




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

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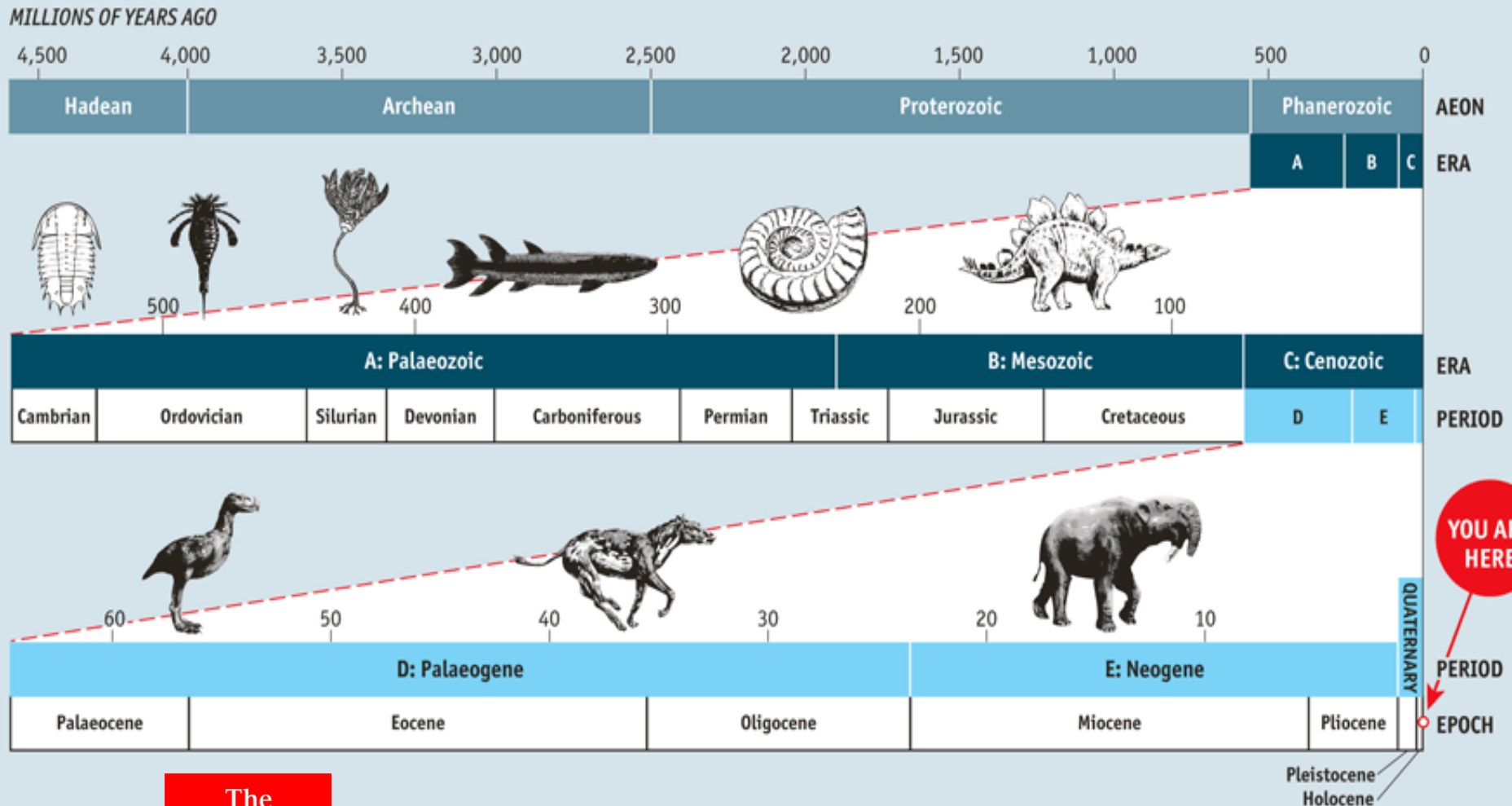
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A photograph showing a river with a large, light-colored rock in the middle. The water is turbulent and white with foam. On the right bank, there is a large pile of dark brown earth or mud. Several people, some wearing orange safety vests, are standing on the bank. In the foreground, there is debris, including pieces of corrugated metal and wooden planks. The background shows a forested hillside.

