Theoretical basis for considering biodiversity towards sustainable ecosystem services

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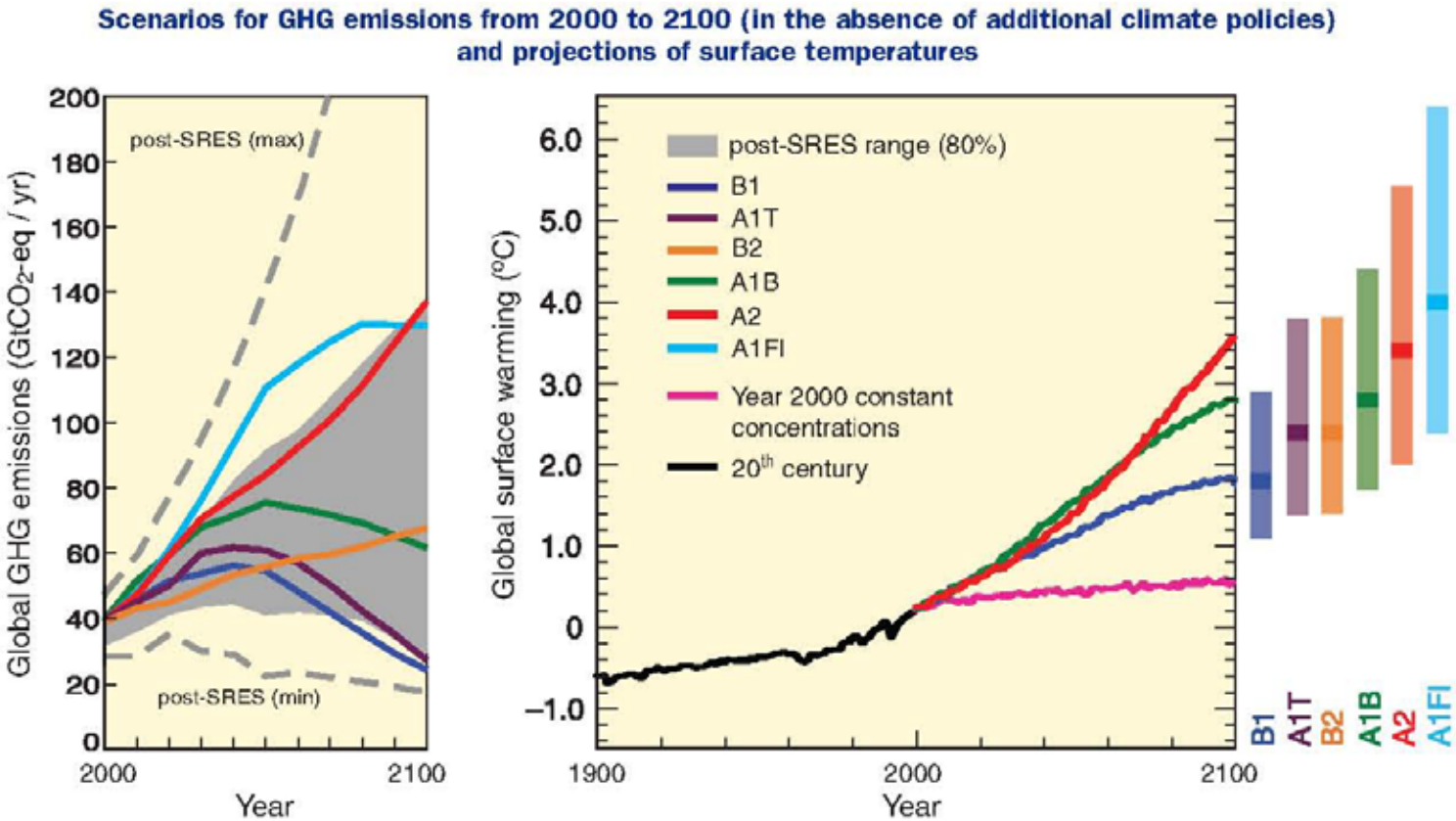
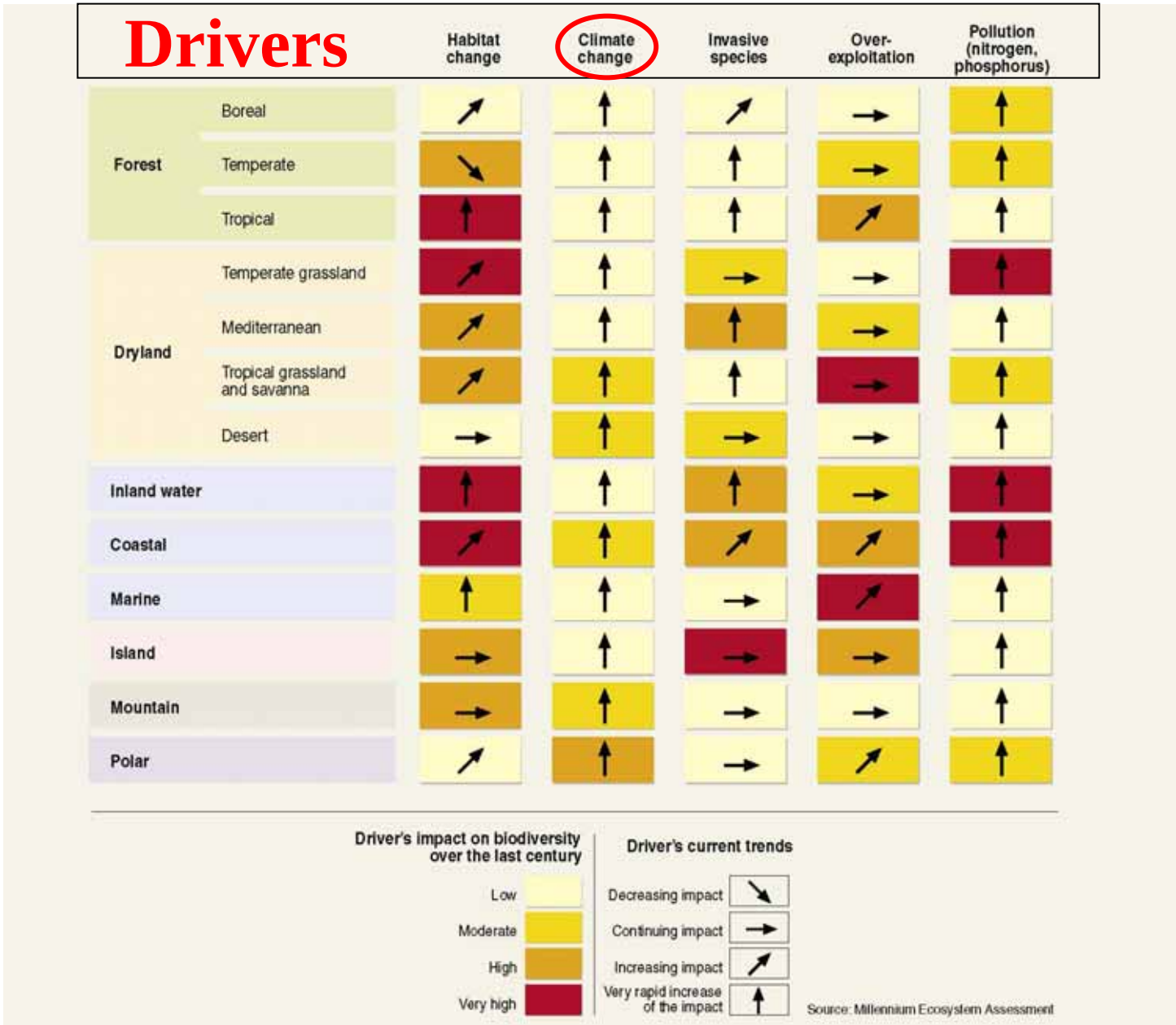
Contents

