Decision Support Tools in a changing climate

Donatella Pasqualini

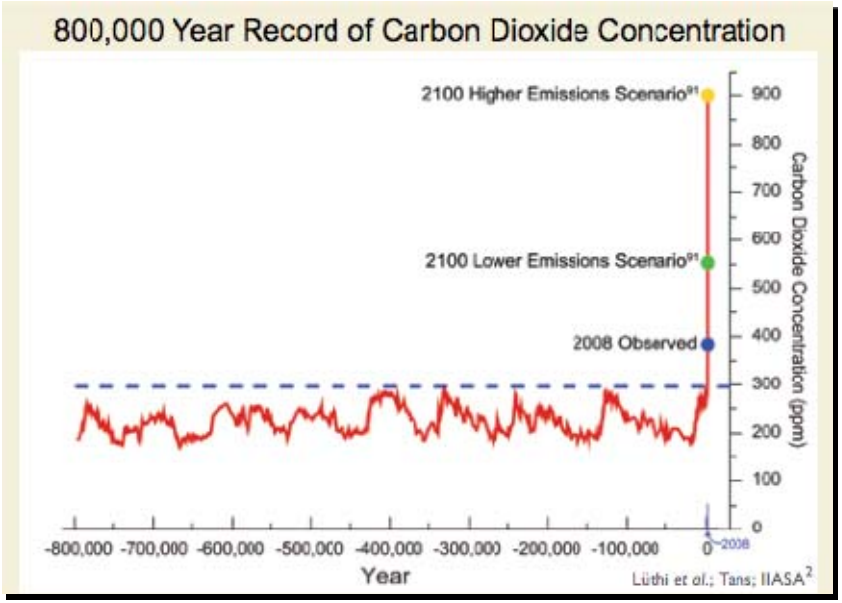
Los Alamos National Laboratory
Earth and Environmental Science Division

Climate Change

In the last 100 years we have been witnessing climatic changes and we have been experiencing their adverse direct and indirect consequences

The global warming is not a natural occurrence

Human activities are responsible



Despite 15 years of intense international climate negotiations, atmospheric CO_2 concentrations have been growing 33% faster during the last 8 years than in the 1990s

WHY ?

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A Dynamical Target

Governmental institutions, private corporations, and single individuals are not prepared to meet the challenges and the opportunities that climate change presents

- The way how they make decisions is based on the assumption of a stationary climate, but that assumption is no longer true
  - Climate change is not only how much the planet is warming but also how fast this happens
  - Ecosystems and societies can adapt, but that takes time
  - These changes are so rapid that societies and ecosystems will not be adapting to a new steady state, but rather to a rapidly moving target
- Decisions cannot be only based on climate information, but we need to consider at the same time social and economics changes and their feedbacks
- Decisions cannot be only made at global and national level with a top-down approach (inertia and frictions), but we also need a bottom-up approach (more agile) at local/community level that considers also adaptation

Need for more effective ways to support climate-related decisions

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CLEAR Model

CLimate-**E**nergy **A**ssessment for **R**esiliency model

The development of this model is part of an ongoing initiative involving Sonoma County, California, and Los Alamos National Laboratory (LANL)

MOTIVATION

In response to the GHG emission reductions required by AB32, Sonoma County has committed to sharp emissions reductions across several sectors, including water, energy, and transportation

GOAL

The main goal of the CLEAR model is to assist Sonoma County develops a RE portfolio to reach this goal in emission reduction