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

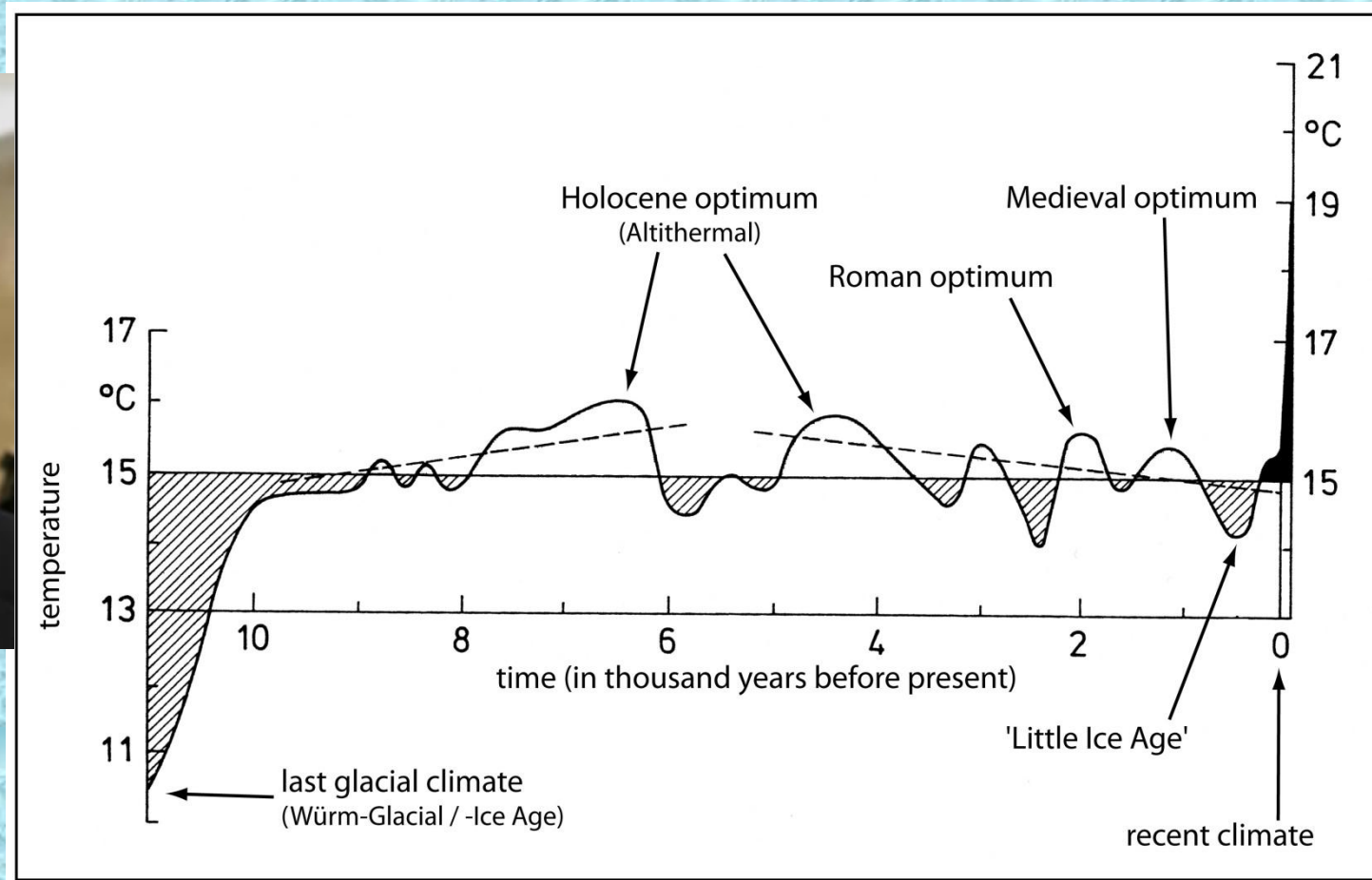
Earth History and Humans



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

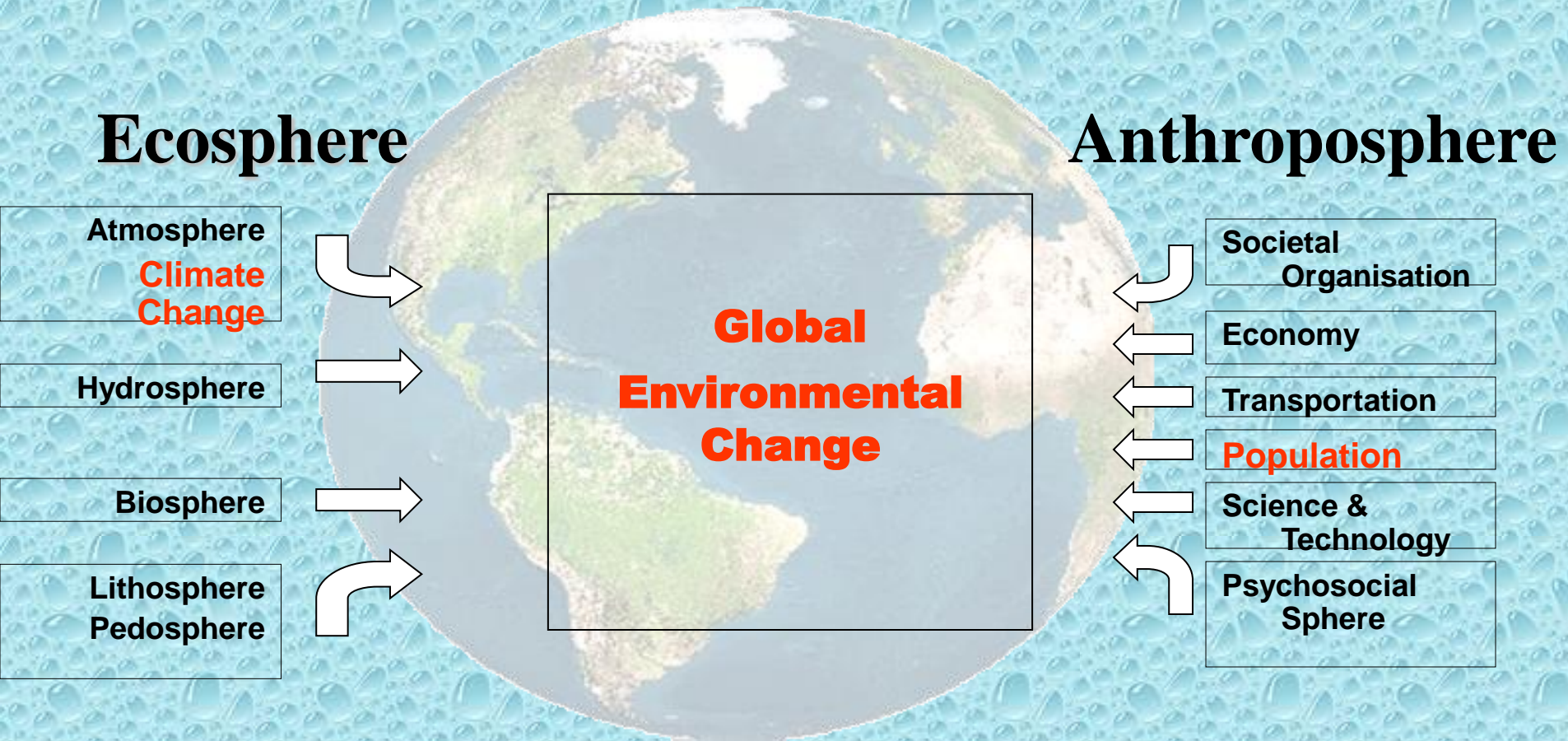


Paul Crutzen,
Nobel Laureate for
Chemistry (1995)



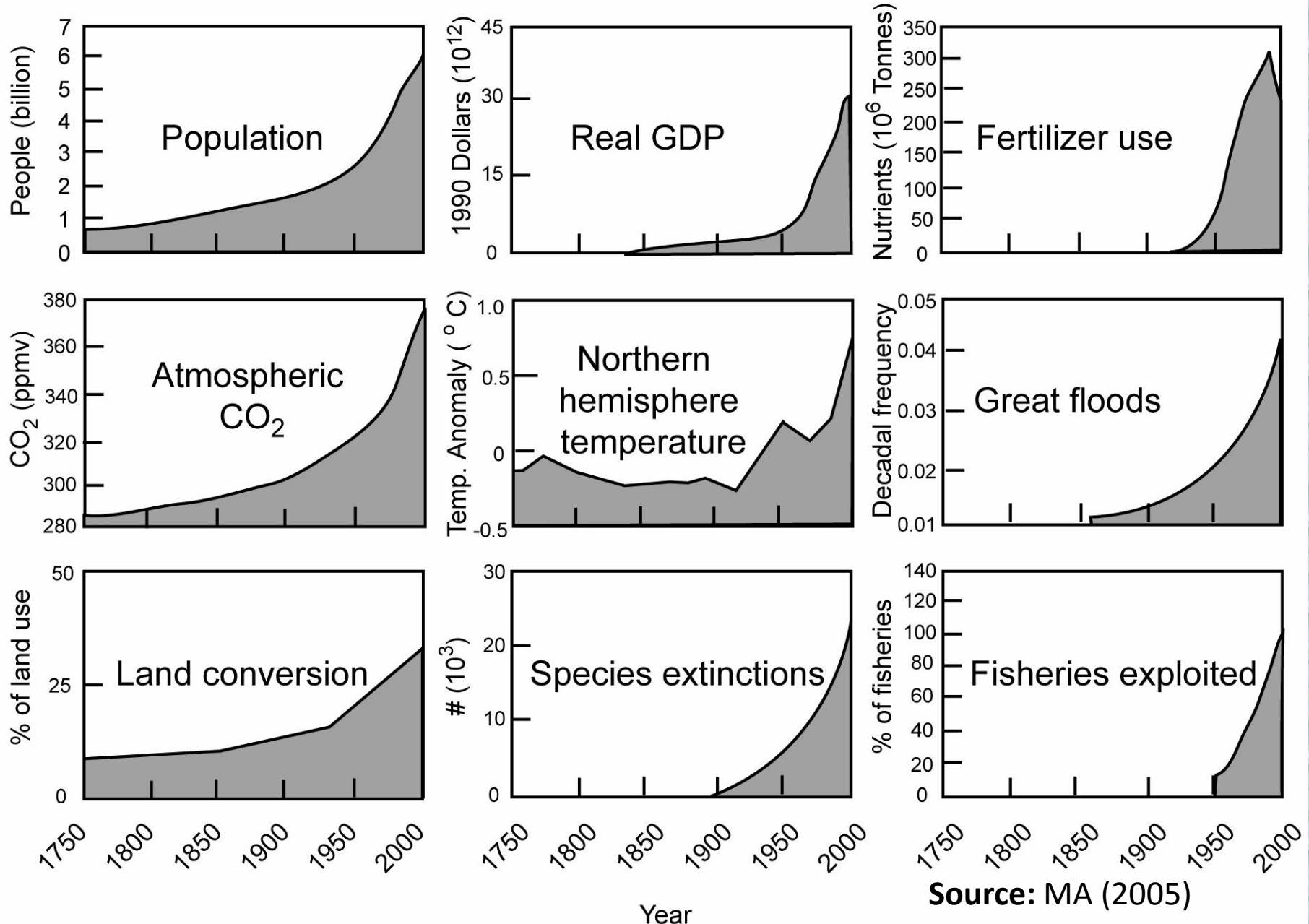
In geography **Holocene** era of earth history since end of glacial period (10-12.000 years ago), **Anthropocene**, since industrial revolution, but especially last 50 years with anthropogenic climate change: burning of coal, oil, gas → GHG increase

Global Environmental Change (GEC)

