Integrated Yautepec River Basin Management with Reduction of Water Related Carbon Footprints

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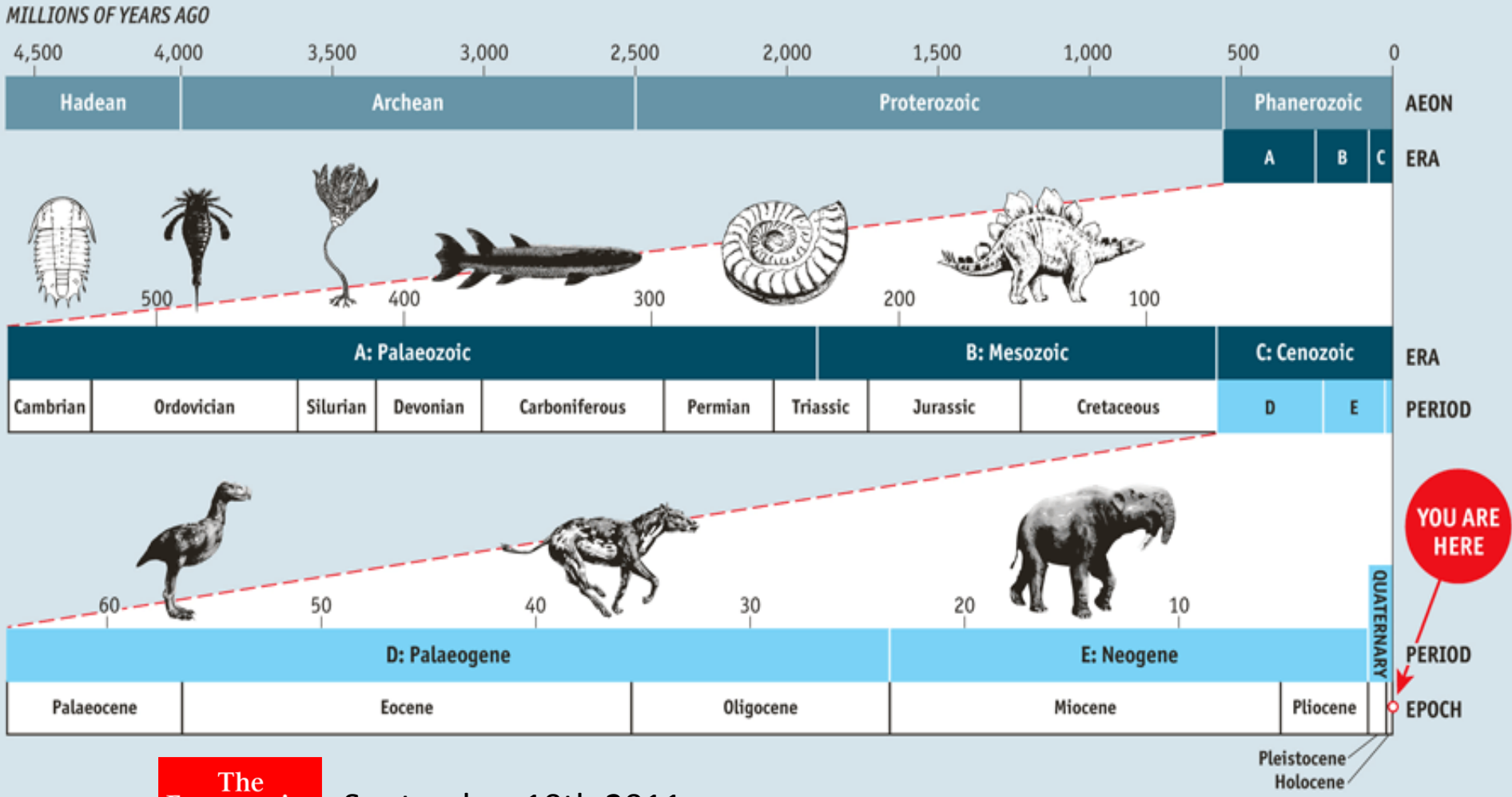
2. Conceptual reflections:
- Anthropocene
- Global environmental change (GEC),
-Dual vulnerability
REUTERS

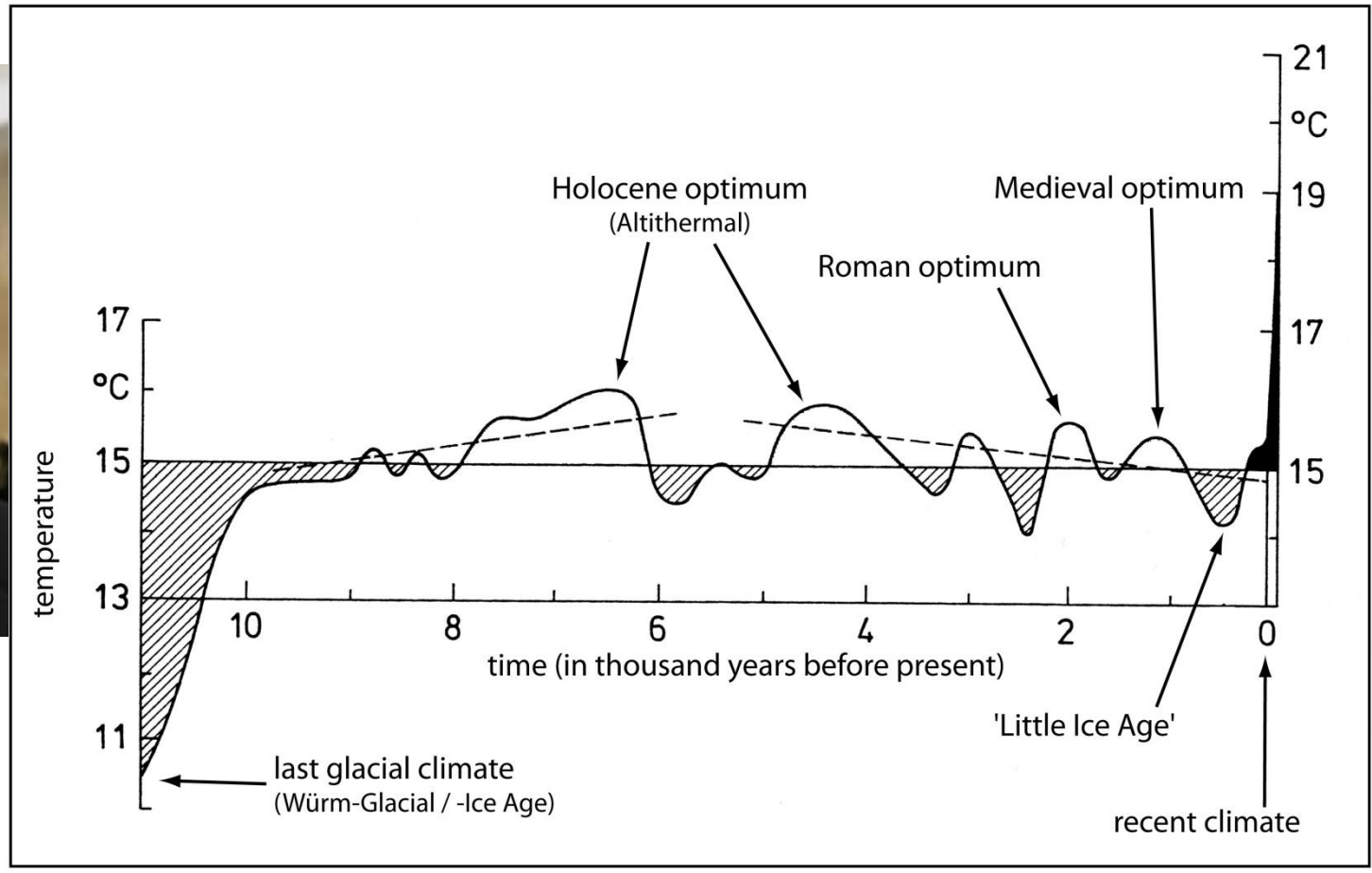
Earth History and Humans



The Economist September 10th 2011

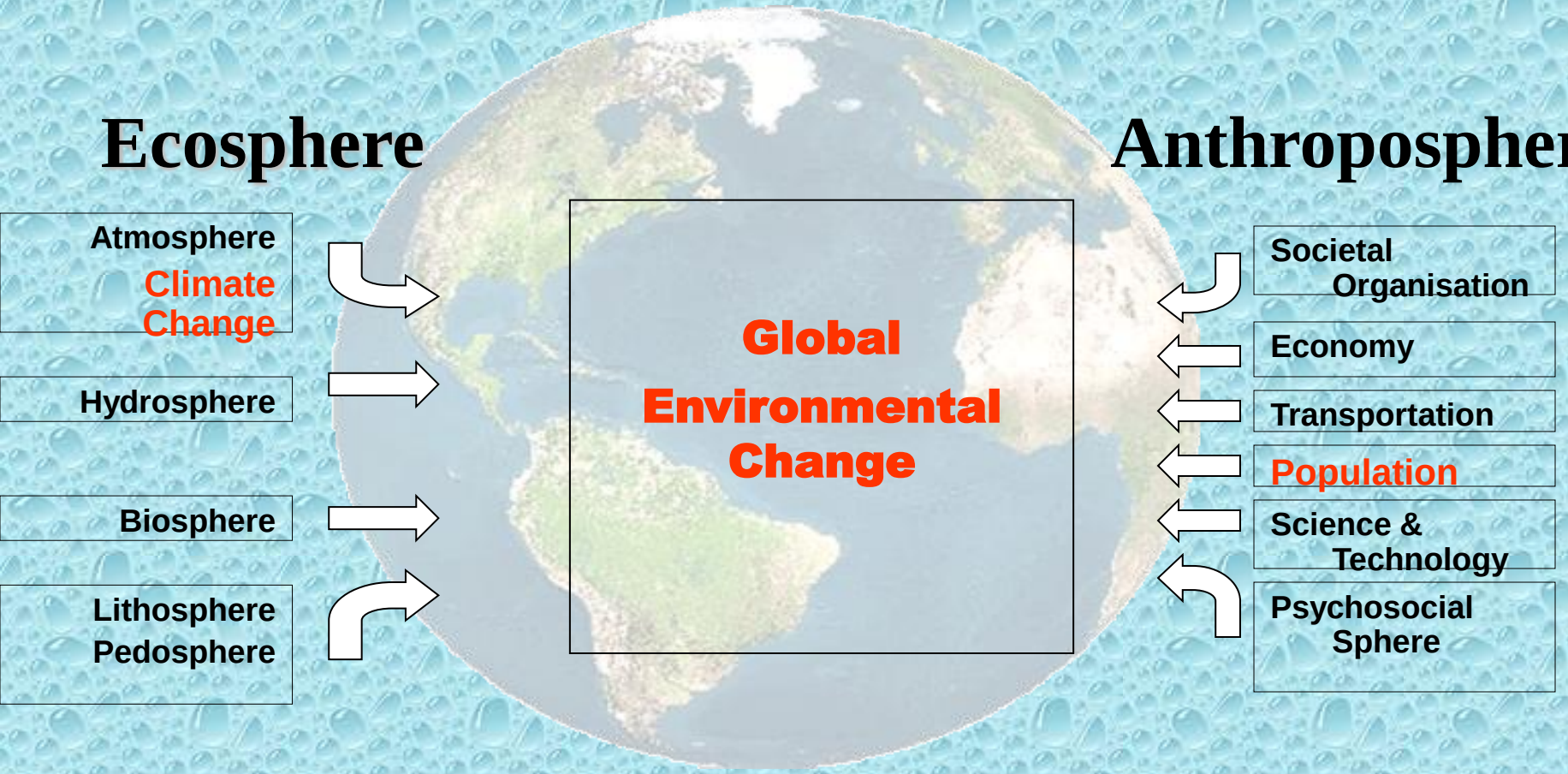
From the Holocene (12.000 years b.p.) to the Anthropocene (1784 AD)