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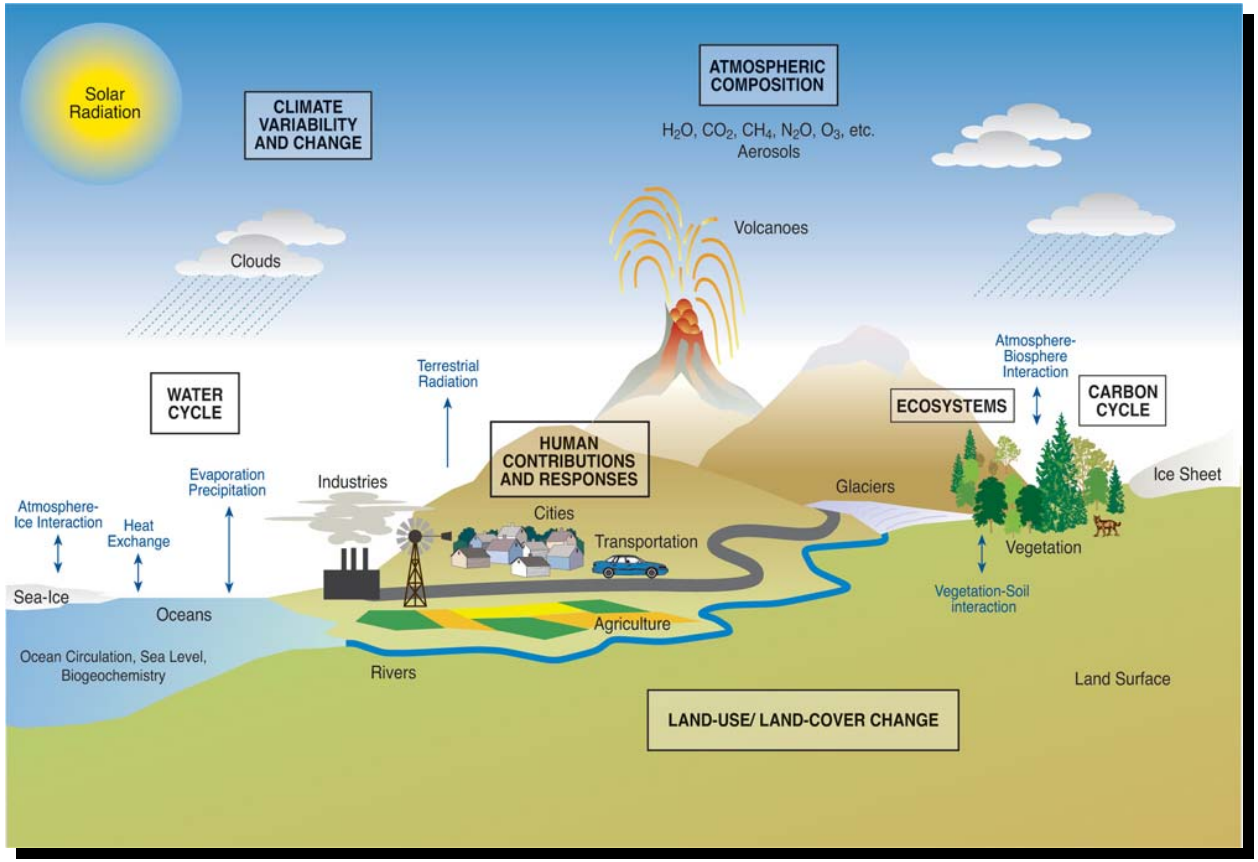
CLEAR Model



CO2 emissions are the results of several coupled processes and the nonlinear outcome of interrelations and feedbacks among different systems

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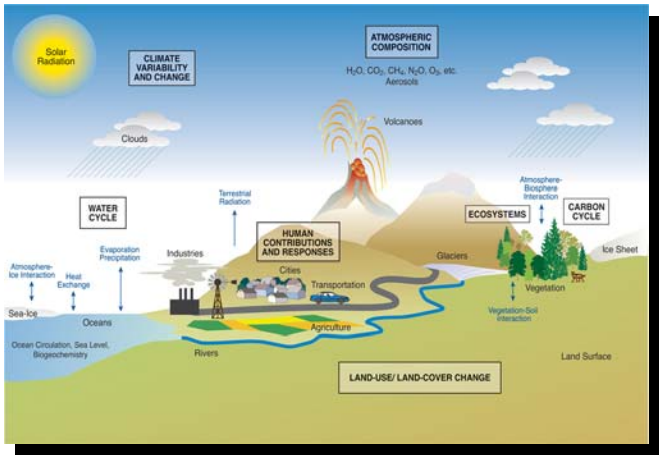
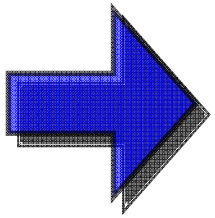
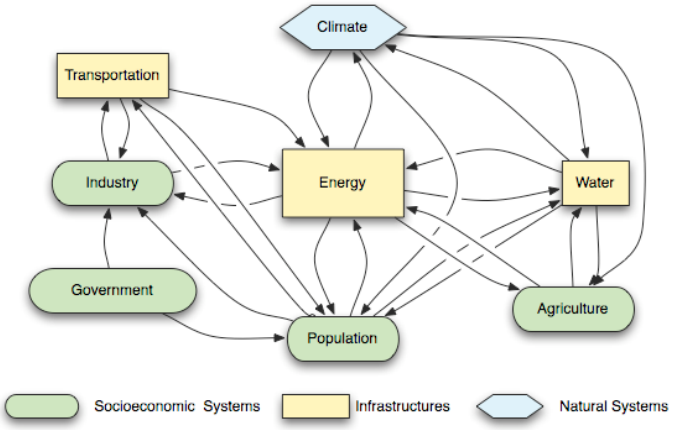
CLEAR Model







