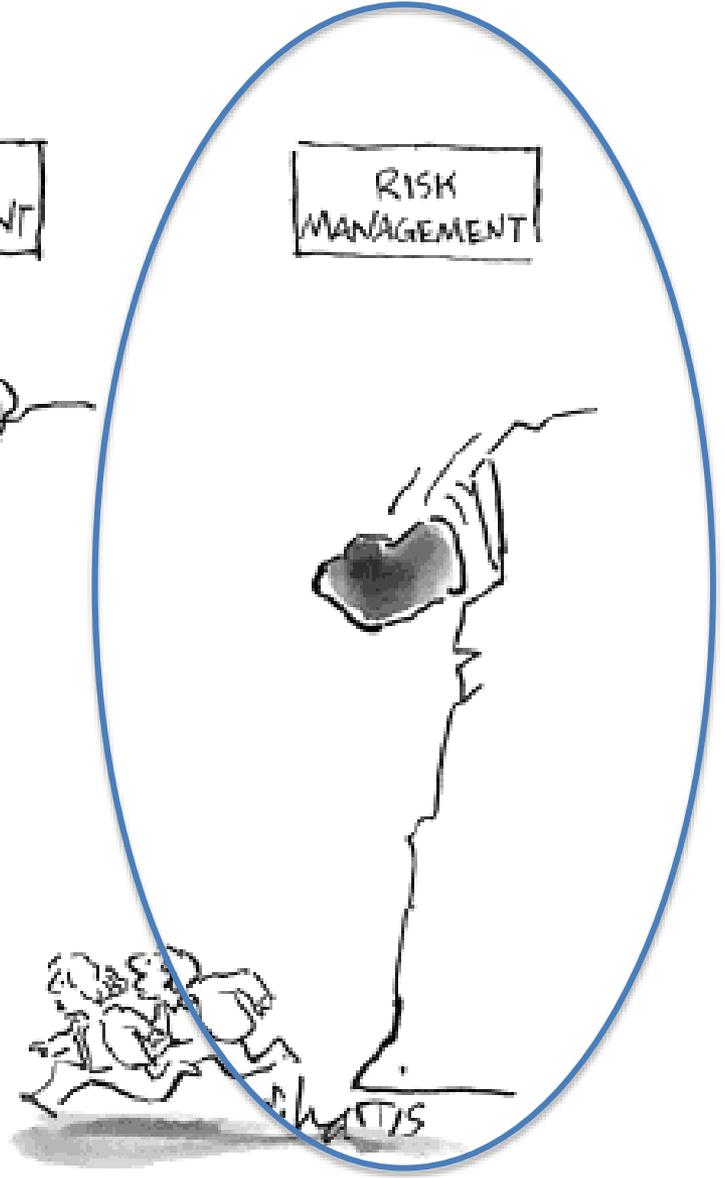
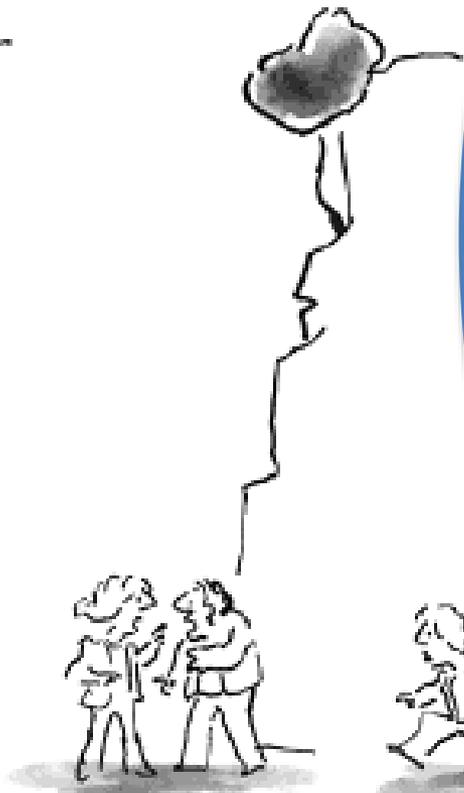
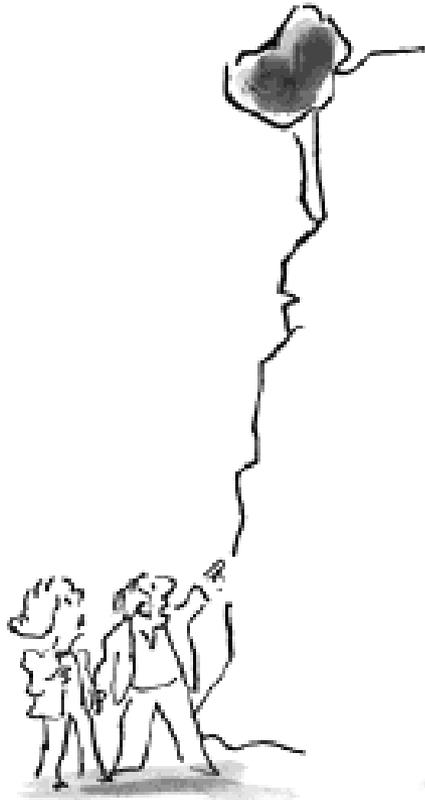
- Exposure-response relationships between climate variation and health outcomes
- Estimate the current health burden (e.g., annual deaths) attributable to climate change
- Develop scenario-based modelling to project health risks
- Assess health harms and benefits of proposed mitigation and adaptation policy options