IPCC 4th Synthesis Report (2007)

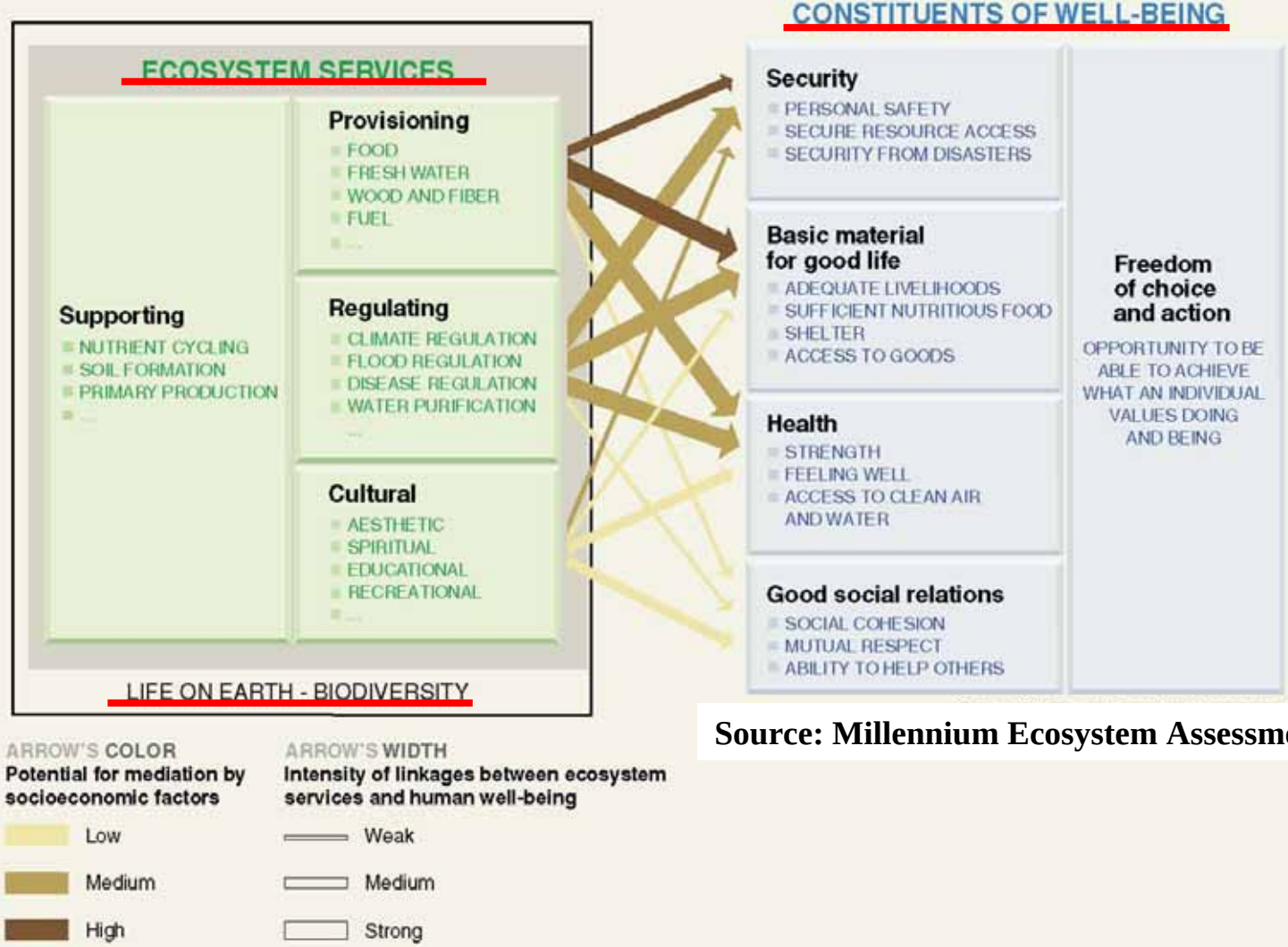


Climate Change

MA Synthesis Report (2005)

