News from Earth's Emergency Room

Insects

Plummeting insect numbers 'threaten collapse of nature'

Damian Carrington
Environment editor
@dpcarrington
Sun 10 Feb 2019 13.00 EST

▲ The rate of insect extinction i
reptiles. Photograph: Courtesy

**Exclusive: Insects could vanis
decline, says global review**

• Why are insects in decline,

The world's insects are hurtlin
"catastrophic collapse of natu
scientific review.

More than 40% of insect speci
analysis found. The rate of ext
birds and reptiles. The total m
according to the best data avai
century.

The planet is at the start of a s
already reported in larger anin
the most varied and abundant
are "essential" for the proper f
food for other creatures, pollin

Insects

Why are insects in decline, and can we do anything about it?

Answers to key questions about the global insect collapse

• Insect collapse: 'We are destroying our life support systems'

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▲ The dragonfly is among more than a million species of insect. Photograph: Silas Stein/AFP/Getty Images

What is the sixth mass extinction?
Many scientists think the current worldwide annihilation of wildlife is the beginning of a huge loss of species on Earth. It has happened five times in the last 4bn years, as a result of meteorite impacts, long ice ages and huge volcanic eruptions. But this one is the result not of natural causes, but of humanity's actions.

How bad is it?
Extremely. By some measures, the biodiversity crisis is even deeper than that of climate change. Since the dawn of civilisation, humanity has caused the loss of 83% of all wild mammals. In the last 50 years alone, the populations of all mammals, birds, reptiles and fish have fallen by an average of 60%.

ELSEVIER
Biological Conservation
Volume 232, April 2019, Pages 8-27

Review

Worldwide decline of the entomofauna: A review of its drivers

Francisco Sánchez-Bayo [a], Kris A.G. Wyckhuys [b, c, d]
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Highlights

- Over 40% of insect species are threatened with extinction.
- Lepidoptera, Hymenoptera and dung beetles (Coleoptera) are the taxa most affected.
- Four aquatic taxa are imperiled and have already lost a large proportion of species.
- Habitat loss by conversion to intensive agriculture is the main driver of the declines.
- Agro-chemical pollutants, invasive species and climate change are additional causes.

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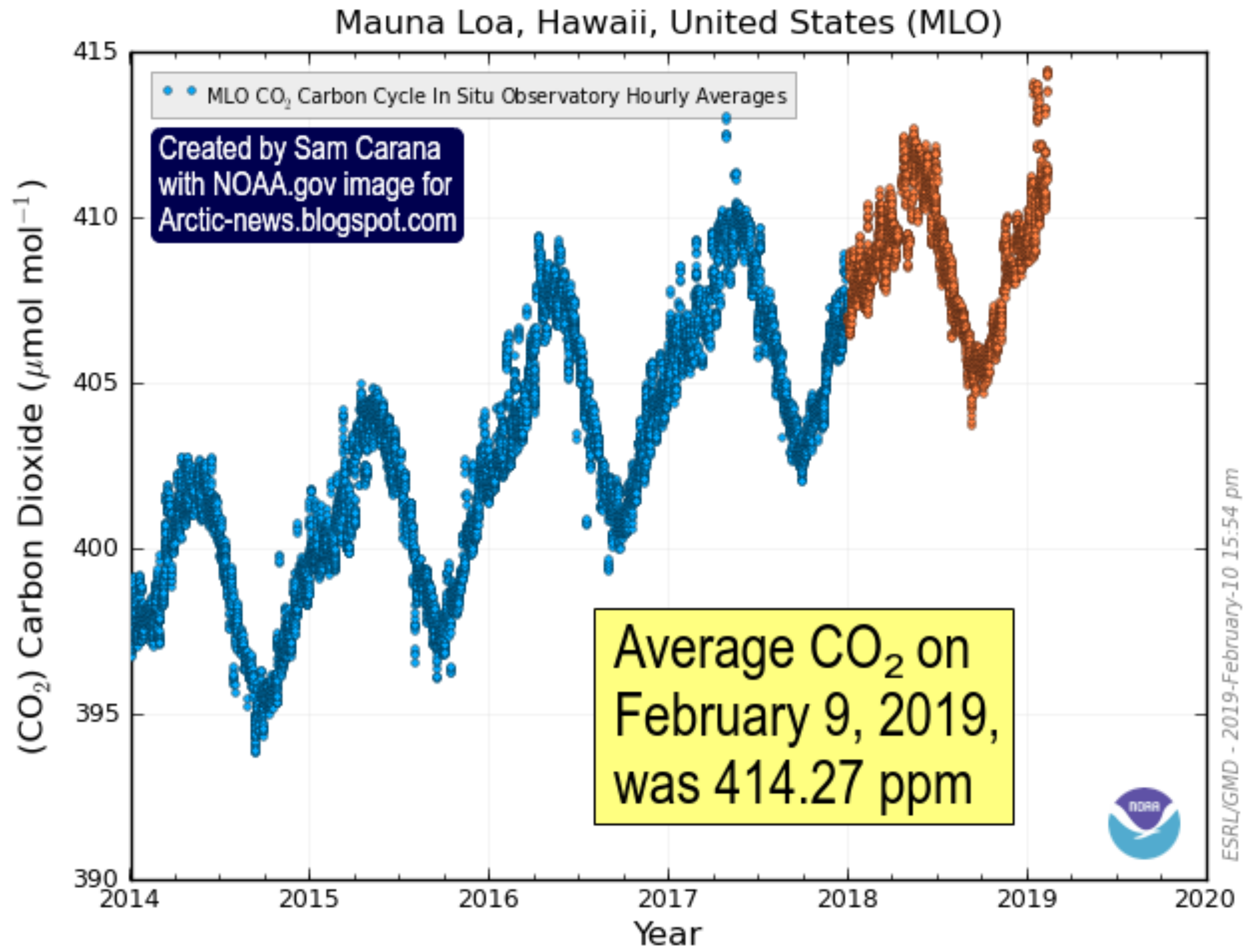

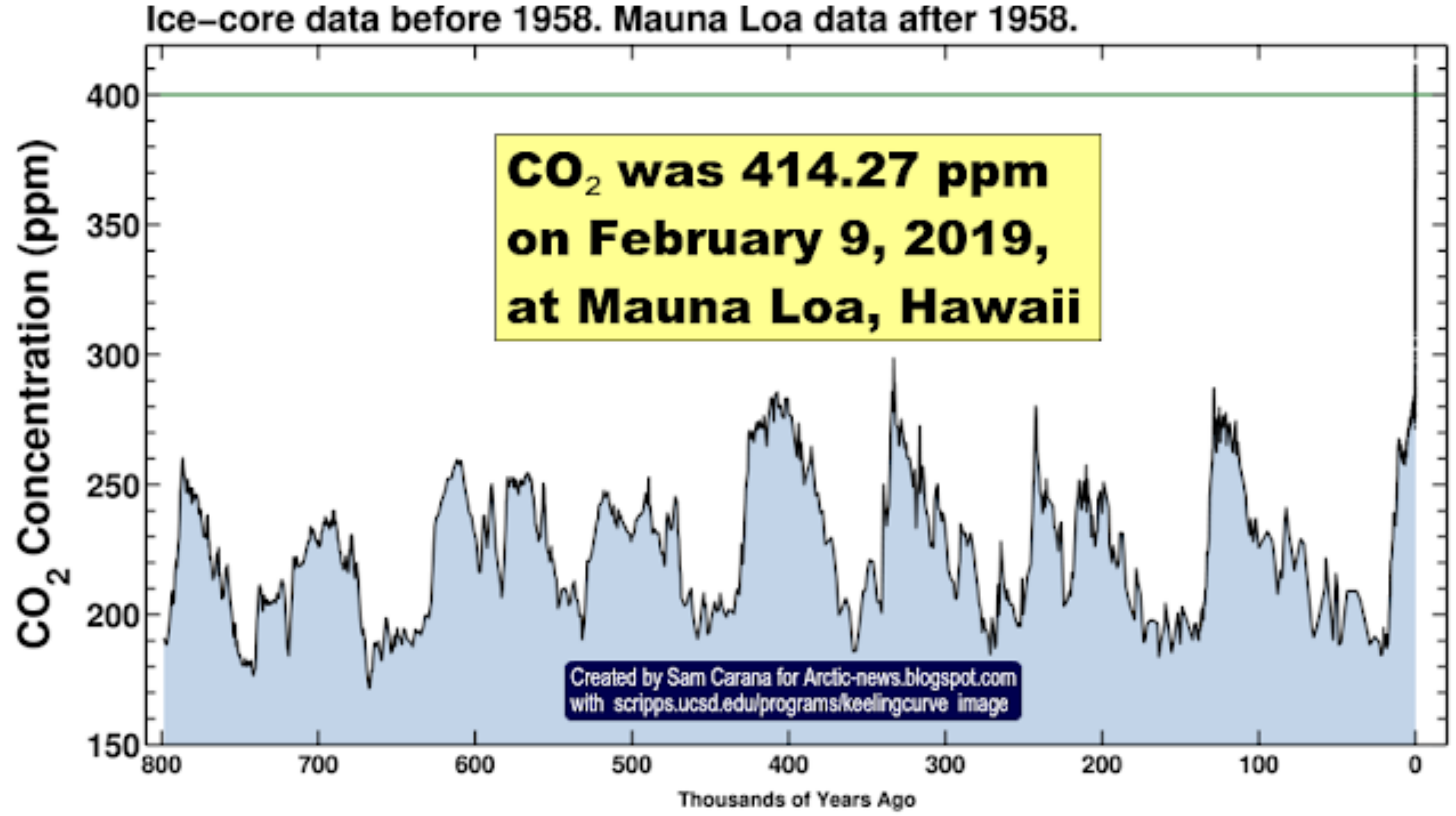

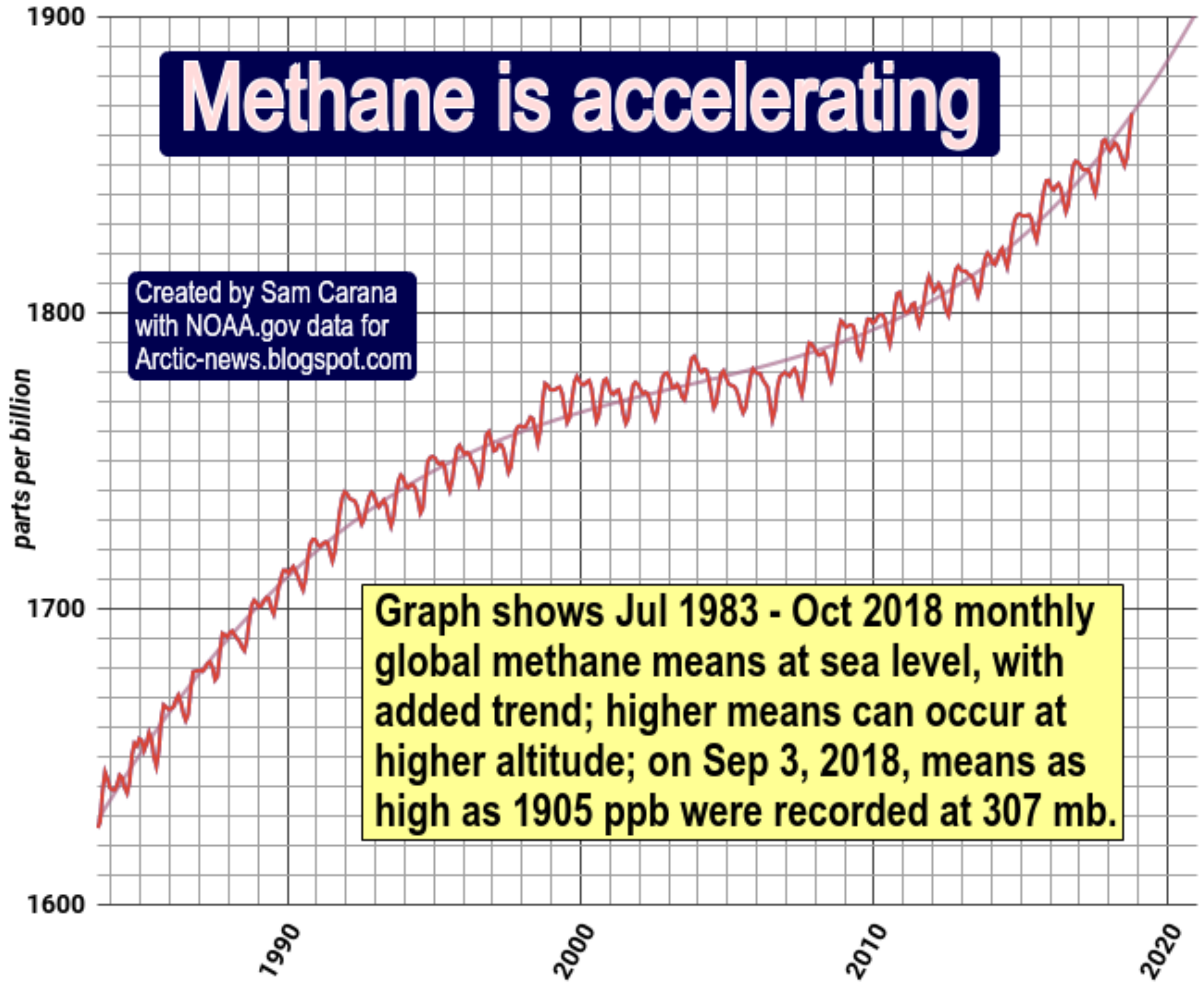

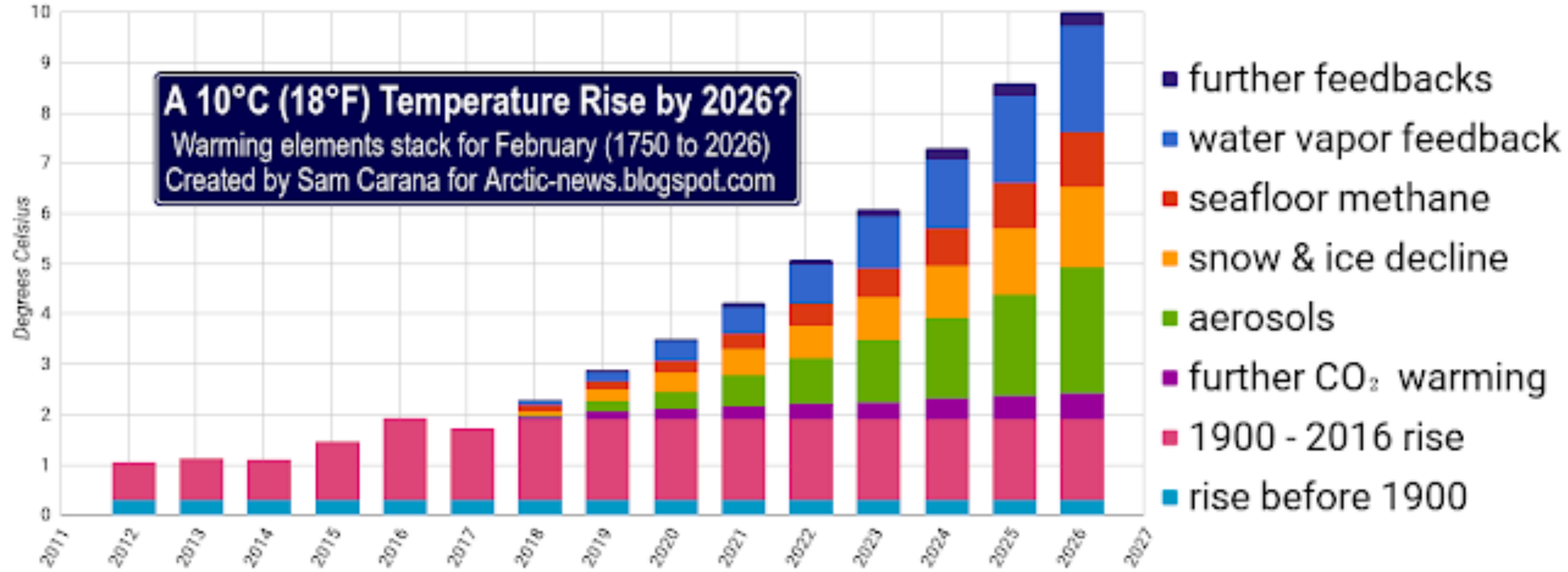

News from Earth's Emergency Room

Environmental activism

Academics back UK schools' climate change strikes

More than 200 sign letter to the Guardian saying pupils right to be angry at inaction

- School climate strike children's brave stand has our support

Matthew Taylor
Wed 13 Feb 2019 07.12 EST

208

▲ Students protesting in Berlin. Up to 70,000 schoolchildren each week are taking part in demonstrations around the world. Photograph: Omer Messinger/Getty Images

More than 200 academics have voiced their support for this week's school climate strikes, in which thousands of young people are expected to take to the streets in towns and cities across the UK.

The academics, including almost 100 professors, say the "tragic and desperate facts" of the unfolding climate breakdown - and the lack of meaningful action by politicians - leave young people with little option but to take matters into their own hands.

In a letter to the Guardian, they write: "[Those taking part in the strike] have every right to be angry about the future that we shall bequeath to them, if proportionate and urgent action is not taken."

