

I=PAT vs. Satoyama

-- Paradigms of SD Indicators

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15min.+QA

※ SD: Sustainable Development ≒ Sustainability

Author's Bio



Shun Sato is a PhD student at Chiba Univ GSHSS.

He studies **theories and roles of SD Indicators**.

Bachelor's degree: integrated human studies, Kyoto Univ.

Master's degree: global environmental studies, Kyoto Univ.

Summary Statement

now mainstream
SD indicators

I=PAT

model logic

in population decline phase

Satoyama

model logic

also needed

Many previous **sustainable development / sustainability indicators** are based on **I=PAT model** (environmental Impact = Population * Affluence * Technology), though **SATOYAMA model** (human interventions play good roles) is also needed.

Today's Topics

- 1) What's I=PAT ?
- 2) What's Satoyama ?
- 3) Examples of some SD Indicators
- 4) Discussion
 - 1) Sustainability Indicators: why I=PAT model ?
 - 2) Relationships between Human & Nature: is Satoyama model new paradigm?

Conceptual level
please think together :)

**What's
I=PAT ?**

I=PAT equation

I: environmental Impact

human impact on the environment

P: Population

population size

A: Affluence

goods consumed per capita

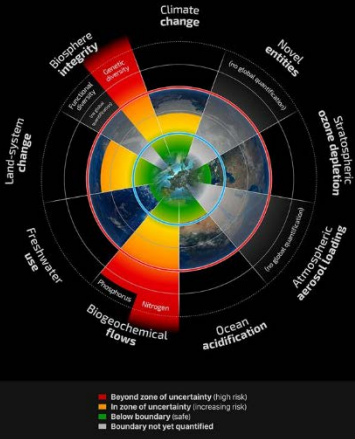
T: Technology

pollution generated by technology per consumed

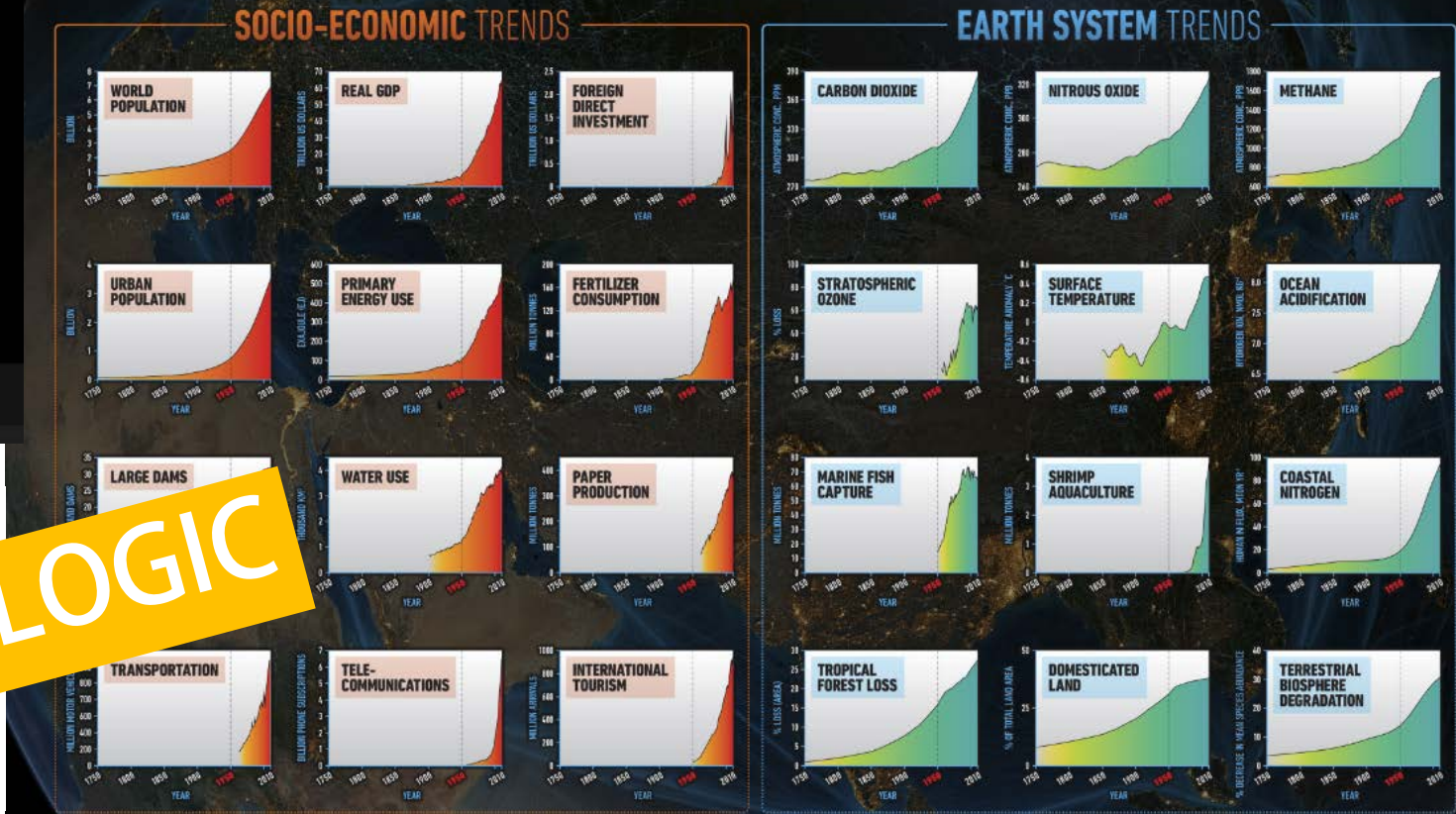
cf. Kaya Identity (Yoichi KAYA) in IPCC Report

$$\text{CO}_2\text{Emission} = \frac{\text{CO}_2}{\text{Energy}} \times \frac{\text{Energy}}{\text{GDP}} \times \frac{\text{GDP}}{\text{Population}} \times \text{Population}$$

Planetary Boundaries
A safe operating space for humanity



THE GREAT ACCELERATION



I=PAT LOGIC



Planetary Boundaries (2009;2015)

Johan Rockström (2015) ver.1 ver.2 7
 Bounding the Planetary Future: Why We Need a Great Transition
<http://www.greattransition.org/publication/bounding-the-planetary-future-why-we-need-a-great-transition>

▼ PAT

(Human activity)

Planetary Boundaries
A safe operating space for humanity

THE GREAT ACCELERATION

SOCIO-ECONOMIC TRENDS

EARTH SYSTEM TRENDS

SOCIO-ECONOMIC TRENDS

WORLD POPULATION

REAL GDP

FOREIGN DIRECT INVESTMENT

TRANSPORTATION

TELE-COMMUNICATIONS

INTERNATIONAL TOURISM

TROPICAL FOREST LOSS

DOMESTICATED LAND

TERRESTRIAL BIOSPHERE DEGRADATION

I=PAT LOGIC

Planetary Boundaries (2009;2015)

Johan Rockström (2015)

ver.1

ver.2

8

Bounding the Planetary Future: Why We Need a Great Transition

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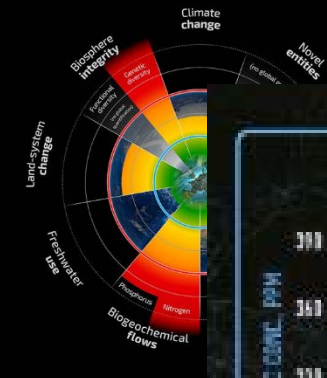




(Environmental Impact)