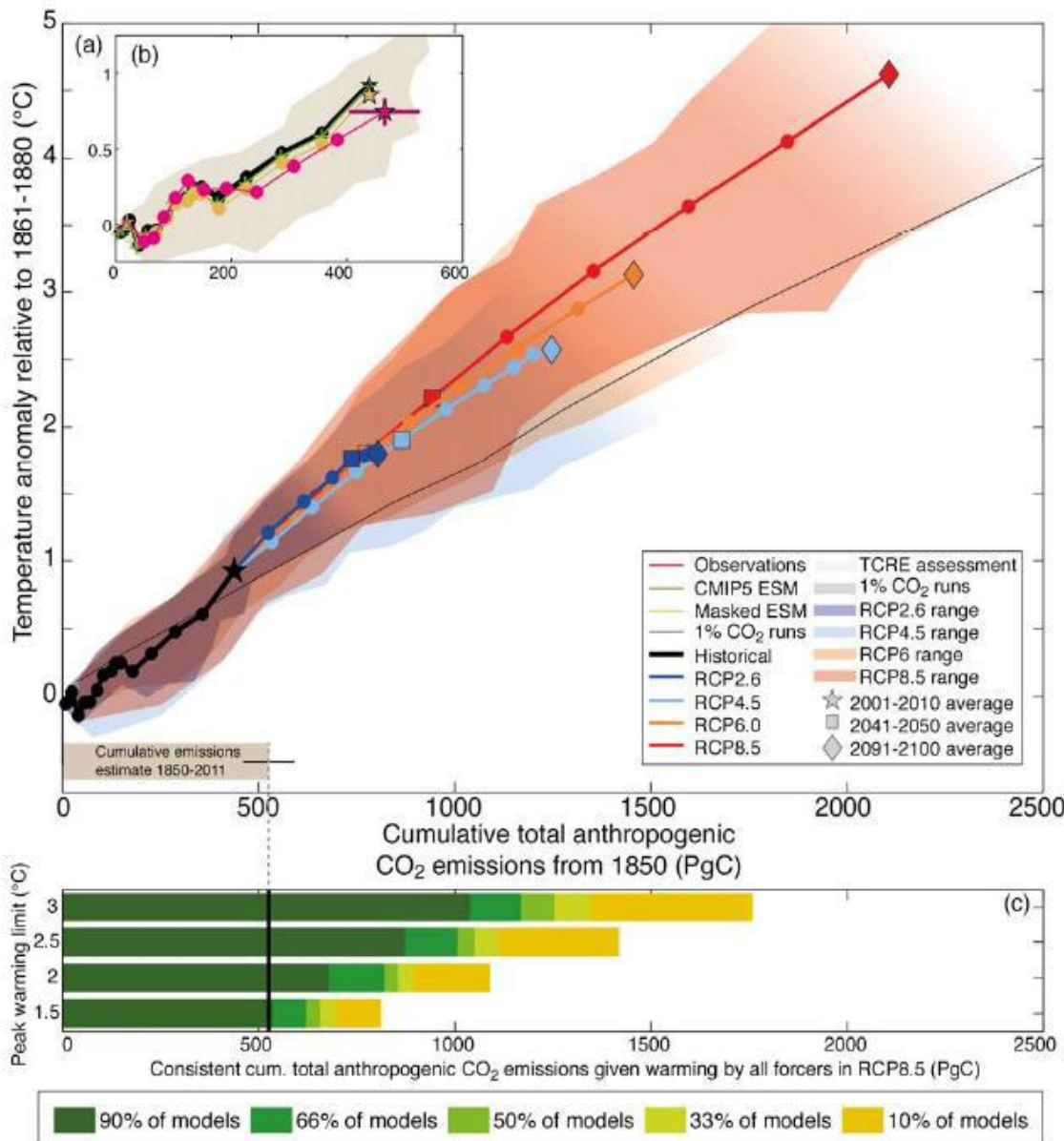


GEC poses a threat, challenge, vulnerabilities and risks for human security and survival.

Global Environmental Change



IPCC, 5th Assessment Report, 2013



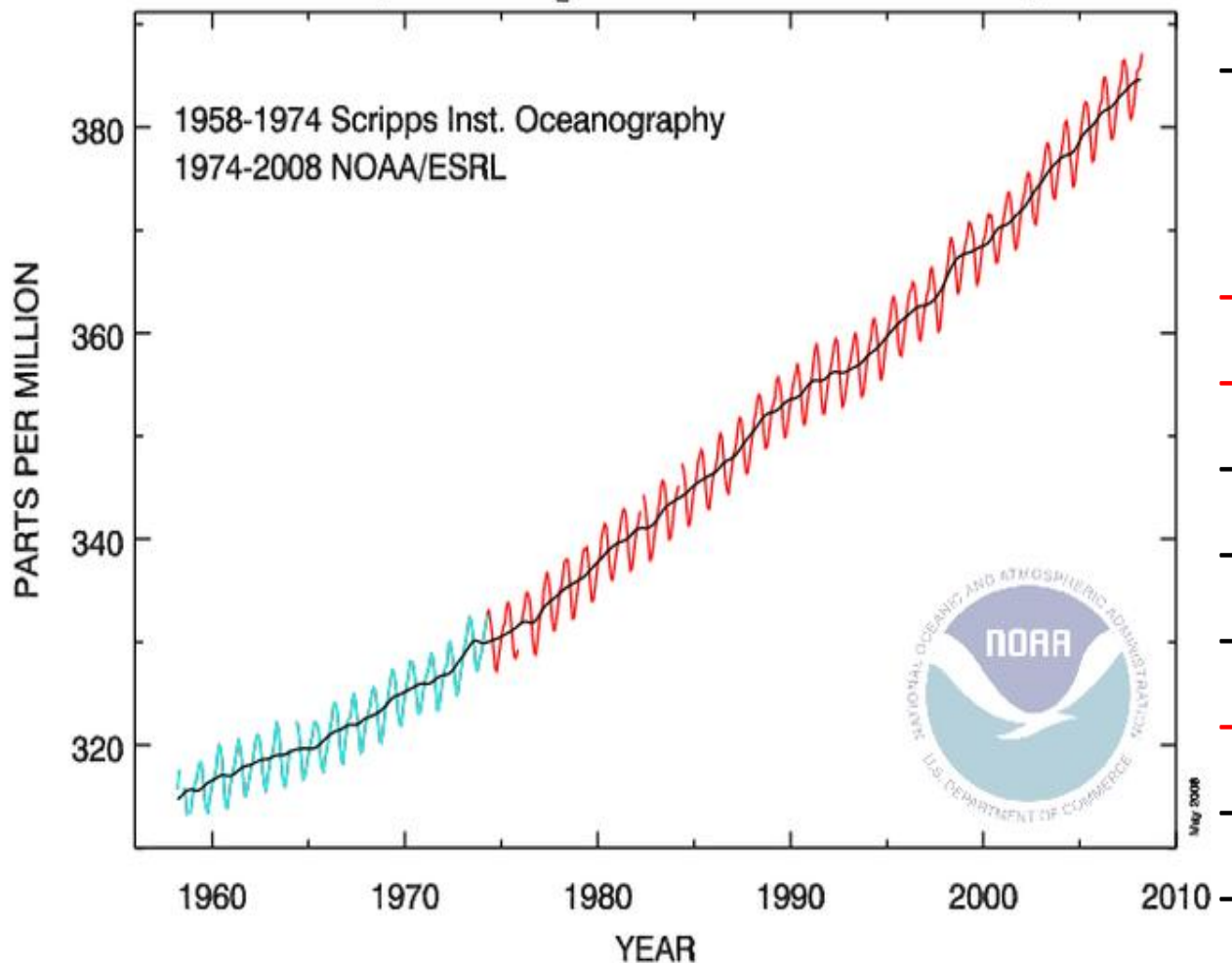
Physical effects:

