Impacts of climate change

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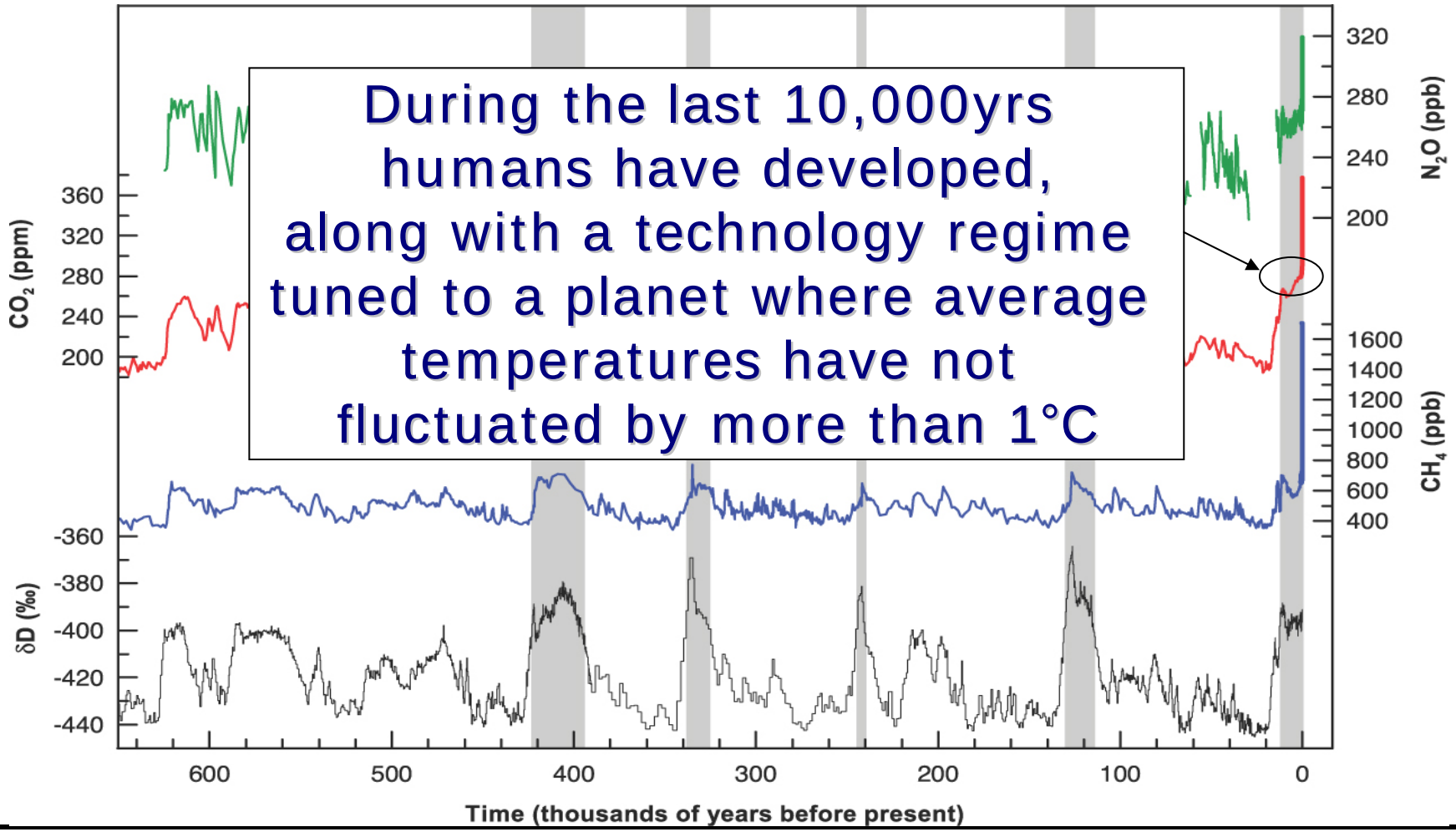
CO_2 concentration over the past 650 000 years

- Due to emissions from human activities the CO2 concentration is 387 ppm (2007), far exceeding the natural range over the last 650 000 years (180 – 300 ppm)