Planetary Boundaries

A safe operating space for humanity

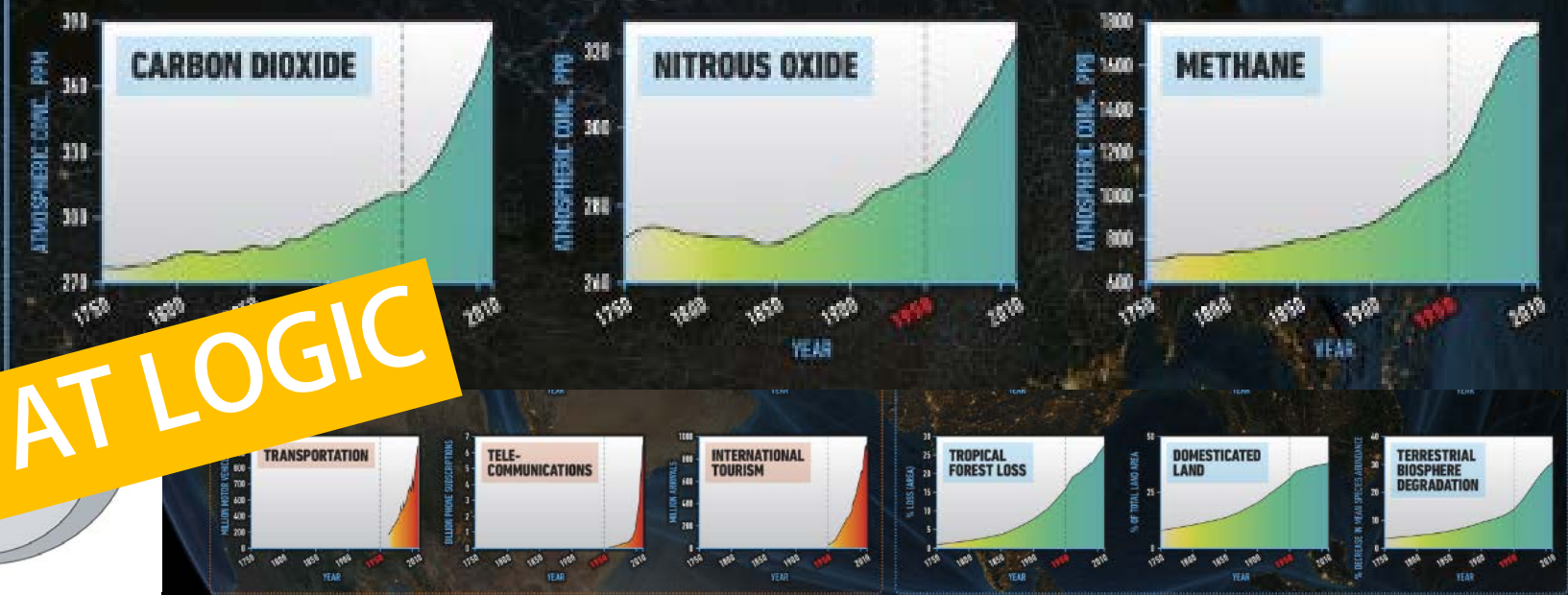


THE GREAT ACCELERATION

SOCIO-ECONOMIC TRENDS

EARTH SYSTEM TRENDS

EARTH SYSTEM TRENDS



I=PAT LOGIC



Planetary Boundaries (2009;2015)

Johan Rockström (2015)

ver.1

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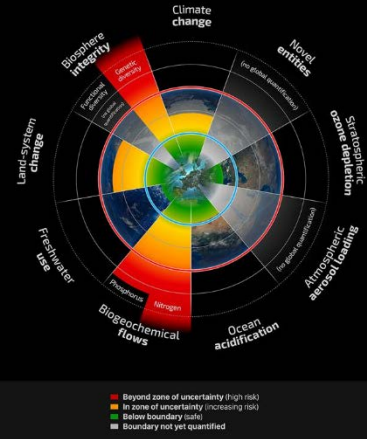


(Human activity)



(Environmental Impact)

Planetary Boundaries
A safe operating space for humanity

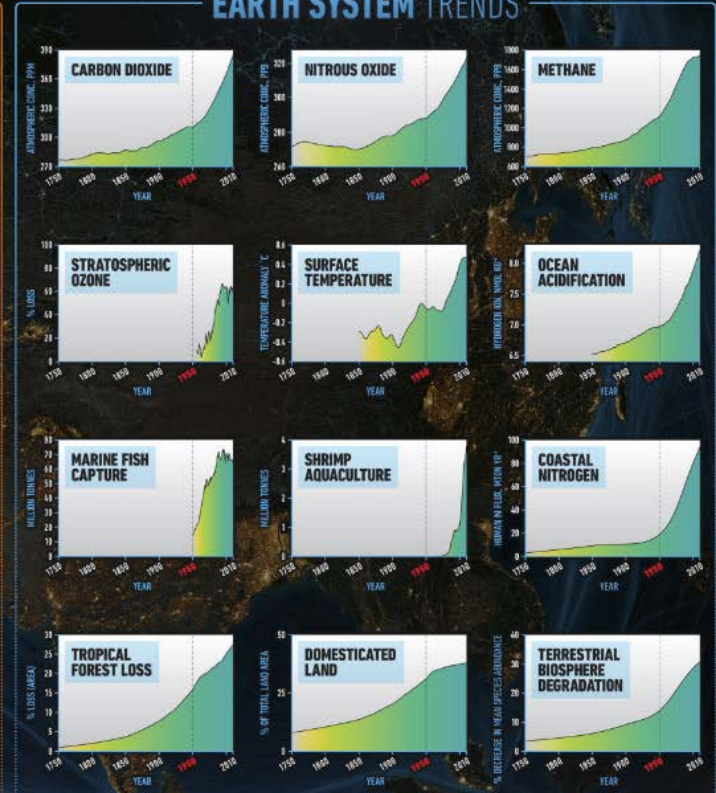


THE GREAT ACCELERATION

SOCIO-ECONOMIC TRENDS



EARTH SYSTEM TRENDS



I=PAT LOGIC



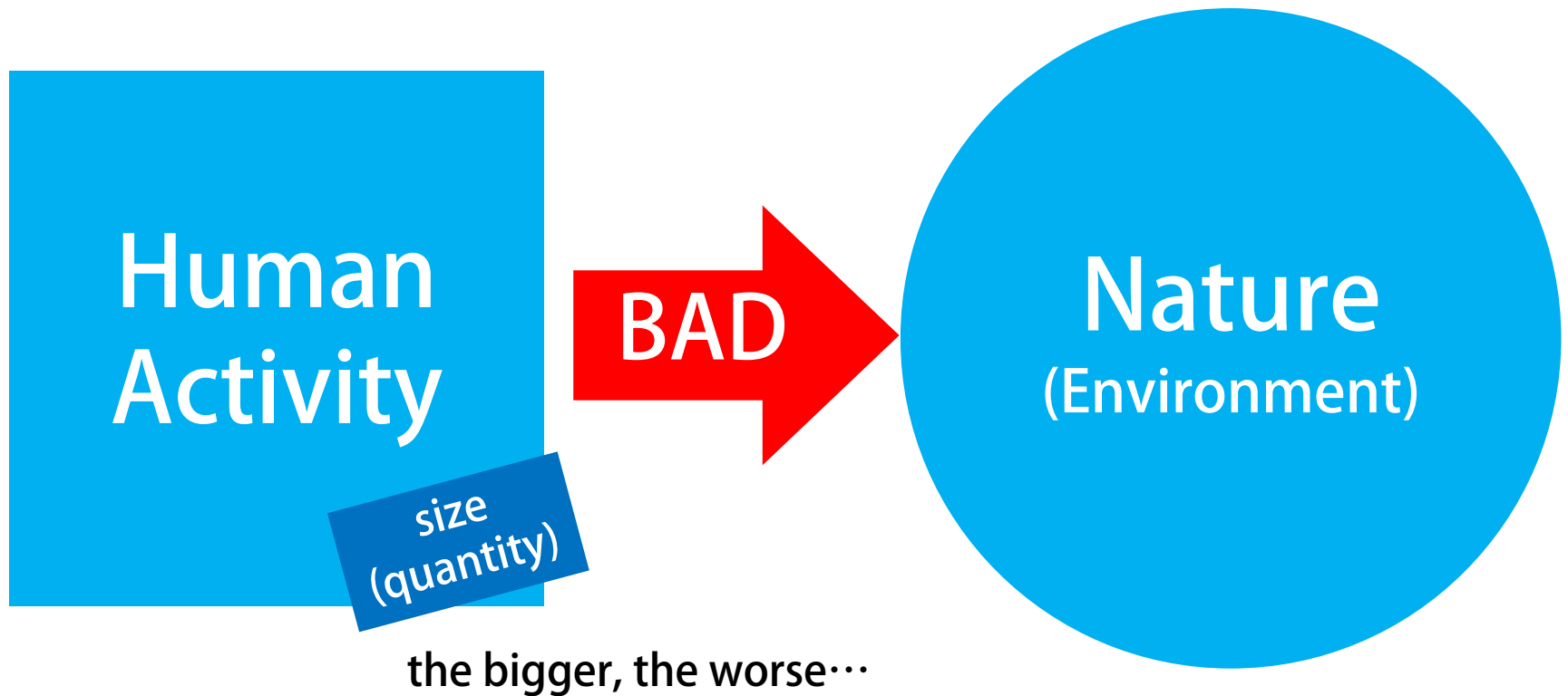
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ver.1

