Why do we need **Human Dimensions** for the FUTURE program?

Mitsutaku MAKINO (Fisheries Research Agency, Japan)
Keith CRIDDLE (Univ. Alaska Fairbanks, USA)

Co-chairs of
PICES Section on Human Dimensions of Marine Systems (S-HD)

- The marine science community has accumulated a lot of knowledge and has made recommendations based on that information.

- But, good scientific knowledge/arguments are often not accepted or implemented in the real world.

- There could be many reasons for this, e.g.:
  1) the basis for the recommendations is too difficult to understand,
  2) policymakers are unaware of the recommendations

etc., etc.

Why a Natural Science Perspective is an Insufficient Framework for Analysis

<Theoretical reason>

The Principle 1 of CBD Ecosystem Approach says the objective of ecosystem conservation is "a societal choice". We clearly need sound social science analyses when setting or selecting the objectives

<Practical reason>

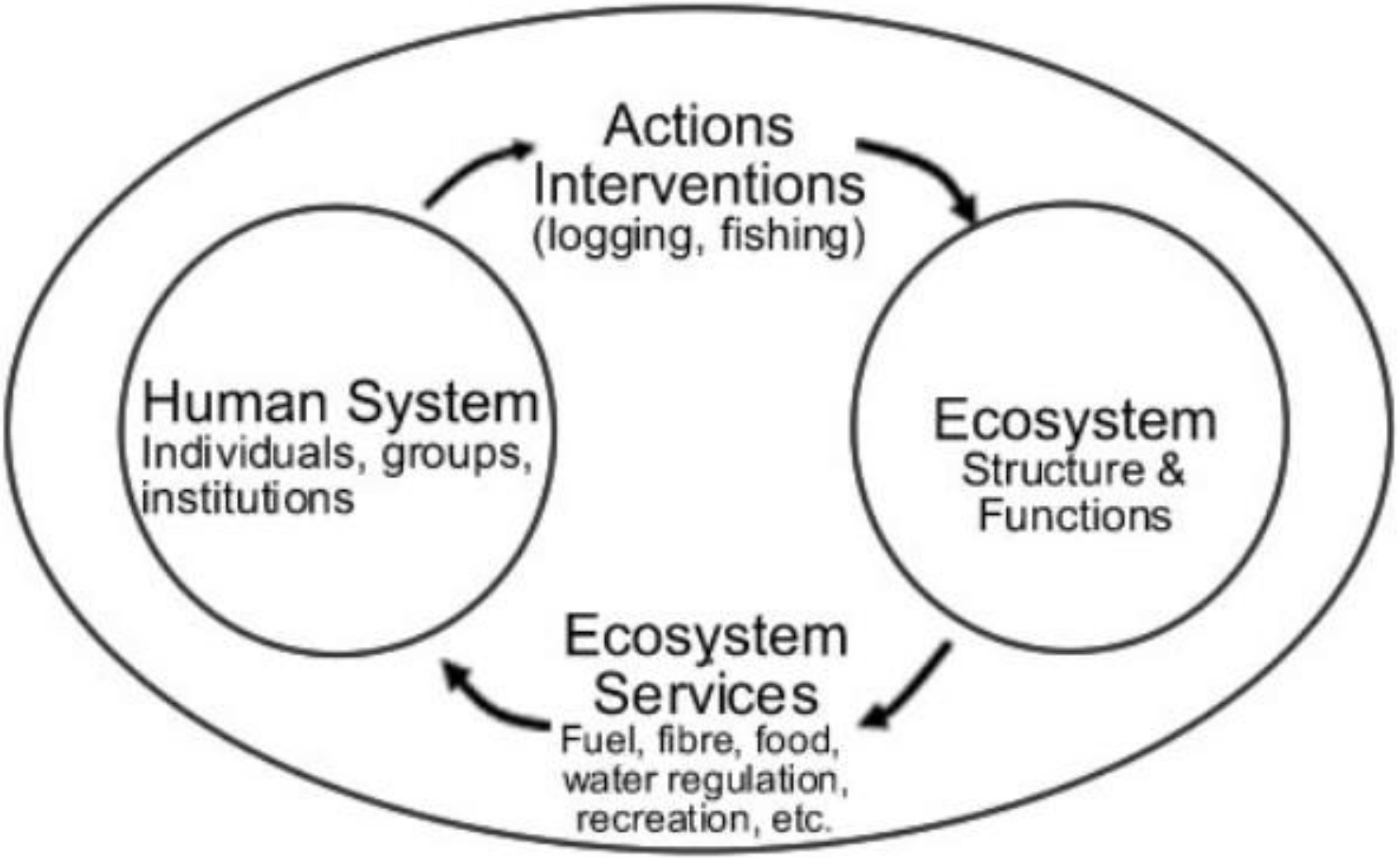
Good natural science-based arguments for management actions are sometimes not accepted or implemented because of the perceived socio-economic or cultural costs.

A Social-Ecological Systems (SES) Approach

- An SES approach recognizes that ecological (or 'natural') systems and human social systems (including cultural, management, economic, socio-political, and ethical aspects) are jointly-dependent sub-systems of larger systems (Berkes and Folke 1998, Ostrom 2009, Perry et al 2010a).

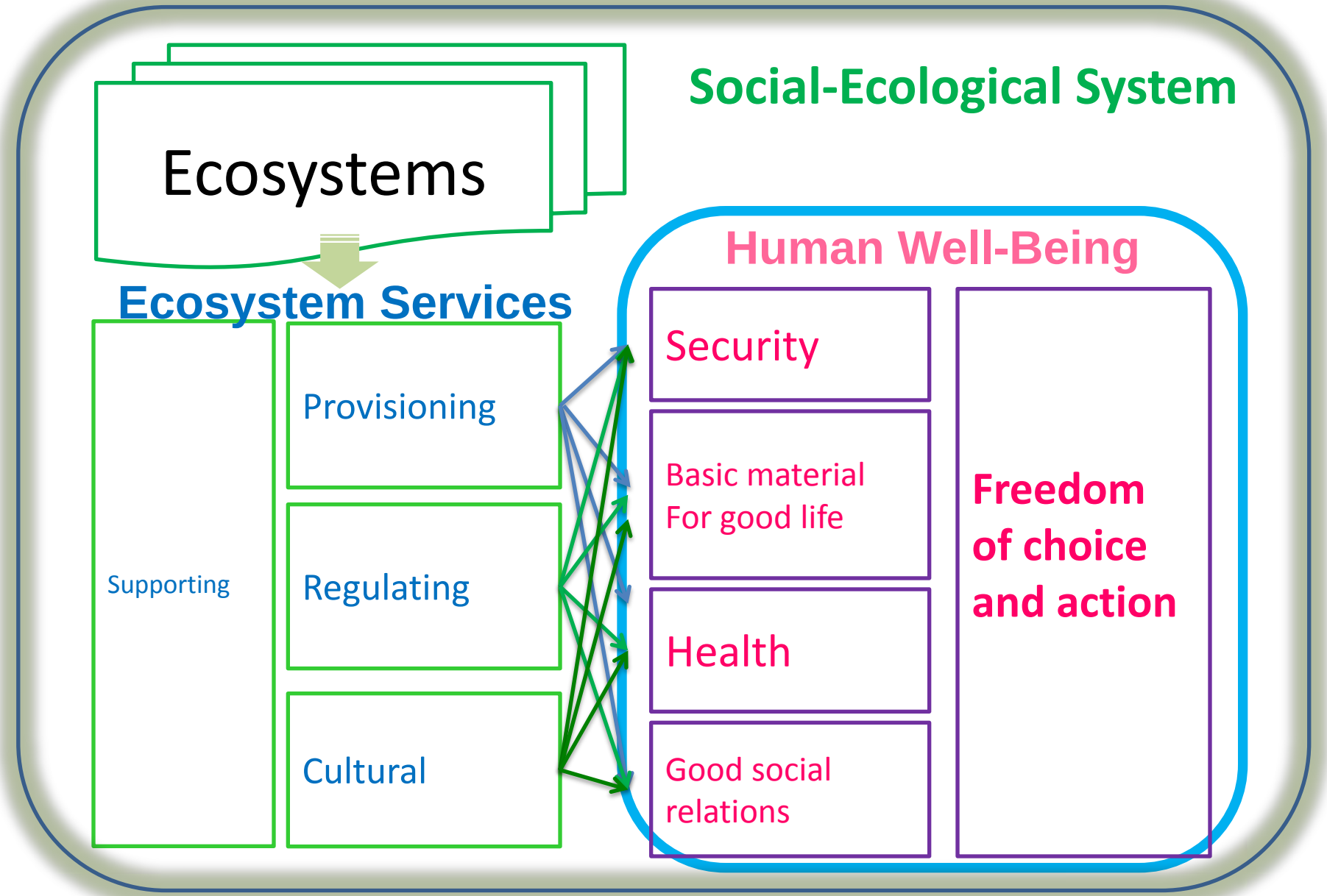
- An SES approach means considering people as more than just "stressors" (Berkes 2011).