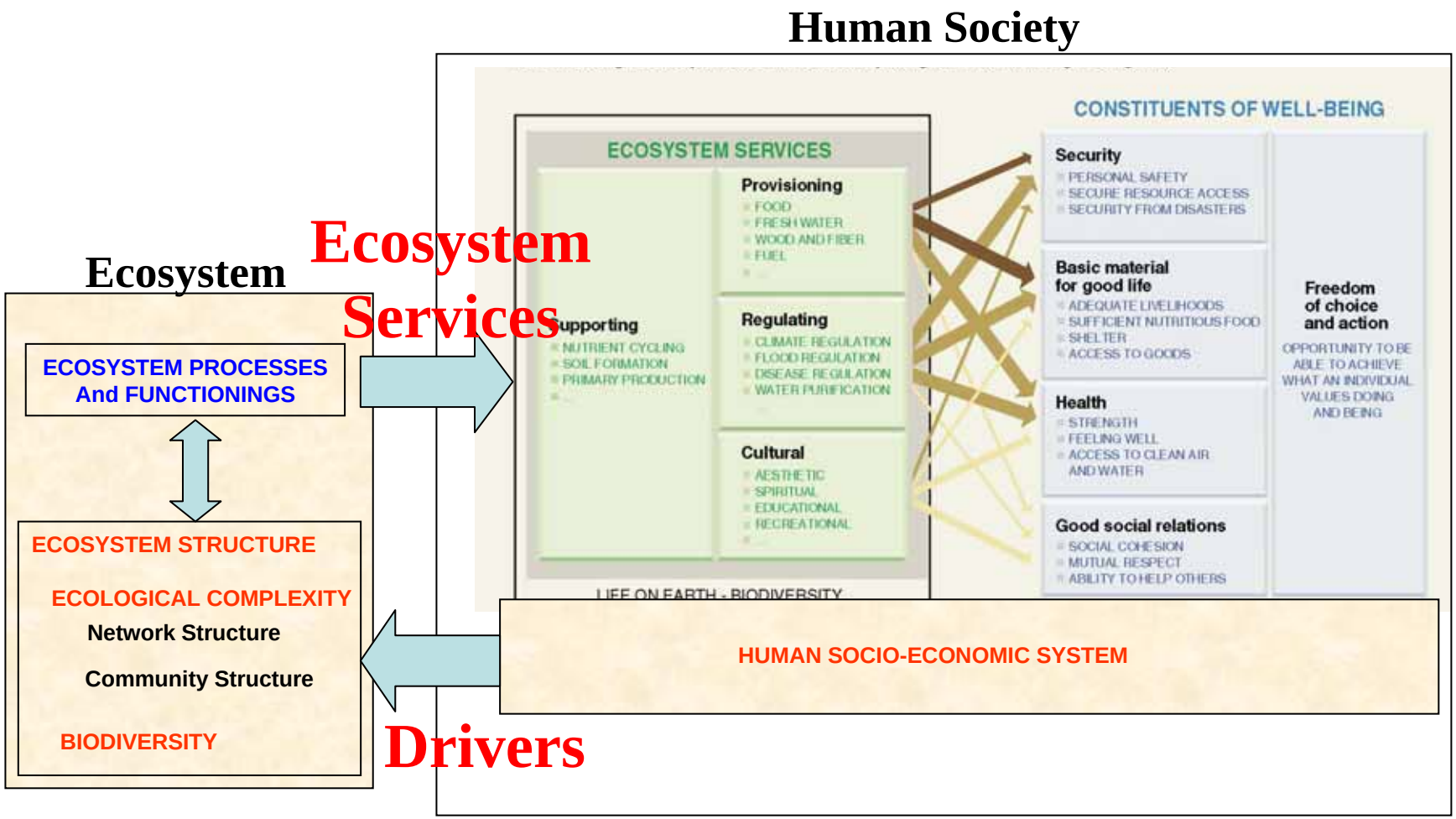


Human Well-Being depends on various Ecosystem Services



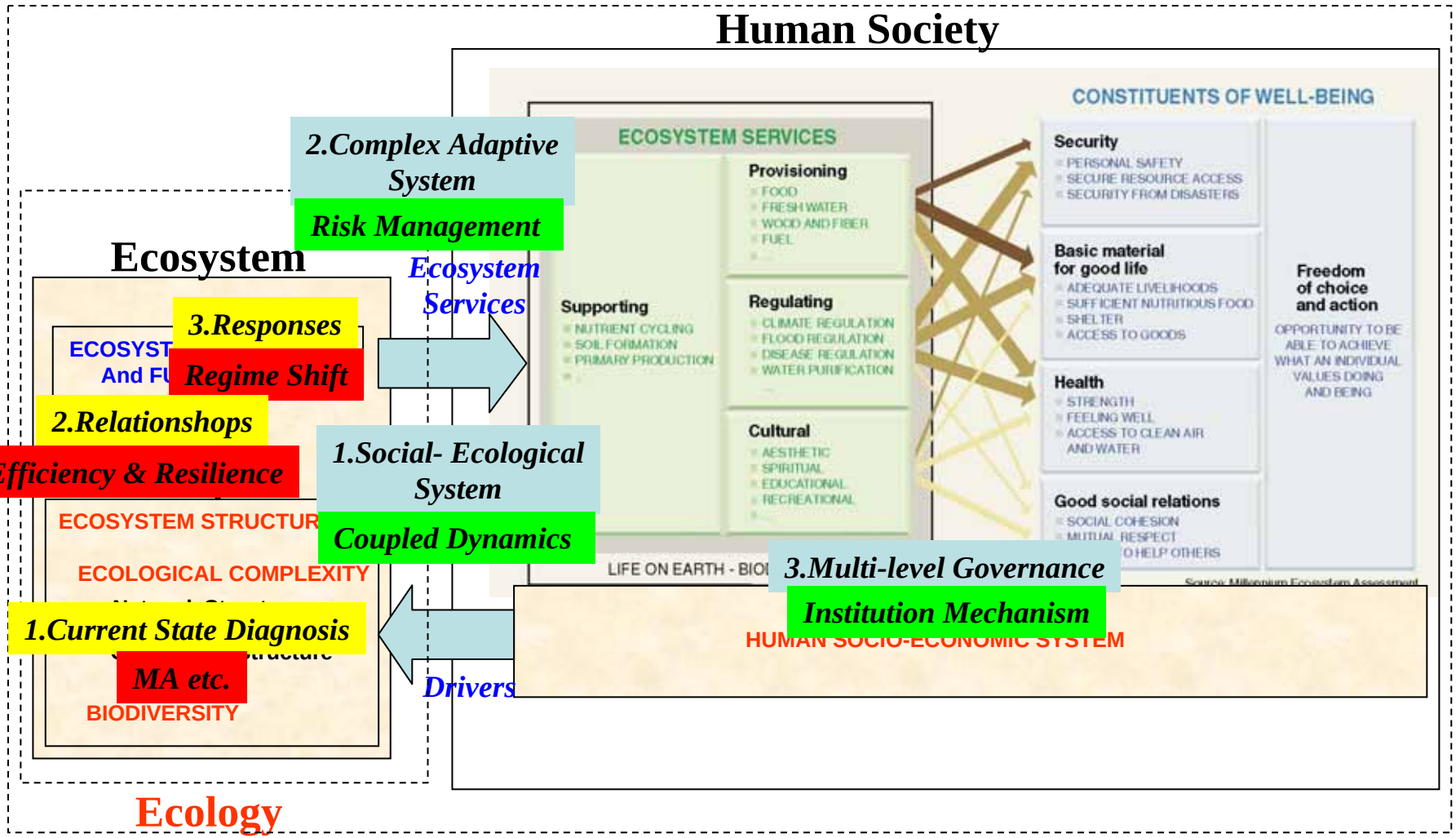
Source: Millennium Ecosystem Assessment

Ecosystem Services rely on Ecosystem Functionings



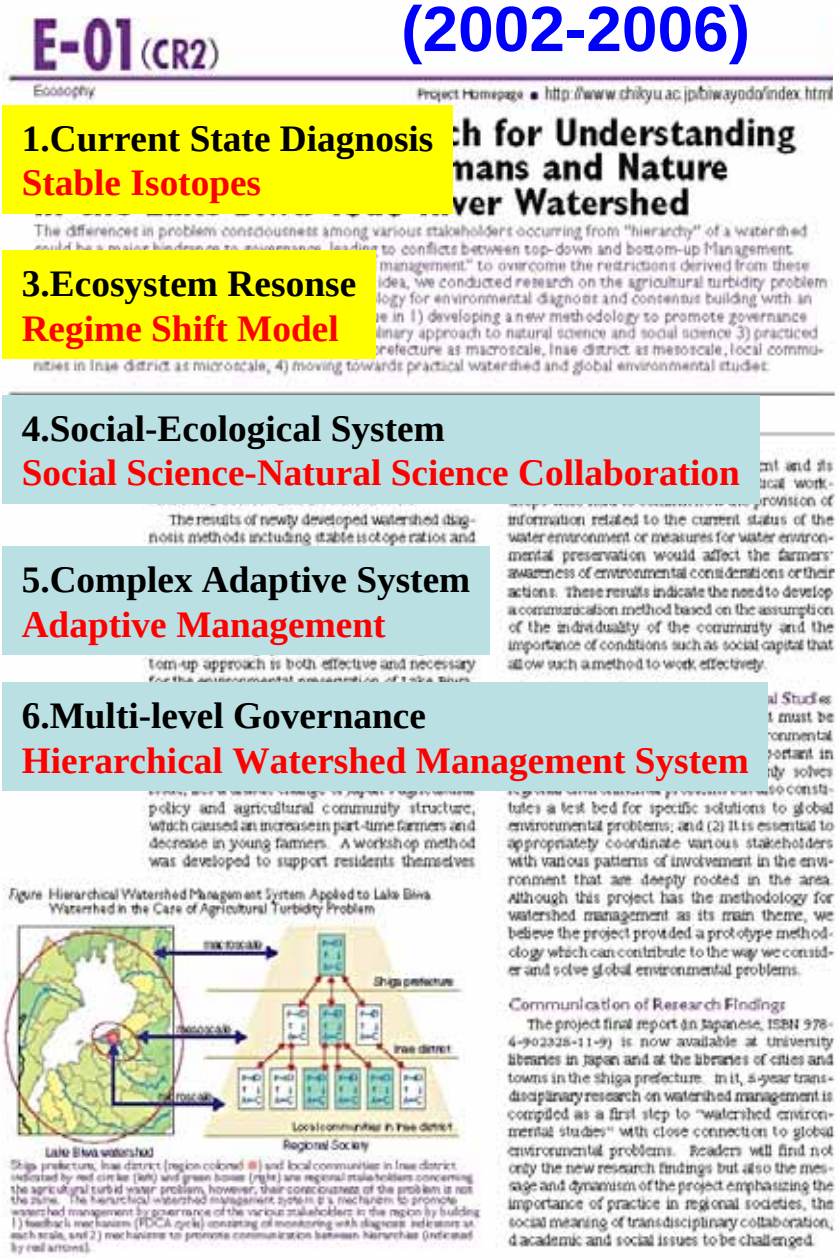
Drivers determined by Human Socio-Economic System

Linking Ecology and Sustainability Science
-Recent Theoretical Principles and Advances-



RIHN Watershed Governance Project

(2002-2006)



E-01 (CR2)

Ecosophy

Project Homepage ● http://www.chikyu.ac.jp/biwayodo/index.html

1.Current State Diagnosis
Stable Isotopes

3.Ecosystem Resonse
Regime Shift Model

4.Social-Ecological System
Social Science-Natural Science Collaboration

5.Complex Adaptive System
Adaptive Management

6.Multi-level Governance
Hierarchical Watershed Management System

ch for Understanding
mans and Nature
ver Watershed

The differences in problem consciousness among various stakeholders occurring from "hierarchy" of a watershed could be a major hindrance to governance, leading to conflicts between top-down and bottom-up Management. management." to overcome the restrictions derived from these idea, we conducted research on the agricultural turbidity problem logy for environmental diagnosis and consensus building with an e in 1) developing a new methodology to promote governance linary approach to natural science and social science 3) practiced refecture as macroscale, Inae district as mesoscale, local communities in Inae district as microscale, 4) moving towards practical watershed and global environmental studies.