- Simulates the complex interrelationships among the key sectors

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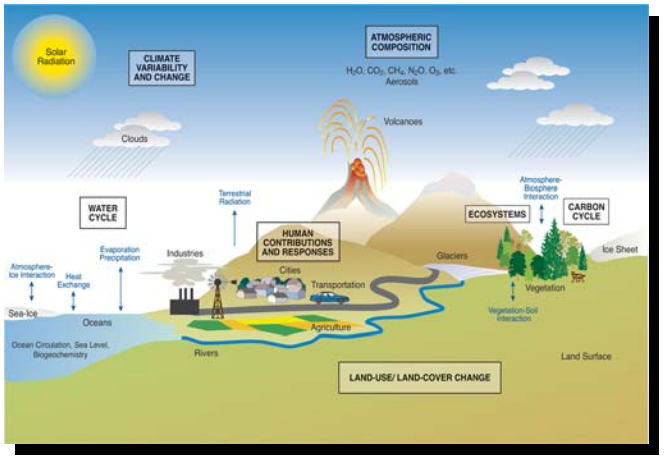
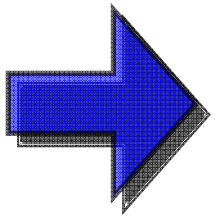
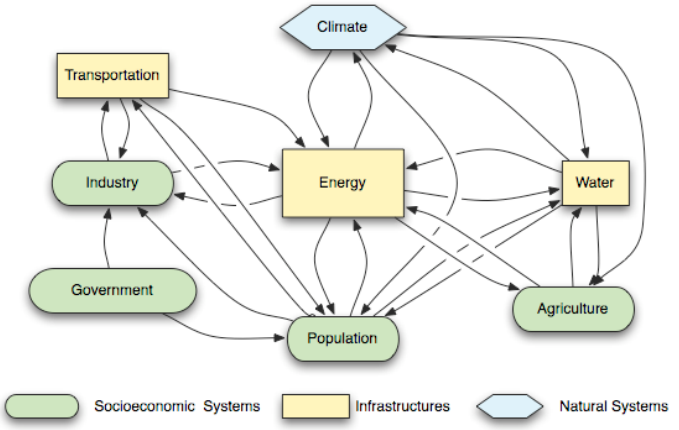
CLEAR Model







- Simulates the complex interrelationships among the key sectors
- Considers also socio-economics drivers as well as climate change
- Simulates technologies deployment
- ROI and financial aspects are under development