ver.2

I=PAT



**What's
SATOYAMA ?**

←these gradation area→

SATO さと

里

=rural town

田 = paddy field

(with human intervention)

土 = soil

YAMA やま

山

= mountain



Maruyama (2007)

We **Care** and **Use**
Natural Stocks

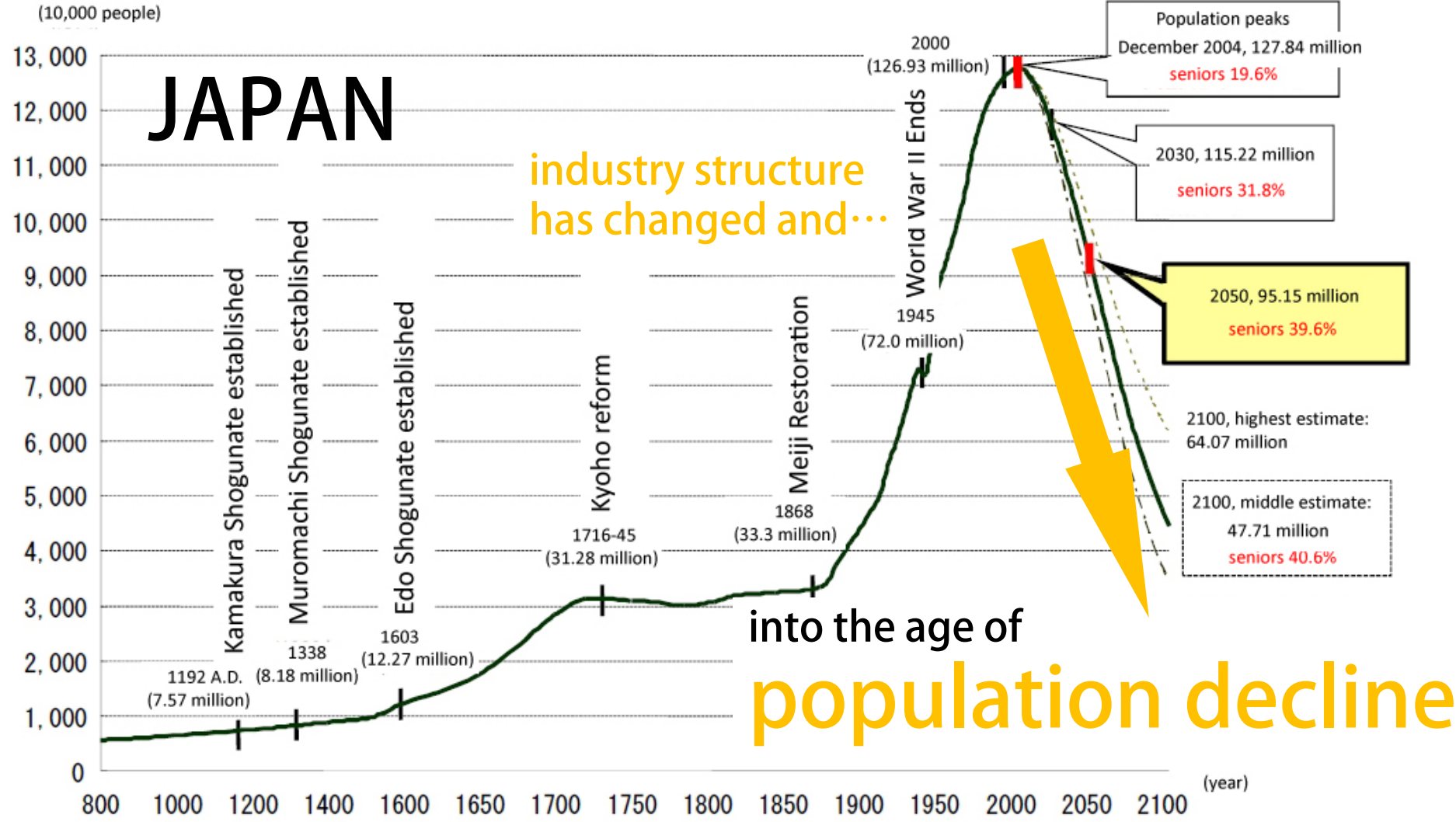


New Harmonized
Ecosystem
(Ecological Cycle)

6F

Food
Fiber
Feed
Fertilizer
Fuel
Forest





Source: Prepared by the National and Regional Planning Bureau, Ministry of Land, Infrastructure, Transport and Tourism, based on "Population Census" by the Ministry of Internal Affairs and Communications (MIC), "Population Estimates" by MIC, "Intercensal Adjustment of Current Population Estimates (2000-2005)" by MIC, "Population Projections for Japan: 2006-2055: Outline of Results, Methods, and Assumptions" by the National Institute of Population and Social Security Research, and "Long-term Time-series Analysis of Population Distribution Change in the Japanese Archipelago (1974)" by the National Land Agency.

The National Biodiversity Strategy of Japan 2012-2020

Roadmap towards the Establishment of an Enriching Society in
Harmony with Nature

Section 3 The structure of the biodiversity crisis.....

- 1 First crisis (caused by human activities including development).
- 2 Second crisis (caused by reduced human activities).....
- 3 Third crisis (caused by artificially-introduced factors)
- 4 Fourth crisis (caused by changes in the global environment).....

