



Title	Initiatives by Higher Education for Establishing a Sustainable Society
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# Initiatives by Higher Education for Establishing a Sustainable Society

Motoyoshi Ikeda

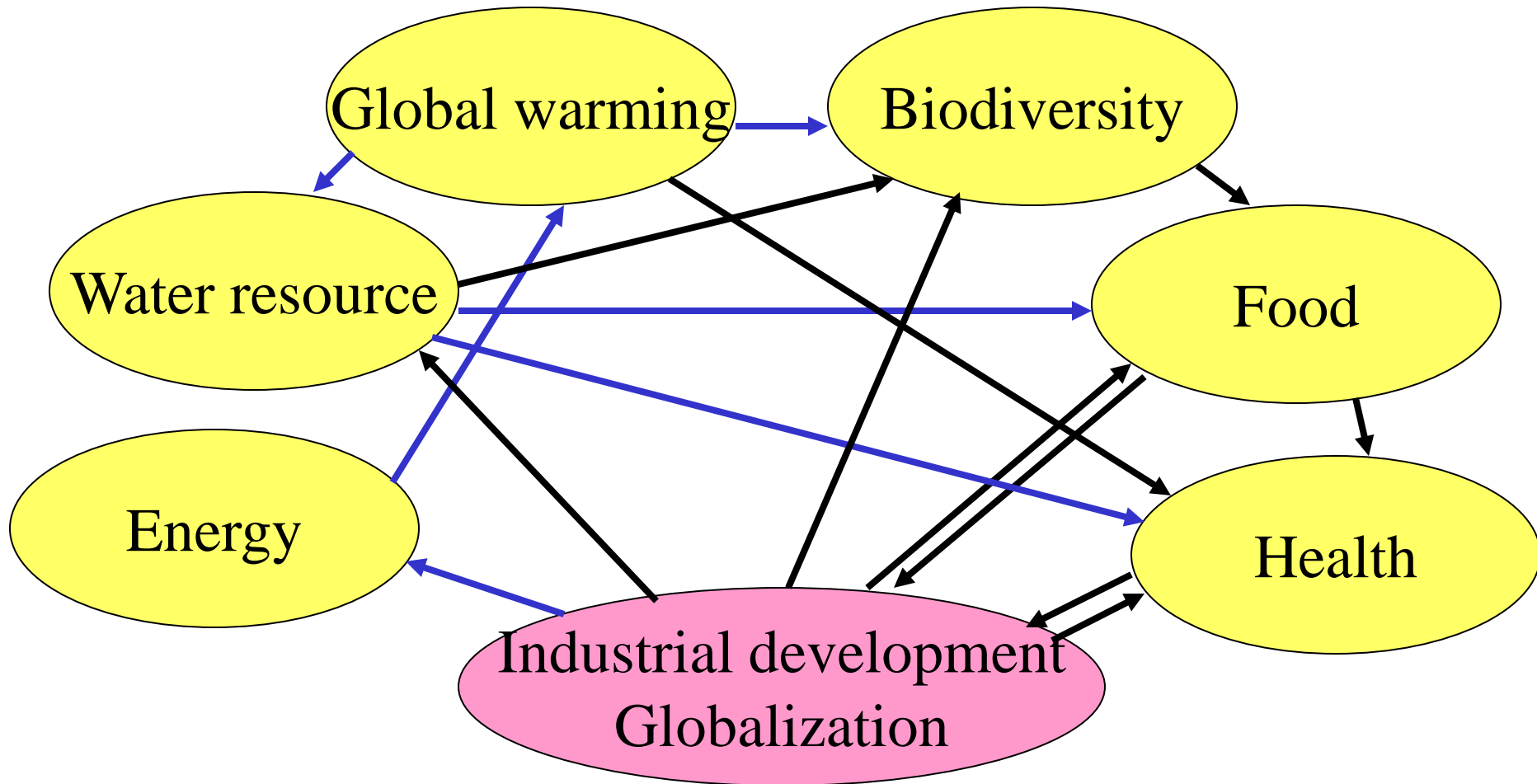
Graduate School of Environmental Science

Hokkaido University

## Key points

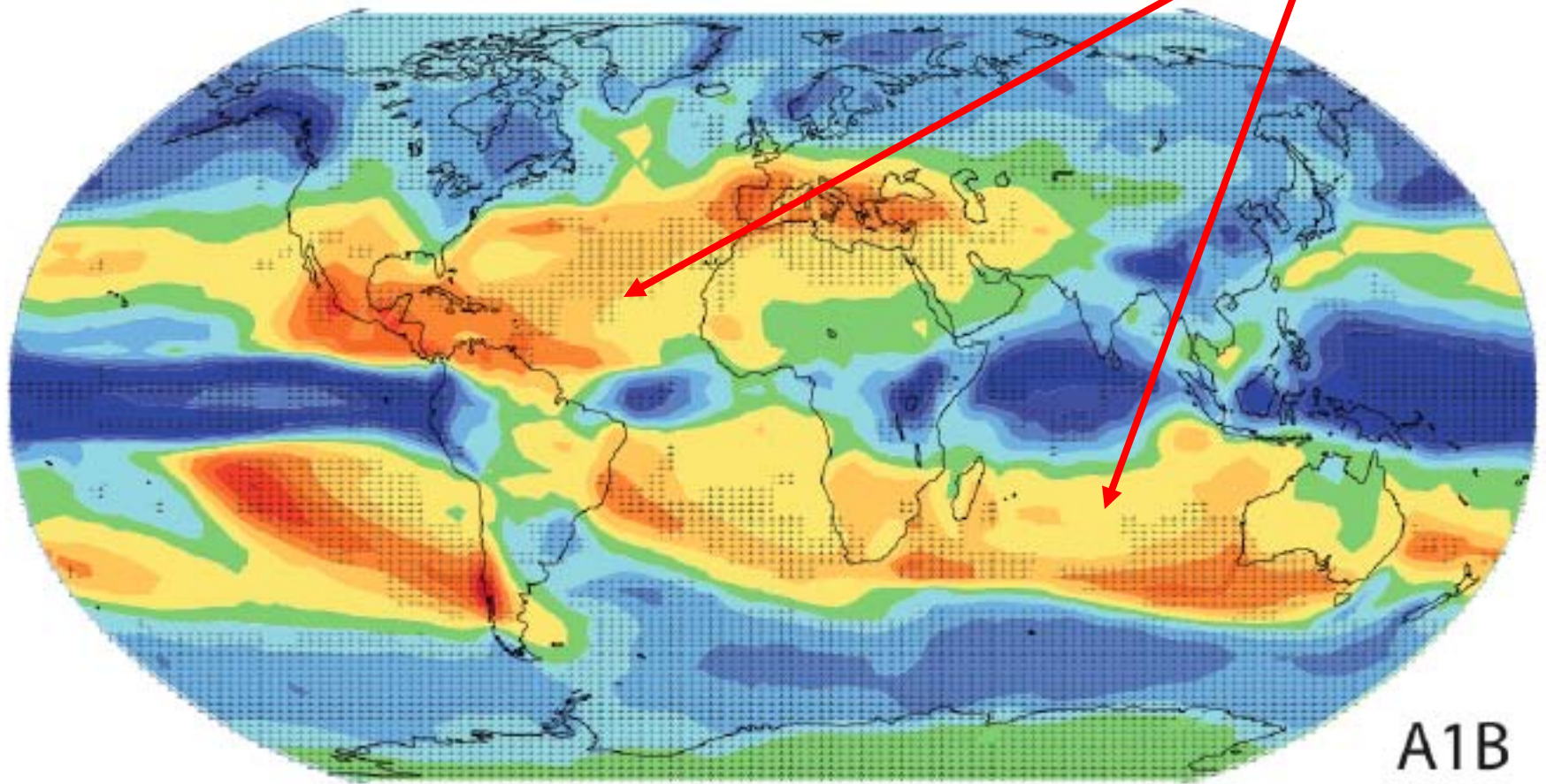
- Six urgent issues:  
ENERGY, GLOBAL WARMING,  
BIODIVERSITY, FOOD PRODUCTION,  
WATER SUPPLY and HEALTH.
- The primary cause in the SOCIETAL SYSTEM
- Efforts of resolving one issue  
⇒ an opposite impact on the others
- The issues in complicated relationship

# Feedbacks among Urgent Issues



Once each issue gets worse, it worsens the others.  
Can we solve all issues at once?