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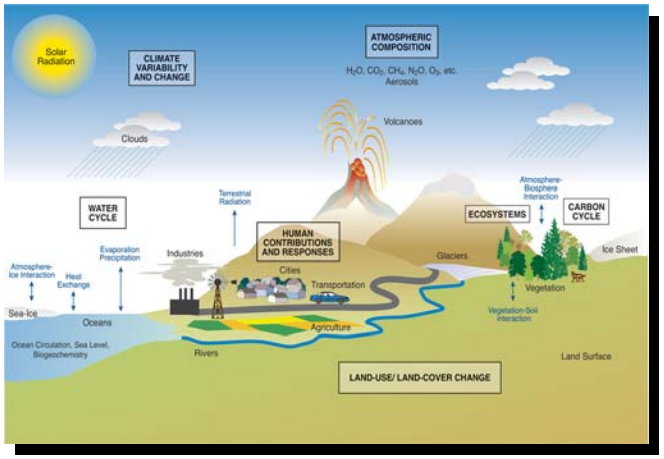
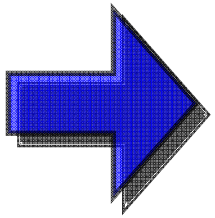
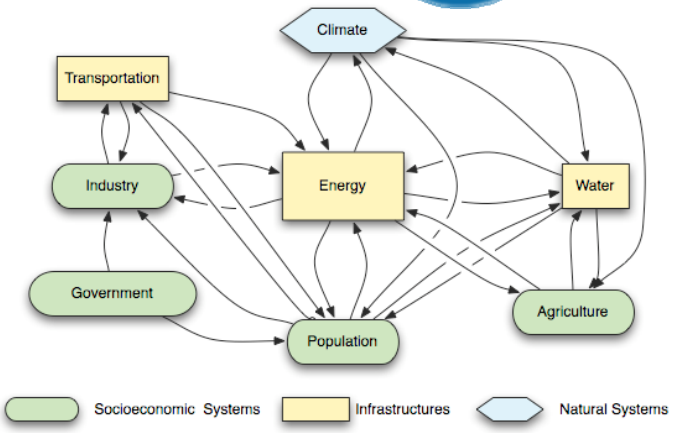
CLEAR Model







- Simulates the complex interrelationships among the key sectors
- Considers also socio-economics drivers as well as climate change
- Simulates technologies deployment
- ROI and financial aspects are under development
- Policy analysis
- Easy interface for users to run and compare scenarios
- Replicable approach for use by other interested communities

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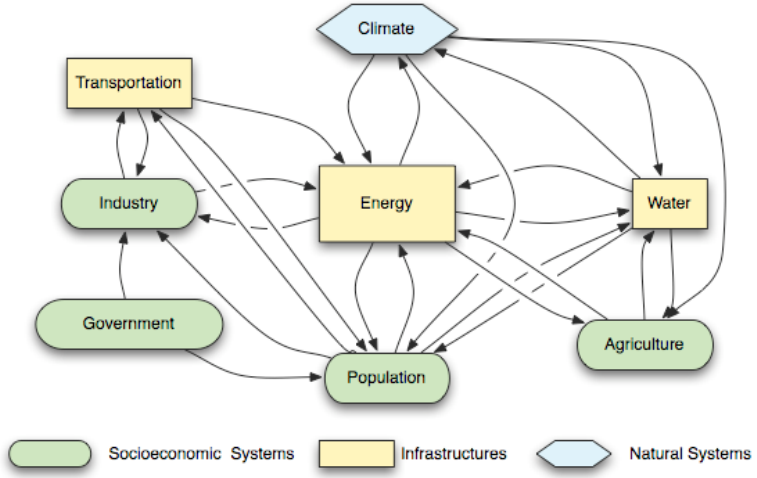
Community involvement

The CLEAR's development is based on the collaboration between science and local field experts in different sectors for instance water, energy, agriculture, economic

Adaptation occurs at local level where energy and water usage can be understood relative to local patterns of agriculture, industry, and culture



The main goal of this model is to integrate the knowledges of local people working at the grass-root level with the scientific knowledges.

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In specific LANL role is to convert the knowledges of these experts in a integrated mathematical tool that:

- Integrates different sectors
- Adds scientific knowledges such as climate change, technology deployment, and growth (CCS e.g.), social behavior and economics
- Updates these scientific knowledges: science by definition is a dynamical process
- Ensures objective answers, integrity based on scientific facts

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Model demonstration

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LANL collaborators: Gordon N. Keating

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- Institute for Geophysics & Planetary Physics (IGPP) Gary Geernaert
- Earth and Environmental Science Division (Los Alamos National Laboratory)
- Sonoma County Water Agency
- RESCO (CEC) Renewable Energy Secure Communities program

Related Activities and Projects

- Sonoma County, CA: RESCO Grant Project (2009-2012)
- Sonoma County Water Agency
- Climate Protection Campaign
- Sonoma County Transportation Authority
- LocalPower Inc.

- Project Zero, Sønderborg, Denmark
- Local and regional sustainability case study
- Established partnership with Sonoma County initiative
- Low-carbon, low-energy programs and design
- Web technologies, public participation

- Initiative for Science, Society, and Policy; Southern Denmark Univerisity, Odense
- Local and regional sustainability
- Web technologies
- Public participation