Environmental activism

School climate strike children's brave stand has our support

Wed 13 Feb 2019 07.05 EST

We are inspired that our children, spurred on by the noble actions of Greta Thunberg and other striking students, are making their voices heard, say 224 academics

▲ Students protest for a climate-friendly policy in Frankfurt, Germany, on 1 February. This Friday children across the UK will join school climate strikes. Photograph: Frank Rumpenhorst/AP

We, the undersigned academics, stand in solidarity with the children going on school climate strike on 15 February, and with all those taking a stand for the future of the planet.

Nelson Mandela once said: "Our children are our greatest treasure. They are our future. Those who abuse them tear at the fabric of our society and weaken our nation." Human planetary abuse *is*, in a very real sense, child neglect.

As many of us and other fellow academics have indicated previously in this newspaper (Letters, 27 October 2018), the scientific evidence of climate change is clear. For example, the summer of 2018 has been confirmed by the Meteorological Office as the hottest on record for England. The heatwave adversely affected crops across Europe, with wheat and potato

Mitigation and Adaptation Studies

Class 9: Conceptual Models

Contents:

- What are Models?
- Why Models?
- Conceptual Models
- Co-Constructing Conceptual Models

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$$\mathrm{Z} = Z_1 + Z_2$$

$$Z_1 = K_3 * Lux$$

$$Z_2 = \iint_{0,0}^{2\pi,D} e^{-K_4 s} * Z_{i,j} ds$$

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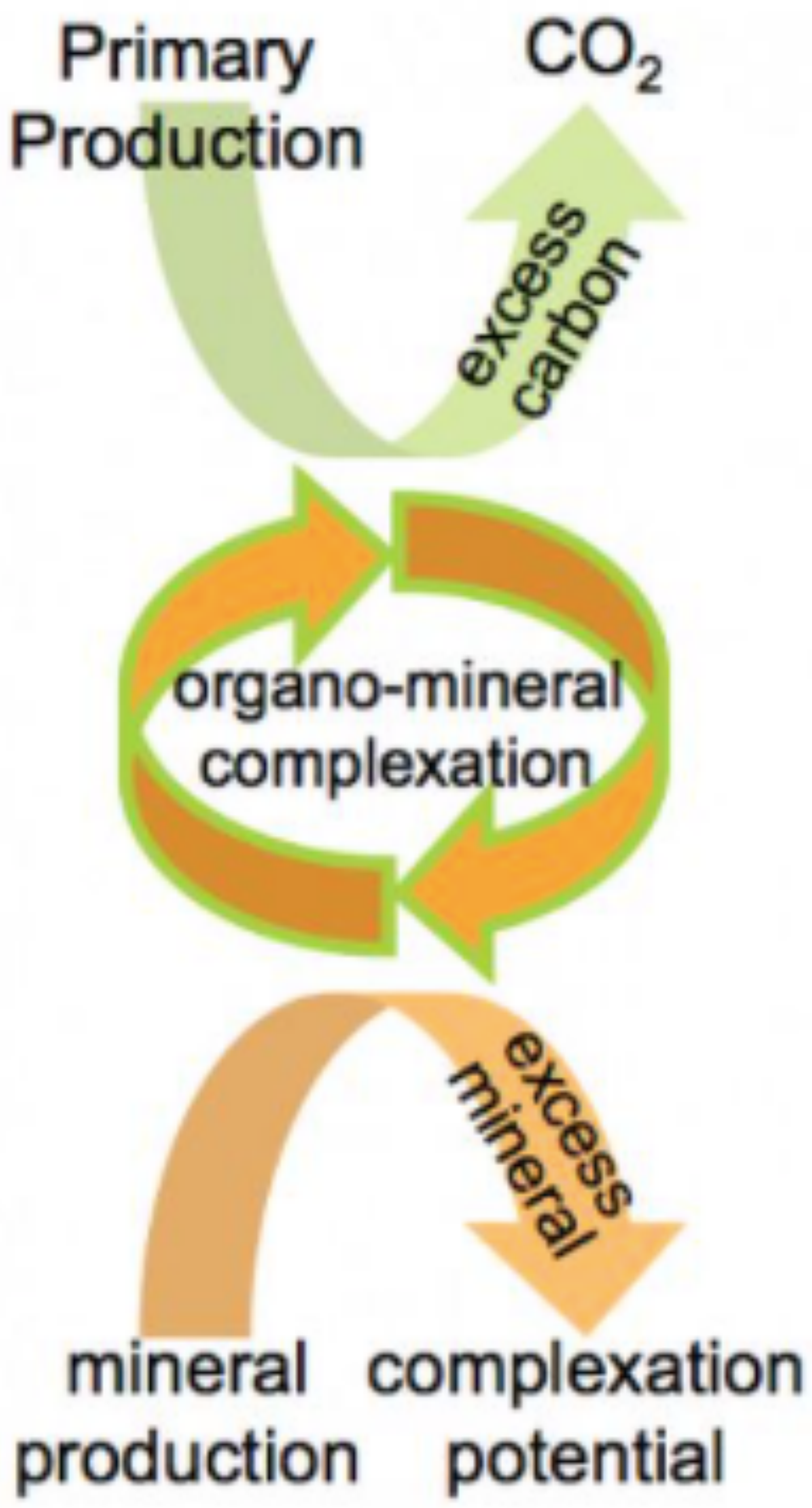

A attempt to conceptualize systems:

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Models:
- Physical model: a physical representation in three(four) dimensions of an object (globe, airplane, topography);
- Architectural model: a model for studying or communicating architectural design aspects.
- Scale model: a representation of a object/system which maintains general relationships between its constituents
- Conceptual model: an abstract representation of a system capturing the main general rules and concepts
- Scientific model: a theoretical representation of a (physical) system

Class 9: Conceptual Models

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JASSS

Joshua M. Epstein (2008)

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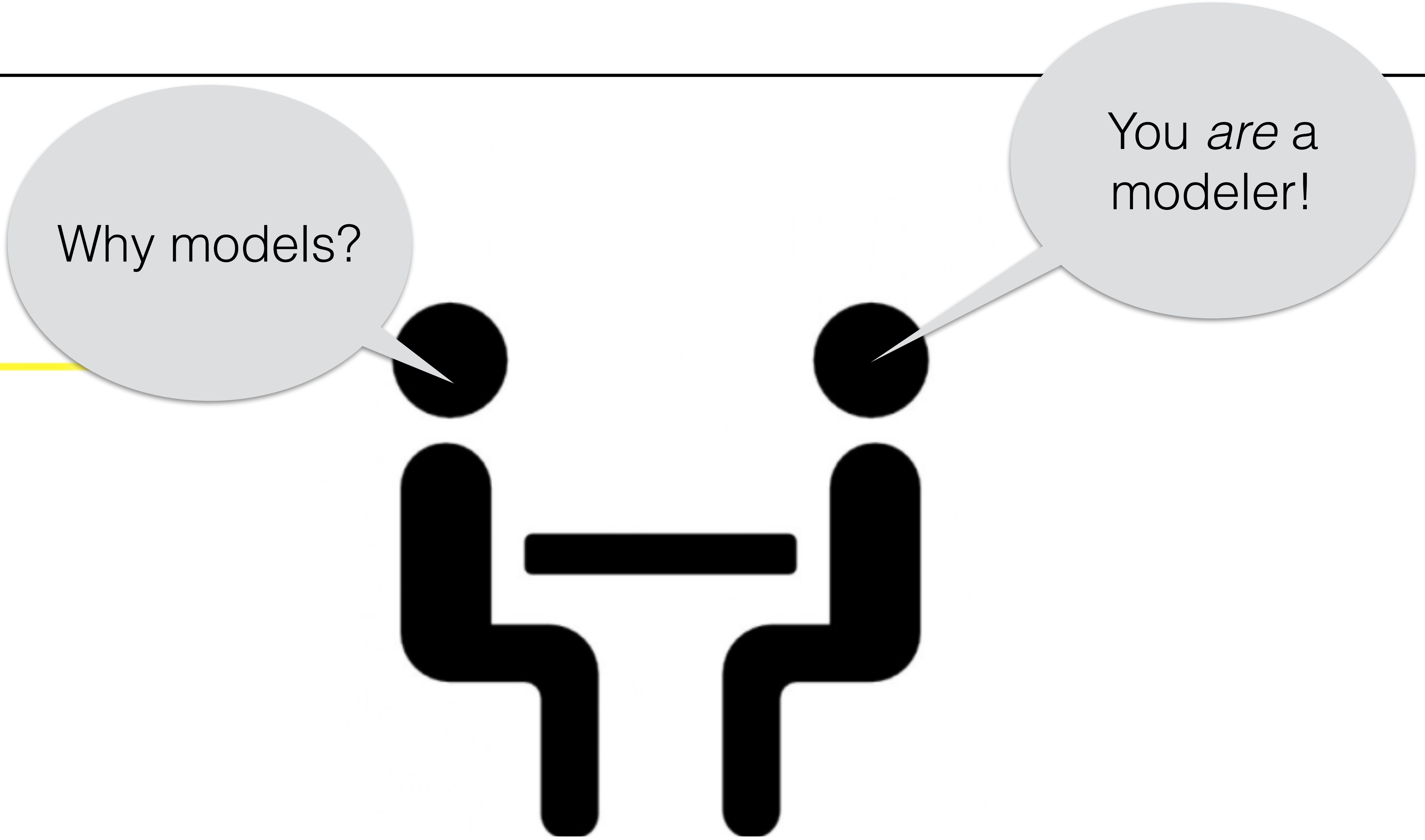

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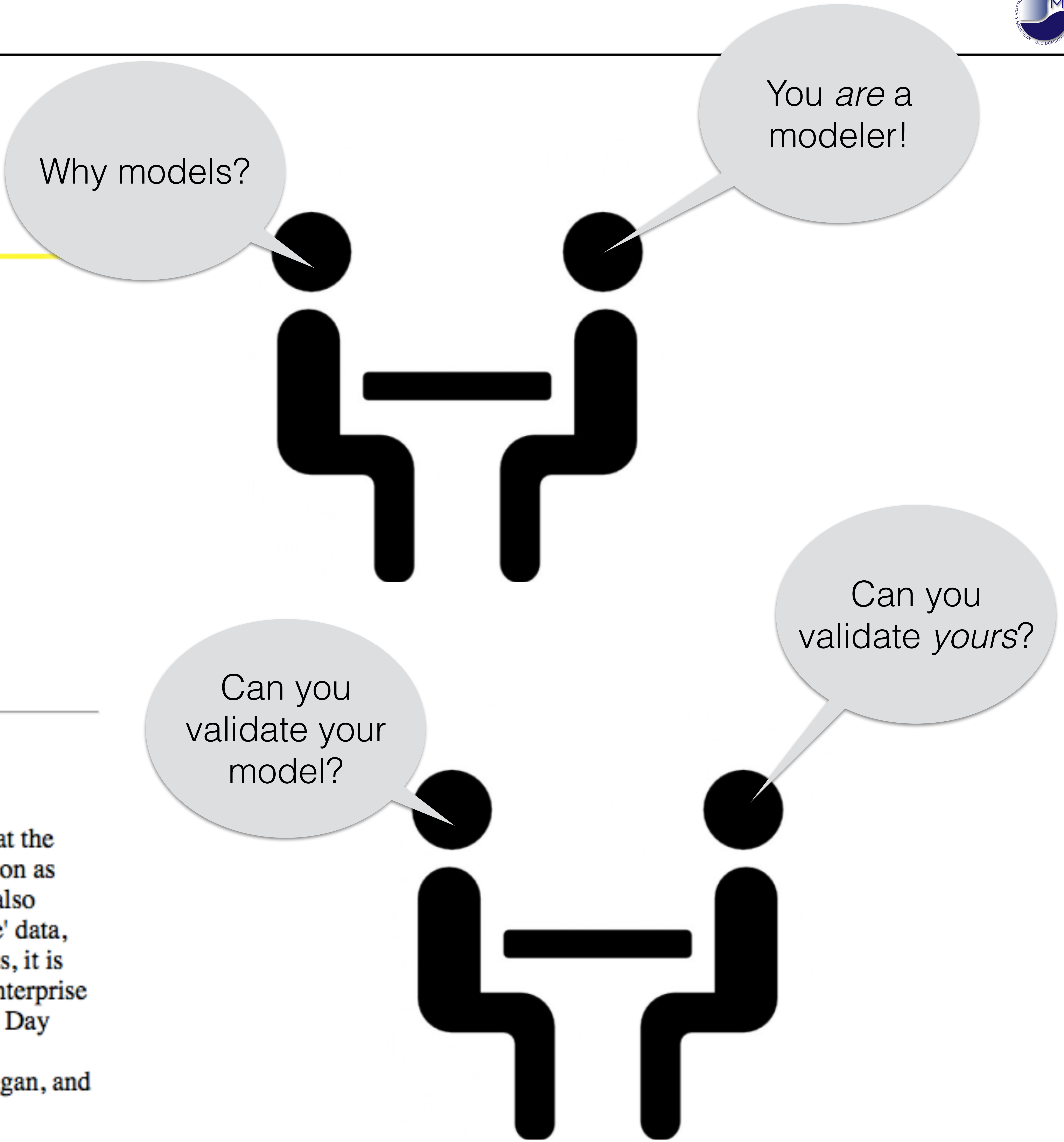

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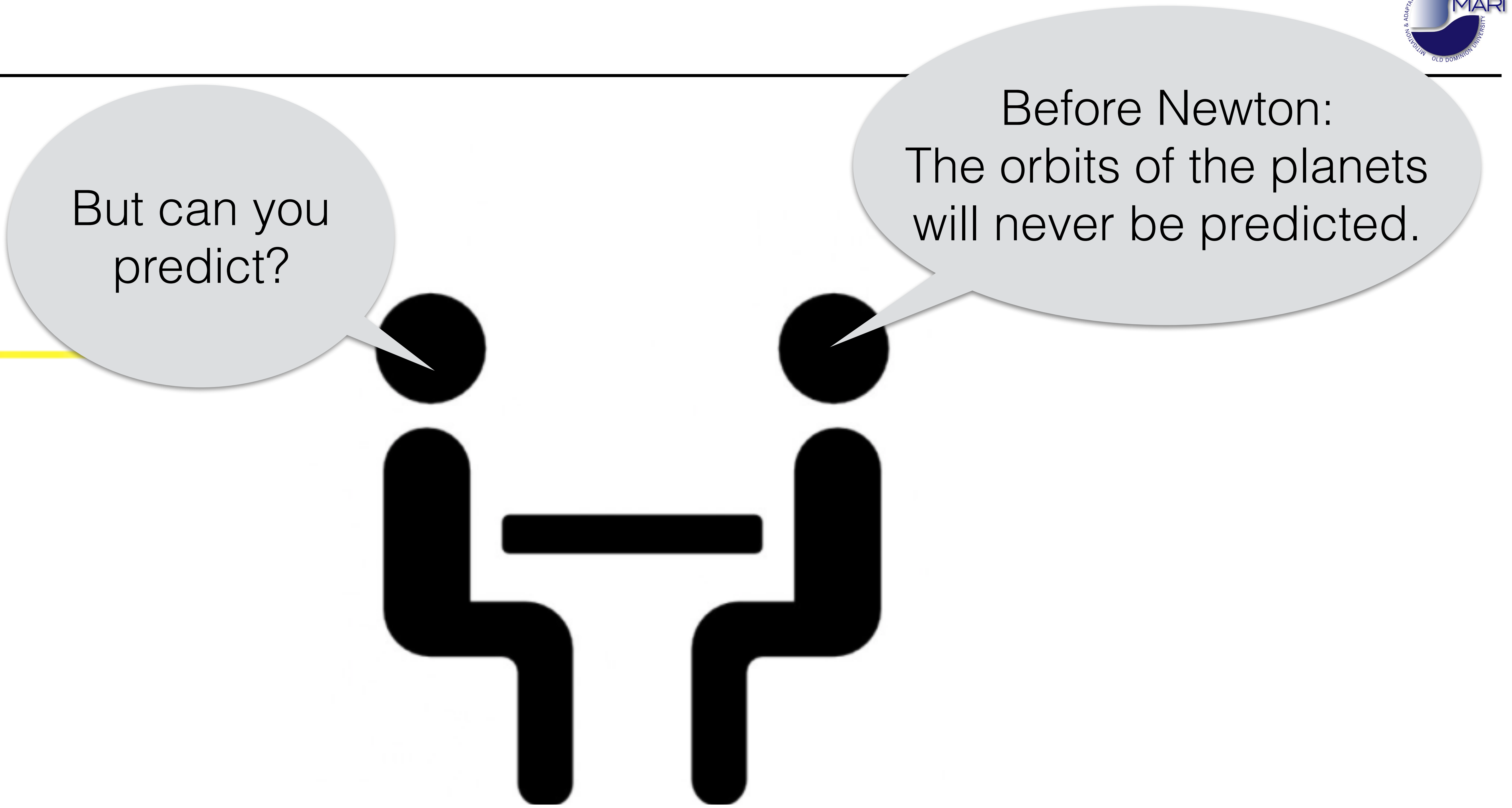