# IPCC (Forth Assessment Report) 2080-2099



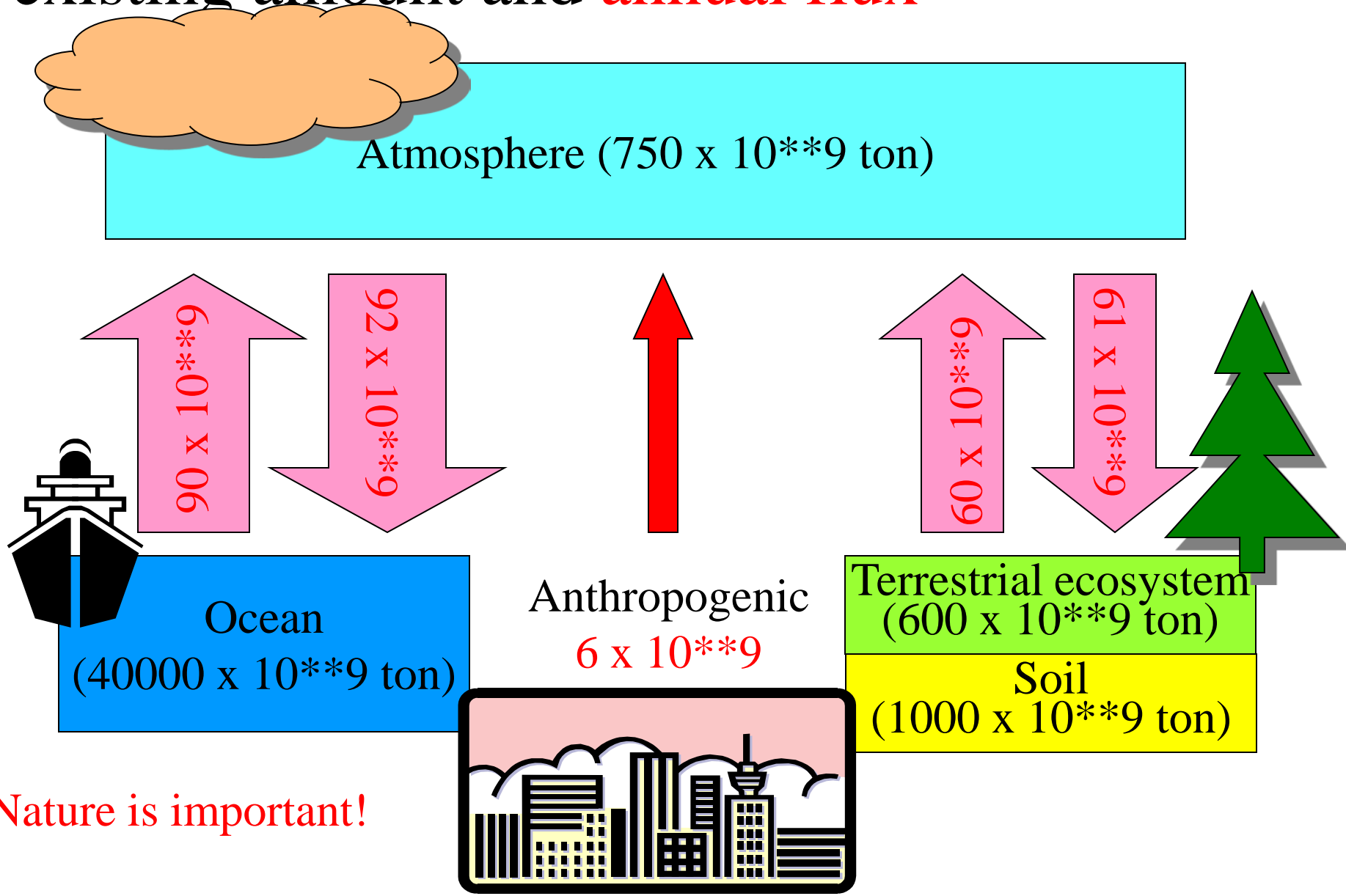
Rain reduction

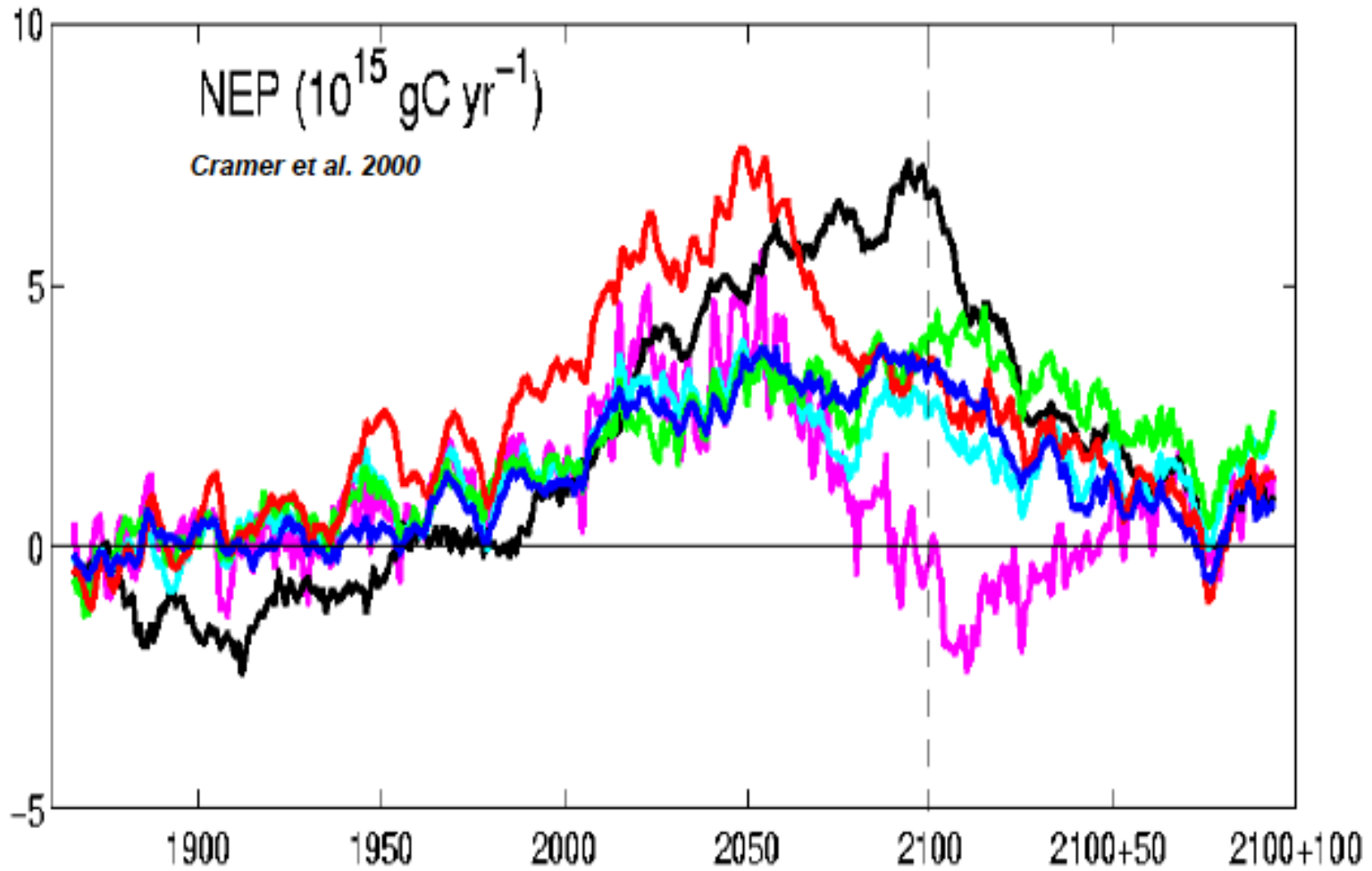


-0.5 -0.4 -0.3 -0.2 -0.1 0 0.1 0.2 0.3 0.4 0.5

Annual Mean Precipitation Change (mm/day)

