

# Welcome words

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Systems Ecological Perspectives on  
Sustainability

24-26 September 2014

Finnish Environment Institute (SYKE),  
Helsinki, Finland

# Contents

- A brief introduction to SYKE
- Systems: what are they
- Systems Ecological Perspectives on Sustainability – some reflections



# Finnish Environment Institute SYKE

*” We provide information, skills and services crucial to achieving sustainable development in Finland and globally. ”*

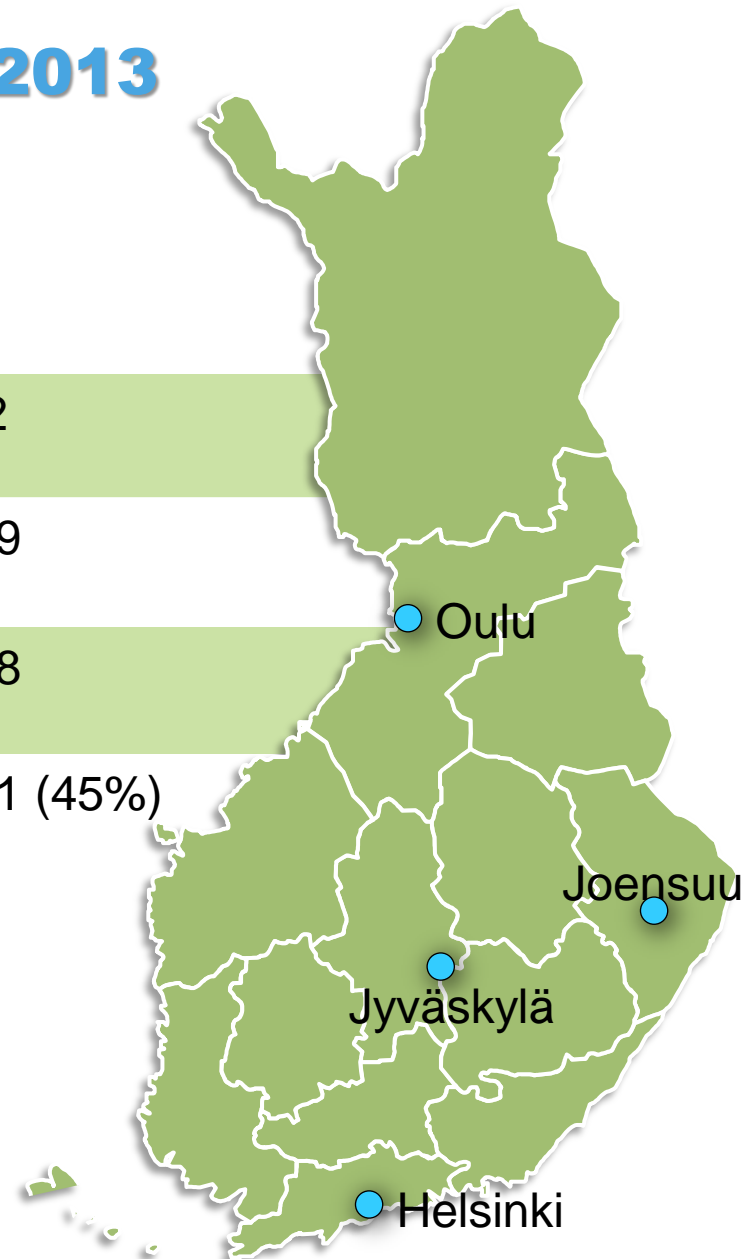
# Our focus is on

- **Climate policy**
- **Sustainable communities**
- **Consumption and production and sustainable use of natural resources**
- **Ecosystem services**
- **Baltic Sea, inland waters and aquatic resources**
- **Producing and utilizing environmental data**

