

NTNU × Glasgow × Kyushu Winter Institute

--Three Islands, One Shared Vision-- Shaping a Sustainable Future Together

Change and Society: Focusing on the Management and its Future of Agricultural Reservoirs in Japan



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(藤岡悠一郎 九州大学共創学部)

Self-Introduction

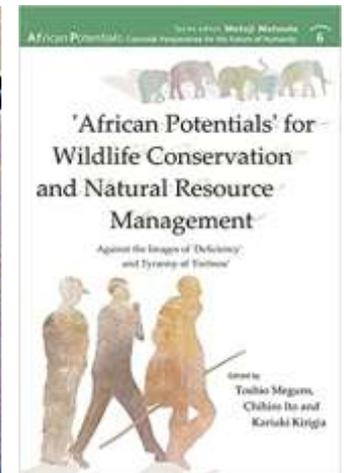
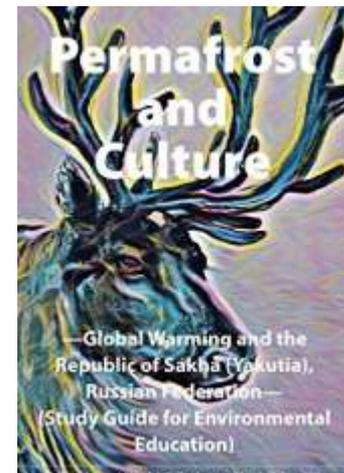
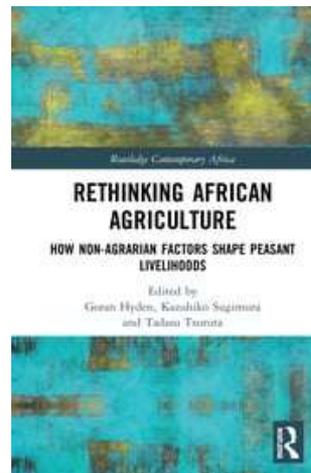


Yuichiro Fujioka
Associate Professor
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Research Topics:

- Human - nature relationships
- Agro-ecosystem, NTFPs utilization
- Climate change adaptation
- Livelihoods changes
- Changes in socio – ecological system

Research Fields



Abstract

Global environmental changes such as climate change, are having a profound impact on local areas. From a local perspective, however, climate change is just one factor transforming the area; these changes occur within the interplay of multifaceted elements such as society, economy, and ecosystems. This lecture introduces a framework that depicts local change as fluctuations within the Earth sphere - the human sphere and the biosphere. Using examples such as Japanese agricultural water reservoir management, it explains approaches for identifying issues and challenges arising from these changes. We will then explore sustainable relationships between the environment and society.

Today's Contents

1. Introduction of ISI in Kyushu University and Interdisciplinary Research
2. Water Relating Social Problems & Issues
3. Framework of “Integrated Sciences for Sustainable Human-Aqua Environment (Aqua Science)”
4. Issues of Japanese Ecosystems
5. A Case Study: Management and its Future of Agricultural Reservoirs in Japan

ISI is

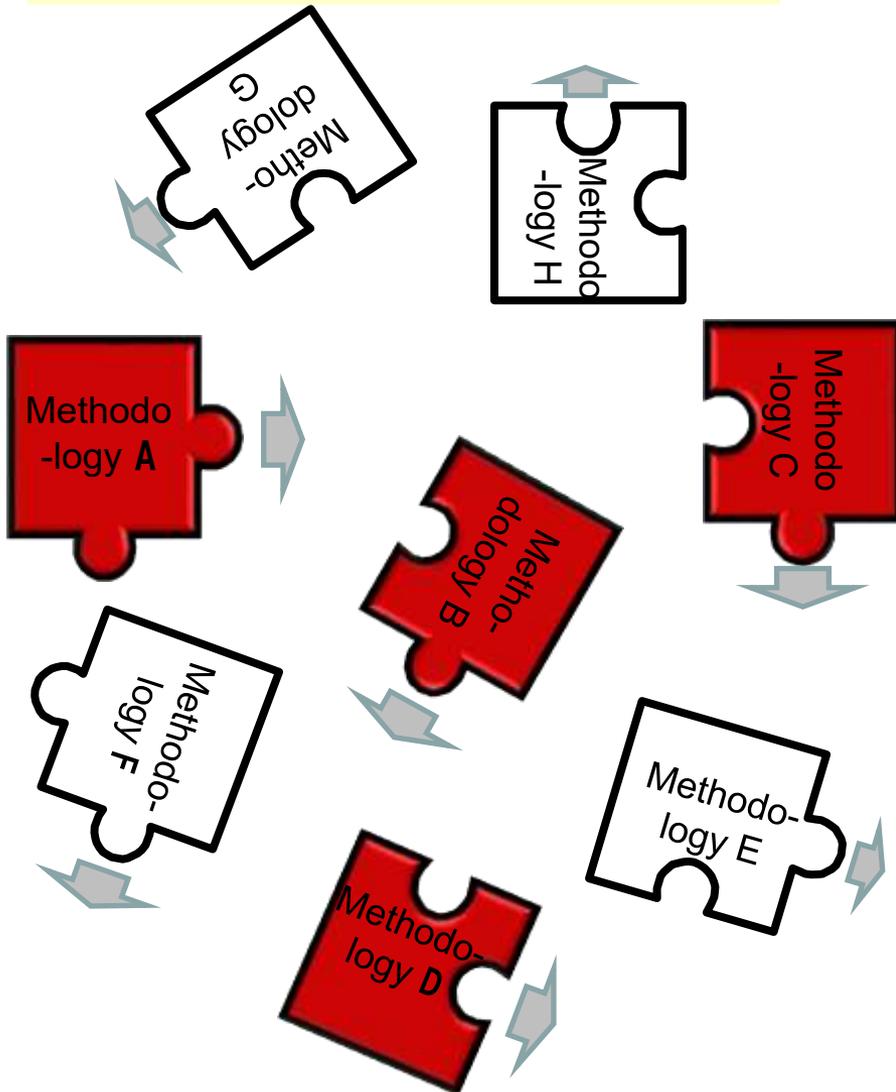
- **Issue-based School, not discipline-based**

Considering and working on various issues
(e.g. Global Warming, Biodiversity, Infectious
Diseases, Public Health, Social Justice,
Inequality...)

- Cultivating perspectives, knowledge, and skills
necessary to consider and solve issues

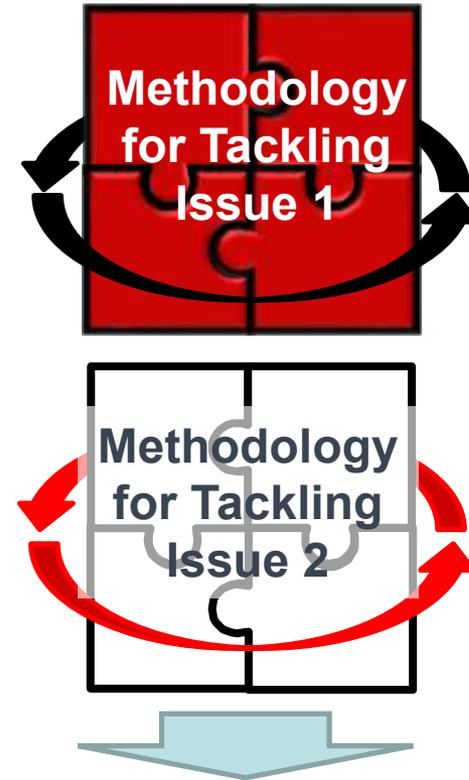


Discipline-Based Methodology



Issue-Based Approach

Combining multiple disciplines necessary for considering and working on issues



Ready for considering and tackling various issues



What is Issue-Based Approach for?

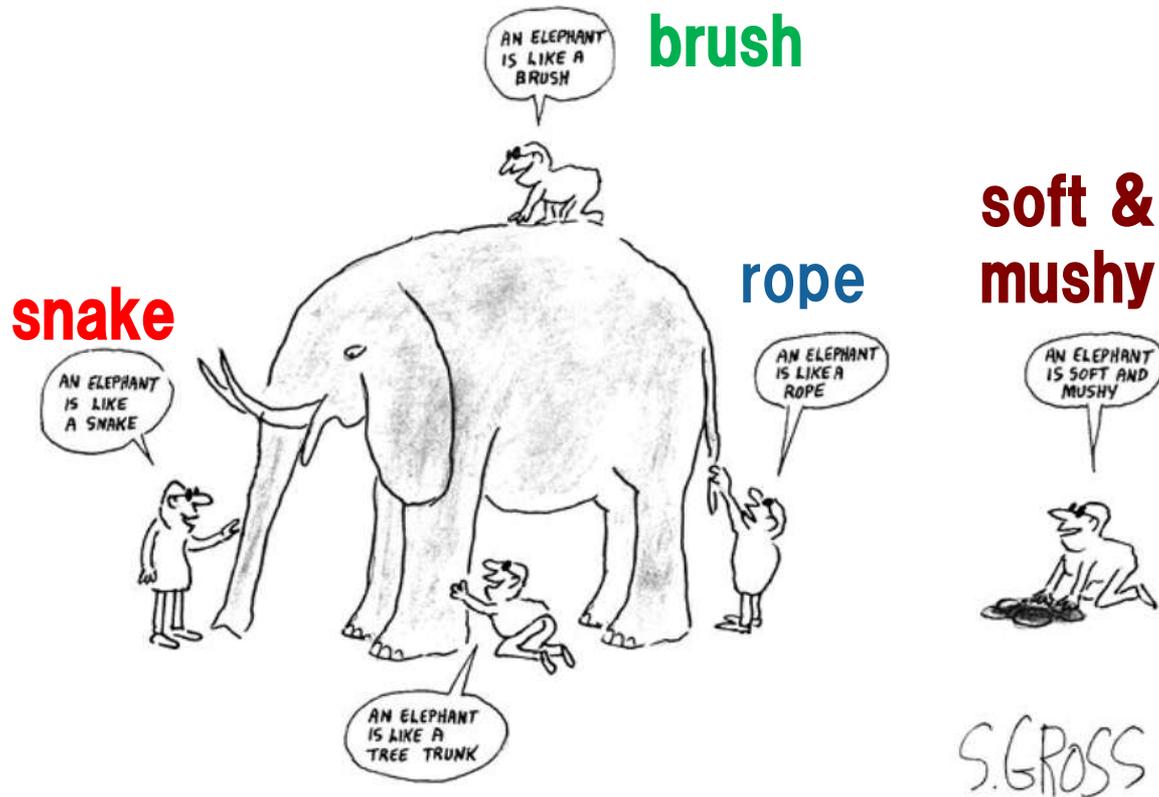
Social Problem



Problems can be solved only by integrating various kinds of special research fields related to the problem!!

- corresponding special research subject (factor) related to the problem

Argument about Social Problems around Our World



“Evaluate the group blind elephant” is quite similar to “Argument about social problems around our world”

THE BLIND MEN AND THE ELEPHANT.

Everyone sees part of a more complex reality and tends to assume that what they see is the whole picture. Sam Gross/The Cartoon Bank

Expansion of a Discipline

Multi-disciplinary	An approach by two or more different academic disciplines. Centered on a specialized area of study and their co-existence . An approach that uses knowledge from multiple academic disciplines to solve the problem at hand.
Inter-disciplinary	Two or more different academic disciplines collaborate and co-work as a team. (There is a dialogue between different disciplines.) The concept of integrating knowledge from multiple academic disciplines to create new disciplines.
Trans-disciplinary	Aiming to create new social values through collaboration between "academia" and "society". The concept of creating new social value by integrating knowledge from multiple academic disciplines.

Today's Contents

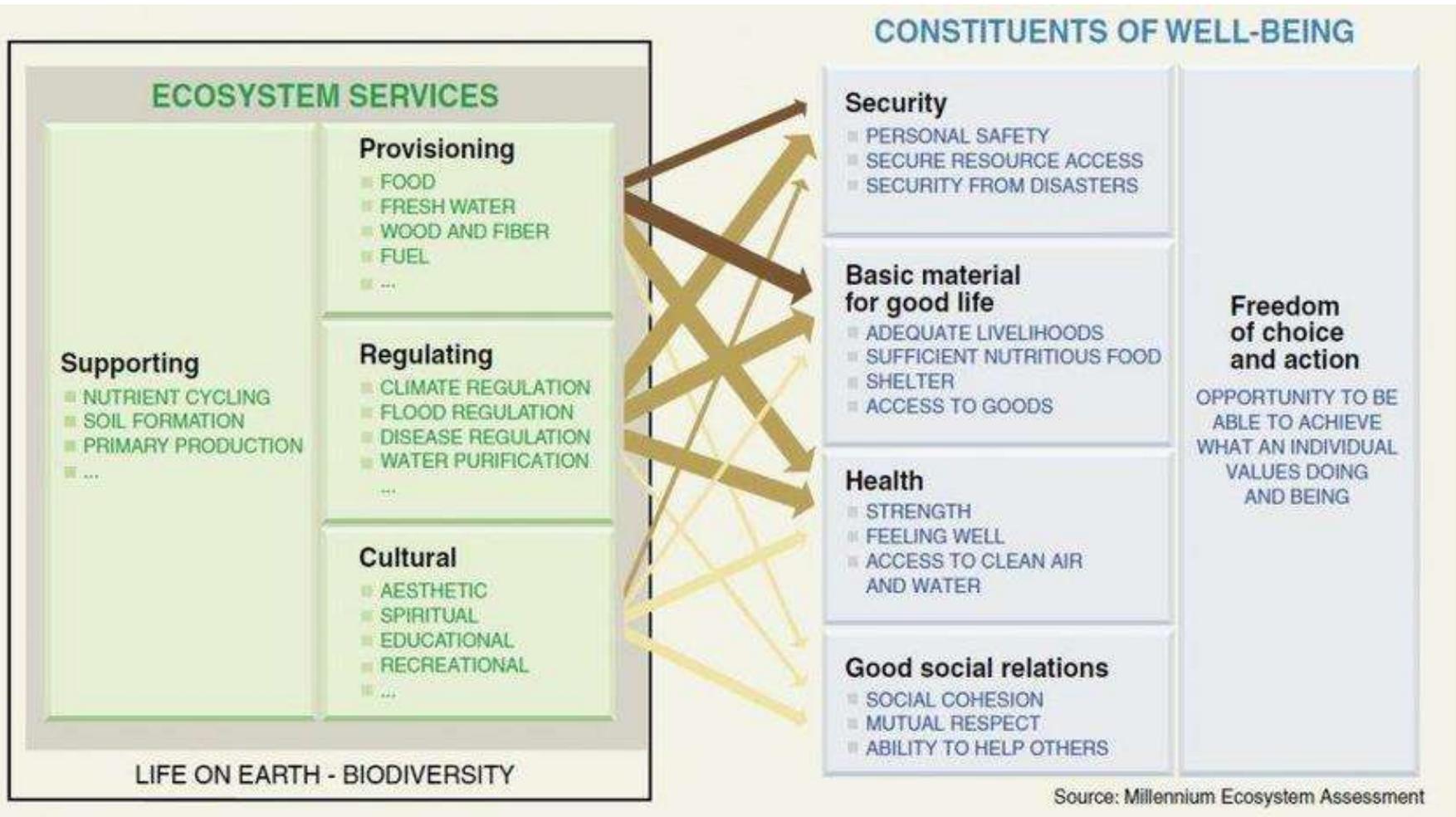
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Area with Water-People-Creatures



Water Provide Benefits for Human

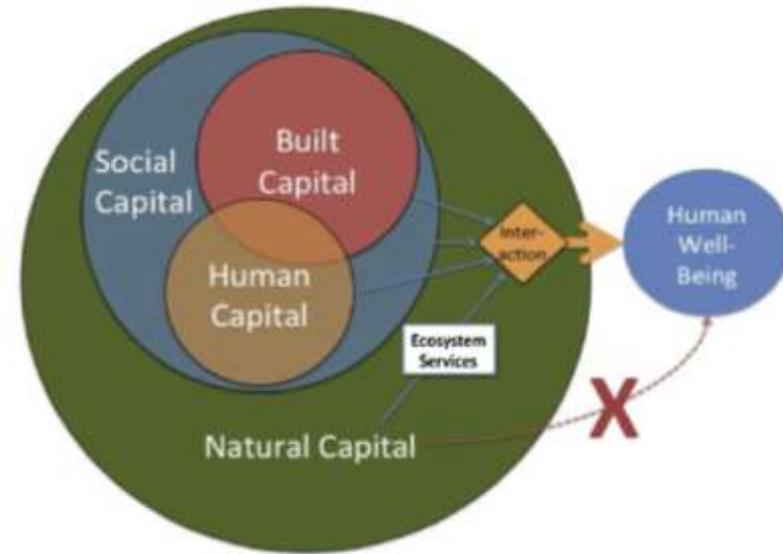
Ecosystem Services and Human Well-being



Economy & Nature

Natural Capital & Ecosystem Services

- Natural Capital:
 - A concept that extends the concept of capital (resources and means of production) in economics to nature. Nature as a source of ecosystem services.

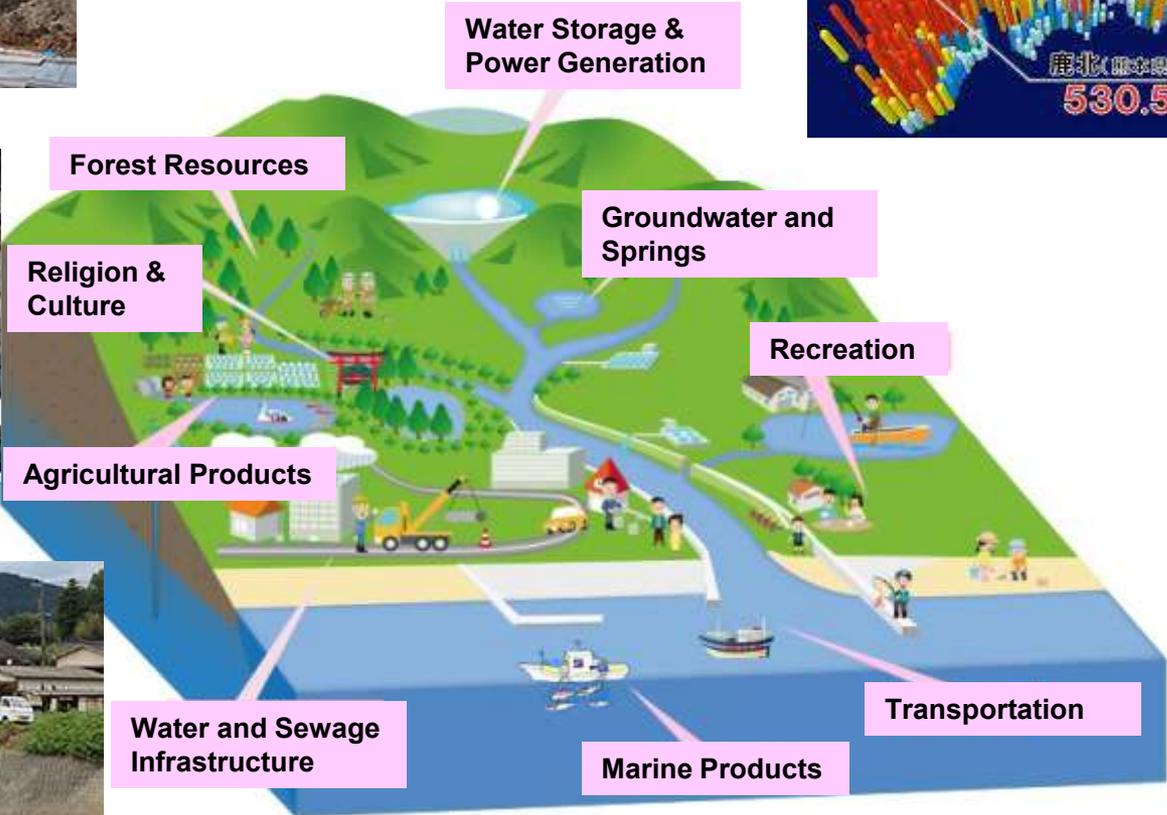
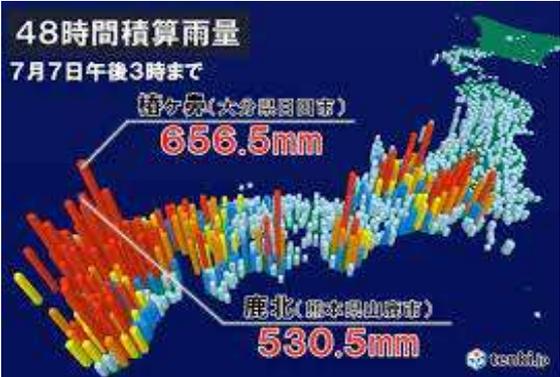