- 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

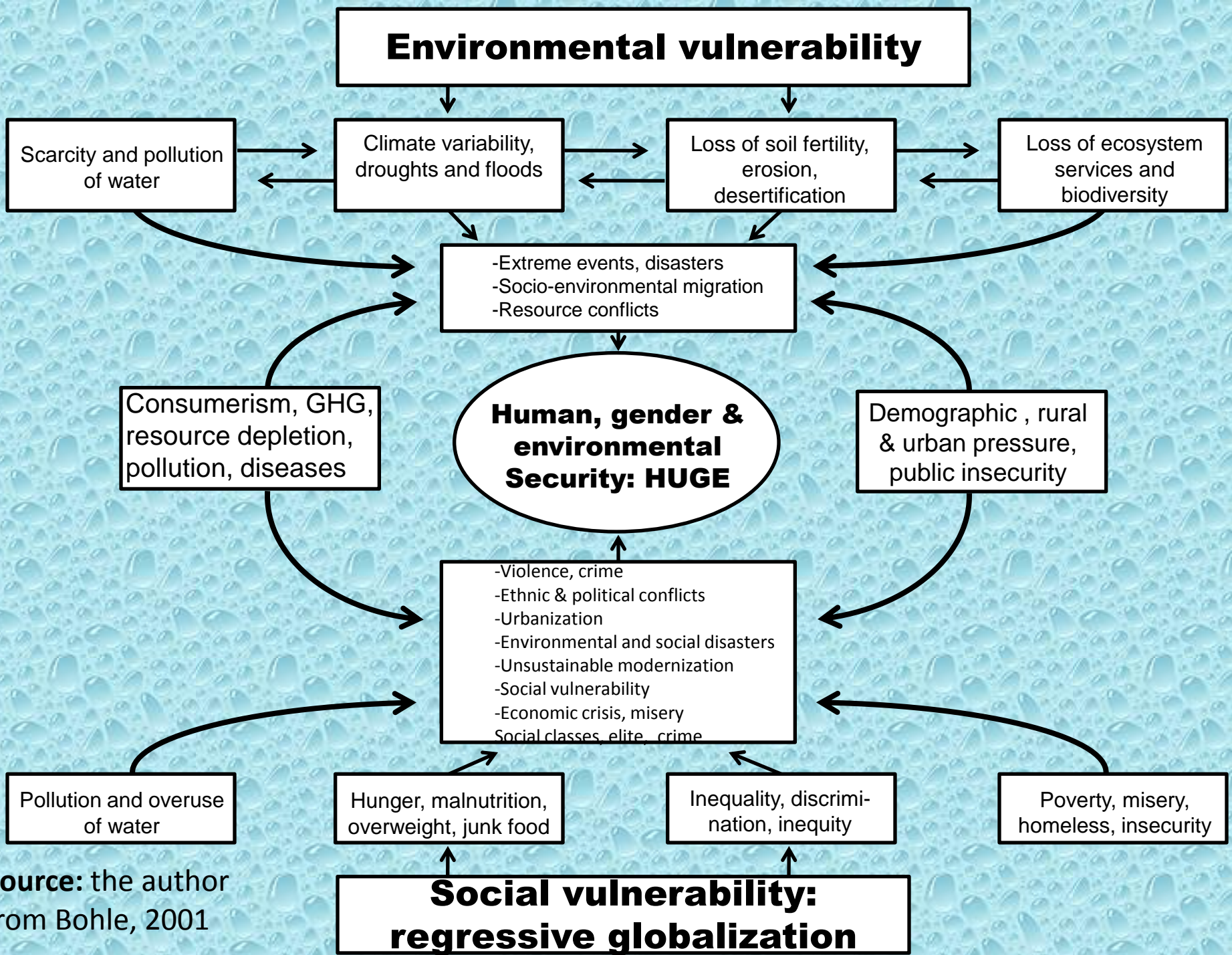
Societal effects

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

Anthropogenic Climate Change in the Anthropocene

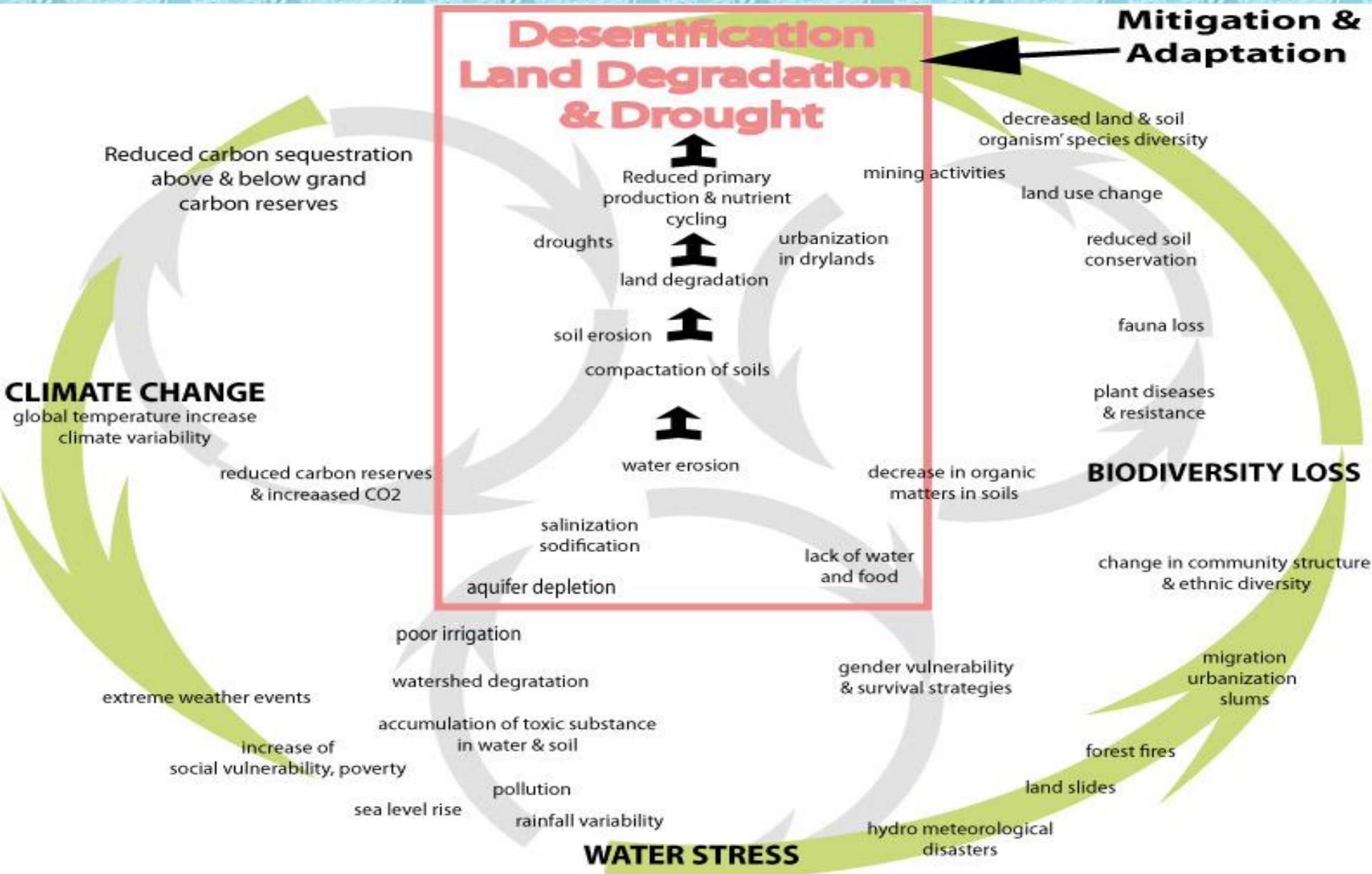


- GHG concentration in the atmosphere
- 1750: 279 ppm
- 1958: 315 ppm
- 1987: 387 ppm
- 2011: 393 ppm
- 2012: 396 ppm
- 2013: 400 ppm
- 1/3: 1750-1958:
- 2/3: 1958-2013:
- 315 to 400 ppm