The results of newly developed watershed diagnosis methods including stable isotope ratios and

tom-up approach is both effective and necessary

policy and agricultural community structure, which caused an increase in part-time farmers and decrease in young farmers. A workshop method was developed to support residents themselves

Figure Hierarchical Watershed Management System Applied to Lake Biwa Watershed in the Case of Agricultural Turbidity Problem

Shiga prefecture, Inae district (region colored ■) and local communities in Inae district indicated by red circles (left) and green boxes (right) are regional stakeholders concerning the agricultural turbid water problem, however, their consciousness of the problem is not the same. The hierarchical watershed management system is a mechanism to promote watershed management by governance of the various stakeholders in the region by building 1) feedback mechanism (PDCA cycle) consisting of monitoring with diagnosis indicators at each scale, and 2) mechanisms to promote communication between hierarchies (indicated by red arrows).

nt and its
ical work-
provision of
information related to the current status of the water environment or measures for water environmental preservation would affect the farmers' awareness of environmental considerations or their actions. These results indicate the need to develop a communication method based on the assumption of the individuality of the community and the importance of conditions such as social capital that allow such a method to work effectively.

l Studies
t must be
onmental
portant in
nly solves
also constitutes a test bed for specific solutions to global environmental problems; and (2) It is essential to appropriately coordinate various stakeholders with various patterns of involvement in the environment that are deeply rooted in the area. Although this project has the methodology for watershed management as its main theme, we believe the project provided a prototype methodology which can contribute to the way we consider and solve global environmental problems.

Communication of Research Findings

The project final report in Japanese, ISBN 978-4-902328-11-9) is now available at university libraries in Japan and at the libraries of cities and towns in the Shiga prefecture. In it, 5-year transdisciplinary research on watershed management is compiled as a first step to "watershed environmental studies" with close connection to global environmental problems. Readers will find not only the new research findings but also the message and dynamism of the project emphasizing the importance of practice in regional societies, the social meaning of transdisciplinary collaboration, academic and social issues to be challenged.

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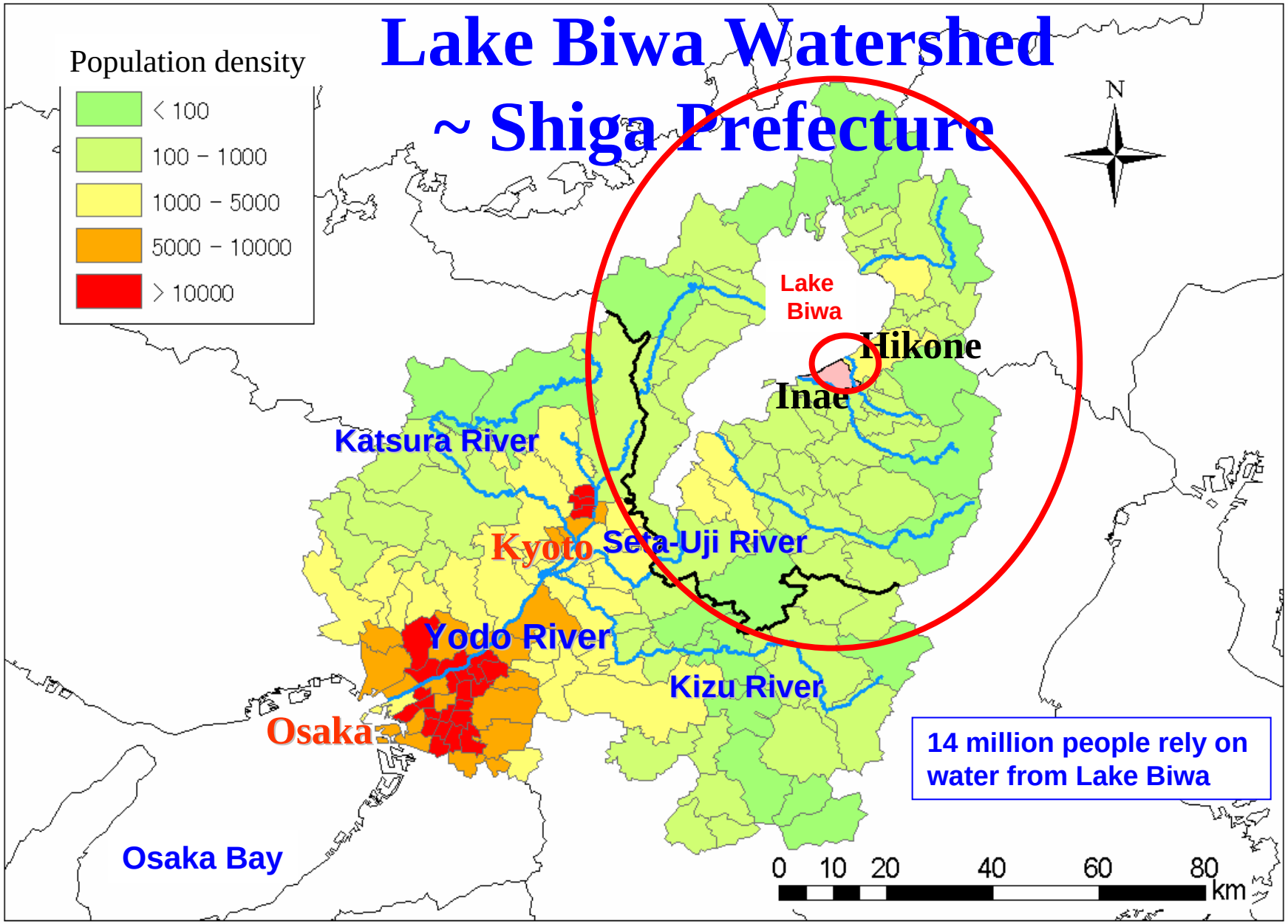