# Global Carbon (Dioxide) Cycle existing amount and **annual flux**





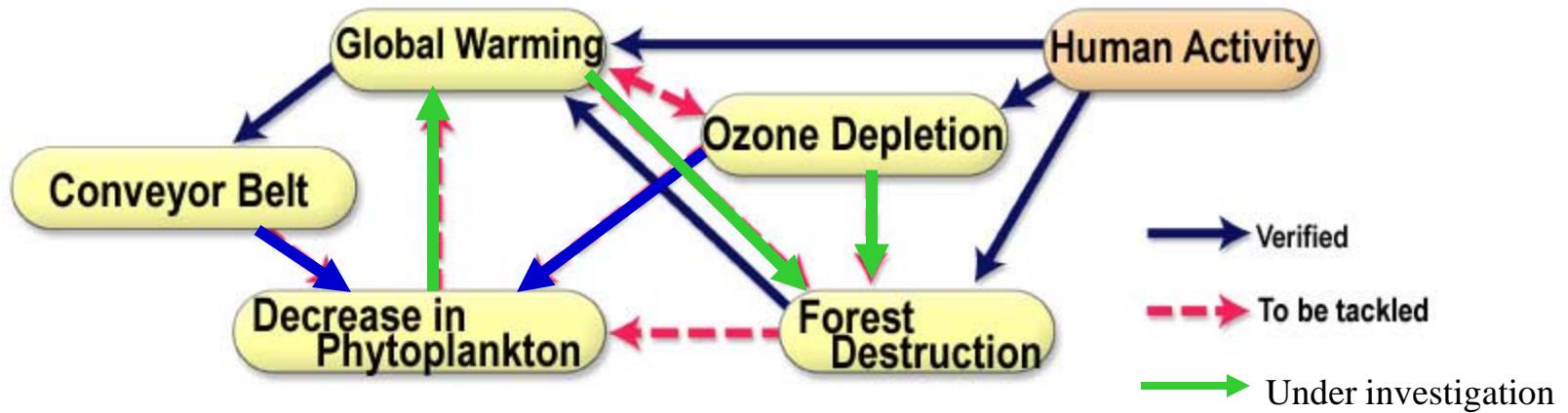
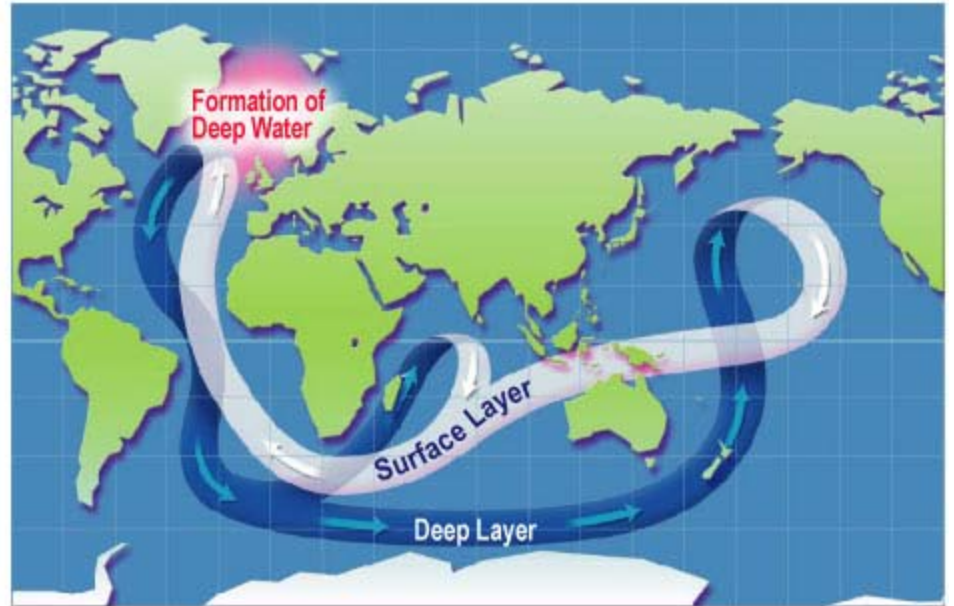
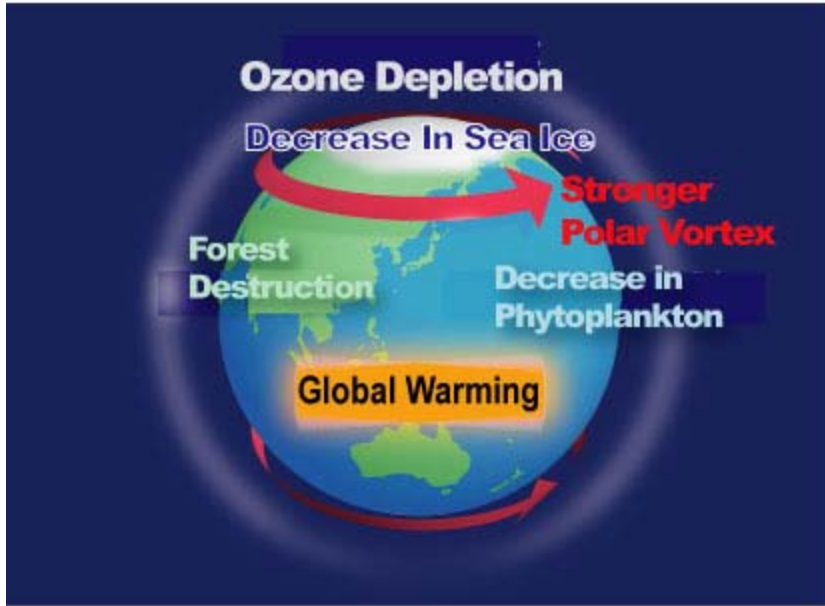
Net Ecosystem Production in various prediction models