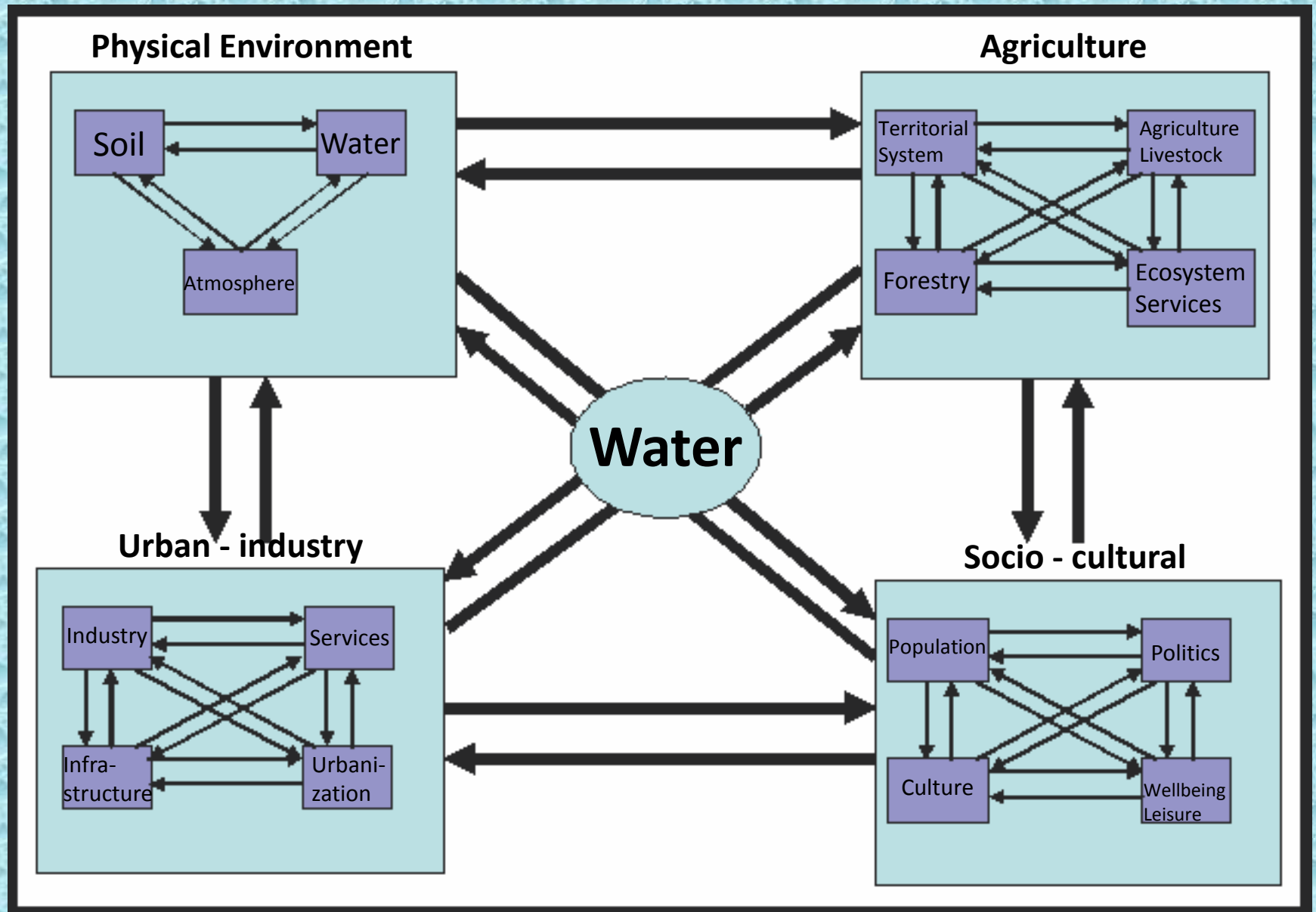


Source: the author from Bohle, 2001

Complex interactions of GEC



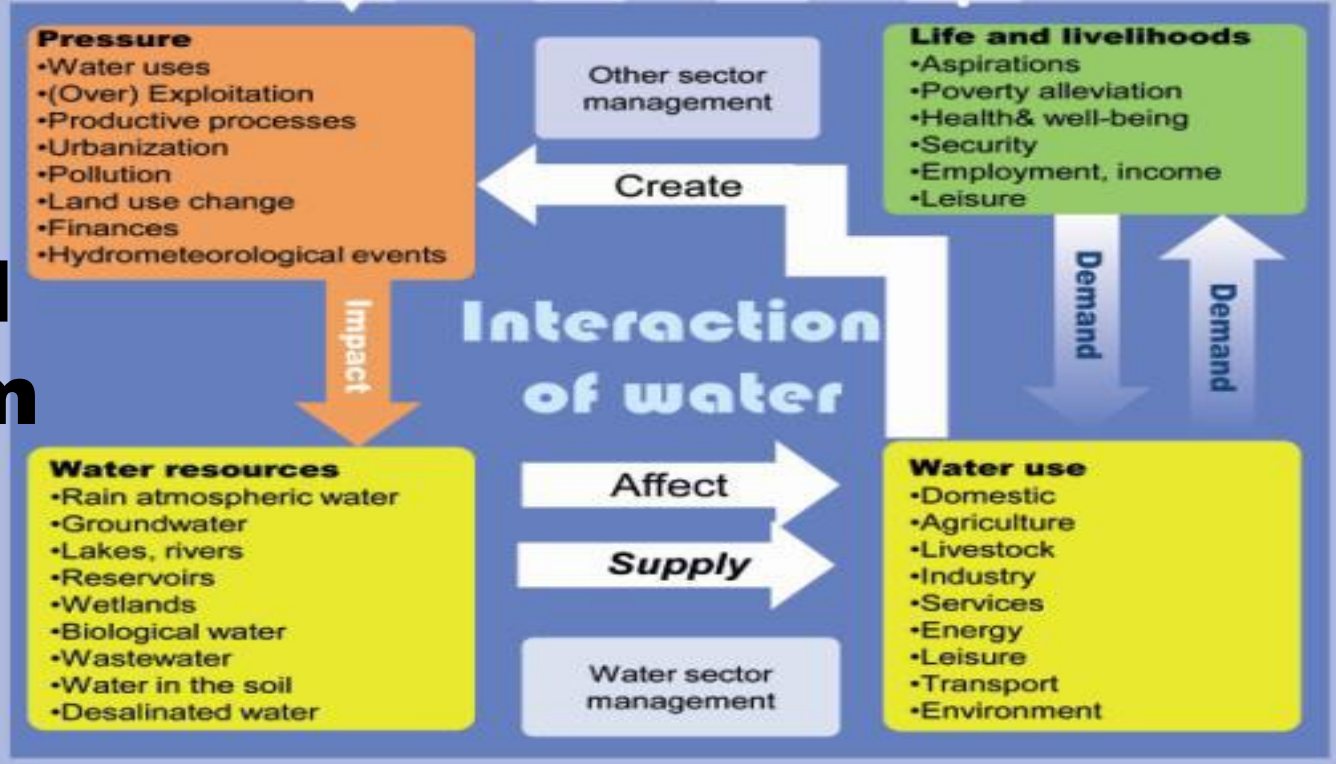
2. Methodological reflections: open dissipative and self-regulating system approach of water management



- CEG: Global Environmental Change:**
- Demographic
 - Urbanization
 - Food
 - Social organization
 - Economy and finance
 - Policy & law
 - Technology
 - Environment
 - Hydrometeorological events