Lake Biwa Watershed
~ Shiga Prefecture
Population density
< 100
100 – 1000
1000 – 5000
5000 – 10000
> 10000
N
Lake Biwa
Hikone
Inae
Katsura River
Kyoto
Seta-Uji River
Yodo River
Kizu River
Osaka
Osaka Bay
14 million people rely on water from Lake Biwa
0 10 20 40 60 80
km

Agricultural Turbid Water Problem

- A Non-Point Source: Watershed Management Issue -

Soil paddling before rice planting

Lake Biwa

Enforced draining

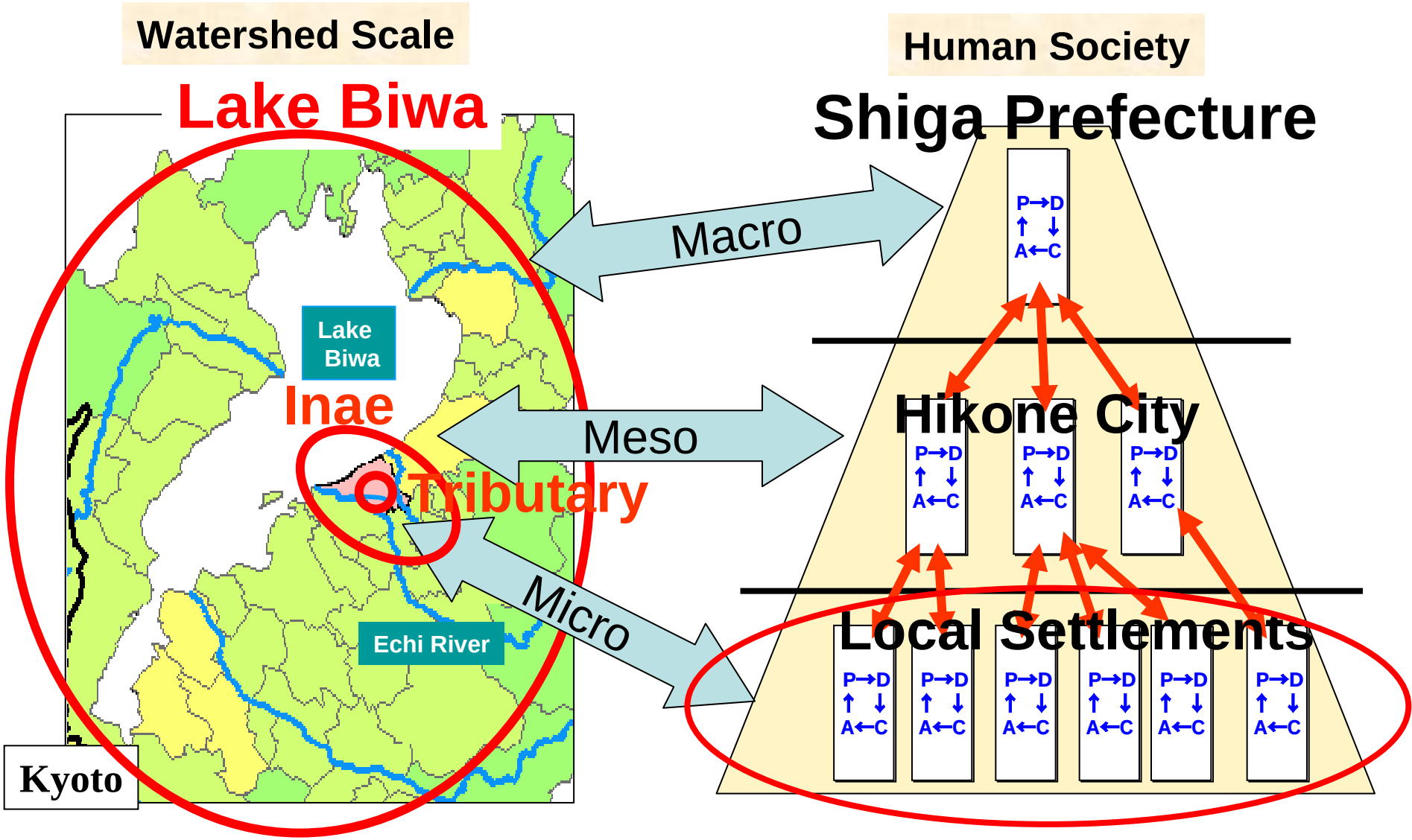
Small rivers in local communities

Turbid Water Problems as *Combined Problems*

Level	 Macro	 Meso	 Micro
Major Problem	Water Quality Regime Shift	Fishery Damage	Deterioration of waterside
Area	Lake BIWA	Lake shore	Canal
Causing	Load from land	Farming household	Farming household
Suffering	Lake water user	Fishery household	Farming household
Material		substances)	lud
Distance	Long	Middle	Short
Time scale	Long	Middle	Short
Type	Global Warming	Causing/Suffering Separation	Self-Feedback

Cognitive Conflict between Stakeholders!