Paul Crutzen, Nobel Laureate for Chemistry (1995)



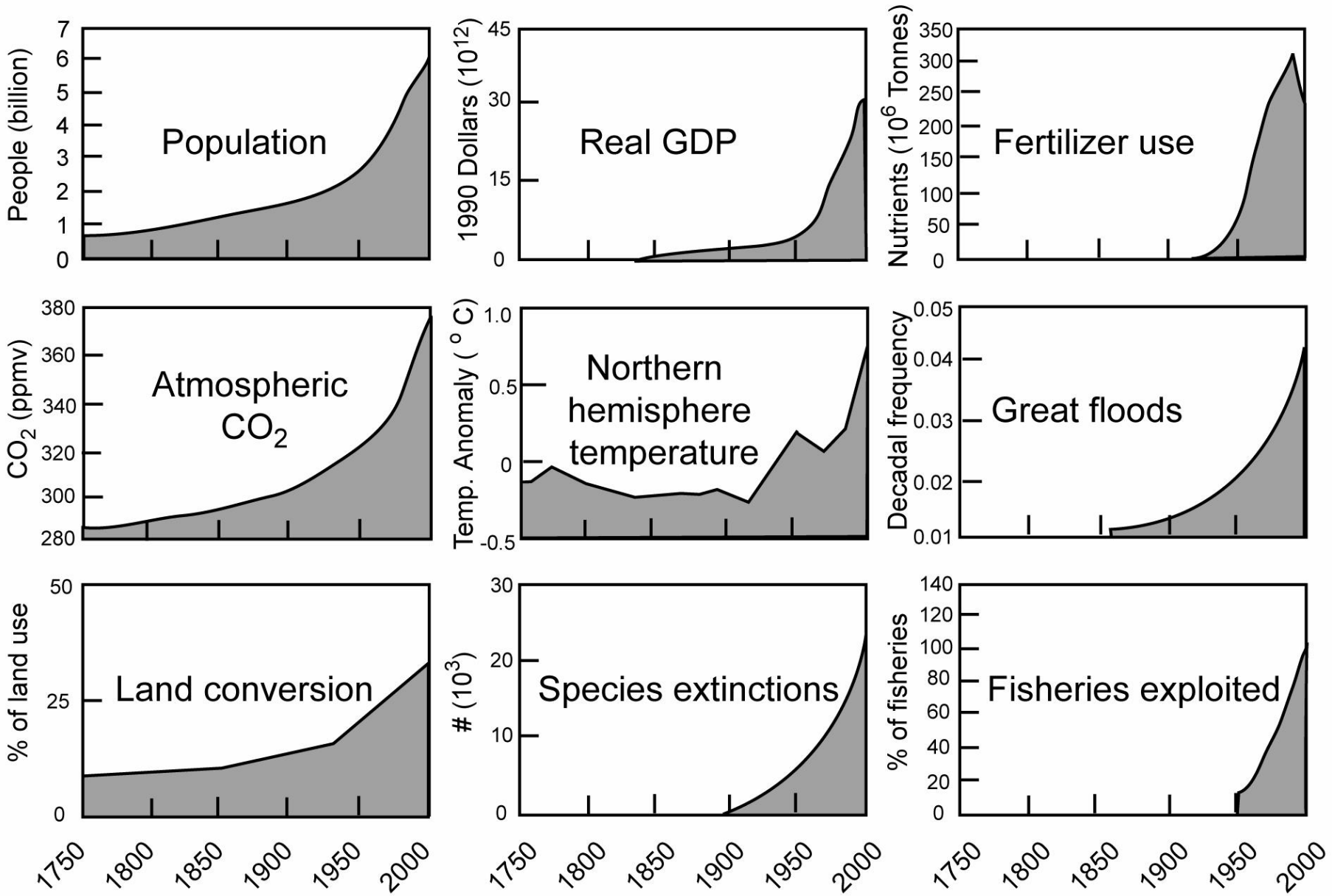
In geography **Holocene** era of earth history since end of glacial period (10-12.000 years ago), **Anthropocene**, since industrial revolution, but especially last 50 years with anthropogenic climate change: burning of coal, oil, gas➔GHG increase

Global Environmental Change (GEC)



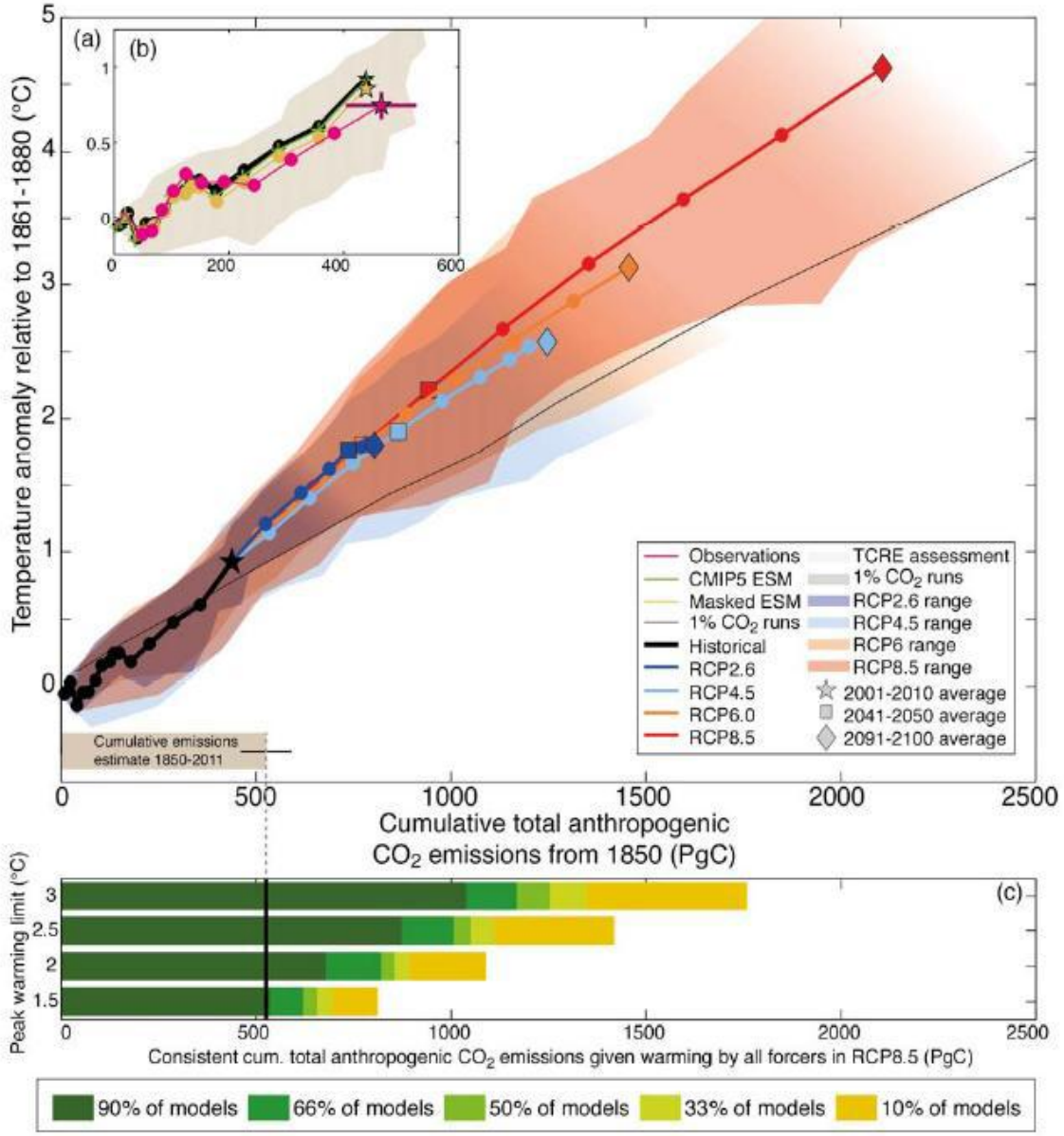
GEC poses a threat, challenge, vulnerabilities and risks for human security and survival.

