New Era for Citizens as Game-changers
-Emerging Responsibility in Environmental Society
ゲームチェンジャーとなった私たち ー環境社会でもとめられるものー

Chiho WATANABE
National Institute for Environmental Studies

15th Kawasaki International Eco-Business Forum

New Era for Citizens as Game-changers
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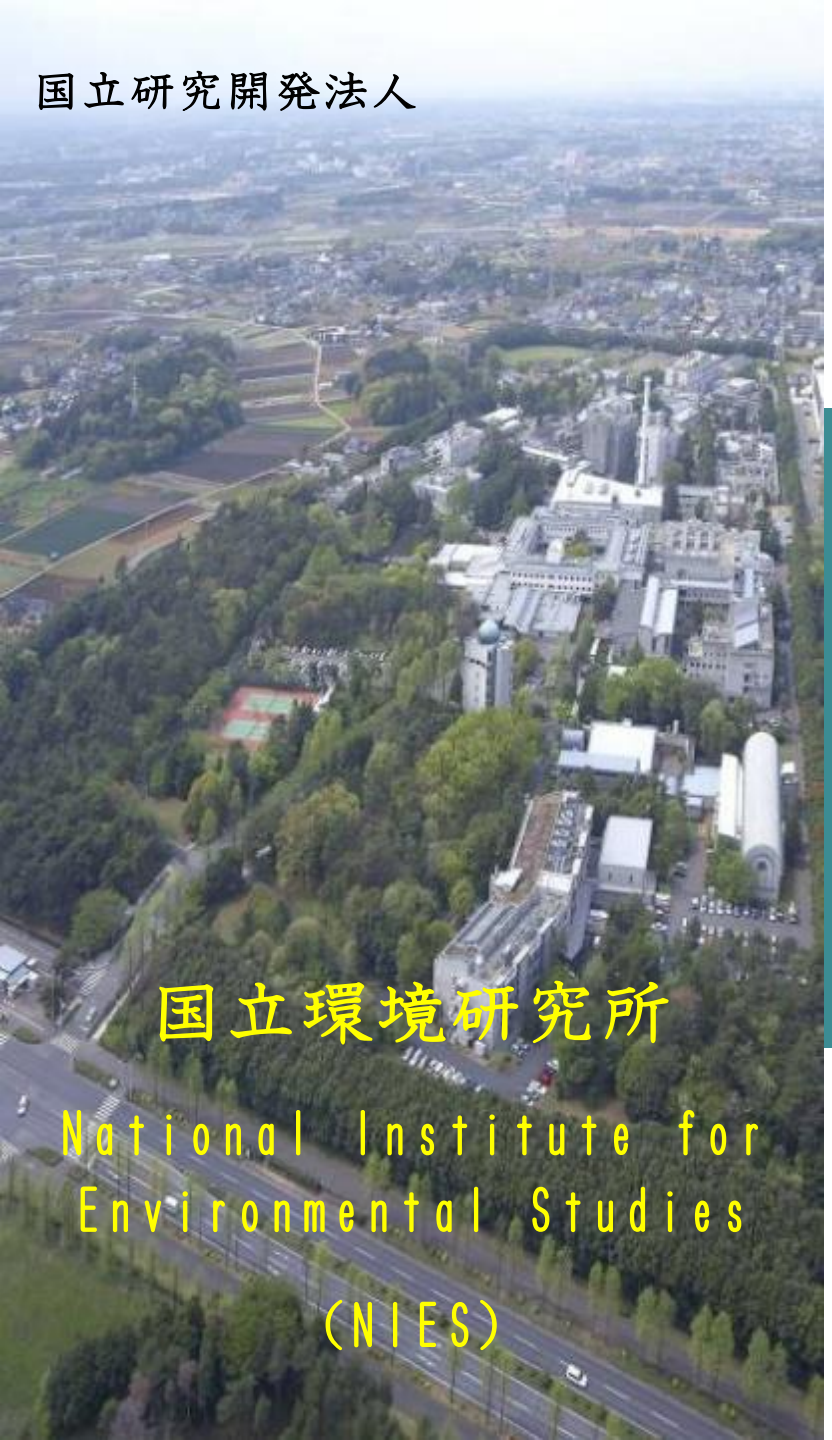
ゲームチェンジャーとなった私たち ー環境社会でもとめられるものー

* ***Anthropocene*, the 'New Era'**
  - **The game we're playing**
  - **Why are we stepping into *Anthropocene?***

* **How to change the game to a 'win-win' one?**
  - **Learning from the past**



Excerpt from our Charter

国立環境研究所は
今も未来も人びとが
健やかに暮らせる環境を
まもりはぐくむための研究によって
広く社会に貢献します

New Era for Citizens as Game-changers
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ゲームチェンジャーとなった私たち ー環境社会でもとめられるものー

* *Anthropocene*, the 'New Era'

