

Eco-units as a Paradigm to Recover the World Climate

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Work Purpose

Apply the emergy analysis as a systemic approach for modeling the concept of eco-units regarding the anthropic emissions of the main greenhouse gases and the reversion of the world climate trends that can be achieved when a shift in life-styles is proposed.

Introduction

Scientific and Industrial Revolutions established a new pace for human society since XVII century, laying the foundations for modern capitalism, that nowadays is failing to provide solutions for resources depletion and destruction of Biosphere resilience.

The planet ecosystems critical situation opens questions about our future that are strongly supported by scientific analysis allowing increased awareness on how humanity can use the accumulated knowledge to make the transition to a sustainable symbiosis with the planet as a living organism (Lovelock, 2007).

The current knowledge about observed impacts of climate changes on the natural and human environment has had a discernible influence from anthropogenic warming, although many effects are difficult to discern due to adaptation and non-climatic drivers (IPCC, 2007).

Besides tectonics, astronomical, and atmospheric causes the human phenomena can influence the climate.

Industrial civilization has provided the uptake of anthropogenic carbon since 1750 influencing the heat retention through the greenhouse effect and the solar reflectivity through the melting of the polar ice caps, as a direct response to global warming.

Lessons from the past

Climate in the past may tell us how life can be in a hotter planet by investigating temperature through geological eras.

Past temperatures regarding geological timescale were rescued by Paleoclimatology through the use of proxies to infer data from carbon and oxygen isotopes, dust layers and stoma counting in fossil leaves. Carbon dioxide can be traced back using trapped air bubbles in ice cores and a temperature correlation is possible.

The change in CO₂ concentration in the geological timescale and temperature can increase from 1 °C to 6 °C in this century.

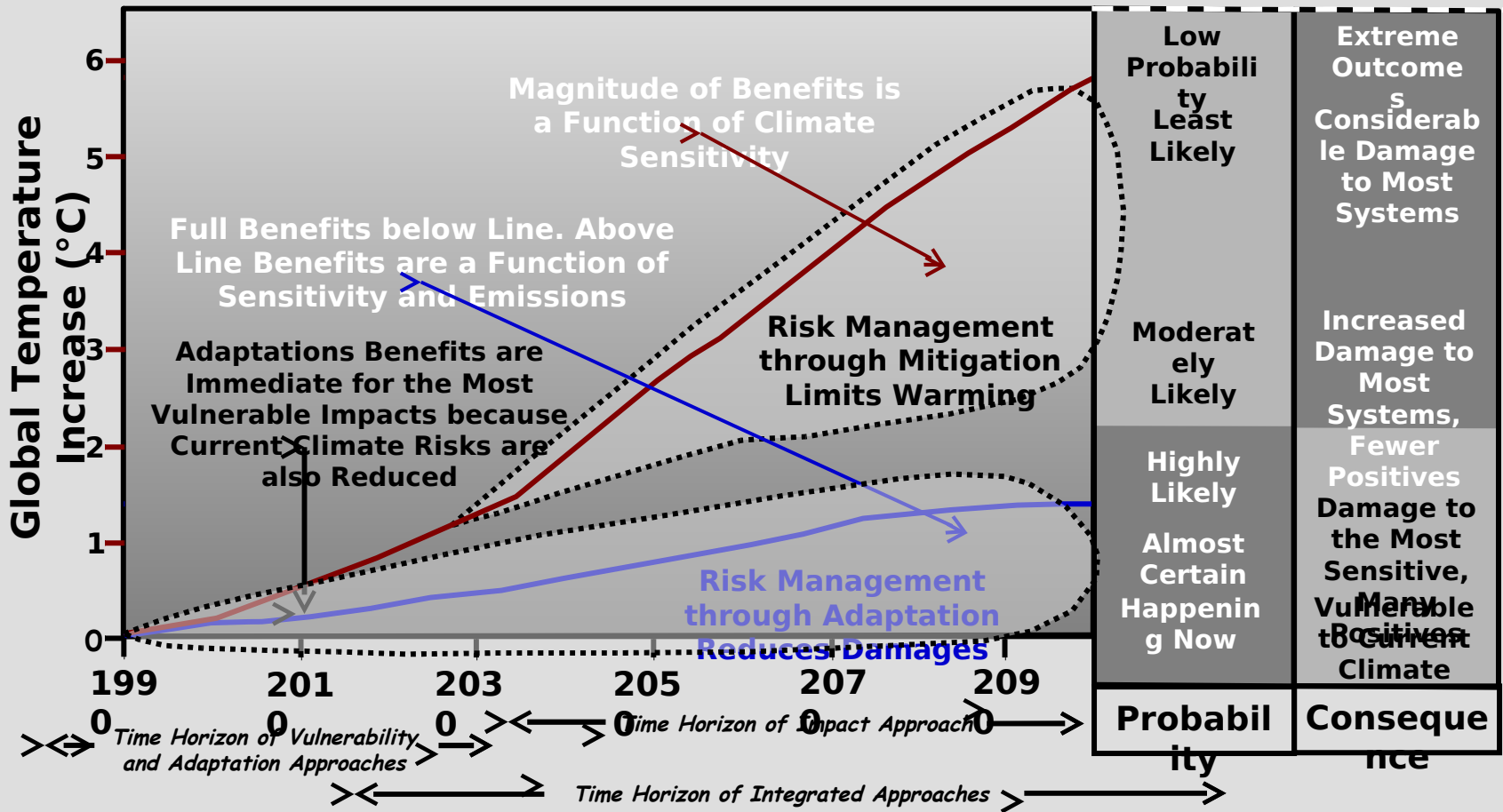
A similar peak can be noticed in the Permian Period, when it occurred the biggest event of life mass extinction in the planet.