Global Environmental Change



Source: MA (2005)

IPCC, 5th Assessment Report, 2013



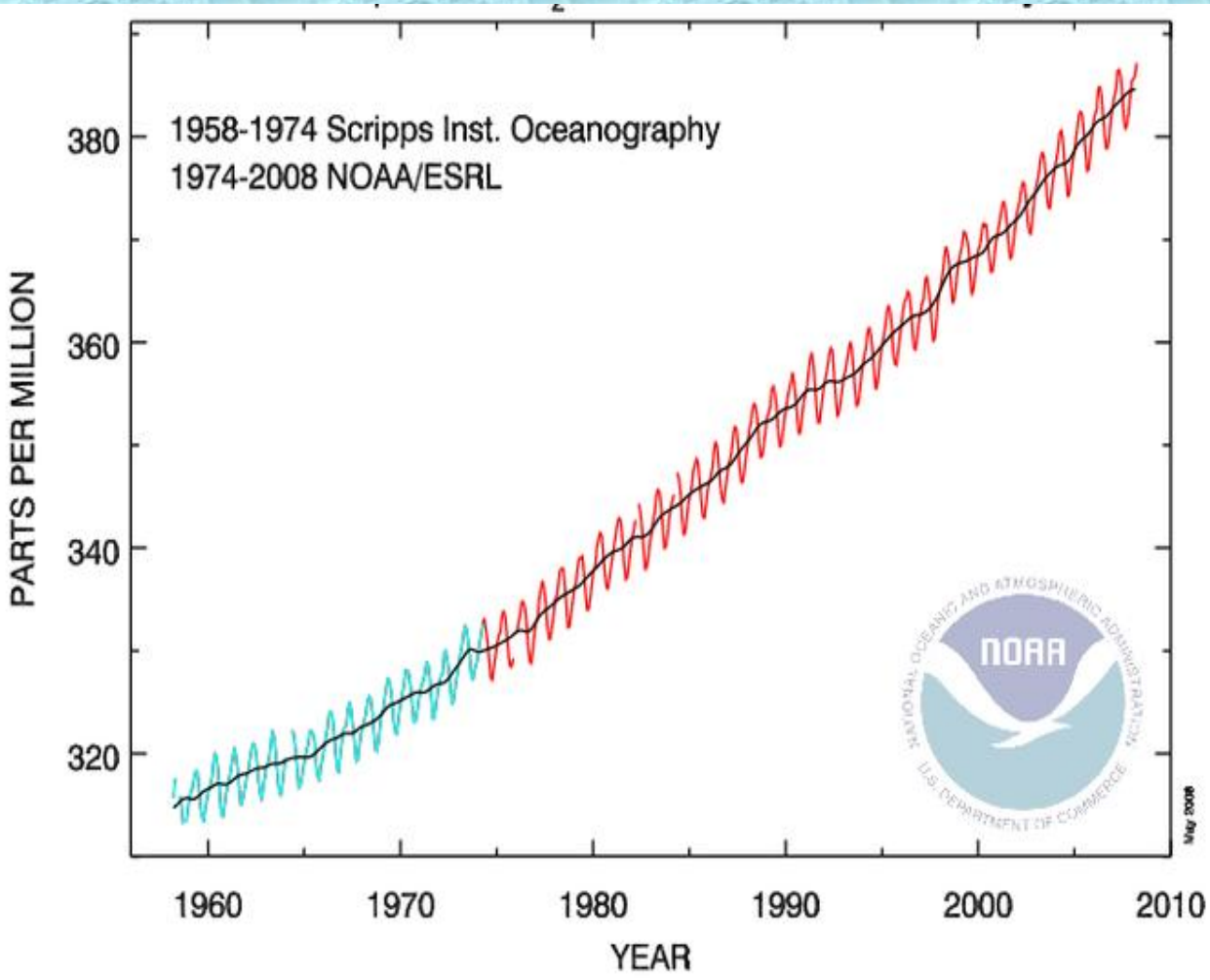
Physical effects:

- **Temperature increase (cumulative anthropogenic CO2 emissions since 1870)**
- Precipitation change
- Sea level rise: to up to 1 meter is possible 2100
- Extreme events
  - Tropical storms (typhoons, cyclones, hurricanes)
  - Winter Storms
  - Floods, flash floods
  - Land slides
  - Droughts
  - Glacier melting

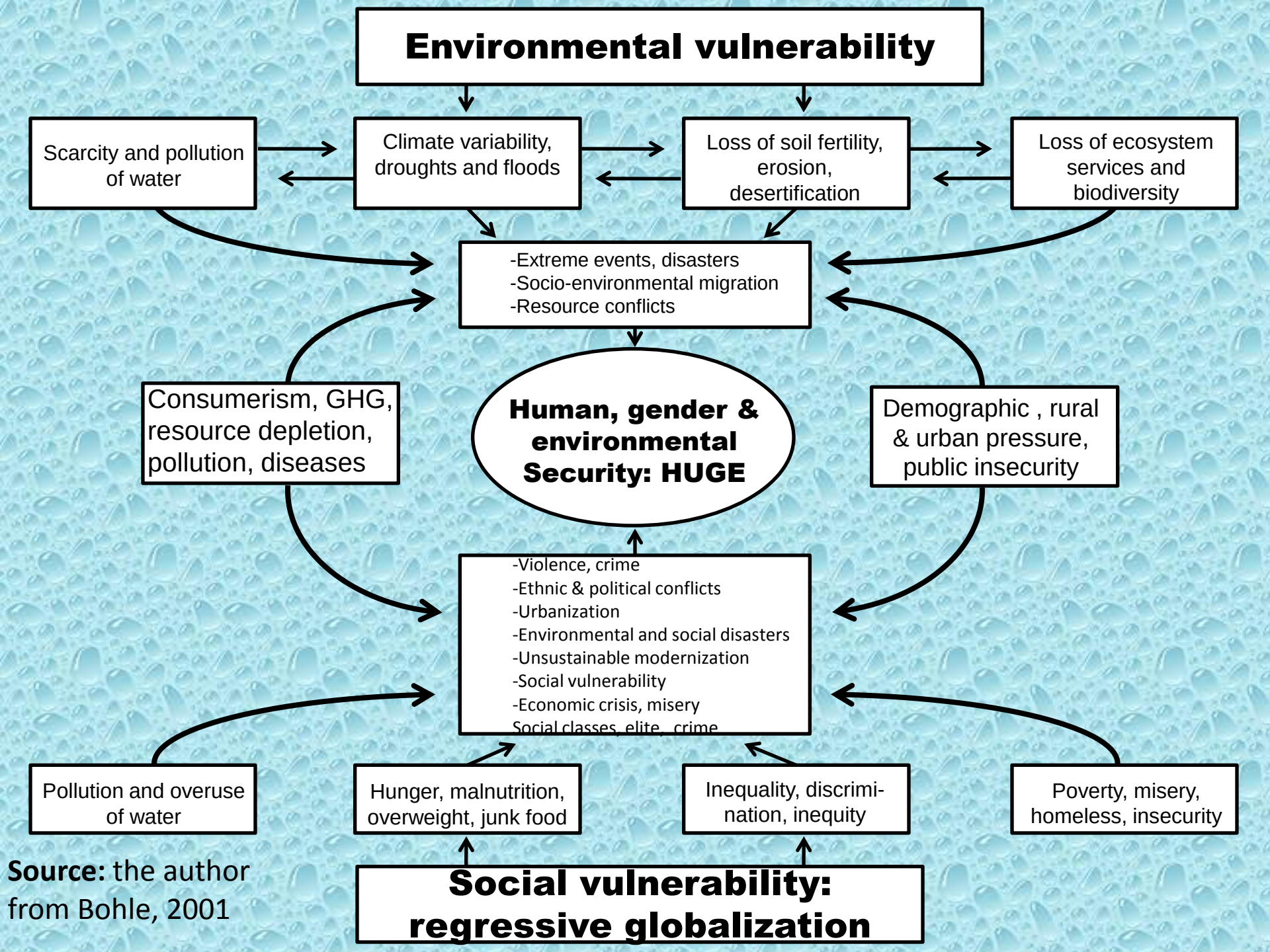
Societal effects

  - Migration
  - Conflicts
  - Adaptation
  - Resilience
  - Loss of culture and livelihood