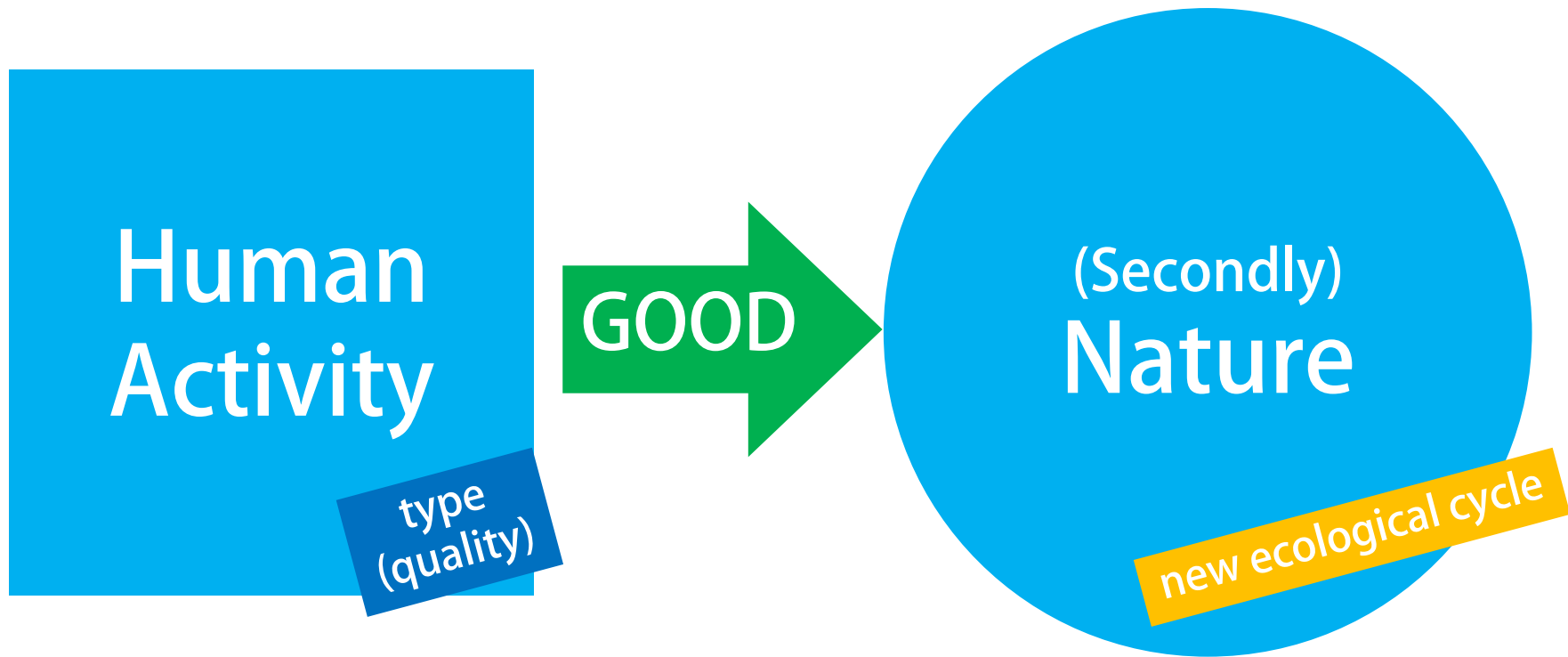


CRISIS

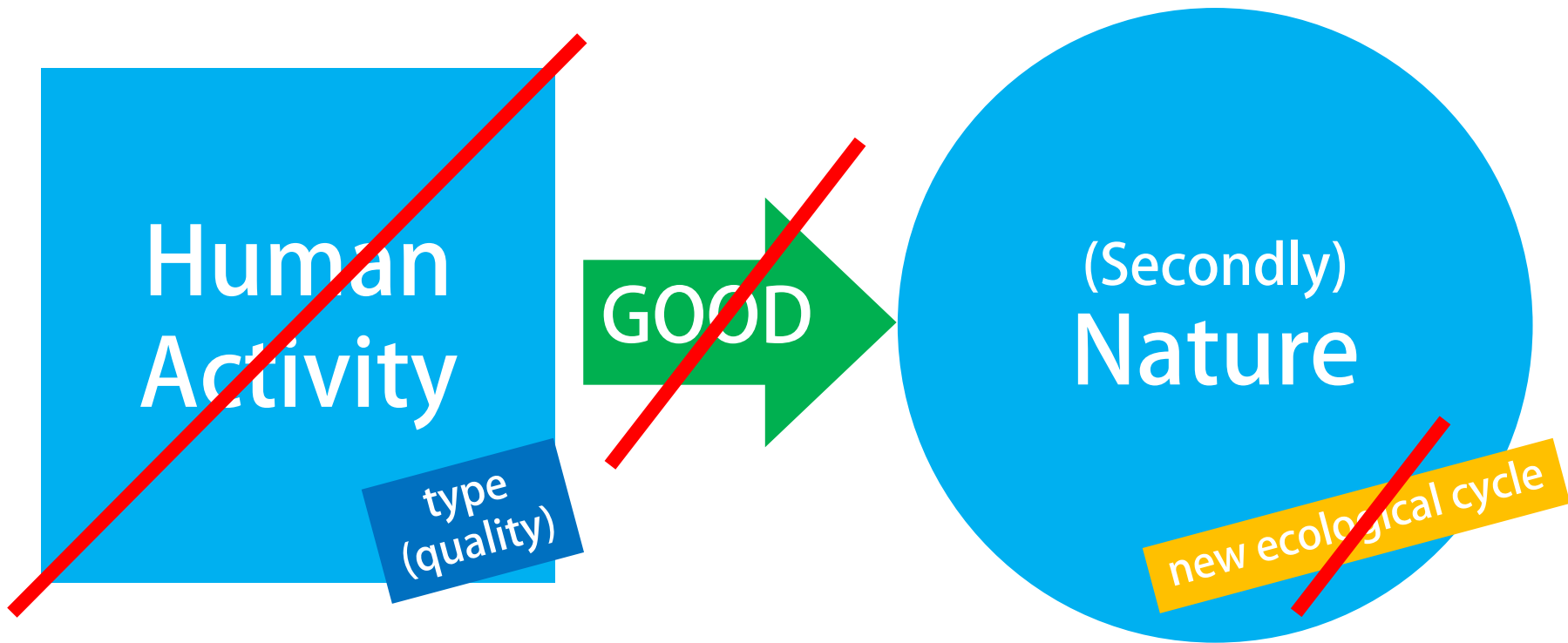


collapse ecological harmony
harm to human timber production/agriculture

Satoyama



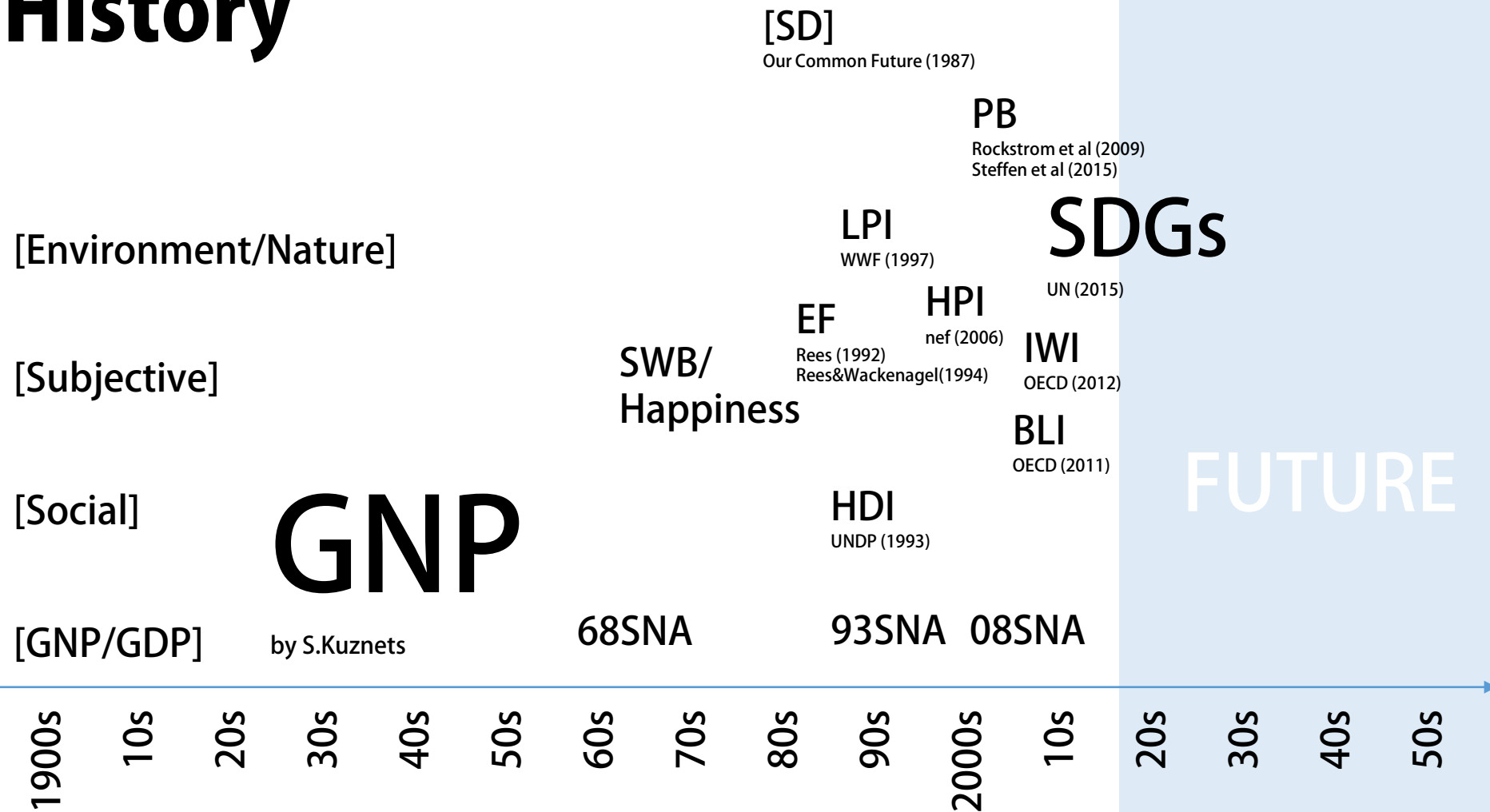
Satoyama



Examples of some SD Indicators

Thesedays

History



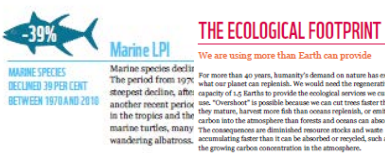
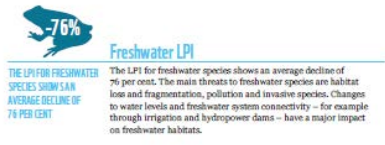
SDGs (2015) :Sustainable Development Goals



2016=>2030

17 Goals
169 Targets
many Indicators

LPI: Living Planet Index EF: Ecological Footprint PB: Planetary Boundaries (DE: Doughnut Economics)



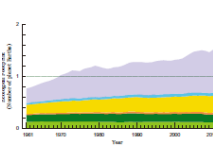
THE ECOLOGICAL FOOTPRINT

We are using more than Earth can provide

For more than 40 years, humanity's demand on nature has exceeded what our planet can regenerate. We would need the regenerative capacity of 1.4 Earths to provide the ecological services we currently use. "Overshoot" is possible because we cut trees faster than they mature, harvest more fish than oceans replenish, or emit more carbon into the atmosphere than forests and oceans can absorb. The consequences are diminished resources, acidic soil and waste accumulating faster than it can be absorbed or recycled, such as with the growing carbon concentration in the atmosphere.

The Ecological Footprint adds up the ecological goods and services people demand that compete for space. It includes the biologically productive area (or bioproduct) needed for crops, grazing land, built-up areas, fishing grounds and forest products. It also includes the area of forest needed to absorb additional carbon dioxide emissions that cannot be absorbed by the oceans. Both bioproduct and Ecological Footprint are expressed in a common unit called a global hectare (gha).