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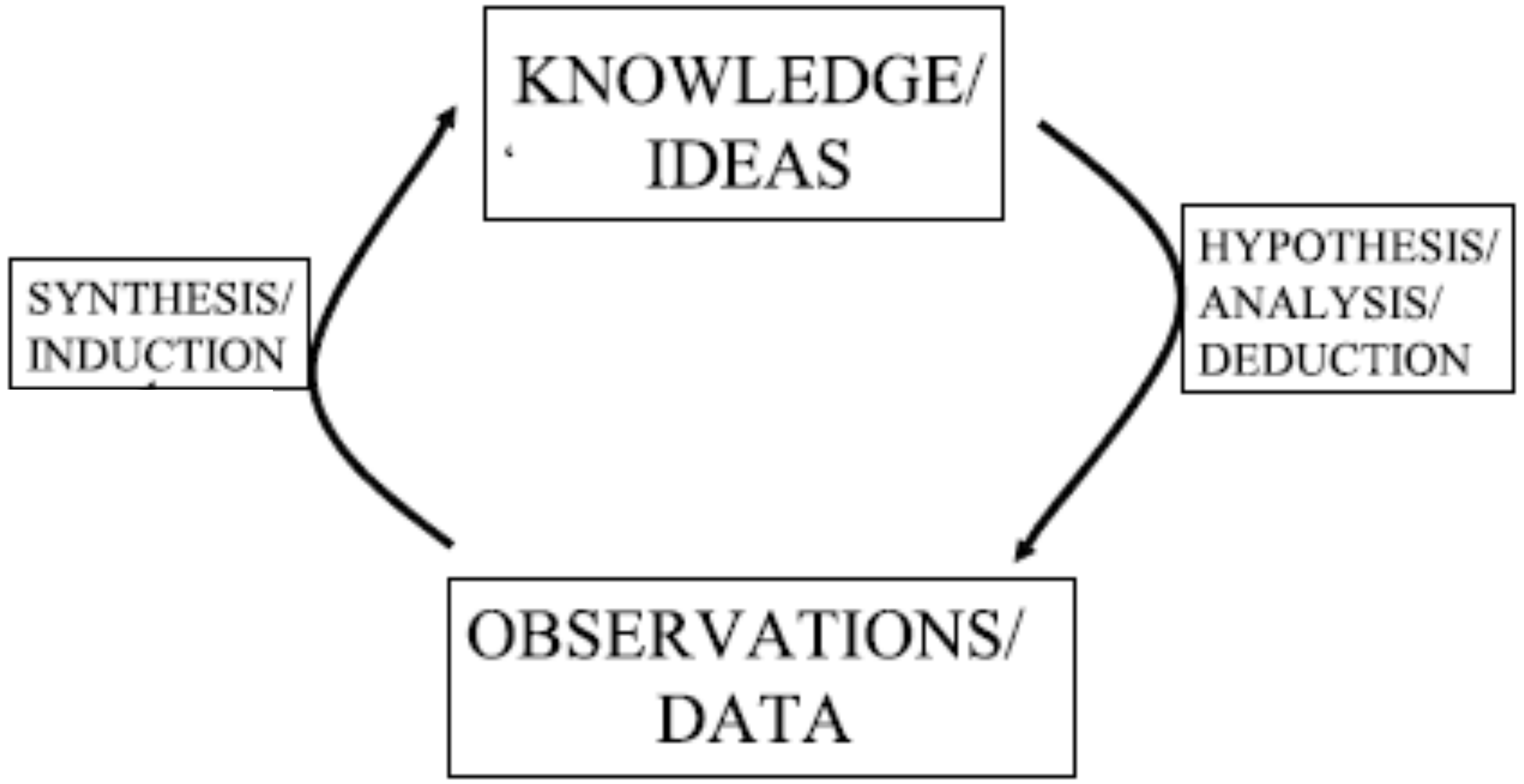

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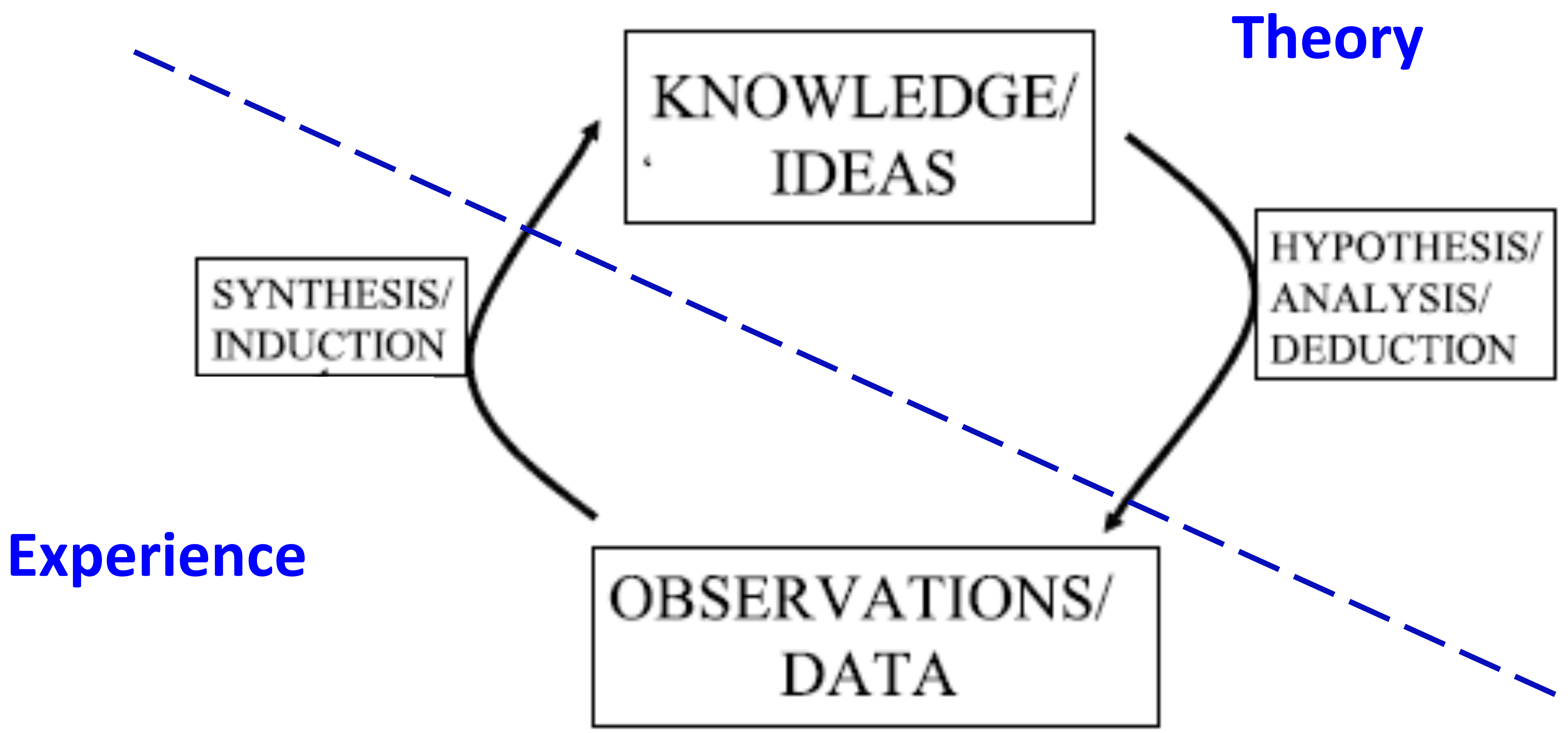

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Models can generate hypotheses for empirical testing

Models can be the best summary of understanding

Modeling helps to be:

- aware of what needs to be known to test a theory
- logical: avoid some pitfalls of reasoning
- focused: forces decisions on what is really important

Mitigation and Adaptation Studies

Class 9: Conceptual Models

Contents:

- What are Models?
- Why Models?
- Conceptual Models
- Co-Constructing Conceptual Models

Conceptual Models

A conceptual model is a highly abstract system of global concepts and linking statements

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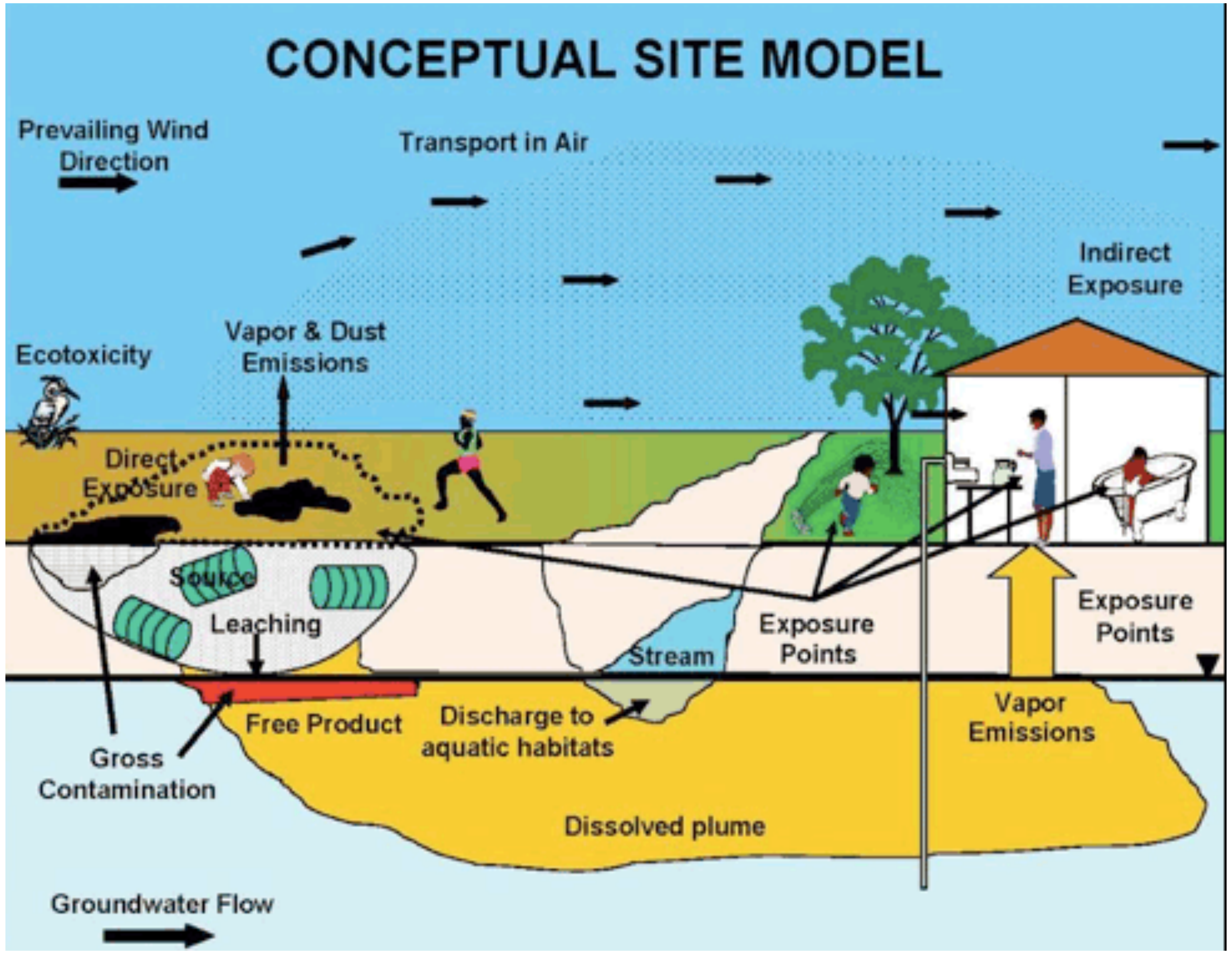

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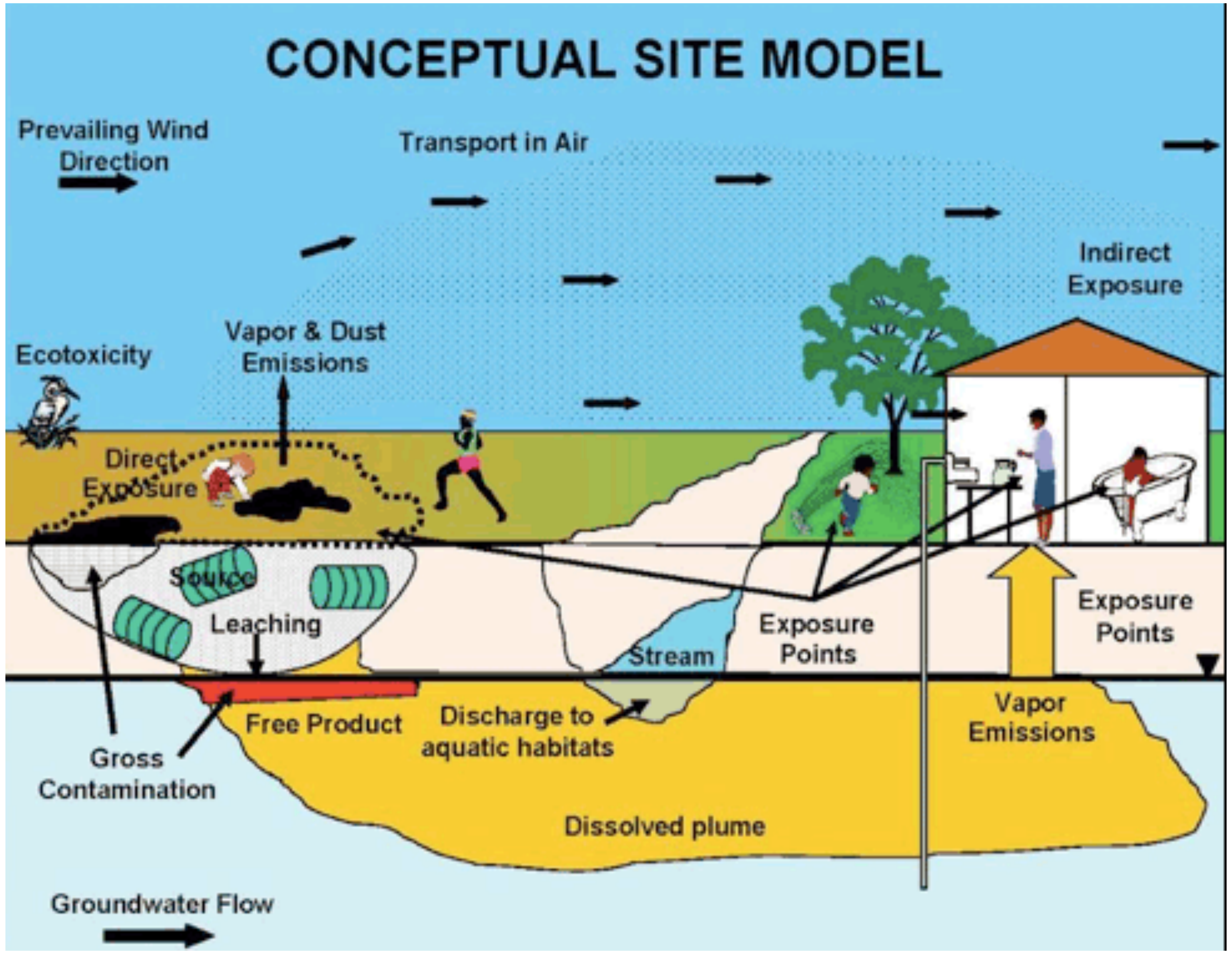
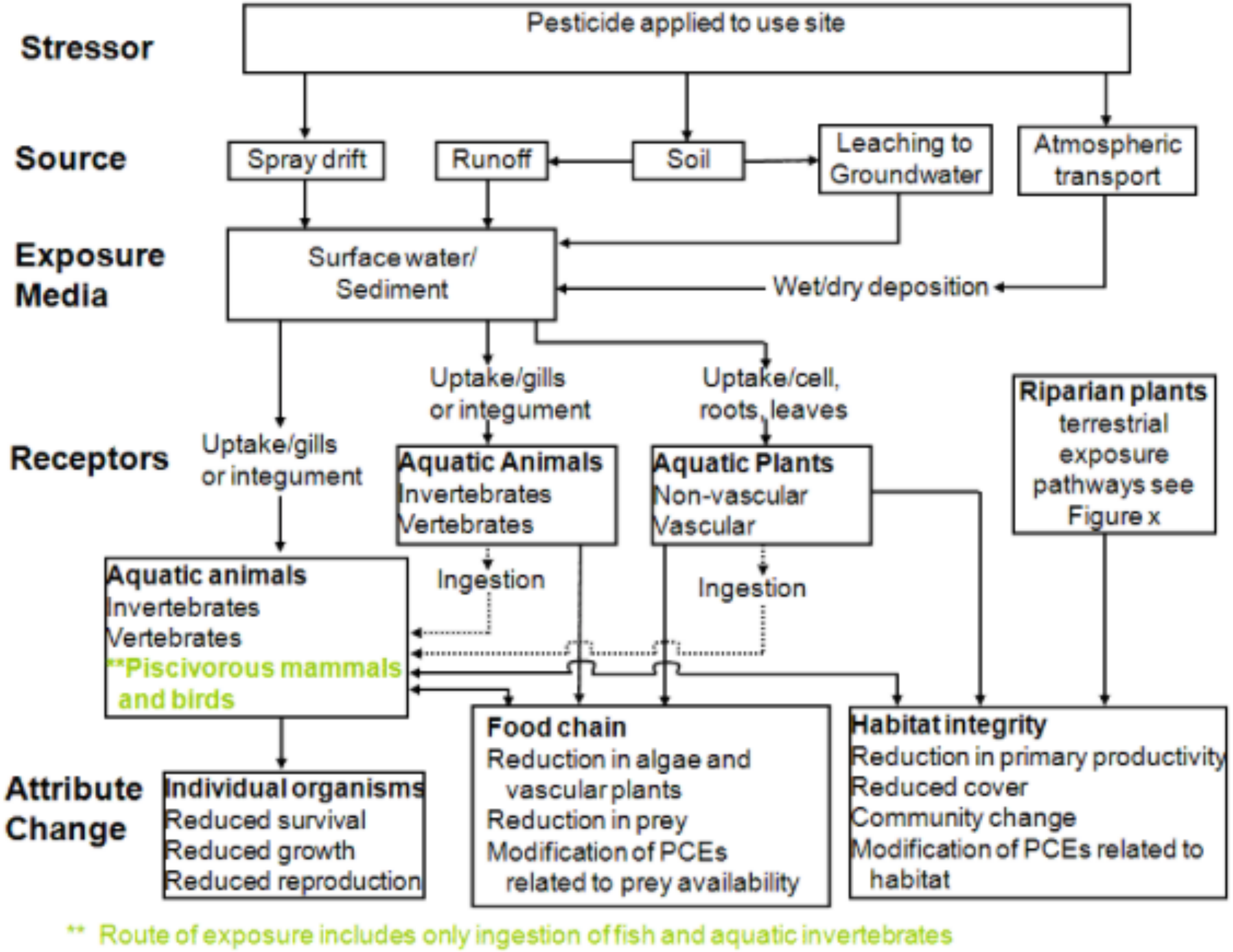
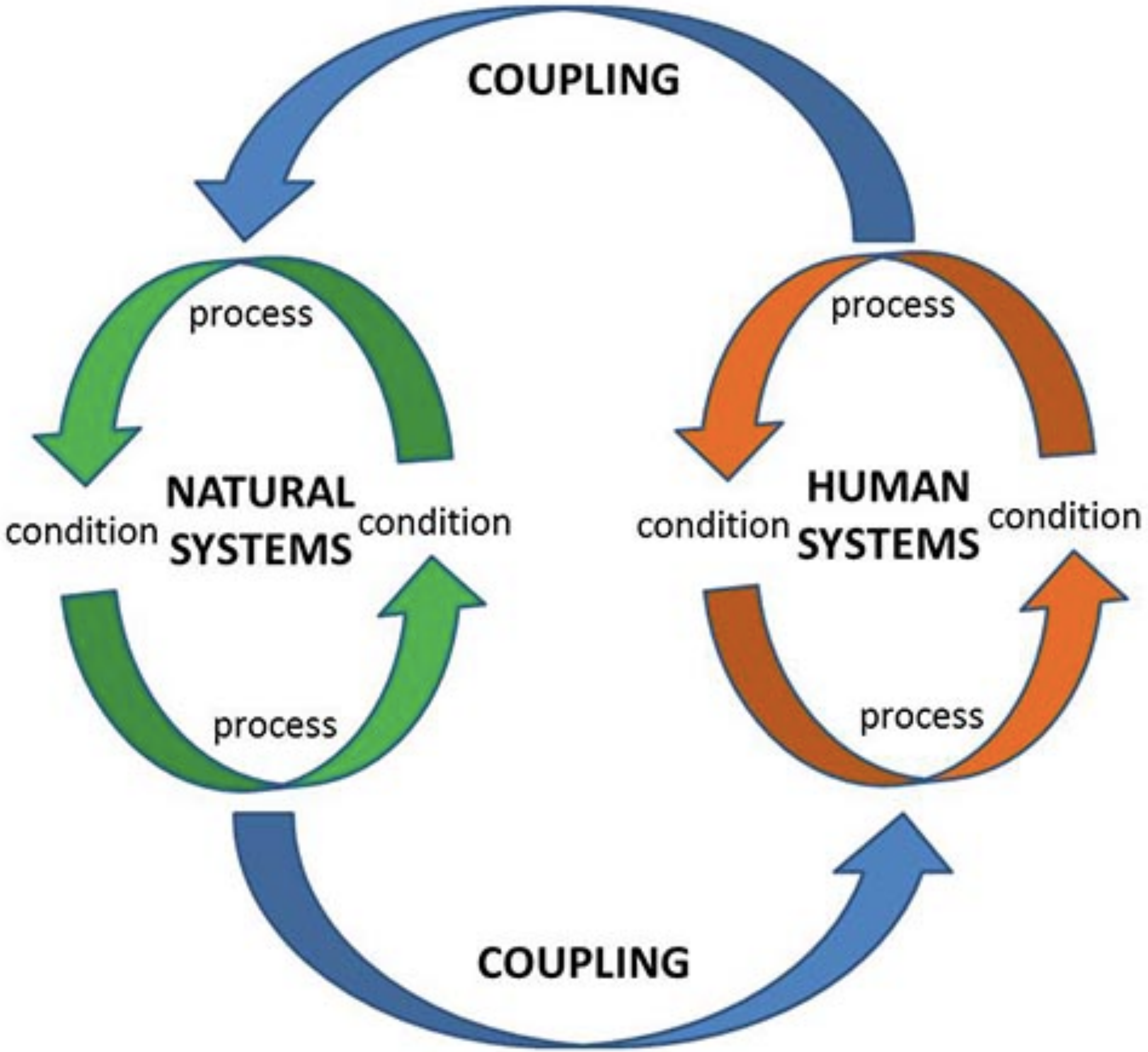