E.g., SES concept by Resilience Alliance



http://wiki.resalliance.org/index.php/Bounding_the_System_-_Level_2

E.g., Relationship among Ecosystems, Ecosystem Services, and Human Dimension (MEA2005)



Science Policy Is Changing As Well

E.g., UNESCO & ICSU (1999)

"The Declaration on Science and the Use of Scientific Knowledge"

proclaimed

1) science for knowledge (traditional 20th century-type science),
2) science for peace,
3) science for development, and
4) science in society and science for society.

Science Policy Is Also Evolving In This Direction At The National Level

- E.g., "The 4th Basic Plan for Science and Technology of Japan" (2011)

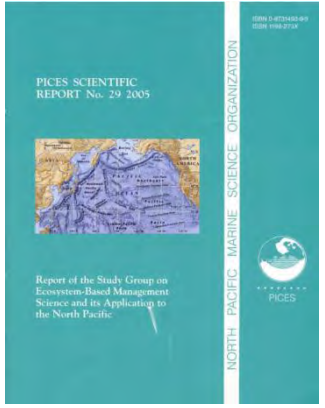
"more strategic utilization of science and technology in order to share its results in common with the society."

PICES Has Conducted Several Activities On Ecosystem-Based Management of Marine Systems

- PICES Study Group on Ecosystem-Based management science and its application to the North Pacific (SG-EBM: 2003-2004)

- PICES Working Group on Ecosystem-based management science and its application to the North Pacific (WG-19: 2004-2009)

SG-EBM Main results
(PICES Scientific Report #29, 2005)



EBM challenges are different between East and West of the North Pacific

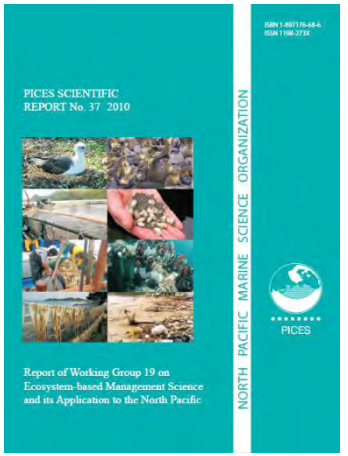
- **China, Japan, Korea**: greater coastal populations, longer history of full exploitation and development.

  -> minimizing existing impacts, rebuilding depleted stocks, minimizing impacts from land runoffs

- **Canada, Russia, USA**: human coastal populations and development pressuress are much less.

  -> maintain unimpacted, pristine habitat and communities with appropriate economic activities.

WG19 Main Results
(PICES Scientific Report #37, 2010)



- Summary of progress in 6 countries towards EBFM (country matrix)

  -> very diverse in approaches.

- Consensus views on indicators for EBFM are needed

  -> collaborations with social science are needed to develop indicators for social-ecological systems.

- Spatial issue is important (EEZ, LME, etc)

  -> for identifying stakeholders, defining objectives, conducting research, and implementing policies.

The FUTURE Program Includes Research Themes and Objectives that Consider Human Dimensions

- FUTURE Research Theme 3

"How do human activities affect coastal ecosystems and how are societies affected by changes in these ecosystems?"

- FUTURE Objective 2 is to convey research findings to society and to foster engagement.

HD Groups Were Established In PICES to Support These FUTURE Goals

- **PICES Study Group on *Human Dimensions***

  (SG-HD: 2009-2011)

- **PICES Section on *Human Dimensions of Marine Systems*** (S-HD: 2011-2020)

Study Group on Human Dimensions

(Oct. 2009 - Oct. 2011)

Acronym: SG-HD

Parent Committee: SB

Chairman: Mitsutaku Makino <mmakino@affrc.go.jp>

Terms of Reference:

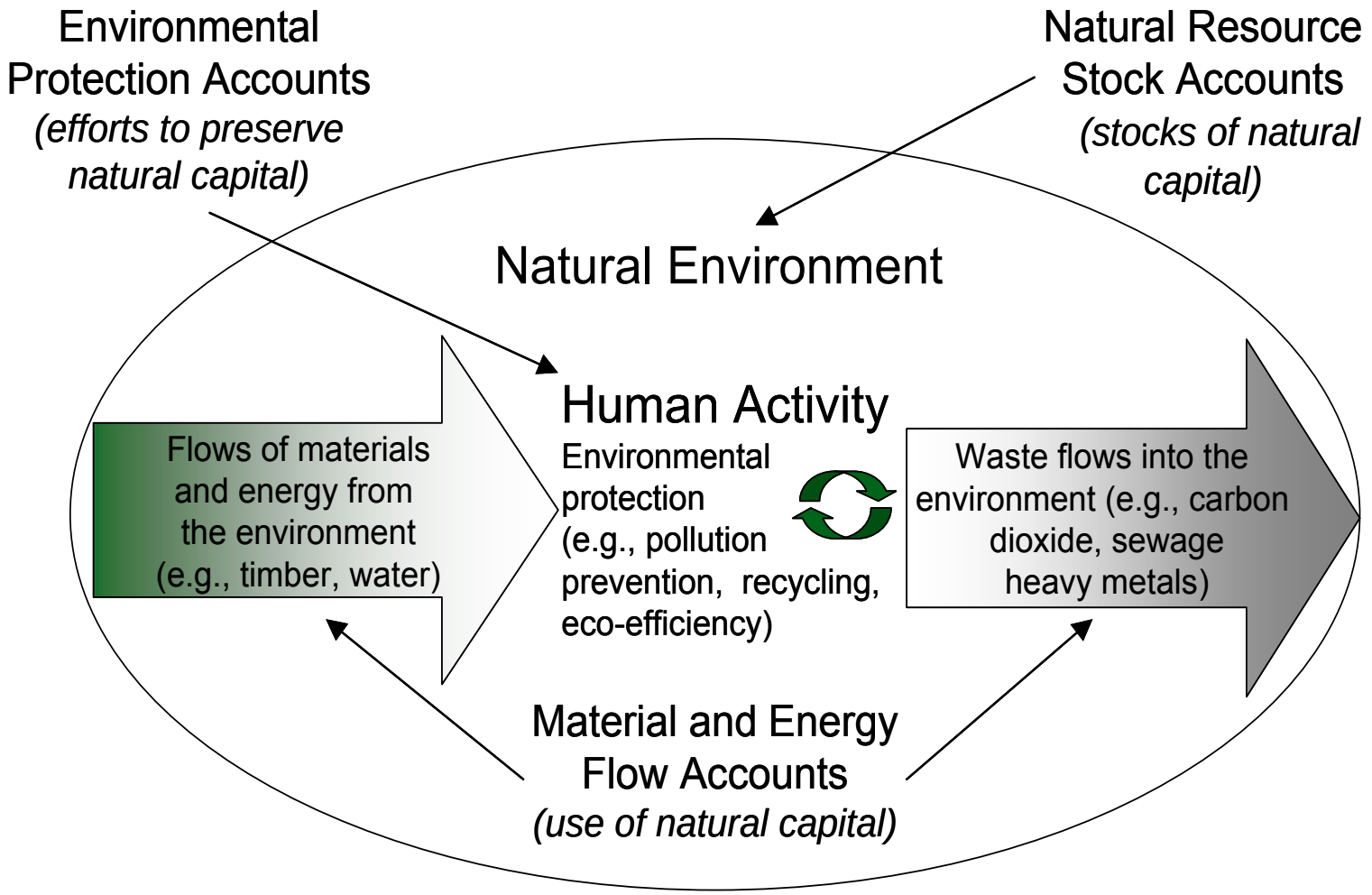
The Implementation Plan for the new PICES integrative science program on "*Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Marine Ecosystems*" (FUTURE) calls for PICES scientists to make the societal implications of their science more explicit and accessible through long-term engagement and communication activities among scientists, decision makers, stakeholders, and across sectors. Because, different marine sectors view ecosystems in terms of their own economic, cultural and societal needs, the objective of ecosystem conservation is "a societal choice" (Principle 1 of the Ecosystem Approach of the Convention on Biological Diversity). Therefore, the social significance of predicted impacts from climate or ecosystem changes, and the types of information, advice and guidance that might be requested of FUTURE might differ from country to country and