Anthropogenic Climate Change in the Anthropocene

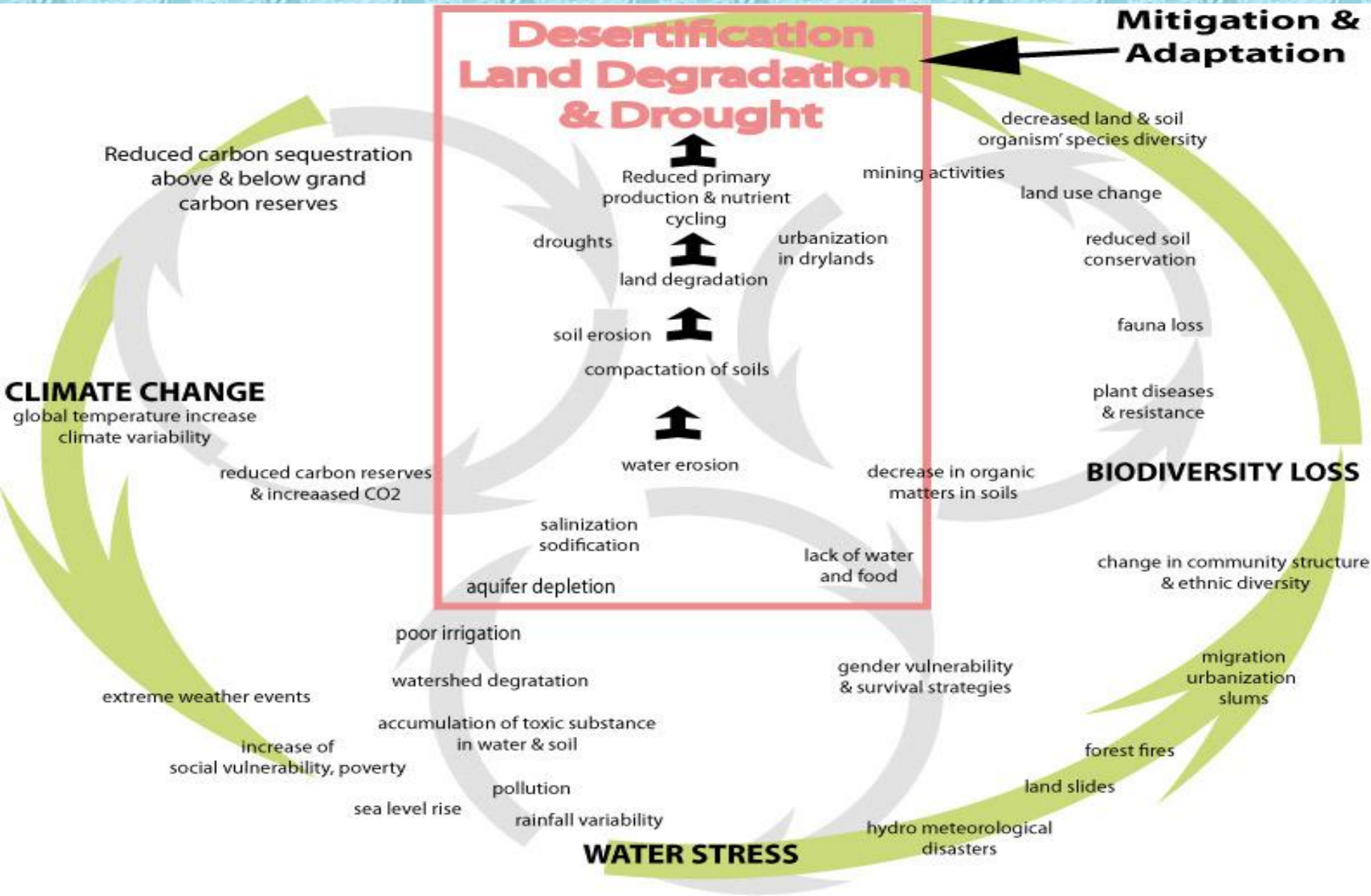


- GHG concentration in the atmosphere
- 1750: 279 ppm
- 1958:315 ppm
- 1987: 387 ppm
- 2011: 393 ppm
- 2012: 396 ppm
- 2013: 400ppm
- 1/3: 1750-1958:
- 2/3: 1958-2013: 315 to 400 ppm