Conceptual Models



Conceptual Models

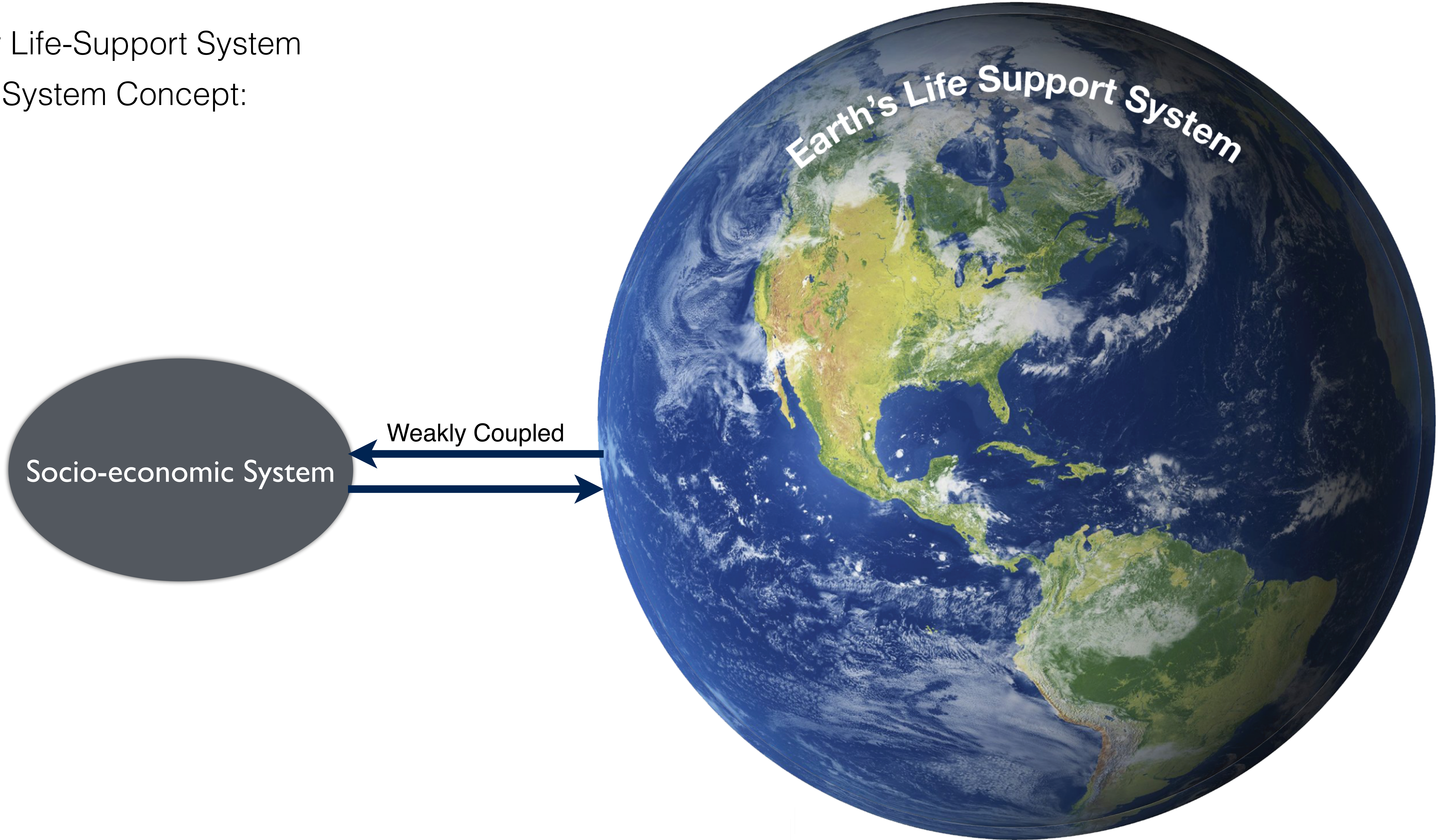
Conceptual Models

Earth: Our Life-Support System

Conceptual Models

Earth: Our Life-Support System

System of System Concept:



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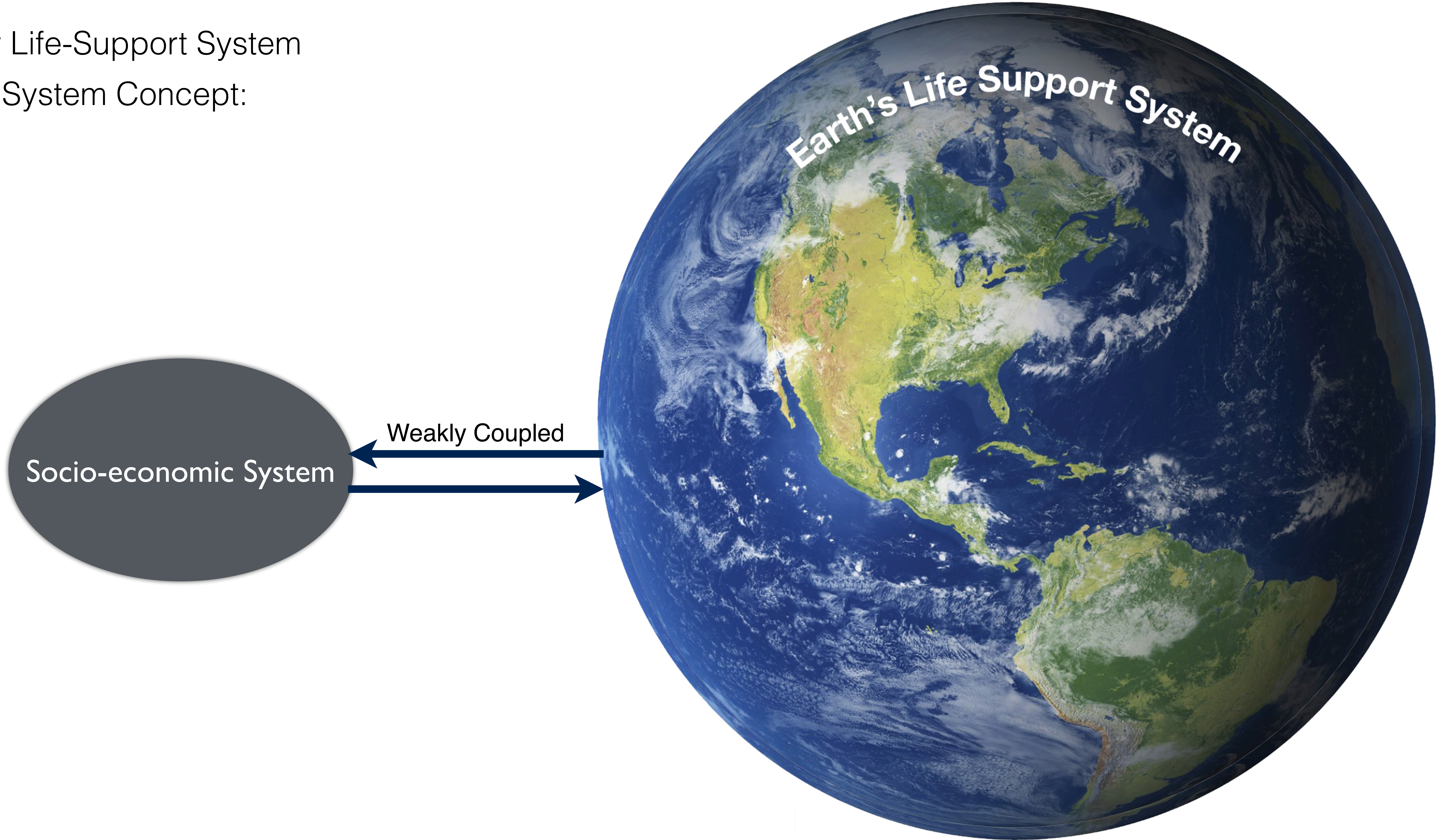

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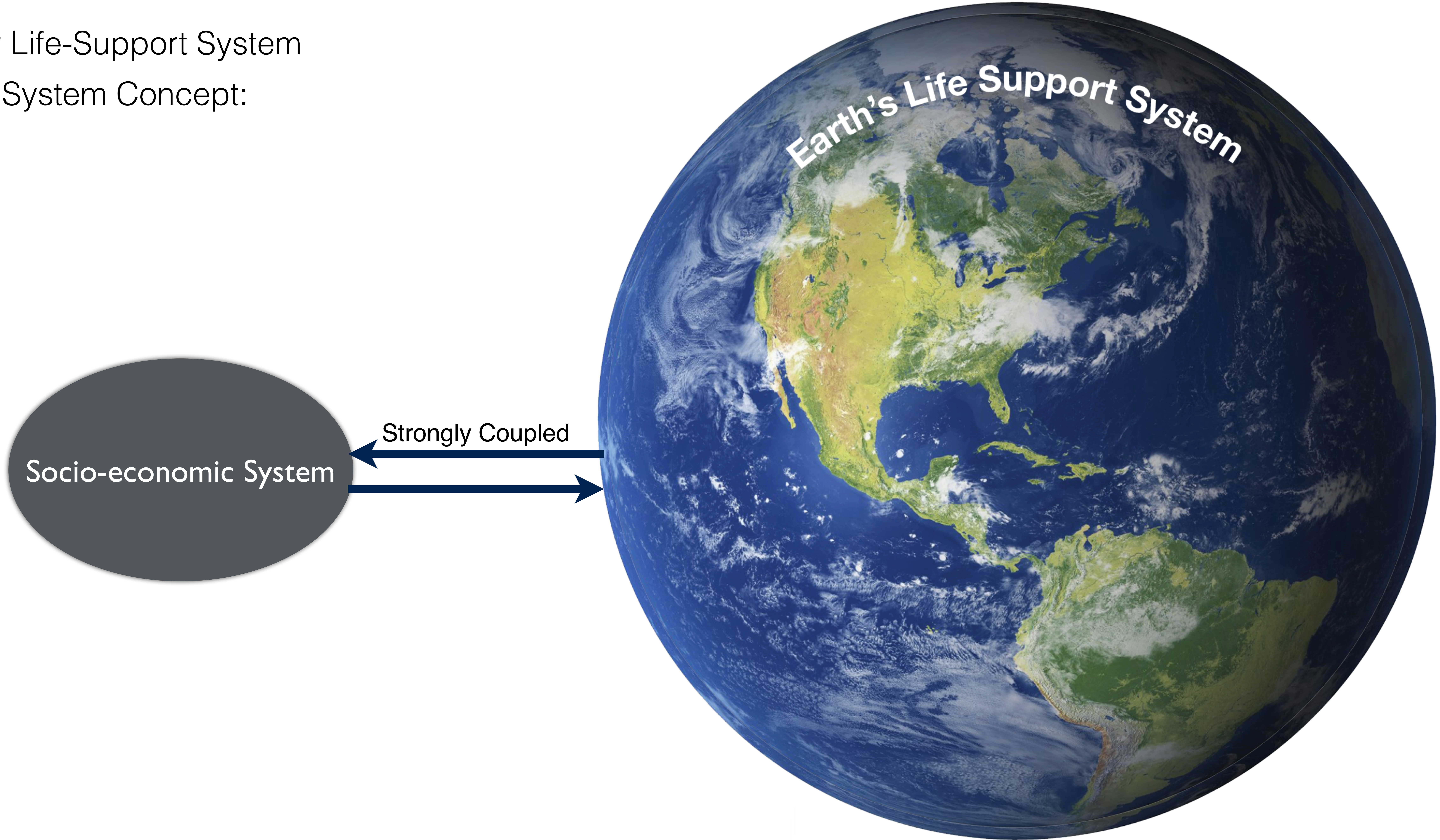