Costanza et al. (2014), Global Environmental Changes



図1.1
自然資本のストック、フロー、価値

Negative Aspects: Heavy Rain and Water-Related Disasters



Water Crises and Water Risks



Water Shortage



Deforestation

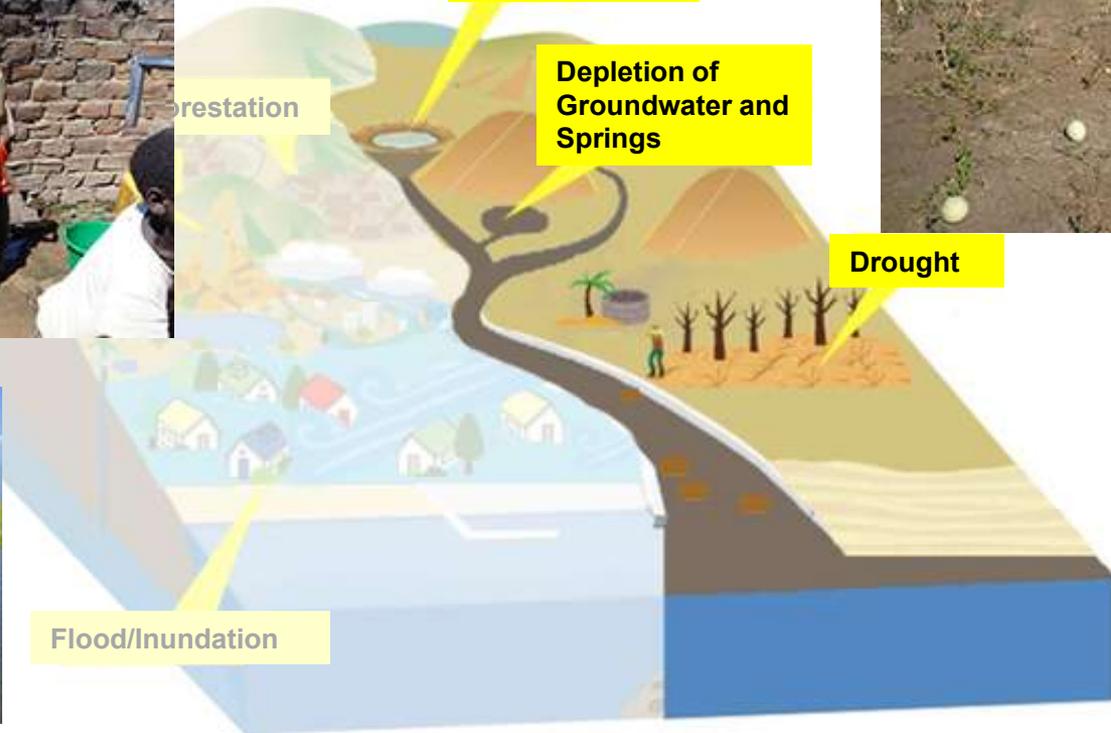
Depletion of Groundwater and Springs



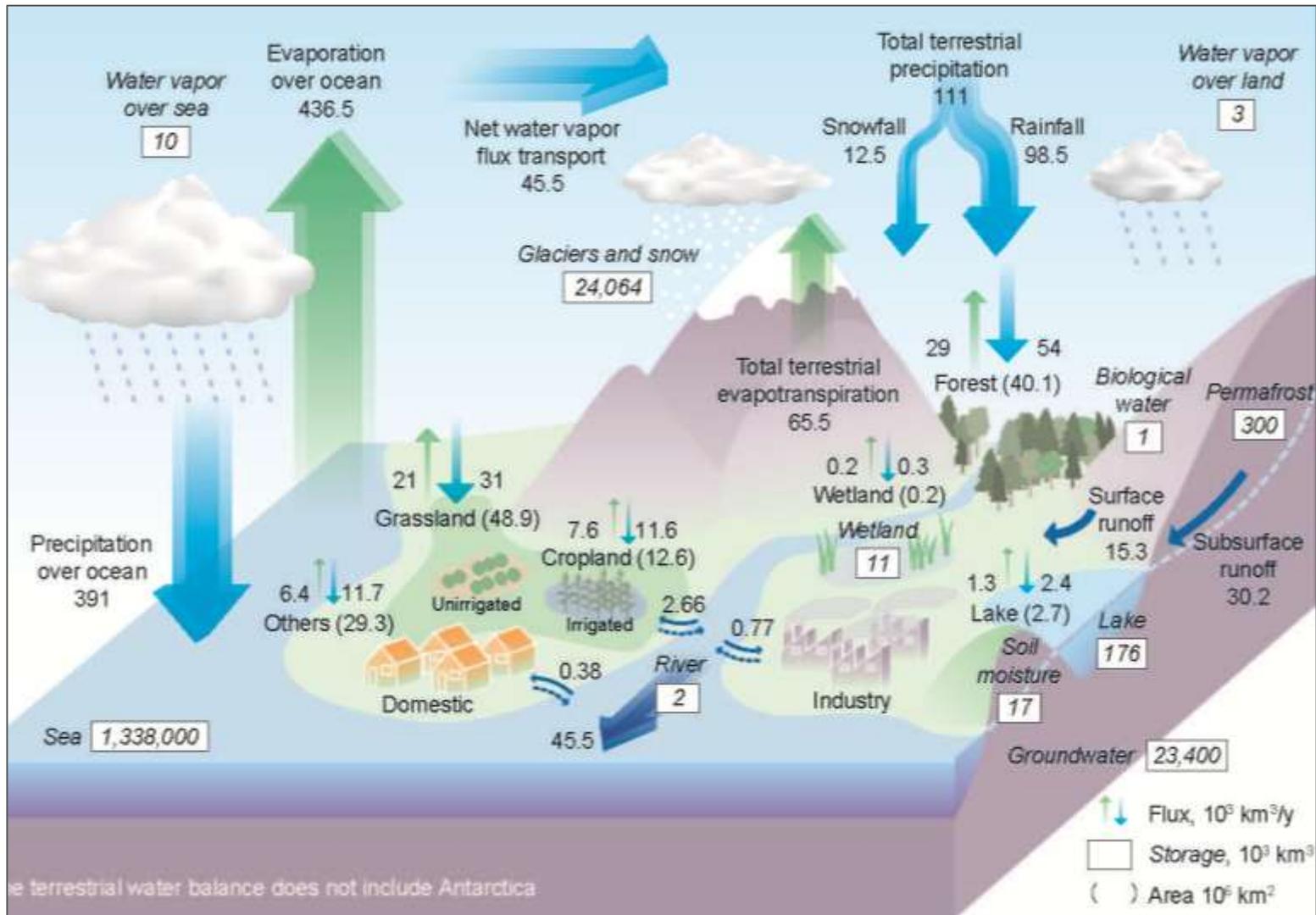
Drought



Flood/Inundation



Water Cycle and Water Inequality



Water as Social Issue

- **The World Economic Forum (WEF)** is an international organization established in 1971 with the aim of bringing together leaders from various fields such as economics, politics, and education to identify challenges facing the world, regions, and industries, and to work towards improving the global situation.
- Annual Meeting: Held in Davos, Switzerland. Commonly known as the “**Davos Meeting.**”
- Annual Report: “**The Global Risks Report**” ranks and lists the risks (challenges) facing the world at that time.

<https://www.weforum.org/>

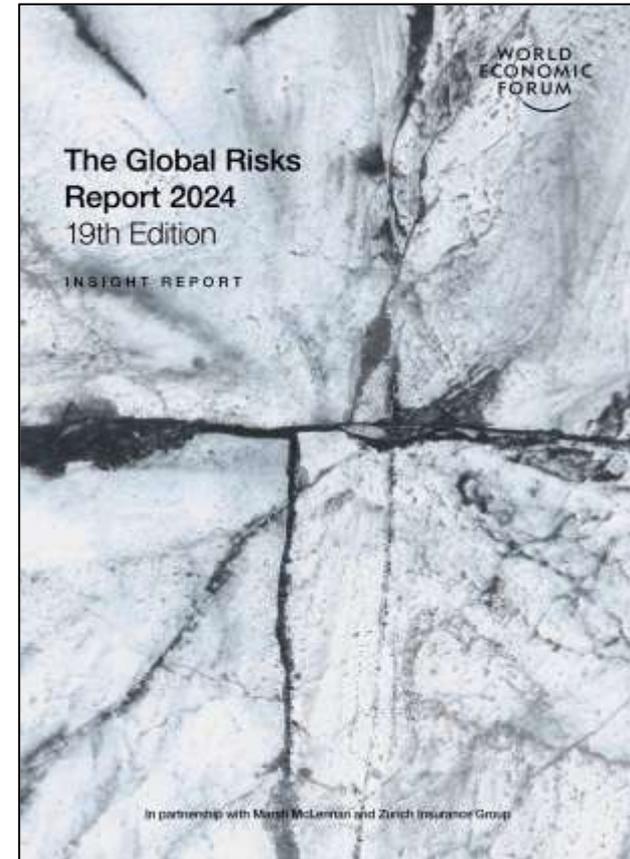


FIGURE B

Current risk landscape

Please select up to five risks that you believe are most likely to present a material crisis on a global scale in 2024.

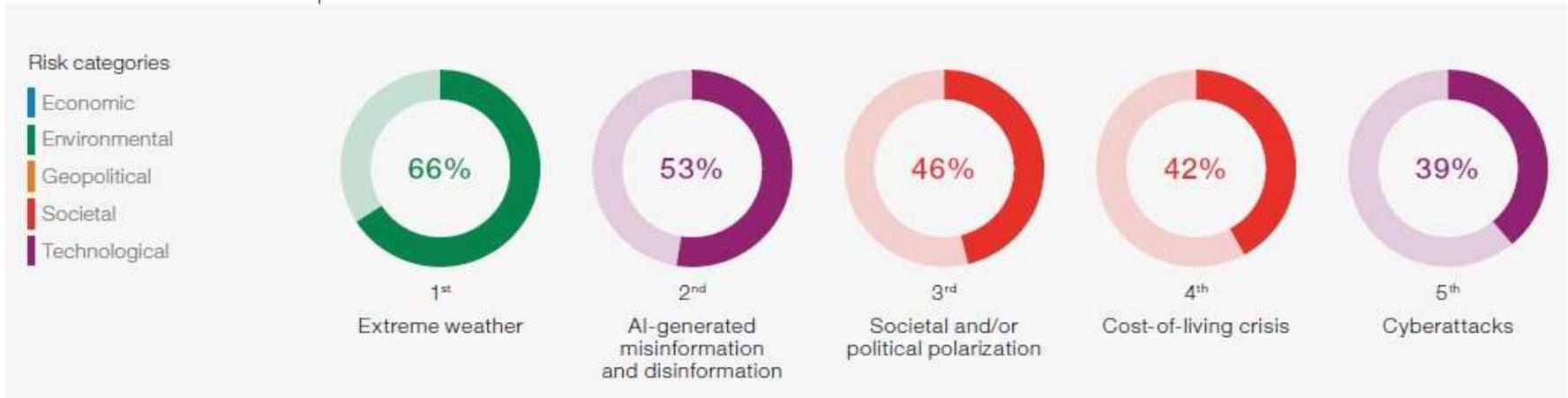


FIGURE C

Global risks ranked by severity over the short and long term

Please estimate the likely impact (severity) of the following risks over a 2-year and 10-year period.



・Global Risk Perception Surveyの結果. 世界中の1500人の専門家に対するアンケート調査. (source: The Global Risks Report 2024: https://www3.weforum.org/docs/WEF_The_Global_Risks_Report_2024.pdf)

SDGs and Water Relating Issues (1)

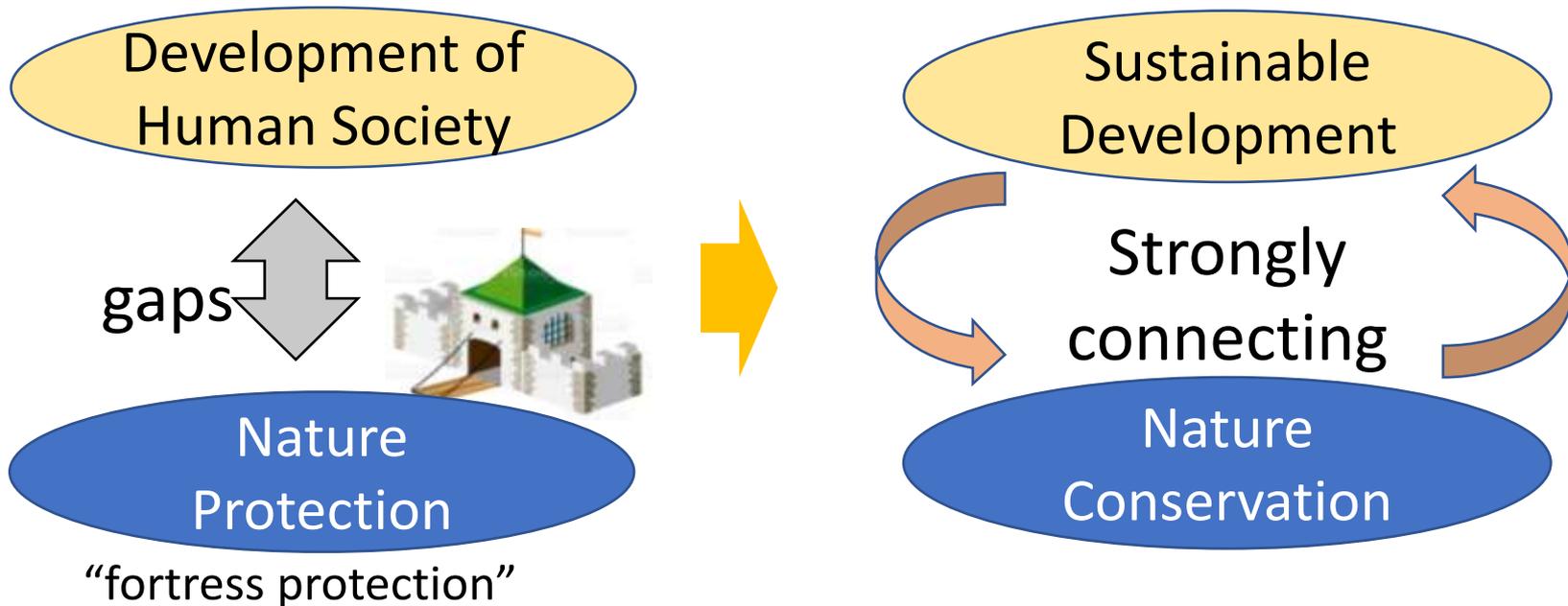
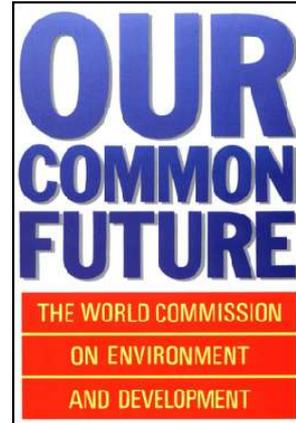


“Transforming our world: the 2030 Agenda for Sustainable Development” (adopted in September 2015)

SDGs and Water Relating Issues (2)

One of a famous report is “**Brundtland report**” published in 1987.

“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (United Nations, 1987).



SDGs and Water Relating Issues (2)

United Nations Conference on Environment and Development, Rio de Janeiro, Brazil, 1992

Known as 'Earth Summit'



- This global conference, held on the occasion of the 20th anniversary of the first Human Environment Conference in Stockholm, in 1972.
- The 'Earth Summit' concluded that the concept of **sustainable development** was an attainable goal for all the people of the world, regardless of whether they were at the local, national, regional or international level.
- It also recognized that integrating and balancing economic, social and environmental concerns in meeting our needs is vital for sustaining human life on the planet.

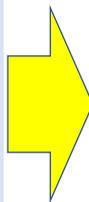
Paradigm Shift toward Challenges for Achieving Sustainable Society

- Seeking for co-existence of economy and environment.
“To pursue benefits of present generation without loss of benefits for future generation”
- Sustainability become one of the most important concept on global politics and global society.

From MDGs to SDGs

MDGs (Millennium Development Goals) (2000-2015)

- 8 Goals, 18 targets
- main target: field of social development
- mainly for developing countries
- purpose was “reducing”



SDGs (Sustainable Development Goals) (2015-2030)

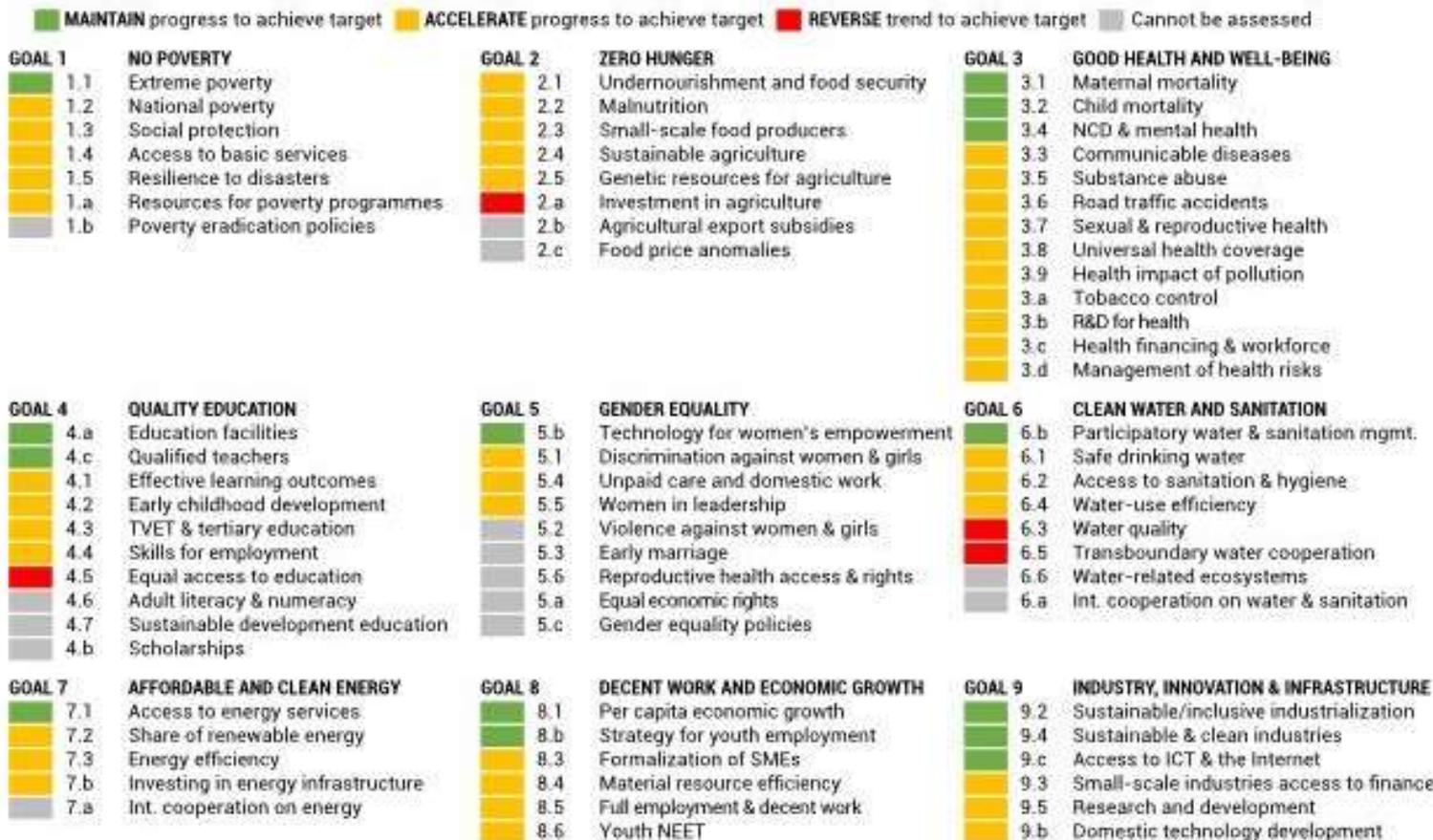
- 17 Goals, 169 targets
- Widely & comprehensively targets including economy, society & environment
- for all countries
- purpose is “removing”

SDGs and Water Relating Issues



- Water Issue is not only relating to water, but other several elements are relating. (e.g. forest, agriculture, culture etc.)

Which SDG targets are on track for 2030?



- SDGs as an Easy-to-Understand “Challenges List”.
- What exactly are the “challenges,” and how do they manifest?
- What are the root causes of these challenges? “
- Challenges” are not necessarily limited to those listed in a formalized catalog.
- Each challenge is mutually relating, and sometimes trade-off.

Problem and Issue (1)

- **Problem**: The gap between the goal and the current situation.
- **Issue (challenge)**: What must be done to bridge the gap between the goal and the current situation—that is, what must be done to resolve the “problem.”

(cf. social issue)

- The distinction is not always strictly made.
- To define a “issue,” it is necessary to understand (research and analyze) the background, causes, and structure of the “problem.”

Problem and Issue (2)

- The **invisibility, multifaceted** and **pluralistic sphere** of social problems.
- The problems exist, yet their presence and underlying structures remain difficult for outsiders to perceive.
- What constitutes a problem varies among stakeholders.
- The ways in which issues impact individuals differ.

What is Stakeholders?

(Longman Dictionary)

1. someone who has invested money into something, or who has some important connection with it, and therefore is affected by its success or failure
 2. a person who is considered to be an important part of an organization or of society because they have responsibility within it and receive advantages from it
- To achieve sustainability, consensus building of stakeholders is a one of significant point.

Stakeholders



HOME SDGS HLPF STATES SIDS UN SYSTEM STAKEHOLDERS

STAKEHOLDER ENGAGEMENT

Business and Industry

...Children and Youth

...Farmers

...Indigenous Peoples

...Local Authorities

...NGOs

...Scientific & Technological Community

...Women

...Workers and Trade Unions

...Persons with Disabilities

...Volunteers

...Ageing

...Education and Academia

High-level Political Forum on Sustainable Development

National Capacity Building

Post 2015 process

Statements

Documents

Stakeholders

Major Groups and other Stakeholders (MGoS) were instrumental in the development and adoption of the 2030 Agenda for Sustainable Development. Since its adoption, MGoS have been actively working towards its implementation, through various initiatives, advocacy, knowledge-sharing, and monitoring the 2030 Agenda. MGoS often work in partnership with

Major Groups and other Stakeholders are also active in the annual follow-up and review process of the 2030 Agenda, which culminates in the annual High-Level Political Forum for Sustainable Development. MGoS interested in engaging in the High-Level Political Forum can register to join the self-organized Major Groups and other Stakeholders High-Level Political Forum Coordination Mechanism (MGoS HLPF CM) and mailing list by completing this registration form. We also encourage MGoS to reach out to the Organizing Partners of their relevant constituency listed below to find out more about opportunities for engagement.