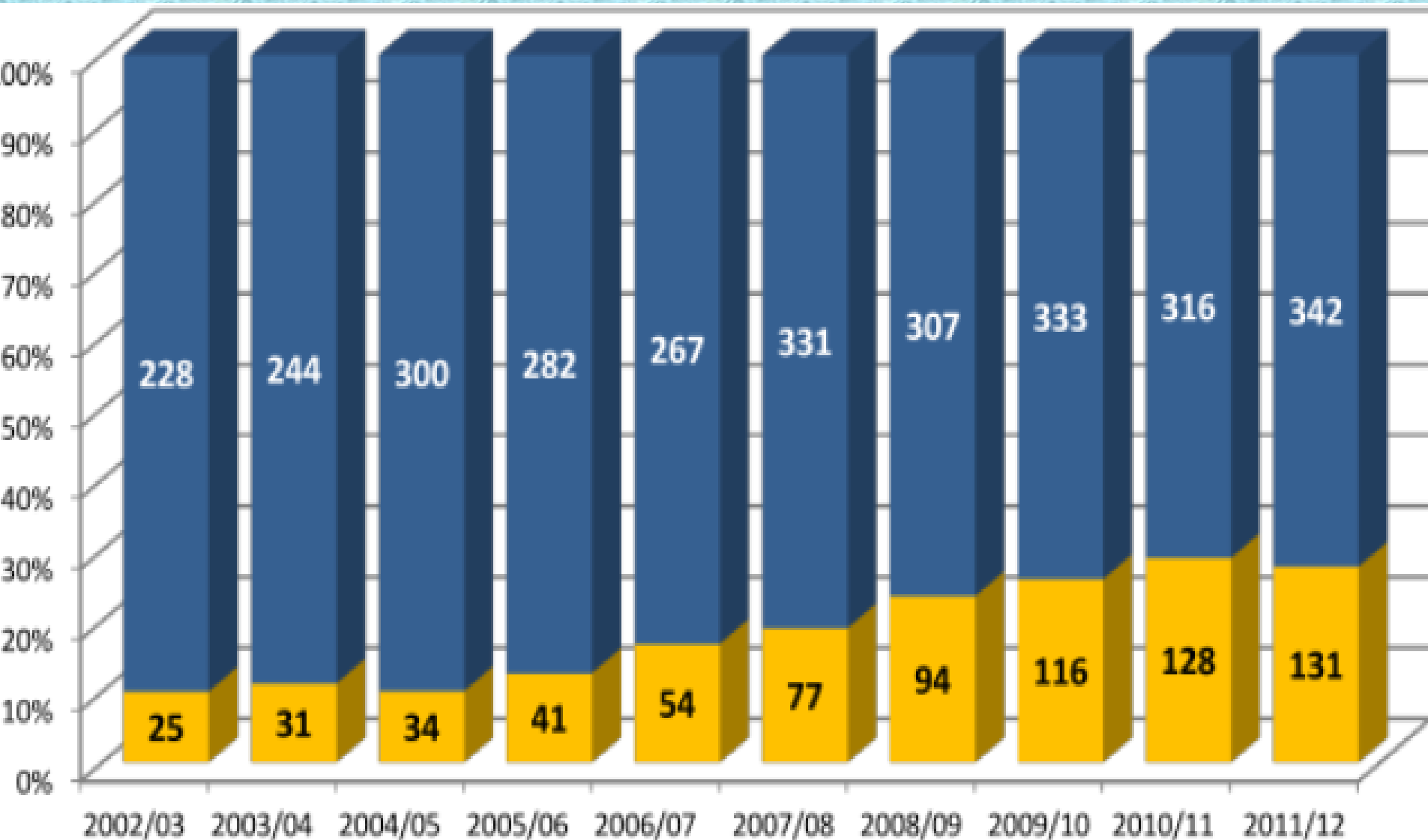
3. Integrated water system



4. Water related carbon footprint

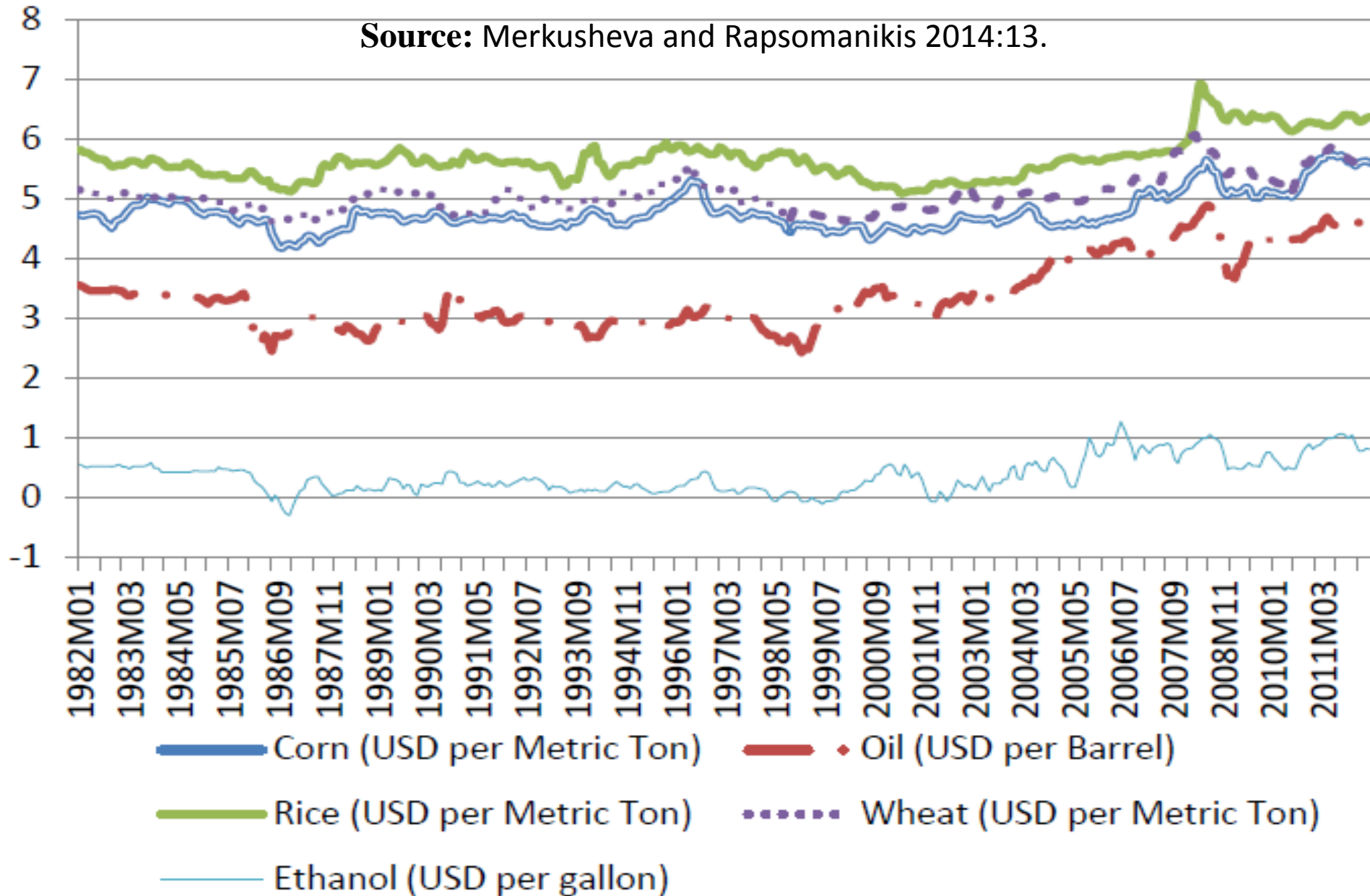


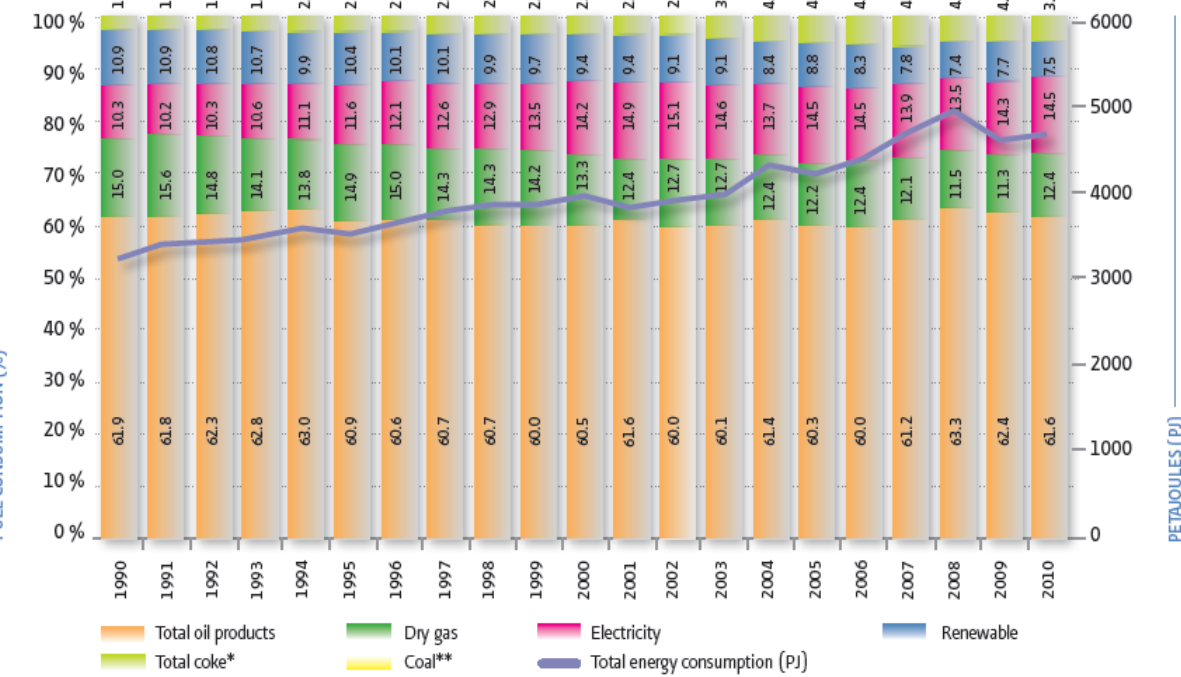
Biofuel production from maize, USA



Food and energy prices 1982-2011

Source: Merkusheva and Rapsomanikis 2014:13.





Fuel consumption in Mexico

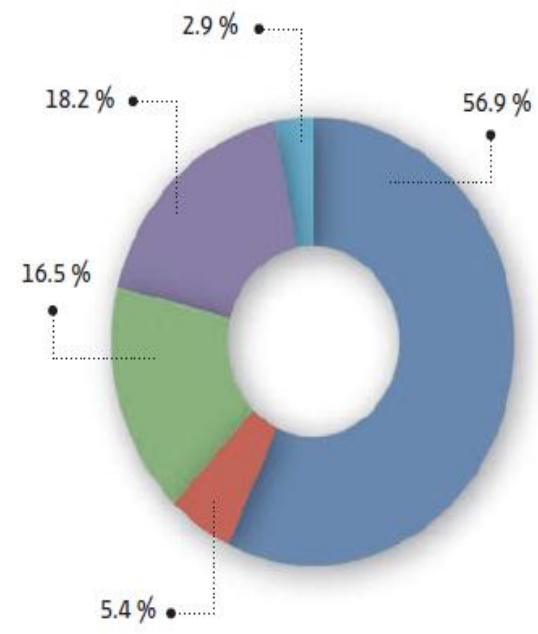
Source: CCI 2012: 6.

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

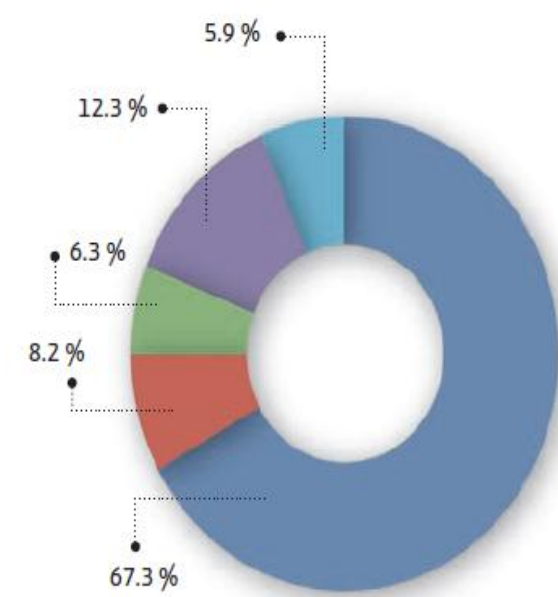
GHG emission by sector

Source: CCI 2012: 20

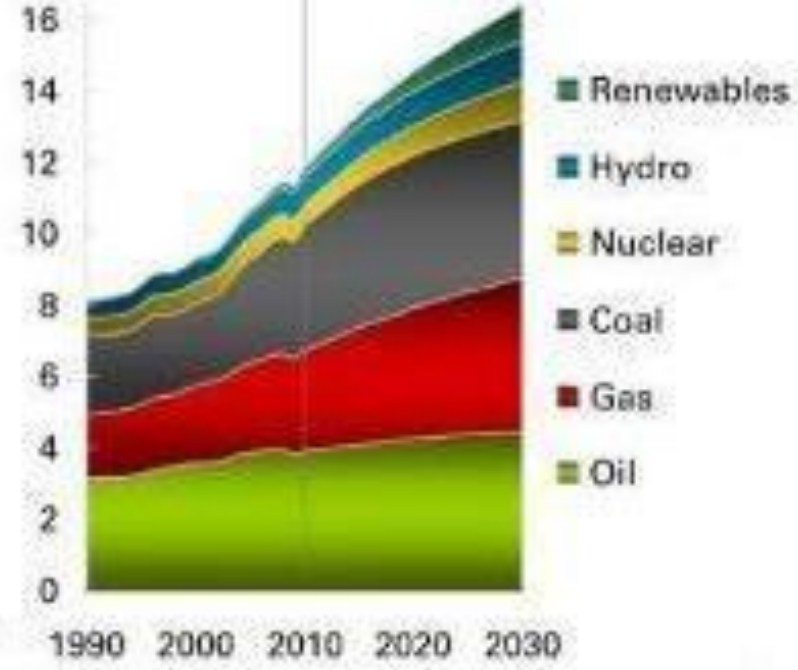
- ENERGY
- INDUSTRIAL PROCESSES
- AGRICULTURE
- LAND USE, LAND USE CHANGE, AND FORESTRY
- WASTE



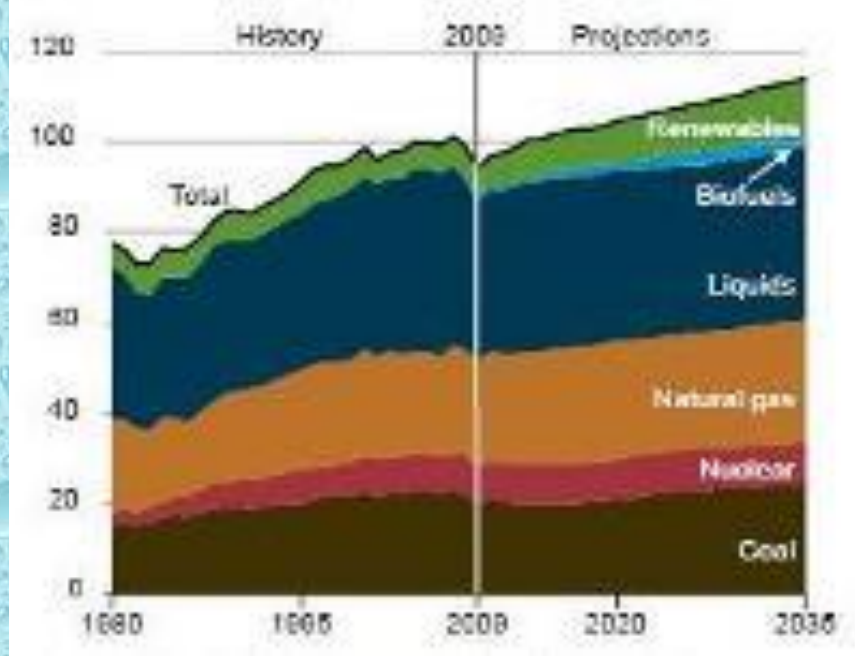
1990
561,035.2 Gg de CO₂ eq.