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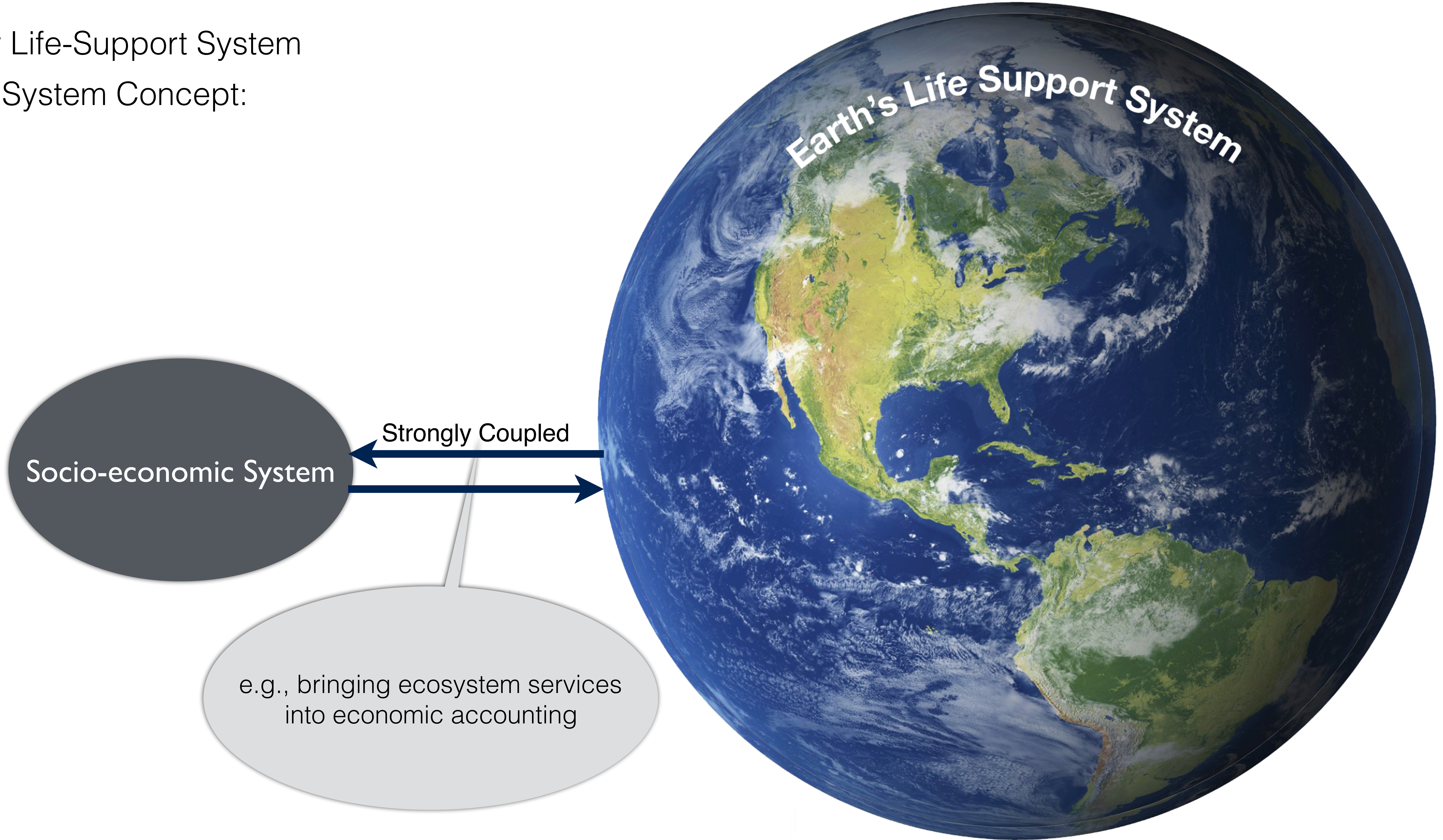

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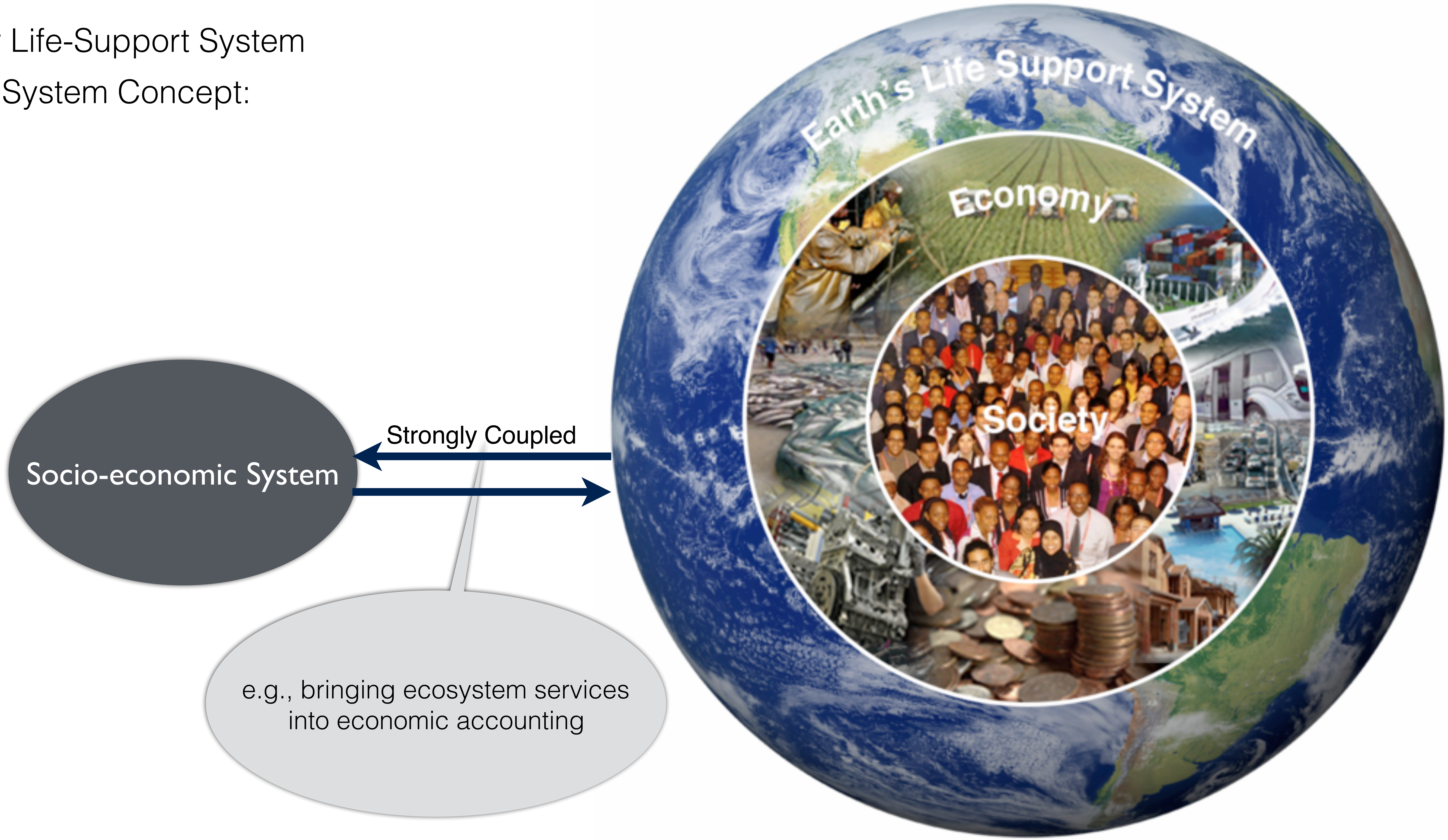

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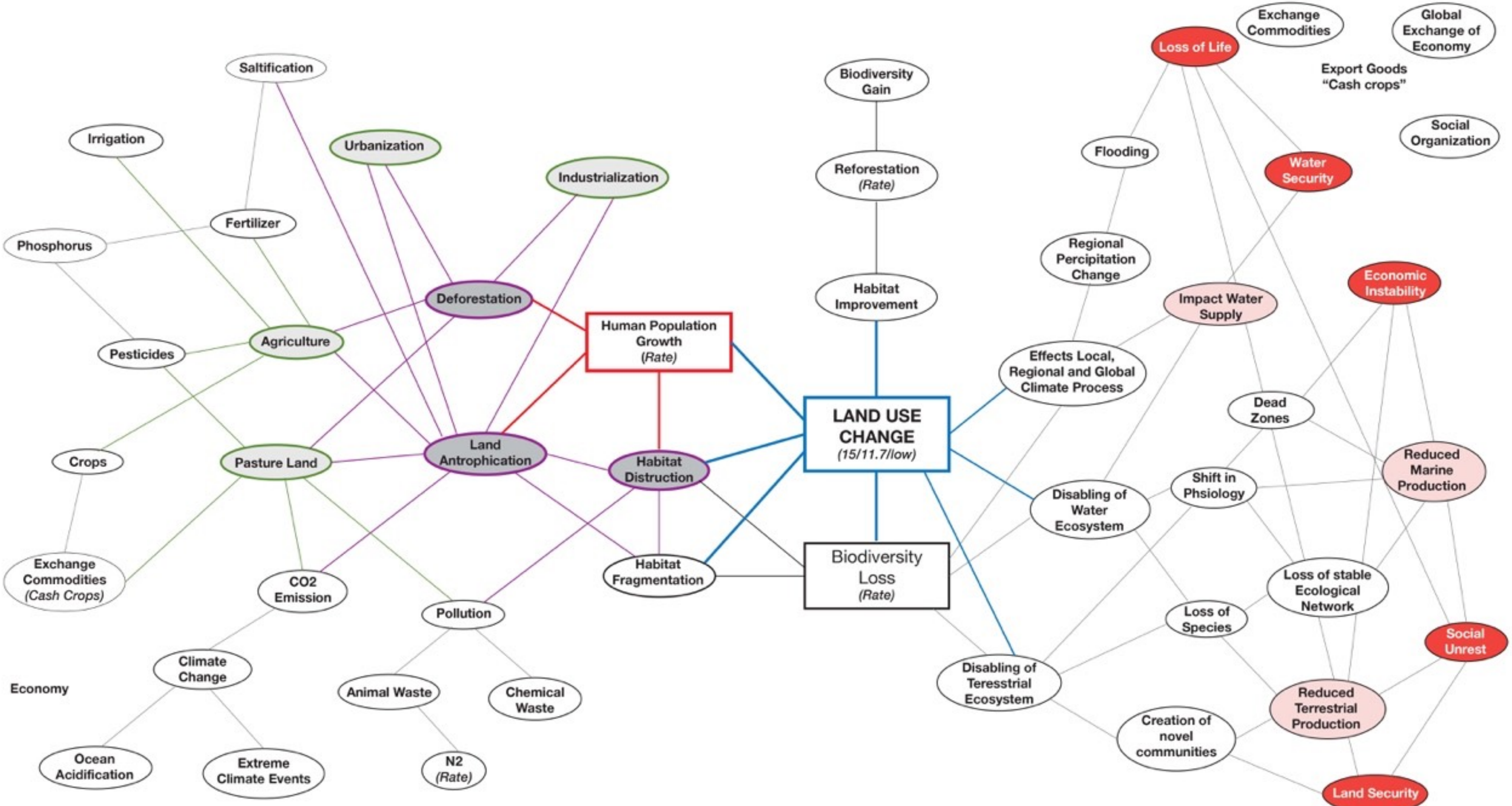

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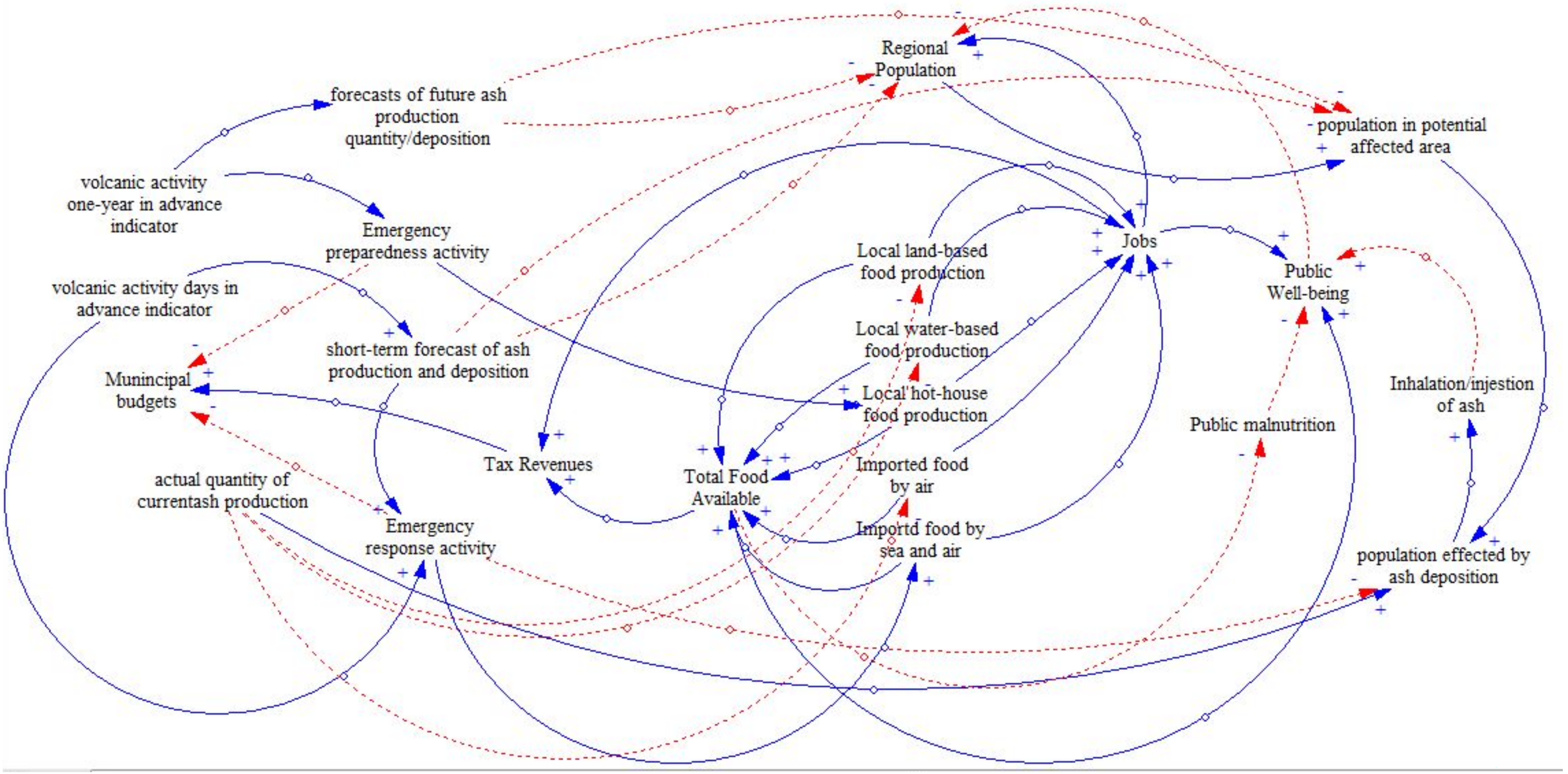

Conceptual Models

Search string: “conceptual ecosystem models”

Integrated Conceptual Model for Ecosystem Recovery

A TECHNICAL MEMORANDUM FOR THE PUGET SOUND PARTNERSHIP

APRIL, 2015

LEAD AUTHOR

Haley Harguth, Hershman Marine Policy Fellow at Puget Sound Partnership

CONTRIBUTORS

Kari Stiles, PhD, Puget Sound Partnership
Kelly Biedenweg, PhD, University of Washington – Tacoma, Puget Sound Institute
Scott Redman, Puget Sound Partnership
Sandie O’Neill, Washington Department of Fish and Wildlife