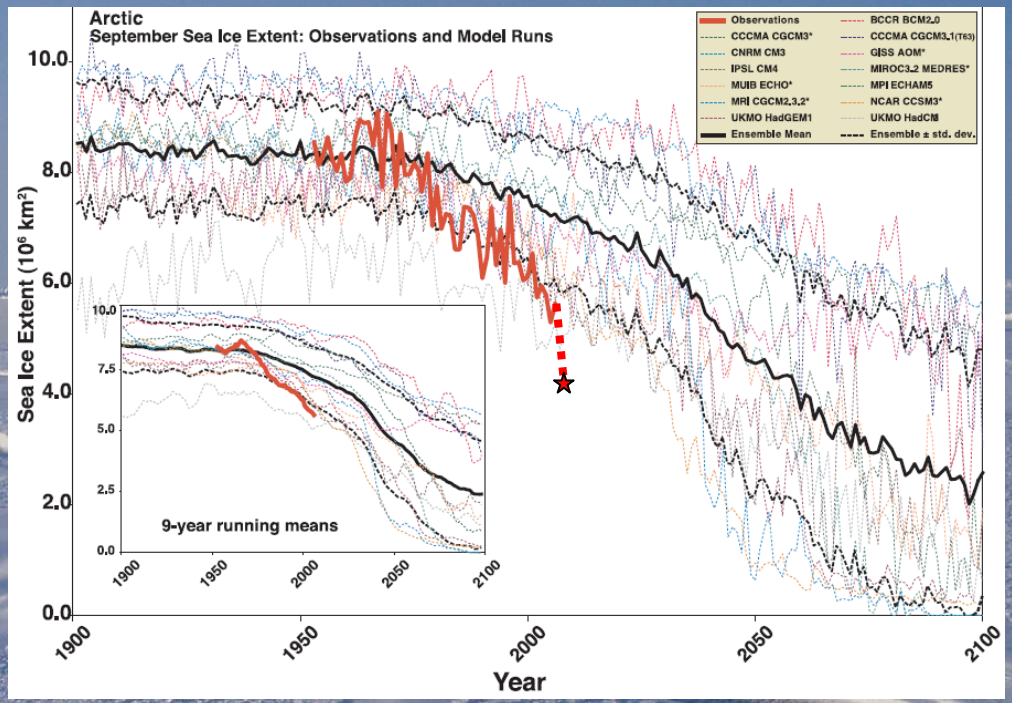
Going, going

Gone

Greening Greenland

Gone

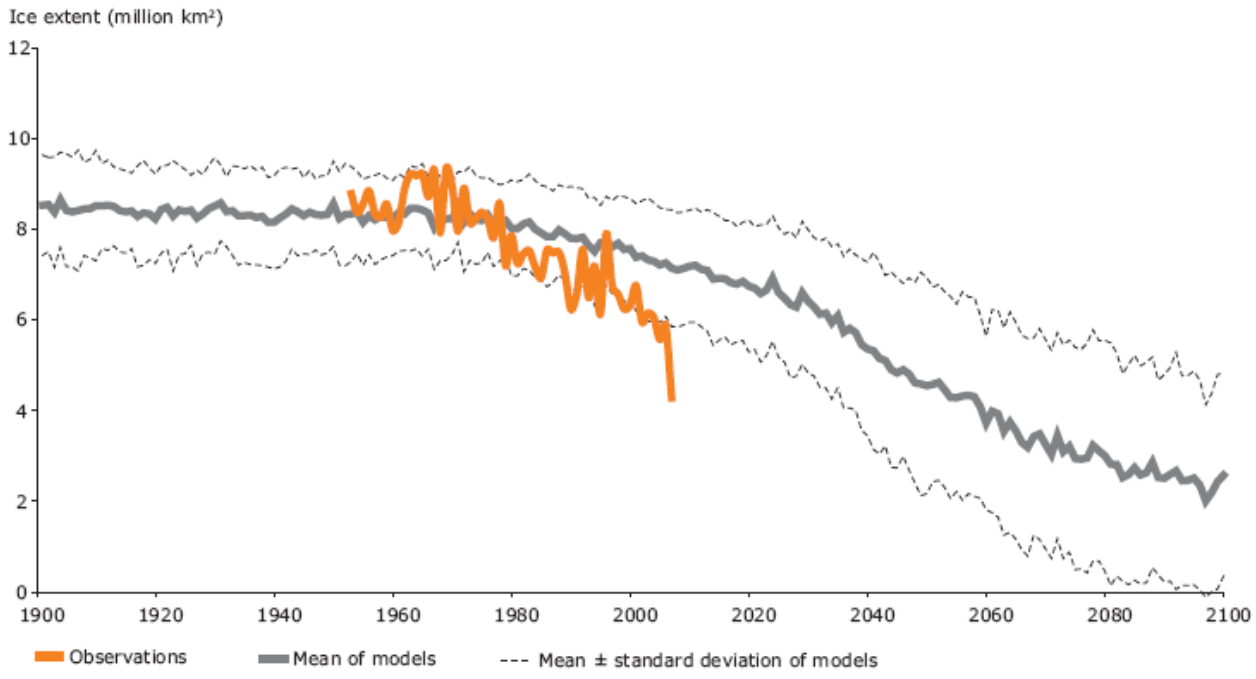

ICESat


Arctic
September Sea Ice Extent: Observations and Model Runs
Observations
CCCMA CGCM3*
CNRM CM3
IPSL CM4
MUIB ECHO*
MRI CGCM2.3.2*
UKMO HadGEM1
Ensemble Mean
BCCR BCM2.0
CCCMA CGCM3.1(T63)
GISS AOM*
MIROC3.2 MEDRES*
MPI ECHAM5
NCAR CCSM3*
UKMO HadCM
Ensemble ± std. dev.
Sea Ice Extent (10⁶ km²)
Year
9-year running means

Arctic sea ice

- Arctic sea ice extent has declined at an accelerating rate, especially in summer
- The record low ice cover in September 2007 was half of the size of a normal minimum extent in the 1950s