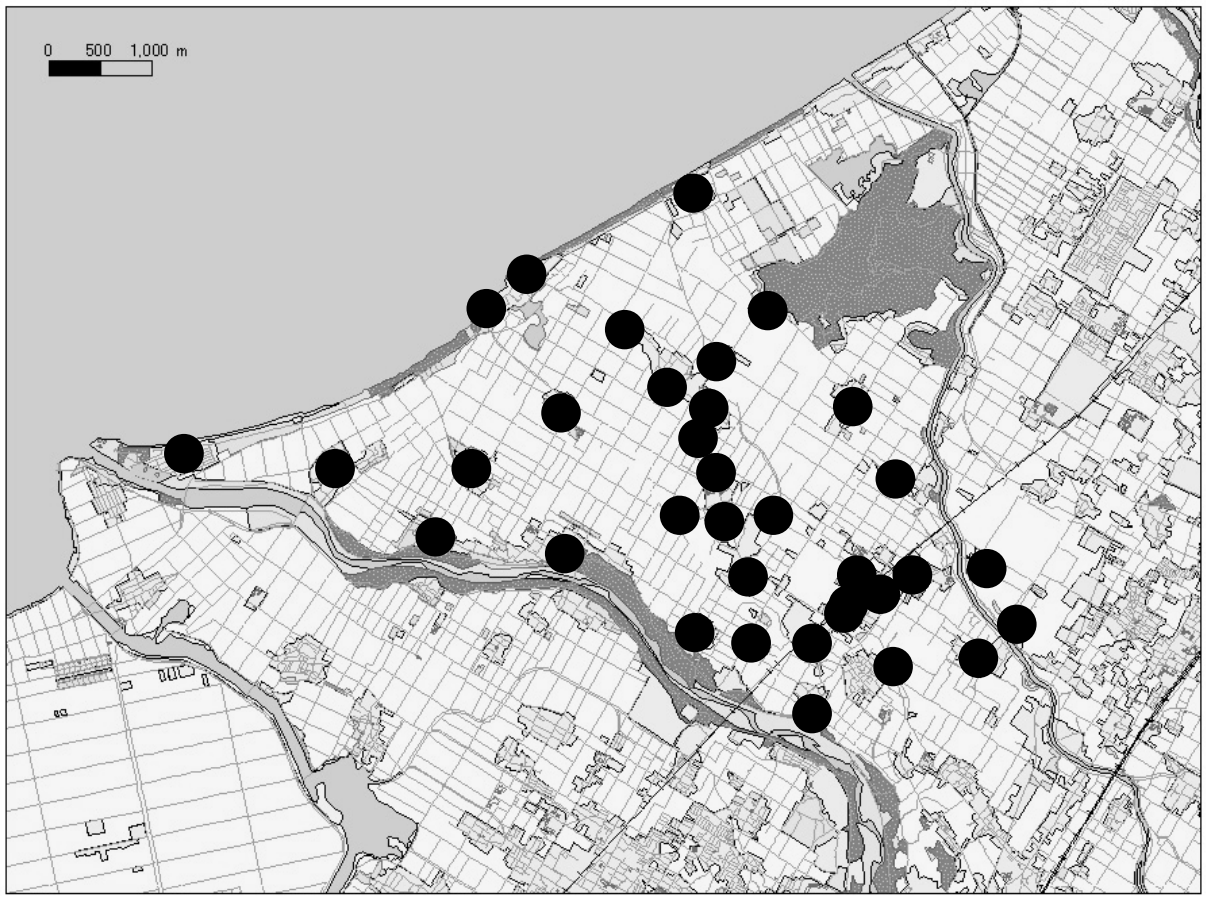
How can we resolve the Conflict?



Hierarchical Watershed Management

1. Adaptive management
2. Inter-hierarchy communication

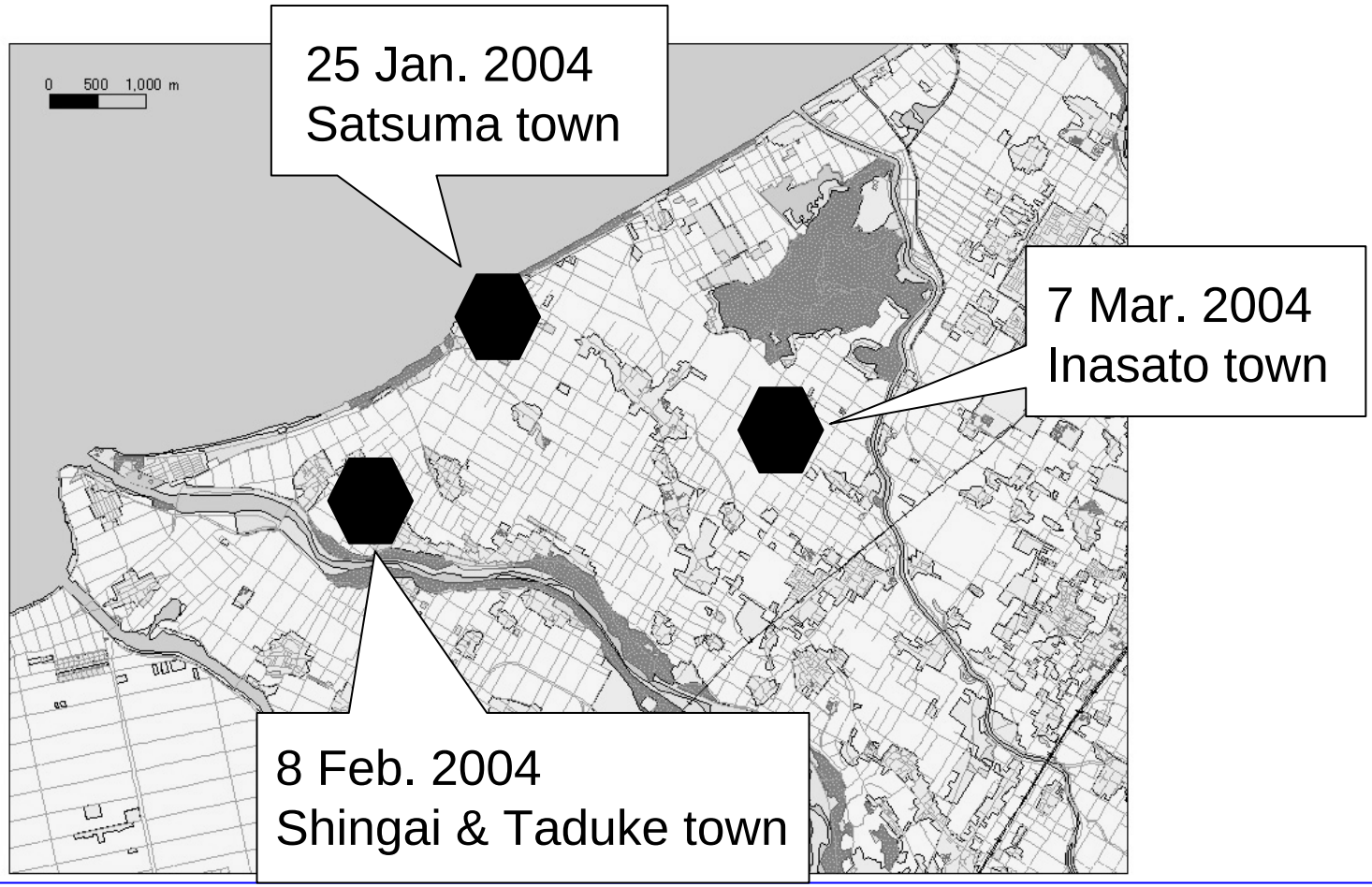
Face to Face Interviews in 35 communities (June - August, 2003)