Main Result: There are many Social Science methodologies for marine SES analysis

- Anthropology/Ethnology
- Economics (bioeconomics, impact analysis, decision theory, non-market valuation, property right regimes, trade/development)
- Environmental accounting
- Geography/area studies
- Law/Political science
- Psychology,
- Sociology
- Seafood business
- Aquaculture industry study
- Inter-disciplinary methodologies, etc.

Many of them have already applied in Member Countries

Environmental Account System Being Applied In Canada



A Small Sample of Oceans Activities in PNCIMA

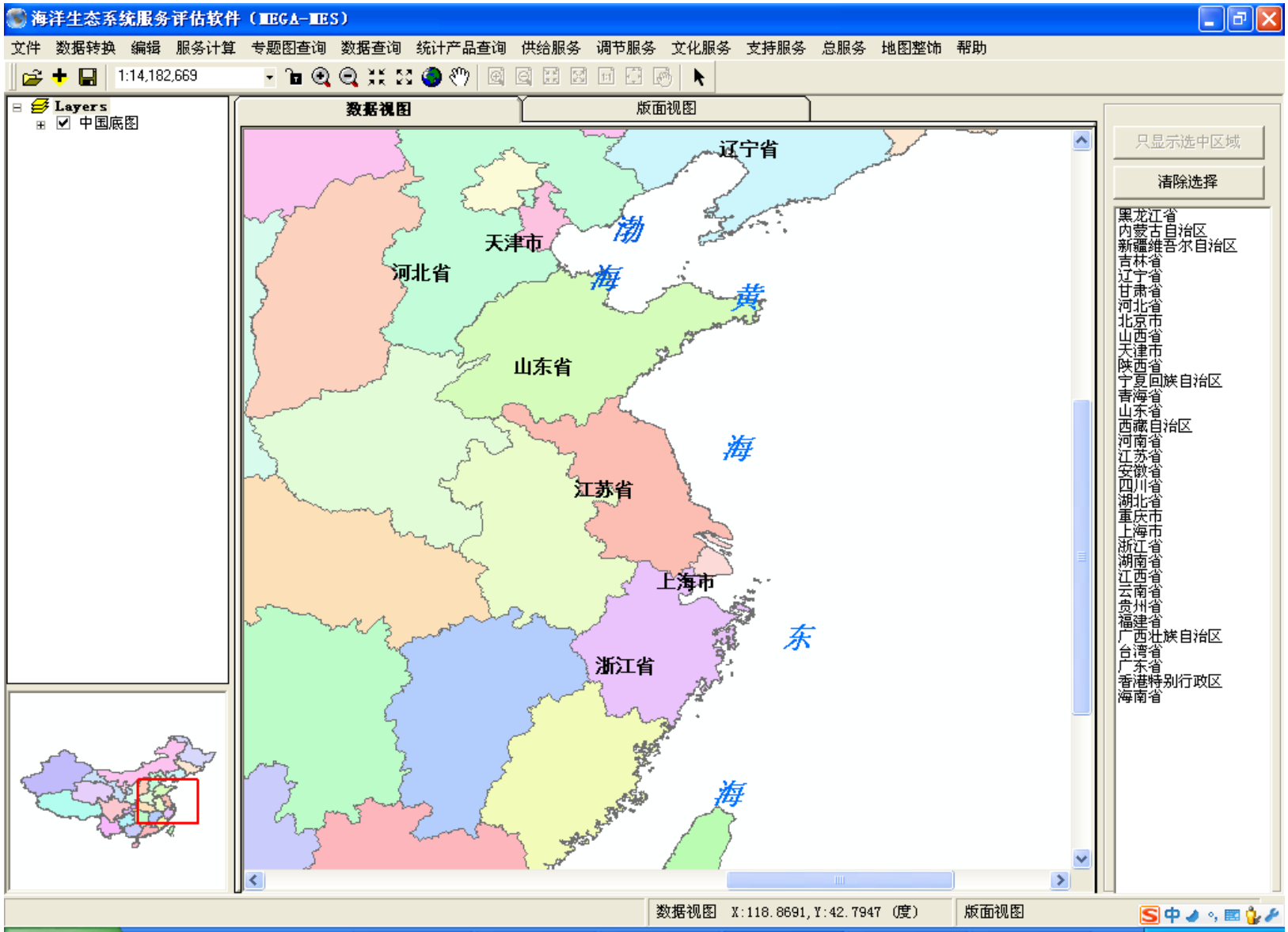
- Salmon Streams
- Salmon Net Fisheries
- Groundfish Trawl
- Groundfish hook and line
- Dungeness Crab
- BC Ferries
- Oil and Gas (Exploratory Wells)
- Marine Transportation and Shipping Traffic

demand for ocean space far exceeds the available area...

The Objective Setting Process For Fisheries Management In Japan (FRA, 2009)

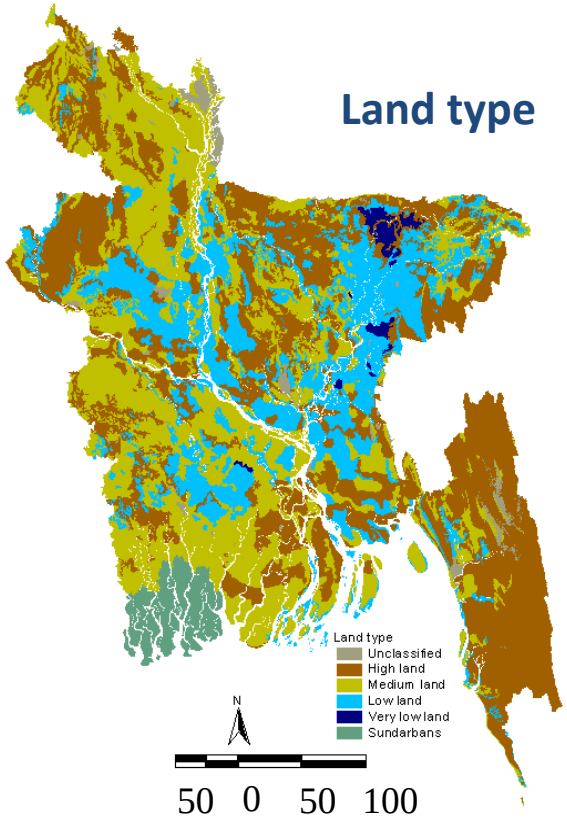
Delphi method

MEGA—MES:
Marine EcoloGical Assessment Group---Marine Ecosystem Service Valuation Software