Carbon from burning fossil fuels has been the dominant component of humanity's Ecological Footprint for more than half a century, and remains on an upward trend. In 1965, carbon was 36 per cent of our total Footprint; by 2010, it accounted 59 per cent.



PLANETARY BOUNDARIES

Defining the safe space for life on Earth

Complementary information and indicators deepen and extend our understanding of our living planet by pointing out to focus on global issues or zooming in on specific regions, themes or species. Humans have benefited hugely from the extraordinarily predictable and stable environmental conditions of the last 10,000 years – the geological period known as the Holocene, which made it possible for settled human communities to evolve and eventually develop into the modern societies of today. But the world has entered a new period – the "Anthropocene" – in which human activities are the largest drivers of change at the planetary scale. Given the pace and scale of change, we can no longer exclude the possibility of reaching critical tipping points that could abruptly and irreversibly change living conditions on Earth.

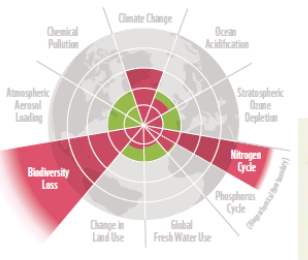


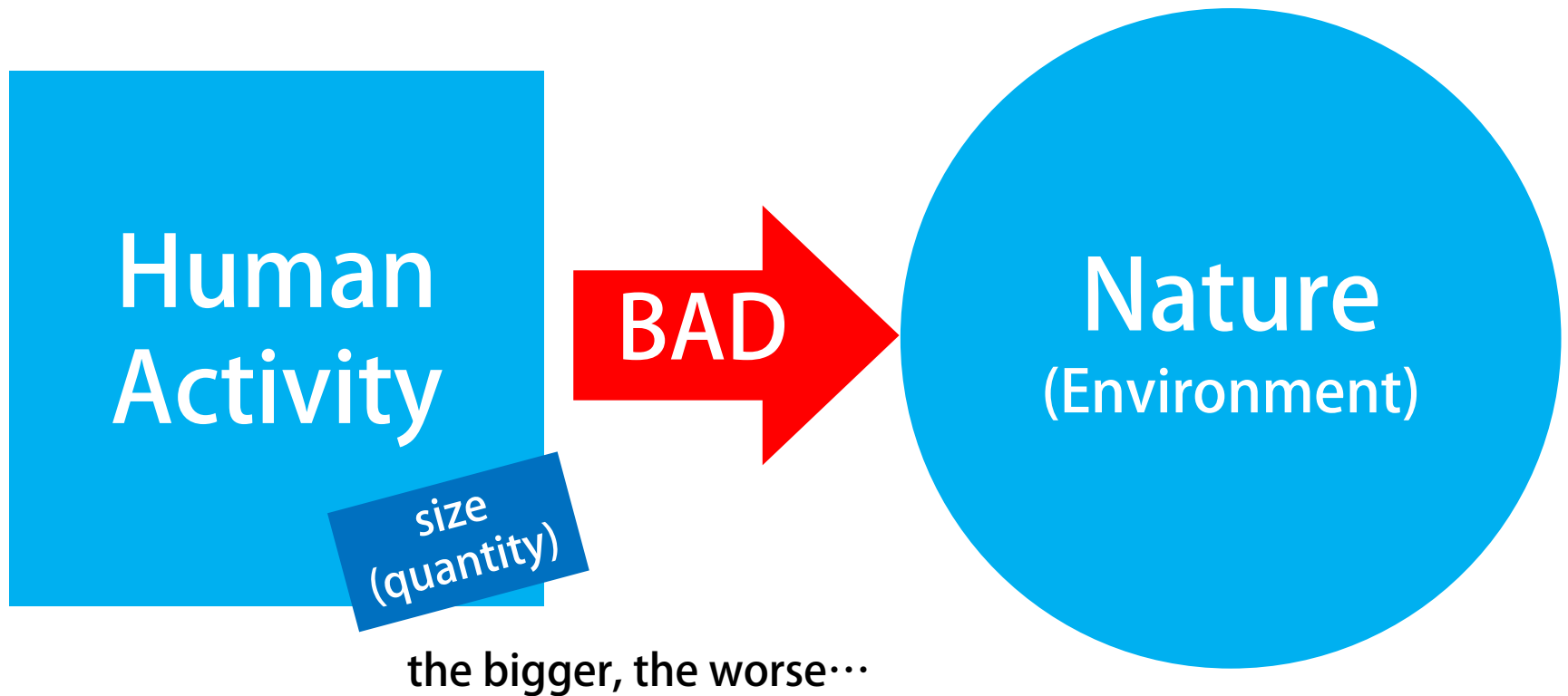
Figure 10: Planetary Boundaries
Defining planetary boundaries establishes a "safe operating space for humanity" where we have the best chance of maintaining a stable and diverse planet for many generations to come (Steffen et al., 2015).