past



Observed and projected Arctic September sea-ice extent 1900-2100

The 2007 minimum sea-ice extent

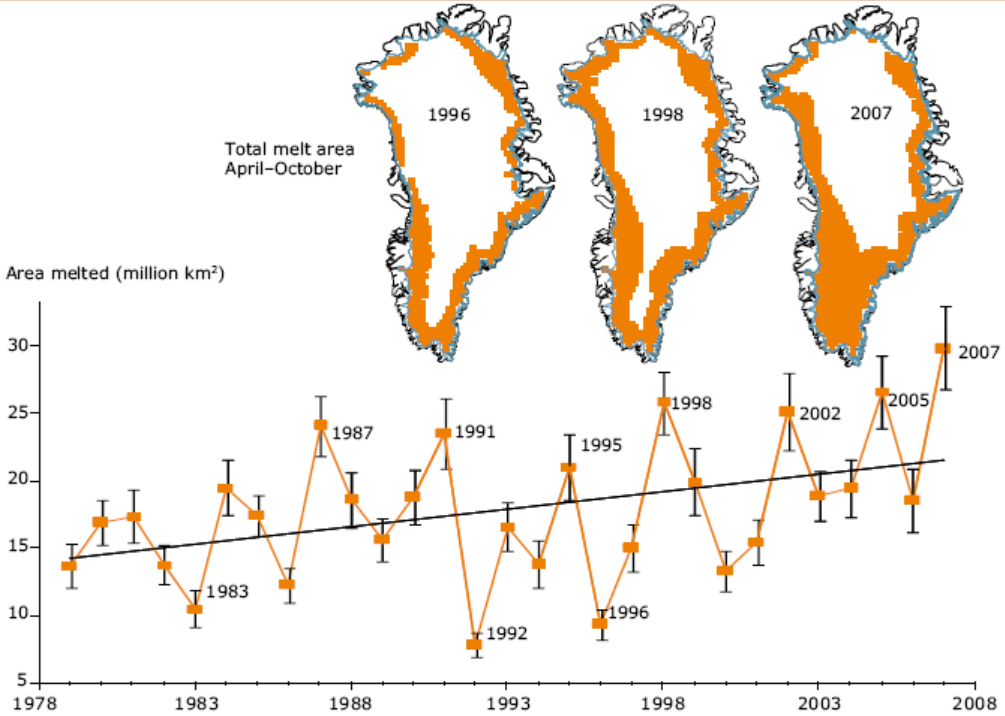
- Summer ice is projected to continue to shrink and may even disappear at the height of the summer melt season in the coming decades
- There will be still substantial ice in winter

future

Greenland ice sheet

- The Greenland ice sheet is losing 100 billion tons of ice per year since the 1990s
- The contribution of ice-loss from Greenland to global SLR is estimated at 0.14-0.28 mm/year for the period 1993-2003 and has since increased

past



Area of Greenland ice sheet melting 1979-2007

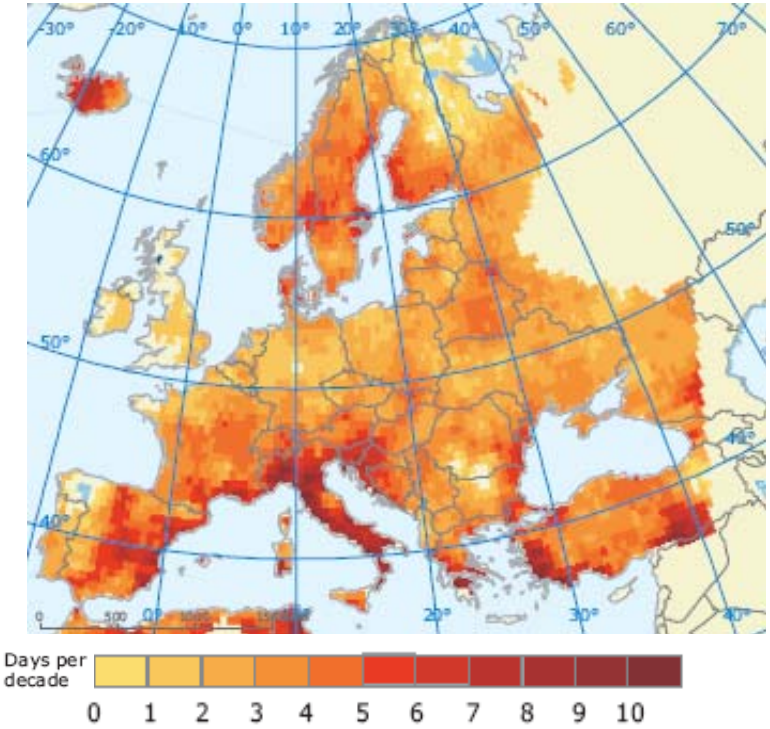
- No reliable prediction of the future of ice sheets can be made, since internal processes are poorly understood
- In the long term, melting ice sheets have the largest potential to increase SLR

future

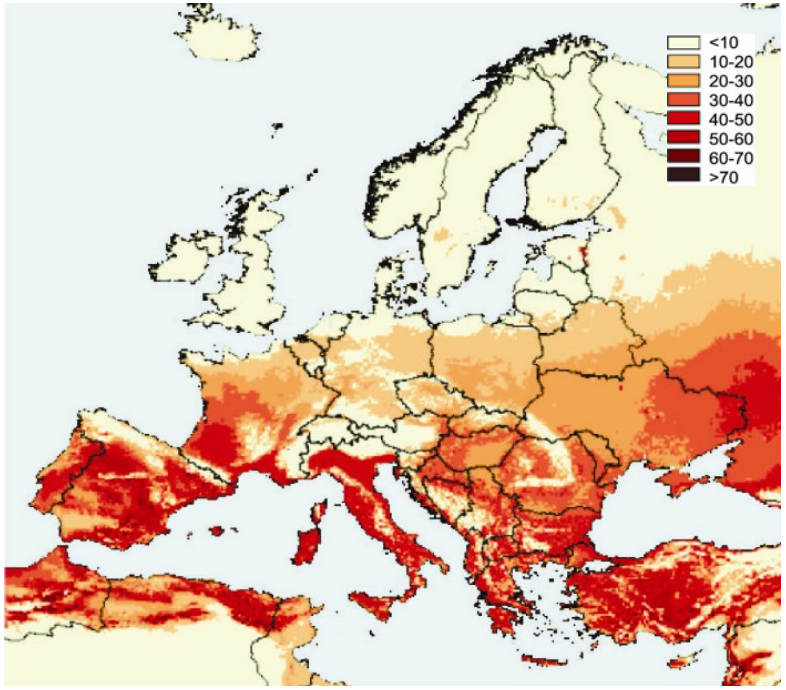
Temperature extremes in Europe

- Extremes of cold became less frequent and warm extremes more frequent
- Number of hot days almost tripled between 1880 and 2005

past



Observed changes in duration of warm spells in summer in the period 1976 - 2006



Projected changes in number of tropical nights between periods 1961-1990 and 2071-2100