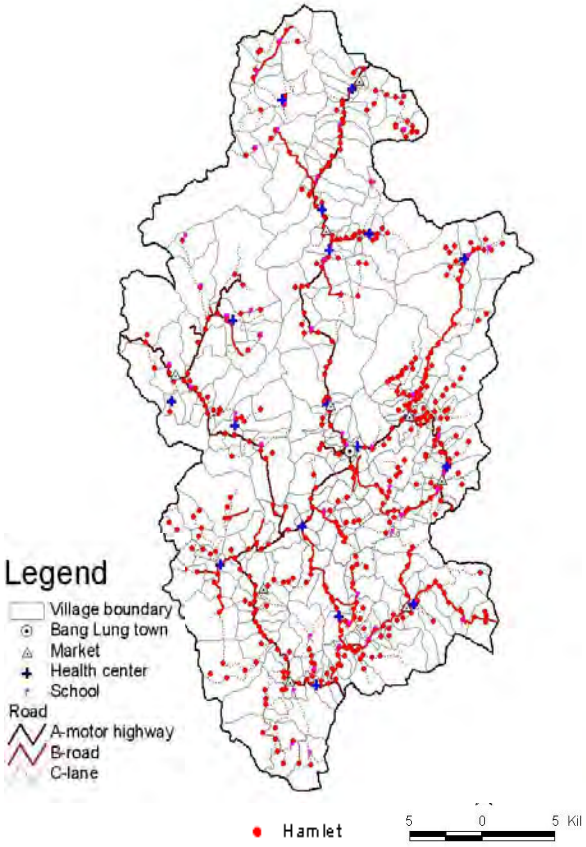


Data from different disciplines

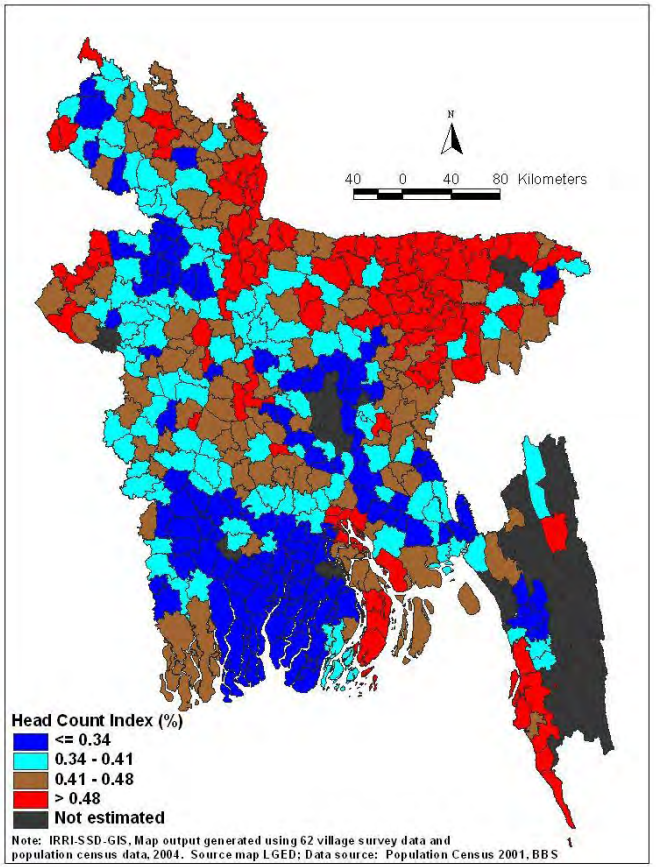
Environment



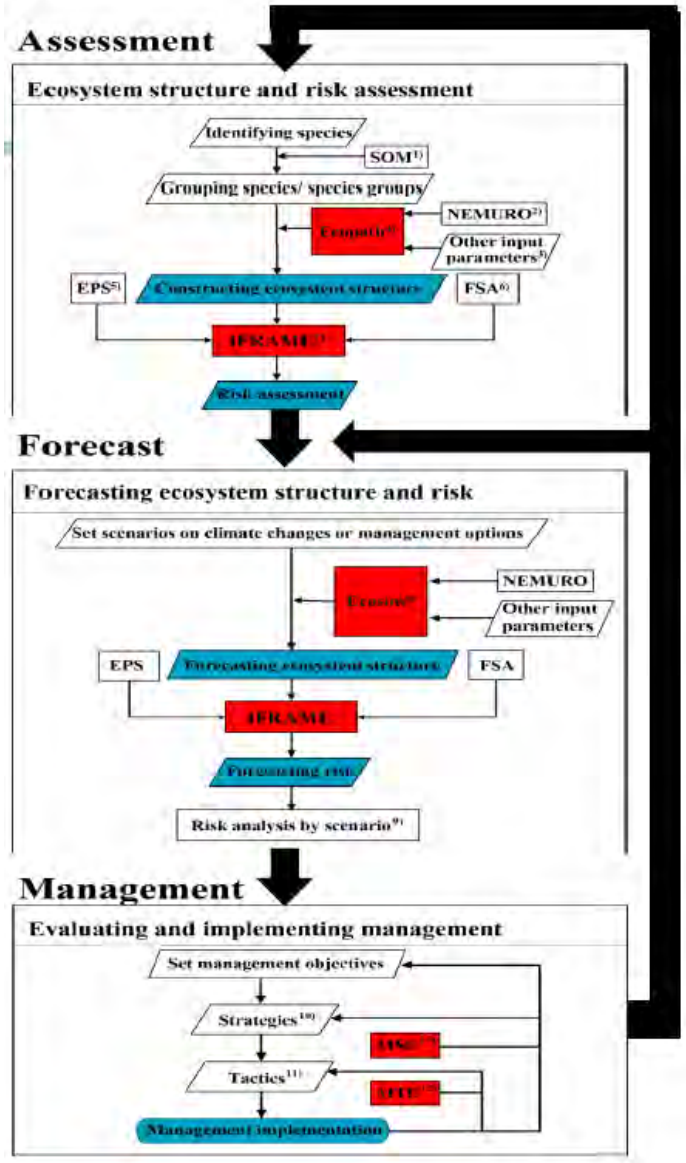
Infrastructure

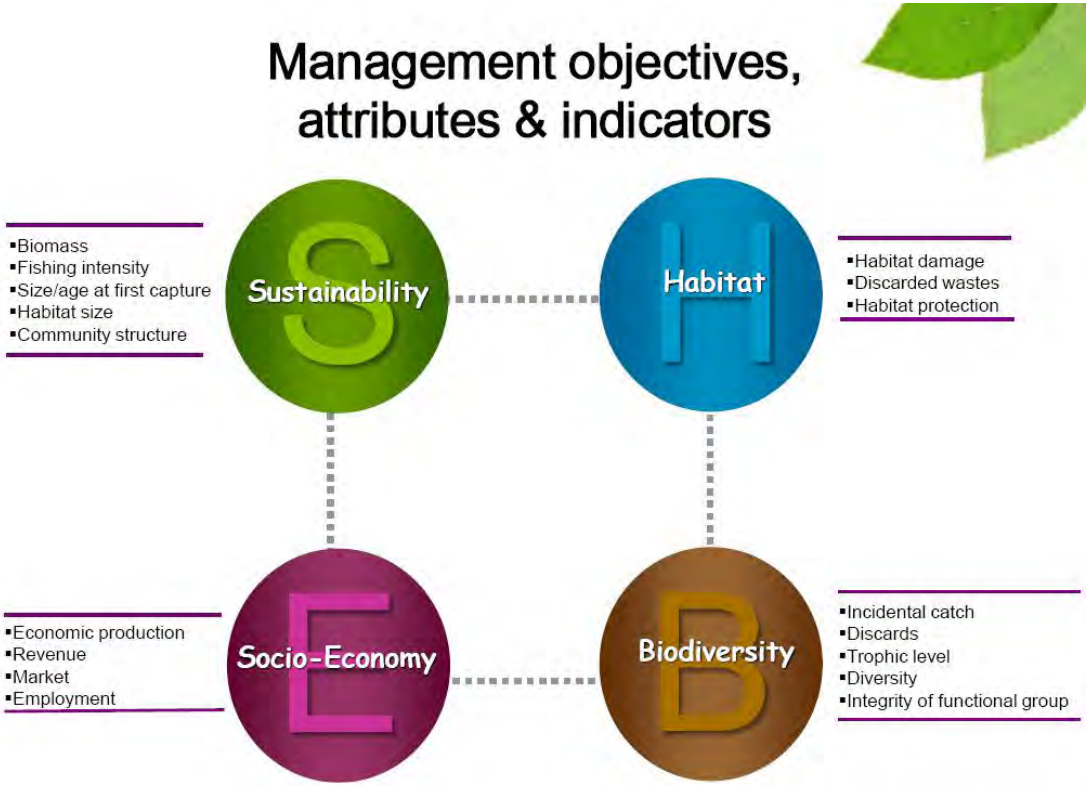


Economic



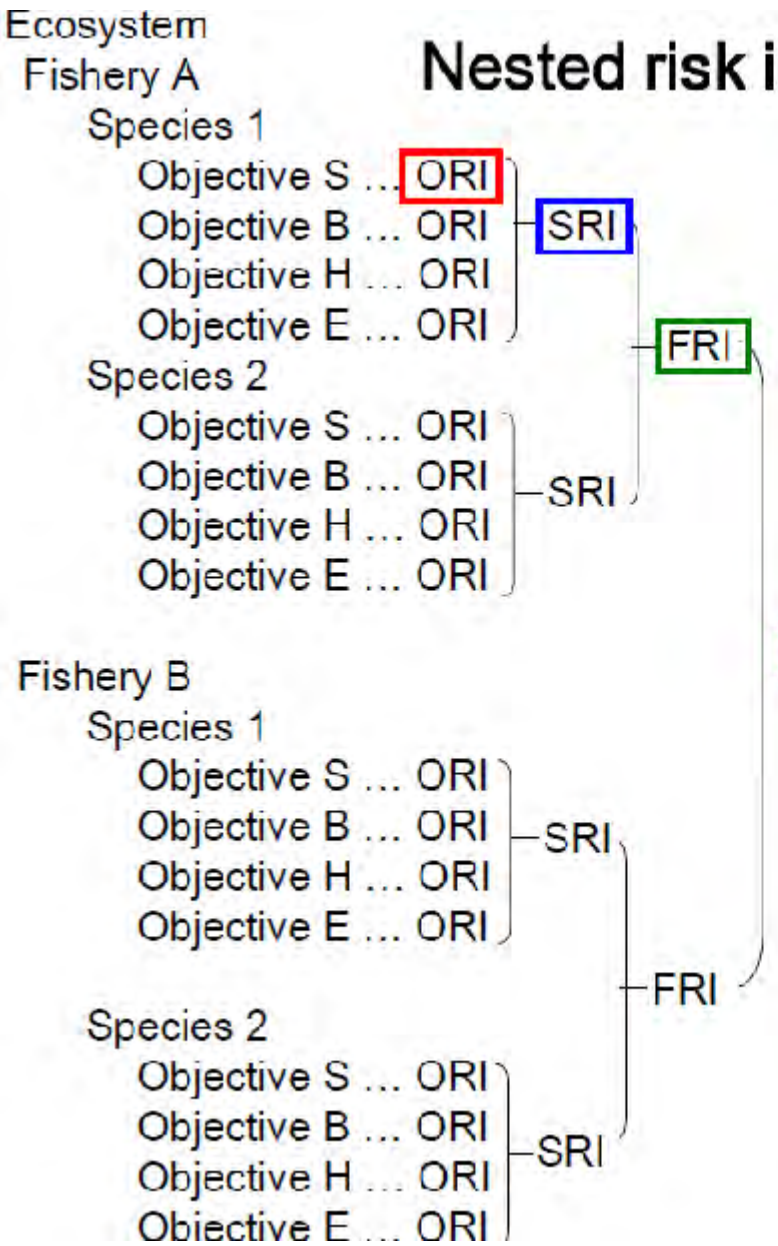
The Integrated Fisheries Risk Assessment, Forecasting and Management for Ecosystems (IFRAME)





Zhang and Kim (2009)

Nested risk indices of IFRAME



$$ORI = \frac{\sum_{i-1}^{n} I_i W_i}{\sum_{i=1}^{n} W_i}$$

I_i : Score of I
W_i : Weighting factor of indicator i
n : Number of indicators

$$SRI = \lambda_S ORI_S + \lambda_B ORI_B + \lambda_H ORI_H + \lambda_E ORI_E$$

$\lambda_S, \lambda_H, \lambda_B, \lambda_E$: Weighting value for objectives