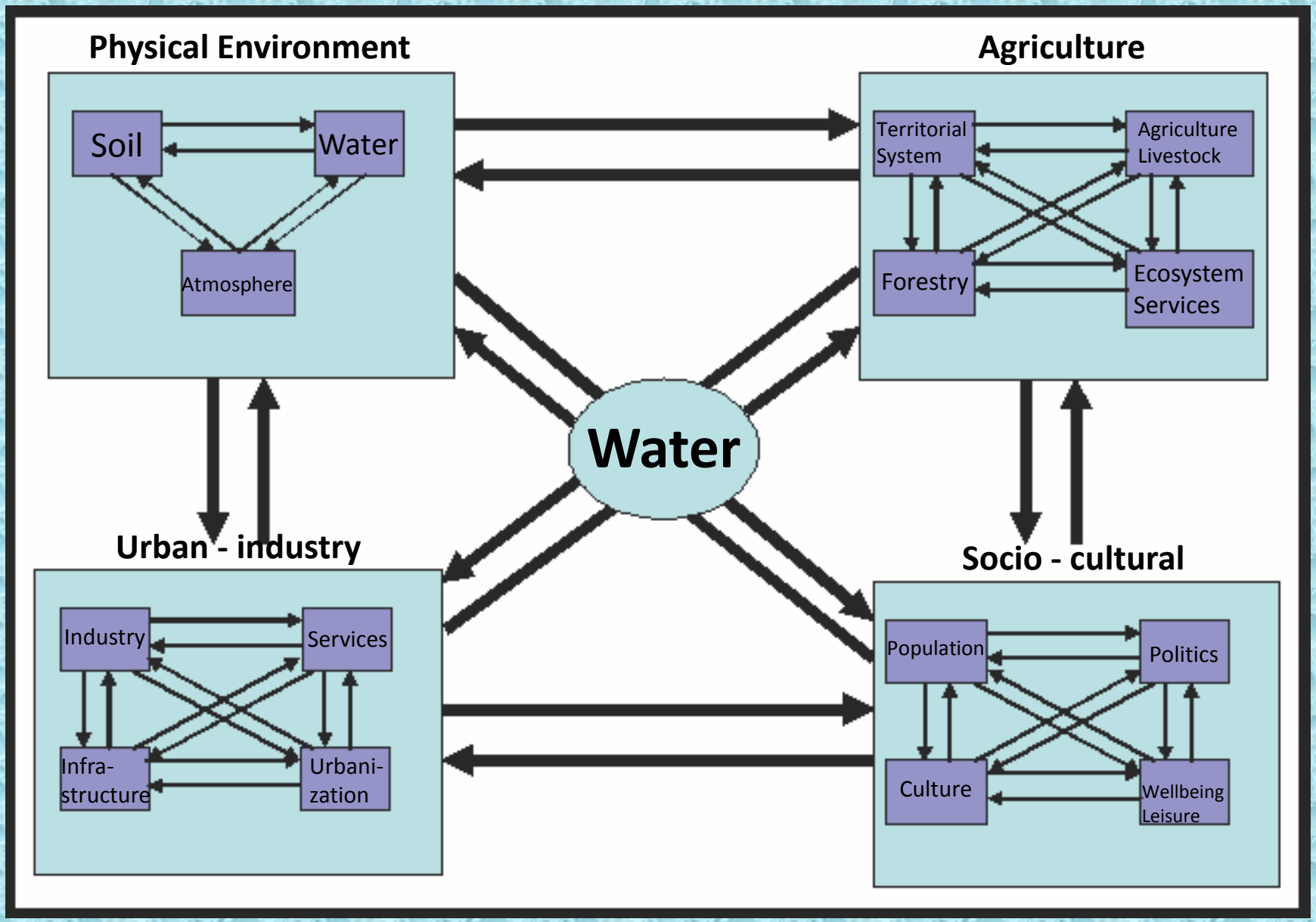


Source: the author from Bohle, 2001

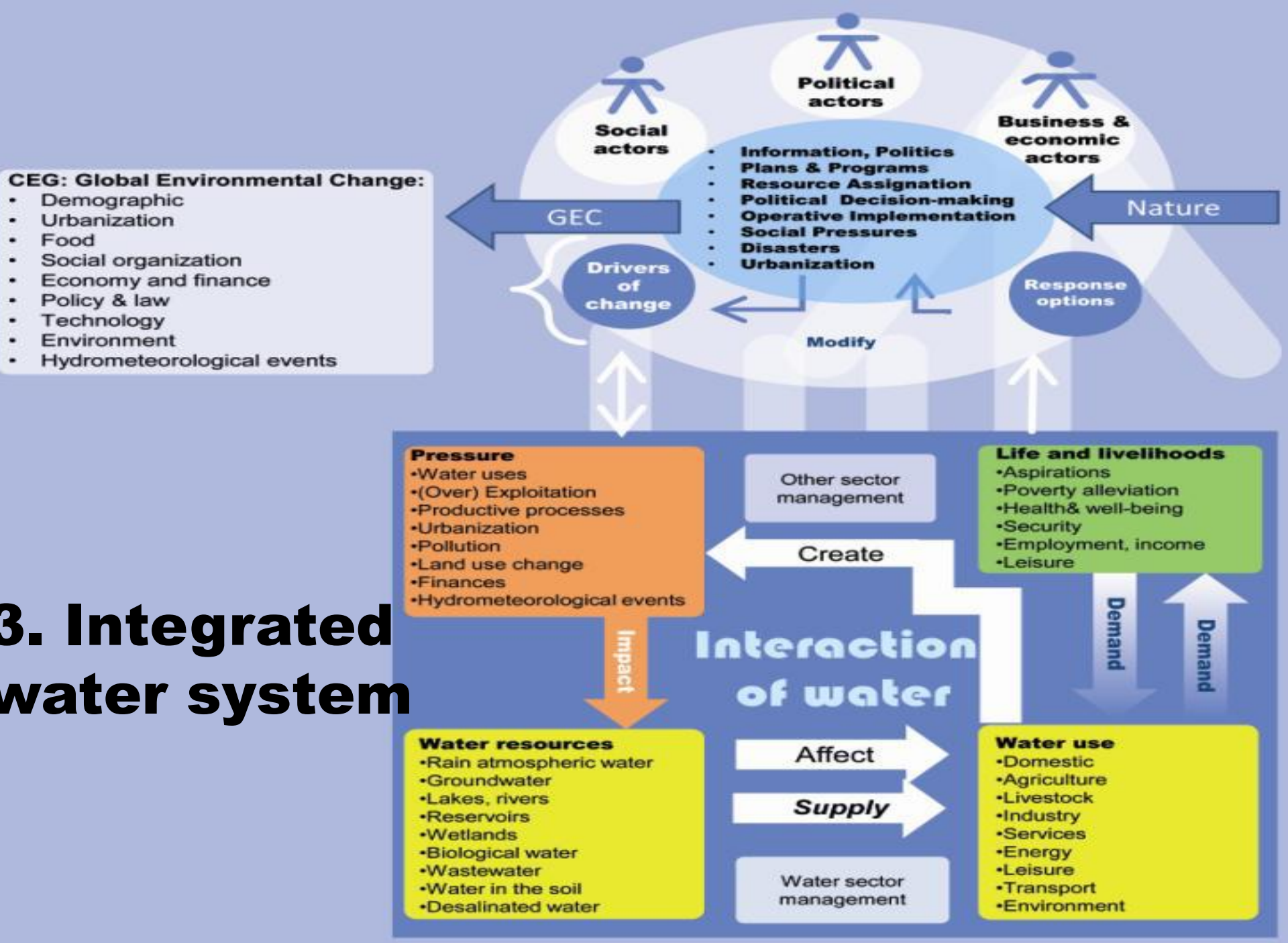
Complex interactions of GEC



2. Methodological reflections: open dissipative and self-regulating system approach of water management

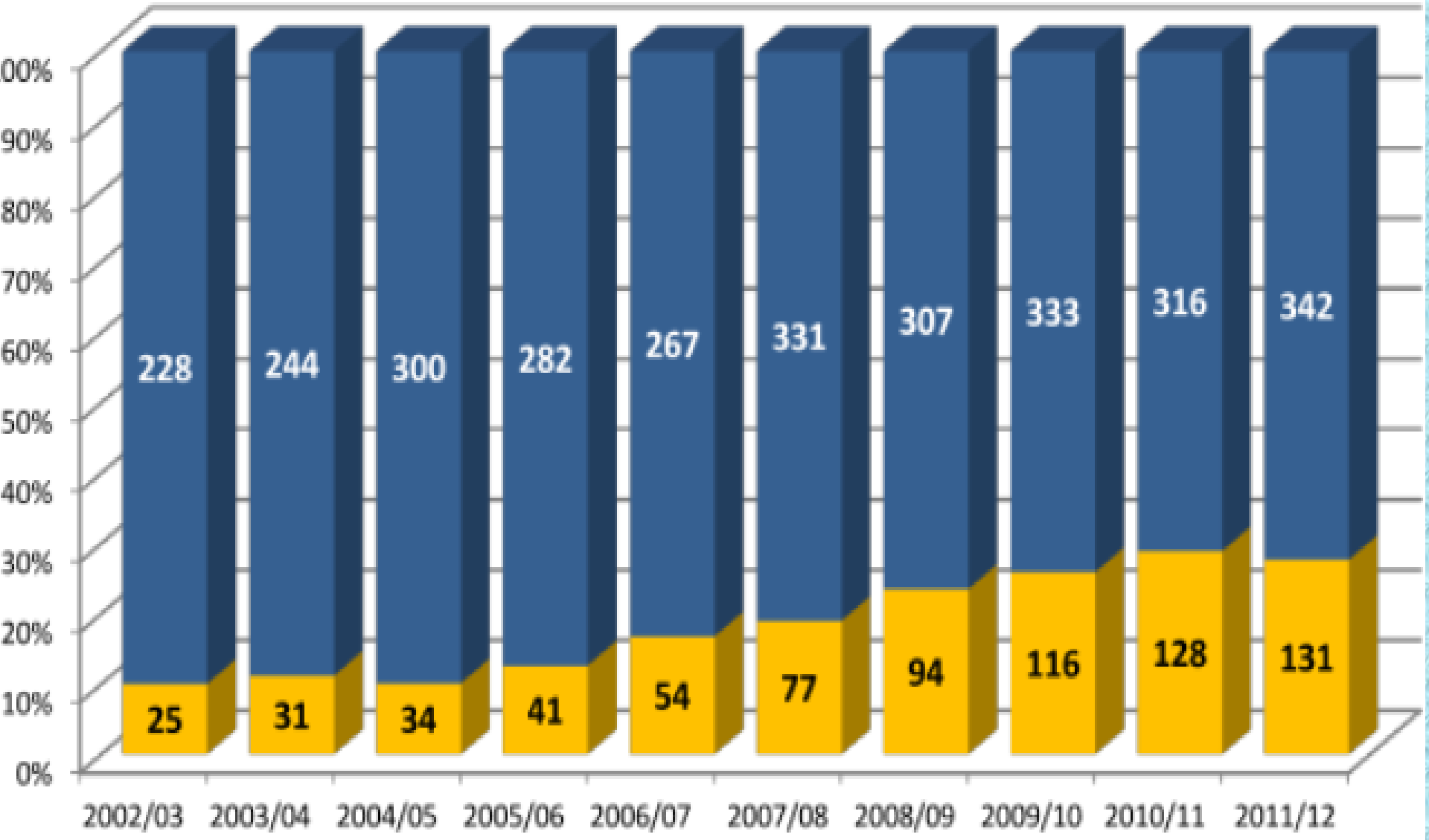


3. Integrated water system

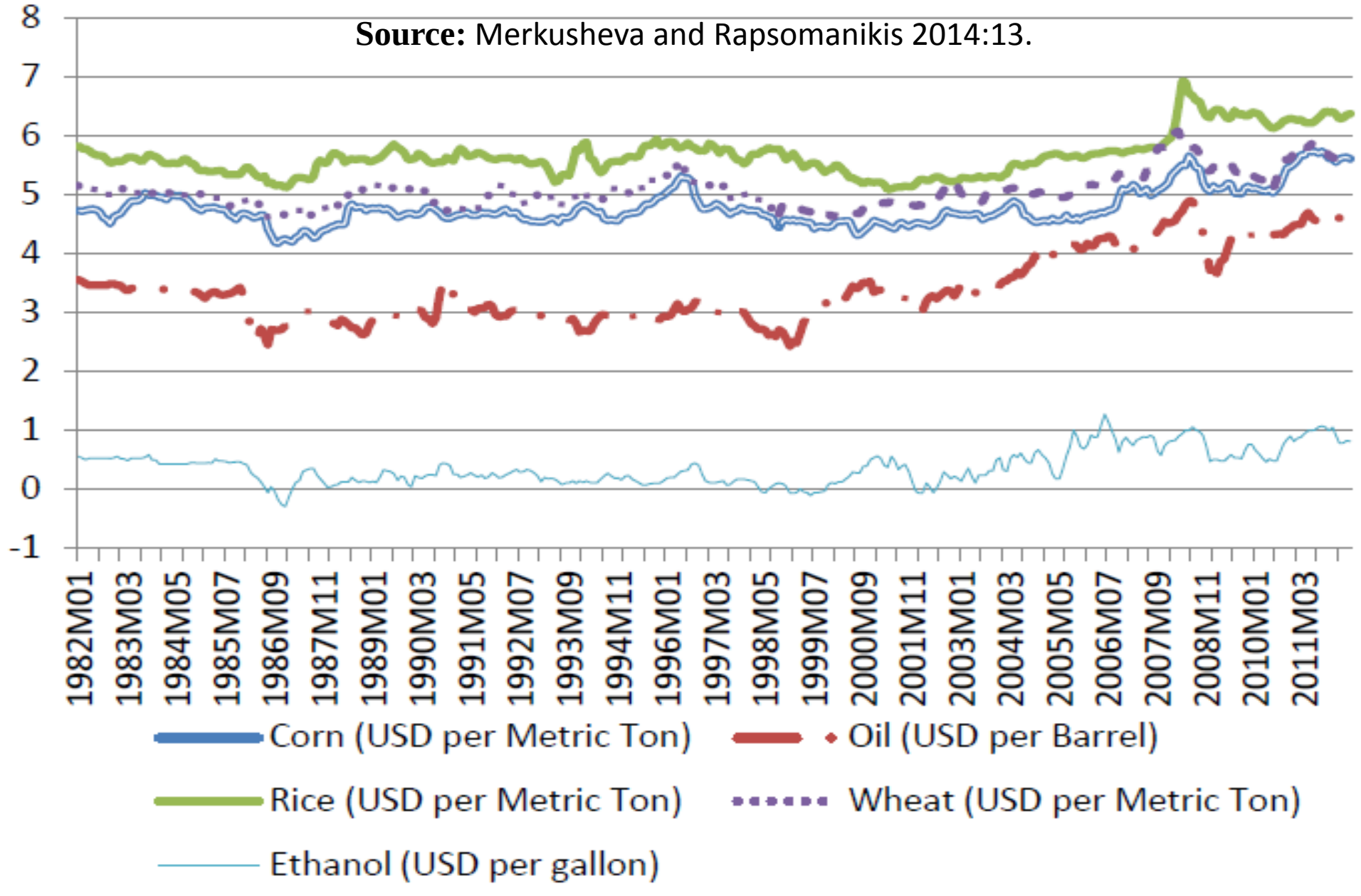