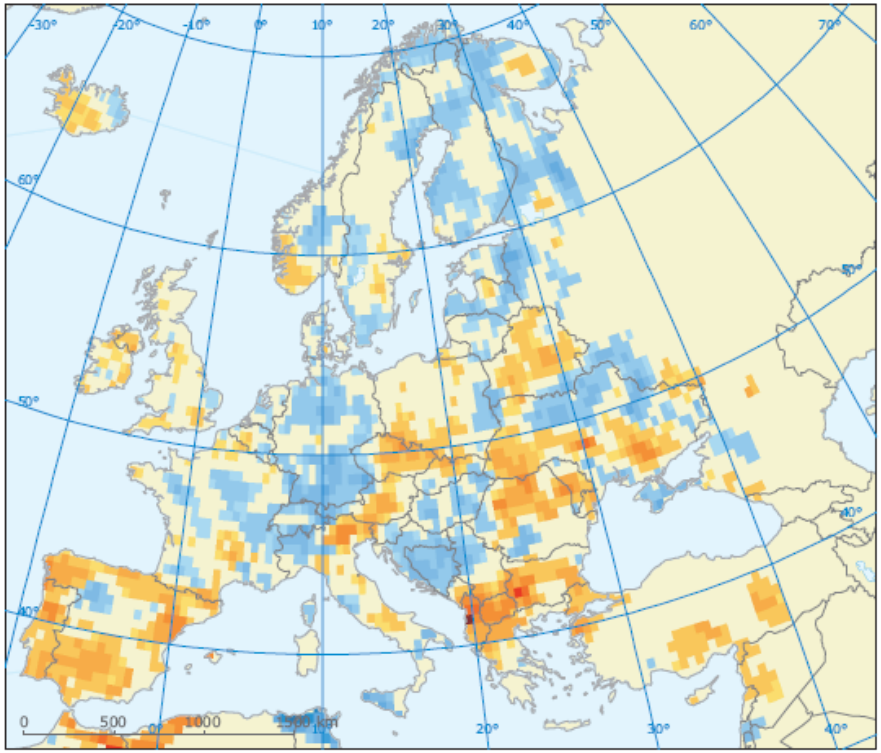
- Increase in frequency, intensity and duration of heat-waves
- Further decrease of number of cold days and frost extremes

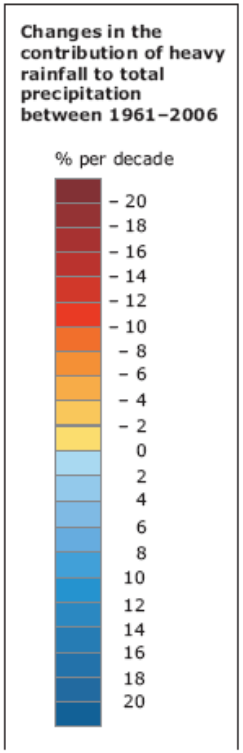
future

Precipitation extremes in Europe

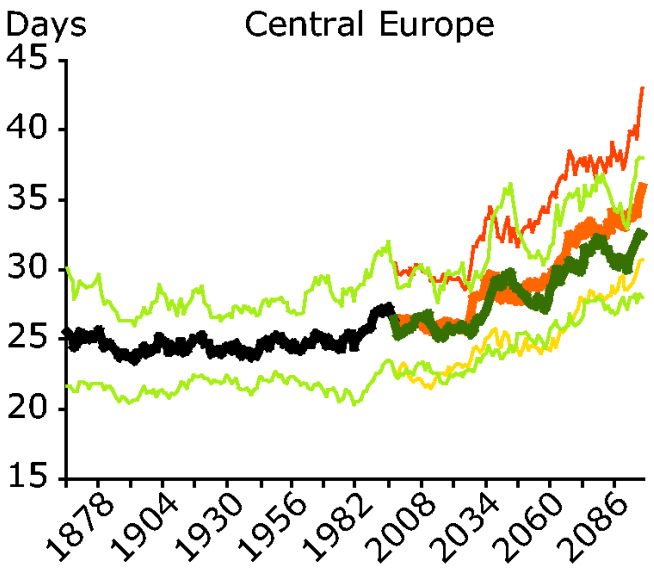
past

- Intensity of precipitation extremes increased in the past 50 years (across Europe)
- No change in part of Europe experiencing meteorological drought conditions





Changes in the contribution of heavy rainfall to total precipitation between 1961-2006



Number of consecutive dry days (1860 – 2100)