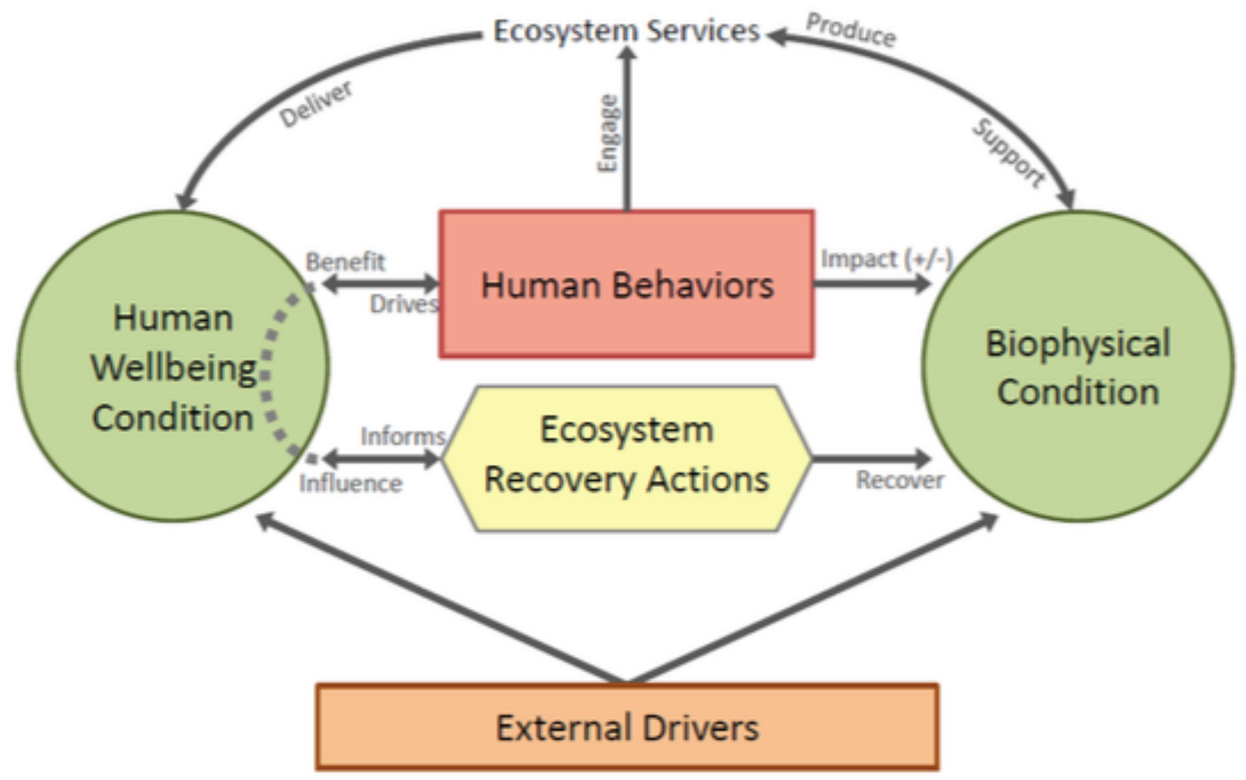

Figure 2: Integrated Conceptual Model for Ecosystem Recovery

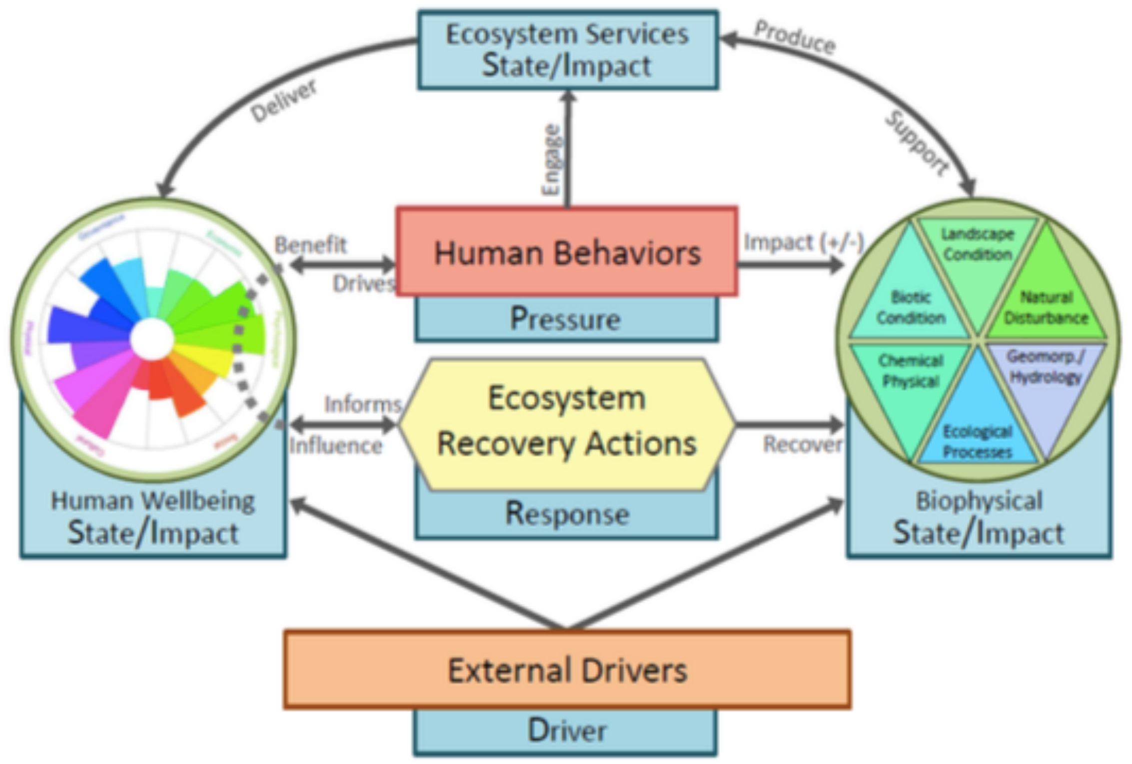

Figure 3: Integrated Conceptual Model for Ecosystem Recovery with DPSIR Framework. The Driver-Pressure-State-Impact-Response (DPSIR) framework is embedded within the new conceptual model (blue boxes). The Essential Ecosystem Attributes (EPA 2002) are shown within the biophysical condition (colored wedges), as well as the domains of human wellbeing (colored wedges; Biedenweg et al. 2014)

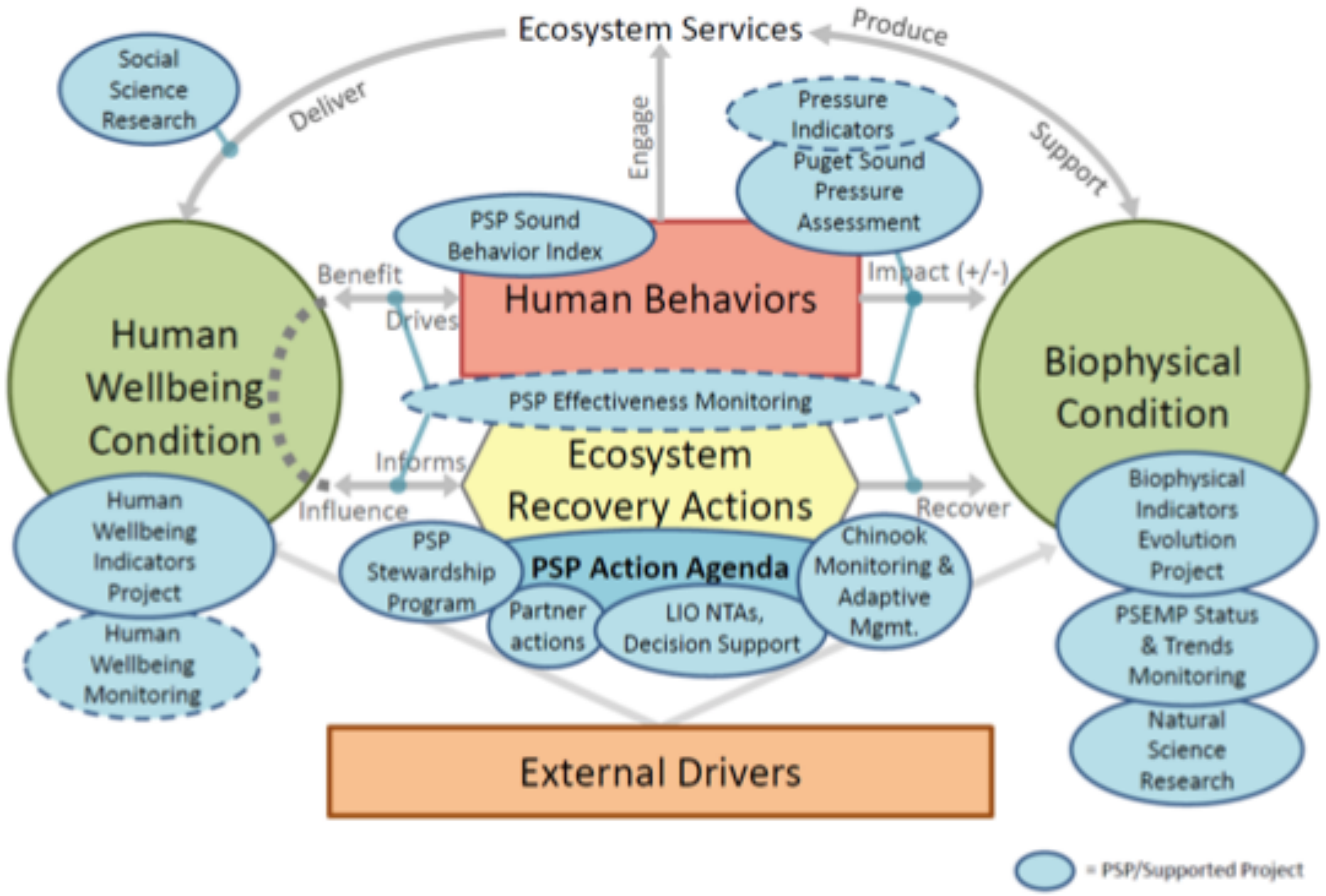

Figure 5: Integrated Conceptual Model for Ecosystem Recovery + PSP Projects and Programs. PSP programs and projects (blue ovals) are mapped to the conceptual model to illustrate where management, research and planning efforts are focused, and which components of the SES require more attention. The blue ovals with dotted outlines indicate projects that are in development.

https://www.eopugetsound.org/sites/default/files/files/PSP%20Integrated%20Conceptual%20Model%20for%20Ecosystem%20Recovery%20Report_2015-04-03_0.pdf

Conceptual Models

https://www.sciencedirect.com/science/article/pii/S221204161630523X

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Ecosystem Services

Volume 29, Part C, February 2018, Pages 428-440

Understanding the role of conceptual frameworks: Reading the ecosystem service cascade

M. Potschin-Young [a], R. Haines-Young [a], C. Görg [b], U. Heink [c], K. Jax [c, d], C. Schleyer [b, e]

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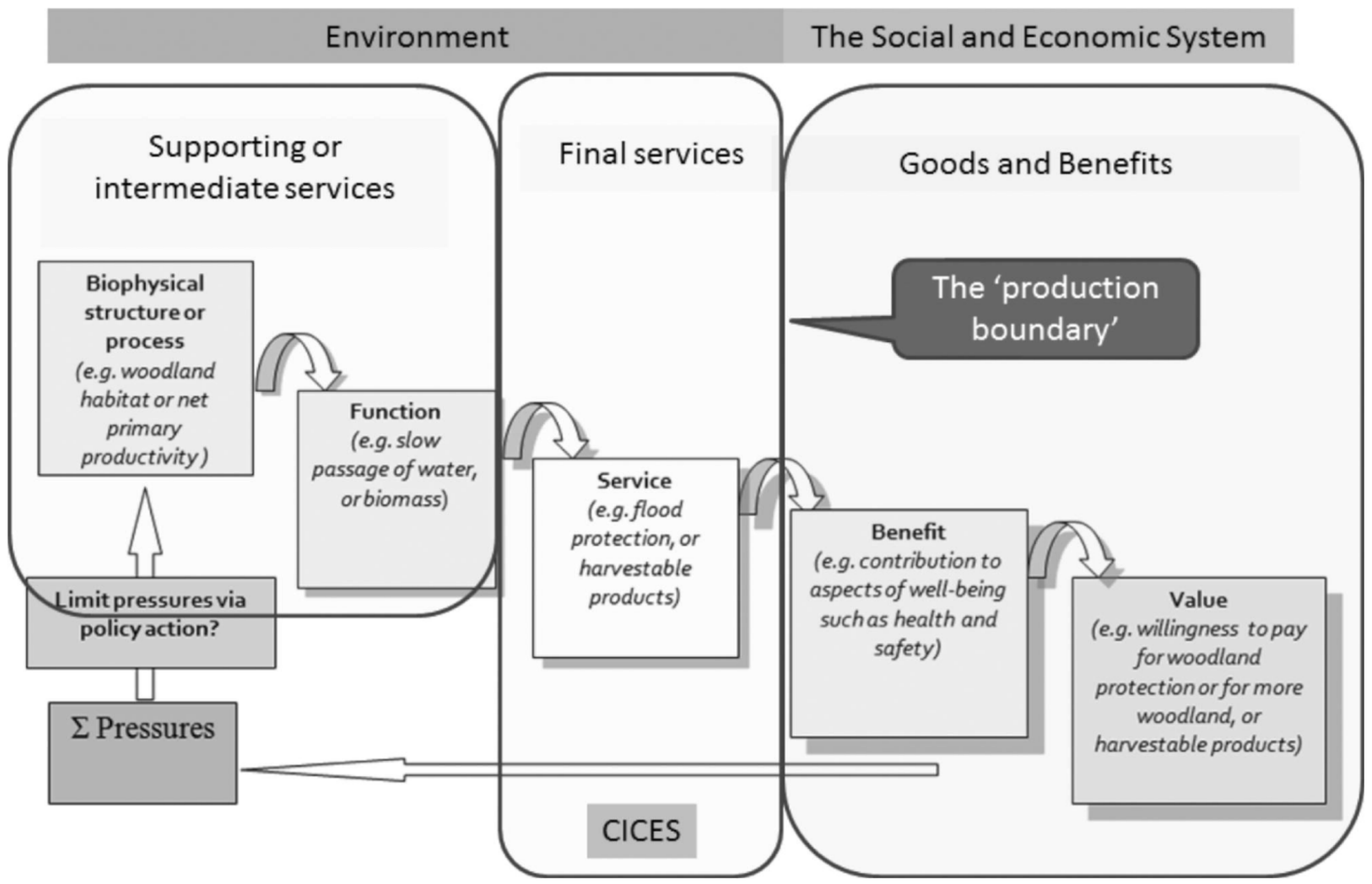
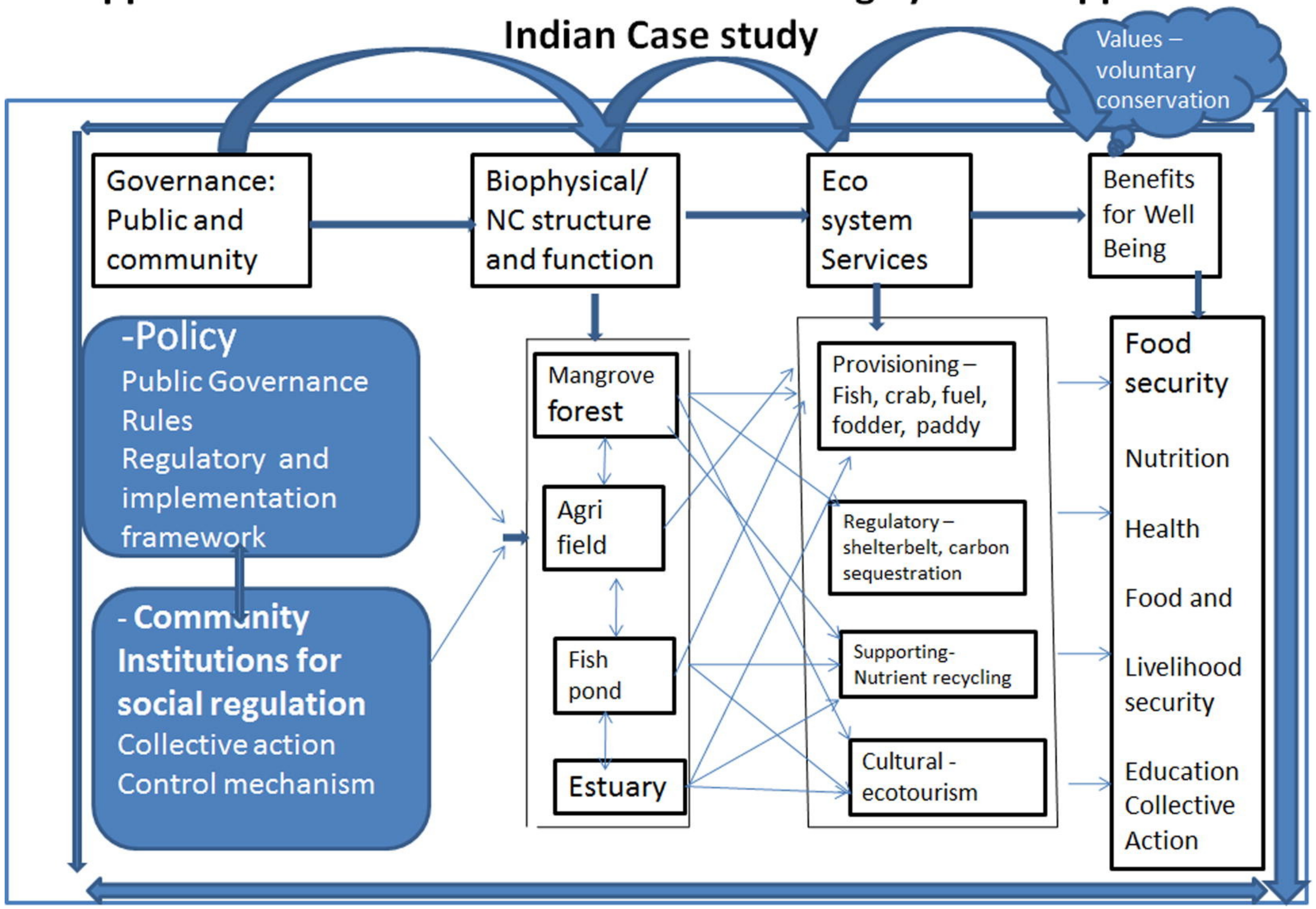


