# Kokonaisuuksia vai/ja niiden osia

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*1.9. 2016*

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# Tekniset ratkaisut – systeemiset muutokset

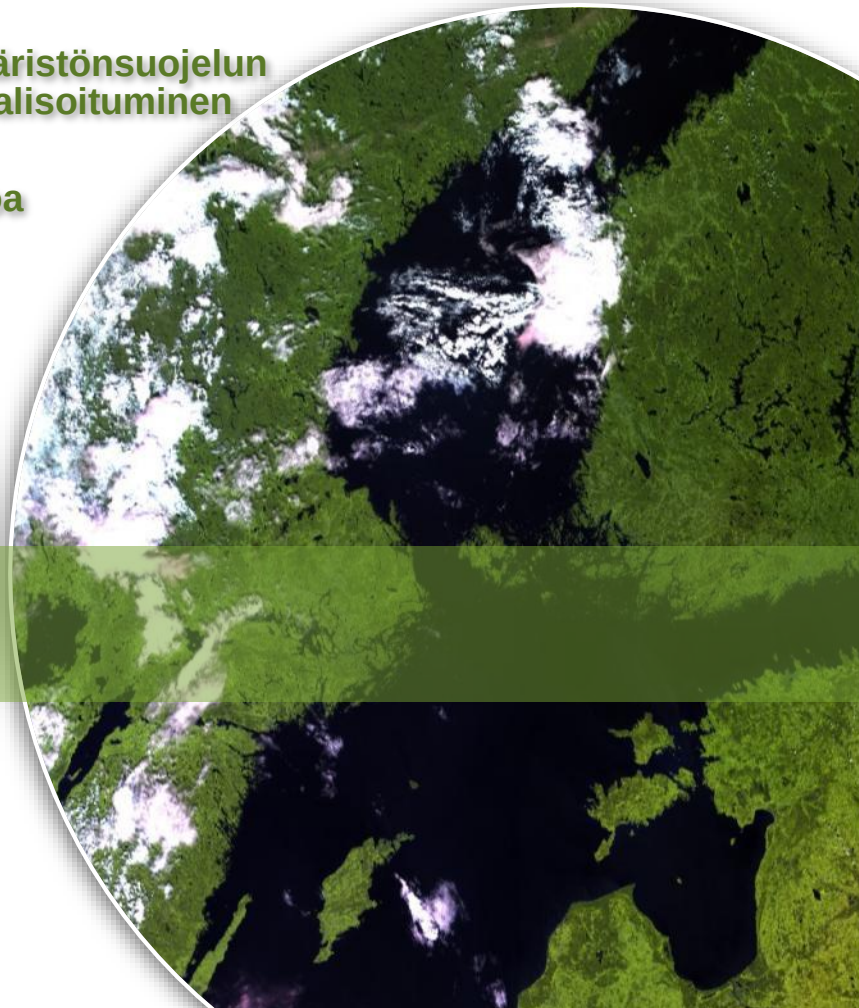
ympäristönsuojelun
globalisoituminen

monitieteistä
ympäristötietoa

vesiensuojelusta
ympäristönsuojeluun

vesiensuojelun
vuosikymmen

ympäristötietoisuuden
vahvistuminen



1970 — vesihallitus

1983 — ympäristö-
ministeriö

1986 — vesi- ja
ympäristöhallitus

1995 — SYKE

SYKE

nature

Vol 461|24 September 2009

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 hum development
- Crossing certain biophysical thresholds could have die consequences for humanity
- Three of nine interlinked planetary boundaries have overstepped


ROAD TO COPENHAGEN

Although Earth has undergone many periods of significant environmental change, the planet's environment has been unusually stable for the past 10,000 years[1–3]. 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[4], in which human actions have become the main driver of global environmental change[5]. This could see human activities push the Earth system outside the stable environmental state of the Holocene, with consequences that are detrimental or even catastrophic for large parts of the world. During the Holocene, environmental change occurred naturally and Earth's regulatory capacity maintained the conditions that enabled human development. Regular temperatures, freshwater availability and biogeochemical flows all stayed within a relatively narrow range. Now, 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[6]. Without pressure from humans, the Holocene is expected to continue for at least several thousands of years[7].