Figure 11: The Oceans Drought – A safe and just operating space for humanity
Says so that it avoids crossing environmental tipping points, and just in that it ensures that every person achieves certain standards of health, wealth, power and participation (Klausner, 2012).



WWF (2014)

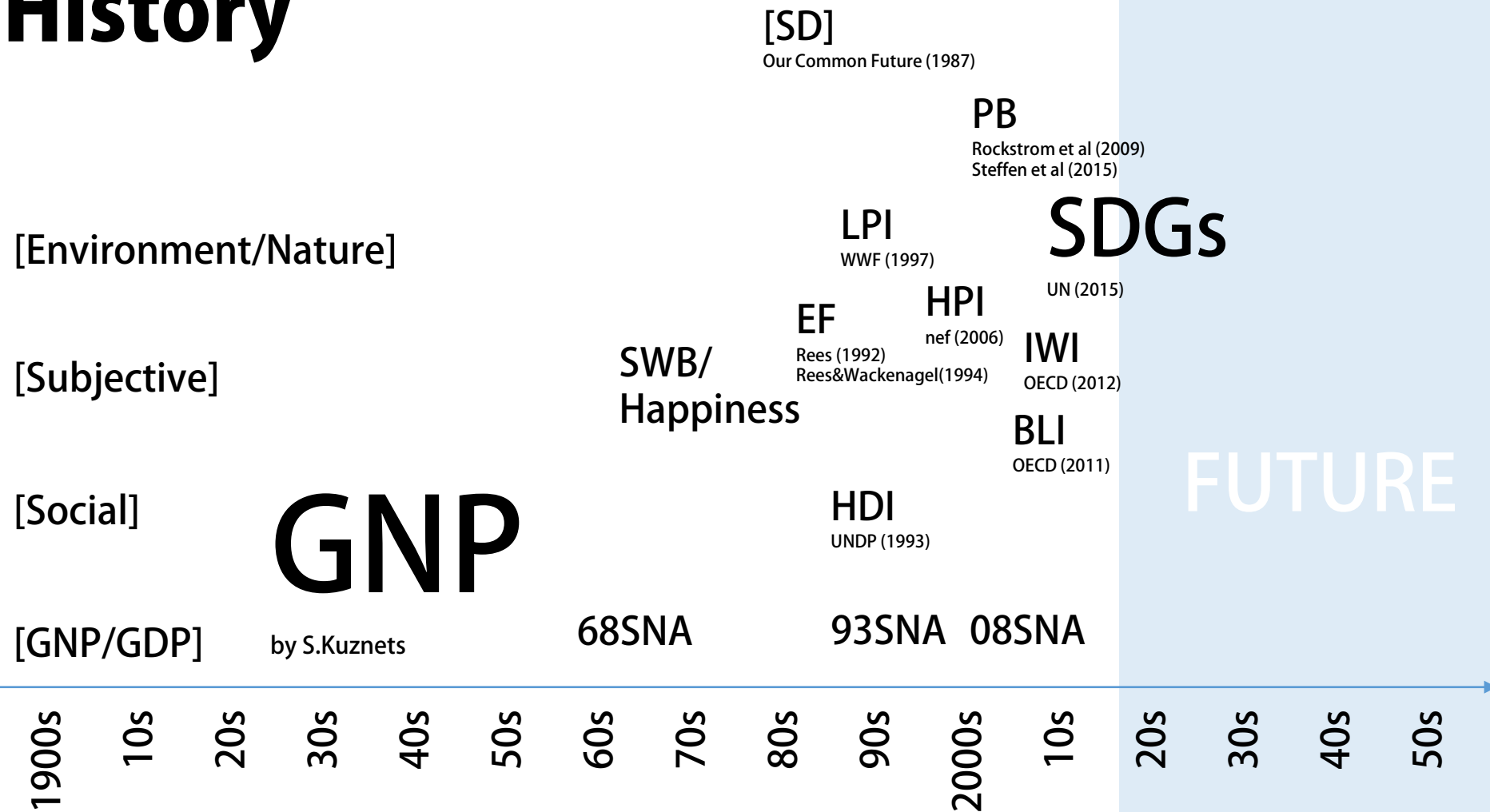
These are mainly based on
I=PAT model



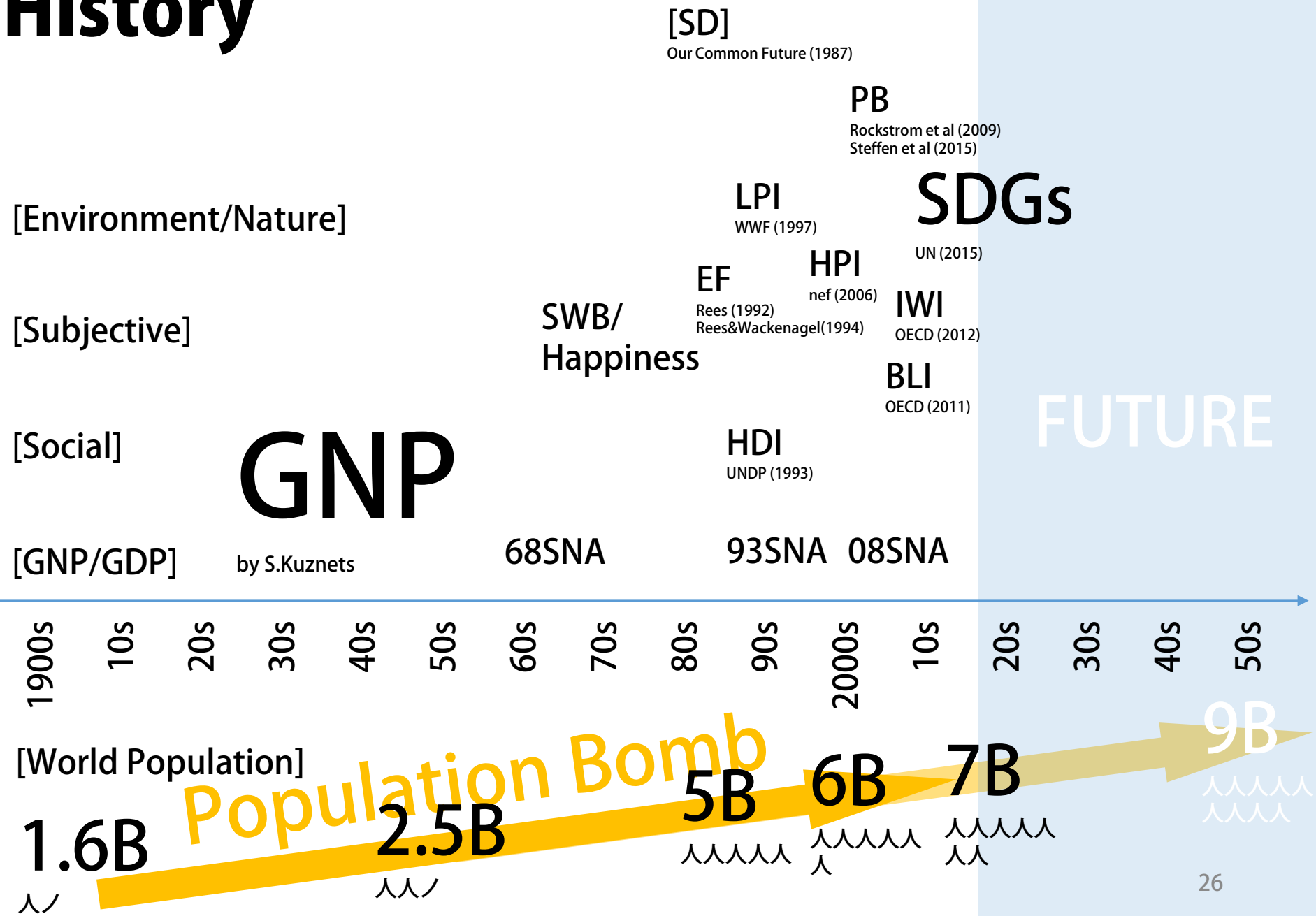
DISCUSSION (1)

why I=PAT model ?