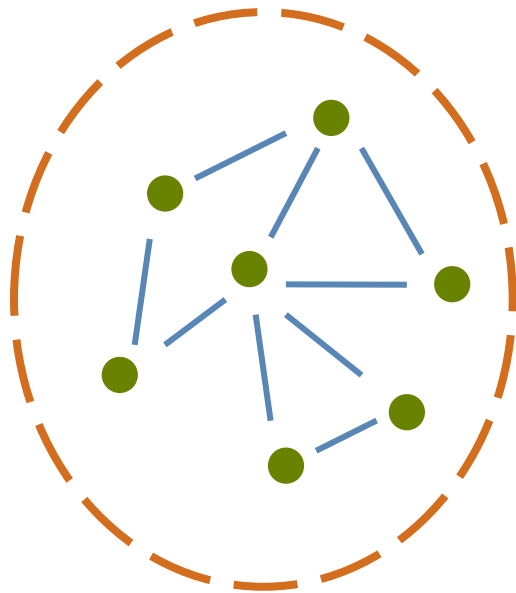


## Personnel and funding 2013

Personnel	701
Number of person years	672
Total funding (M€)	59,9
Direct budgetary funding (M€)	32,8
External funding (M€)	27,1 (45%)



# Systems



- **Objects / elements**
- **Links / connections / relationships**
- **The borders of a system**

Ingelstam 2001



***“Essentially, all models are wrong,  
but some are useful.”***

George E. P. Box

# The starting point: The world is not sustainable

Vol 46 | 24 September 2009

nature

## FEATURE

### A safe operating space for humanity

Identifying and quantifying planetary boundaries that must not be transgressed could help prevent human activities from causing unacceptable environmental change, argue **Johan Rockström** and colleagues.



#### SUMMARY

- New approach proposed for defining preconditions for human development
- Crossing certain biophysical thresholds could have disastrous consequences for humanity
- Three of nine interlinked planetary boundaries could have disastrous consequences for humanity

Although Earth has undergone many periods of significant environmental change, the planet's environment has been unusually stable for the past 10,000 years<sup>1</sup>. This period of stability — known to geologists as the Holocene — has seen human civilizations arise, develop and thrive. Such stability may now be under threat. Since the Industrial Revolution, a new era has arisen, the Anthropocene, in which human activities have become the main driver of global environmental change<sup>2</sup>. This could see human activities push the Earth system outside the stable environmental state that are detrimental or even catastrophic for large parts of the world.

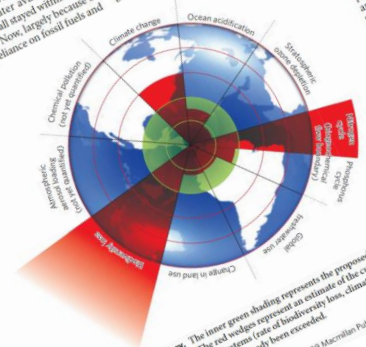
During the Holocene, environmental activities with consequences for the conditions that enabled human development. Regulation of the Earth system, freshwater availability and biogeochemical flows all stayed within a relatively narrow range, none, largely because of a rapidly growing reliance on fossil fuels and

industrialized forms of agriculture, human activities have reached a level that could damage the systems that keep Earth in the desirable Holocene state. The result could be irreversible and, in some cases, abrupt environmental change, leading to a state less conducive to human development<sup>3</sup>. Without pressure from humans, the Holocene is expected to continue for at least several thousands of years<sup>4</sup>.