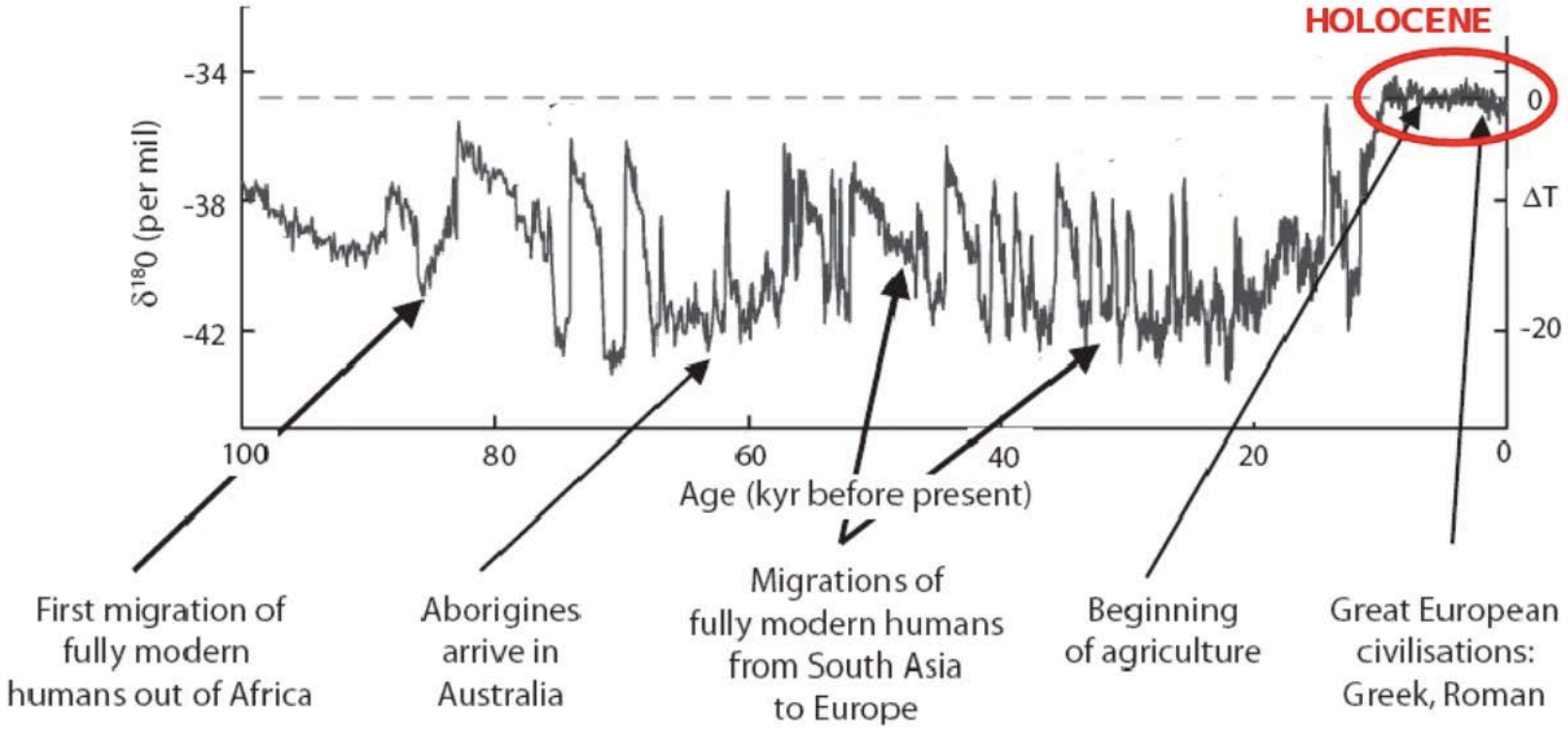
The game we're playing

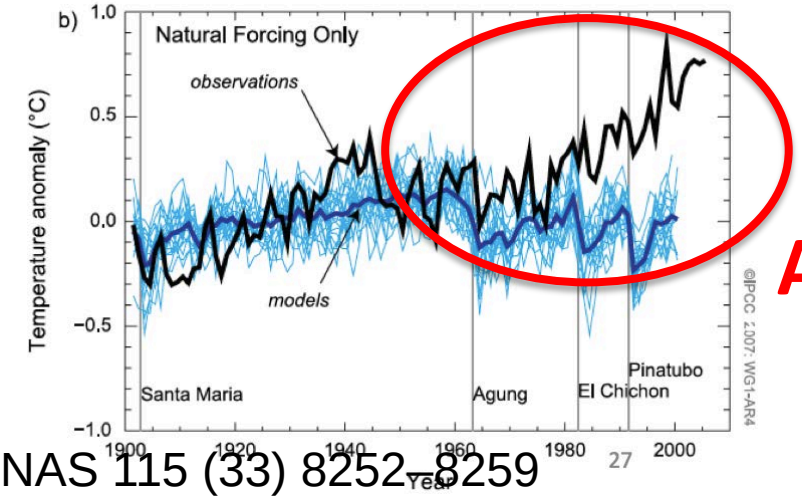
Why are we stepping into *Anthropocene?*

* How to change the game to a 'win-win' one?

Learning from the past

We are living in *Anthropocene*.

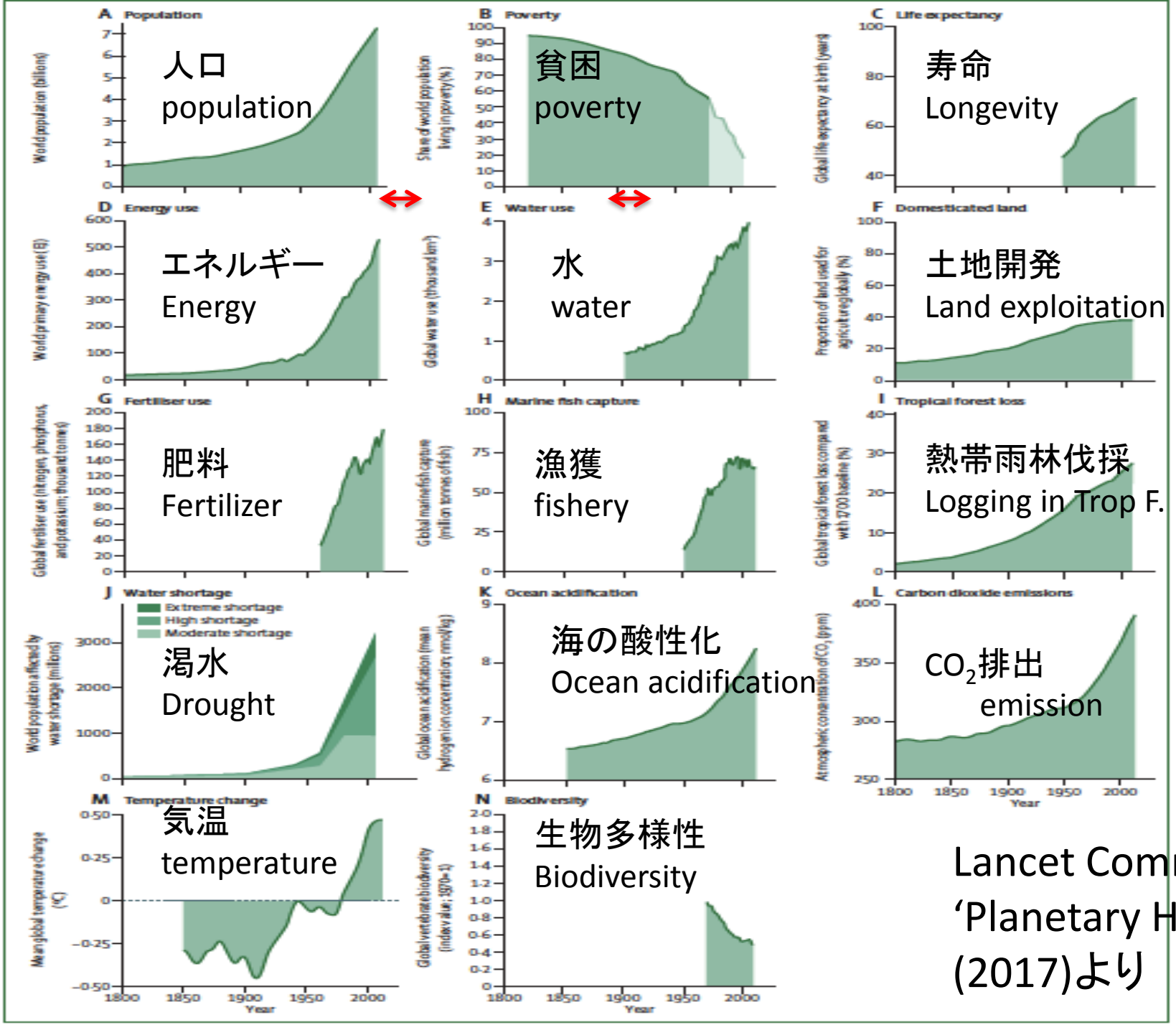




Rockstrom et al. (2009)