For more information on the 2019 HLPF, [please click here](#). For more information on how MGoS can engage in the HLPF and its preparations, please see "[HLPF Preparatory Webinars for Major Groups and other Stakeholders](#)" under the "preparation" tab on the [2019 HLPF website](#).

- Women
- Children and Youth
- Indigenous Peoples
- Non-Governmental Organizations
- Local Authorities
- Workers and Trade Unions
- Business and Industry
- Scientific and Technological Community
- Farmers



BUSINESS & INDUSTRY



CHILDREN & YOUTH



FARMERS

One Perspective on Social Issues: Social Constructivism



Joel Best 2020 “Social Problems”
W W Norton & Co Inc

What is Social Constructivism?

- The constructivist approach that emerged in the 1970s

Malcolm Spector John I. Kitsuse (1977)

“Constructing Social Problems”

Social Constructivism: The idea that a given matter is socially constructed and therefore subject to change.

↔ objectivism, essentialism



Discussion by Best (2020) (1)

- Definition of Social Problems (**Objectivist Definition**):

A social problem is a state that undermines the well-being of some or all members of a society, and typically involves issues that become subjects of public debate.

(Macionis 2013, p.5)

- From an objectivist standpoint, social problems are “harmful conditions.”

Best (2020) Discussion (2): Problems with Objectivism

Problems with Objectivism :

1. **Not all socially harmful conditions are considered social problems** (e.g., racial discrimination, the history of gender discrimination concepts, “height discrimination,” and other forms of “discrimination” that receive little attention).
 2. **The same (harmful) condition is often regarded as a social problem for different reasons** (perspectives on what constitutes a problem vary among individuals).
 3. The list of social problems is extremely broad, and definitions are ambiguous. It does not specify what constitutes harm.
- It is extremely difficult to devise an objective definition of social problems that can distinguish between what people consider a social problem and what they do not.

Best (2020) Discussion (3): Problems with Objectivism

- Common to a wide range of phenomena: “The fact that all of these are considered social problems.”
- What matters is “not that a state of affairs causes harm, but that people consider a state of affairs to be harmful.”
- “We must stop thinking that the state of affairs called ‘social problems’ exists ‘outside’ society, and instead view social problems as the process by which members of society come to regard a state of affairs as problematic” (Best 2020, p.10)
- A social problem is less an objectively harmful state and more an “effort to arouse concern about the state of society.” It is through this effort that social problems are constructed. This perspective is known as the constructivist theory of social problems.

Best (2020) Discussion (4): Problems with Objectivism

- Social construction refers to the way people give meaning to the world.
- The meanings by which people understand and give meaning to the world is through language. Words labeled by language are social constructions.
- Example: The term “poverty” is a category created to understand the world (though this does not mean the state of poverty does not exist in the world).
- What matters is asking: “Why is a particular state constructed as a social problem?”, “Why do people decide what should be done about a certain state?”, and “How do people decide what should be done?” (What logic is used to talk about social problems?)

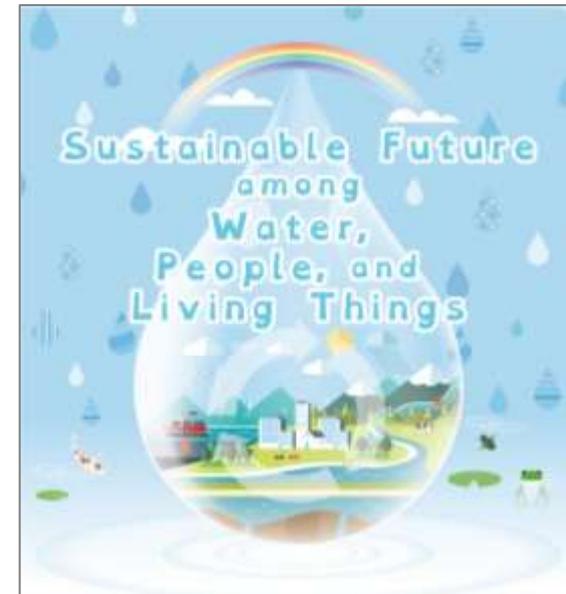
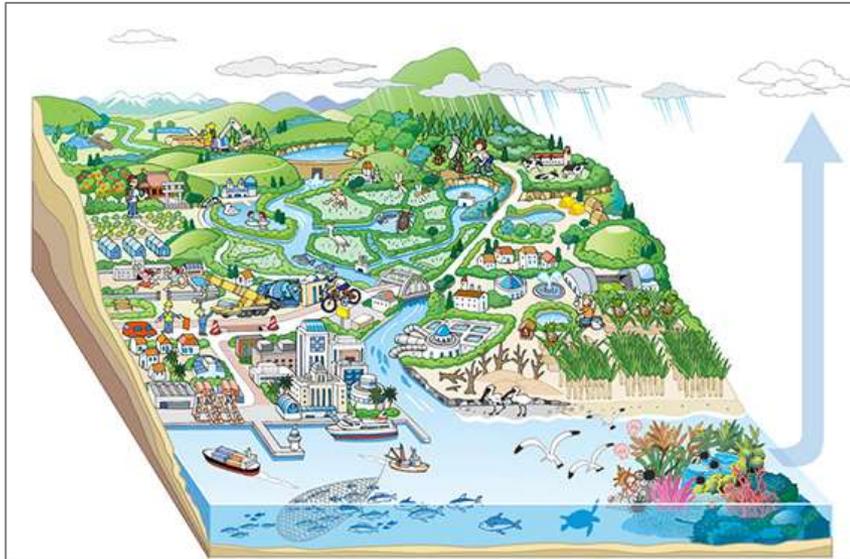
The reason for adopting a social constructivist approach

- Criticism of social constructivism also exists from other perspectives, and it is by no means absolutely superior.
- However, rather than treating “social problems” as absolute justice (essentialism), they are social constructs.
- Of course, since social problems do exist, we should analyze them and strive to resolve them.
- However, we must also consider the historical background that led to the process becoming “social problem” of such states, along with the intentions of relevant stakeholders.
- **An Approach to “Fundamental Understanding of the Issue”**

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Introduction of Research Project: “Integrated Sciences for Sustainable Human-Aqua Environment (Aqua Science)”



水共生学

Sustainable Human-Aqua Environment

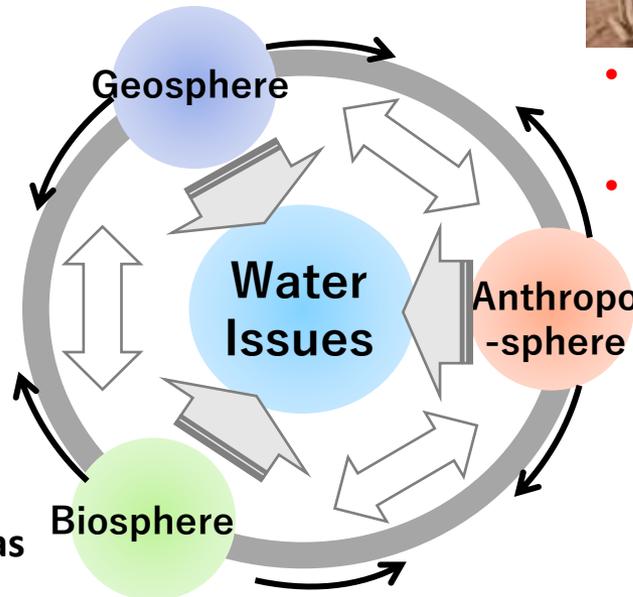
Water as Social Issues

Solving diverse water-related issues is an urgent social challenge.



- The intensification & increased frequency of meteorological disasters such as torrential rains, floods, and droughts

- Disparities in access to water resources due to poverty and other factors
- Water shortages resulting from increased cooling water demand at data centers



- Conservation of ecosystems such as water reservoir & tidal flats
- Protection of rare species including aquatic insects

- Waterborne diseases such as malaria

An academic foundation bridging interdisciplinary area is necessary.

“Integrated Sciences for Sustainable Human-Aqua Environment (Aqua Science)”

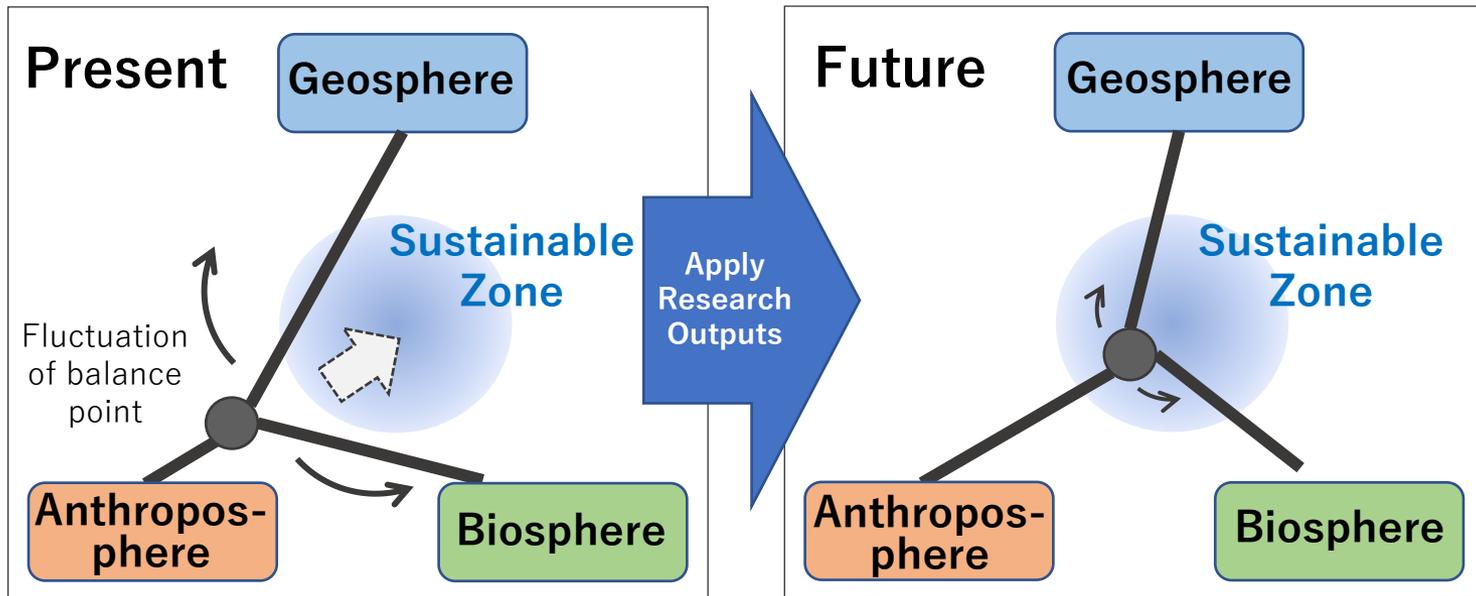
Background of This Research

- Research examining the hydrological cycle that is mainly in the field of natural science has tended to focus on general phenomena with a high emphasis on universality on a global macro scale.
- The issue of water crises and water risk requires a detailed analysis that takes into account region-specific mechanisms, and environmental conditions.
- Especially in “Anthropocene”, human activities have become a major factor in water crises and water risks.
- To consider the nature of the relationship between the water cycle, human society, creatures and ecosystems, a new academic field that encompasses multiple disciplines and integrates information from the natural sciences with knowledge from the humanities and social sciences is required.

Overview of Research (1)

New concept: **Water Cycle System**

A system that constantly includes “fluctuations” established by the interaction of three spheres: the Geosphere, Biosphere, and Anthroposphere

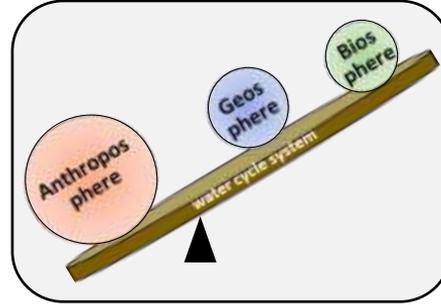


- The realization of a sustainable human-aqua society is an issue of how to find a balance between the global water cycle (geosphere), ecosystems (biosphere), and human activities (anthroposphere).

Overview of Research (2)

Outward to
Unsustainable Direction

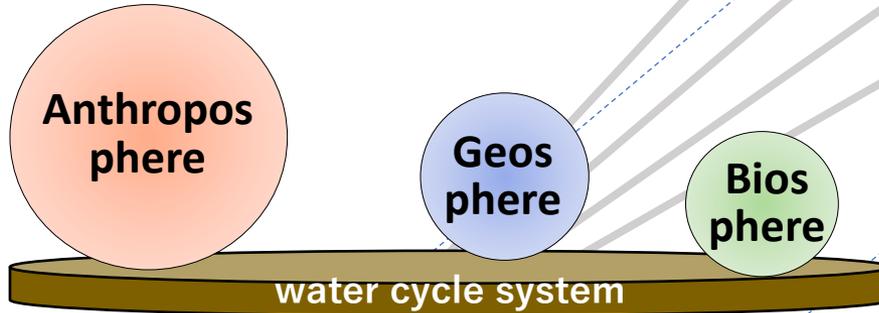
Backcasting for the
Pathways to
Sustainable Zone



Sustainable Zone of
Water Cycle System

Future

Visions



Proposing
Scenarios

Present **Understand of Interaction
between Geosphere -
Biosphere - Anthroposphere**

20th
Century **Clarify the Balance
at Present**

19th
Century **Clarify the Balance in
the Past**

*Elucidating the Historical
Fluctuation of Water Cycle
System*

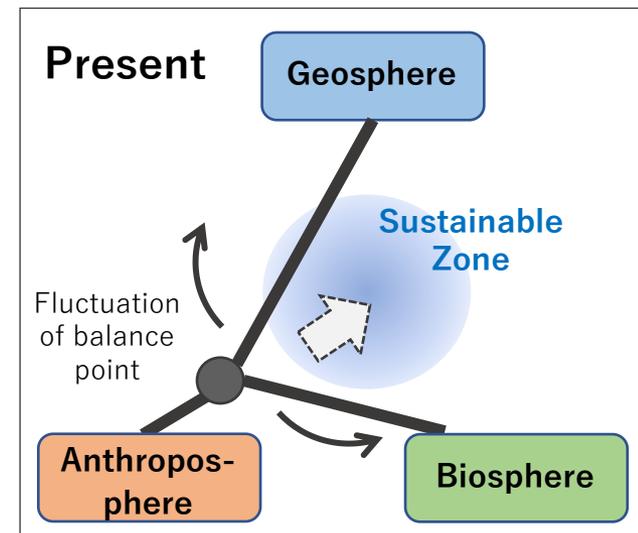
Aims of Research

Overall Research Outcomes:

1. By analyzing the current status and issues of local water cycle systems from the perspective of three spheres: the geosphere, the biosphere, and the anthroposphere, we will establish Aqua Science that proposes a future vision of a sustainable water cycle system.
2. We will share the results obtained through Aqua Science with various stakeholders, such as governments, companies, and citizens, to collaborate in creating a system that enables water environment conservation and sustainable use of water resources.

What is the Features of this Approach?

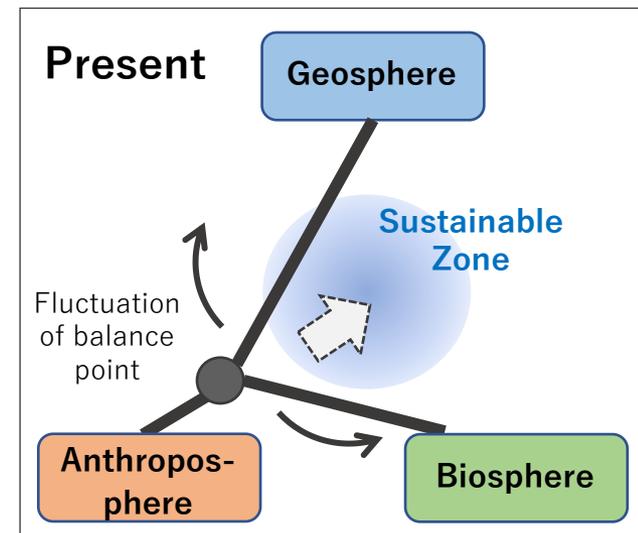
- Classification as “Sphere”: A strategy of simplification to “gain a clear understanding” of the real world and its dynamics, which are composed of extremely diverse elements.
- Strategical simplification (Inoue 2023): When treating indigenous knowledge as equal to scientific knowledge, “it is a pragmatic option to focus on values that are more readily accepted by the majority society and to assign those values to indigenous and local knowledge through collaborative work between the stakeholders and ‘conscientious outsiders’.” (Inoue 2023)



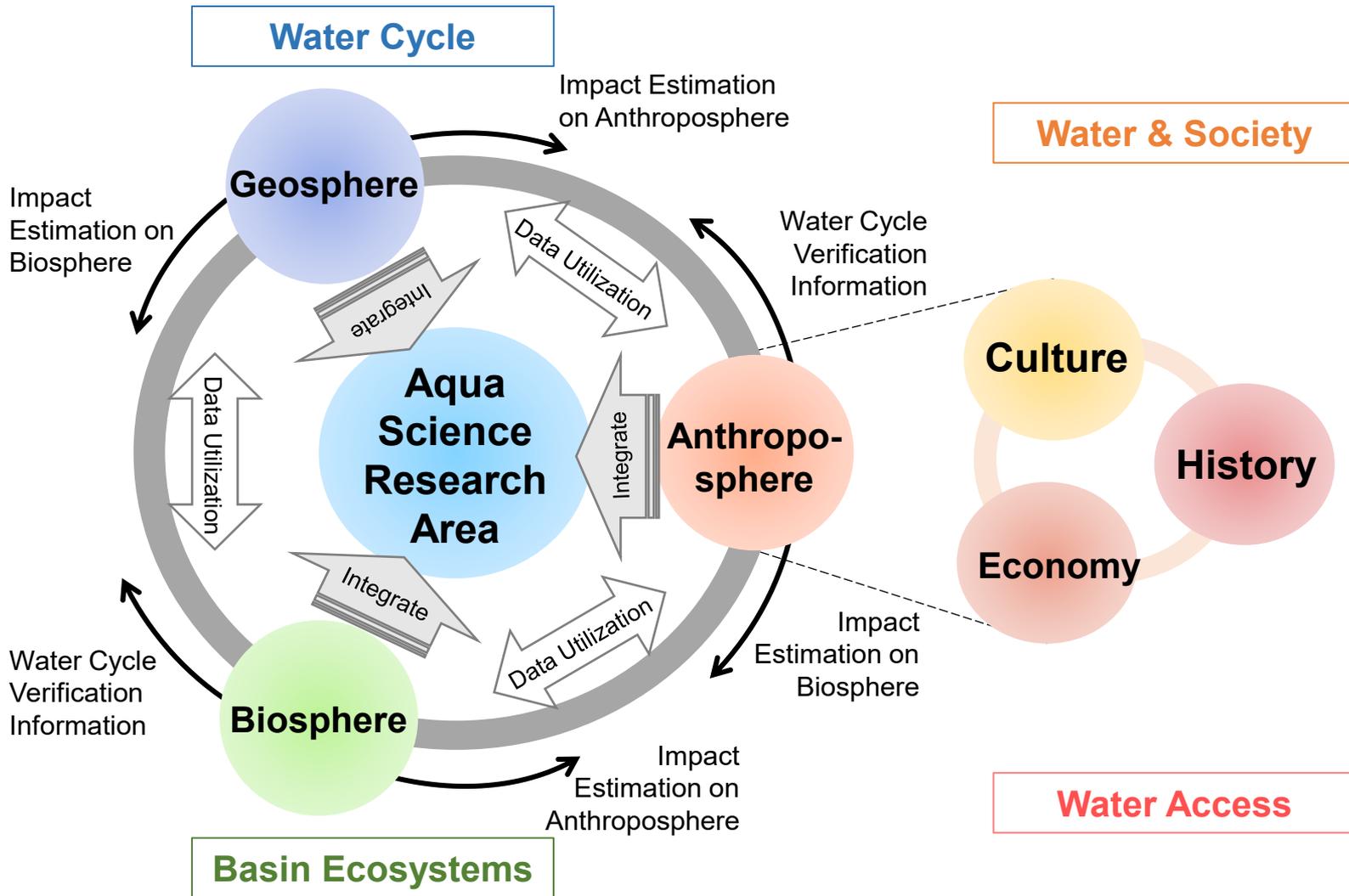
What is the Features of this Approach?

- Including 3 types of Fluctuations in the “water cycle system.”
 - (1) The “fluctuations” arising from the interplay of three spheres: the geosphere, the anthroposphere, and the biosphere.
 - (2) The “fluctuations” occurring in small-scale aquatic environments—places where water, creatures, and humans interact daily.
 - (3) The “fluctuations” arising from the passage of time, extending from the past through the present and into the future.