History

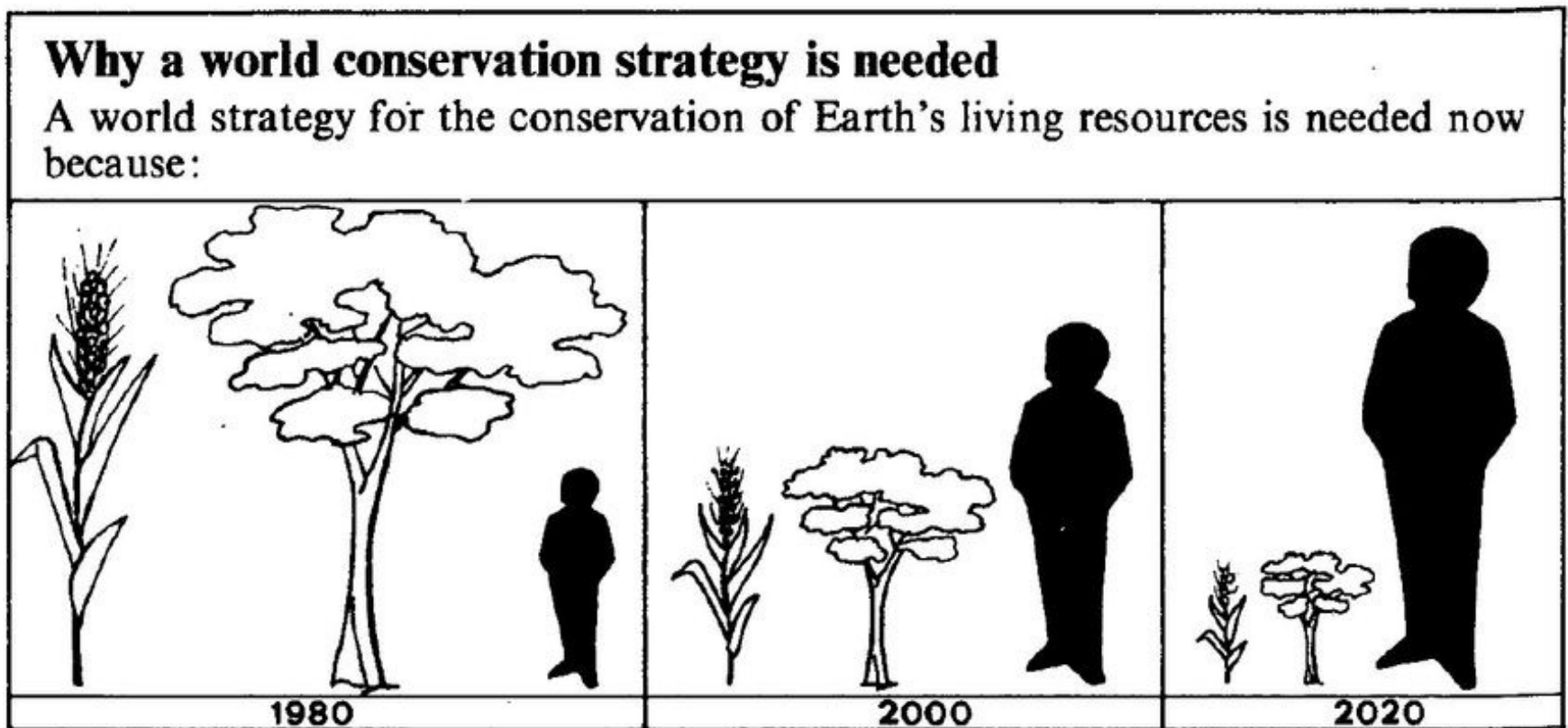


History



IUCN et al.(1980) World Conservation Strategy

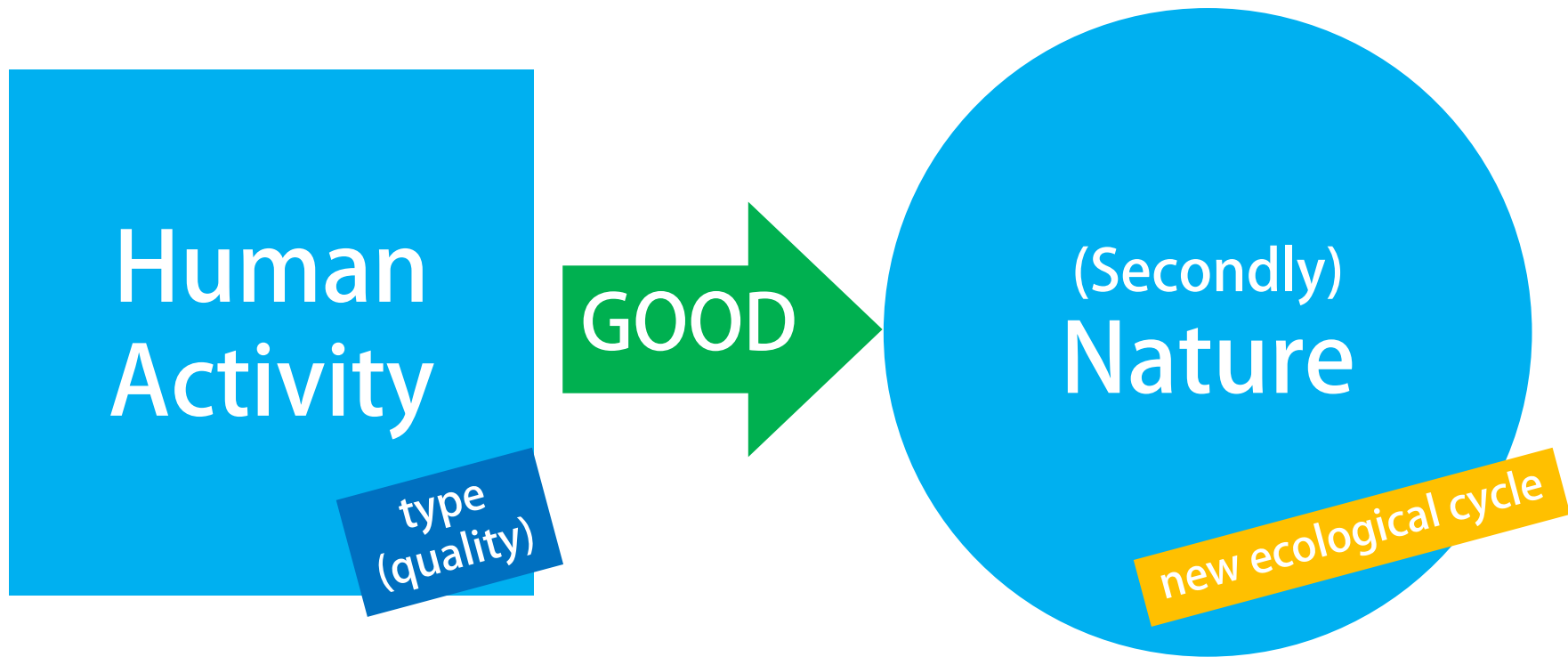
the term "Sustainable Development" first used in the international context
increasing population was the big problem