4. Water related carbon footprint

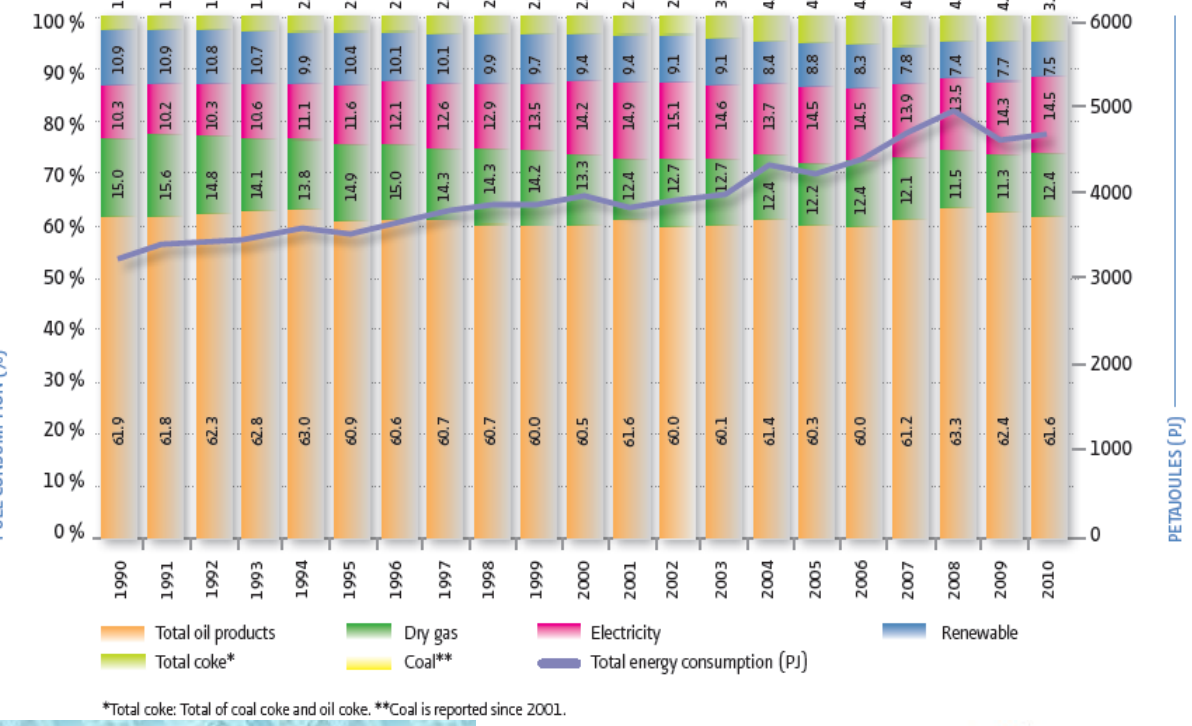
Biofuel production from maize, USA



Food and energy prices 1982-2011



Fuel consumption in Mexico

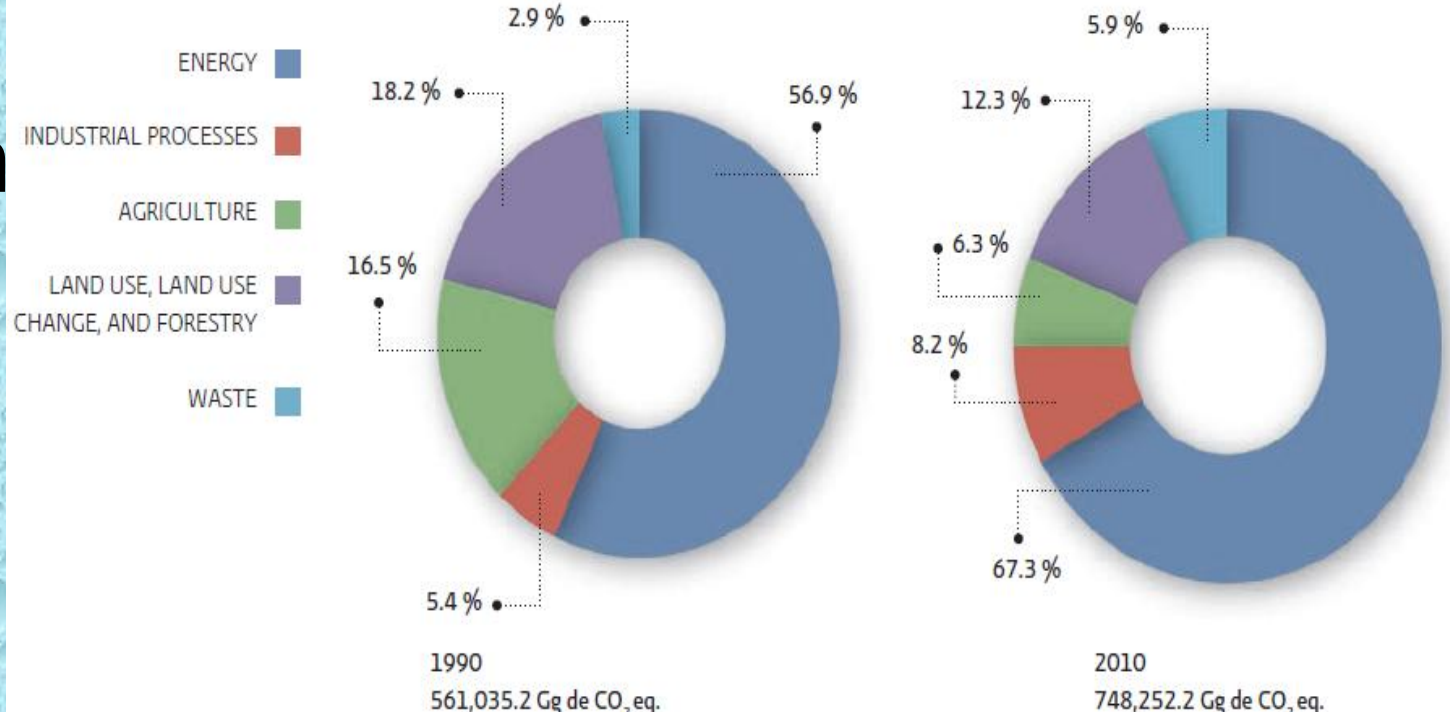


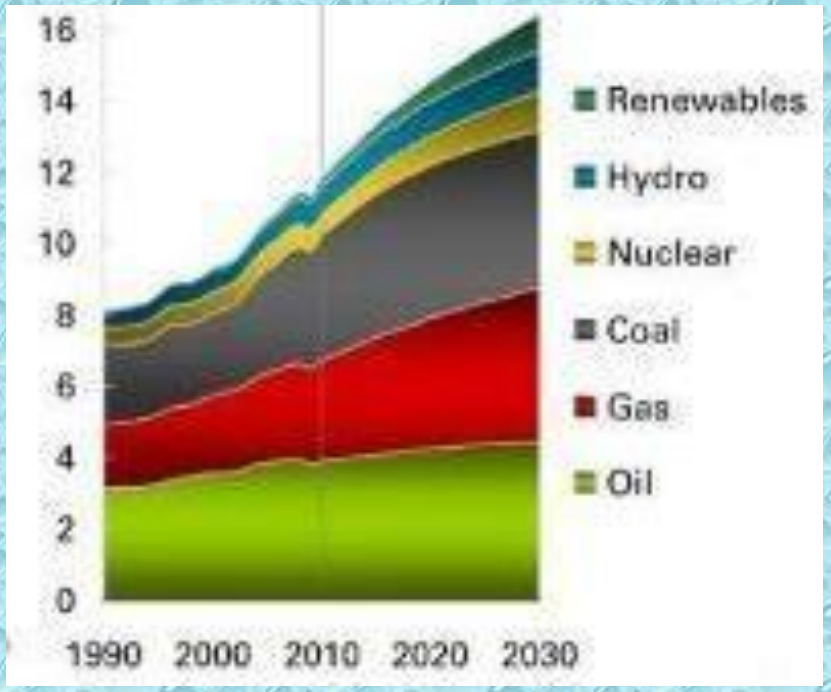
*Total coke: Total of coal coke and oil coke. **Coal is reported since 2001.

Source: CCI 2012: 6.