- An approach to depicting area dynamics through interactions among three spheres.
 - Moving beyond the dualism thinking way of nature and society
 - Relativizing “anthropocentrism”

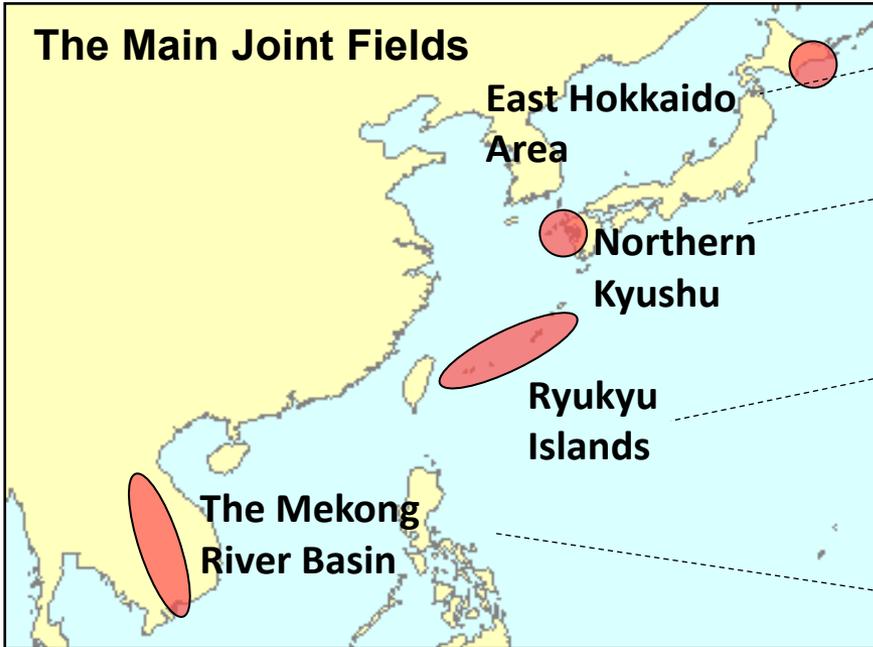


Research Groups



Joint Fields

The Main Joint Fields



Having the largest wetland in Japan, that becoming a grassland due to the effects of global warming and other factors. And also having the largest port in eastern Hokkaido.

Having the largest river in Kyushu, river traffic, estuary development, the use of tidal flats, and frequent heavy rainfall disasters.

Strongly affected by changes in the frequency and intensity of typhoons. Because of a remote island, a trade-off is occurred between securing water resources and preserving the biodiversity.

One of the leading international rivers in the region. It is facing a crisis of destruction of the basin ecosystem due to the increased use of fishing, domestic and industrial water, hydropower generation, and other purposes based on the development of neighboring countries.

- Several **joint fields** are established in which multiple planned research groups work together to conduct surveys, research, and social implementation.
- Develop future scenarios for the water cycle system, select a potentially sustainable future image (vision) from among those scenarios, and develop a method to realize it.
- The goal is to create some models that can be applied in other regions.

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Socio-Ecosystem

- Natural environments (ecosystem) and human societies (socio-economic system) have changed with mutually relating each other.
- Sociological-ecosystem
- Various social issues have emerged.

Issues about Biodiversity & Socio-Ecosystem



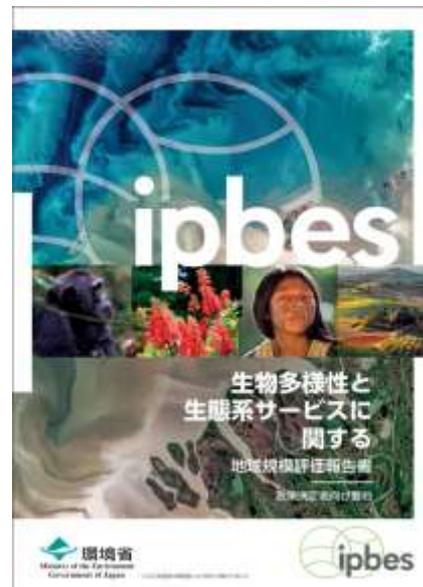
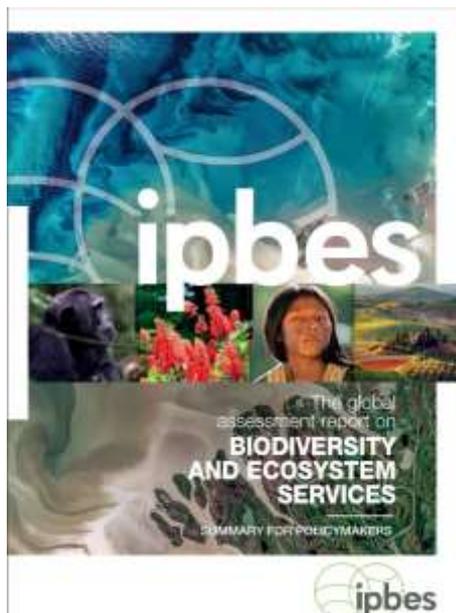
Science and Policy
for People and Nature

Intergovernmental Science-Policy Platform on
Biodiversity and Ecosystem Services

- The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)
- IPBES <https://www.ipbes.net/>
- IPBES (環境省, 日本語)
<https://www.biodic.go.jp/biodiversity/about/ipbes/deliverables/index.html>

What is IPBES?

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) is an independent intergovernmental body established by States to strengthen the science-policy interface for biodiversity and ecosystem services for the conservation and sustainable use of biodiversity, long-term human well-being and sustainable development. It was established in Panama City, on 21 April 2012 by 94 Governments. It is not a United Nations body. However, at the request of the IPBES Plenary and with the authorization of the UNEP Governing Council in 2013, the United Nations Environment Programme (UNEP) provides secretariat services to IPBES. See [here](#) for more information on the history of IPBES.



IPBES 2019



Figure SPM 1 Global trends in the capacity of nature to sustain contributions to good quality of life from 1970 to the present, which show a decline for 14 of the 18 categories of nature's contributions to people analysed.

DRIVERS

INDIRECT DRIVERS

Values and behaviours

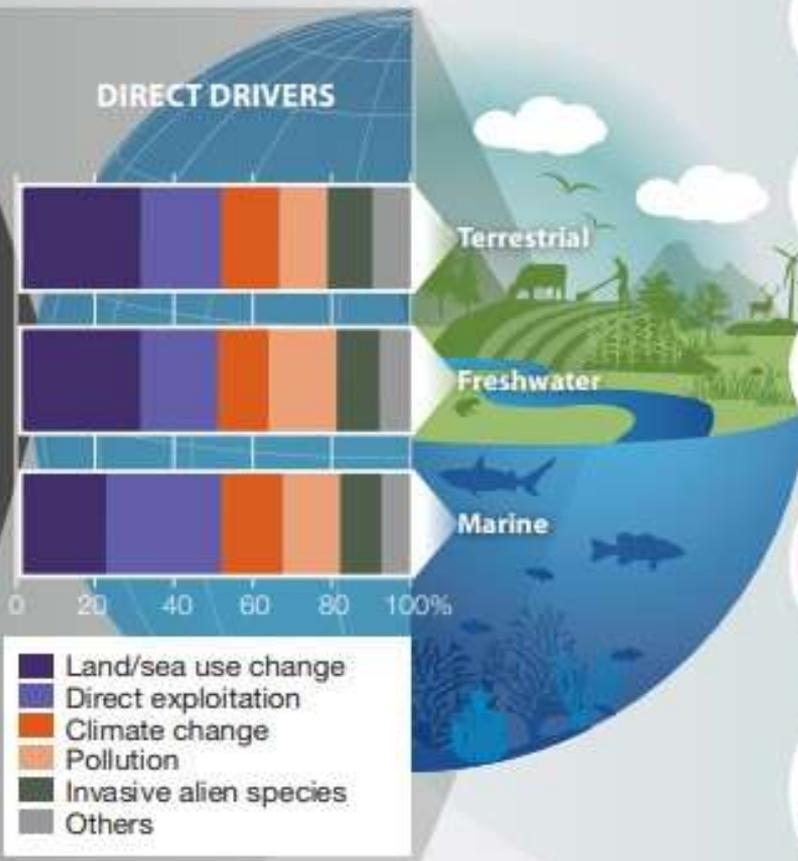
Demographic and sociocultural

Economic and technological

Institutions and governance

Conflicts and epidemics

DIRECT DRIVERS



EXAMPLES OF DECLINES IN NATURE

47%

ECOSYSTEM EXTENT AND CONDITION

Natural ecosystems have **declined by 47 per cent** on average, relative to their earliest estimated states.

25%

SPECIES EXTINCTION RISK

Approximately **25 per cent of species are already threatened with extinction** in most animal and plant groups studied.

23%

ECOLOGICAL COMMUNITIES

Biotic integrity—the abundance of naturally-present species—has **declined by 23 per cent** on average in terrestrial communities.*

82%

BIOMASS AND SPECIES ABUNDANCE

The global biomass of wild mammals has **fallen by 82 per cent**.* Indicators of vertebrate abundance have declined rapidly since 1970

72%

NATURE FOR INDIGENOUS PEOPLES AND LOCAL COMMUNITIES

72 per cent of indicators developed by indigenous peoples and local communities show **ongoing deterioration** of elements of nature important to them

* Since prehistory

Figure SPM 2 Examples of global declines in nature, emphasizing declines in biodiversity, that have been and are being caused by direct and indirect drivers of change.

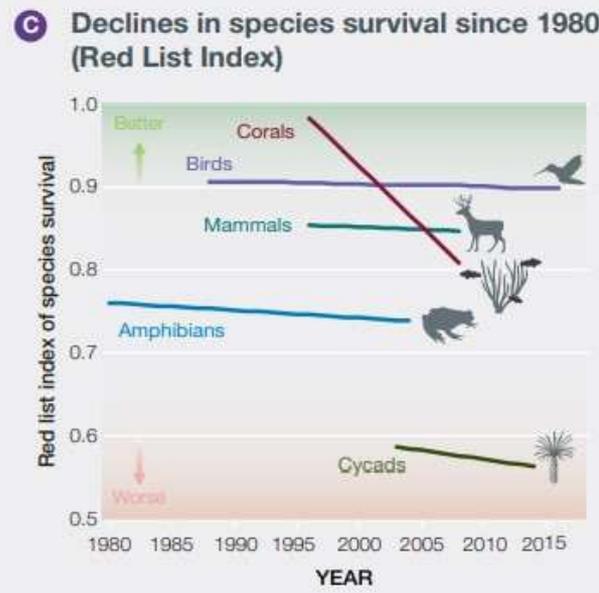
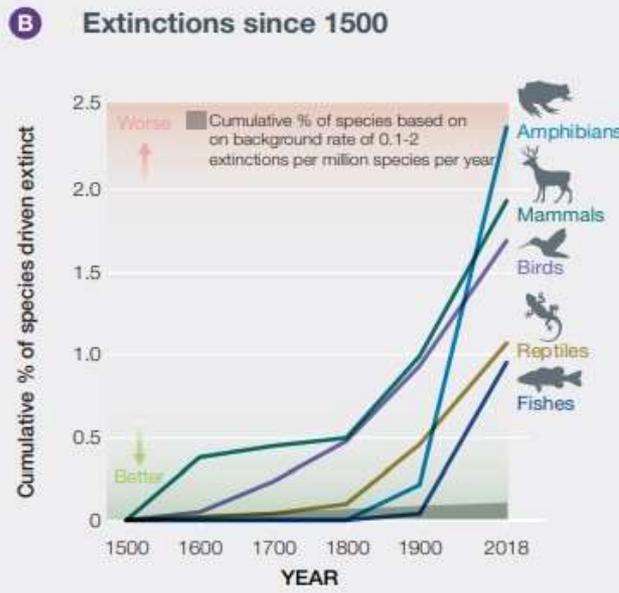
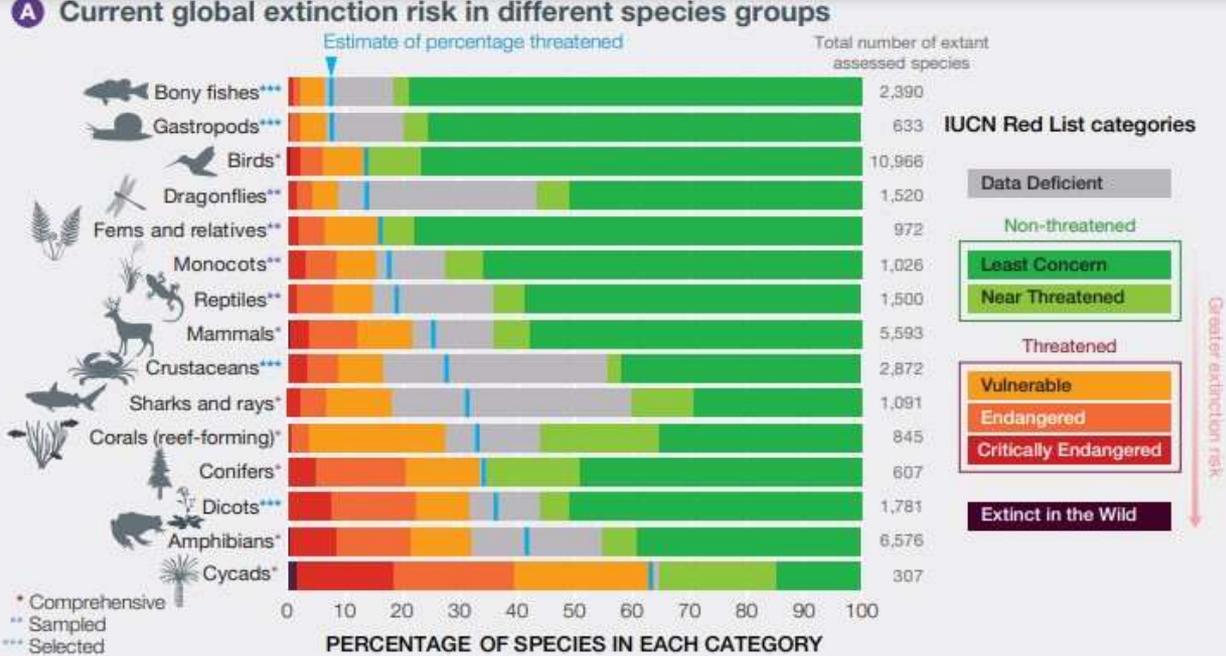


Figure SPM 3 A substantial proportion of assessed species are threatened with extinction and overall trends are deteriorating, with extinction rates increasing sharply in the past century.

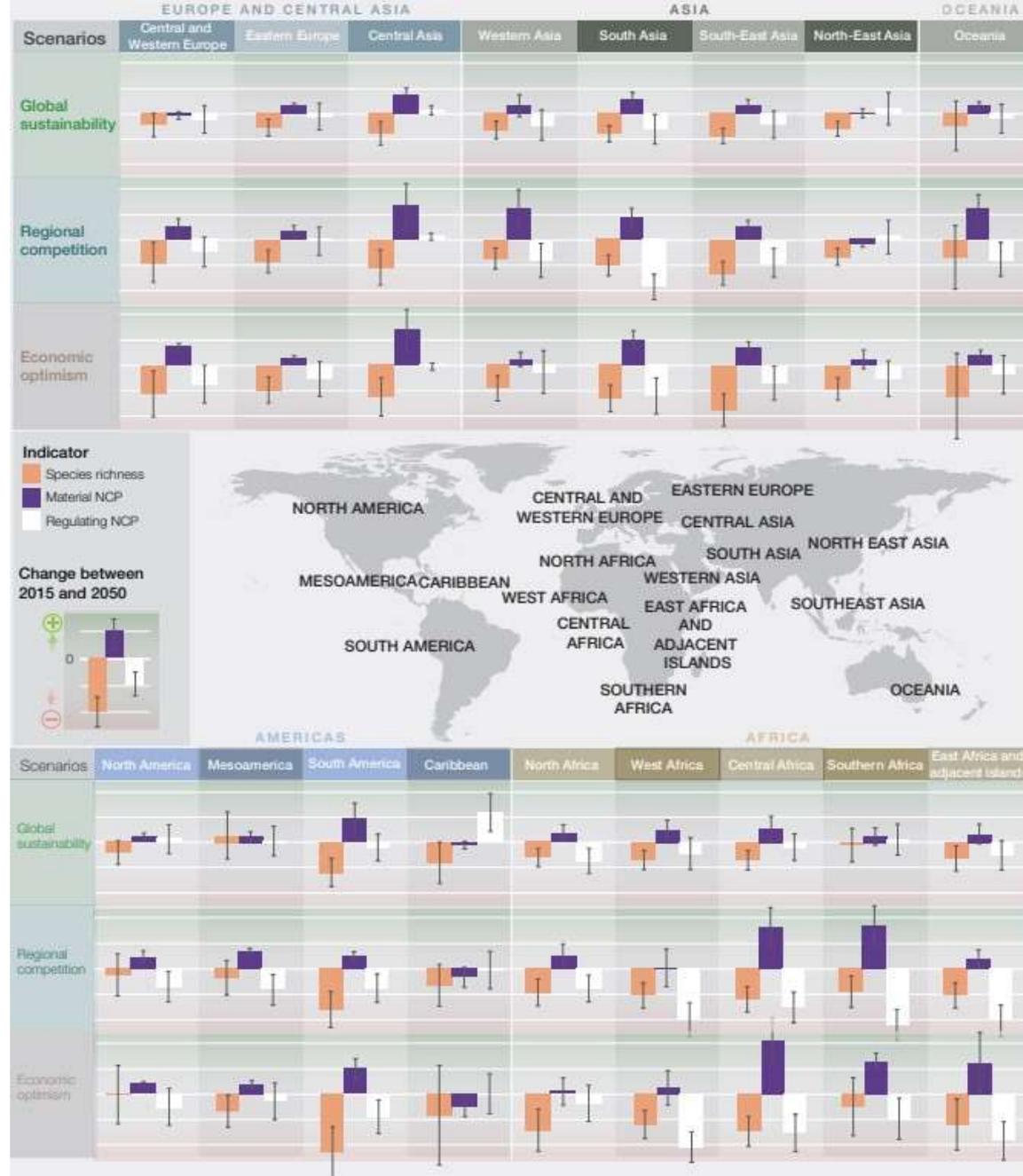


Figure SPM 8. Projections of the impacts of land use and climate change on biodiversity and nature's material and regulating contributions to people between 2015 and 2050.

IPBES Report

- Extremely diverse set of issues
- Various direct and indirect factors intervene
- Different regions/area face different challenges and major causes

Issues in Japan: Four Crises

First Crisis : Caused by human activities including development

This is the impact on biodiversity due to negative factors caused by human activities. Habitat loss and degradation due to development, and population decline due to overexploitation and illegal collection, remain problems. Climate change mitigation measures such as solar and wind power generation may also have negative effects on ecosystems, depending on how they are introduced.

Second Crisis: Caused by reduced human activities with nature

Contrary to the first crisis, this is the impact caused by negative impacts on biodiversity due to reduction of human activities with nature. In *satochi-satoyama*, the reduced use and management of farmland, canals/reservoirs, and forests has led to a decline in the numbers of creatures that live there. Furthermore, the decrease in hunters and the consequent expansion of the distribution of sika deer and wild boar have led to increased damage to agriculture, forestry, and ecosystems.

Third Crisis : Caused by artificially introduced factors

This refers to the negative impact on ecosystems caused by things brought in by humans, such as alien species and chemical substances. Alien species introduced into a new area can threaten local endemic ecosystems by preying on native species, taking over their habitats and food sources, and causing genetic disturbances through hybridization. In recent years, there has also been concern about the impact of marine plastic litter, including microplastics, on ecosystems.

Fourth Crisis : Caused by changes in global environment

This is the impact on biodiversity due to climate change, such as rising temperatures, changes in precipitation, an increase in the frequency of strong typhoons, and ocean acidification. In Japan, the northward expansion of bamboo species and southern species of butterflies and coral bleaching due to rising sea temperatures have been observed. It is considered unavoidable that various ecosystems, including islands, coastal areas, and subalpine and alpine zones, will continue to be affected.

Rapid Changes of Economy in Japan around 1950s

Real GDP



(Ministry of Land)



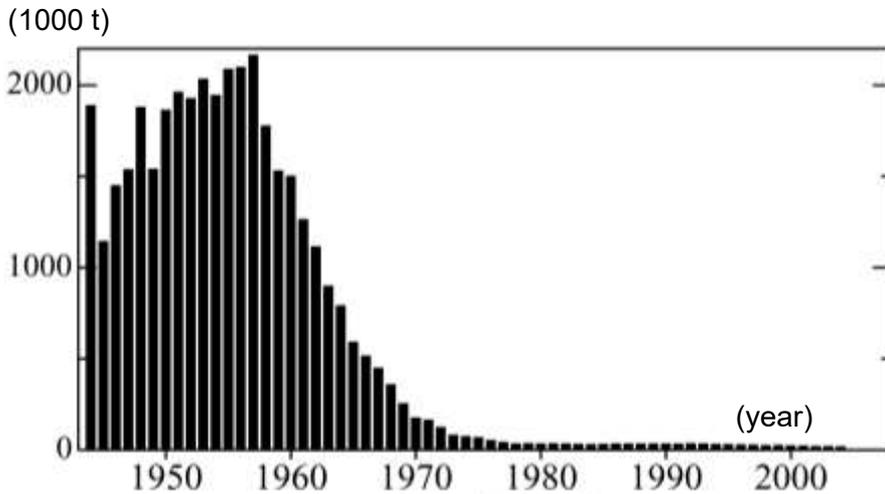
Changes of Lifestyles in Japan around 1950s

- Fuel revolution: from wood and charcoal to electricity and gas
- Agricultural revolution: herbicides and pesticides, chemical fertilizers, mechanization
- Infrastructure development: transportation networks, water supply, sewerage, river development
- Diffusion of household appliances
- Penetration of market economy into rural areas
- Food changes: Westernization, fast food
- Diffusion of tourism and leisure activities
- Liberalization of imports of lumber and agricultural products
- Expansion of cities and urban areas
- Concentration of population in cities

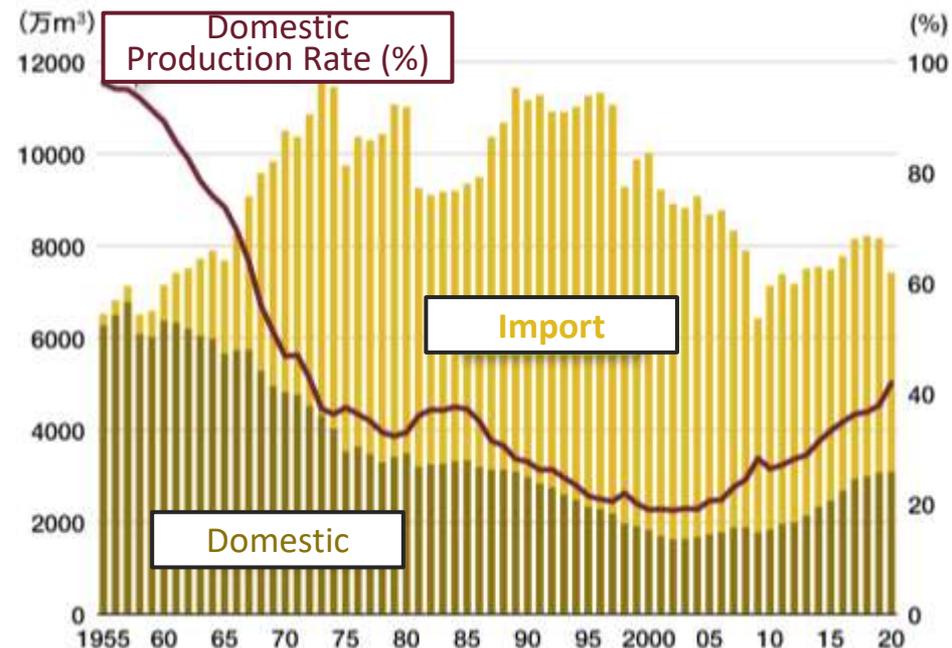
Changes of Environment in Japan around 1950s

- Serious pollution problems: water, soil, and air pollution.
- Overexploitation of nature
- Rapid expansion of artificial forests.
- Abandonment of satoyama, decline of livelihoods connected to nature.
- Decline of local beliefs and culture.
- Depopulation of agricultural and mountain villages: Decline in use and management of nature.