#### Planetary boundaries

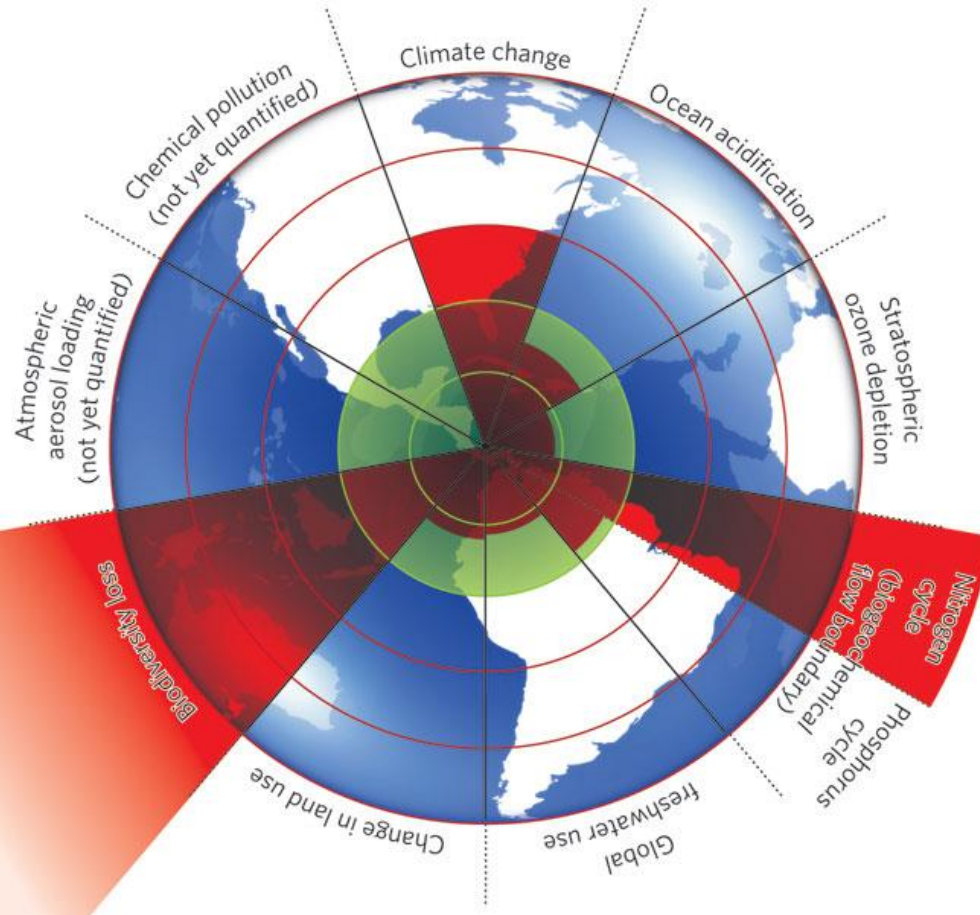
To meet the challenge of maintaining the Holocene state, we propose a framework based on 'planetary boundaries'. These

boundaries define the safe operating space for humanity with respect to the Earth system and are associated with the planet's biophysical subsystems or processes. Although Earth's complex systems sometimes respond smoothly to changing pressures, it seems that this will prove to be the exception rather than the rule. Many subsystems of Earth react in a nonlinear, often abrupt way, and a certain key variables. If these thresholds are crossed, then important subsystems, often with deleterious or even catastrophic consequences for human civilization, could shift into a new state. Most of these thresholds are not yet defined, but a critical value for one or more subsystems, such as carbon dioxide, is well defined. Not all processes or subsystems are equally important, and some are more vulnerable to human activities than others. We have tried to identify the most important subsystems and processes, and to define thresholds for each. These thresholds are not yet defined, but a critical value for one or more subsystems, such as carbon dioxide, is well defined. Not all processes or subsystems are equally important, and some are more vulnerable to human activities than others. We have tried to identify the most important subsystems and processes, and to define thresholds for each. These thresholds are not yet defined, but a critical value for one or more subsystems, such as carbon dioxide, is well defined.