$$\sum \lambda = 1.0$$

ORI_S : Sustainability risk index
ORI_B : Biodiversity risk index
ORI_H : Habitat risk index
ORI_E : Socio-economic risk index

$$FRI = \frac{\sum B_i SRI_i}{\sum B_i}$$

B_i : Biomass or biomass index of species i

$$ERI = \frac{\sum C_i FRI_i}{\sum C_i}$$

C_i : Catch of fishery

Applied to large purse seiners, stock recovery plan, fry releasing, etc.

In Russia

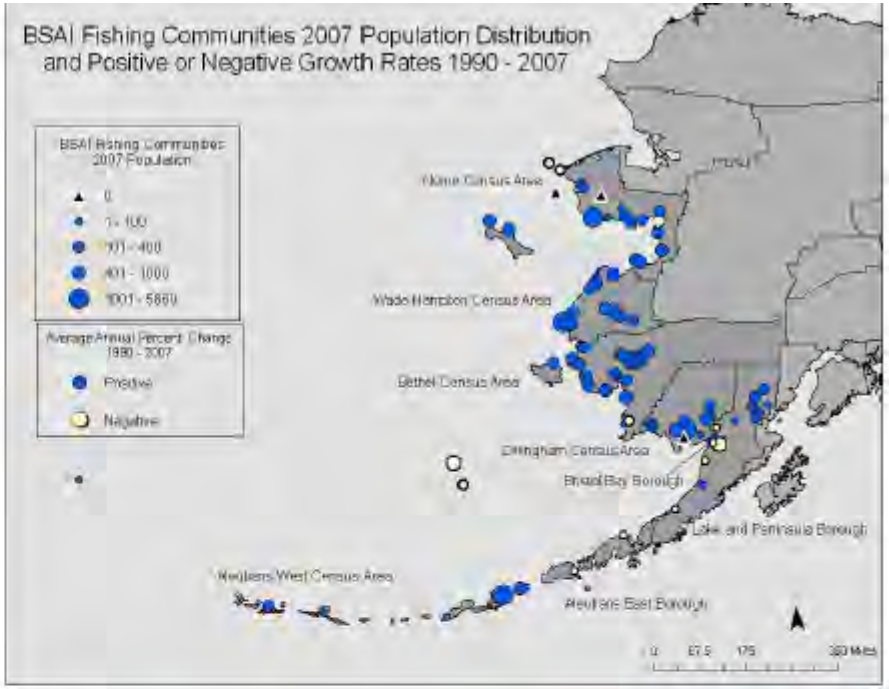
- Assessment of economic losses from marine pollution and water engineering are being conducted at Primorsky kray, and Sakhaline regions.

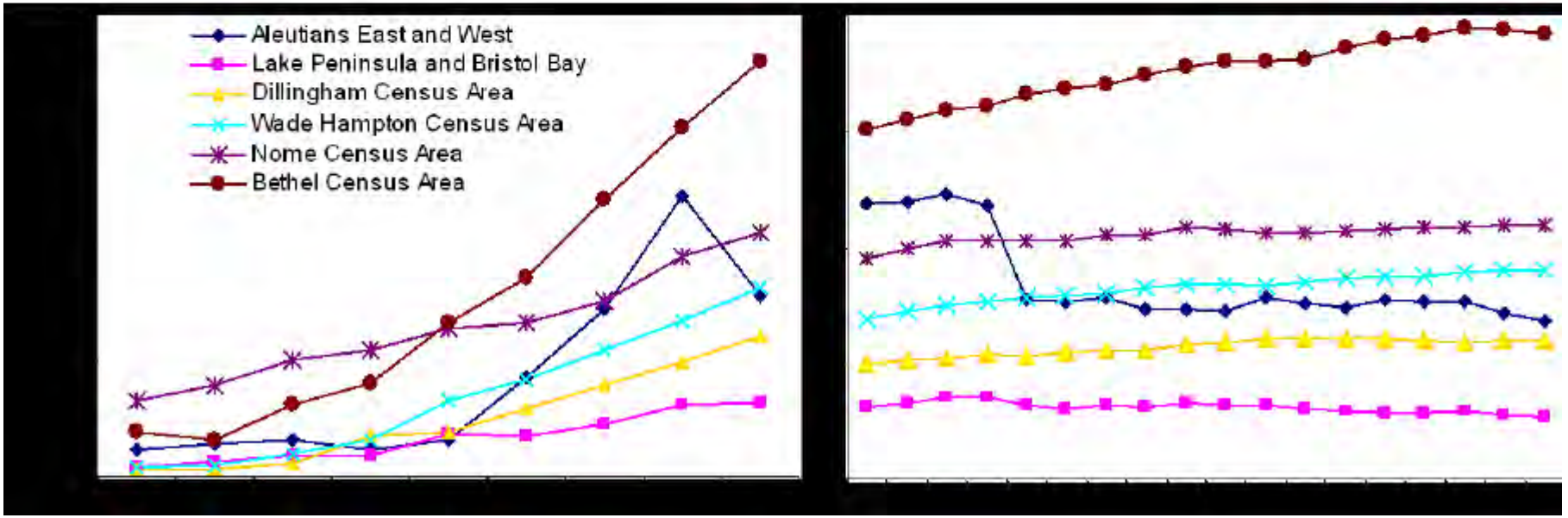
- Economic evaluation of ecosystem services were conducted in Kamchatka region and Primorsky Kray.