RISK PERCEPTION

RISK ASSESSMENT

RISK MANAGEMENT



© 2015

Adaptation

= preparedness and prevention of impacts

- Education
- Policies
- Interventions
- Both top-down and bottom-up perspectives are needed



Climate Change and Global Health

UMEÅ CENTRE FOR GLOBAL HEALTH RESEARCH

- Epidemiology of disease directly related to weather and climate extremes (heat waves, floods, occupational exposures etc.)
- Epidemiology of disease indirectly related to weather and climate (malaria, dengue, waterborne disease, vole fever etc.)
- Perceptions, experiences and knowledge of the public to climate change and health
- Projections of disease under climate change scenarios
- Research and policies for mitigation and adaptation
- Community adaptation to climate change health impacts (e.g. early warnings and action plans, mixed methods)

4. Health Impacts in Sweden

4. Health Impacts in Sweden

KLINIK OCH VETENSKAP

RAPPORT

LÄS MER: Engelsk sammanfattning
<http://kariv.kivartianingen.se>

Ändrat klimat får konsekvenser för hälsoläget i Sverige

Värmeböljor och smittspridning oroar mest



ELISABET LINDGREN, leg läkare, fil dr, Stockholm Resilience Centre, Stockholms universitet
elisabet.lindgren@stockholmresilience.se

ANN ALQVIST, docent, sektionschef, Statens veterinärmedicinska anstalt, Uppsala

TYORNE ANDERSSON, chefsepidemiolog, Smittskyddsinstitutet, Solna

BEITIL FORSBERG, docent, Institutionen för folkhälsa och

klinisk medicin, Umeå universitet
GGRE OLSSON, fil dr, virologiska avdelningen, Smittskyddsinstitutet, Solna; CBRN-skydd och säkerhet, FOU, Umeå; Vilt, fisk och miljö, Sveriges lantbruksuniversitet
MARCIN ROCKLÖN, statistiker, Institutionen för folkhälsa och klinisk medicin, Umeå universitet

Ett flertal länder, som Nederländerna, Finland och Portugal, har redan tagit initiativ till nationella riskanalyser.

SVENSK UTVÄRDERING

I Sverige utfördes under perioden år 2006–2007 den första nationella utvärderingen av klimatförändringens påverkan på människors och djurs hälsa under 2000-talet. Det framgick klimatets betydelse för zoonoser och smittspridningen mellan djur och människor belystas också. Slutrapporten ingår som bilaga i regeringens Klimat- och säkerhetsutredning, vilken haft som uppgift att utreda effekterna av klimatförändringar i Sverige och hur samhällets sårbarhet för dessa kan minskas (SOU 2007:60). Vi presenterar här de viktigaste fynden som rör människors hälsa [7].

4. Health Impacts in Sweden

Heat and heat waves

Heat-related deaths and diseases

Likely to increase, in particular, with extreme heat waves. Impacts mainly on the elderly population. Temperatures are projected to increase in the summer periods.

Cold and cold waves

Cold-related deaths and diseases

May decrease. Temperatures are projected to increase considerably in the winter period.

Storms, floods and erosion

Accidents, infectious outbreaks of various diseases. Leakage of toxins from industrial contaminated areas to water catchment areas. Hindrance to society function like emergency help and health care

May increase. The projected change of storm frequency is uncertain. Rainfall is projected to increase overall. Lack of systematic evidence.

4. Health Impacts in Sweden

Rainfall and floods

Waterborne infectious diseases, e.g. giardia, cryptosporidium, Campylobacteria, leptospiros, EHEC and calicivirus

Not well studied in relation to climate in Sweden.

Increasing water temperatures in combination with heavy rains and floods

Recreational swimming and playing at beaches may increase as well as the contamination of water to transfer gastrointestinal diseases and skin infections.

Increased transmission of vibrio cholera particularly in brackish water. Increased algae blooms and risk for intoxication.

Lack of systematic evidence

Temperature increases

Increases in transmission and growth of food-borne disease like salmonella, Clostridium, Stafylococcus

No systematic evidence for Sweden, but international studies support this association

4. Health Impacts in Sweden

Water and air temperatures

Increased irrigation and risk of transmission of disease to agriculture products, e.g. EHEC.

Lack of systematic evidence

Shorter and winter and warmer conditions in general

Vector-borne diseases like borreliosis (vector: ticks), visceral leishmaniasis (vector: sand flies), tularaemia, pollens

Borreliosis is well studied, while many of the other vector-borne disease lack systematic evidence for introduction and transmission capacity in Sweden

More rain and damp conditions

Mites and mould associate allergies and respiratory diseases

Lack of systematic evidence

Temperature and wind conditions

Air pollution (ozone and particles) associated diseases

Uncertain, may contribute to lower levels as well

4. Summary and updates

- Health conditions in Sweden are sensitive to climate change
- Much remains to be better understood

New convincing evidence on impacts from:

- Heat waves (warnings system under development)
- Borreliosis (increased surveillance and preparedness northwards)
- Drinking water (surface water sources; under research; new technology investments, e.g. UV-light)
- Pollen season longer

“Integrating climate change science with global health – understanding and preparing for climate change to protect our health and wellbeing”



5. Health Impacts in Indonesia