Changing in Japanese Forest Uses to Serious Underuse since 1950s



↑ Changes in **Charcoal** Production in Japan



↑ Changes in **Timber** Consumption in Japan

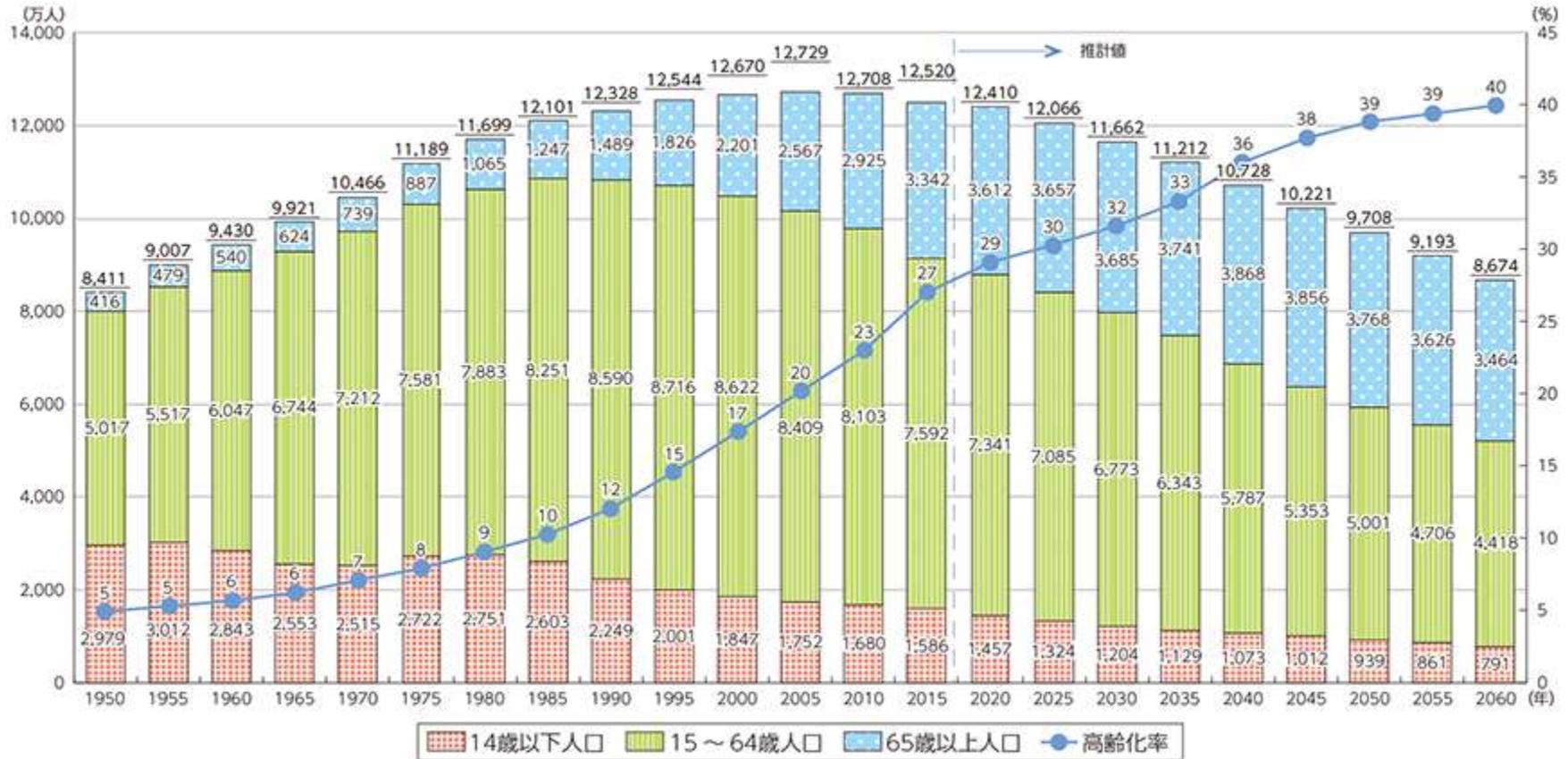
Changes of Lifestyles in Japan around 1970s–

- Population Decline
- Depopulation of rural areas
- Decline in self-sufficiency: dependence on international markets
- Declining use of natural resources: **underuse**
- Rapid global warming, climate change

Changes of Environment in Japan around 1970s–

- Change in satoyama environment: Transition to forest is underway.
- Decrease in biodiversity
- Decrease in biodiversity due to pesticide pollution.
- Increase in abandoned planted forests and abandoned bamboo forests.
- Increasing severity of animal damage

Population Trend in Japan



Under 14 years old

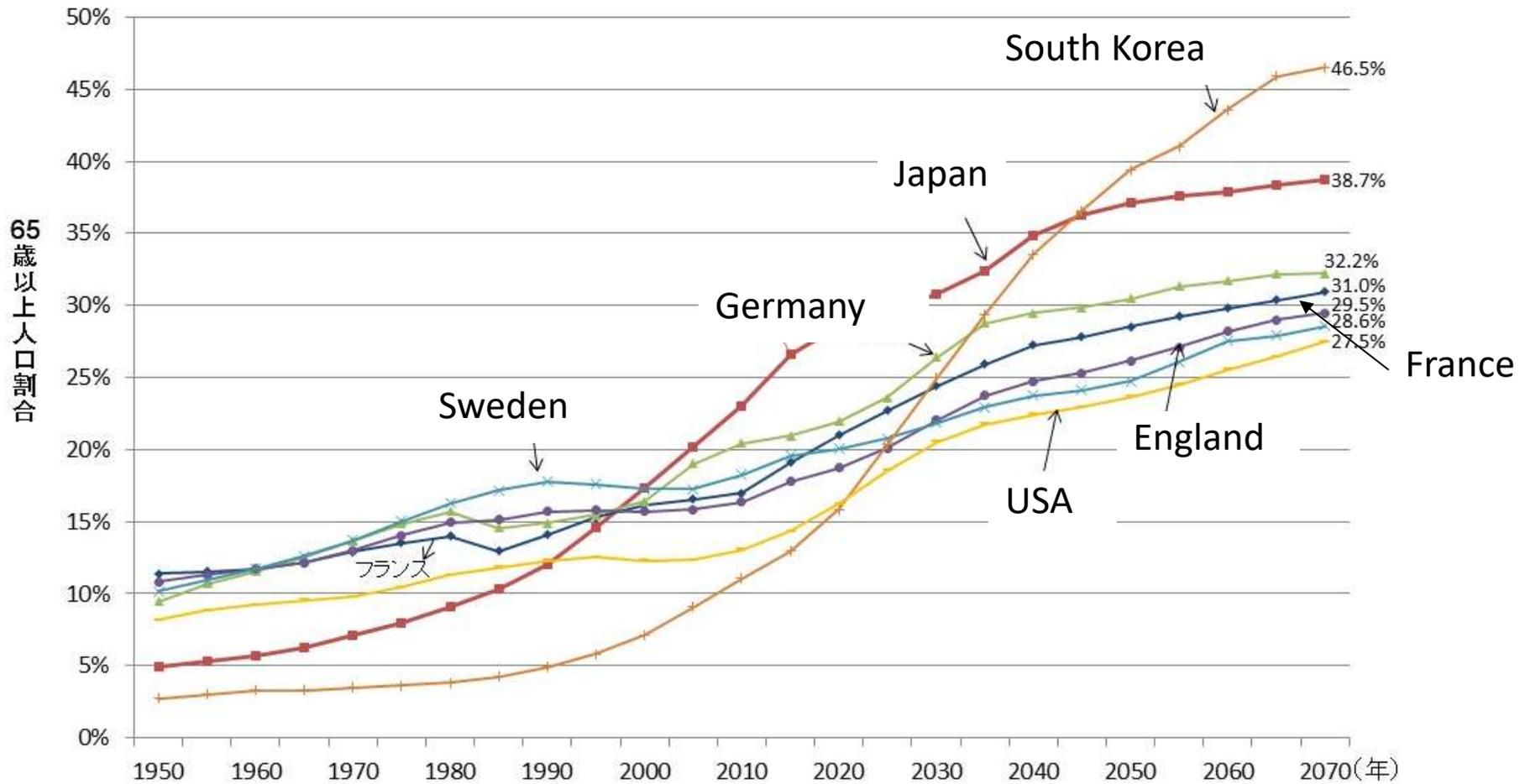
15-64 years old

Over 65 years old

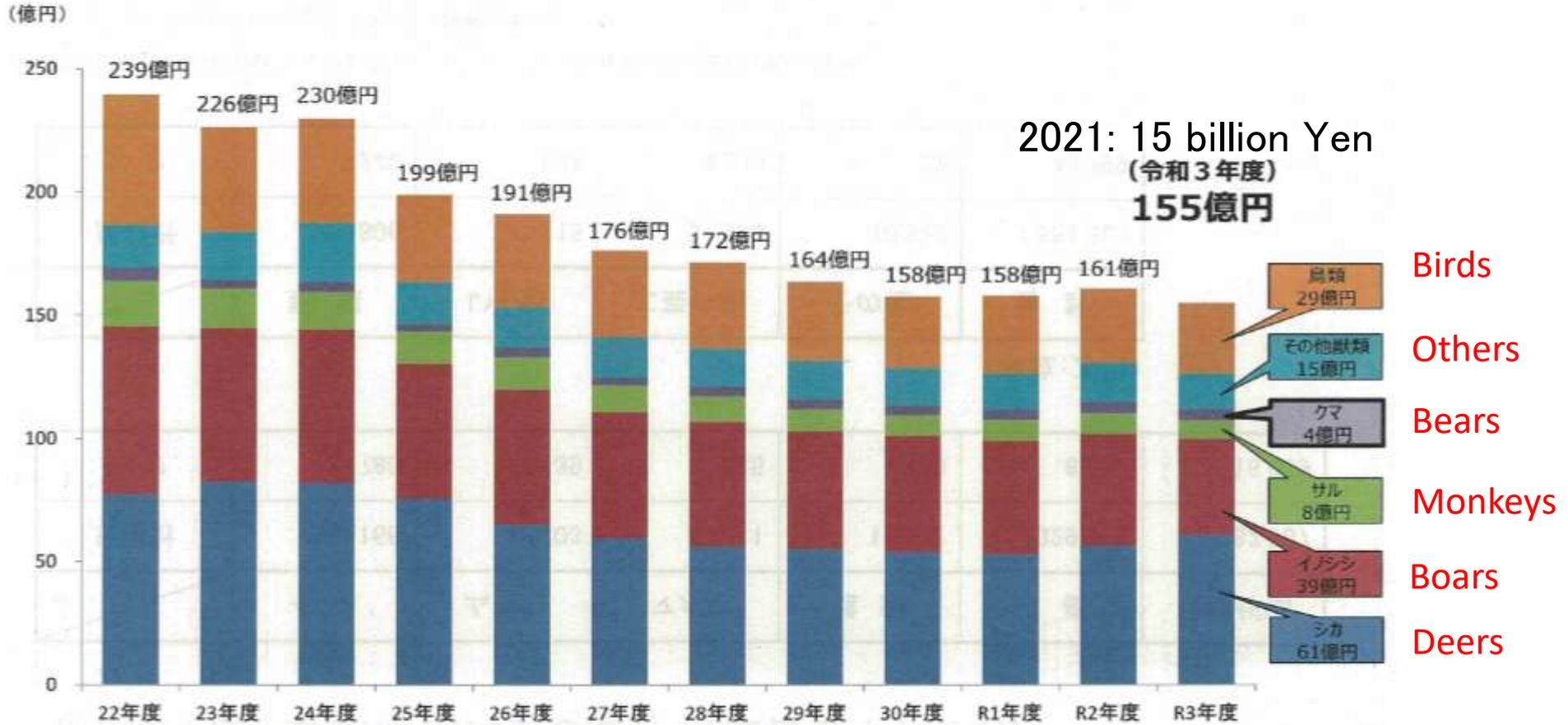
Ratio of over 65 years old people in population

Population Trend of Over 65 Years Old People

Ratio of over 65 years old people in population



Agricultural Damage by Wild Animals & Birds



2010 道府県の報告による（都道府県は、市町村からの報告を基に把握を行っている）。
 2. ジウンドの関係で合計が一致しない場合がある。

2021

【出典】「全国の野生鳥獣による農作物被害状況について」（農林水産省）

Major Animal Species for Hunting



Deer



Boar



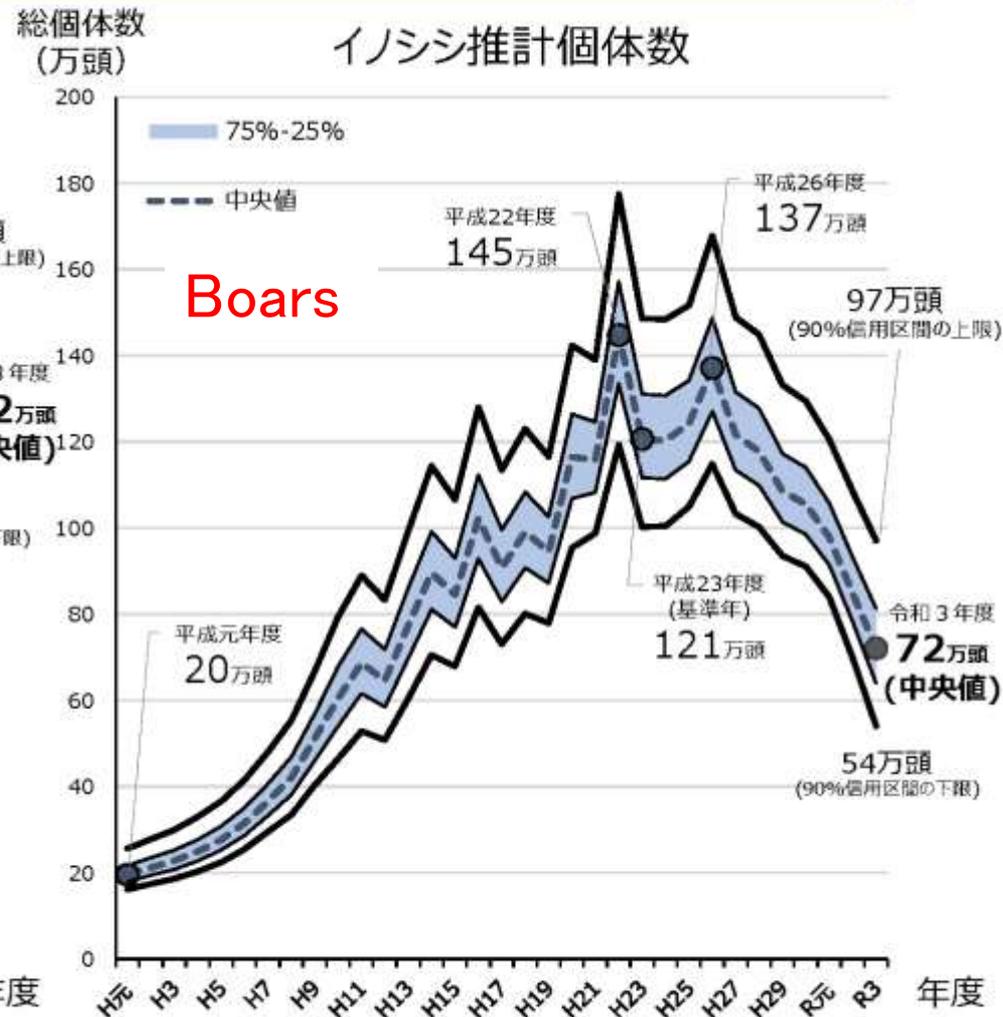
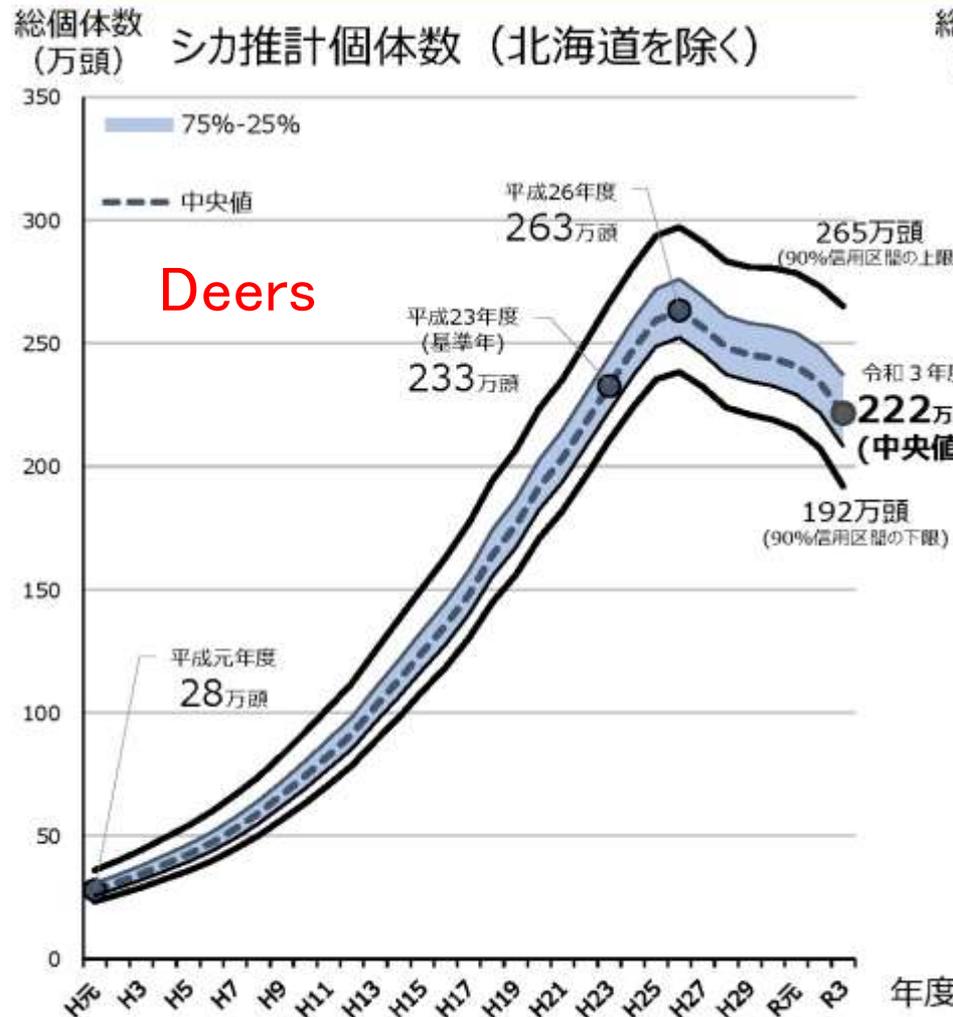
Bear



Japanese
Monkey

Estimated Population of Deers and Boars

- シカは平成元年度～令和3年度で約8倍（中央値）に増加。平成26年度以降は減少傾向にあるものの、そのペースは鈍い。
- イノシシは平成元年度～令和3年度で約4倍（中央値）に増加。平成26年度以降は大幅な減少傾向。