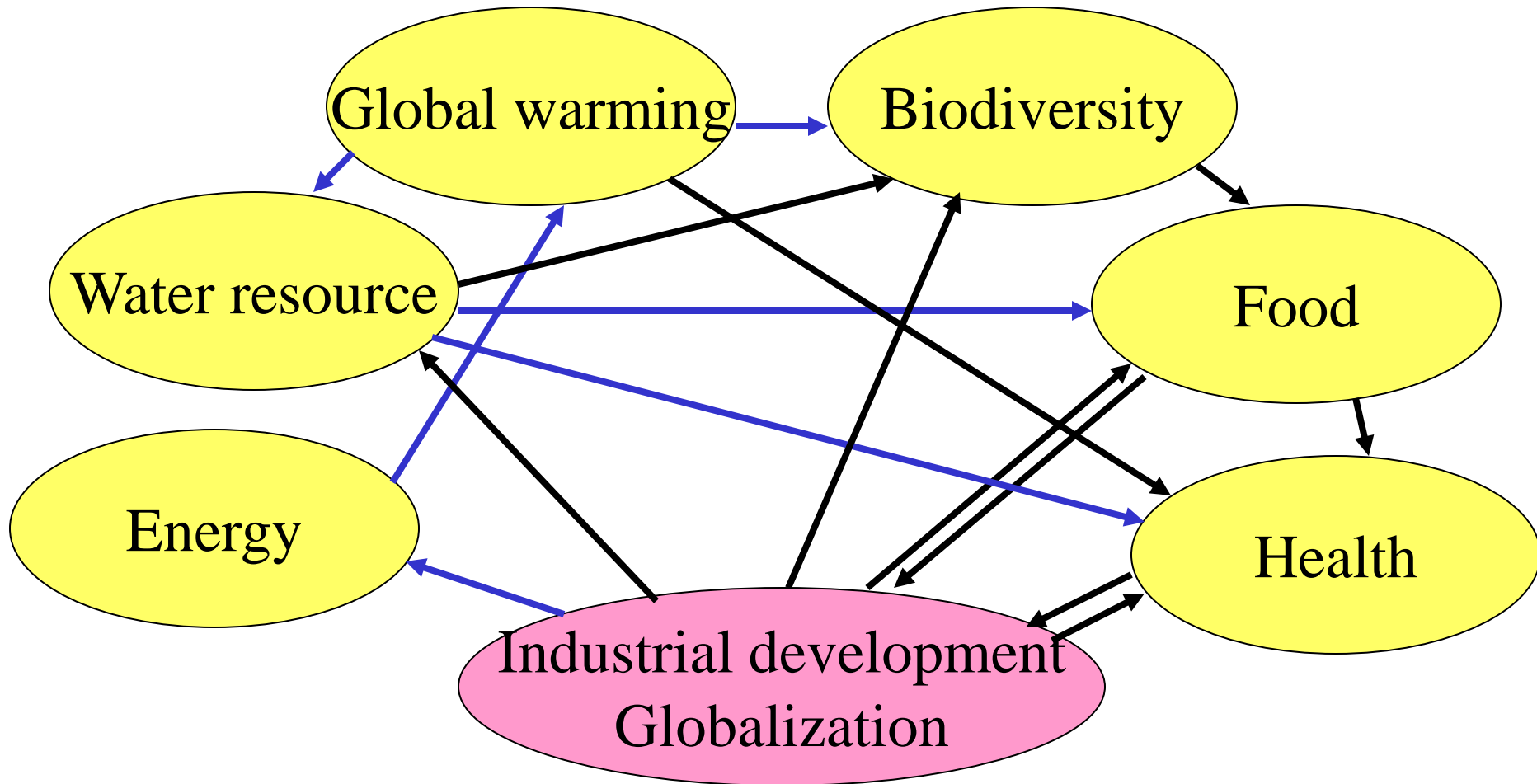


The topics that we focus on

## Clarify the mechanism of Abrupt Change

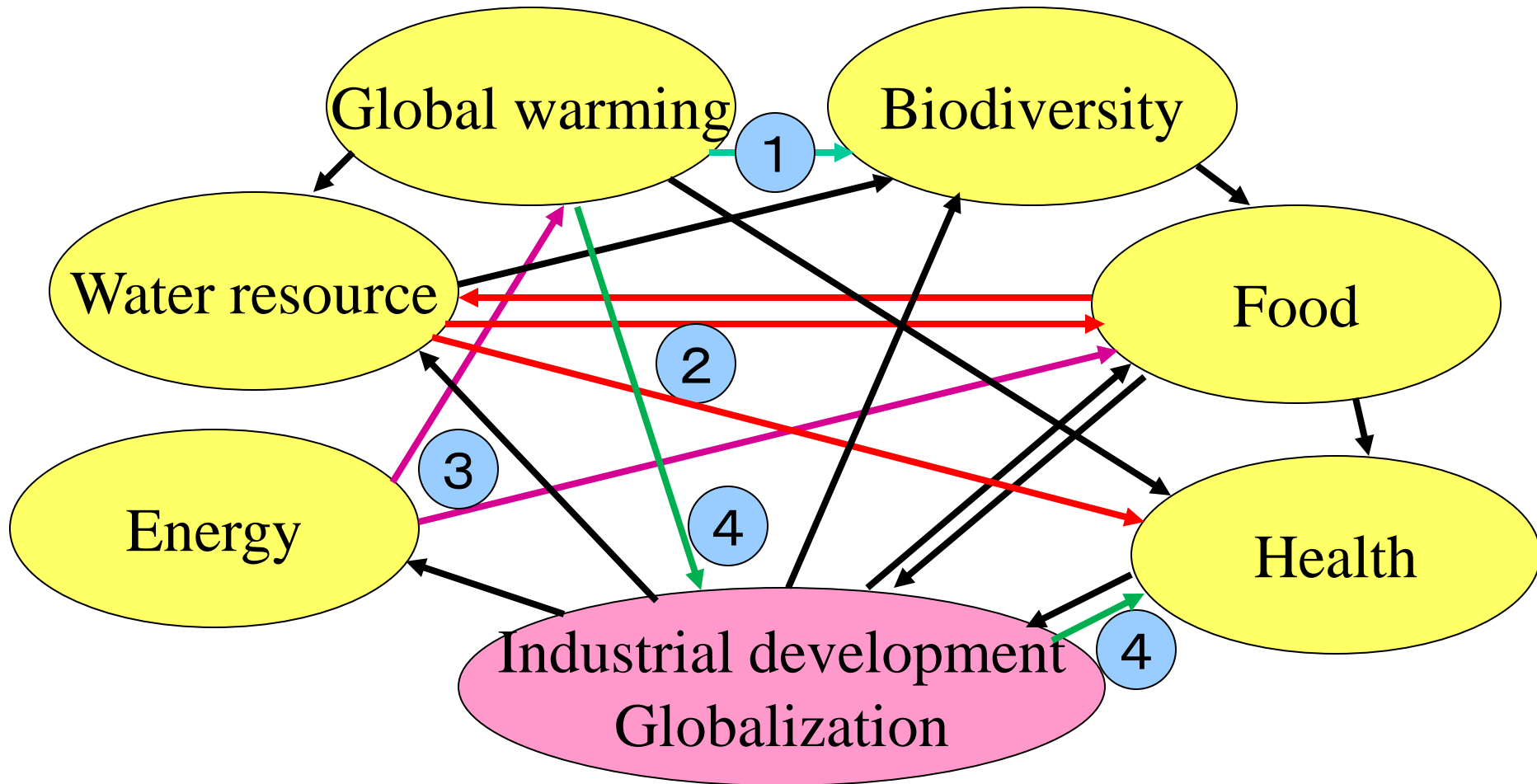


# Feedbacks among Urgent Issues



Once each issue gets worse, it worsens the others.  
Can we solve all issues at once?