Application of Cascade Framework following Systemic Approach: Indian Case study



Conceptual Models

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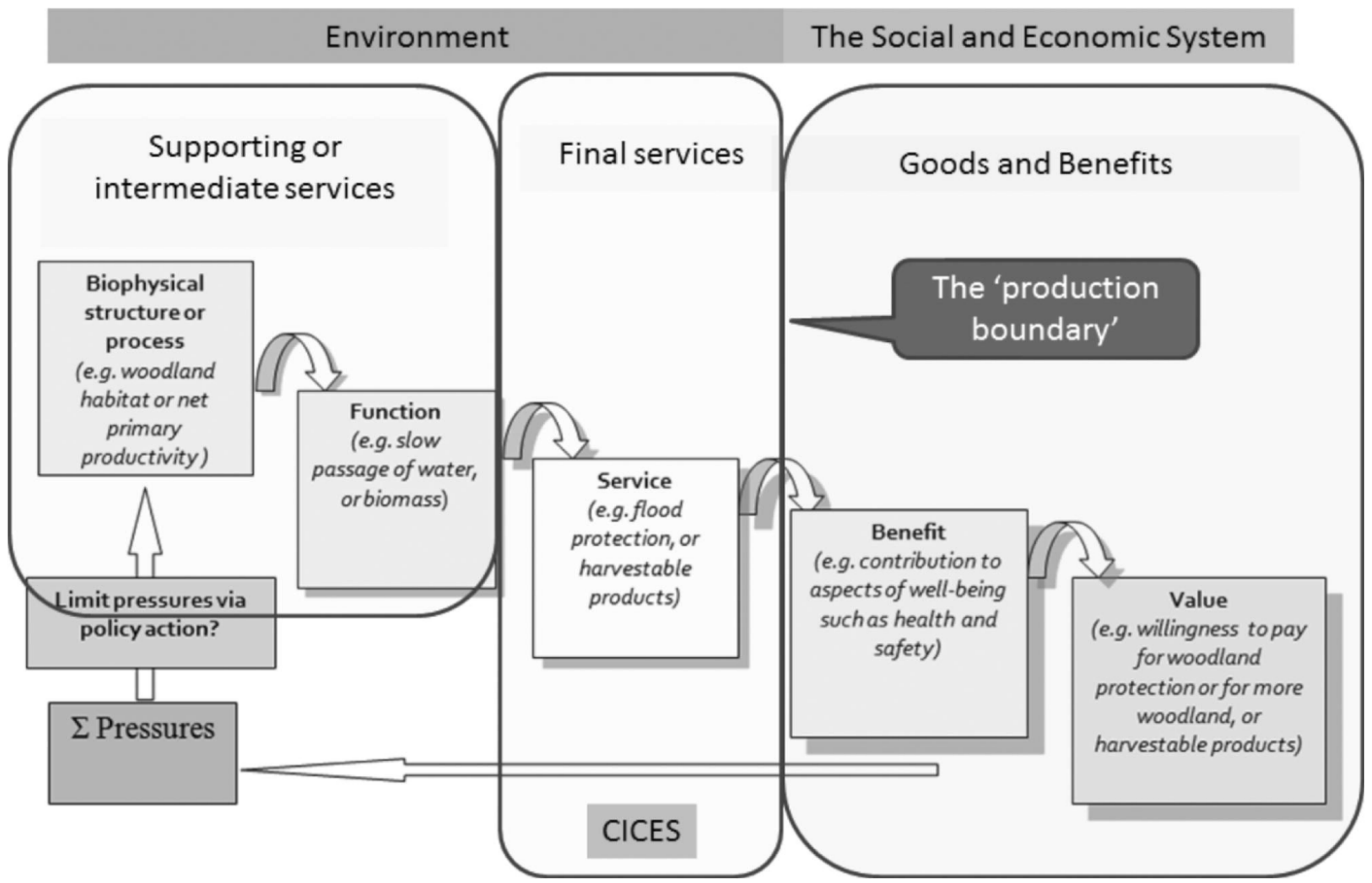

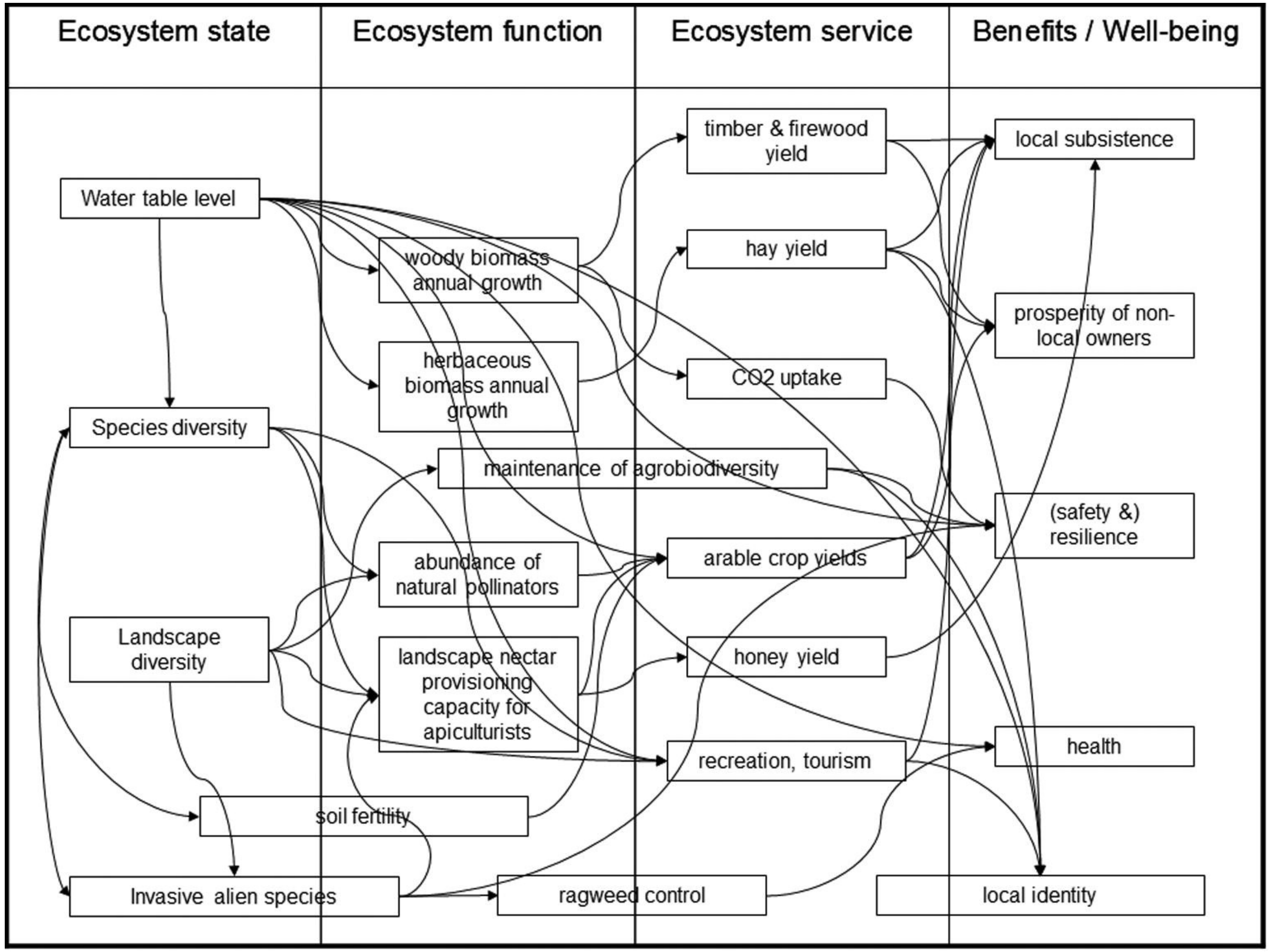

Mitigation and Adaptation Studies

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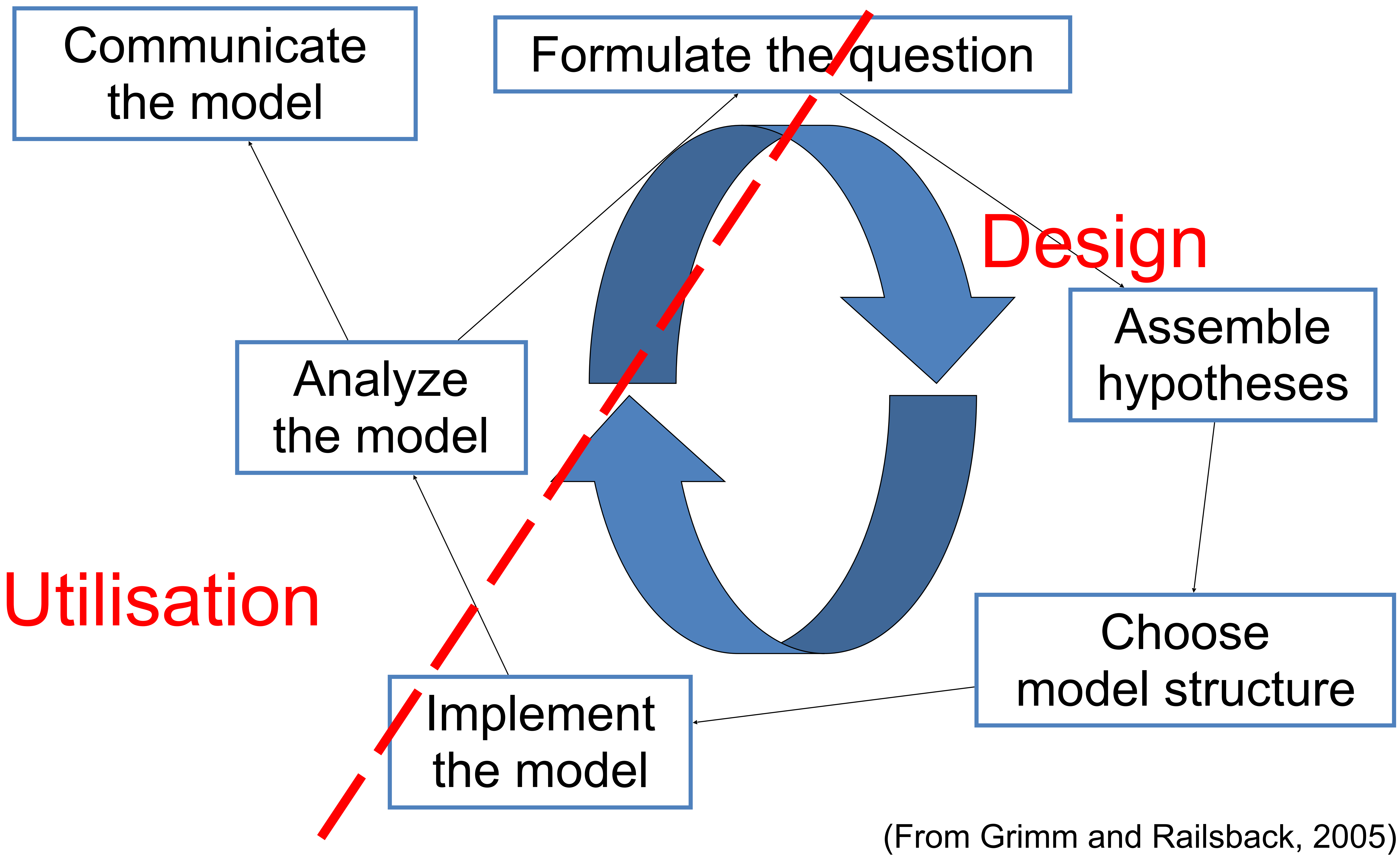
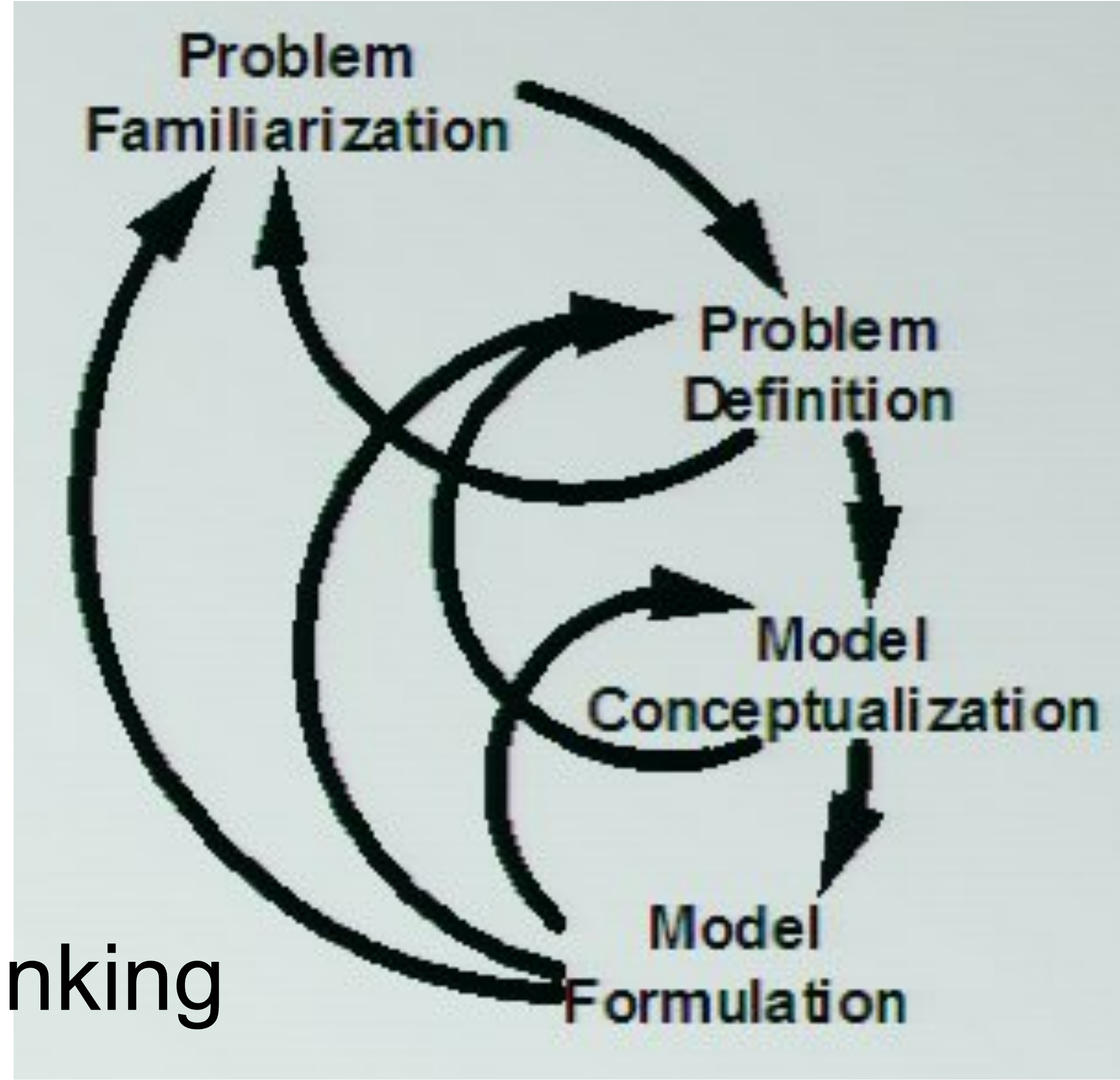
A modelling loop

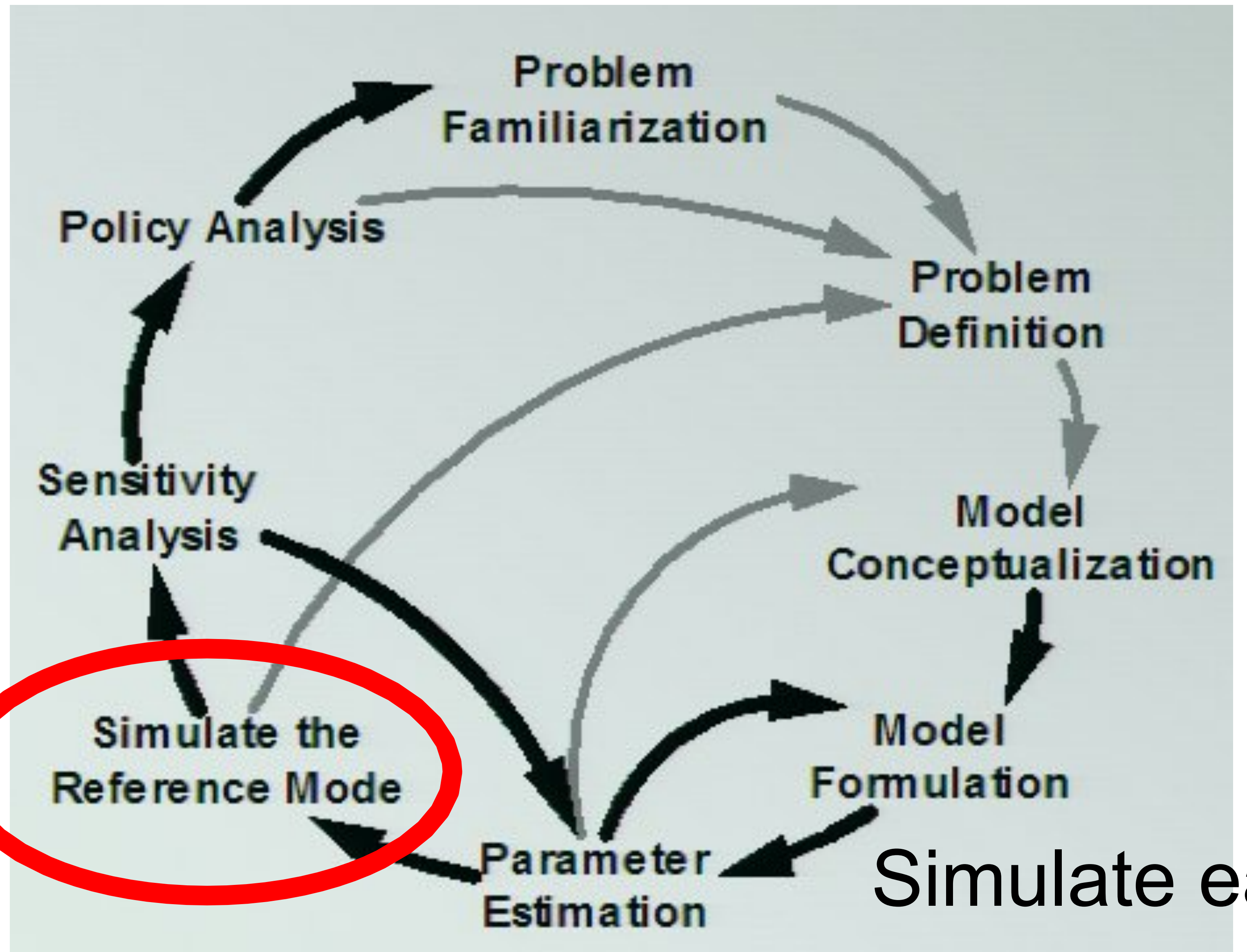


(From Grimm and Railsback, 2005)