Anthropocene

see Steffen et al. (2018) PNAS 115 (33) 8252–8259

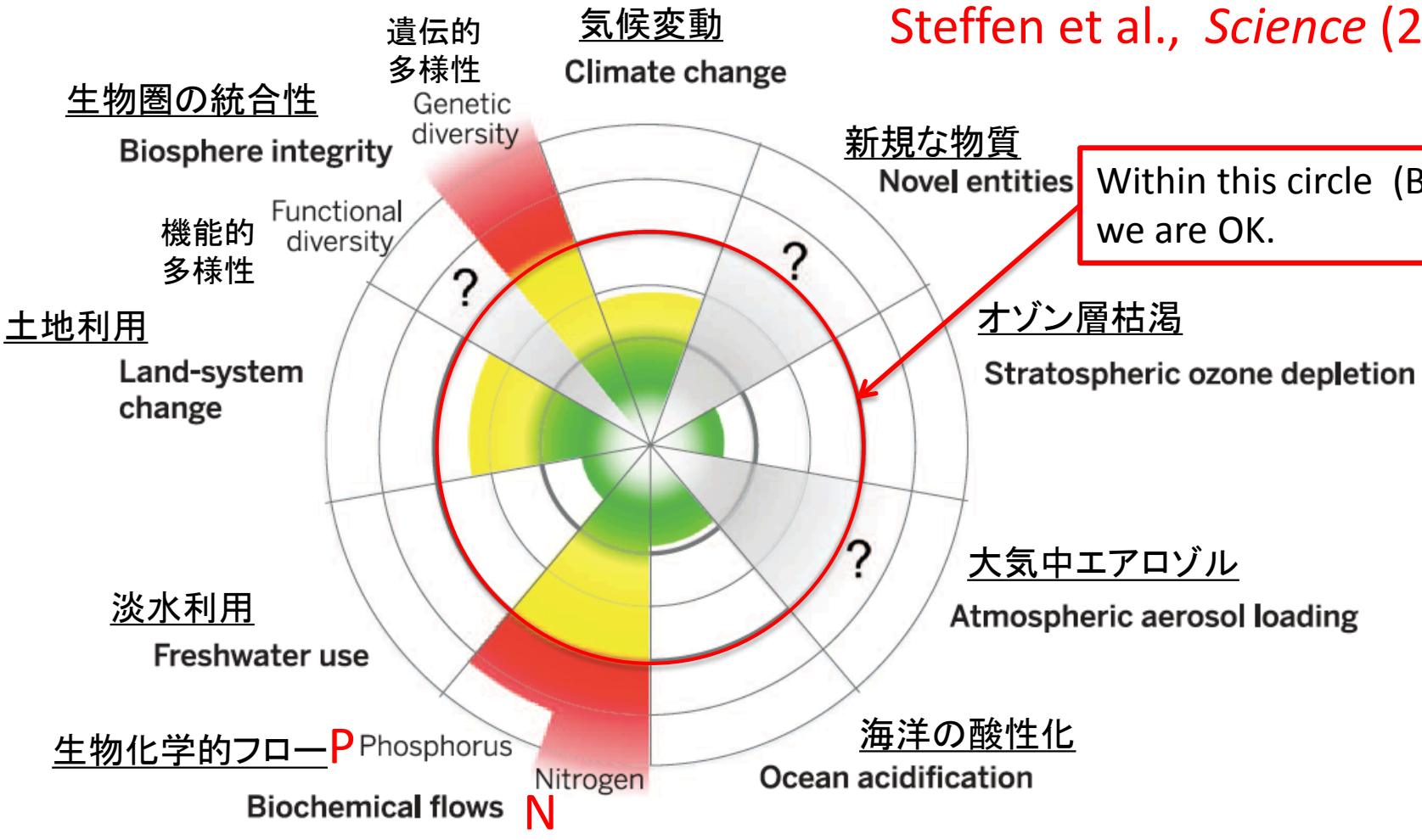


Lancet Commission
'Planetary Health'
(2017)より

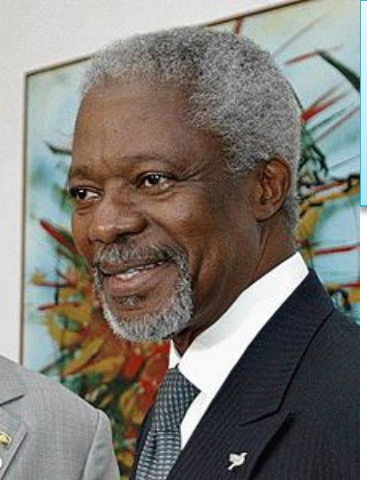
‘*Planetary boundaries*’; some are transgressed or close

Rockstrom et al.. *Nature* (2009)

Steffen et al., *Science* (2015)



Within this circle (Boundary), we are OK.



We are playing a 'win-lose' game

Millennium Ecosystem Assessment

A 5-year (2001-05) project evaluating the interrelationship between ecosystem change and human wellbeing in the latter half of 20th century. Called by late Cofi Anan (ex UN-SG). 1,360 experts participated in the project.

Ecosystem change ⇔ improvement of wellbeing and economics

⇒ *ecosystem service* for future generations may decrease.

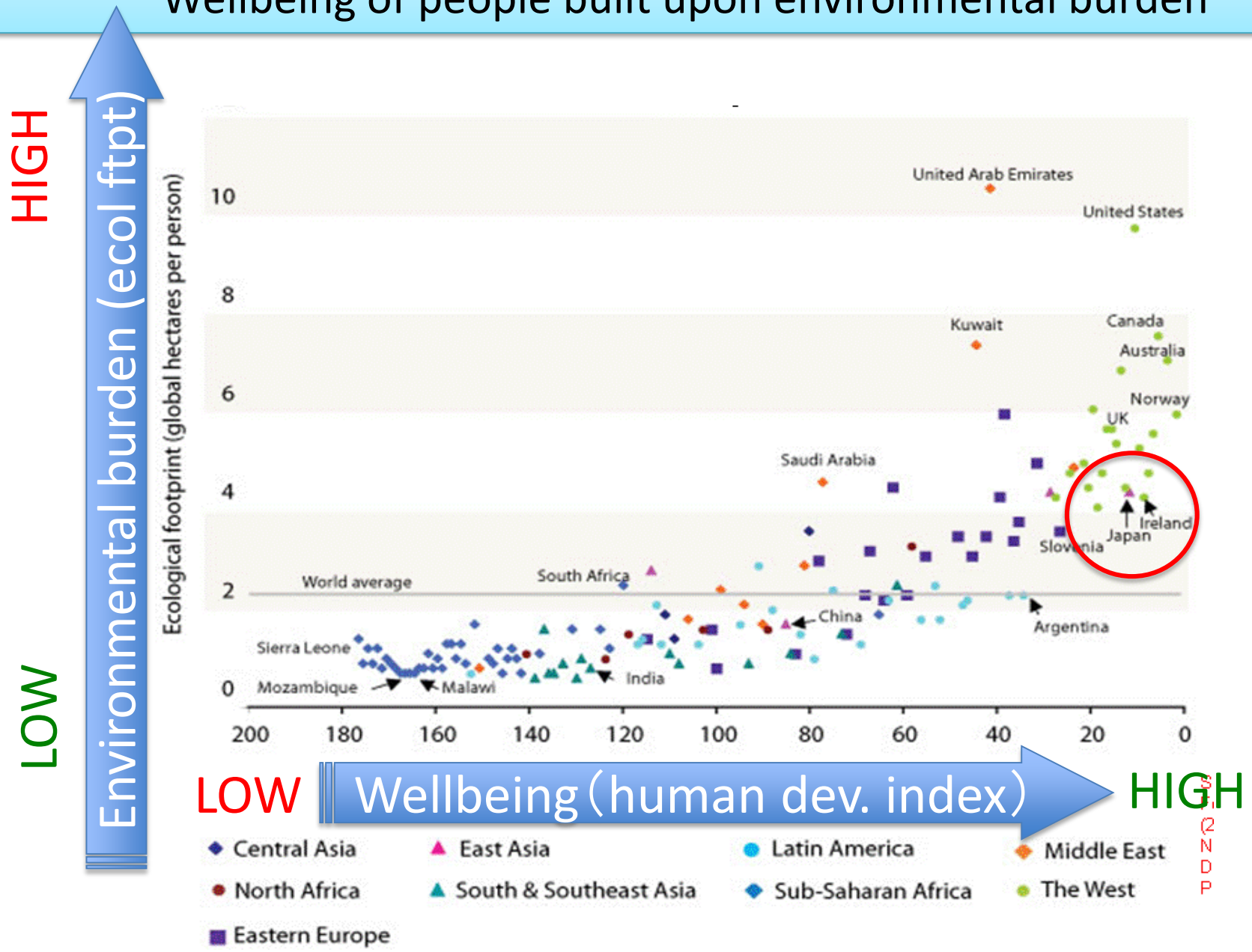
← avoidable with *appropriate actions in the next half century*