# Feedbacks among Urgent Issues



However, we try to solve one issue,  
but often make others worse.

(1)  
Tree with  
higher carbon fixation  
↓  
Lower biodiversity

(2)  
More food, Water resource  
↓  
Saline soil, Health problem  
↓  
Less food

(3)  
Oil price up  
↓  
Ethanol from soybean and corn  
↓  
Food price up, Forest destruct

(4)  
Environ. technology transfer  
↓  
Higher competition  
↓  
Rich-poor distinction  
in developed countries

# Beyond Kyoto Protocol

- What will come in 2050-2100?
- The global population has increased by a factor of 2.4 in last 50 years, and will increase.
- Some of the under-developing countries will become developed countries in 50 years, and emit a large amount of carbon dioxide.
- Global warming will change the pattern of rain.
- Biodiversity is reduced and food supply is limited.
- Human health is damaged.
- How can we solve this problem?

# Green New Deal

- Aim at both of environment and economy?
- Global environment under deterioration
- Analyze nation-nation relationship in past

A few developed countries (industry) vs. Many under-developing countries (export material)

→Developing countries play roles similar to Developed countries (industrialization, severe competition, low cost labor in developed countries)

- Impossible to continue the traditional division between developed countries and developing countries
- Hope to move toward harmonious and sustainable society
- We should evaluate Green New Deal actions, on the basis of progressive and smooth shift to sustainable society.

# In Japan

- New administration has promised 25% reduction in CO2 emission by 2020.
- Useful as brainstorming
- Politicians are interested in politics (i.e., follow majority of citizens, but often in their election districts).
- Citizens should understand importance of sustainability, develop the concept and move forward to a sustainable society so that politicians follow citizens.

# Roles of higher education

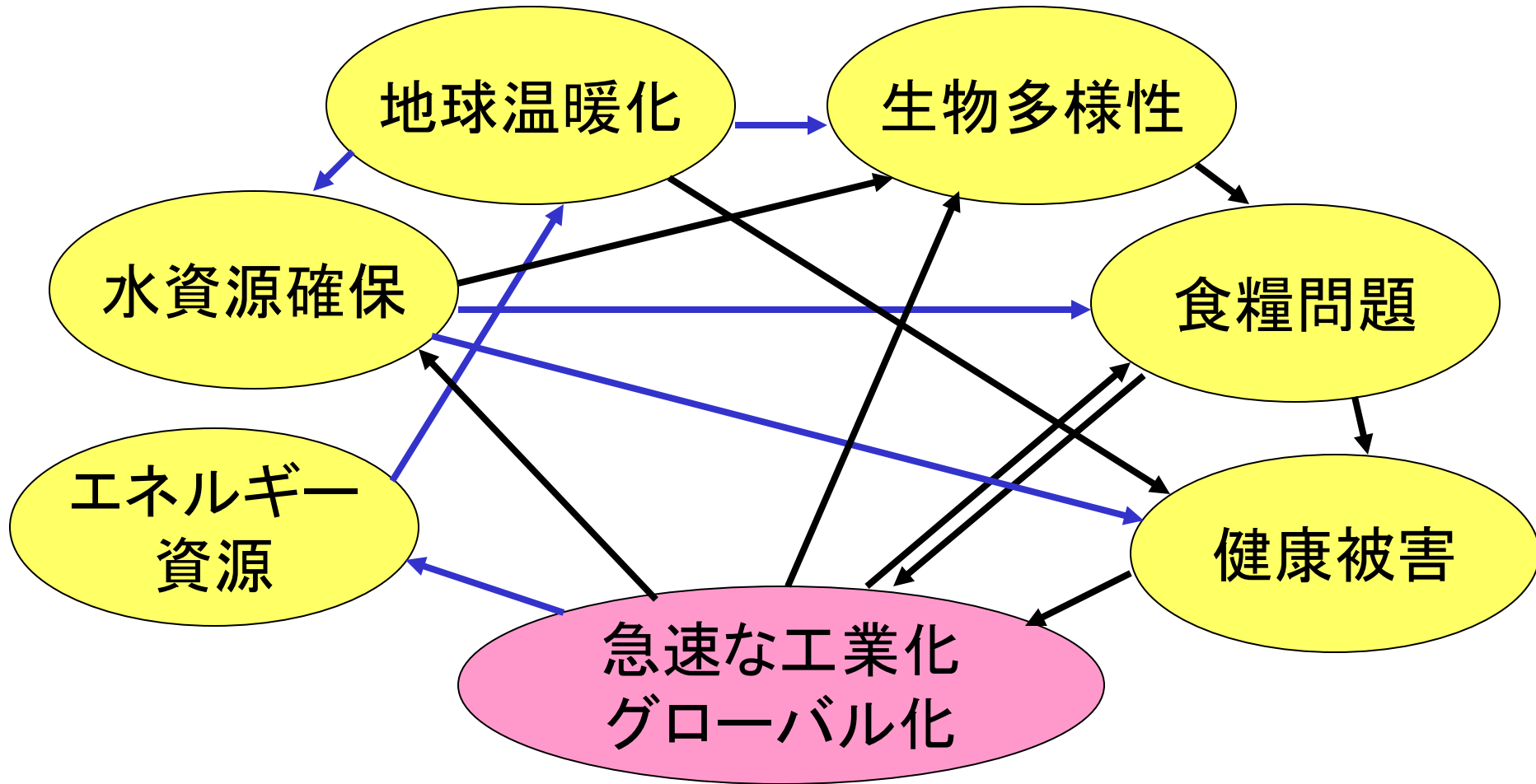
- Develop education programs for covering variety of fields with their sophisticated inter-relationship
- Encourage and support students to achieve their capability of and experience in communication and collaboration with world citizens who have diverse backgrounds in culture, economy, information, value, etc.