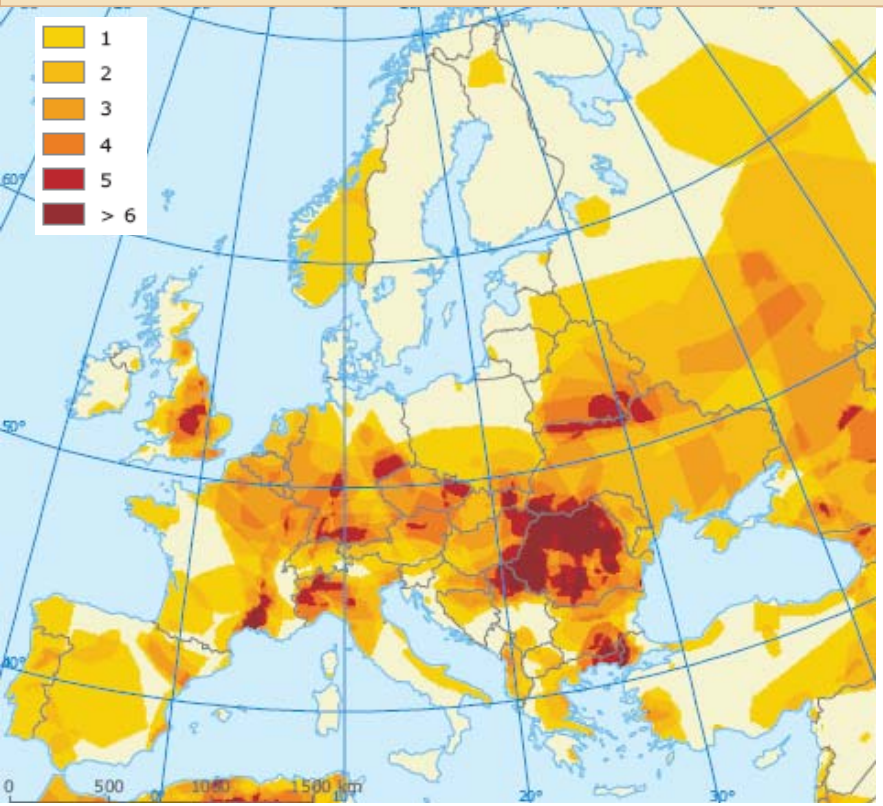
future

- More frequent heavy precipitation events (across Europe)
- More and longer dry periods (especially in southern Europe)

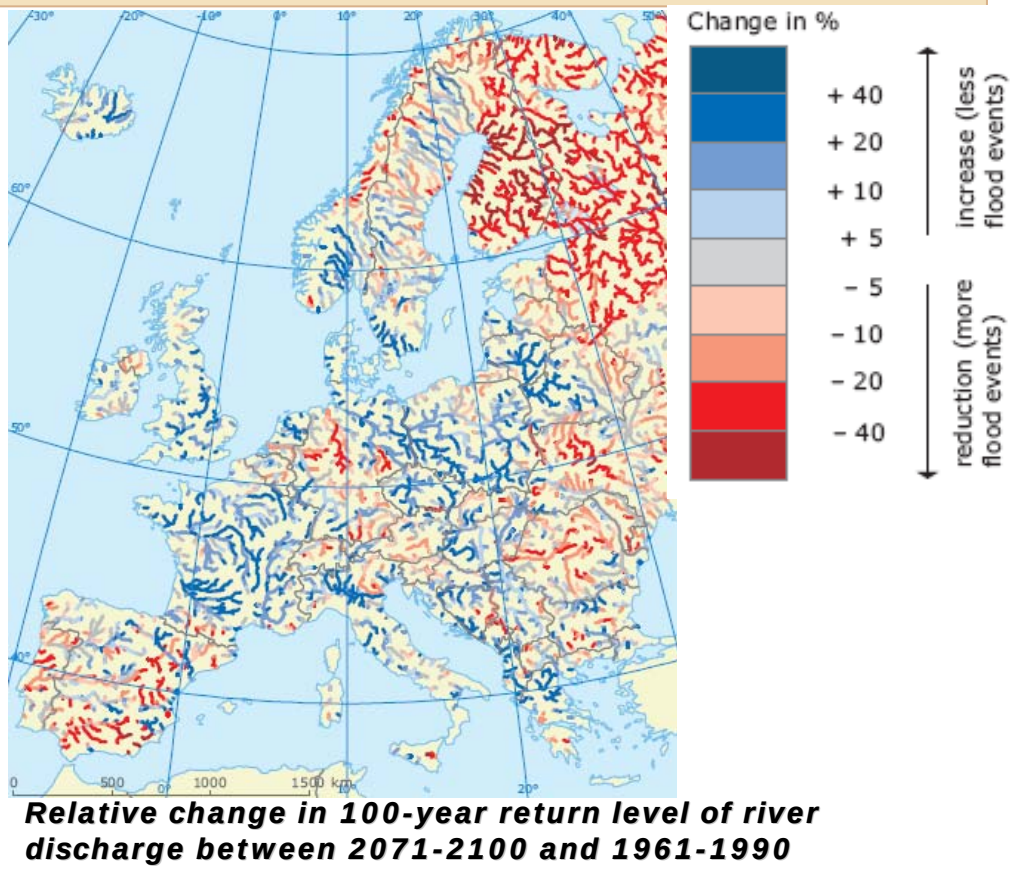
River flooding

past

- Since 1990, 259 major river floods have been reported in Europe (165 since 2000), the increase is mainly because of better reporting and land-use changes