← substantial shifts in policy and practice required

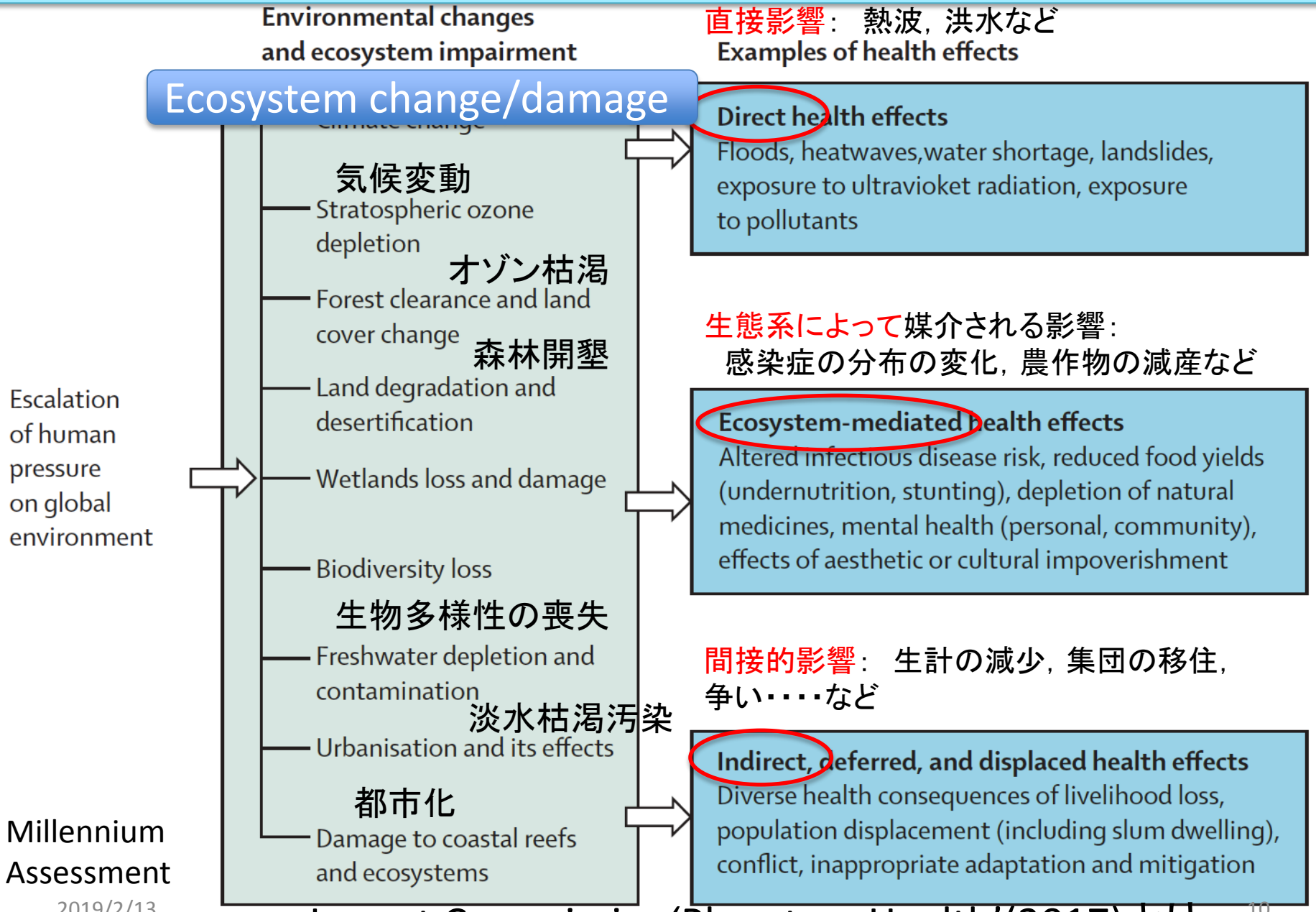
www.millenniumassessment.org *"synthesis report"*

We are playing a 'win-lose' game

Wellbeing of people built upon environmental burden



Links between ecosystem damage and human welfare



Lancet Commission‘Planetary Health’(2017)より

Why are are stepping into *Anthropocene?*: 3 reasons

Paul Ehrich's equation

Environmental Impact
= Population x Affluence x Technology

T: bigger = worse (higher environmental burden)

ex)