Type of resources	Total value of resources and services			
	Minimal variant		Maximal variant	
	Total Value	%	Total value	%
Water biological resources	4.0	5.0	8.7	8.8
Oil and gas resources	19.8	24.8	30.0	30.4
Hydro-energetic resources	2.5	3.1	6.6	6.7
Ecosystem services	53.3	66.7	53.3	54.1
Total	80.0	100.0	98.6	100.0

Lukyanova, et al. (2010)

Bering Sea/Aleutian Islands Region Population Trends





COGNITIVE STUDY for Puget Sound Partnership

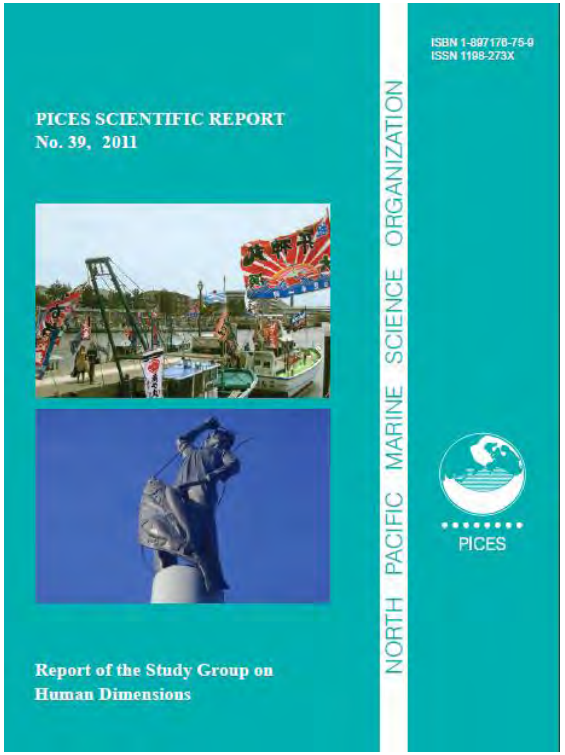
- **95%** of population of Puget Sound region regards puget sound as an asset/part of quality of life
- **25%** agree that Puget Sound is in trouble and are willing to spend money to support restoration

[Recent poll indicates support may be building 95% value Puget Sound/45% willing to spend PSCG November 2009]

Roles of Social Sciences for EBM/EBFM

(PICES Scientific Report 39, 2011)

1. To define/select the goals, objectives, Indicators, targets;
2. To judge/asses the performances of specific measures;
3. To propose spatial/temporal/ organizational scales for management, coordinating with existing institutional scale (stake holders) and natural science knowledge,
4. To improve the value of bio-physical-chemical information for better public, officers' and fishers' understandings.



Based on these results, PICES started

Section on *Human Dimensions of Marine Systems*

(PICES S-HD: 2011 –2020)

Section on *Human Dimensions of Marine Systems*

(Oct. 2011 -2020)

Acronym: S-HD

Parent Committees: SB

Duration: lifetime of FUTURE (Oct. 2011 – Dec. 2020)

Co-Chairman: Mitsutaku Makino <mmakino@affrc.go.jp>

Co-Chairman: Keith Criddle <kcriddle@alaska.edu>

Mailing List (S-HD Members only)

Objective:

To better understand and communicate the societal implications of the conditions and future trends of North Pacific marine ecosystems (FUTURE vision), to provide a forum for the integration of FUTURE-related studies using social science approaches and tools, and to facilitate the close discussions and communications among researchers from both the natural and social sciences.

Terms of Reference

Three Key Questions in S-HD TORs

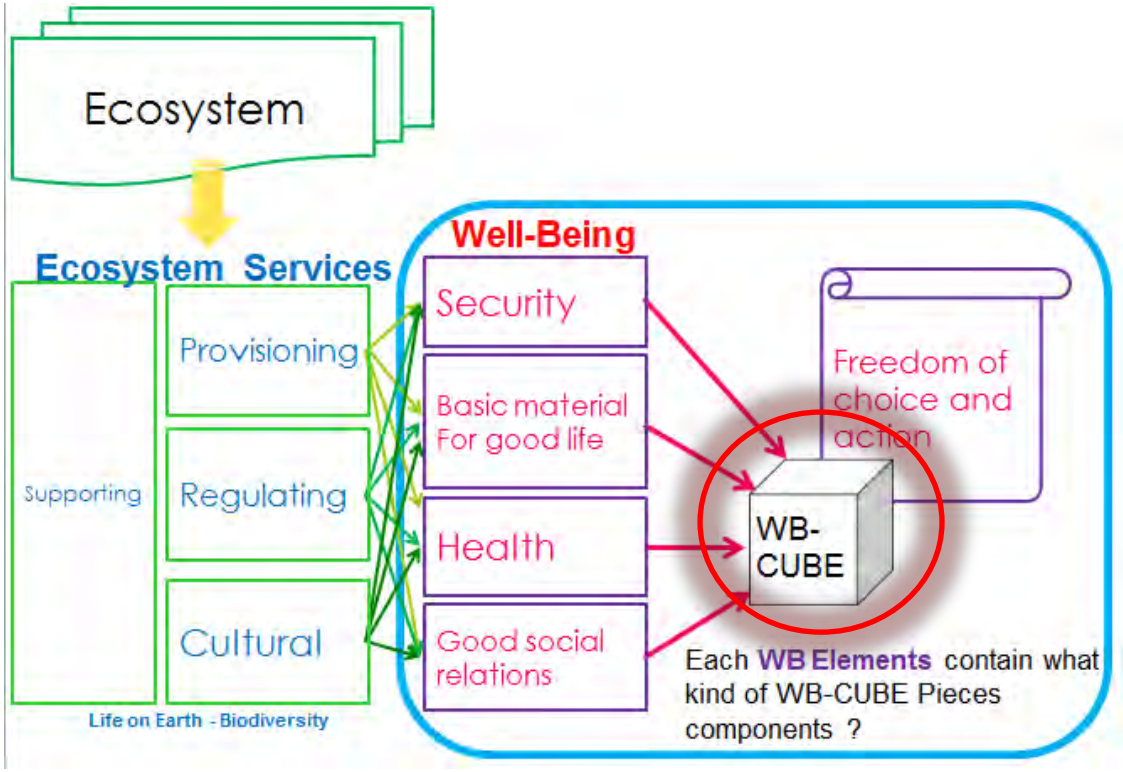
1. How can we SCIENTIFICALLY clarify the differences in societal objectives and needs among stakeholders in different sectors and countries?

2. Based on that result, how can we develop an inventory of potential recipients, and their communication requirements?

3. How can we SCIENTIFICALLY explore the consequences to and responses of human social systems to factors such as climate-induced changes in marine ecosystems (FUTURE key question 3.4) ?

Progress report: Well-Being Cube (in collaboration with MarWeB project)

Based on the Psychological theory, the WB-CUBE can clarify the detailed structure and needs for Marine Ecosystem Services to improve Human Well-being.