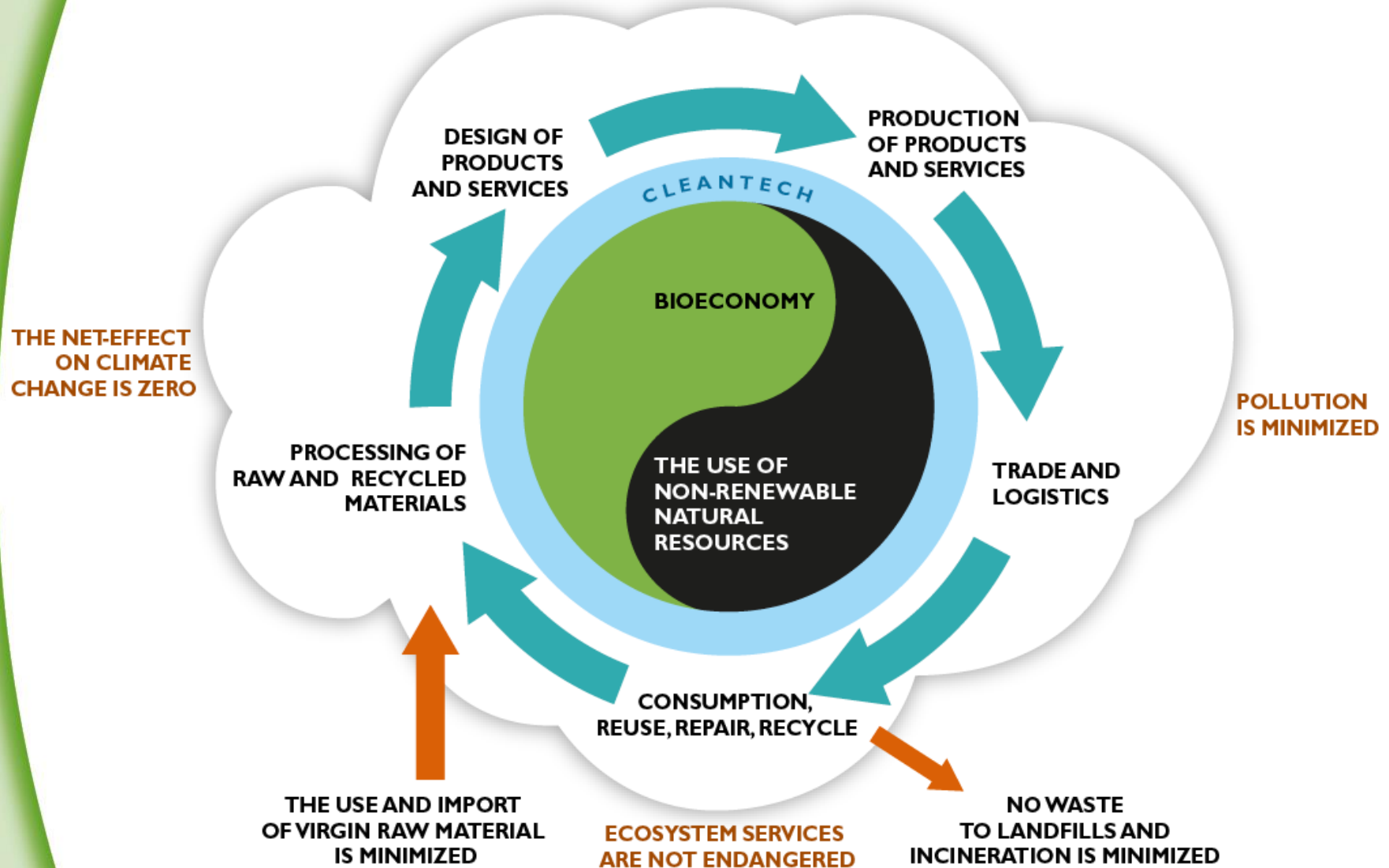
**Figure 1 | Beyond the boundary.** The inner green shading represents the estimated safe operating space for nine planetary systems. The red wedges represent an estimate of the current position for each variable. The boundaries in three systems (rate of biodiversity loss, climate change and human interference with the nitrogen cycle) have already been exceeded.

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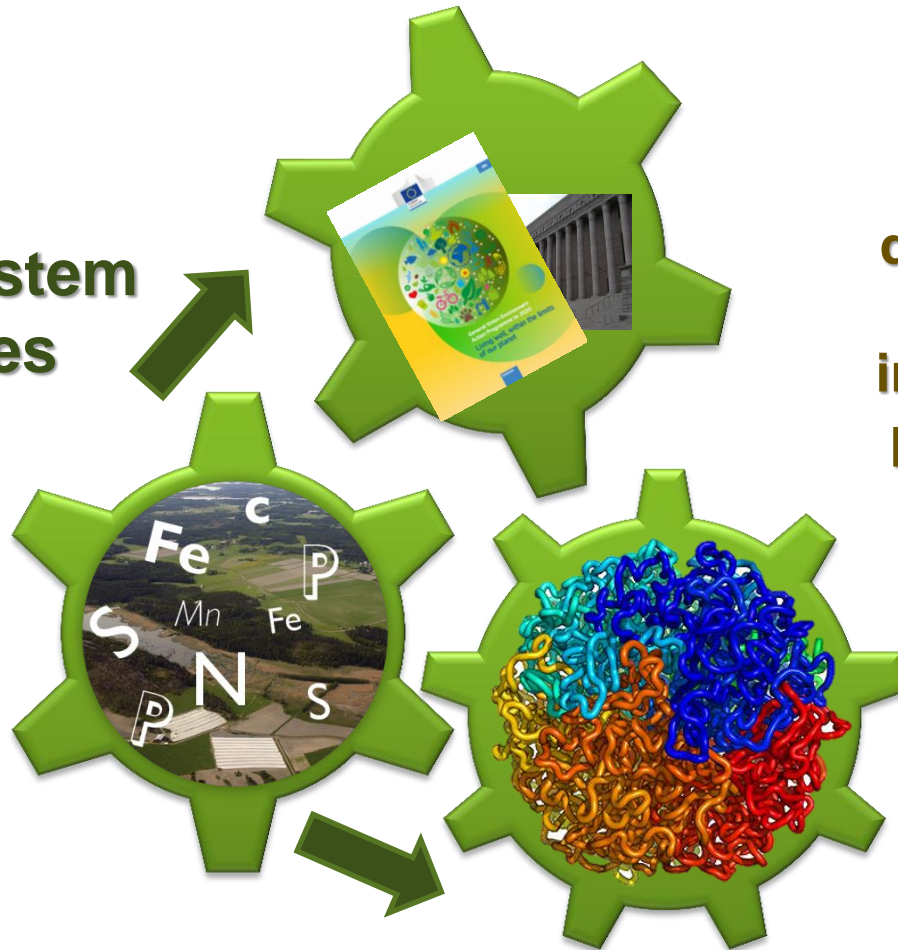