I : CO_2 emission by the population

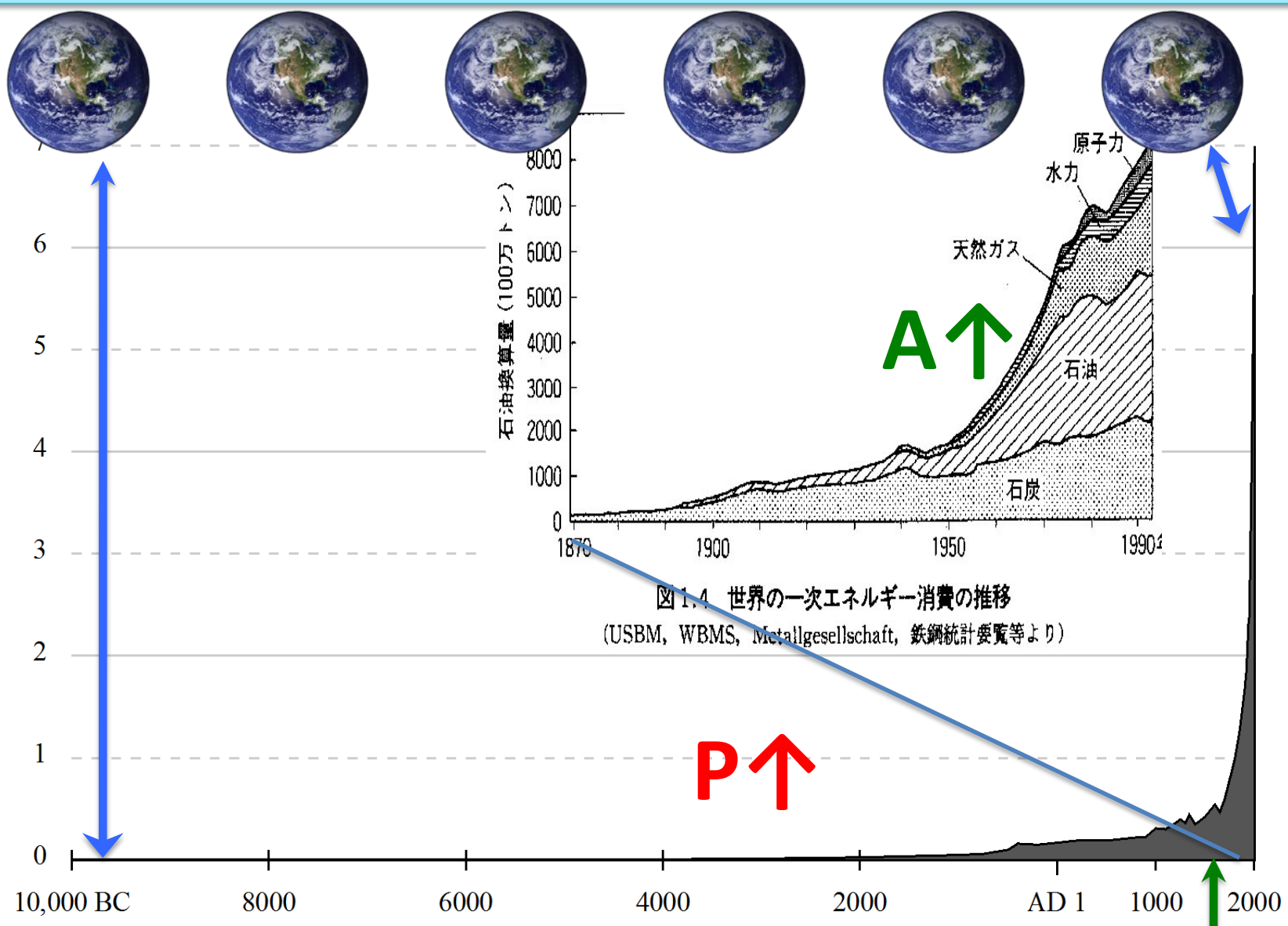
P: population

A: consumption of electricity per capita

T: CO_2 emission per unit electricity production

Ehrich P. 1932～
(Stanford U., Conservation Ecology)

Reason #1: *Exponential increase in 'Impact"*



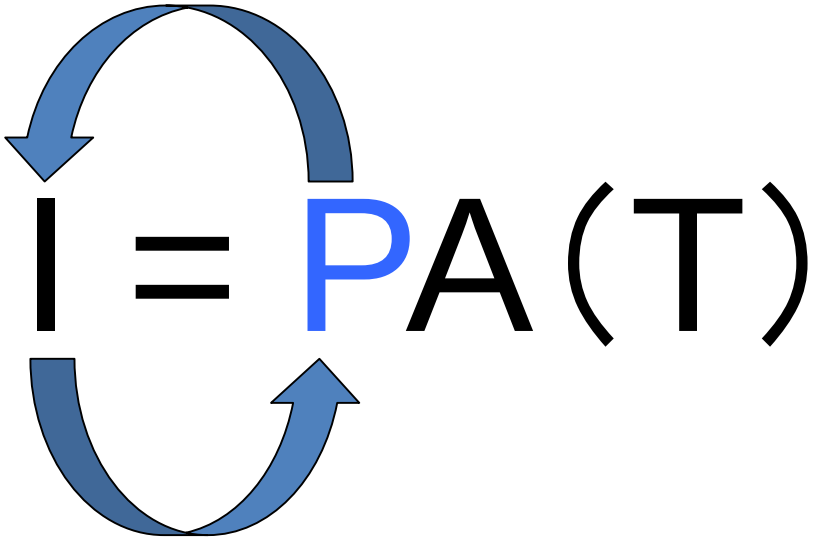
Beginning of **Food production**
('Agricultural Revolution')

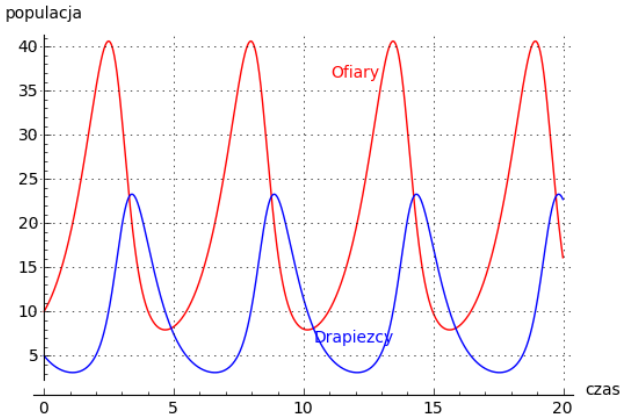
Industrialization
('Industrial Revolution')

Reason #2: Weak I=PAT feedback <examples with direct, strong feedback>

- Animals (*natural ecosystem*)
- Hunter-gatherers (*human*-ecosystem)
- cf. Local environmental pollution

(Minamata, Itai-itai, air-pollution in mid-20C Japan)





Decrease in ecological service
(including food shortage)

Reason #2: Weak I=PAT feedback <examples with strong feedback>

Prior to industrialization

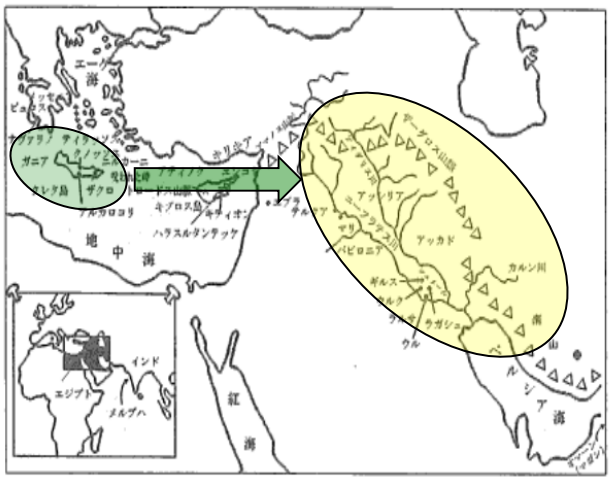
Forest = limiting factor [for 'A']

as fuel (heating, cooking, refining Ag .....),
as construction material
(house, palace, battle ship, barrel)

→ constraints on land use

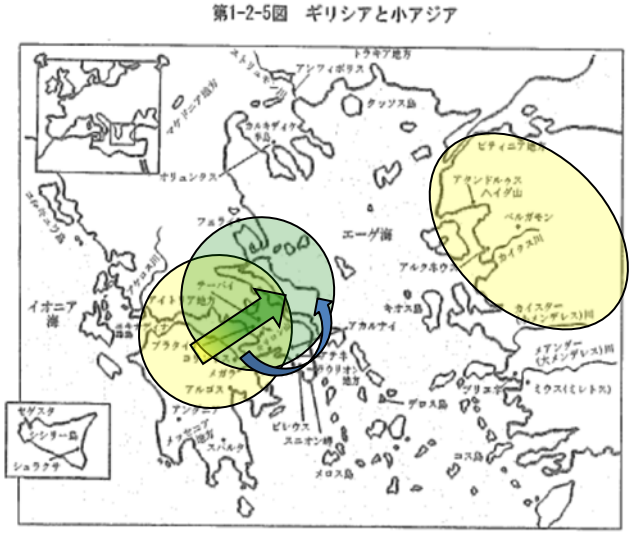
BC 5¢ -AD 4¢

BC3,500-1,500



第1-2-3図　青銅器時代の世界の地図

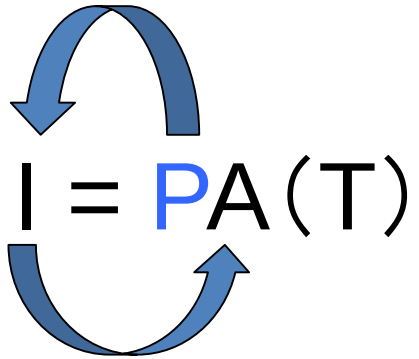
（資料：パーリン「森と文明」）



第1-2-5図　ギリシアと小アジア

BC1,500-800

（資料：パーリン「森と文明」）



Decline in ecosystem service
＝decline in QOL

（White Paper MOEJ; 2005）

Spreading the Impact

urban areas, company, country……

$$I_1 + I_2 + \cdots + I_n = PAT$$

food, electricity, 'materials'
waste, CO_2,
human resource

Reason #2: Weak I=PAT feedback
<Condition/strategy to avoid feedback>

Major urban areas are supported by x100 times larger areas.