In the Holocene mankind is living in a very stable system, but that stability is about to be lost unless we modify our mental model in a sense of the accumulated knowledge brought the paradox power of collapsing the planet or succeeds as a healthy symbiotic relationship with the various ecosystems

Lessons from the past can teach us what expect, and the state-of-the-art of technology can make the future still mild for life in Earth, but...

are the leaders and the people prepared to build and make feasible a mental model which will conduct to a new order where present life-styles have to change?

It seems that is possible, once we defeat the state of denial we live in, and start playing the role, may be the most important one science community has ever dealt with, of changing public perception to trigger the change (Flannery, 2007; Lynas, 2008).



Probability - the Likelihood of Reaching or Exceeding a Given Level of Global Warming
 Consequence - the Effect of Reaching or Exceeding a Given Level of Global Warming
 Core Benefits of Adaptation and Mitigation

Risk = Probability x Consequence

Synthesis of Risk-Management Approaches to Global Warming

Future around the corner

Among the IPCC main findings about climate change is that some adaptation is occurring now in a limited basis.

Further adaptation will be necessary to address impacts from warming that is already unavoidable due the past emissions. This adaptation is required to reduce vulnerability to future climate changes, which can be exacerbated by the presence of others stresses (IPCC, 2007).

Future vulnerability depends also on the development pathway and can be reduced by sustainable development, but climate change could restrain nation's abilities to achieve sustainable development pathways.

Many impacts can be avoided, reduced or delayed by mitigation, then a portfolio of adaptation and mitigation measures can diminish the risks associated to climate changes. It is recognised that there are synergies between adaptive capacity and sustainable development, being more resilient the societies that are pursuing a path of sustainable development (Parry, 2007).

Is There a Climate Policy?

DEGREE CHANGE	TEMPERATURE CHANGE IN CELSIUS	ACTION NEEDED	CO ₂ TARGET
One Degree	0.1 - 1.0°C	Avoidance Probably Not Possible	350 ppm (*)
Two Degrees	1.1 – 2.0°C	Peak Global Emission by 2015	400 ppm
Threshold for Carbon-Cycle Feedback?			
Three Degrees	2.1 – 3.0°C	Peak Global Emission by 2030	450ppm
Threshold for Siberian Methane Feedback?			
Four Degrees	3.1 – 4.0°C	Peak Global Emission by 2050	550 ppm
Five Degrees	4.1 – 5.0°C	Allow Constantly Rising Emissions	650 ppm
Six Degrees	5.1 – 6.0°C	Allow Very High Emissions	800 ppm

(*) Today's level is 380 ppm

Source: Lynas, M.; 2008

Emissions, Sources, Sinks, Sequestration, Energy Use,

Sustainability is a multileveled quality only defined by its absence and does not to be defined in a general way: if a basic quality is not fulfilled, the fulfillments of less basic quality is not enough to compensate the absence of this basic quality.

The basic factor for sustainability are the independence of stocks and the capacity of being supportive to the super system.