## 大事な点

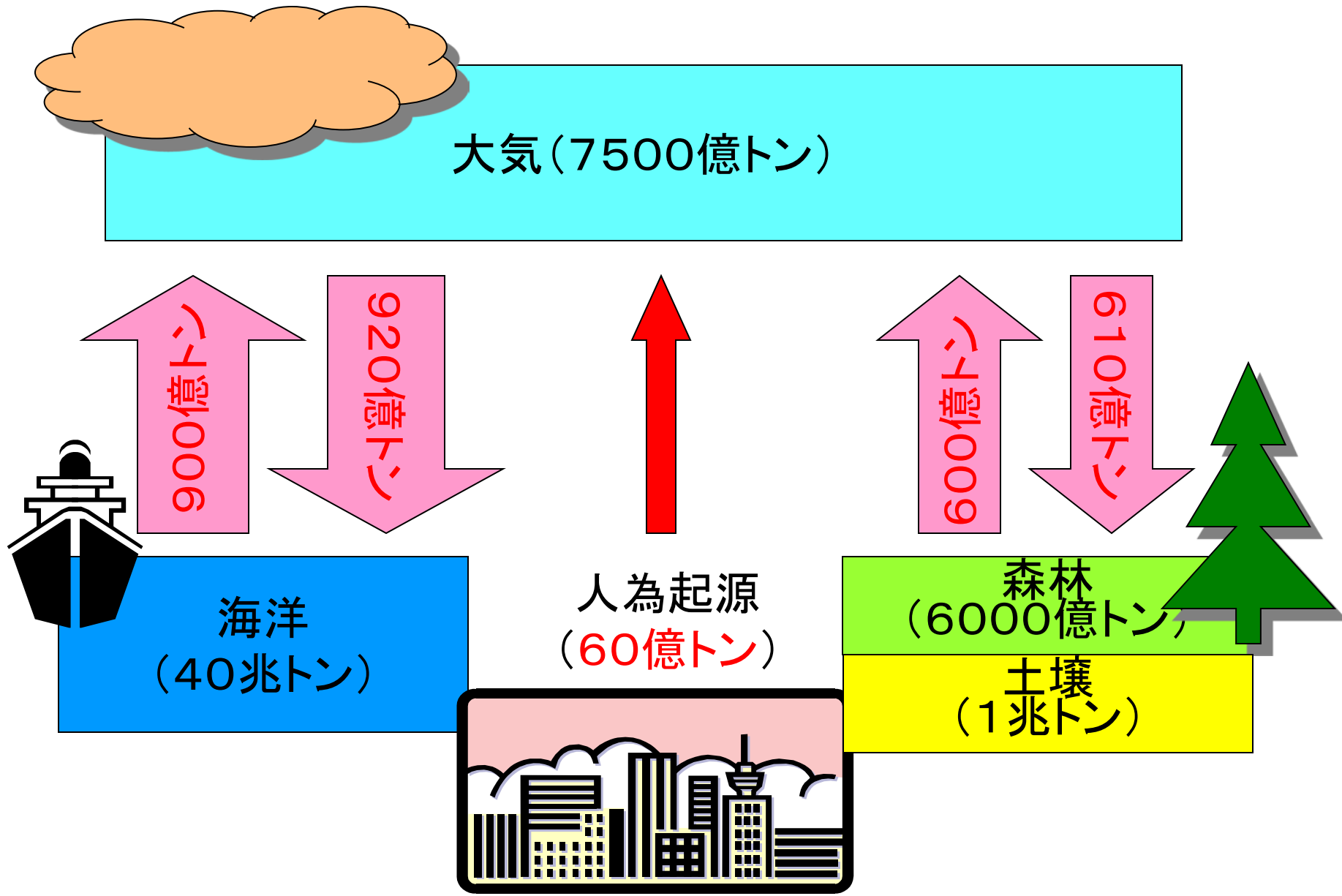
- 6つの緊急課題: エネルギー、地球温暖化  
生物多様性、食糧生産、水資源、健康
- 根底には社会システム
- 個別の課題を解決する努力  
⇒ 他への悪影響
- 諸課題の間には複雑な関係がある