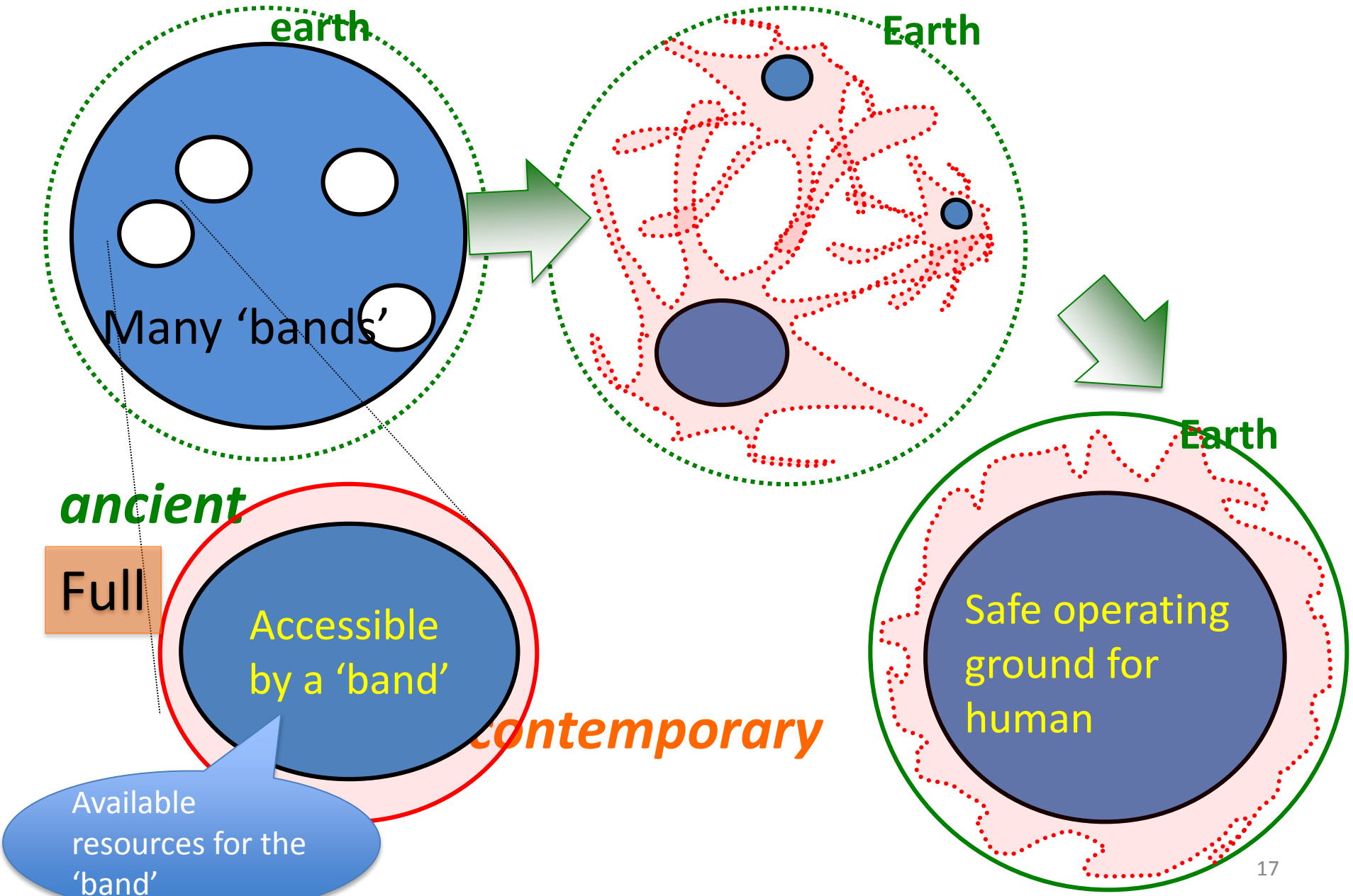
＊**Vancouber**（pop=472,000@1991)
Ecological footprint 2M ha (i.e., 4hr/person)
180 times larger than the administrative （Wakenagel，2008：Urban Ecology）.

＊**Baltic sea coastal region** (29 major urban areas)
Ecological footprint =200 times larger than administrative area
（Folke 2008）

＊**Japan** (4+1 major cities)
・Tokyo, Yokohama, Osaka, Nagoya
around 4-5 ha/person (250-600 times*)
・Matsue <a smaller city> 4.25 （30 times*）

*: ratio for environmental capacity 2008
（by Yokoo and Oka, 2005；“環境容量超過率”（倍)

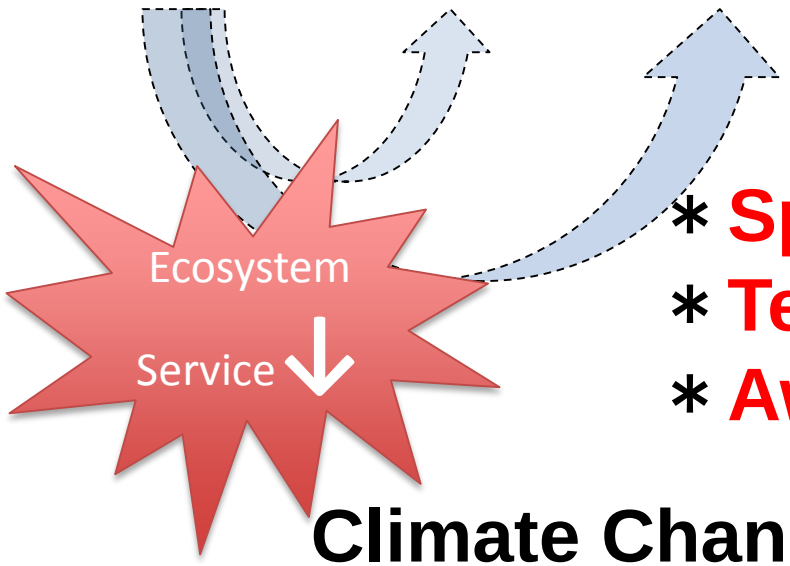
Full world before empty world



Reason #2: Weak I=PAT feedback
<Condition/strategy to avoid feedback>

Barriers for feedback:

I = P A T



* **Spatial** =far/isolated
* **Temporal** =distant past, future
* **Awareness** =invisible, low priority

Climate Change: spatial, temporal, awareness
biodiversity: spatial, awareness
chemicals: awareness
waste: spatial
urban: spatial, awareness

Reason #3. no rival species

What if……?

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Learning from the past

Past success-failure and the **way forward**

Current status is the results of our past effort to 'adapt'.