## Planetary boundaries

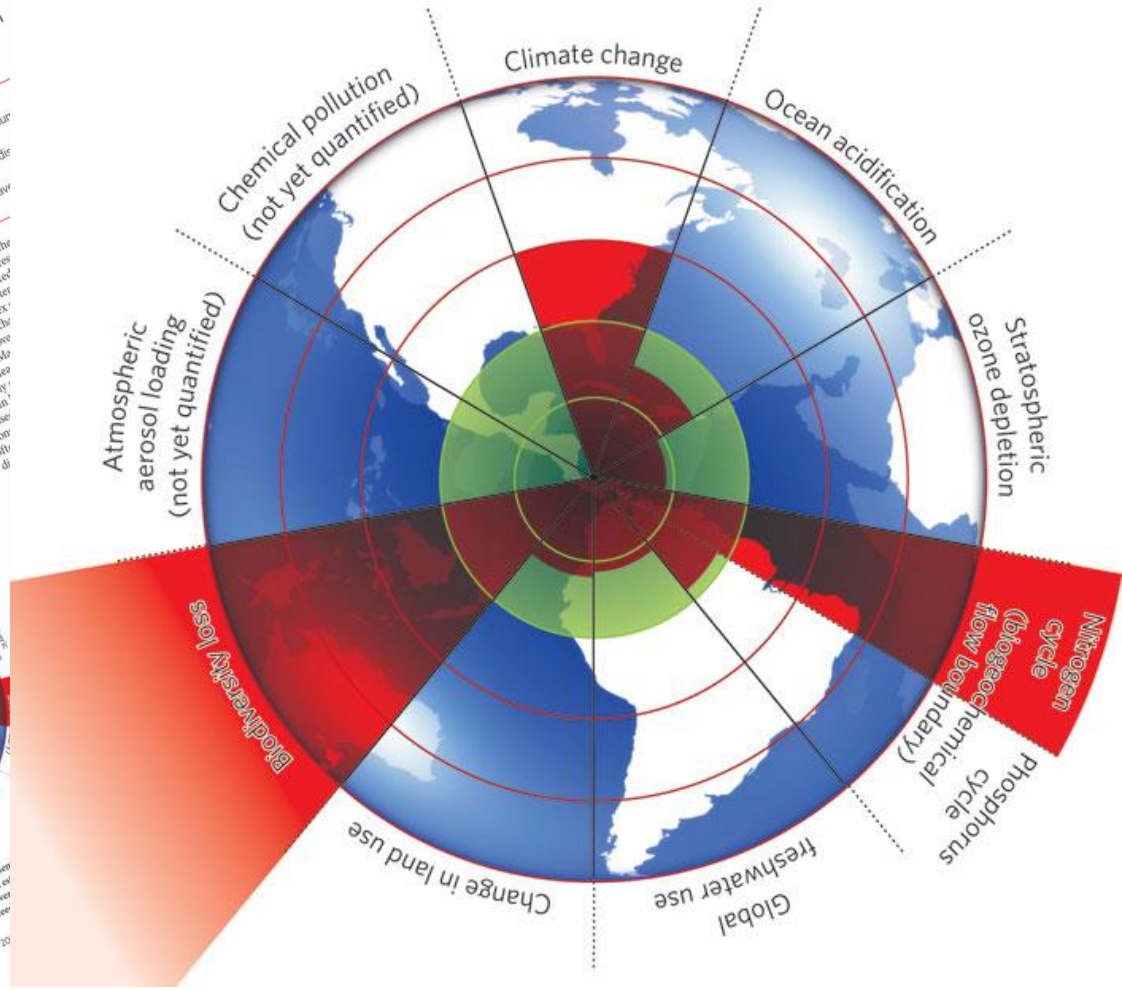
To meet the challenge of maintaining the Holocene state, we propose a framework based on 'planetary boundaries'. These boundaries define the for humanity with res and are associated physical subsyster Earth's complex smoothly to ch this will prove the rule. Ma a nonlinea ticularly certain crosse mon oth




**Figure 1 | Beyond the boundary.** The inner green shading represent space for nine planetary systems. The red wedges represent an es each variable. The boundaries in three systems (rate of biodiver interference with the nitrogen cycle), have already been exceed