Japan

Freedom of choice and action
Low satisfaction type

Security

◆Explorations/Beneficial/Defense/Self-esteem/-Dominance/-Nurturance/ Appetite
("S" R^2=.217)

◇Appetite ("E" R^2=.040)

Basic material for good life

◆Impression/Personal/ Explorations/Play/-Collection/ -Competition/Appetite
("S" R^2=.277)

◇Stability/ -Competition/Apptetite
("E" R^2=.070)

Health

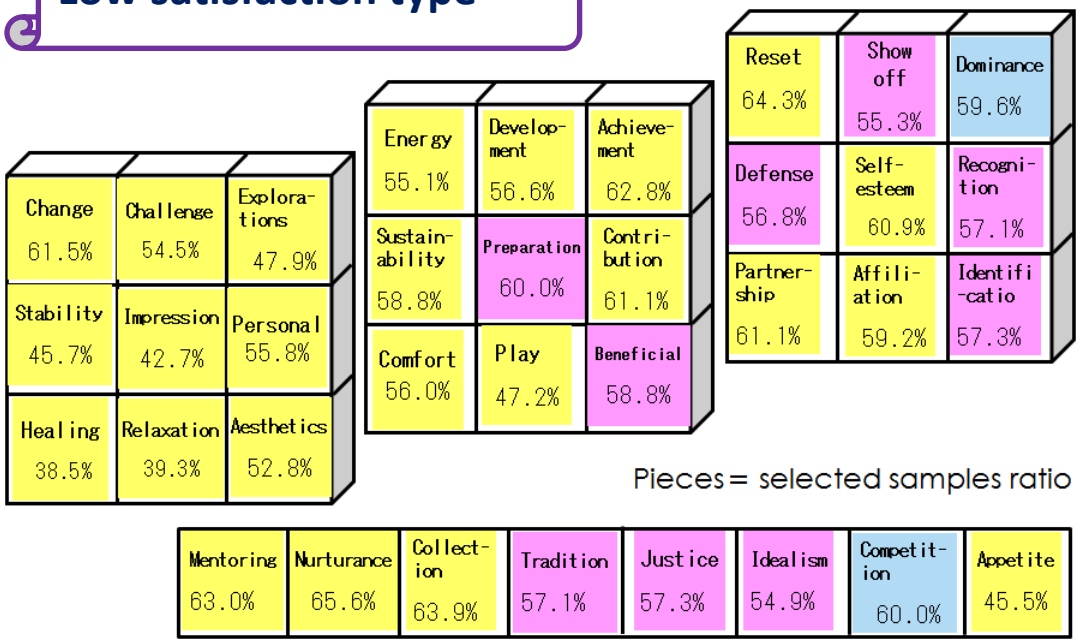
◆Change/Personal/Sustainability/ Appetite
("S" R^2=.156)

◇Affiliation ("E" R^2=.217)

Good social relations

◆Change/Stability/Self-esteem/ Affiliation/-Collection/Appetite ("S" R^2=.232)

◇Affiliation/ Defense/ Show off
("E" R^2=.217)



Pieces = selected samples ratio

- Generally, low satisfactions and low expectations for the well-being(pessimistic)
- Marine related "Defense" is important, but out of PICES's business.
- Information on the food provisioning service will improve all of 4 WB elements.
- (-Collection) and (-Competition) seem to imply the people's needs to ease them.

Korea

Freedom of choice and action +polarity Ⅱ type

Security

◆Change/-Challenge/Healing/Achievement/ Contribution/self-esteem/Collection （”S” R^2＝.279）

◇ Healing/Impression/Recognition/Idealism （”E” R^2＝.169 ）

Basic material for good life

◆Healing/Self-esteem/ Collection/Appetite （”S” R^2＝.238）

◇Relaxation/Play/-Beneficial/ -Partnership/Identification/Justice/ Appetite（”E” R^2＝.205）

Health

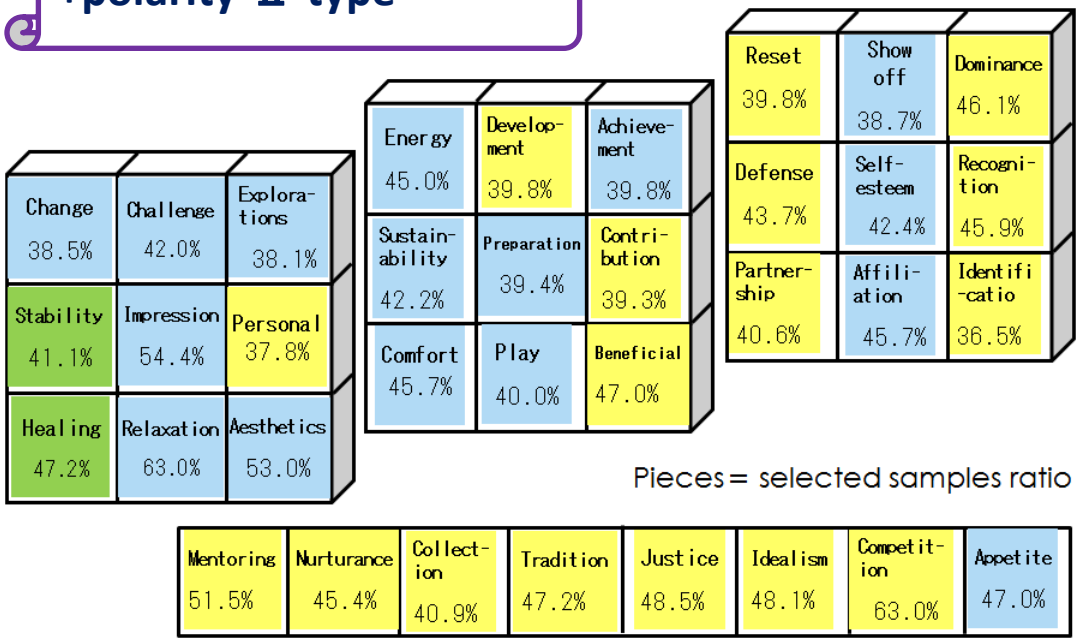
◆Healing/Relaxation/Sustainability/ -Preparation/Self-esteem/Affiliation/ Collection （”S” R^2＝.282）

◇ Relaxation/Play/Identification/ Show off （”E” R^2＝.180）

Good social relations

◆Healing/Self-esteem/ Affiliation/ Nurturance （“S”R^2＝.261）

◇Relaxation/ Impression/Dominance/Tradition/ Competition （”E” R^2＝.201）



- Polarity.
- The personal aspects of well-being (the first 9 pieces) are relatively satisfied than the social aspects.
- “Healing” piece is important in all the 4 WB elements. People are satisfied with this.
- “Collection” piece is positively relating to 3 WB elements. What does this mean？

Security

◆Stability/Explorations/Aesthetics/Energy/Achievement/-Contribution/-Reset/Recognition/Nurturance/Appetite（"S" R^2=.460）

◇Challenge/-Development/Achievement/sustainability/ Play/-Reset/Idealism/Appetite（"E" R^2=.334）

Basic material for good life

◆Stability/Aesthetics/Energy/ -Preparation/-Beneficial/Self-esteem/Recognition/Appetite（"S" R^2=.356）