- We are unaware of how 'powerful' we become.'

→need to understand the potential consequence of *any* behavior

→ devise appropriate feedback measures for *any* behavior

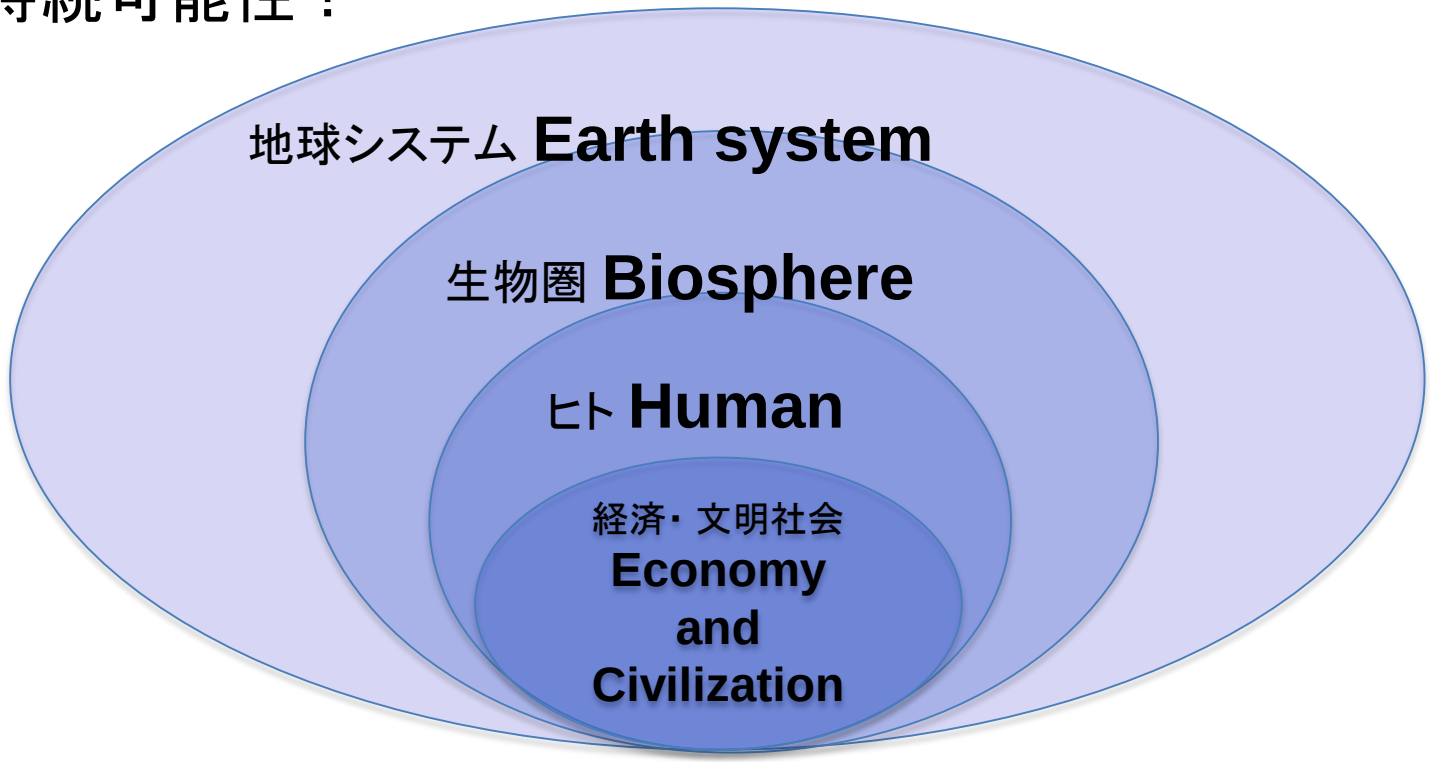
- Had been focused only (almost exclusively) on humans

→ should pay attention to non-human world

→ monitor and broadcast the status of ecosystems

Connected layers

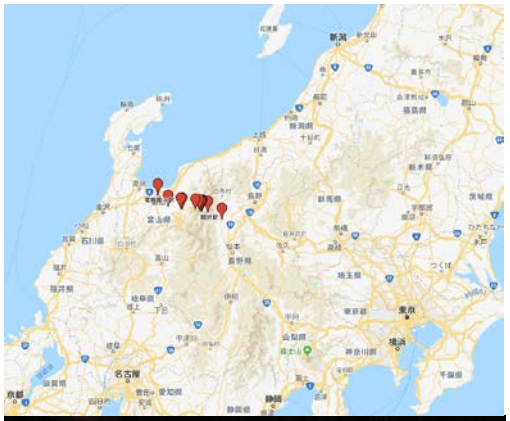
→Sustainability of which?
どの持続可能性？



“Planetary health”（Whitmee et al., 2015. Lancet）

Human health and civilization can be achieved based on the flourishing natural system and wise management of it.