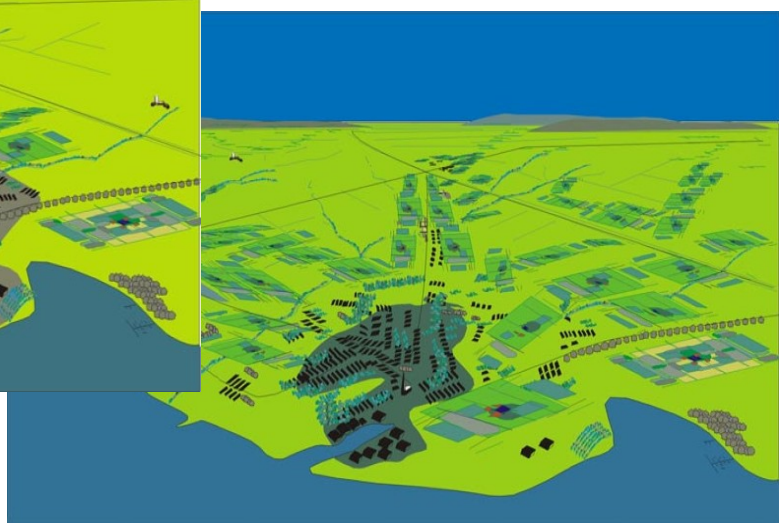
Any society depending on a certain stock to evolve and survive does not exist longer than this stock, and human civilization has been addicted to oil during the last centuries.

The ecosystems provide life-support services to the mankind and a supportive relationship towards them is imperative (Günther, 2004).

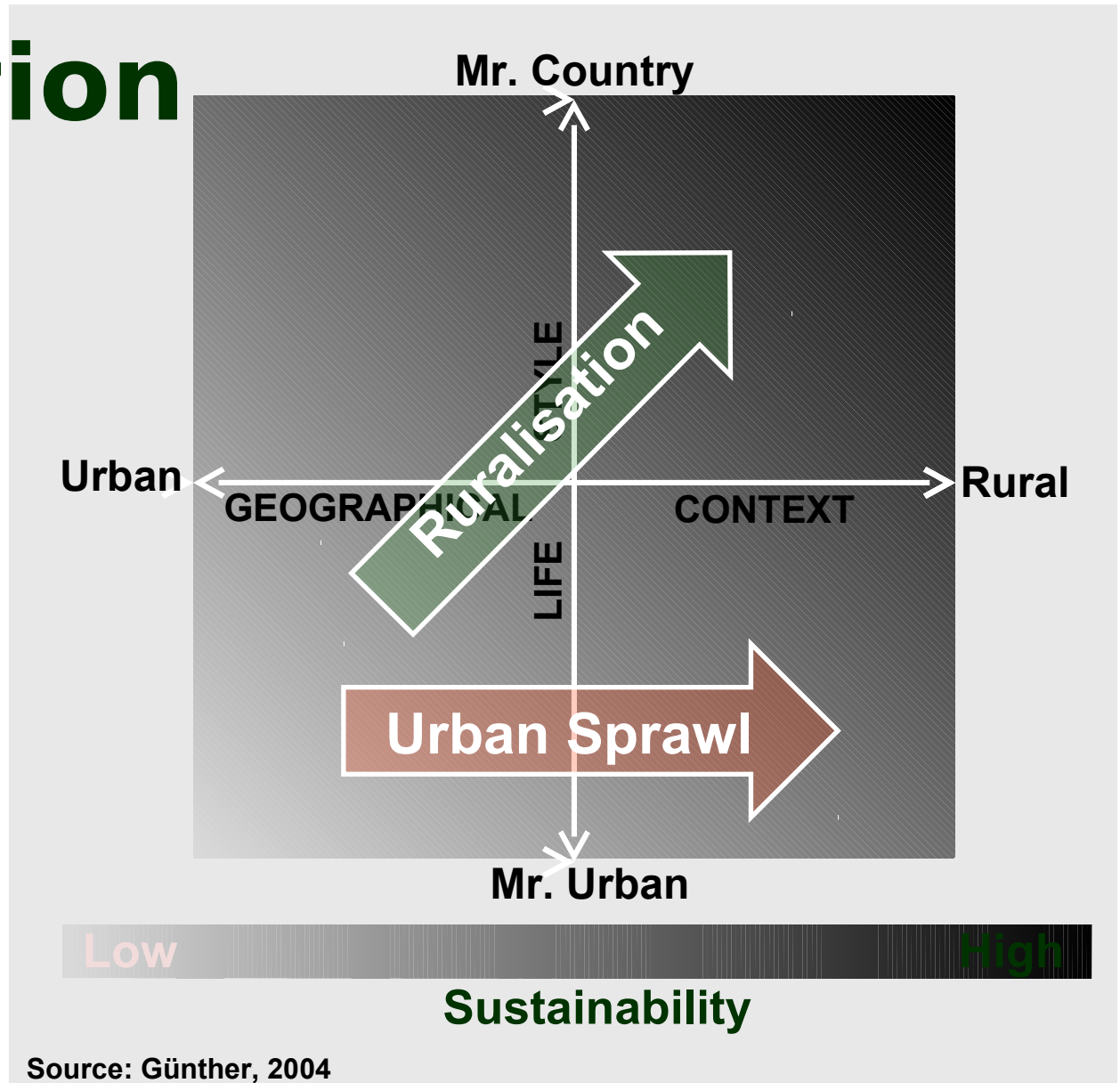
Intensive carbon emission from the use of oil is one of the causes for the global warming and even modern agriculture is a carbon source.