Occurrence of flood events 1998-2008

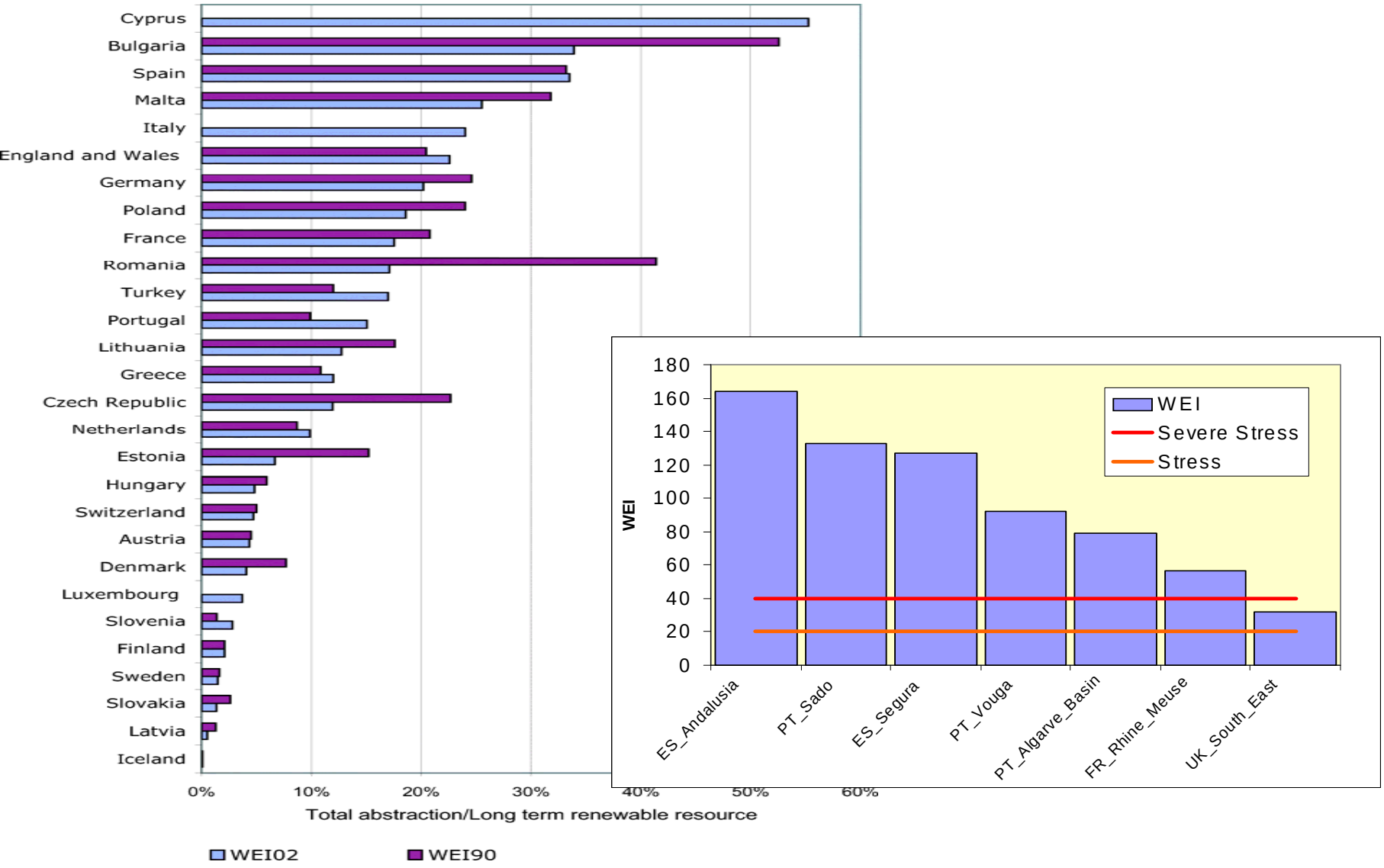


Relative change in 100-year return level of river discharge between 2071-2100 and 1961-1990

future

- Increase in the occurrence and frequency of flood events in large parts of Europe
- Less snow accumulation in winter and lower risk of early spring flooding