10-yr monitoring of vegetation/snowfall at *Tateyama*



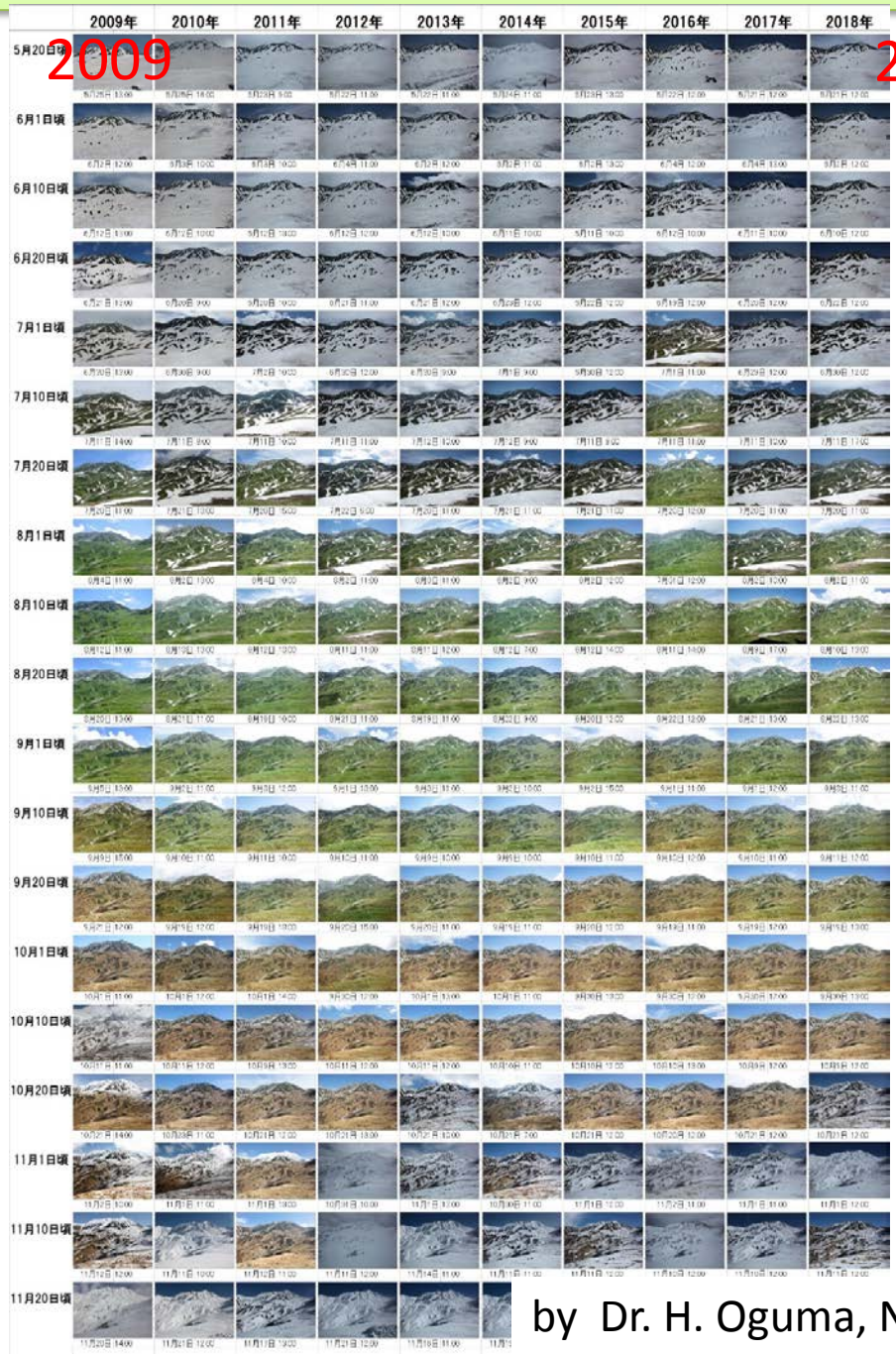
Camera set @ Murodo-cabin

May

Nov

2009

2018



by Dr. H. Oguma, NIES

Past success-failure and the **way forward**

Current status is the results of our past effort to 'adapt'.

- We are unaware of how 'powerful' we become.'
  → need to understand the potential consequence of *any* behavior
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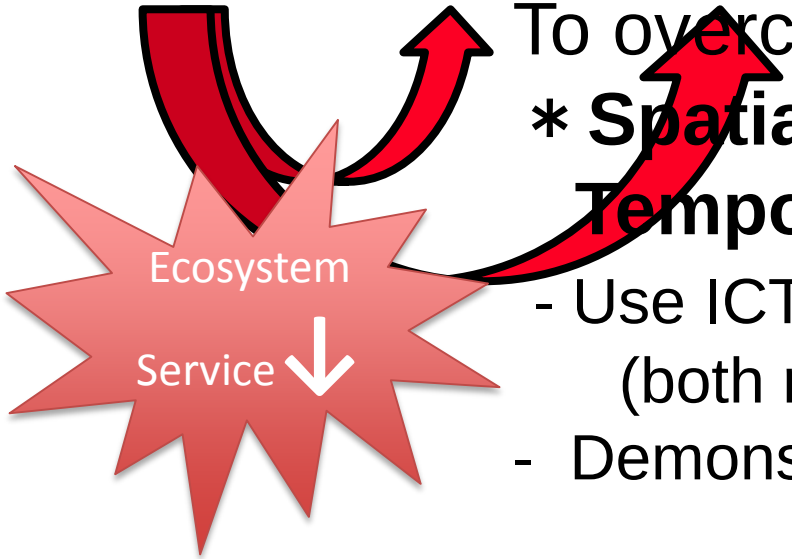
- Had been focused only (almost exclusively) on humans
  → should pay attention to non-human world
  → monitor and broadcast the status of ecosystems

- failure to notice warning signals [for feedback]
  → should be more sensitive to those signals (?)
  → education, literacy raising, visualization of the signals

Revitalize the warning signal for *I=PAT* feedback

I = P A T



To overcome the Barriers for feedback:

∗ **Spatial** =far/isolated

Temporal =distant past, future

- Use ICT to feedback monitoring (both real-time and long-term)
- Demonstrate planet-ecosystem-human links

∗ **Awareness** =invisible, low priority

- Raise '*environmental literacy*' through conversation, education
- Resort to more 'tangible' value systems;

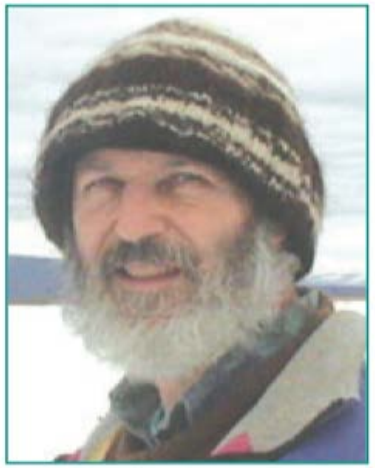
Planetary Stewardship

Ecological Society of America (2009)

Mary E Power
ESA President,
University of
California, Berkeley,
CA

As current President and President-Elect of the Ecological Society of America (ESA), we call for *planetary stewardship* as a framework for science and society to rapidly reduce anthropogenic damage to the biosphere. Ecologists and the ESA must collaborate with other natural and social scientists – as well as with practitioners, resource harvesters, land managers, decision makers, and other concerned citizens – to explore solutions. Humankind's past actions have already committed the planet to a substantially altered future; the task ahead is to find creative and scientifically defensible actions that minimize risks of further resource or ecosystem degradation and maximize opportunities to sustain and restore natural ecosystems and the services they provide.

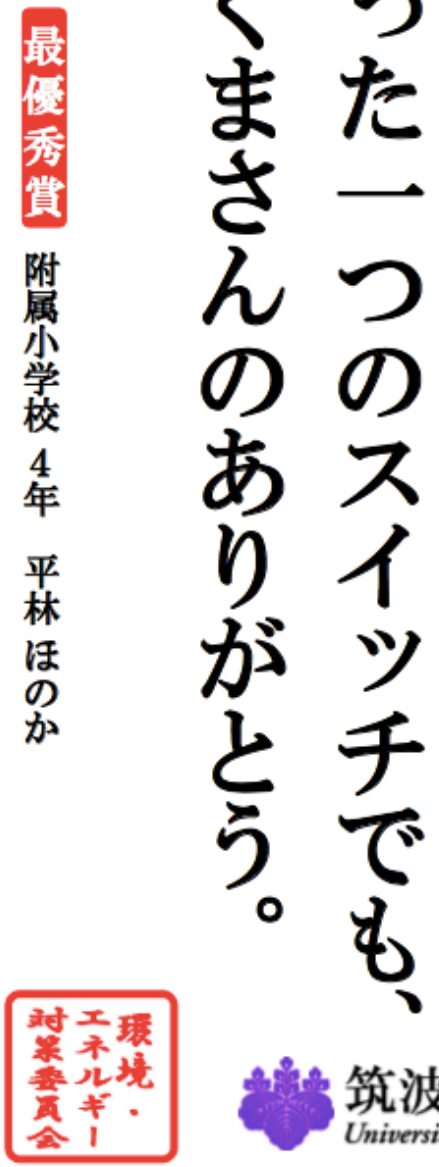
Guest Editorial; Frontiers in Ecology (2009)



F Stuart Chapin III
ESA President-Elect,
University of Alaska,
Fairbanks, AK

筑波大学冬季省エネ・節電標語

The barriers may be breakable;
Spatial, temporal, and awareness.



筑波大学
University of Tsukuba

'A polar bear would say thank you for your turning off an electric device.'

by a 4th-grade primary schoolgirl

U of Tsukuba,
Energy reduction campaign, Dec 2017
筑波大学 冬季省エネ・節電標語（2017．12月）


Thank you for your attention!