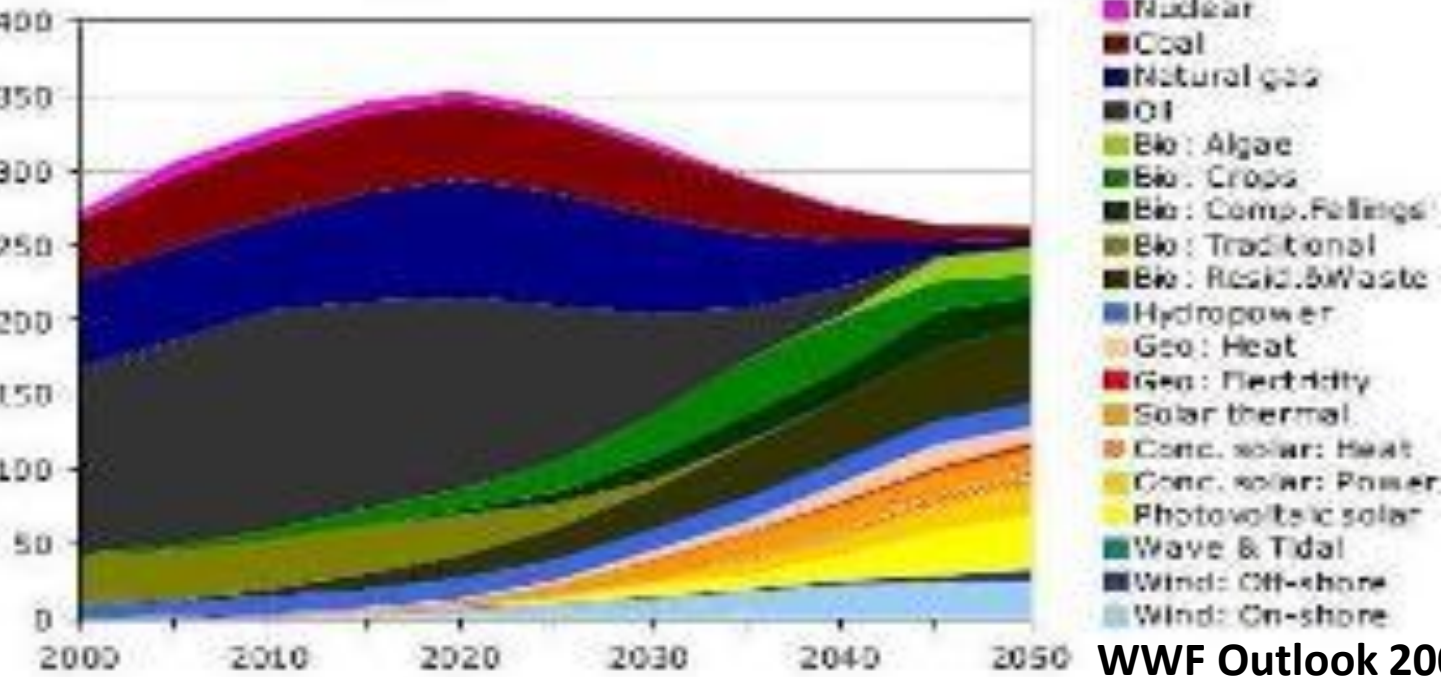
2010
748,252.2 Gg de CO₂ eq.



BP Outlook 1990-2030: 16



Energy Information Agency Outlook 1980-2035: 63

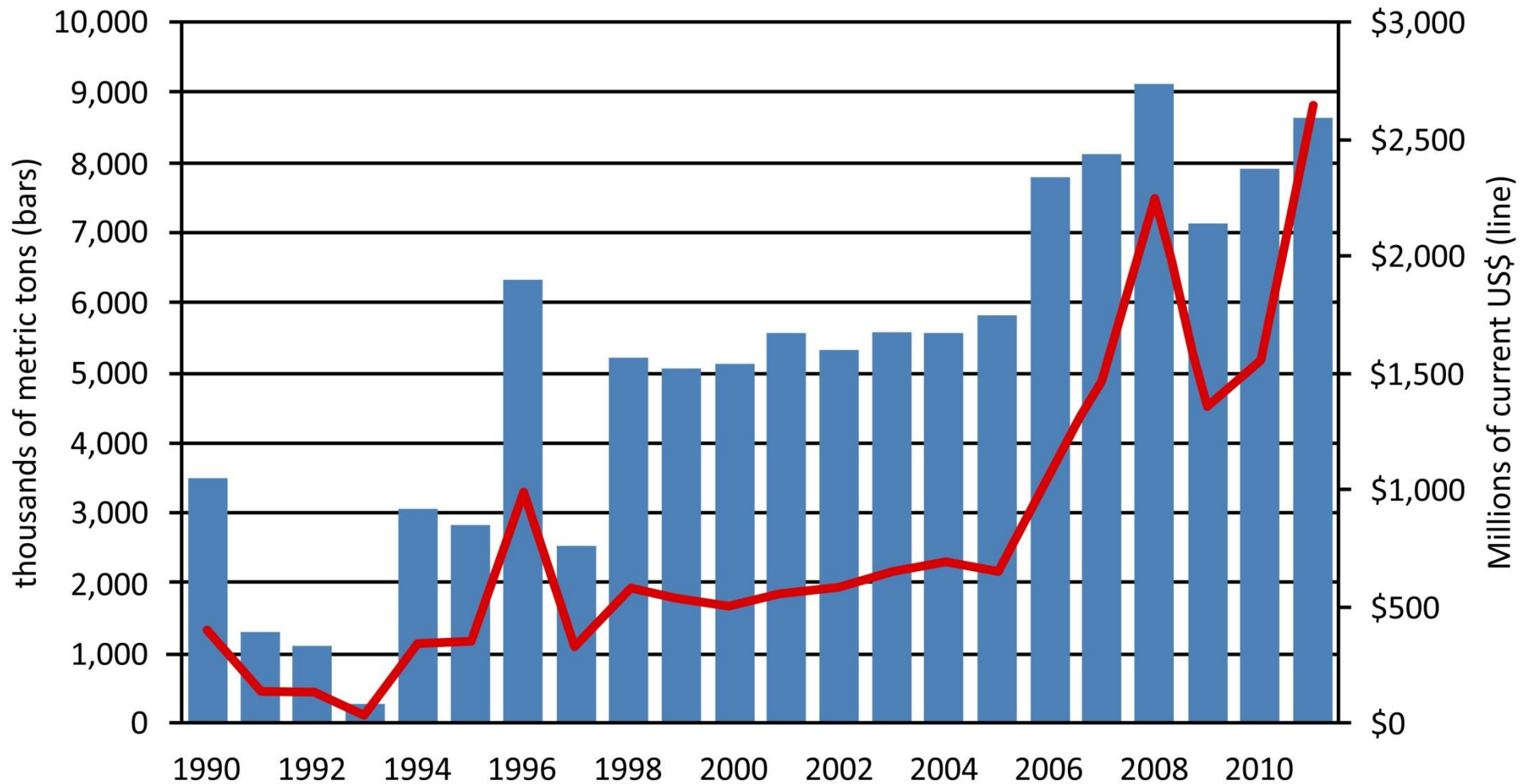


WWF Outlook 2000-2050: 92

**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%**

Distrito Federal

México

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**

Morelos



**Integrated river basin management
with disaster risk reduction**

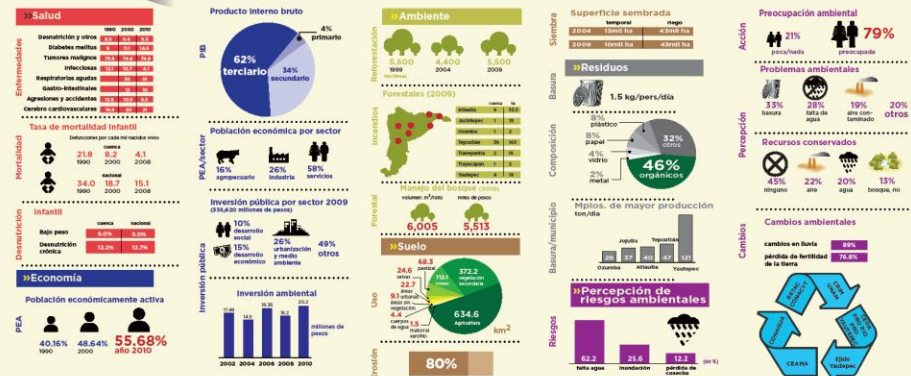
Mi Río Yautepec

Niños, niñas y adultos de 13 municipios de los estados de Morelos y México construimos el futuro de nuestro río para hacer de este pequeño territorio un lugar seguro de trabajo, educación, agua limpia, bosques y selvas.