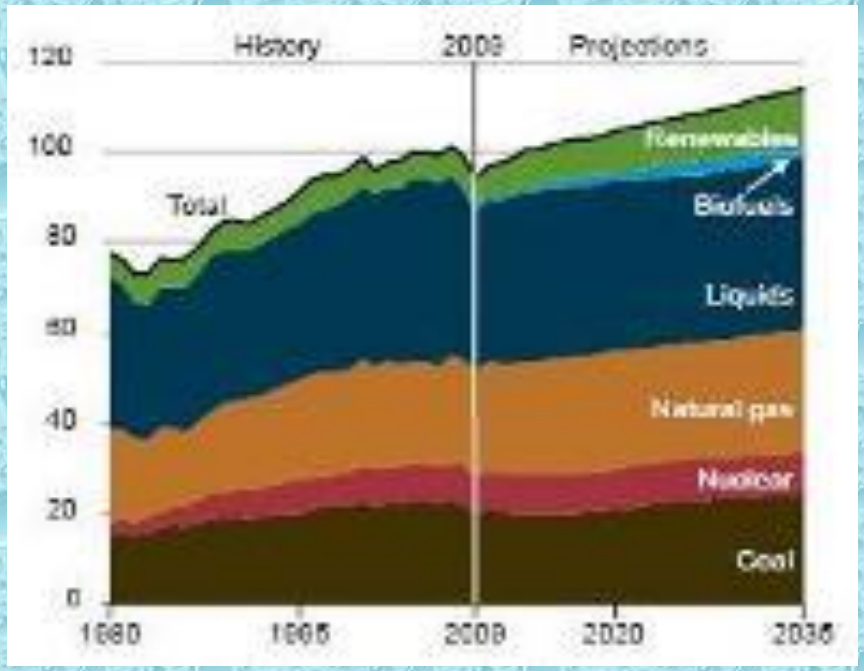
GHG emission by sector

Source: CCI 2012: 20

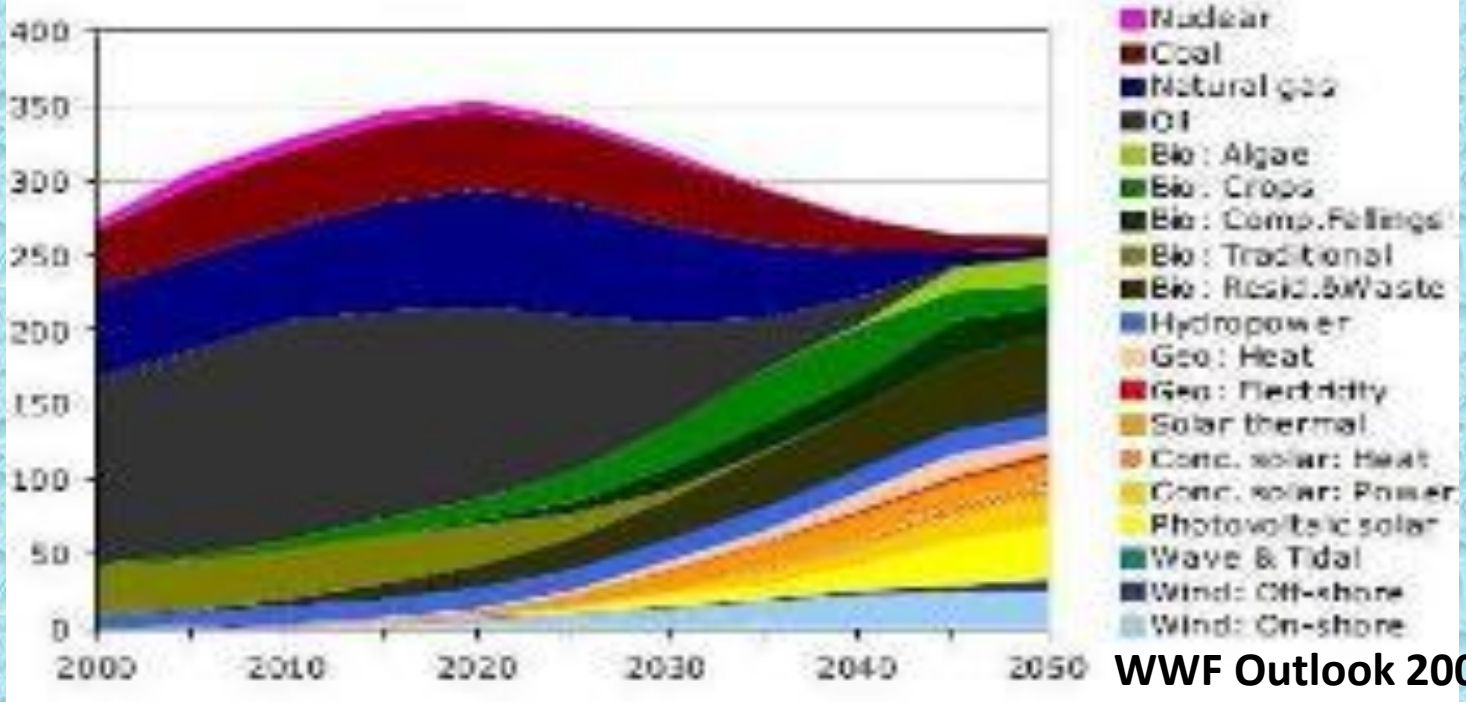




BP Outlook 1990-2030: 16



Energy Information Agency Outlook 1980-2035: 63

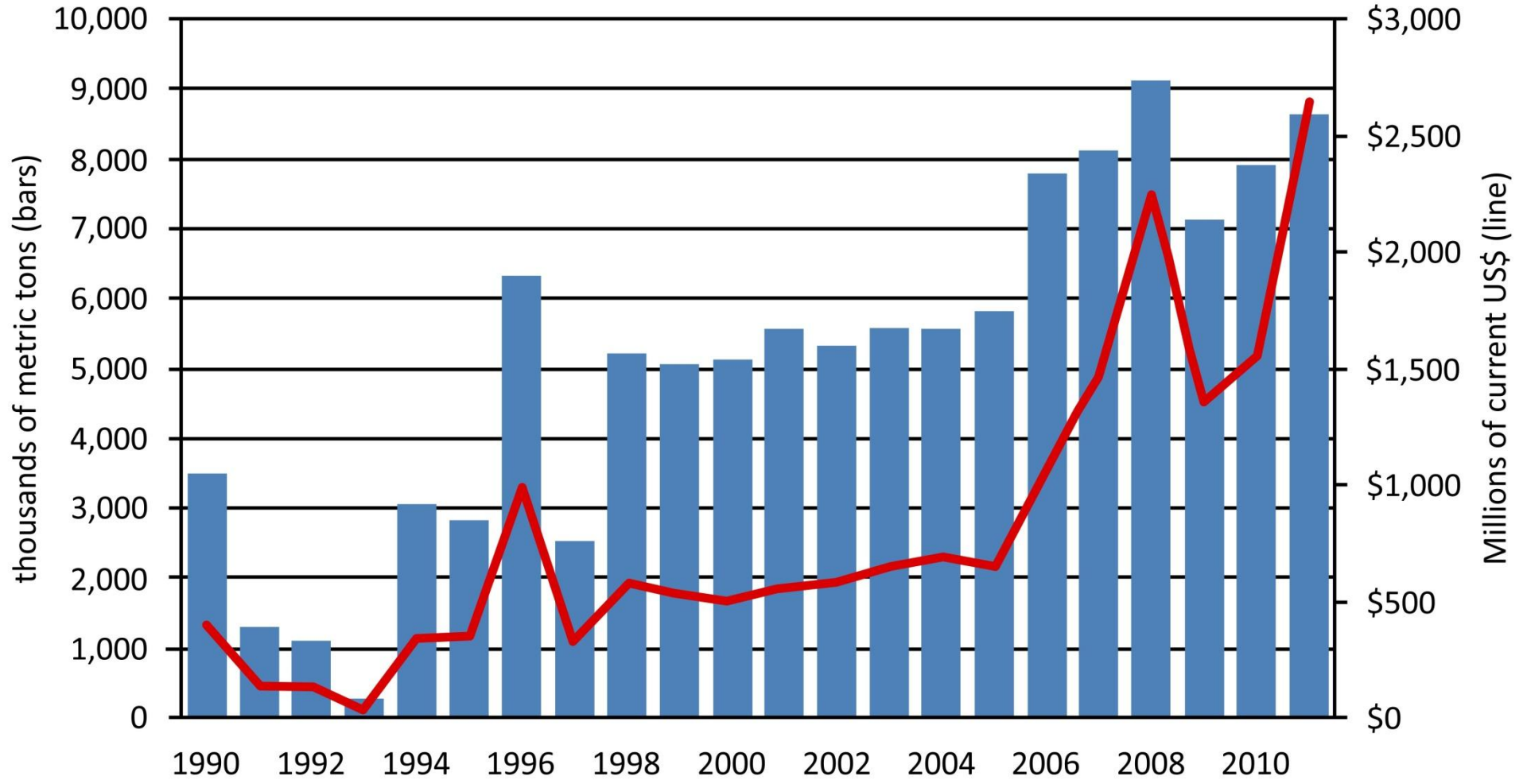


WWF Outlook 2000-2050: 92

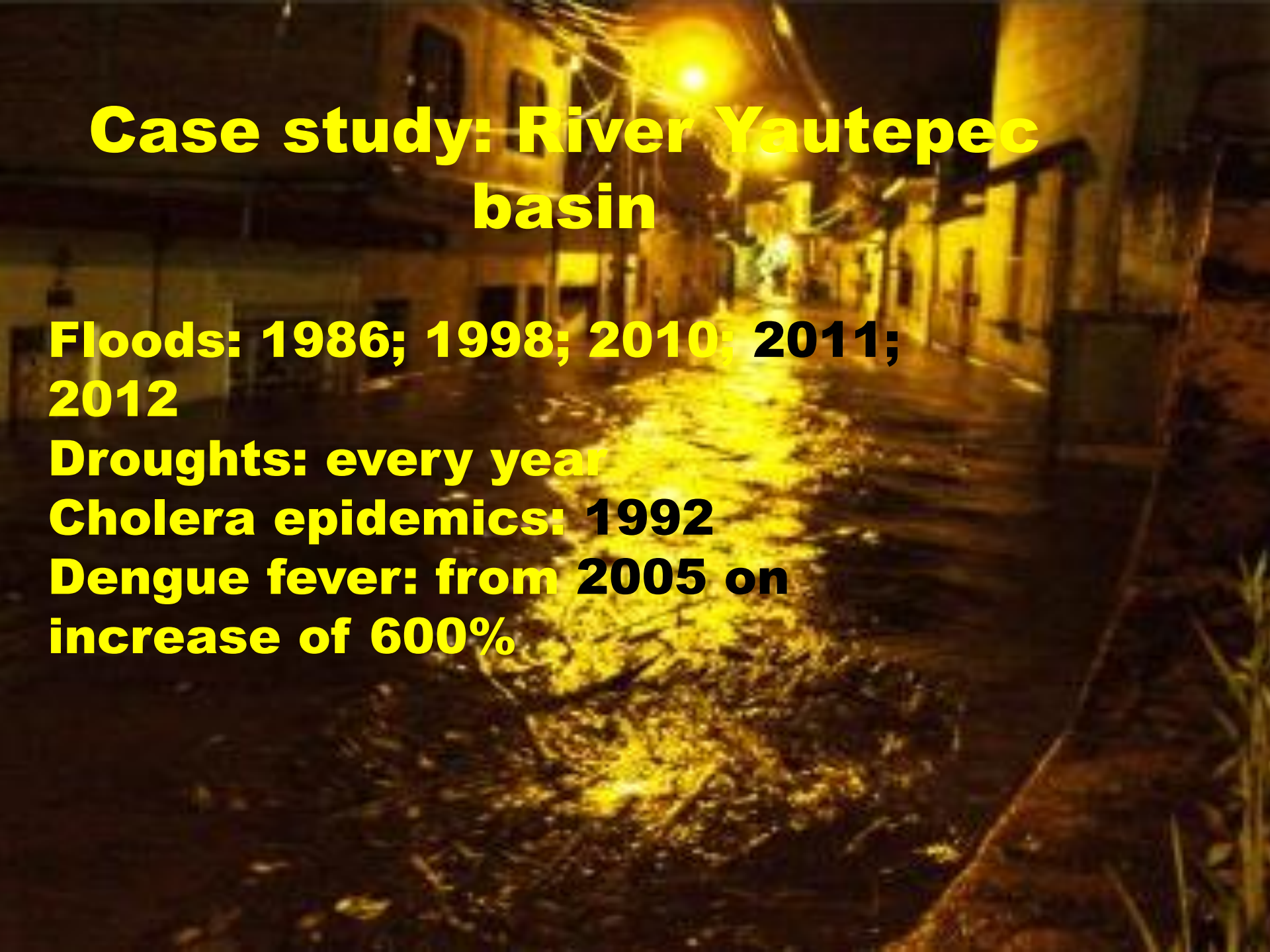
Three mind-sets interest-driven

Import of maize in Mexico

Source: SIAP 2013



Case study: River Yautepec basin

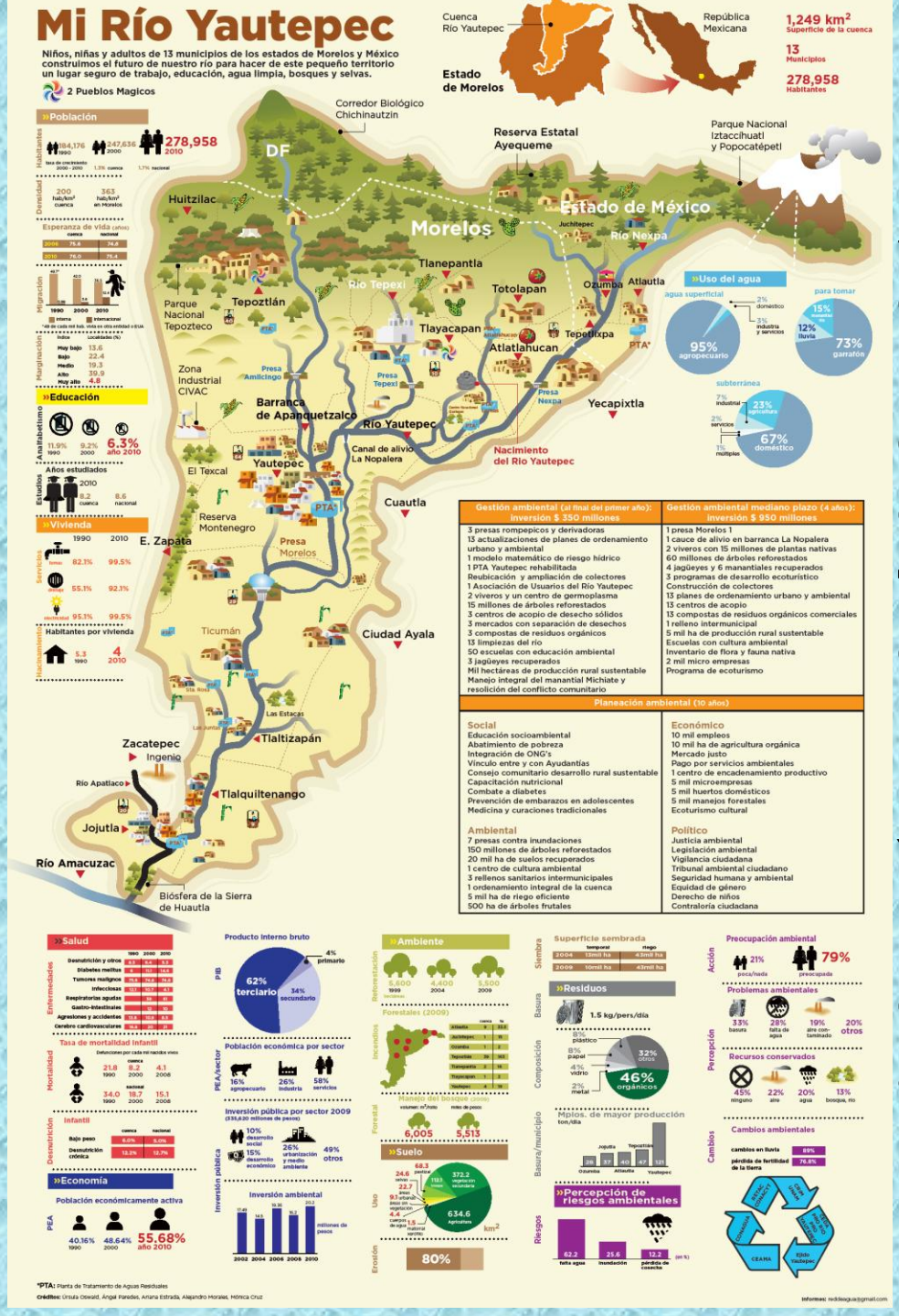


Floods: 1986; 1998; 2010; 2011; 2012
Droughts: every year
Cholera epidemics: 1992
Dengue fever: from 2005 on increase of 600%

Threats

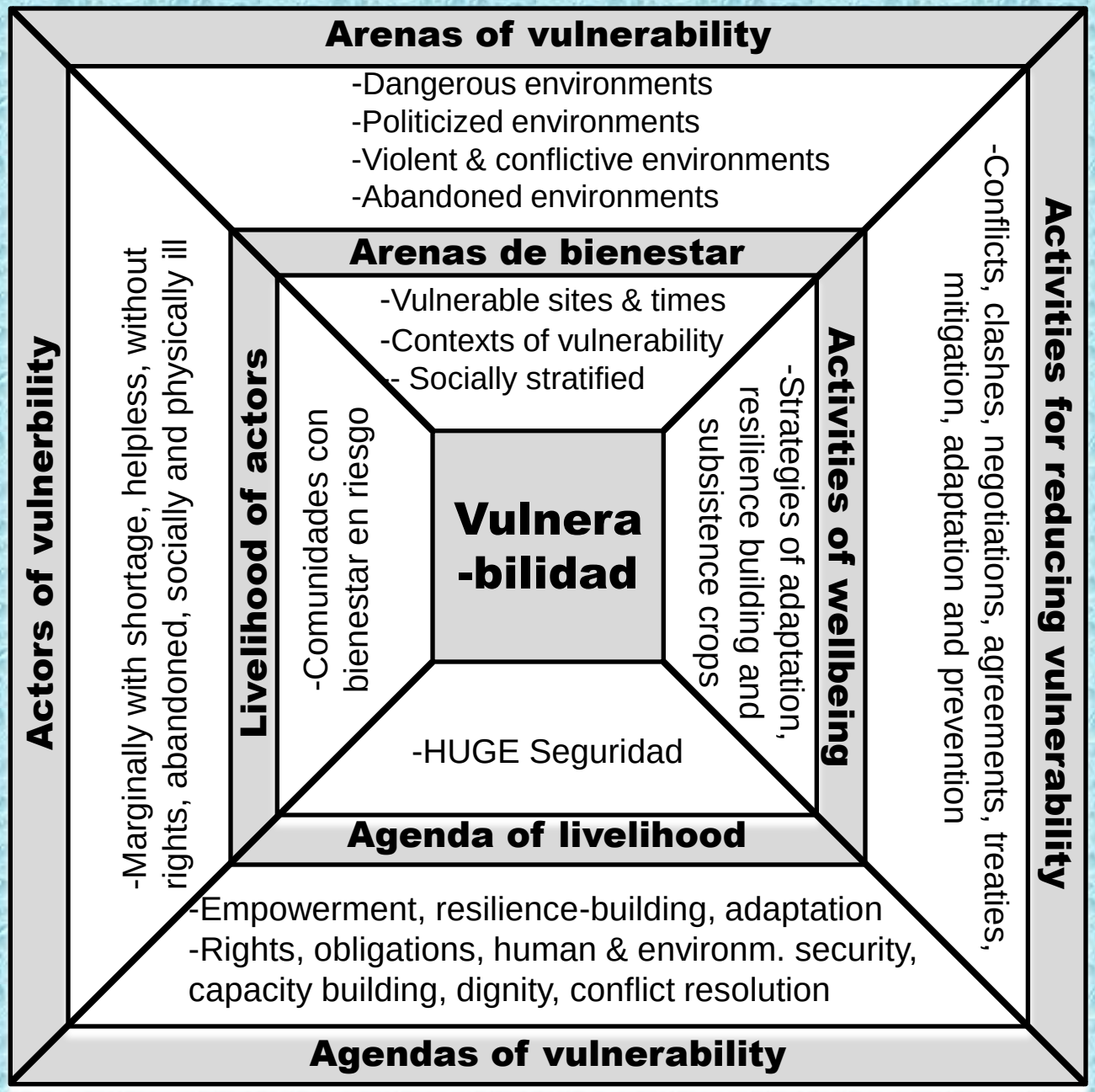
1. High altitude from Popocatepetl to Yautepec: 5400m down to 1200m
2. High speed of water with rocks and trees
3. Complex hydrology: with a lot of small rivers, often dried out and eroded
4. Deforestation, also in national parks
5. Soil erosion (80%)
6. High sedimentation in river bed
7. Extreme rainfalls
8. Large drought periods
9. Invasion of the river basin