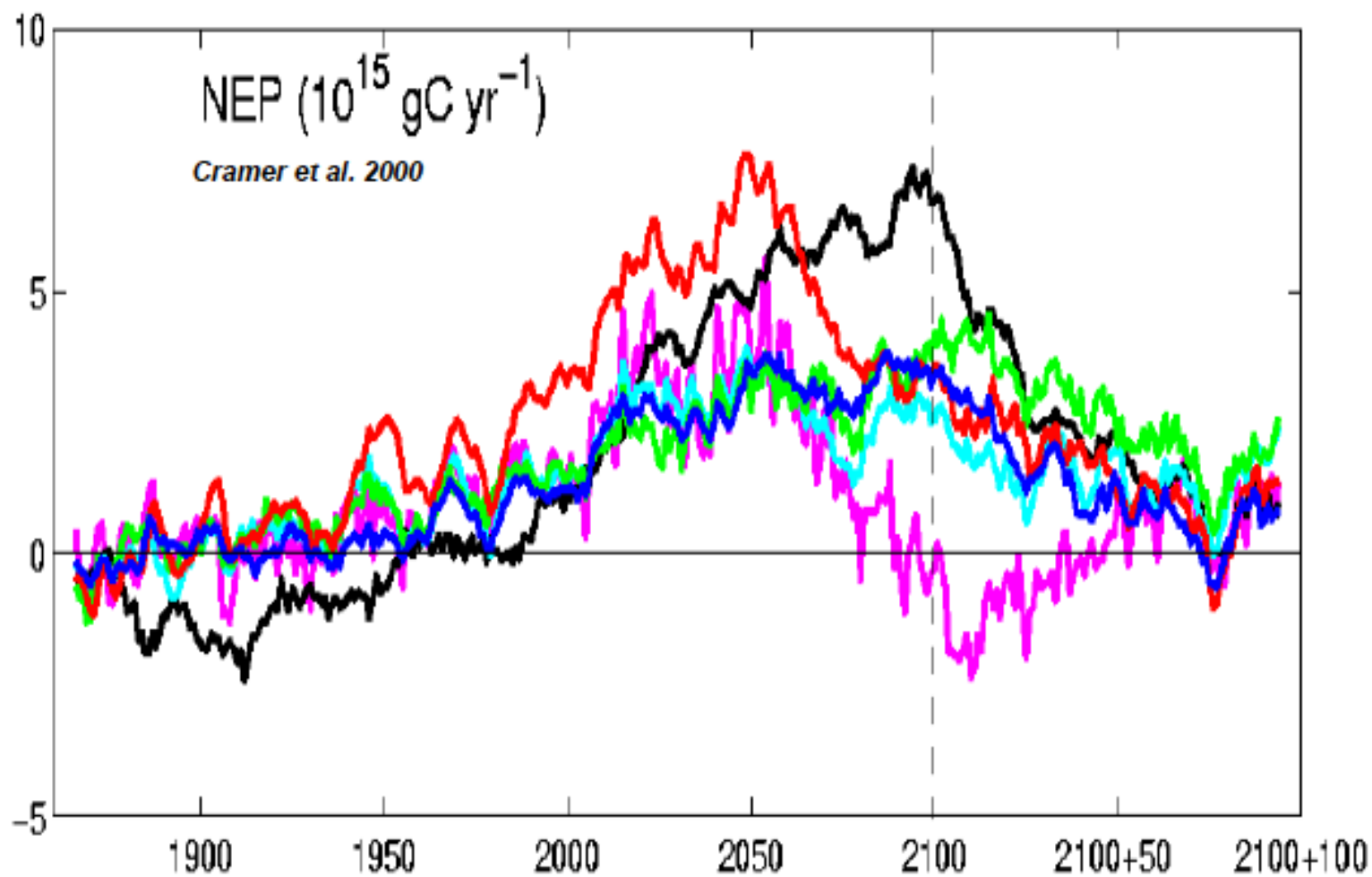
# 世界が直面している課題



ひとつの課題が悪化すると他の課題も深刻化する  
ひとつの課題の解決が他の課題も解決する？

# 地球上の炭素存在量と循環(年あたり)

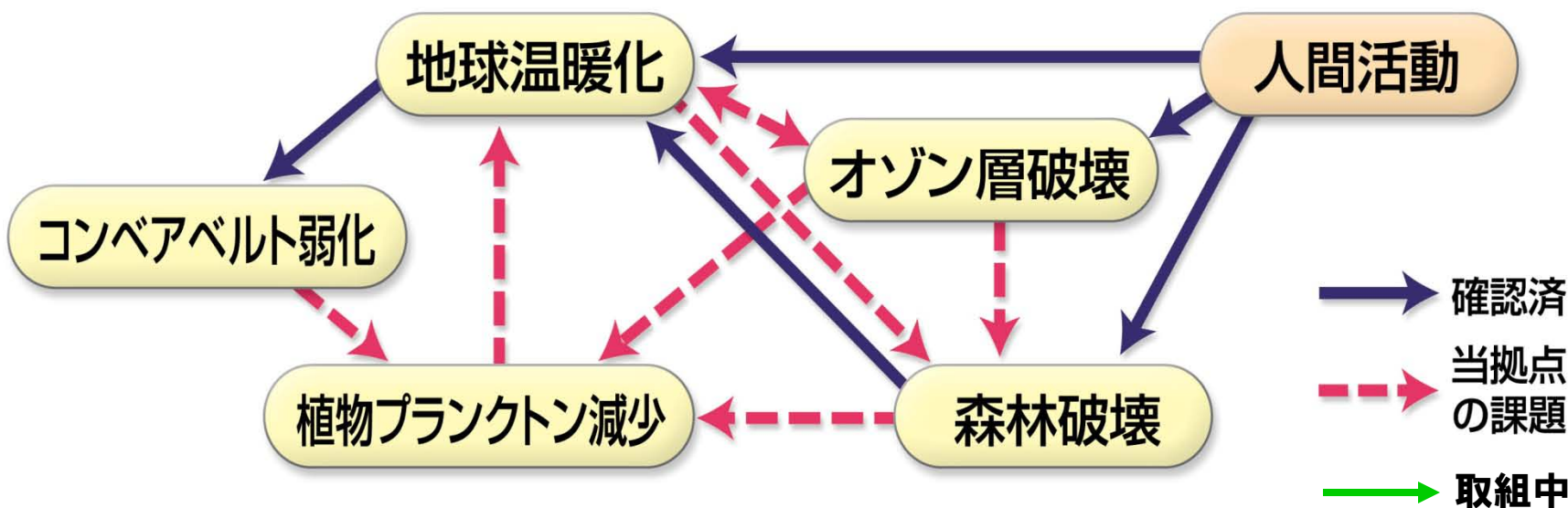




## モデルによる陸域炭素吸収量の変動予測

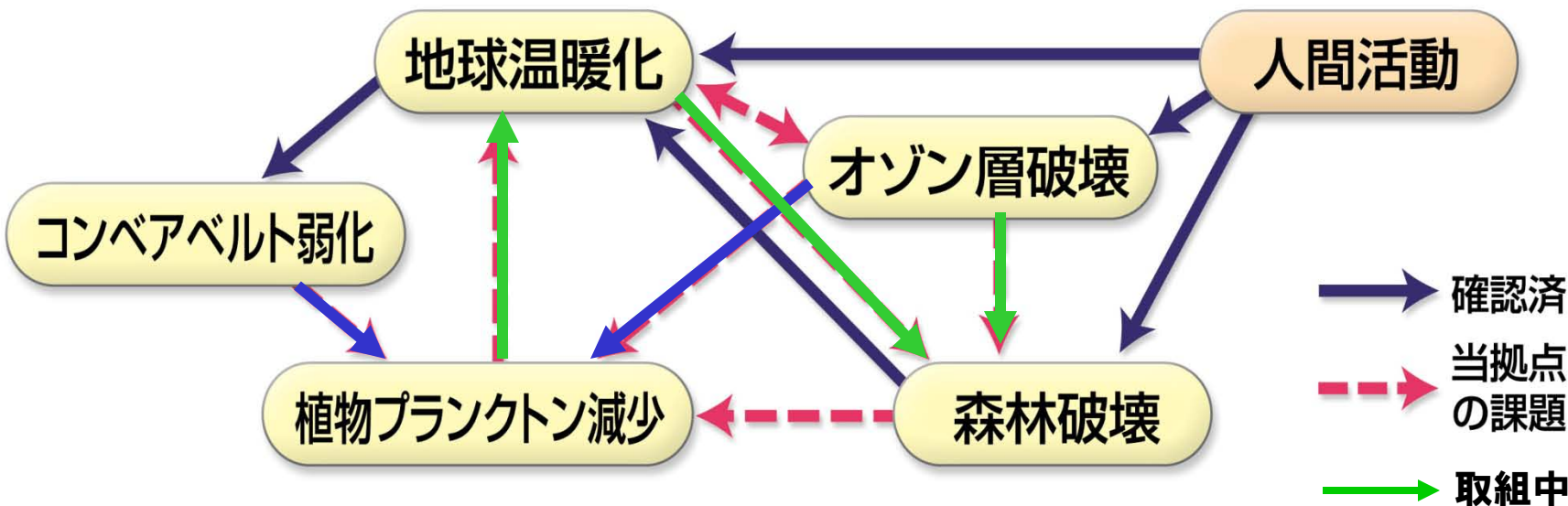
①世界最高水準の拠点形成実現に向け最重要視している事項

## 劇的变化メカニズムの解明

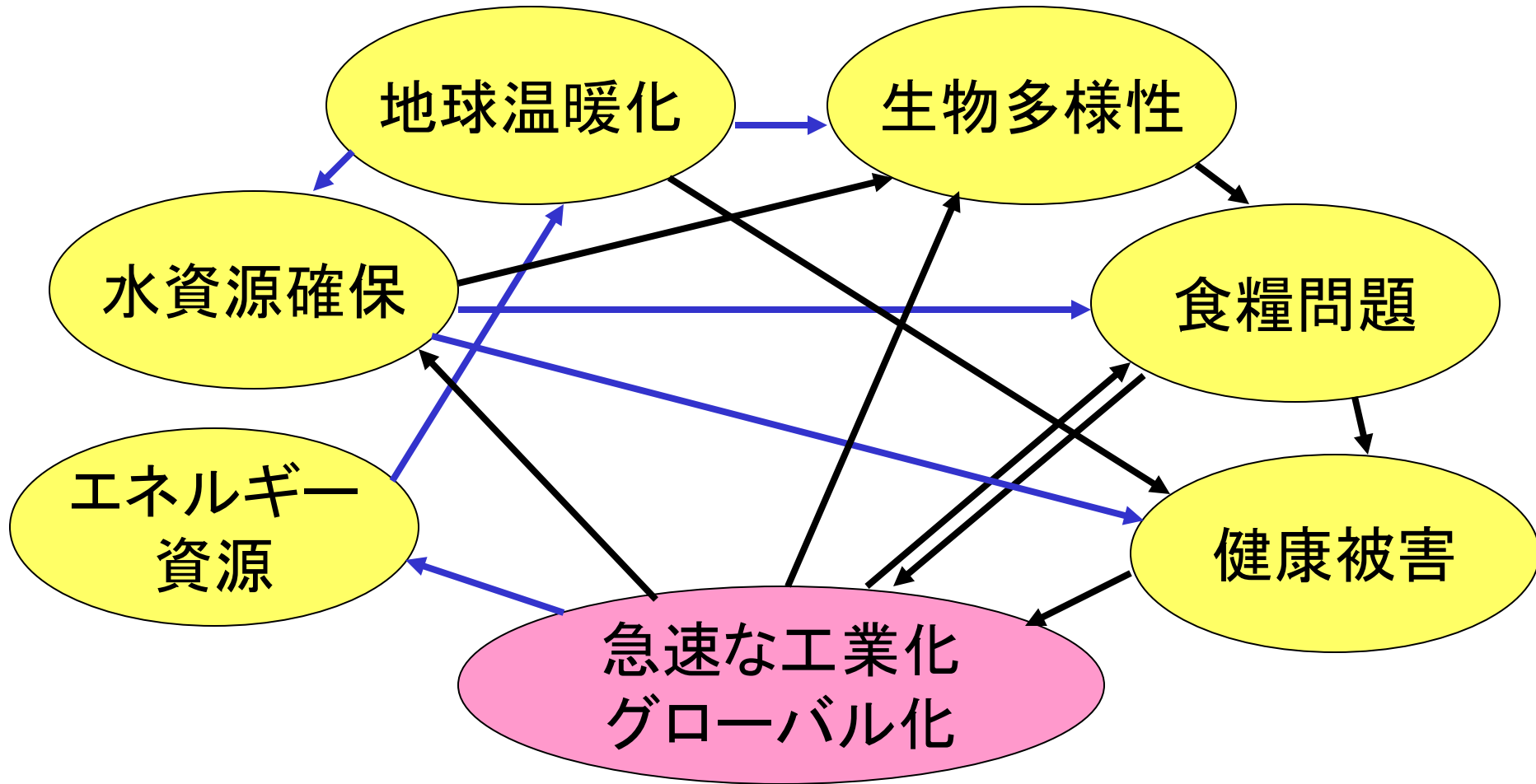


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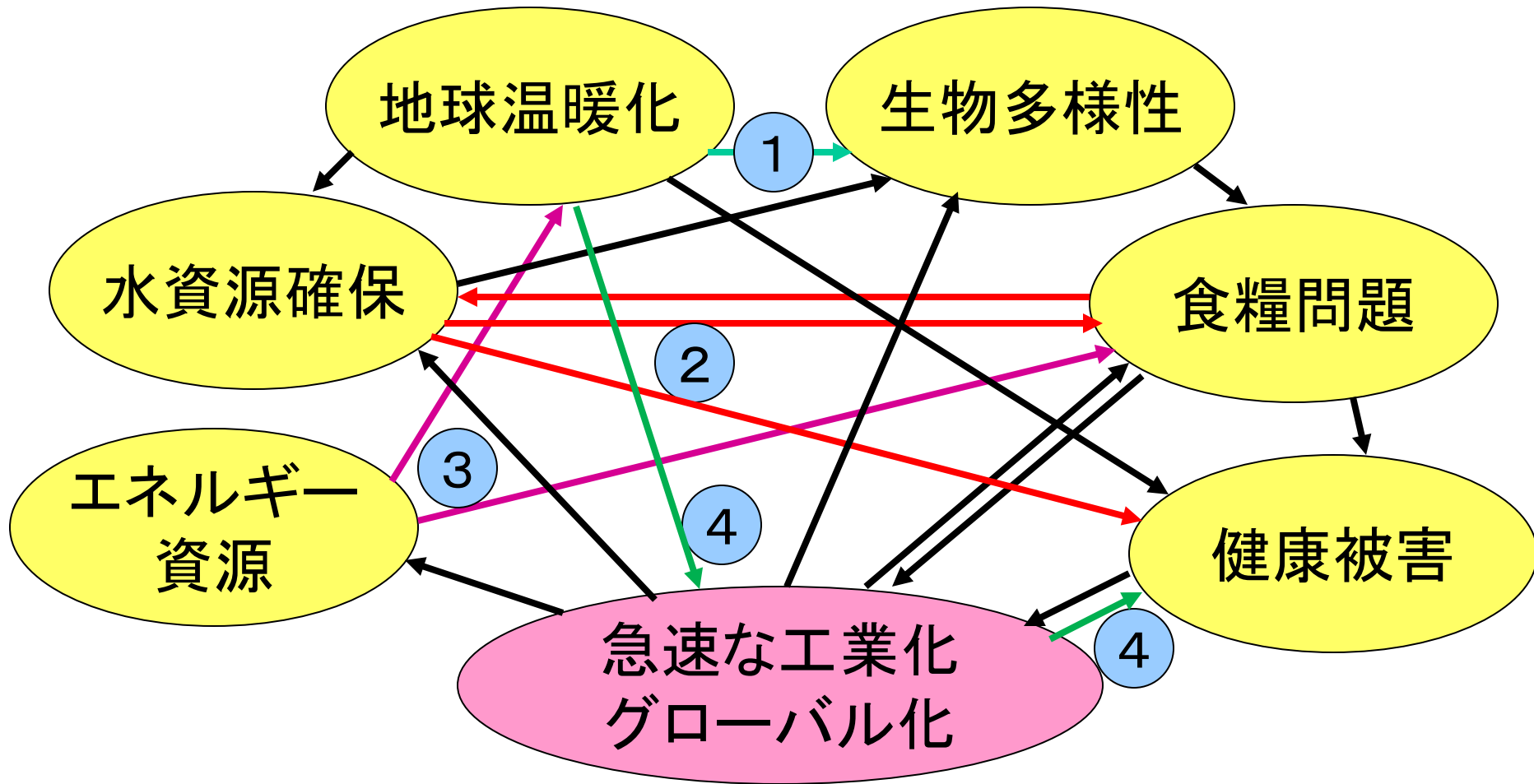


# 世界が直面している課題



ひとつの課題が悪化すると他の課題も深刻化する  
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# 世界が直面している課題



しかし人間の**浅知恵**でひとつの課題を解決しようとすると、さらに他の課題の解決を難しくする



(1)  
炭素固定能の高い樹木  
↓  
生物多様性の低下

(2)  
食糧生産・水資源確保  
↓  
塩害で土壌劣化・健康被害  
↓  
食糧生産低下

(3)  
石油価格高騰  
↓  
大豆・さとうきびからエタノール  
↓  
食糧価格高騰・森林破壊