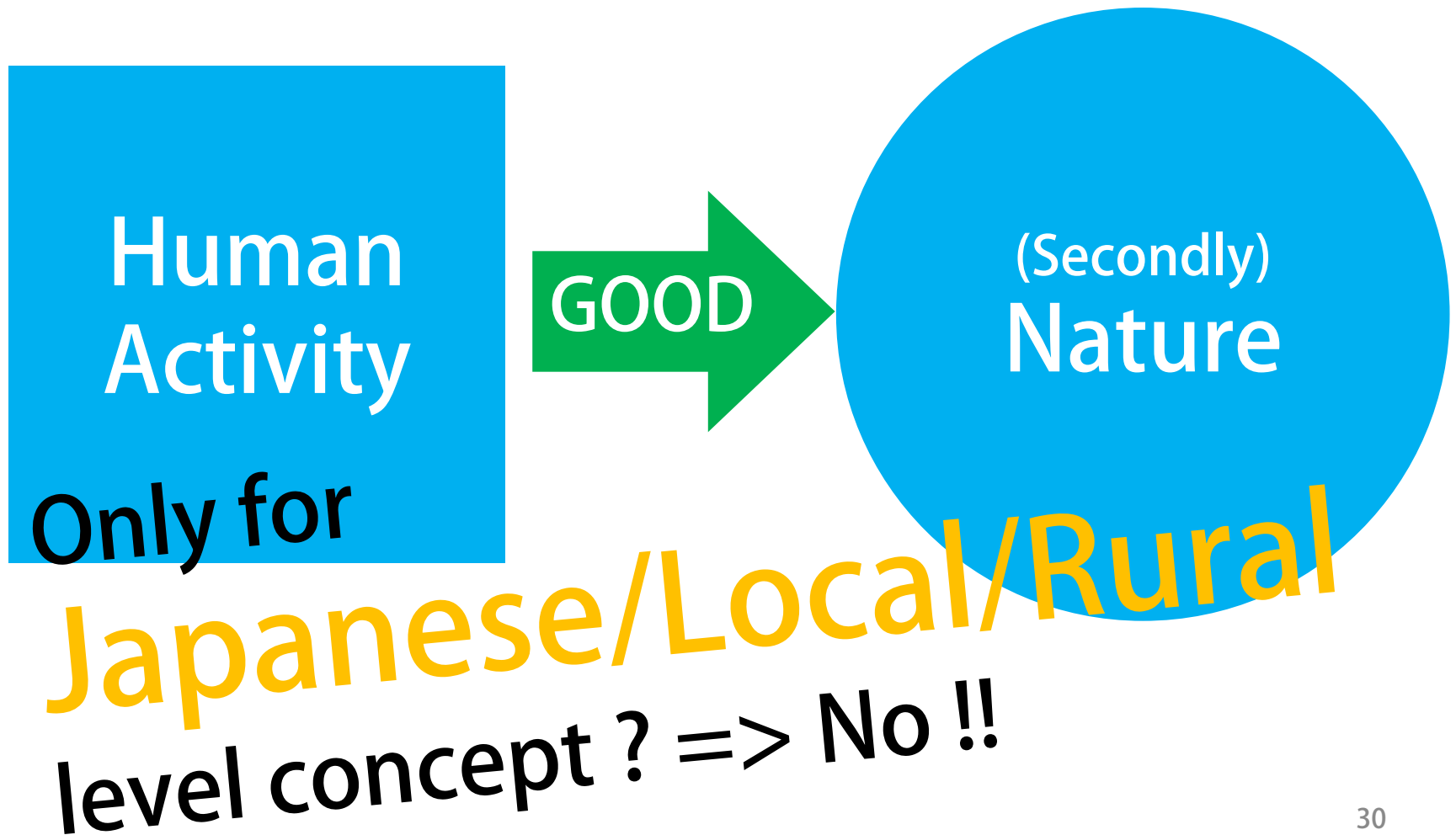
DISCUSSION (2)

about Human and Nature

Satoyama



SATOYAMA



Satoyama model = a new paradigm

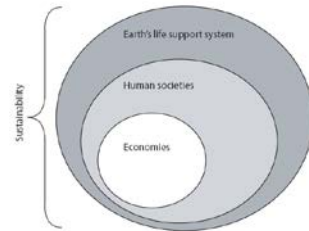
I: Human **AND** Nature

nature is just an outer separated resource

I=PAT

II: Human **IN** Nature ← now main paradigm

nature (earth) is our fundamental base



III: Human **AS** Nature

we human are part of nature

our activity can be a part of (new harmonized) ecological cycle

=Satoyama

Conclusion

Summary Statement

big stream & important

I=PAT

model logic

human AND/IN nature

also needed

Satoyama

model logic

new paradigm

human AS nature

Many previous **sustainable development / sustainability indicators** are based on **I=PAT model** (environmental Impact = Population * Affluence * Technology), though **SATOYAMA model** (human interventions play good roles) is also needed.

Implication for Impact Assessment

We should consider...

Demographic Change(now&future)

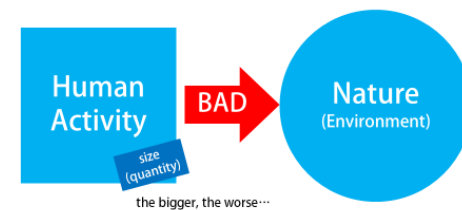
- Increasing / Decreasing
- Aging

Both Impact

- Good Impact / Bad Impact

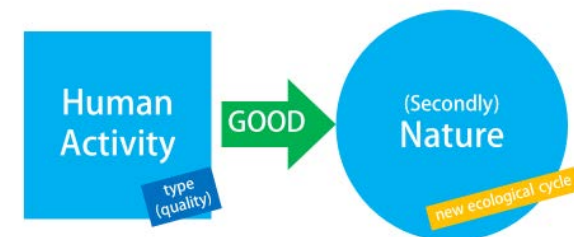
and we may actively
make positive impacts

These are mainly based on
I=PAT model



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Satoyama



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Thanks

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facebook/ linkedin

Appendix

Discussion Point

I am wondering...

Satoyama logic model is...

- only for
 - **Japan** ? (other country?)
 - **local** level ? (national/ regional/ global/ universal level?)
 - **rural** area ? (urban area?)
- really
 - **paradigm** level ?
 - only technical level ? (e.g. I=PAT, T<0)

Additional IDEA

Neo-Satoyama

cf. Urban mine

cf. Man-made naturally-regenerating forest

Definitions of SD

1) Our Common Future (1987)

Needs, Present generation, Future generation

2) Triple Bottom Line (+ α)

Environment, Society, Economy (+ Well-being...)

3) Herman Daly's Principles

Renewable resources, Non-renewable resources, Waste absorption

4) Non-decline of well-being

Headonic well-being, Evaluative well-being, Eudaimonic well-being

5) Non-decline of productive base

capital assets, enabling assets

6) Non-decline of population

Stiglitz, Sen, Fittoussi (2009; 2010)

Beyond GDP

- 1) improve GDP**
- 2) measure Quality of Life**
- 3) measure Sustainability**

Roles of Indicators

- 1) Instrumental role
- 2) Conceptual role
- 3) Political role

EU FP7 Research Project

POINT: policy influence on indicators

BRAINPOOL: bringing alternative indicators into policy