Water Exploitation Index



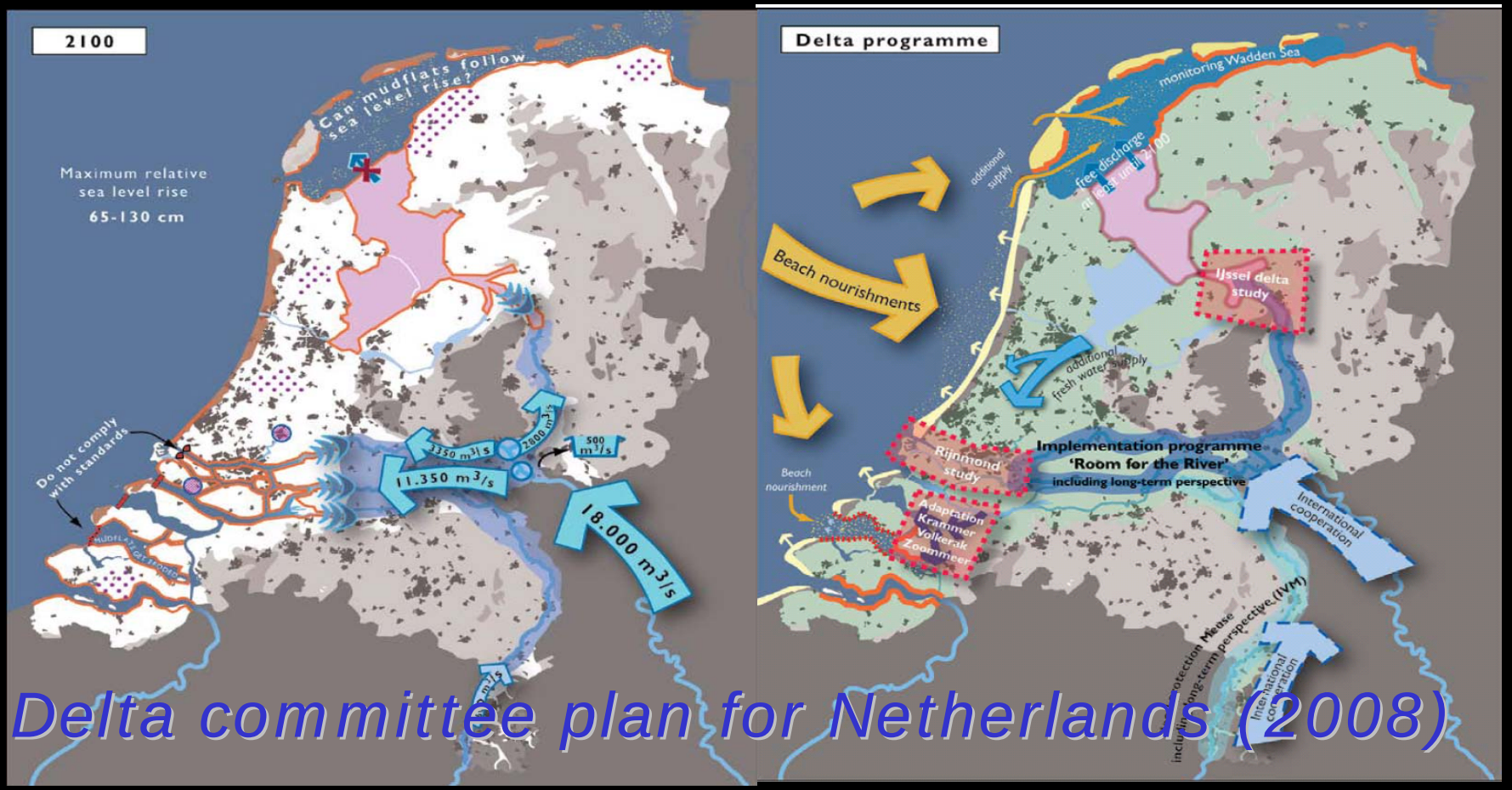
Fish out of water

Aral Sea

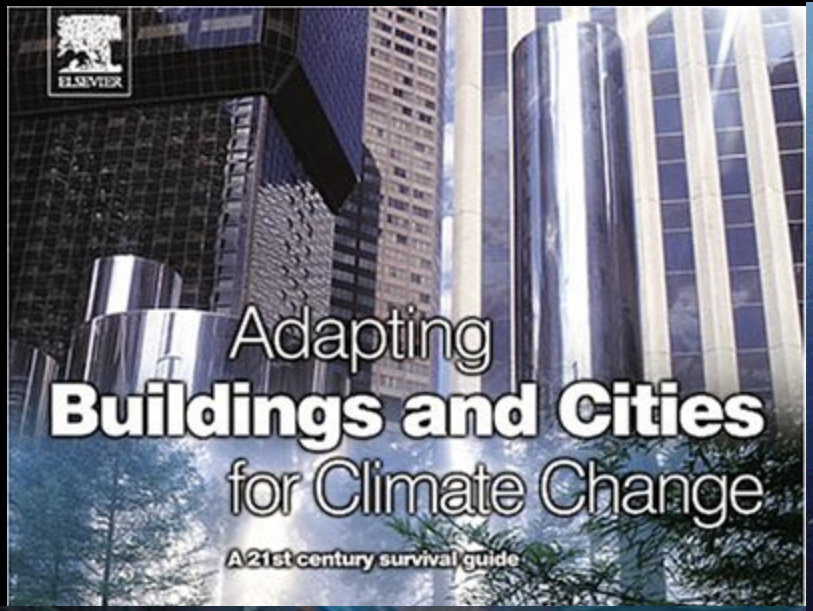
Falling water

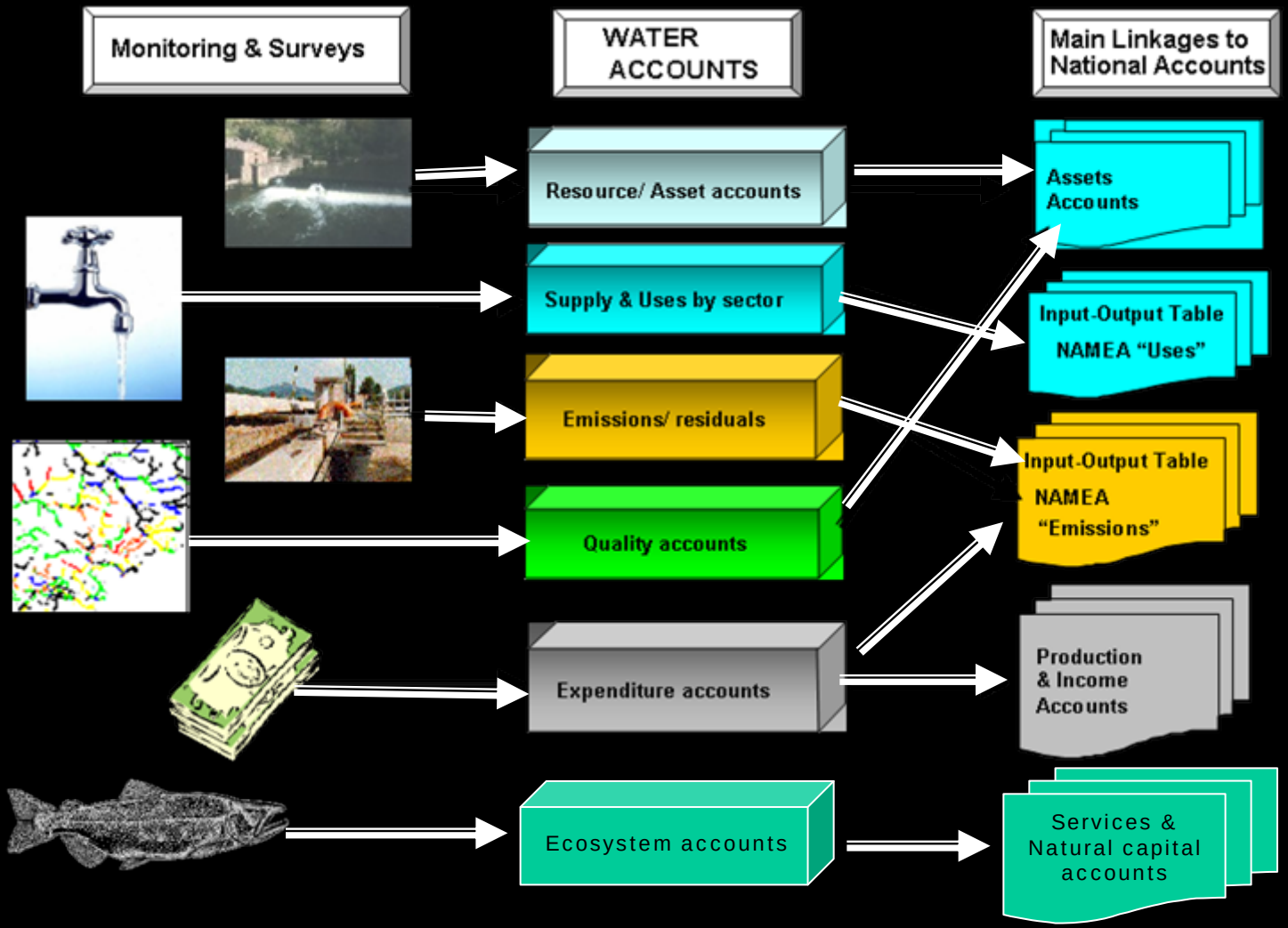
No more water

Living with water



Delta committee plan for Netherlands (2008)