Eco-units and Ruralisation: shifting life-styles

Year	0	18	50
Urban Population:	33,000	18,000	3,000
Rural Population:	3,000	18,000	33,000

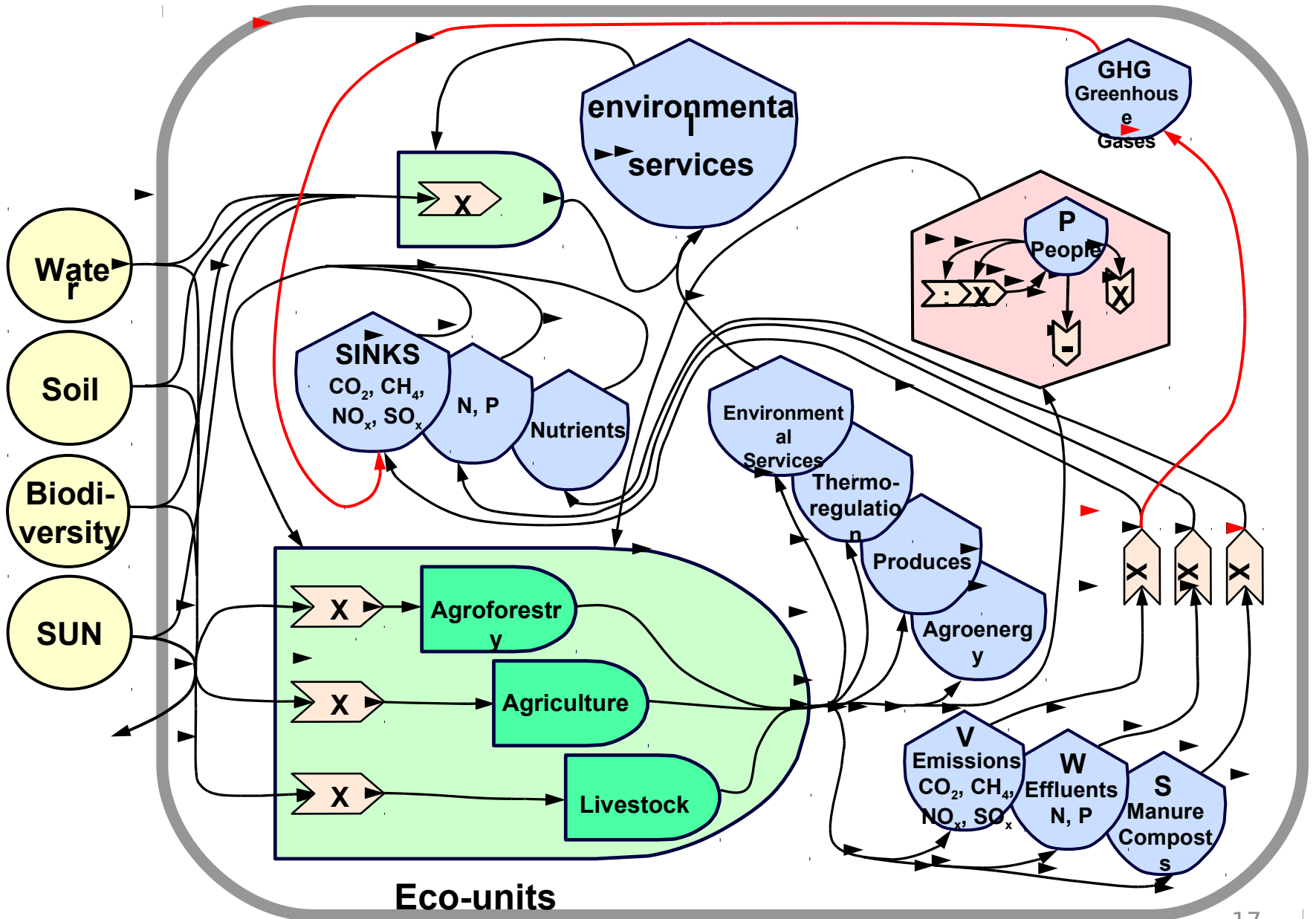


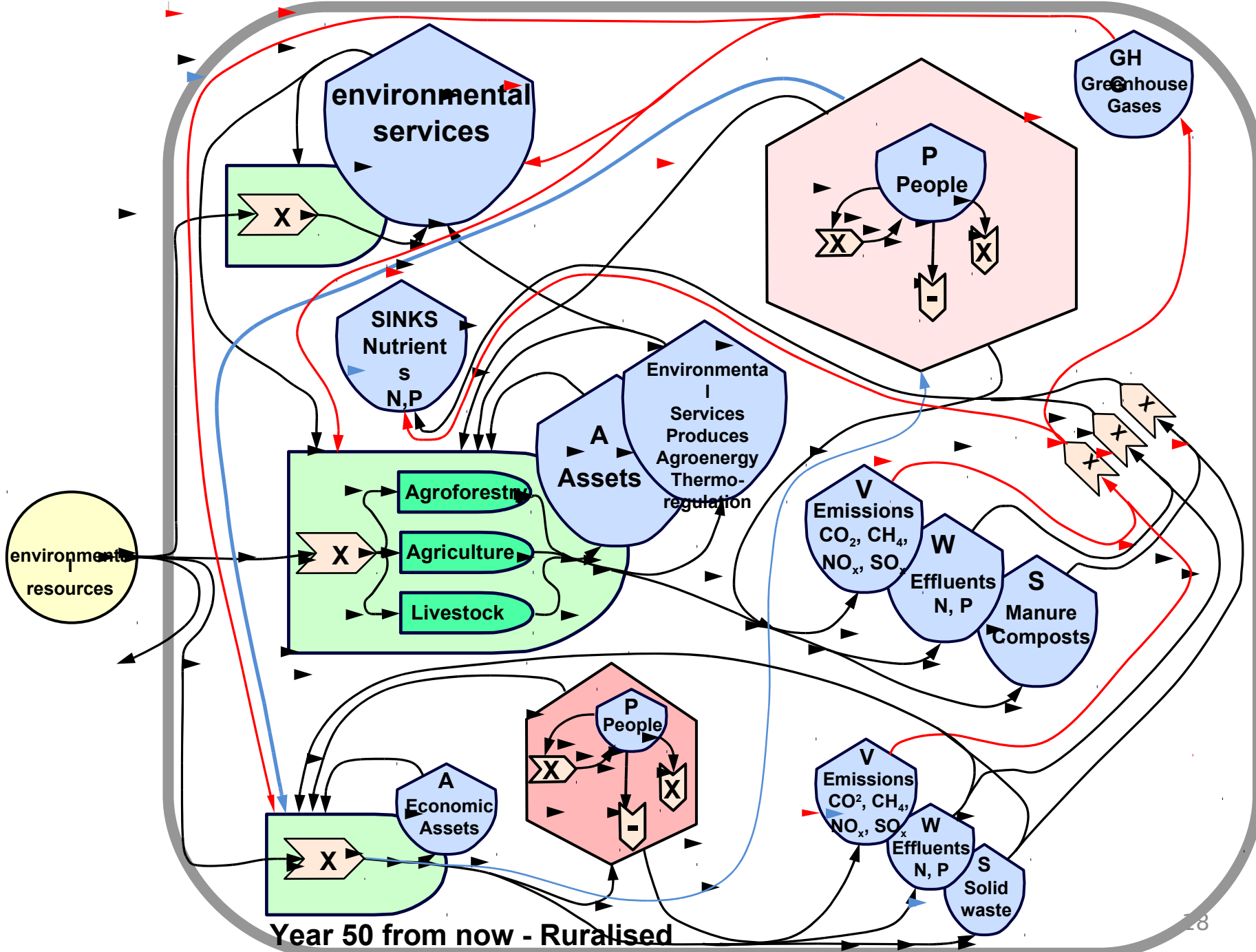
Ruralisation



During the last 50 years of his life, Howard T. Odum dealt with a systems approach to Ecology, researching and proposing models for all kind of systems, including man and society, besides natural systems (Odum, 1994, 1996).

In his last book with Elizabeth Odum (2001) all the knowledge in this field was gathered and organised to propose a broadened system view to support the urgent transition from the present peak of development, based on fossil fuel, to a lower energy society, following, as he stated a prosperous way down.





Conclusions

If Climate Change is really a critical and vital problem, there is need of urgent actions for climate mitigation for the survival of human civilization. Oil should be maintained as stock to preserve climate and biodiversity.

Billions of people will have to move to rural areas. Besides absorbing people, rural should recover native vegetation and absorb carbon dioxide, methane, and gaseous acids as well as provide water for aquifers and rivers. In order to help in this ecological ruralisation process, science and politics should adopt a broad and integrated scope;

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