(4)  
途上国へ技術移管  
↓  
競争激化  
↓  
先進国内の格差拡大

# 京都議定書を超えて

- 2050-2100にどうなるか？
- 人口増加は過去50年で2.4倍に
- ある途上国は50年のうちに先進国となり大量の二酸化炭素を排出する
- 地球温暖化は降水パターンを変える
- 生物多様性が低下し、食糧生産をおびやかす
- 健康被害も増大
- **どのように解決する？**

# グリーン・ニューディール

- 未曾有の経済危機に環境重視で産業と雇用？
- 地球規模の環境問題も必然的に深刻化
- 根本的な国際社会の変遷を分析  
先進国は少数(製造)vs途上国が多数(原材料)  
→新興国が先進国の仲間入り(新興国でも製造、競争激化、先進国の労働が低廉化)
- 従来の産業・貿易・労働の国際分業は継続不可
- 協調し持続可能な社会に移行できるか
- 持続可能な社会に移行する貢献度を基準に選別すべき

# 日本では

- ・ 新政権は2020年までに1990年比で25%の二酸化炭素排出削減を宣言した
- ・ 既成概念を打ち破る効果をもつ
- ・ 政治家は政治に関心をもつ(国民の多数派に付く、自分の選挙区だけの危険性もあるが)
- ・ 国民が持続可能な社会を理解し、その概念を作り上げ、前進することが肝要である。政治家が付いてくるように

# 高等教育機関の役割

- 複雑な相互作用をする多様な分野について、現場で学ぶことができる教育カリキュラムを作り上げる
- 学生が多様な文化、経済、情報、価値観の背景をもつ世界中の市民と意思疎通をし、また協働できる能力を、十分な経験を通じて身に付けるよう支援を行う