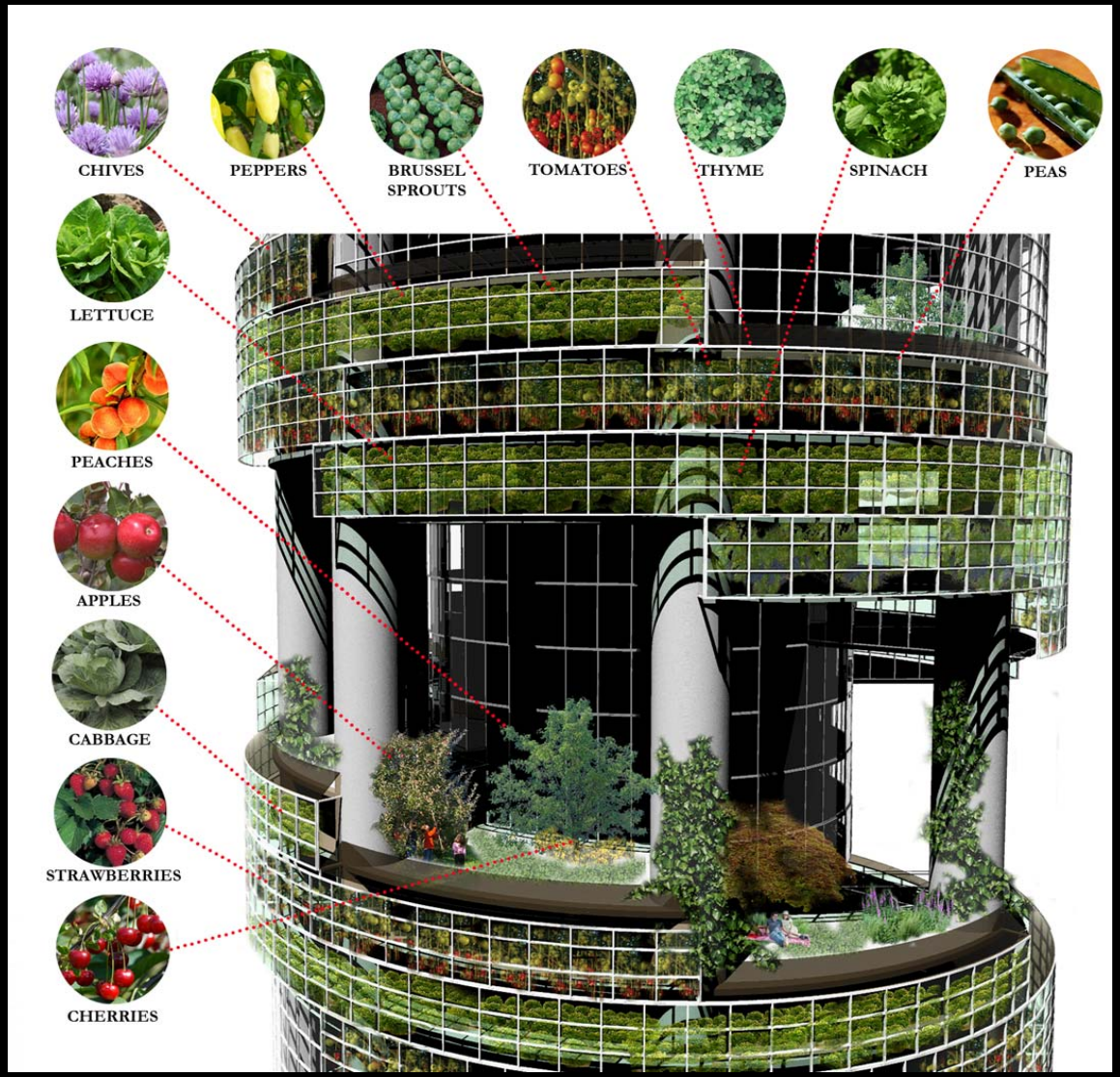

ELSEVIER
Adapting
Buildings and Cities
for Climate Change
A 21st century survival guide



Water accounts

Vertical farming

...a fast cropping concept!



Natural capital

Imaginative capital

Liveable landscapes