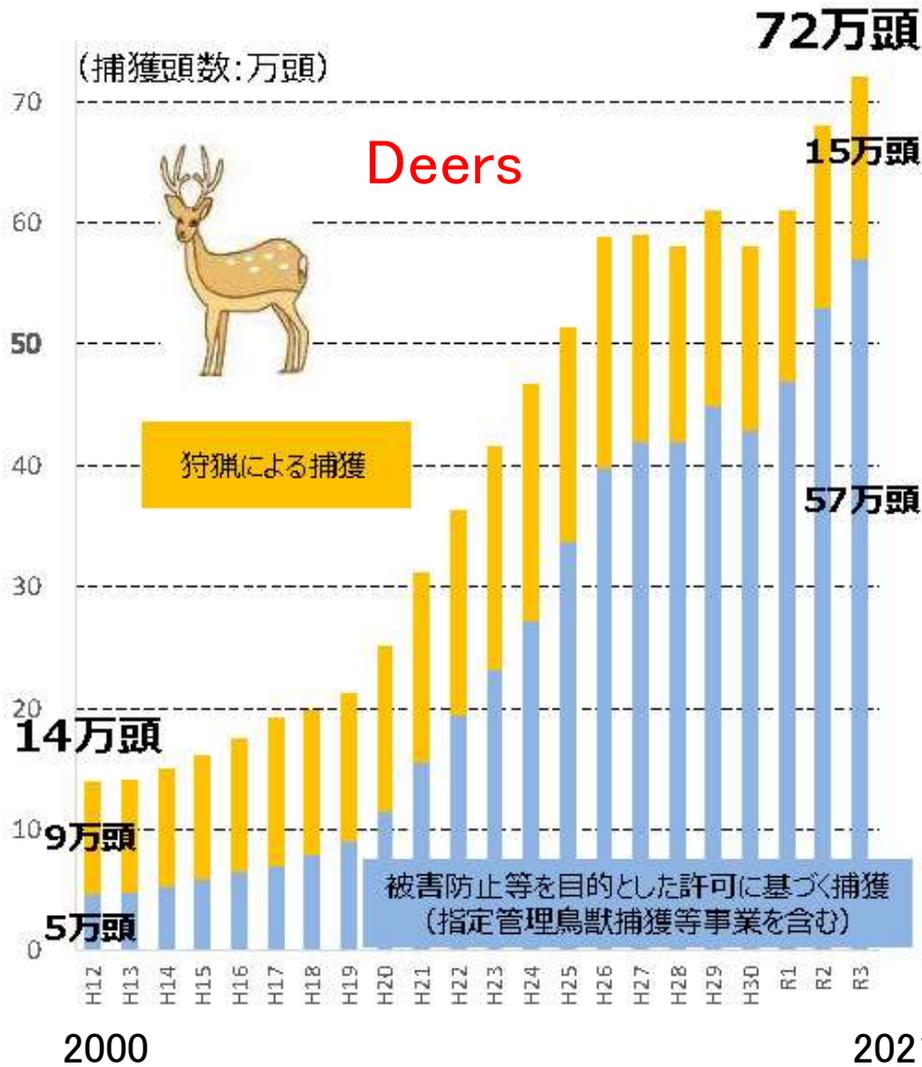
【出典】「全国のニホンジカ及びイノシシの個体数推定等の結果について（令和3年度）」（環境省）

Number of Animals Caught (annual)

【出典】「捕獲数及び被害等の状況等」（環境省）に基づき鳥獣対策室で作成

○ シカの捕獲頭数推移 720,000 (2021)

○ イノシシの捕獲頭数推移



Increasing Factors of Damage by Animals

- Decrease in the number of hunters
- Decrease in snow cover
- Abandonment of mountains, decrease in use of forests
- Decreasing and aging population
- Increase in afforestation
- Decrease in food sources
- Acclimation to humans, acclimation to urban environment

Wild Bear – Human Conflicts

朝日新聞

Human Damage

Death Cases

	人身被害			死者		
	2023年	2024年	2025年	2023年	2024年	2025年
秋田県	70	11	66	0	0	4
岩手県	49	10	37	2	1	5
福島県	15	6	23	0	1	
長野県	12	13	15	1	0	1
青森県	11	4	10	0	1	
新潟県	10	7	18	0	0	
富山県	9	1	3	1	0	
北海道	9	3	5	2	0	2
岐阜県	7	3	4	0	0	
山形県	5	4	12	0	0	
石川県	5	3	0	0	0	
群馬県	4	4	11	0	0	
島根県	3	1	0	0	0	
宮城県	3	0	4	0	0	1
福井県	2	0	1	0	0	
山梨県	2	2	2	0	0	
山口県	0	3	0	0	0	
栃木県	1	2	3	0	0	
三重県	1	1	0	0	0	
滋賀県	0	0	2	0	0	
広島県	0	0	1	0	0	
京都府	1	1	2	0	0	
奈良県	0	1	1	0	0	
岡山県	0	1	0	0	0	
東京都	0	0	1	0	0	
神奈川県	0	1	0	0	0	
兵庫県	0	2	1	0	0	
埼玉県	0	1	0	0	0	
合計(人)	219	85	222	6	3	13

スーパーにクマ、その時店長は「本当にいるの」扉開けると右腕に...

無料記事

中沢尚乃 星井麻紀 高木智子 2025年10月8日 17時30分



- Several factors relating to this issue.
Change in forest environment (eg change in *satoyama*), behavior change of bears, human land utilization changes, decreasing of hunters

(↑ data up to 16th November 2025)

<https://www.tokyophotograph2001.jp/>

Hunting

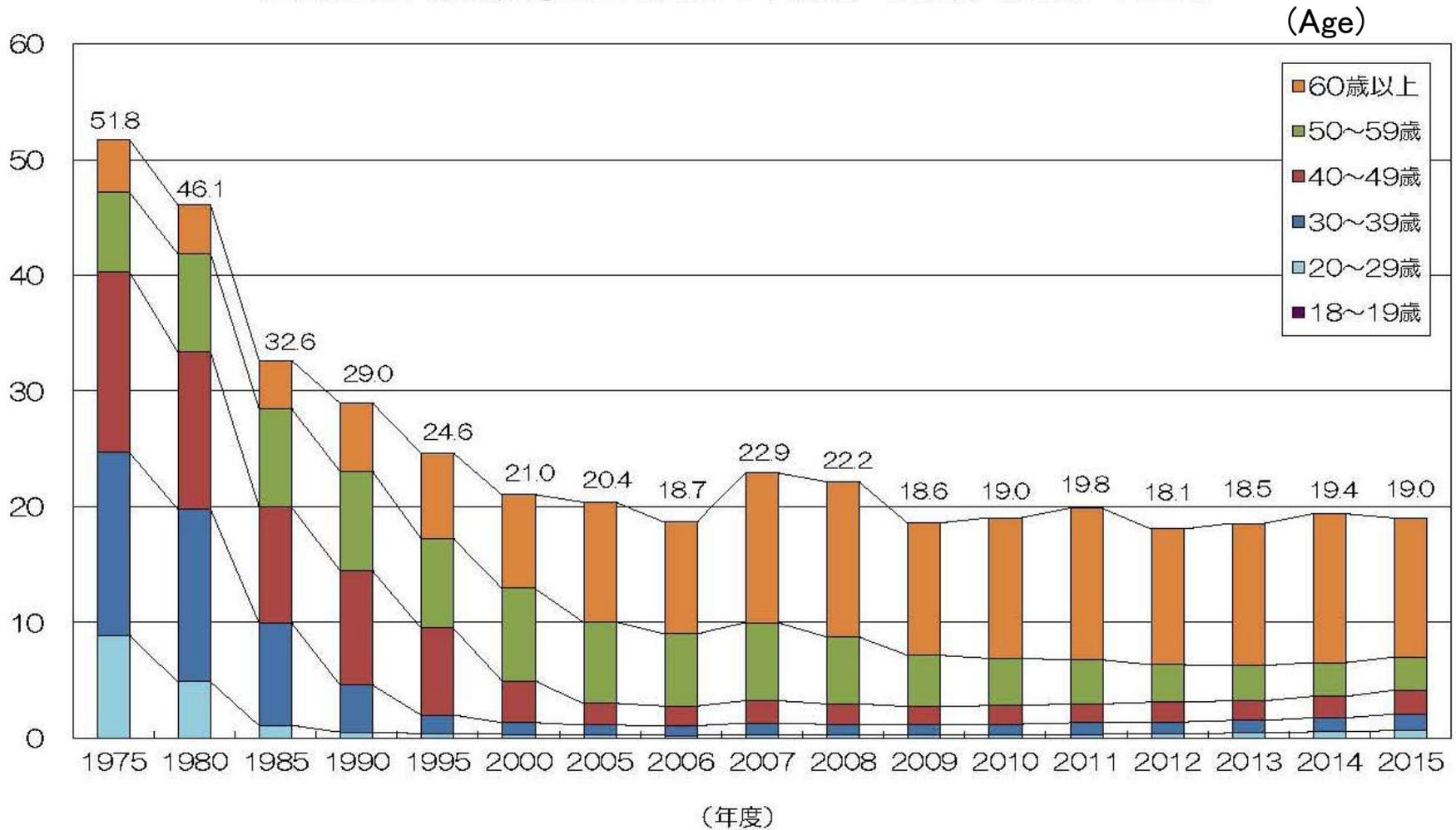


- Hunting was an important winter occupation.
- In recent years, the number of hunters is aging and decreasing.

Number of hunting license holders

(10,000)
(万人)

全国における狩猟免許所持者数（年齢別）の推移（S50～H27）



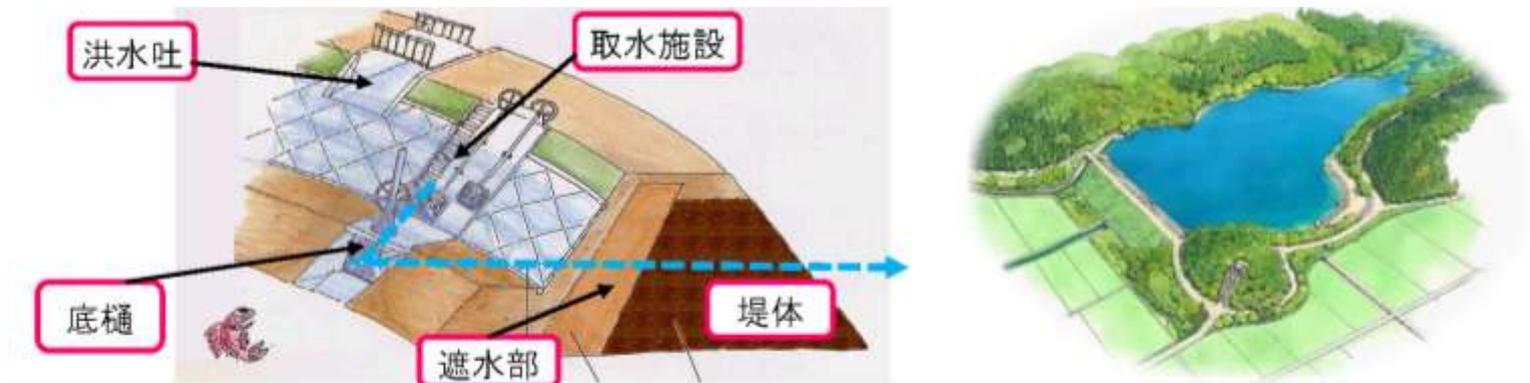
Today's Contents

1. Introduction of ISI in Kyushu University and Interdisciplinary Research
2. Water Relating Social Problems & Issues
3. Framework of “Integrated Sciences for Sustainable Human-Aqua Environment (Aqua Science)”
4. Issues of Japanese Ecosystems
5. A Case Study: Management and its Future of Agricultural Reservoirs in Japan

Issue on Management of Agricultural Water Reservoir

Water Reservoir (*tame-ike*):

An artificially constructed pond designed to store water for withdrawal, enabling the securing of agricultural water supplies in regions with low precipitation and lacking large rivers within their watersheds.



谷池



山間や丘陵地で谷をせき止めて造られたため池

皿池



平地の窪地の周囲に堤防を築いて造られたため池

重ね（親子）池

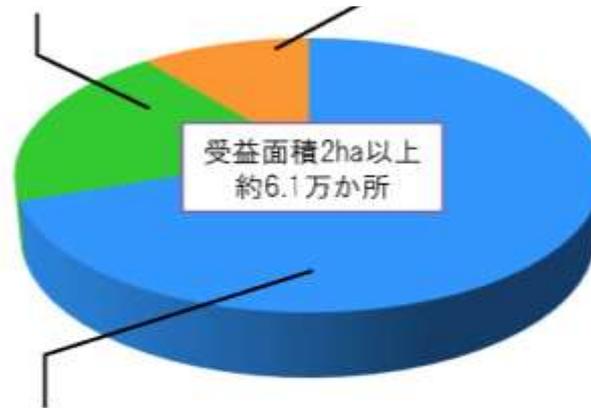


棚状に複数のため池が連なっているため池

Dates of the Water Reservoirs

Meiji & Taisho Era (160 - 100 years before) : About 20%

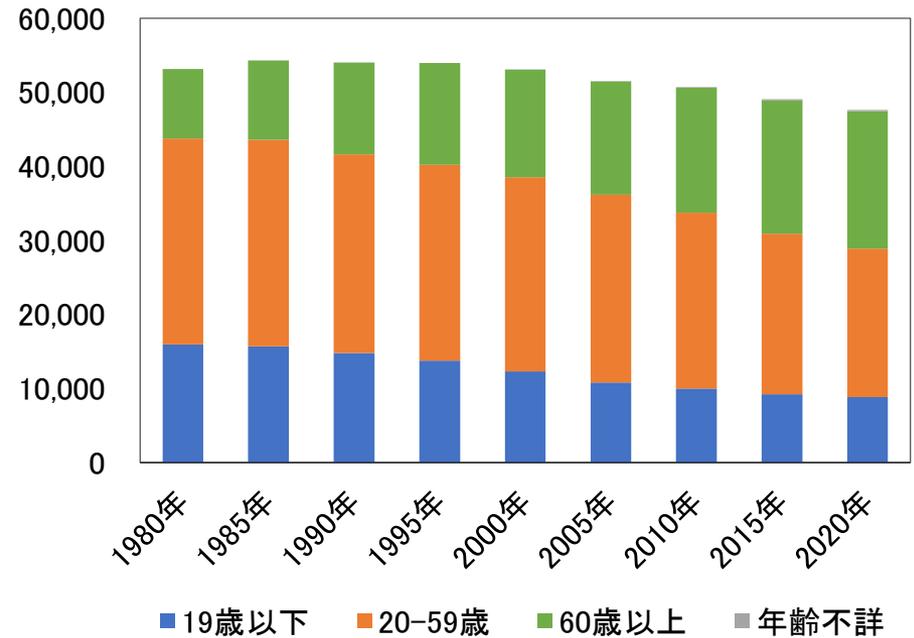
Showa Era (within 100 years before) : About 10%



Edo Era (400 - 200 years before) & unknown: About 70%

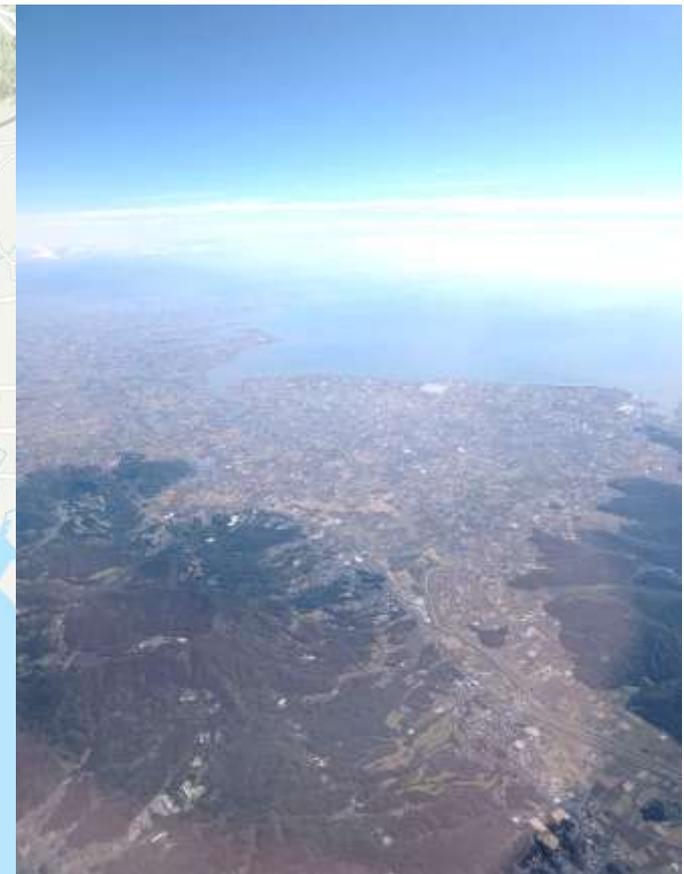
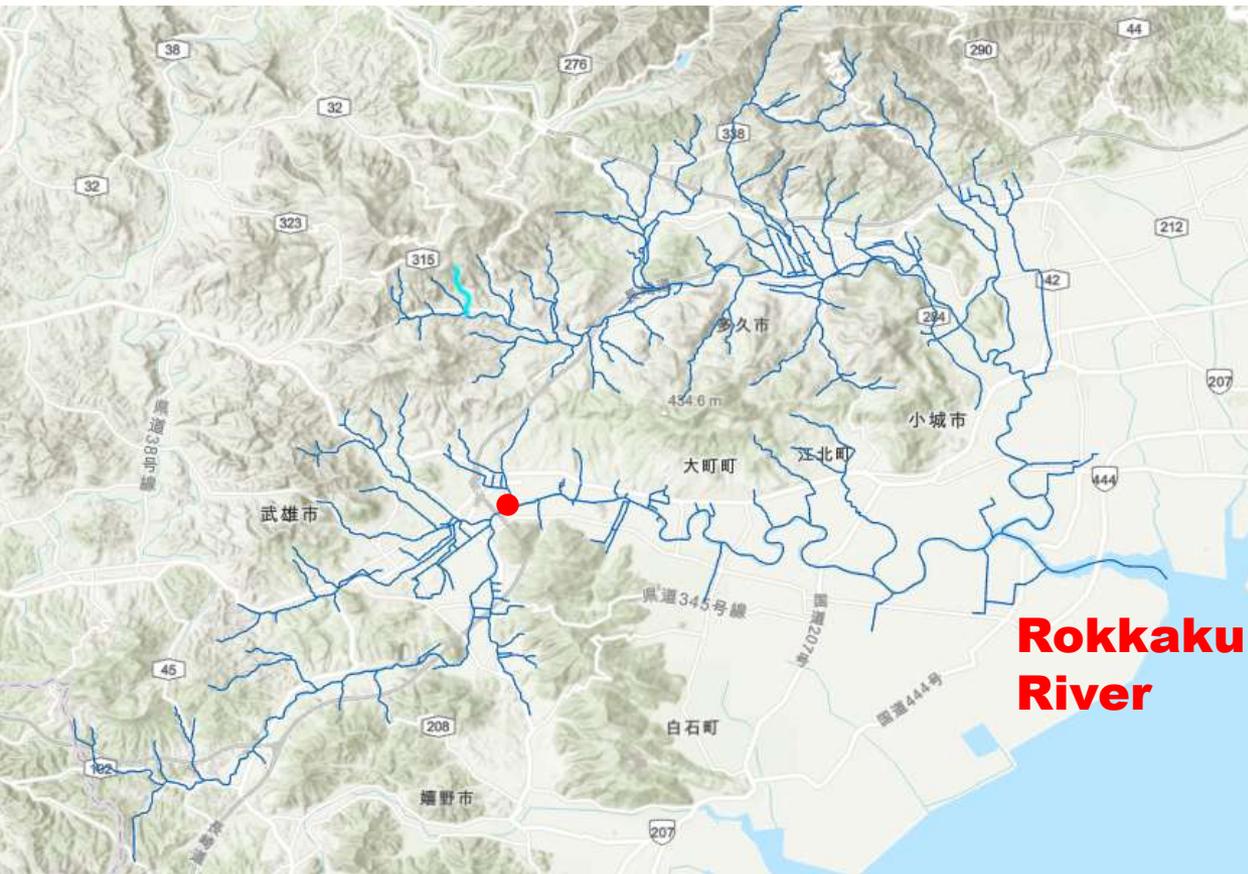


A Case Study: Takeo City, Saga Prefecture



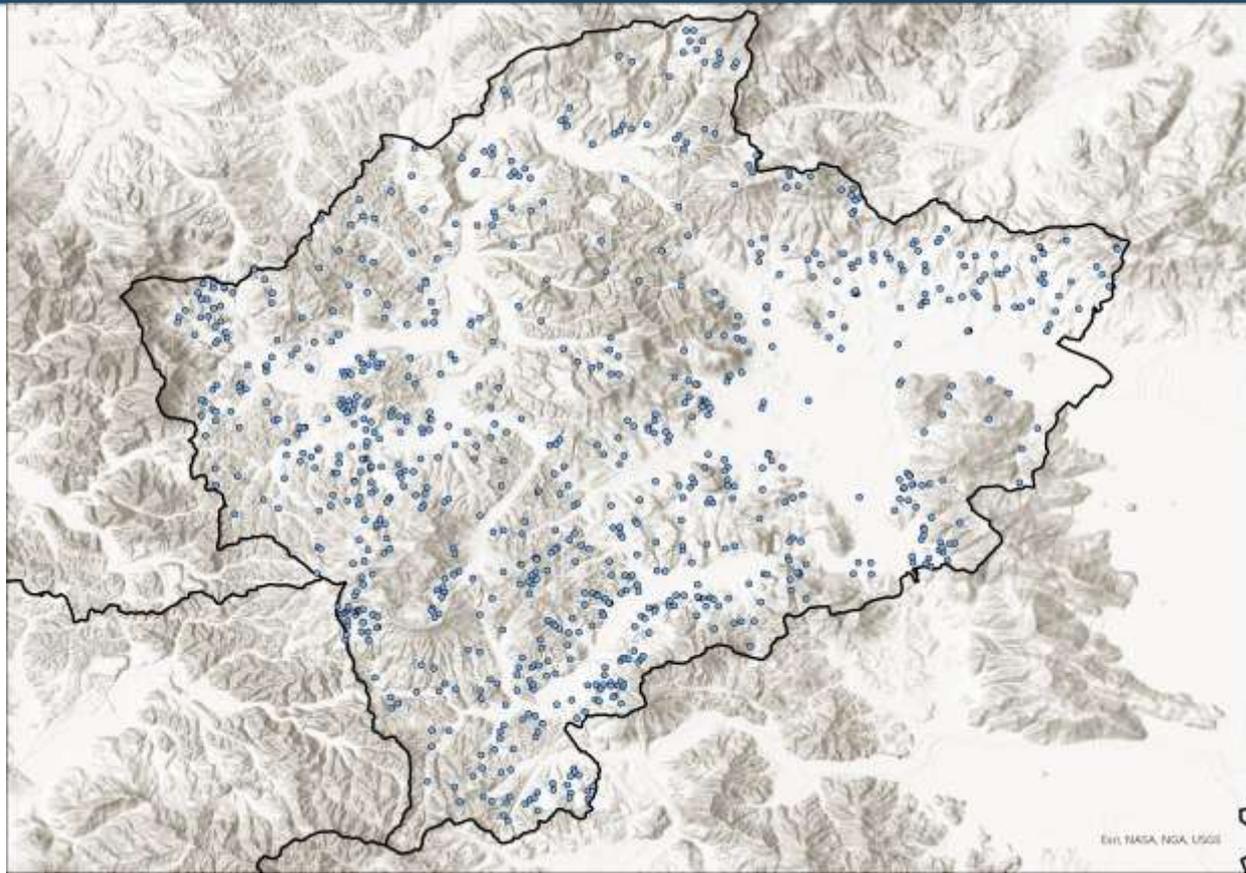
Population Change in Takeo City

Takeo, located in the watershed of the Rokkaku River



- The tidal range in the Ariake Sea reaches up to 6 meters per day, causing seawater to surge upstream as far as Takeo.
- When heavy rain coincides with high tide, inland flooding occurs.