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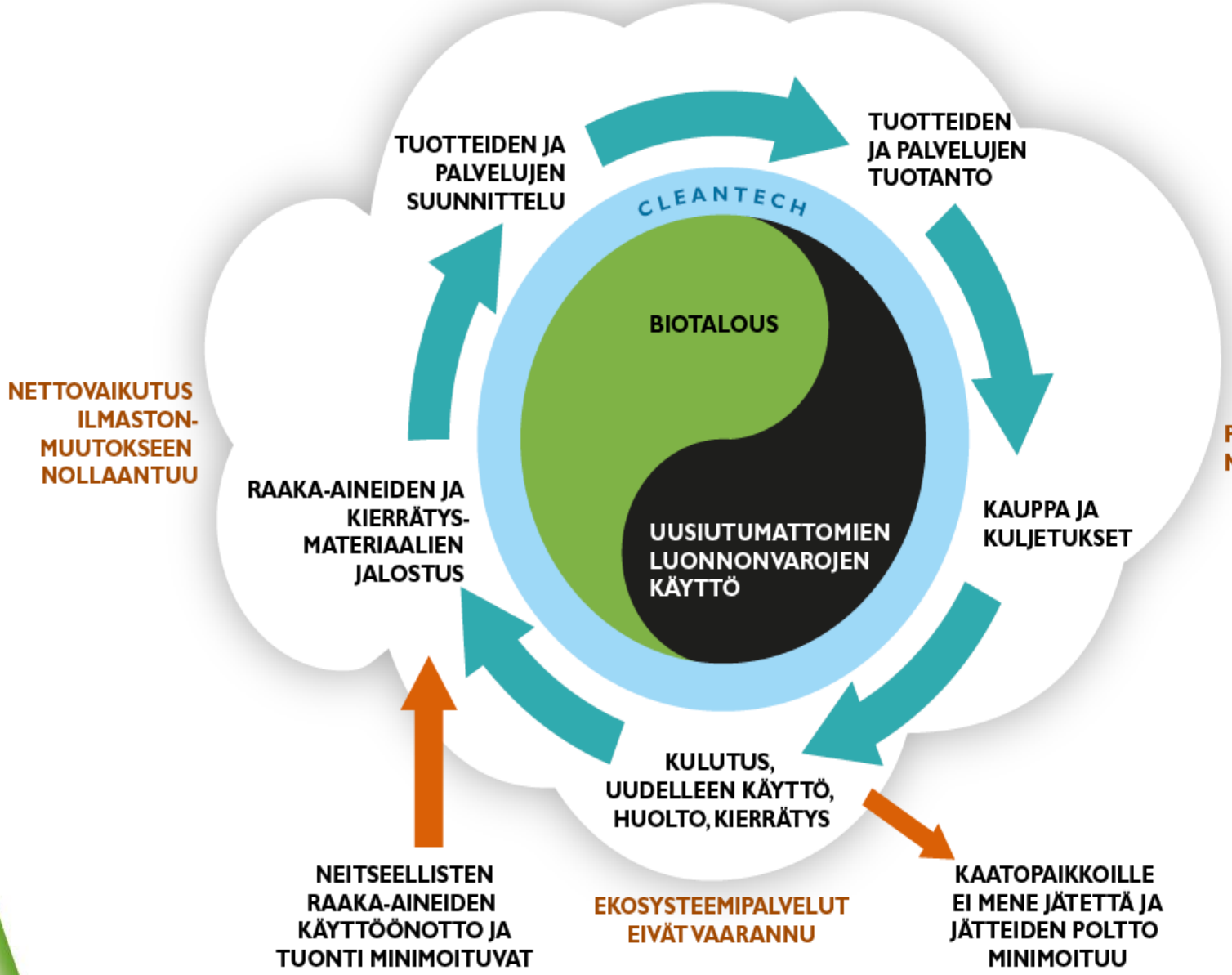
# HIILINEUTRAALI KIERTOTALOUS

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# Lämpimät kiitokset rautaisten osaajien kasvattamisesta ja erinomaisesta yhteistyöstä!

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