10. Lack of infrastructure
11. Waste in the river
12. Lack of municipal planning
13. Initial cooperation among the three levels of government
14. Few participation of citizens


Integrated river basin management
with disaster risk reduction

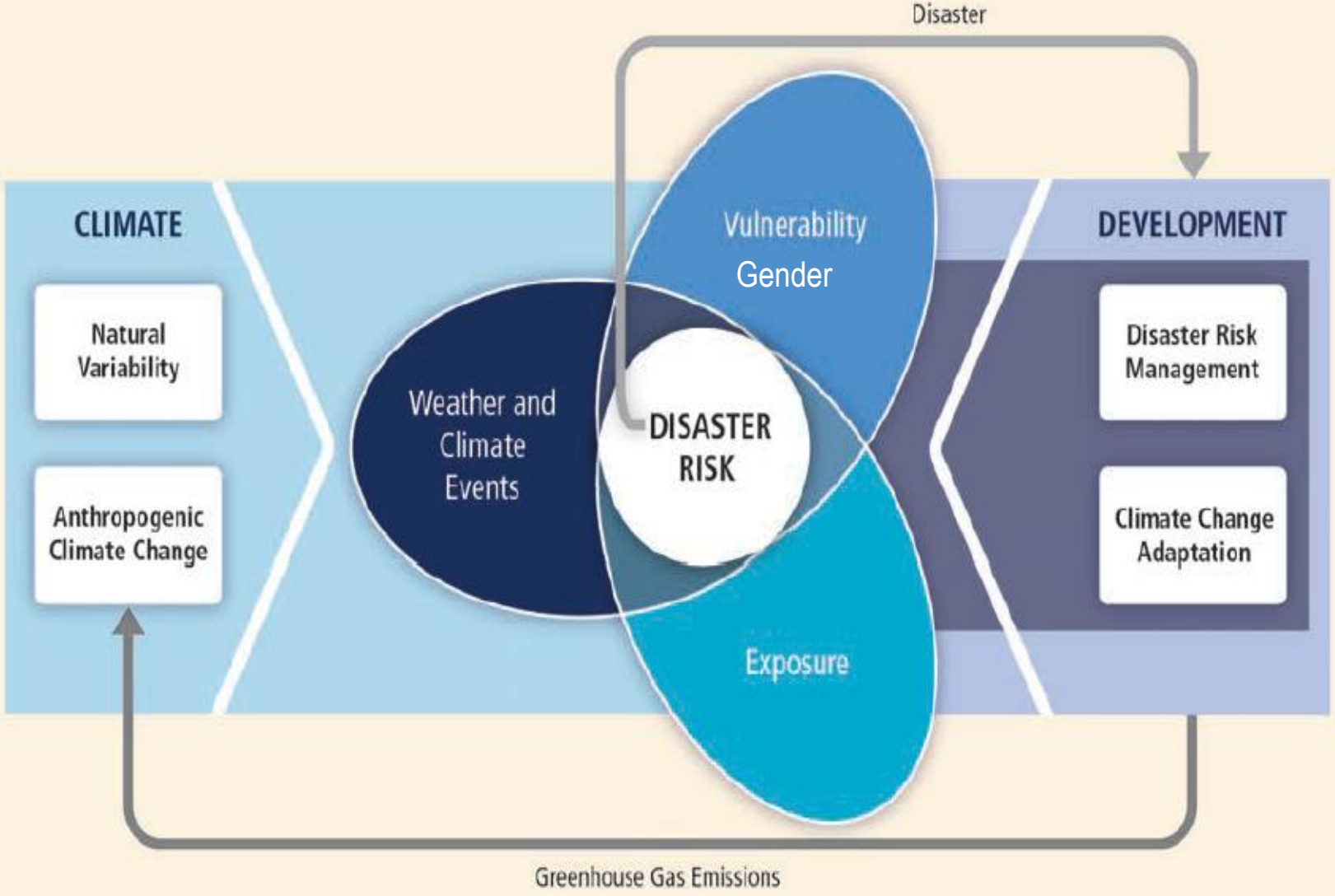


Peasants, traders, micro-entrepreneurs, social movements, NGO's, citizens, scientists, people affected by disasters, women, children, teachers and the three levels of government developed an integrated basin management of the River Yautepec for reducing risks increased by climate change and are promoting a transition to sustainability from local niches.

Model of interaction of socio-environmental vulnerability



Potential for a sustainable transition



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Thank you very much for your attention

Úrsula Oswald Spring
Editor

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Los retos de la investigación del agua en México

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