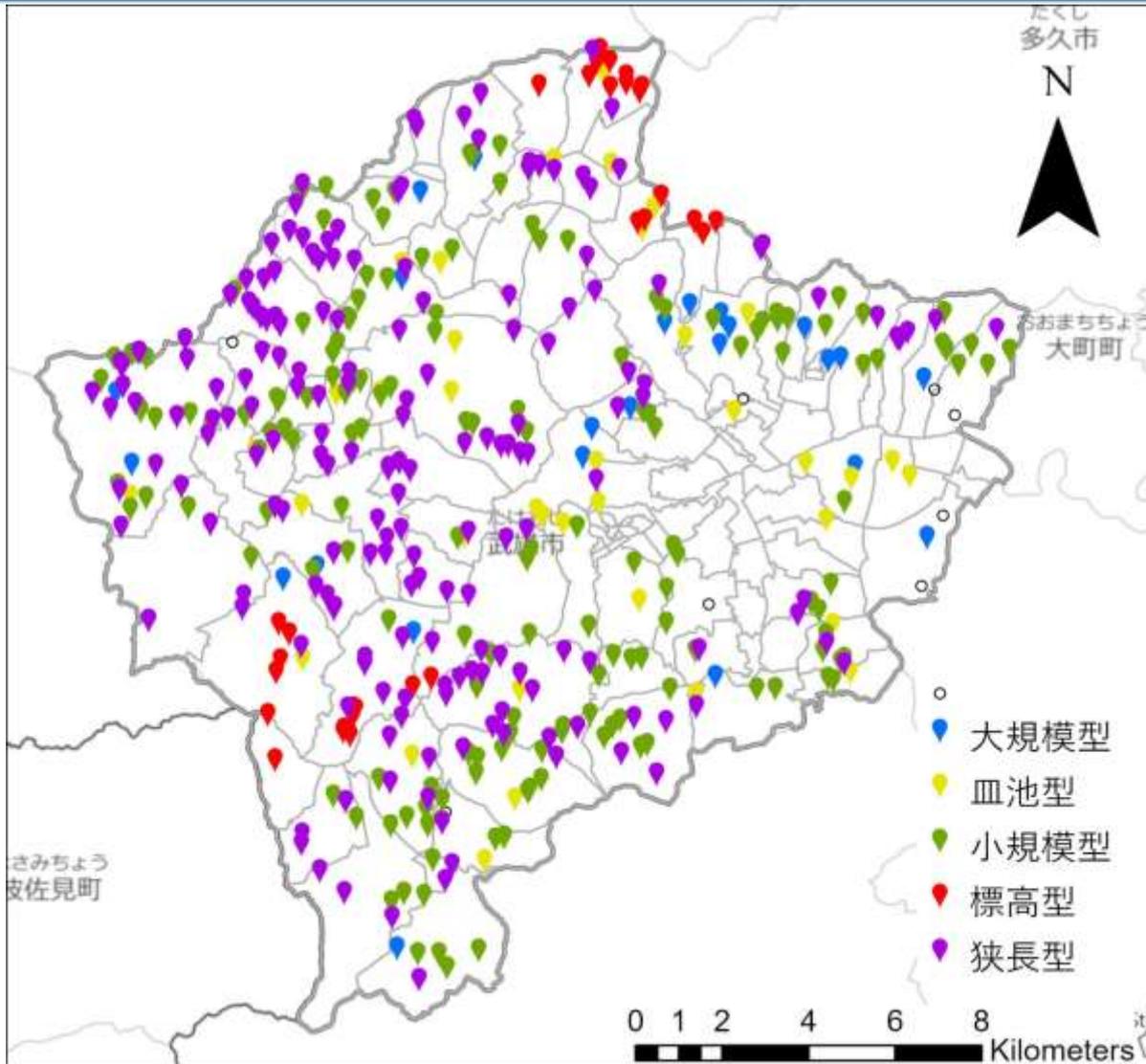
Water Reservoirs in Takeo



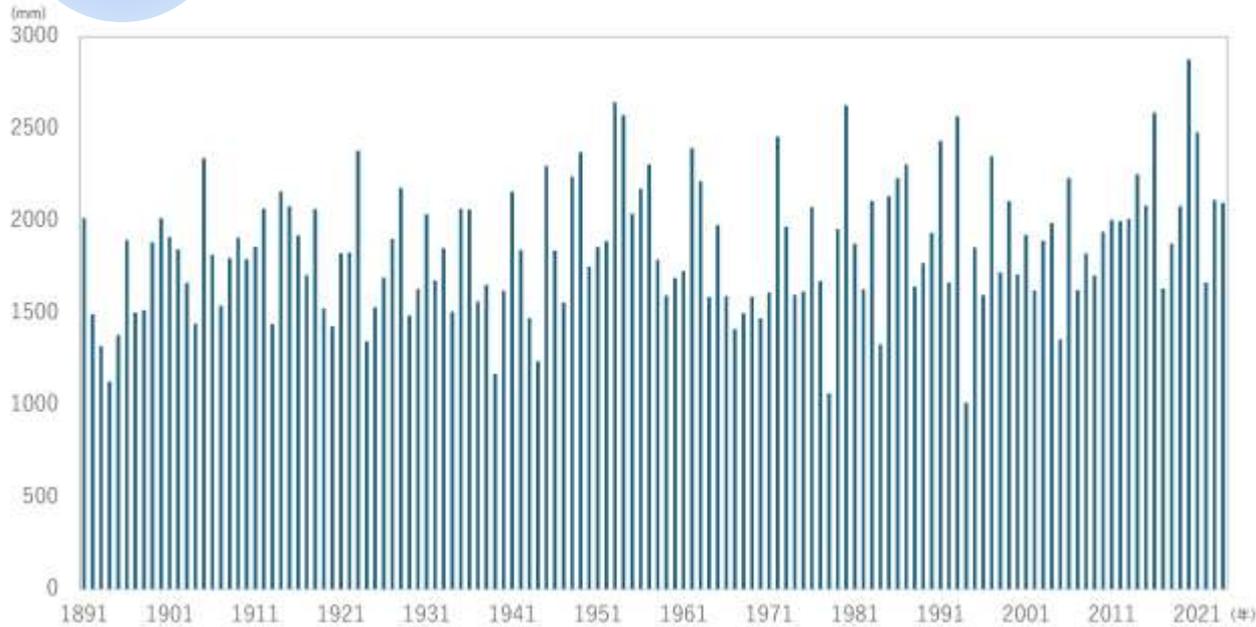
Registered water reservoir: **455**

Disaster Prevention Priority Agricultural Reservoir: 229

Several Types of Water Reservoirs



Annual Rainfall Fluctuation & Disaster

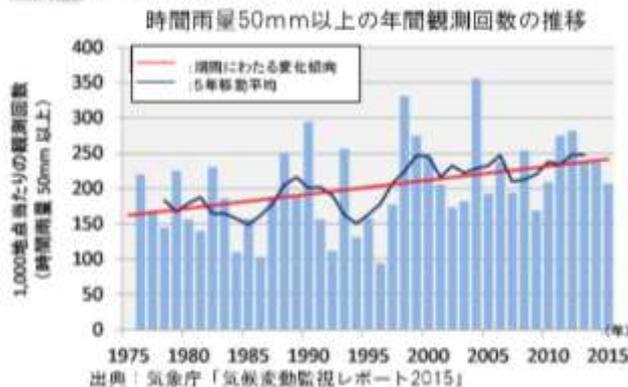


1953	June	Flood	1964	Aug.-Sep.	Drought	1971	Sep.-Dec.	Drought
1955	Aug.	Drought	1966	July-Aug.	Drought	1972	July	Flood
1956	July-Aug.	Drought	1966	Aug.-Sep.	Drought	1978	April-June	Drought
1956	Aug.	Flood	1967	5~6月	Drought	1978	July-Sep.	Drought
1957	Jan.	Drought	1967	July	Flood	1980	Aug.	Flood
1958	July-Aug.	Drought	1967	Aug.-Oct.	Drought	1990	July	Flood
1959	June	Drought	1968	Mar.-June	Drought	1993	Aug.	Flood
1959	Sep.	Drought	1968	Aug.-Sep.	Drought	1994	July-Aug.	Drought
1960	Aug.	Drought	1969	Aug.-Sep.	Drought	1995	July	Flood
1964	June	Drought	1969	Dec.-Jan.	Drought	2007	July	Flood
1964	July-Aug.	Drought	1971	April-May	Drought	2009	July	Flood

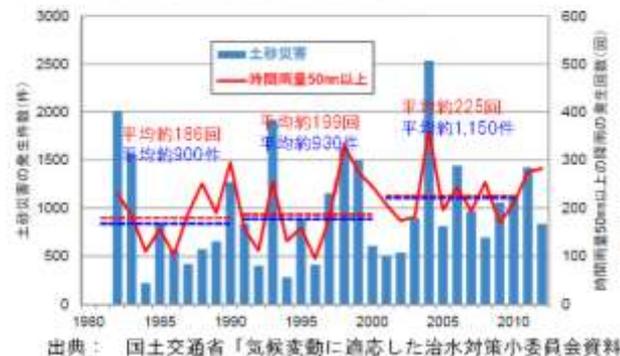
Drought (white)
Flood (orange)

- In recent years, heavy rains have been occurring more frequently, and as a result, landslides and mudslides have also been on the rise.
- The probability of a magnitude 7-class earthquake occurring within the next 30 years is estimated to be approximately 70%, and there are concerns about the occurrence of trench-type earthquake.

近年の気候変動

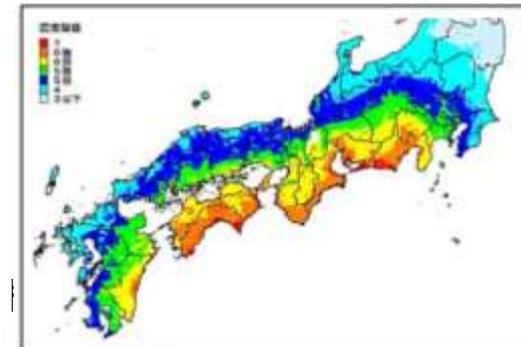


豪雨と土砂災害の推移



南海トラフの地震予測

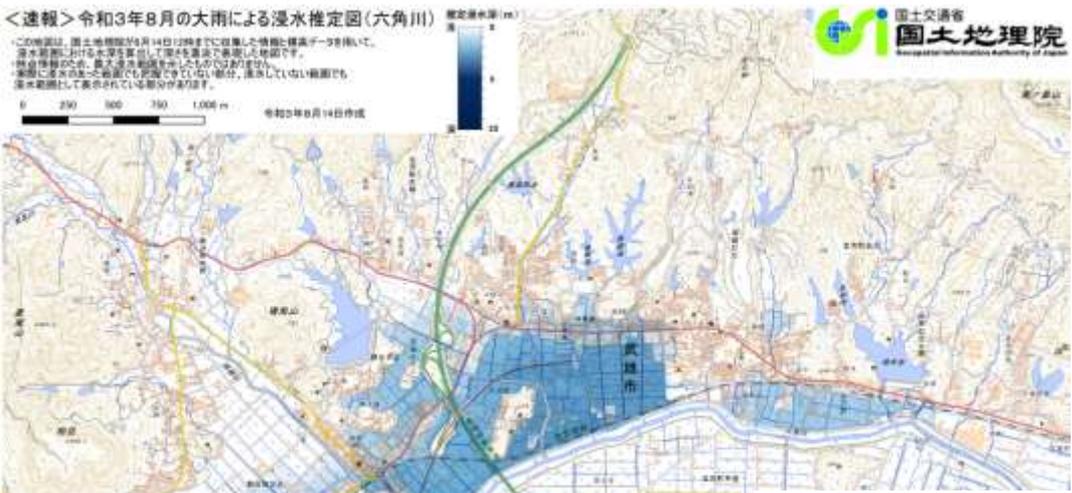
南海トラフの巨大地震モデル検討会【最大クラスの震度分布図】



- Implementation of the “Nationwide Emergency Inspection of Reservoirs” following the July 2018 Heavy Rainfall.
- Reservoirs requiring emergency measures: 1,540 locations

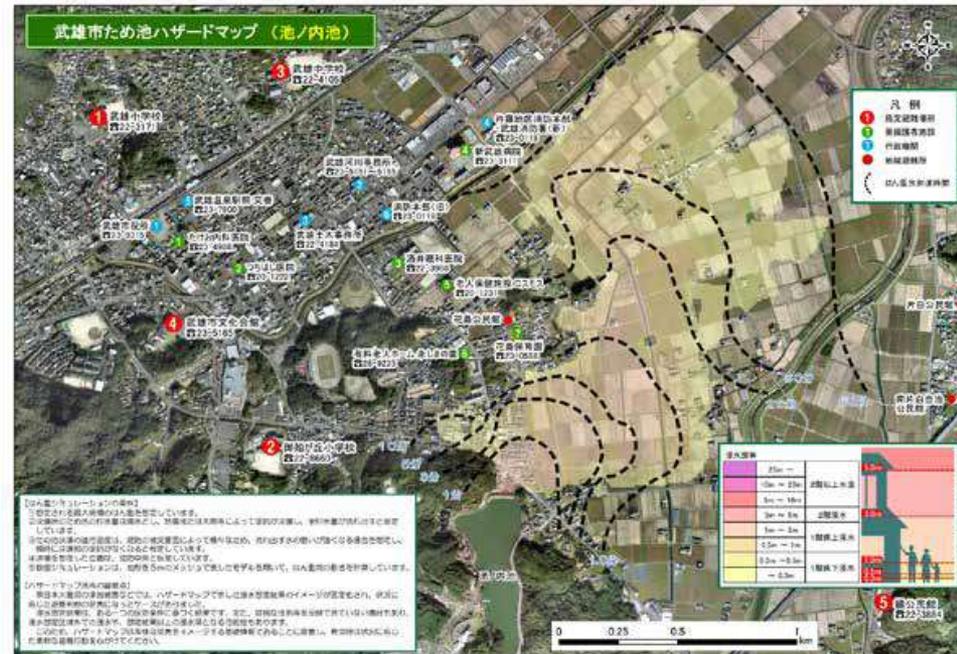
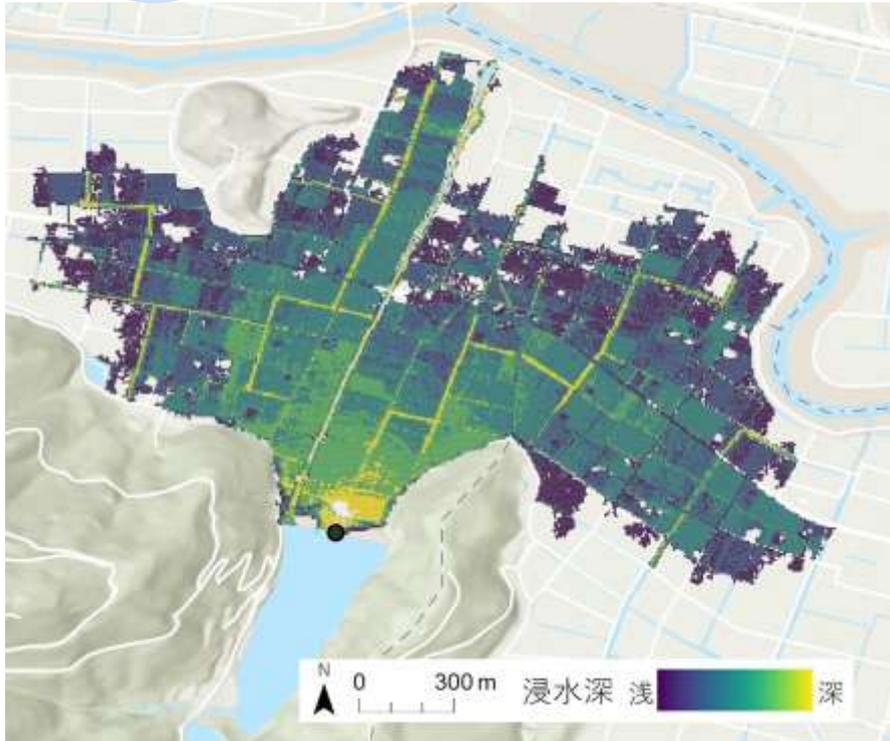


出典:NHKニュース <https://www3.nhk.or.jp/news/html/20210814/k10013203021000.html>



出典:国土地理院

Large-scale floods occurred in succession in August 2019 and August 2021.



Hazard map showing flood risks by destroy a levee of water reservoir

Simulation for a case of destroy the levee of a water reservoir, a result using SIPOND software.

- Risk of reservoir breaches during heavy Rains
- Discussions on abolishing reservoirs that cannot be managed.