Interview of community-based water management system
-Sharing information using GIS-

Workshops in 3 towns

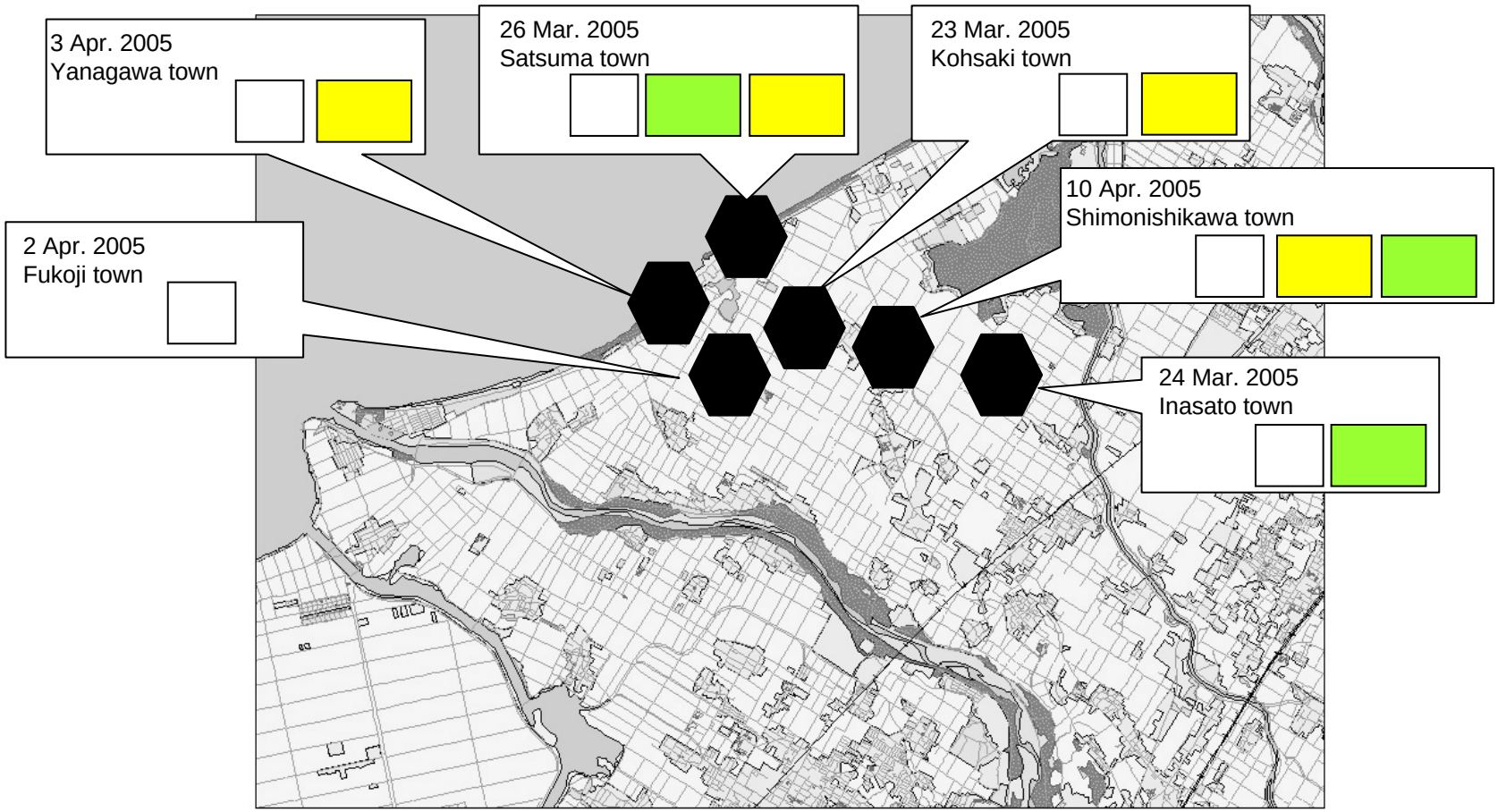
Water Environment in the Future



Empower local residents with discussion opportunities
Develop methods for making regional scenarios for and by residents themselves

Workshops in 6 towns

Social psychological Factors



Seek conditions to resolve cognitive conflict to empower environmental consciousness behaviors

Environmental Consciousness Behavior Model

(Hirose 1995, Nonami & Kato 2006)

Risk

Attribution of Responsibility

Effectiveness

Cost/Benefit

Subjective Norm

Feasibility

Identification to their community

1. Rational Persuasion

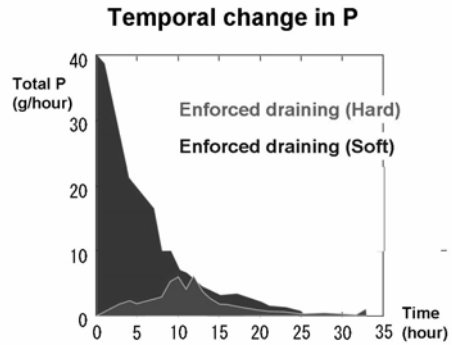
Goal Intentions

Behavioral Intentions

2. Emotional Persuasion

3. Rational + Emotional Persuasion

4. Control conditions



Scientific information

Information such as the farmer's attachment to their local areas and living things

Conclusions

(1) Theoretical Framework and Recent Advances
-Linking Ecology and Sustainability Science-

(2) Case study to link Ecology and Sustainability Science

(3) Future Challenges: Linkages between Theory and Practices