# A CARBON NEUTRAL CIRCULAR ECONOMY



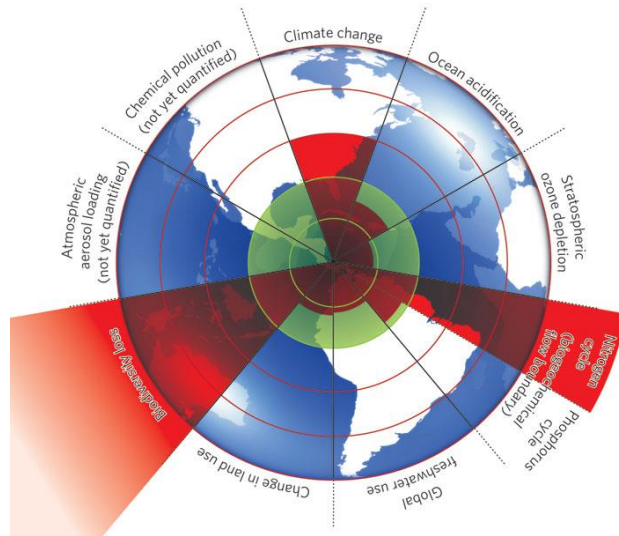
# The world as three interlinked dynamic systems

**Ecosystem  
services**

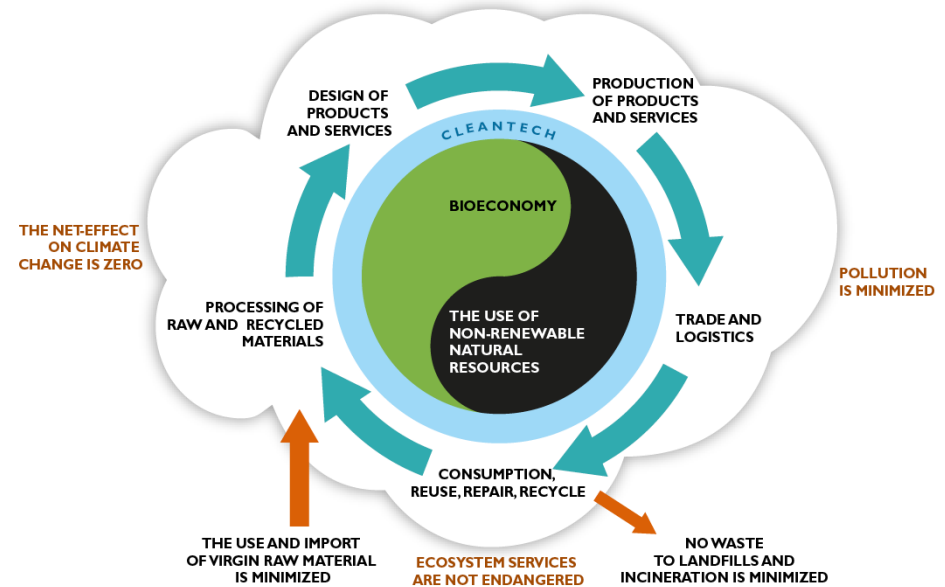


**Research  
as a forth  
dynamic system  
with nonlinear  
interactions with  
policy & politics**

I hope that systems ecological perspectives can enable knowledge production that radical transformations sustainability requires



#### A CARBON NEUTRAL CIRCULAR ECONOMY



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**I wish you all a  
fruitful conference  
and  
welcome you to  
SYKE**