- Areas prone to heavy rain flooding and drought disasters (Interaction with the Anthroposphere).
- Predictions of Japan's overall precipitation patterns reveal that, due to the increased frequency and severity of torrential rains associated with global warming, reservoirs now pose a threat of disaster.
- The increased disaster risk from reservoirs is not solely due to global factors. It is also the result of complex interactions involving factors such as the difficulty in maintaining them due to declining birthrates, aging populations, and migration to cities. (Interaction with the Anthroposphere)



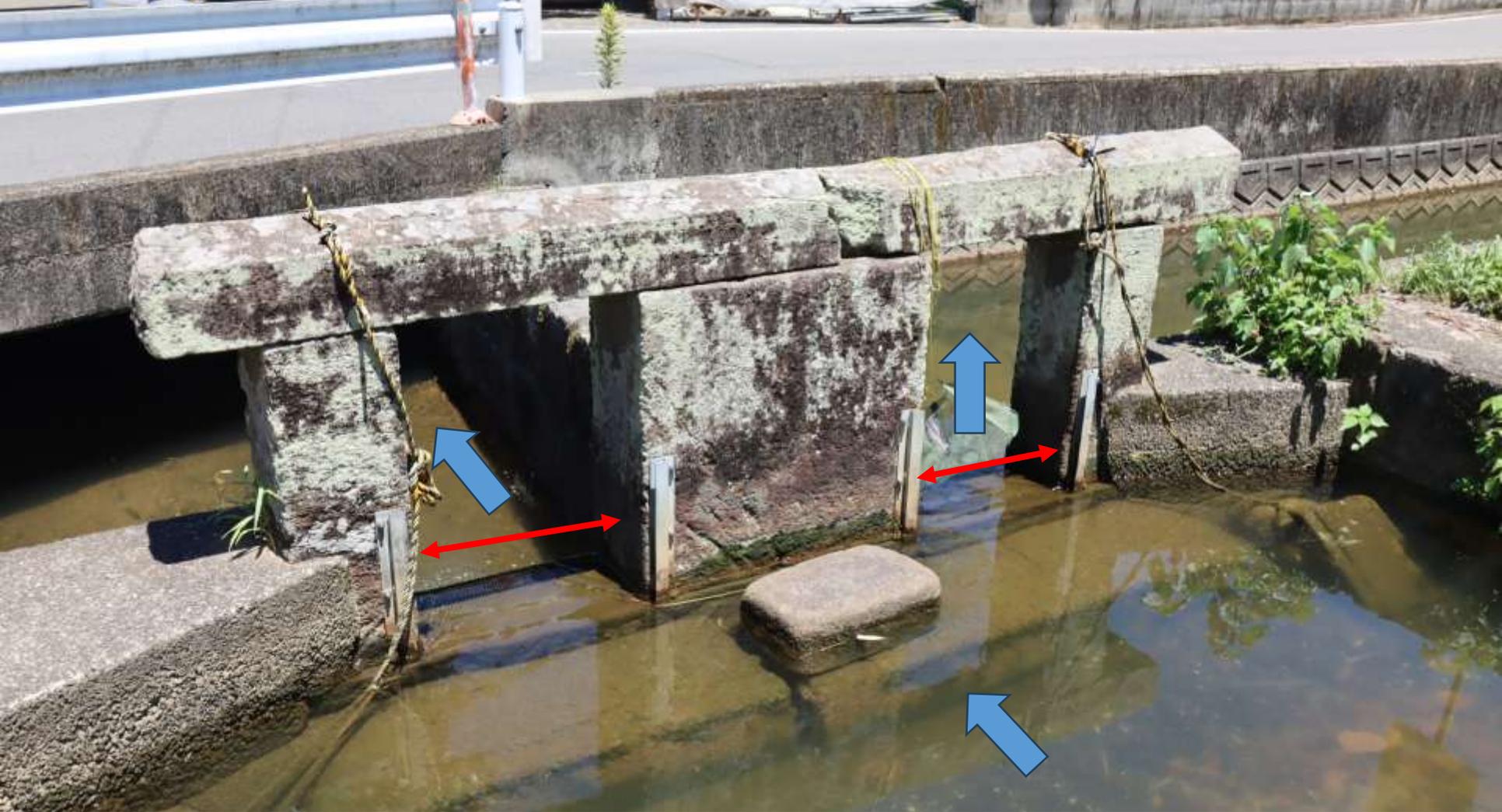
- Securing water supplies during droughts and ensuring rapid drainage during floods have been historical challenges for producing rice. (Interaction with the Geosphere)



Formation of Water Reservoir in Edo Era



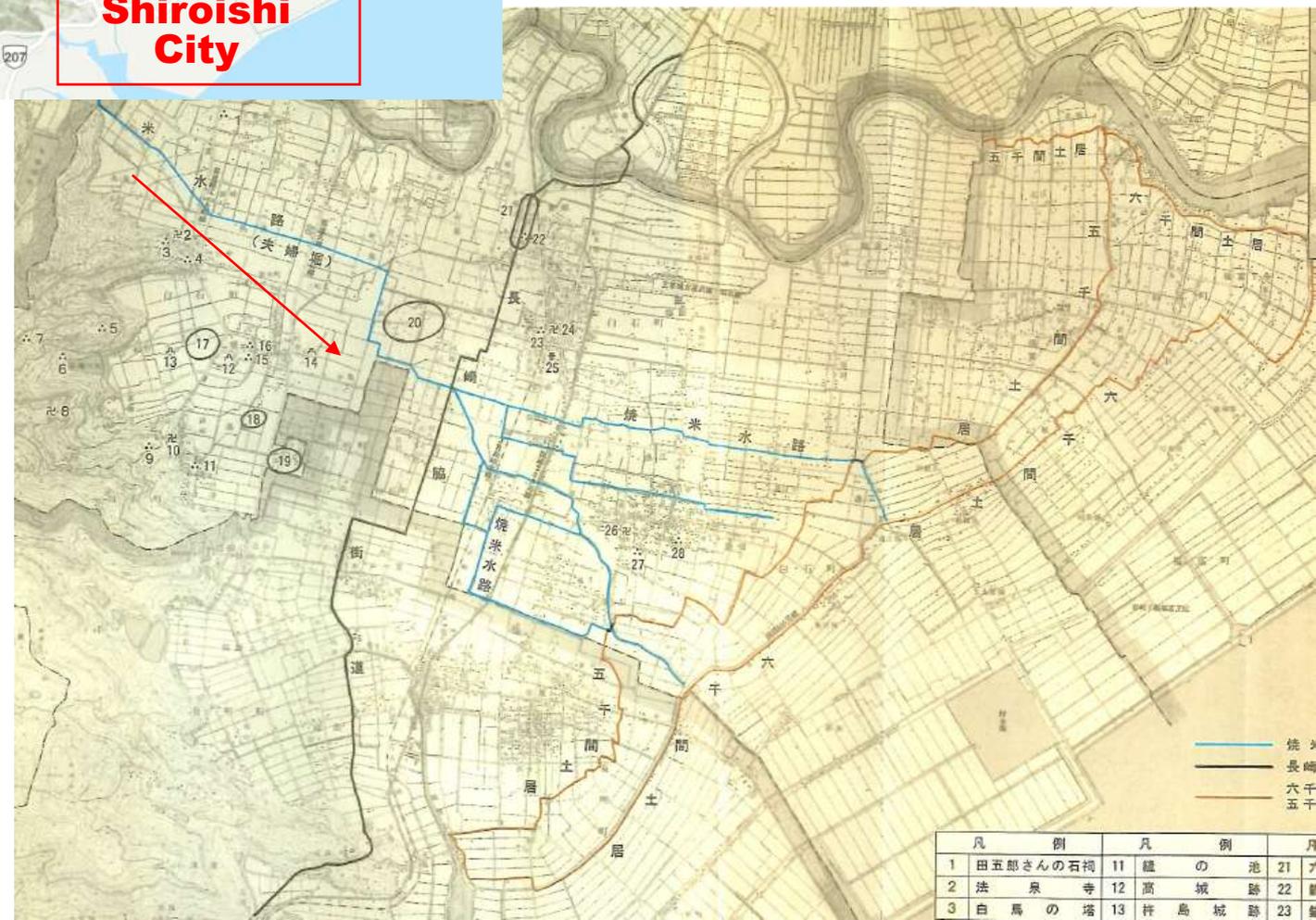
Formation of *Ikenouchi-ike*
寛永2年 (1625年)



- Adjust the water flow to each settlement based on the ratio of sluice gate lengths.
- Securing water is an extremely important issue for stable rice production.
- Rules established in the Edo period are still applied today.



- Part of the water from Yaki-gome Pond benefits neighboring Shiraishi Town
- A rule established in Edo-period documents that remains in effect today



橋町と潮見川の治水工事の推移



「たっぼくん」

弥生時代より鎌倉初期(橘氏入部1237年)



橘氏の潮見川築造(1237から1302年)



成宮兵庫の三法方石井樋(1625年)



前田伸右衛門の治水工事(1786年頃)



令和三年 橋町まちづくり推進協議会

「三法方石井樋」略図

至、永島



空中写真(1981年撮影)

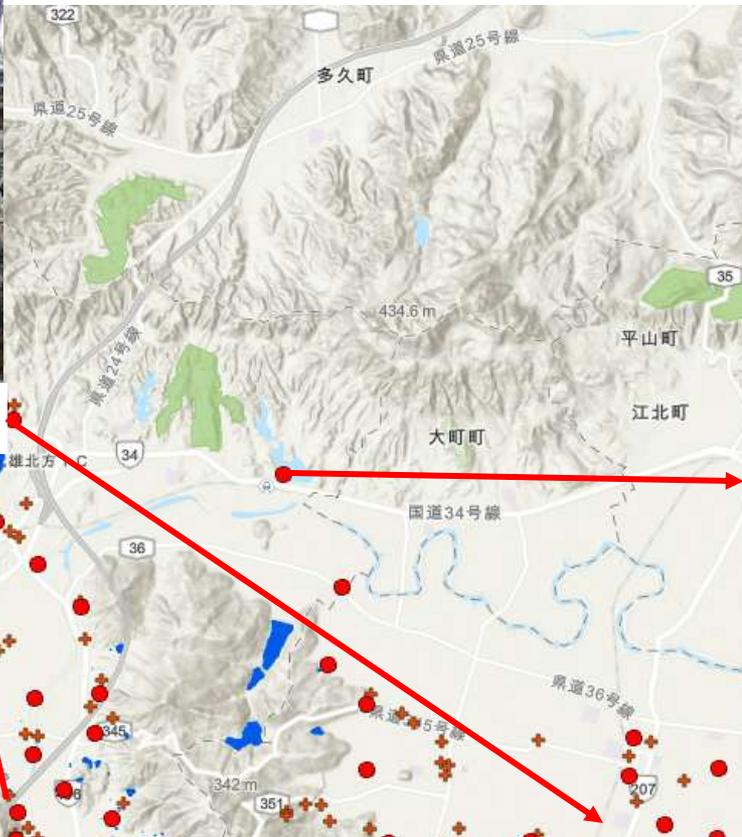


↑ 生見の石井樋

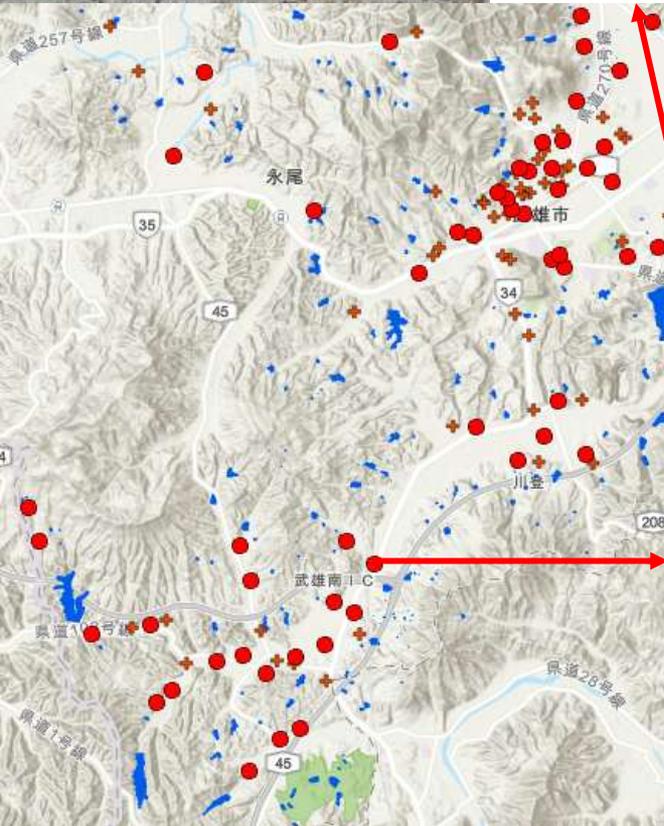
Shrines Relating to Water



潮見神社



海童神社

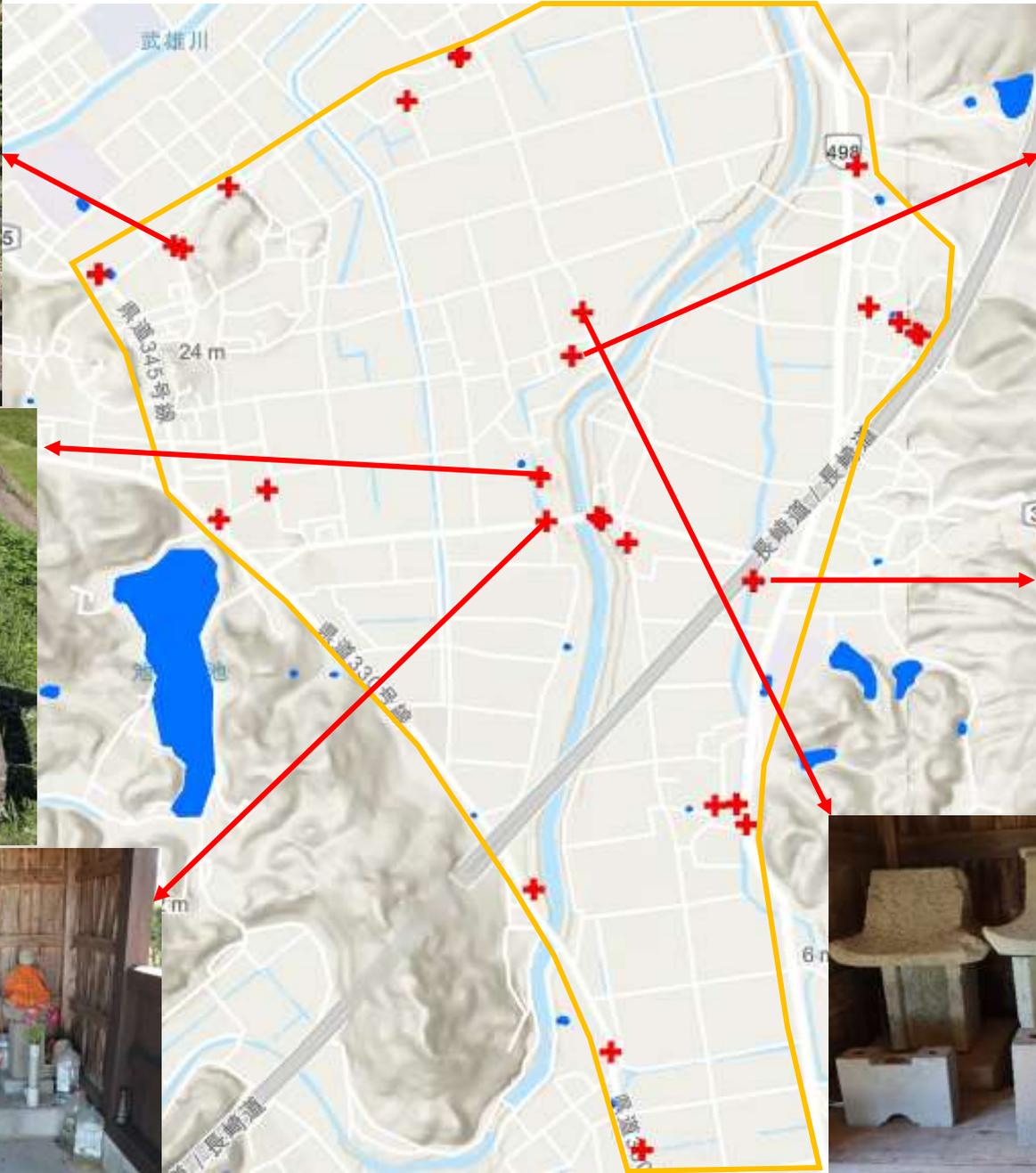


貴船社



貴船社

Shrines in a Word



- Until several decades ago, irrigation ponds served as fish farms for raising carp.
- The culinary tradition of eating carp is deeply rooted in the region.

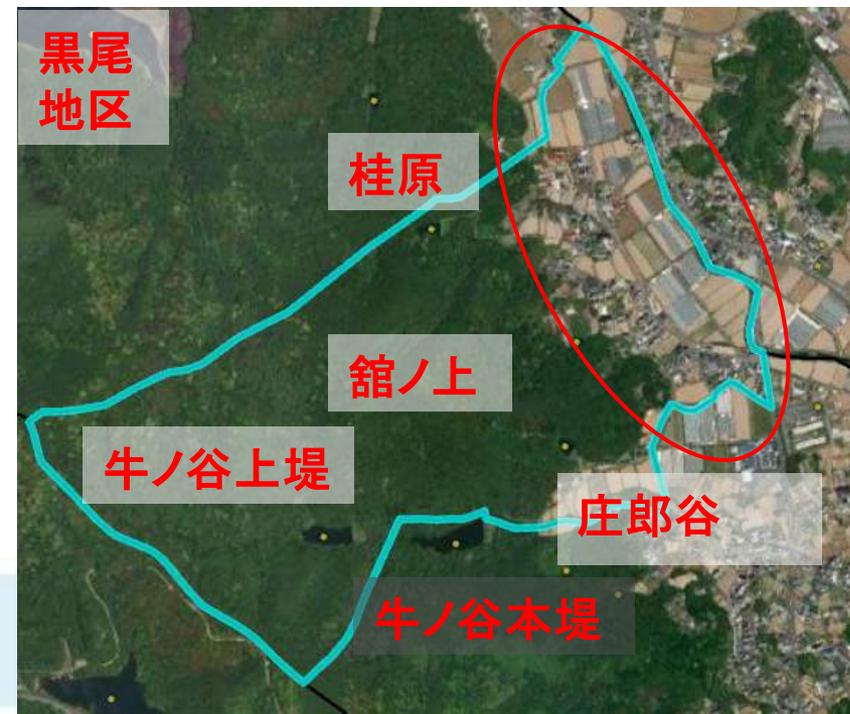


Workshop Method



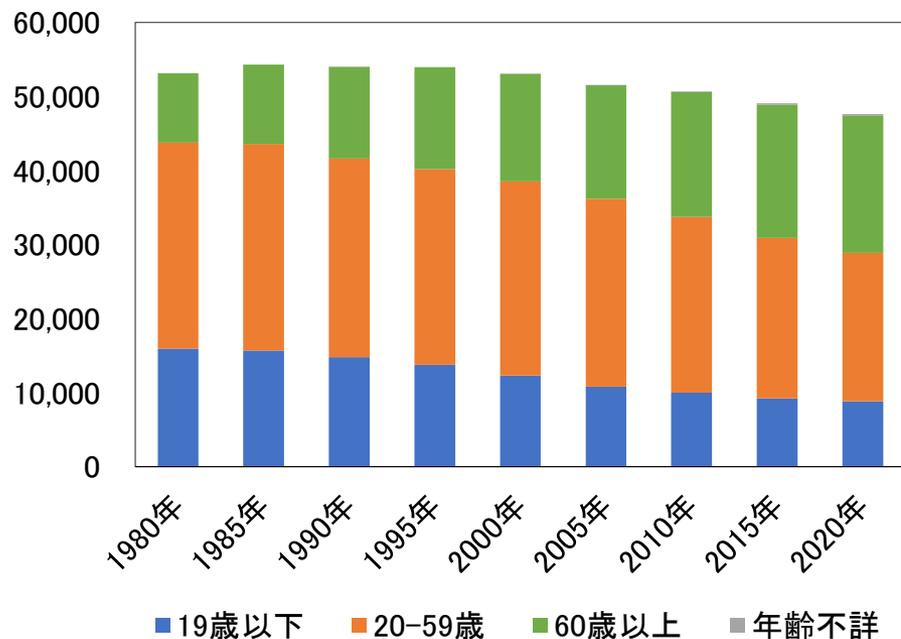
Challenges and Conflicts Surrounding Reservoir Management

- Declining use of reservoir water due to fewer farmers
 - The number of farmers growing rice within the district has decreased, reducing the number of people using reservoir water.
 - Some reservoirs have no users at all. However, there is resistance to draining reservoirs completely, so water is retained in at least part of them.



Young farmers are converting rice paddies to greenhouse cucumber cultivation.

Population Decrease & Population Aging



Population Change in Takeo City

- Agency of Rice: To achieve stable yields from rice cultivation, local communities have historically reshaped their region's unstable water environment.
- The water-related deities and artificial canal networks that remain in the area demonstrate this relentless adaptation to water.
- The declining population and aging society have created a significant challenge: A shortage of labor for managing irrigation ponds and water resources.



- Reservoirs are historically protected water bodies that have undergone moderate human disturbance, making them habitats for rare species.
- According to a survey on the biodiversity of reservoirs in Hyogo Prefecture conducted from 2002 to 2007, at least one endangered species was found in 64% of the 99 surveyed ponds. Furthermore, 8 or more endangered species were found in 5% of these ponds.



Damaged by Wild Animals

- Wild boars dig up dam soil while foraging, increasing risks.
- Establish wire mesh fencing on the dam is now necessary, but part of the cost falls on the community.
- The burden-sharing approach between reservoir users and non-users remains an issue.



- When floating weed proliferates massively, it affects water intake, necessitating weed removal.
- Increased burden of reservoir management (interactions with the Anthroposphere)



- As a measure against avian influenza, local governments requested communities to lower reservoir water levels during winter to prevent migratory birds from using them.
- Increased burden of reservoir management (interactions with the Anthroposphere)



Summary & Future Implications

3 Spheres Perspectives

- Future Climate/Hydrological Data
- Simulation of Water Circulation

Geosphere

Culture

Focus Point of Water Cycle System in Takeo City:

- Management of **Water Reservoir** in High Fluctuation of Annual Rainfall

データ活用

Data Uses

Data Uses

Biosphere

Economy

- Fish survey in small ponds and water channels
- Aqua insects survey

- Agricultural water use
- Farm management



- Hearing to Administration, Questionnaire
- Old map analysis



Summary1: Water Environment Extracted from 3 Perspectives

Geosphere

- Originally prone to heavy rain floods & droughts, recent changes in precipitation patterns have led to frequent torrential rains, bringing reservoir disaster risks into sharp focus.
- Combined with factors like the difficulty of sustaining maintenance work due to declining birthrates & an aging population, discussions are progressing to decommission reservoirs posing high risks.

Anthroposphere

- Maintaining rice cultivation & ensuring a stable rice supply amid unstable precipitation patterns has long been a challenge for the area. To address this, the water environment has been artificially reshaped.
- Reservoirs hold cultural value, often tied to local festivals, and communities manage them based on rules established at the time of construction (mostly during the Edo period). However, perceptions & management practices have changed amid socioeconomic shifts.
- Population decline & aging have become bottlenecks for maintaining the artificial water environment.

Biosphere

- Reservoirs and irrigation canals serve as vital habitats for fish and aquatic insects, but changes in management practices and increased wildlife damage are altering ecosystems.
- Biological factors such as migratory bird avian influenza risks and floating weed removal contribute to the growing burden of reservoir management.

Summary2: Water Environment Extracted from 3 Perspectives

From the perspective of a single academic discipline, conclusions regarding water reservoirs may lean one-sidedly—whether toward filling them in to avoid disaster risks or toward rigorous maintenance to preserve rare species.

However, the characteristics of water reservoirs vary by area & era, and the focus of judgment criteria shifts depending on the viewpoint. Even within the same region, conditions differ for each individual reservoir, making uniform responses difficult.



- Development of a composite index to provide decision-making criteria for reservoir management.
- Establishing mechanisms enabling residents of urban areas within the region to participate in reservoir management (sharing accurate risk information, weed control, invasive species removal, etc.)

Summary 3: Driving Forces of Fluctuation

- By viewing area as interactions within a triadic configuration, we can extract the “driving forces” that have transformed them.
- By tracing the historical shifts in these driving forces, we can depict regional history as the “dynamics of fluctuation.”