Diversity of revisiting patterns

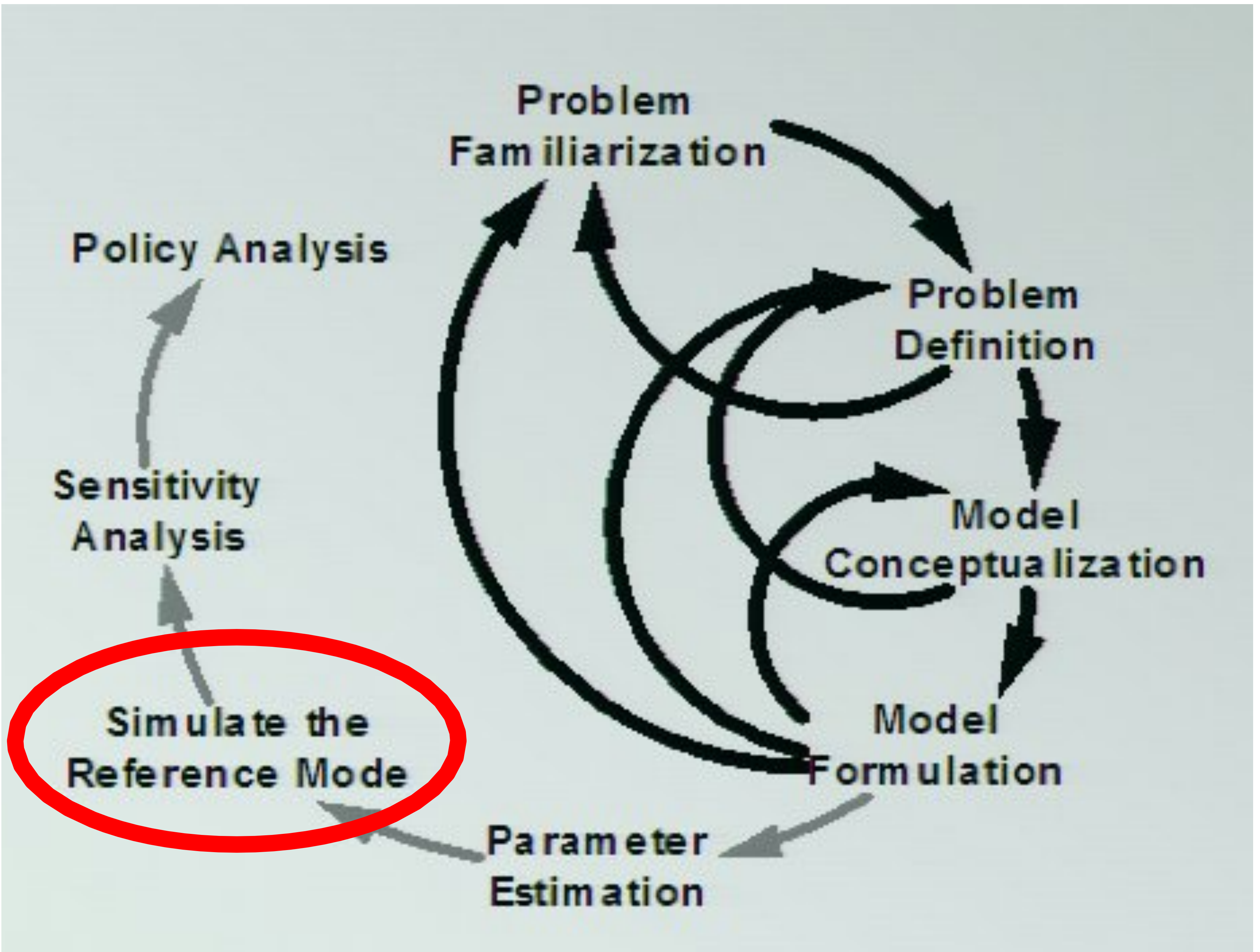


System thinking



Simulate early and often

Simulate at the end



Conceptual Models

1. Sensitizing those involved in wicked problems to the participatory modeling approach and its possible applications in local problems
2. Definition of the question raised between those involved
3. Inventory of scientific, lay or expert knowledge, available through surveys, diagnostic studies and analysis of the existing literature
4. Eliciting knowledge for the model through surveys and interviews
5. Co-construction of the conceptual model with stakeholders concerned by the issue at stake
6. Choice of a modeling tool (computerized or not) and implementation of a model
7. Calibrating, verifying and validating the model with local stakeholders
8. Definition of scenarios with local stakeholders
9. Exploratory simulations with local stakeholders
10. Monitoring and evaluation of the effect of the process on the practices of the participants
11. Diffusion among stakeholders who have not participated in the process
12. Training stakeholders interested in using the tools developed

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Conception

Implementation

Use

Roles in the modeling process

Requesters, who specify the objective and expected use;

Modelers, whose role consists in obtaining a formulation of concepts that is recognized as being true and acceptable to the participants; they provide specifications that must be complete, coherent and relevant;

One or several model developers (implementers) whose role is to develop, verify and execute the model on computers depending on the needs of the approach;

Suppliers of ideas and contents;

Model end-users, who are often the initial requesters

(From Ferrand, 2007)

Status of the participants to the modeling process

Scientists from various disciplines

Modeling as a mean to integrate scientific knowledge

Societal agents (stakeholders) represented in the model

Managers, decision-makers, resource users can share representations: modeling as a platform for communication

Types of engagement of societal agents

- **Passive participation**: objective is just to inform people;
- **Extracting information** from people for the scientists who need data;
- **Participation to support the decisions**, in which the societal agents are used to promote and articulate the chosen decisions;
- **Interactive participation**, where societal agents share the diagnostic and analytical methods and tools or results;
- **Self organization**, where the lessons from the participatory process are transformed into decisions by the agents themselves.

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(Pretty, 1995)

- **Extractive use**, in which knowledge, values, or preferences are synthesized by the extracting group and passed on as a diagnosis to a decision-making process
- **Co-learning**, in which syntheses are developed jointly and the implications are passed to a decision-making process
- **Co-management**, in which the participants perform the syntheses and include them in a joint decision-making process.

(Lynam, 2007)

Co-Constructing Conceptual Models

Participatory modeling is a practical approach in system dynamics, with the aim of including all interested parties such as stakeholders or public in the decision-making process regarding environmental questions.

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ComMod
Companion Modelling

Home | Charter | Case Studies | Documents | Training | Association

ComMod : a Companion Modelling Approach

Since 2000, some researchers working in the field of renewable resource management have been using various tools, particularly Agent-Based Models and Role-Playing Games, to tackle issues regarding decision processes, common property, co-ordination among actors, etc. Dealing with models and games has been a mean to cross disciplines boundaries and to acknowledge the complex nature of the systems under study. This choice led us to formalise our relation to modelling within what we called a ***companion modelling*** approach.

At a time when models and simulations to tackle complexity and for decision support are flourishing, this group of researchers found important to specify the contents of this approach, which should be understood as a scientific posture more than a modelling handbook. Modelling is merely an intermediary object facilitating our collective and interdisciplinary thought.

A charter, written in April 2004, presents the posture and the main principles in a text that has to be taken as a starting point for further discussions.

A project on sustainable development and agriculture recently led to the publication of a collective book.

Members from the ComMod network have developed training sessions based on active learning principles. These training modules on participatory modelling favour collective activities: in small groups, participants design a conceptual model, then they implement it as a concrete tool. Two formats are proposed:

- **ComMod interdisciplinary research school** : one week on the main principles of the companion modelling approach, with a special focus on role-playing games and facilitation. Forthcoming sessions:
  - in English, 21-26 Septembrer 2014 in Wageningen (organized by Wageningen University, Graduate School PE&RC; contact: Lennart Suselbeek). Information and registration: www.pe-rc.nl/cm.htm
  - in French, 16-20 March 2015 in Chateauneuf-de-Gadagne (France), organized by FormaScience INRA (for further information, please contact Michel Etienne);
  - in English, 18-22 May 2015 in Zürich (Switzerland), organized by ForDev ETH Zürich (for further information, please contact Anne Dray).
- **MISS-ABMS** (Multi-platform International Summer School on Agent-Based Modeling & Simulation): 2 intensive weeks on being able to code computer agent-based models, with some insights about their use in the companion modelling approach. Forthcoming session:
  - in English, 8-19 September 2014 in Montpellier (France), organized by CIRAD-Green (for further information,have a look here).

If you share the scientific posture expressed in the charter and if you are willing to participate to the collective work of the group, you are welcome to join the ComMod association. Additionally, you can also subscribe to a mailing list related to companion modelling.

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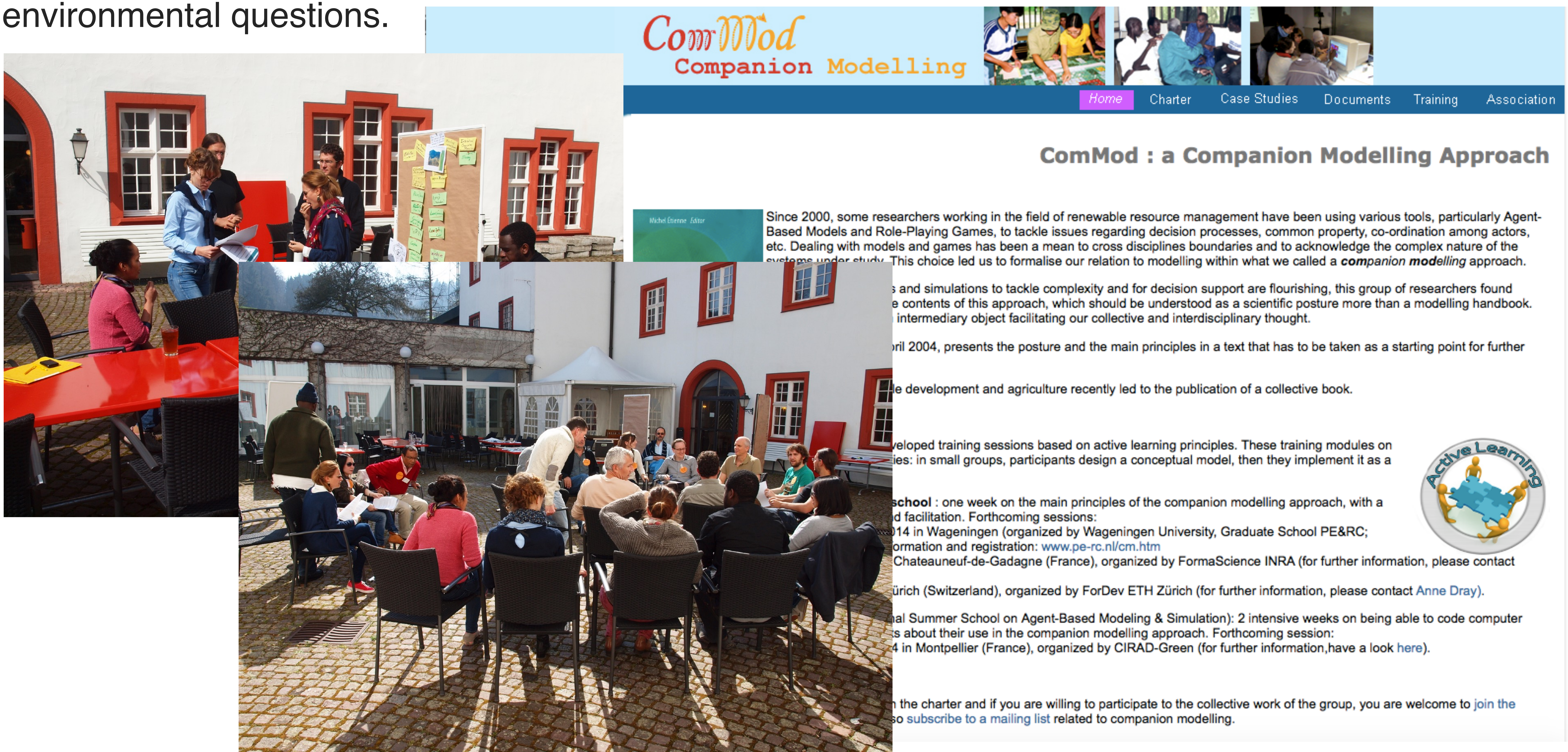

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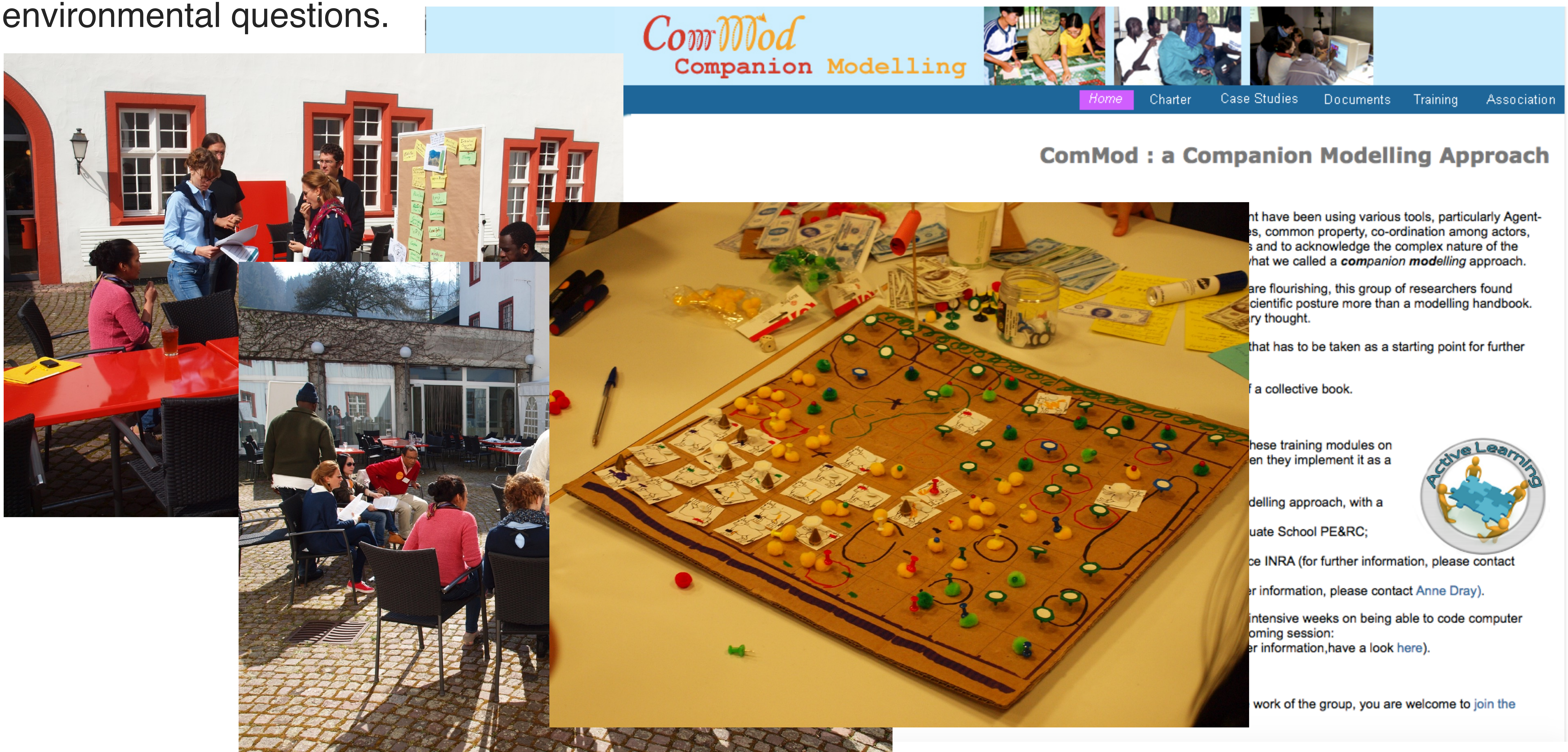

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