2 Pueblos Mágicos

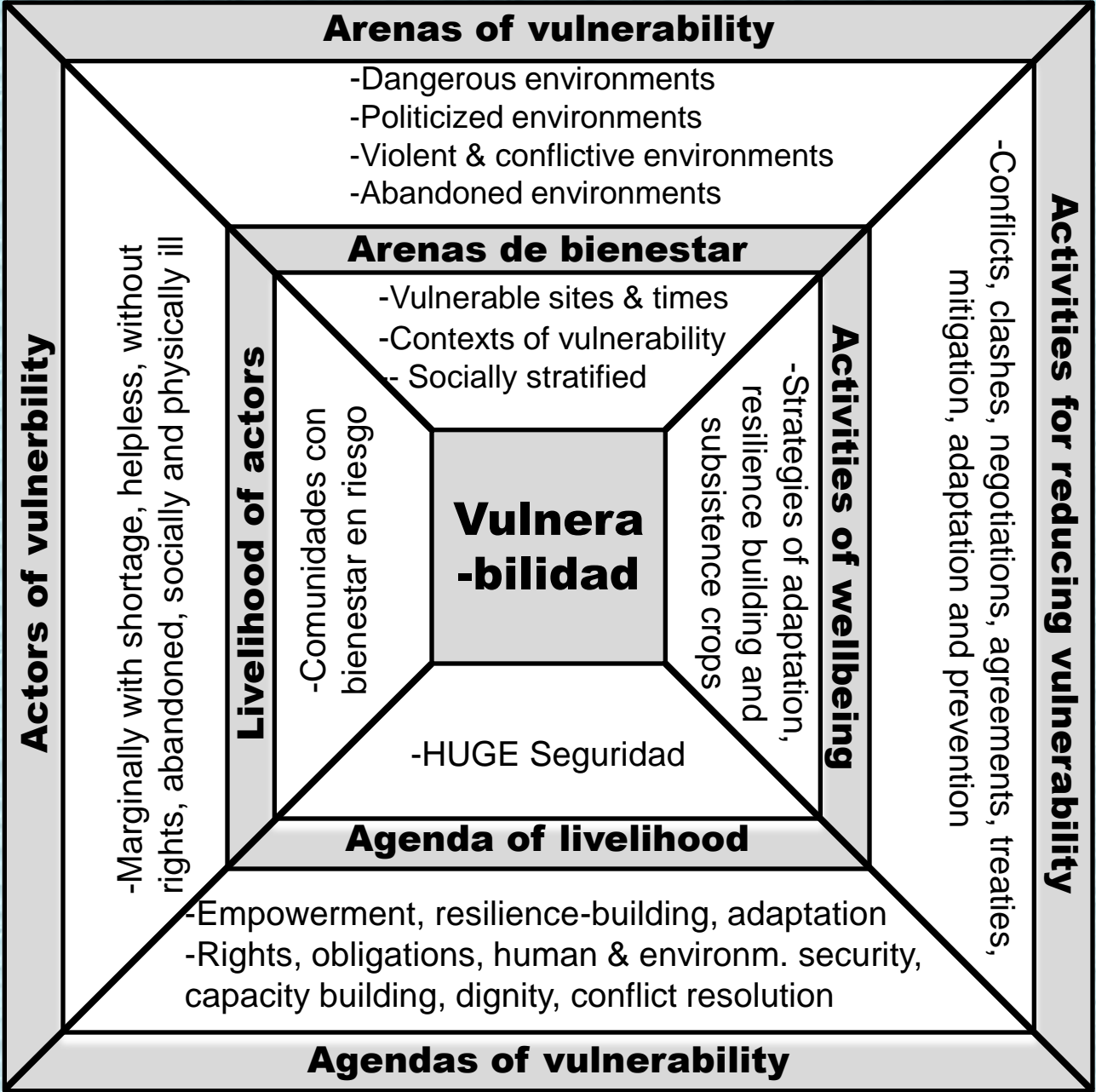


Peasants, traders, micro-entrepreneurs, social movements, NGO's, citizens, scientists, people affected by disasters, women, children, teachers and the three levels of government developed an integrated basin management of the River Yautepec for reducing risks increased by climate change and are promoting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

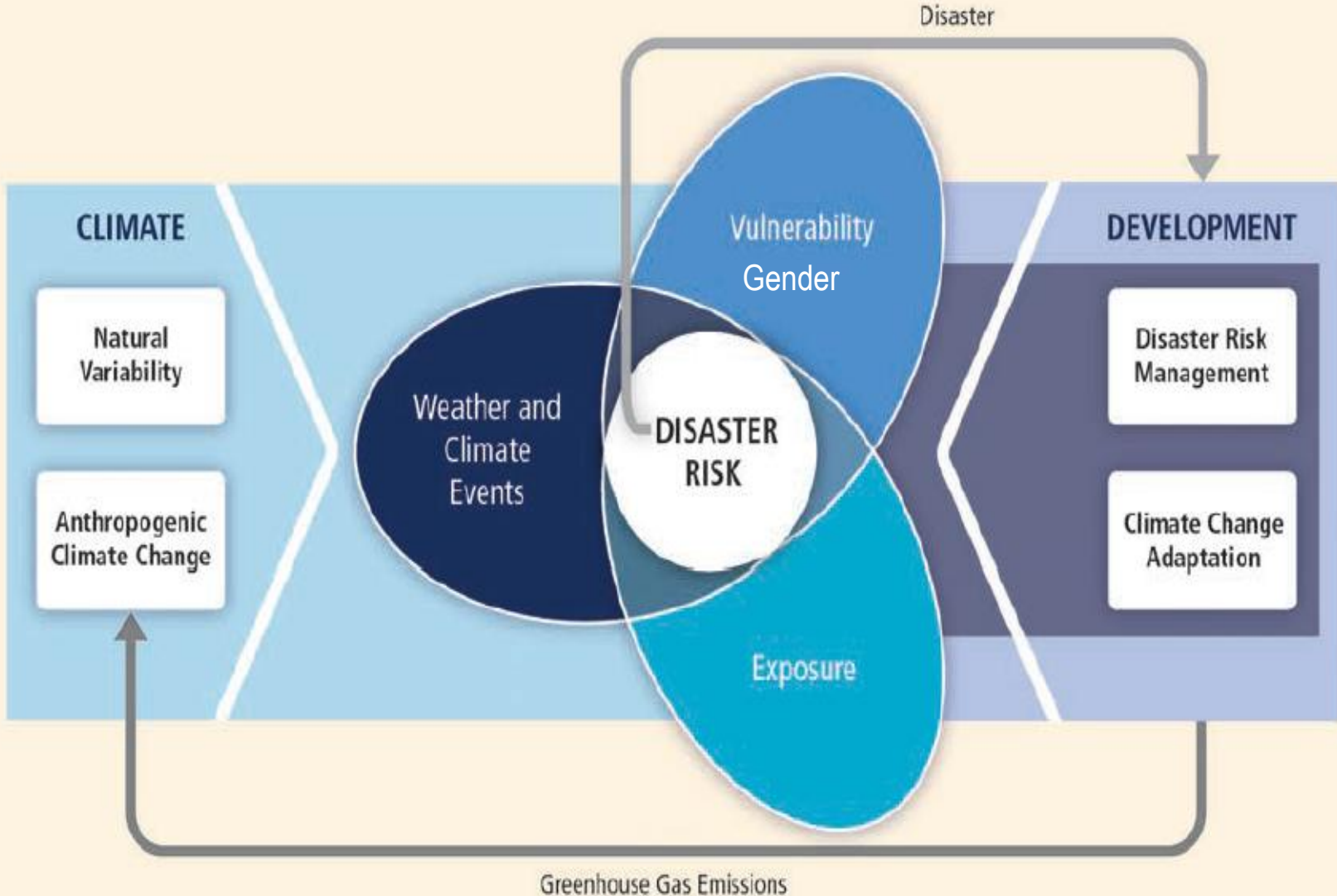


PTA: Planta de Tratamiento de Aguas Residuales
 CENRES: Unidad Ciudad, Angel Gardes, Ana Estrella, Alejandro Morales, Hércula Cruz
 Información: rch@agropal.com

Model of interaction of socio-environmental vulnerability



Potential for a sustainable transition



**Thank you very much
for your attention**

Úrsula Oswald Spring
Editor



Water Resources in Mexico

Scarcity, Degradation, Stress, Conflicts,
Management, and Policy

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Los retos de la investigación
del agua en México

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