◇-Healing/ Impression/Play/Sustainability/Appetite（"E" R^2=.219）

Health

◆Stability/Relaxation/Collection/Justice/Appetite（"S" R^2=.351）

◇Aesthetics/ Impression/Competition/Appetite（"E" R^2=.245）

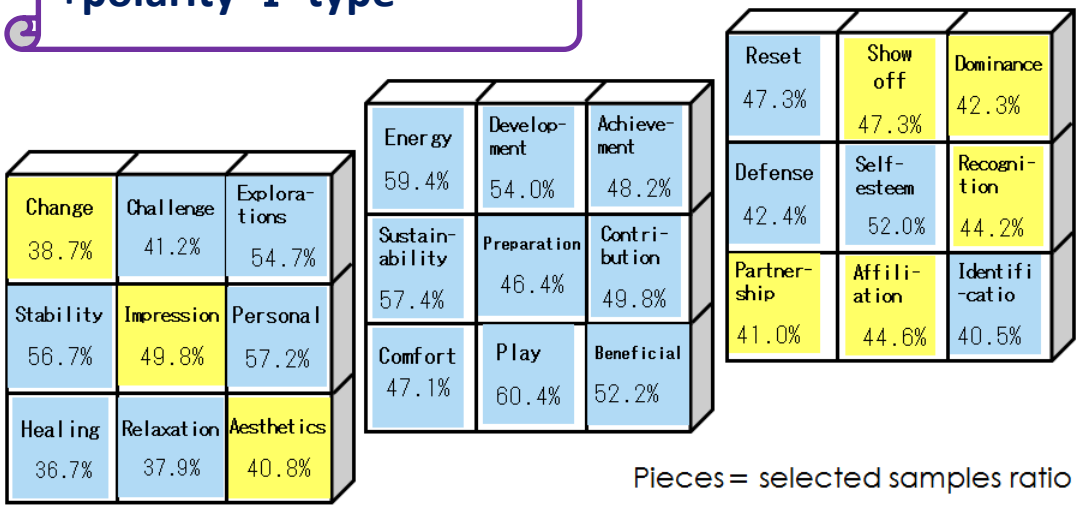
Good social relations

◆Impression/Aesthetics/Achievement/Recognition/Mentoring/Appetite（"S" R^2=.390）

◇ Aesthetics/Challenge/Contribution/Justice/Idealism（"E" R^2=.246）

Freedom of choice and action +polarity Ⅰ type

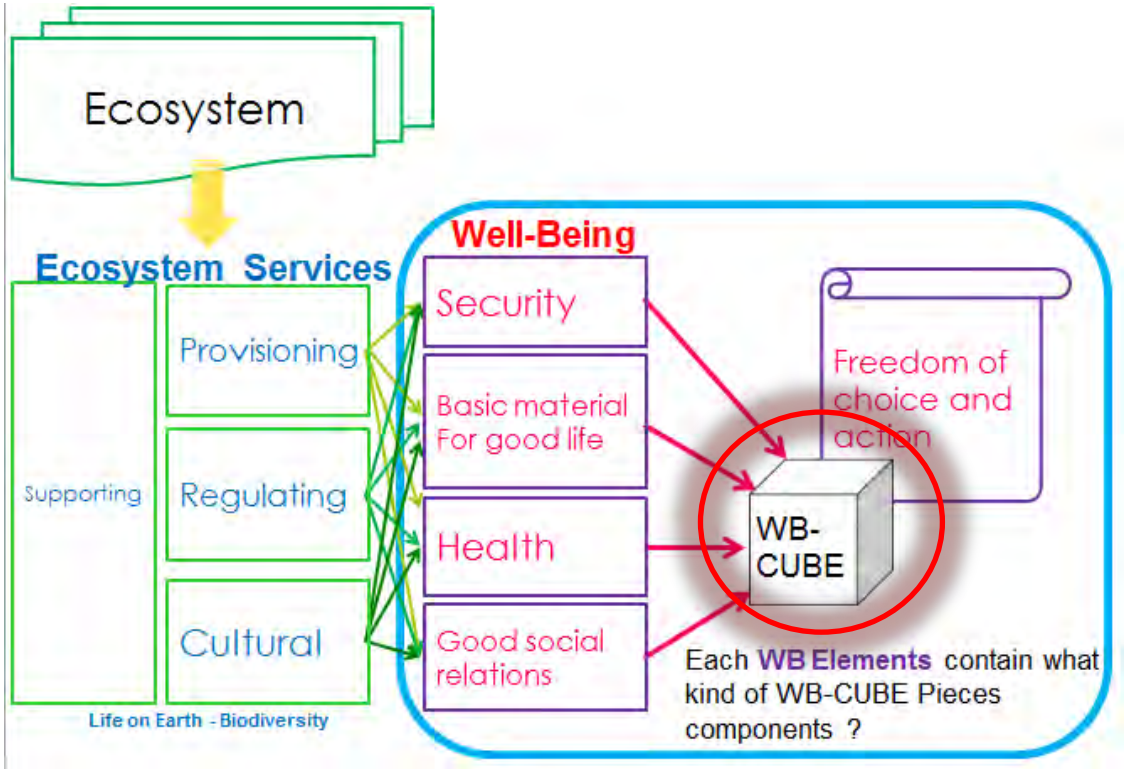
USA



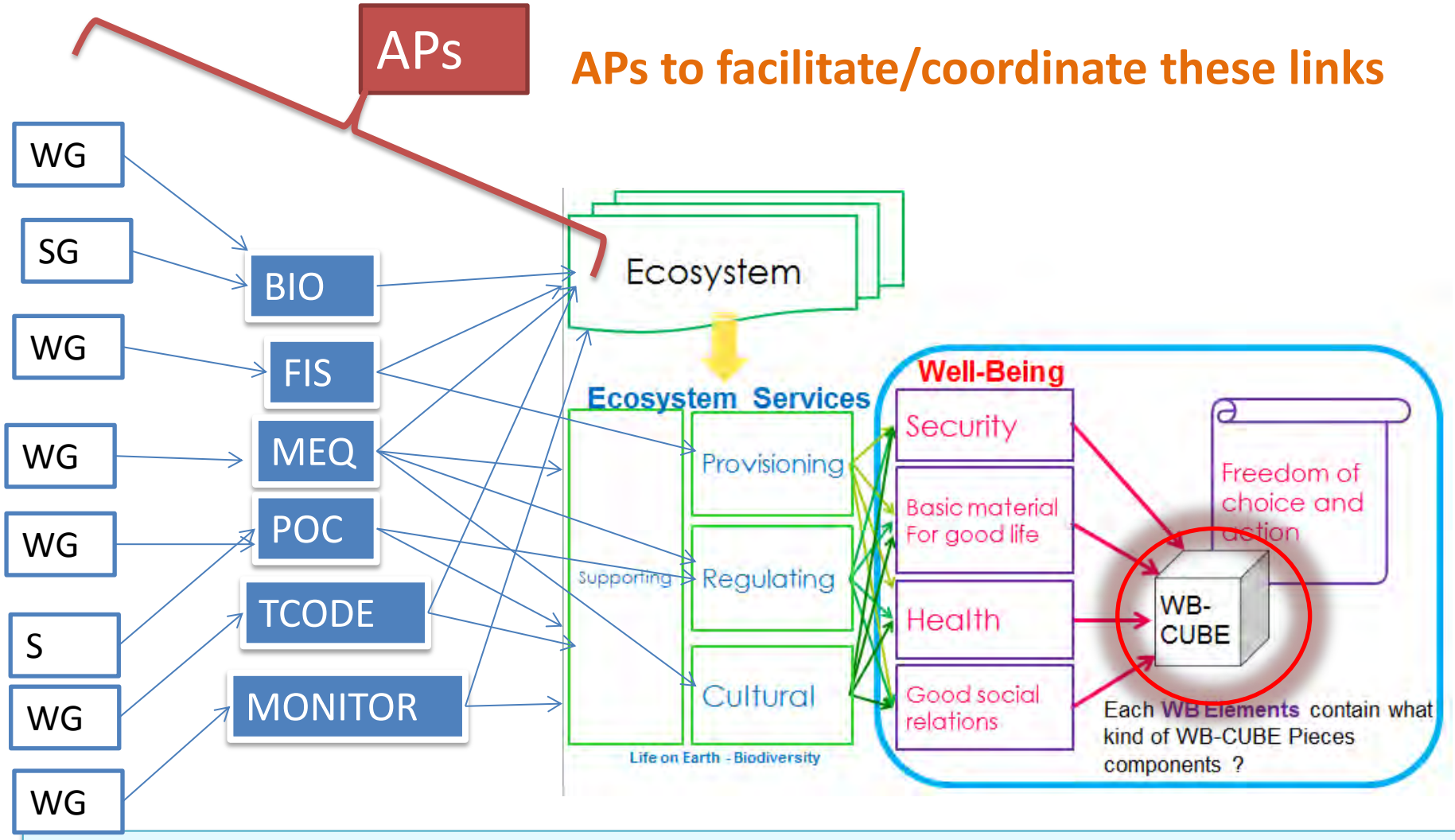
- Generally, satisfied and having high expectations for well-being(optimistic？).
- But, when people begin to feel unsatisfied, blue pieces become reds, i.e., people strongly require some measures.
- Scientific information relating to the cultural services (i.e., Aesthetic and Impression) are relatively important than others.

How can we utilize WB-CUBE in FUTURE Program?

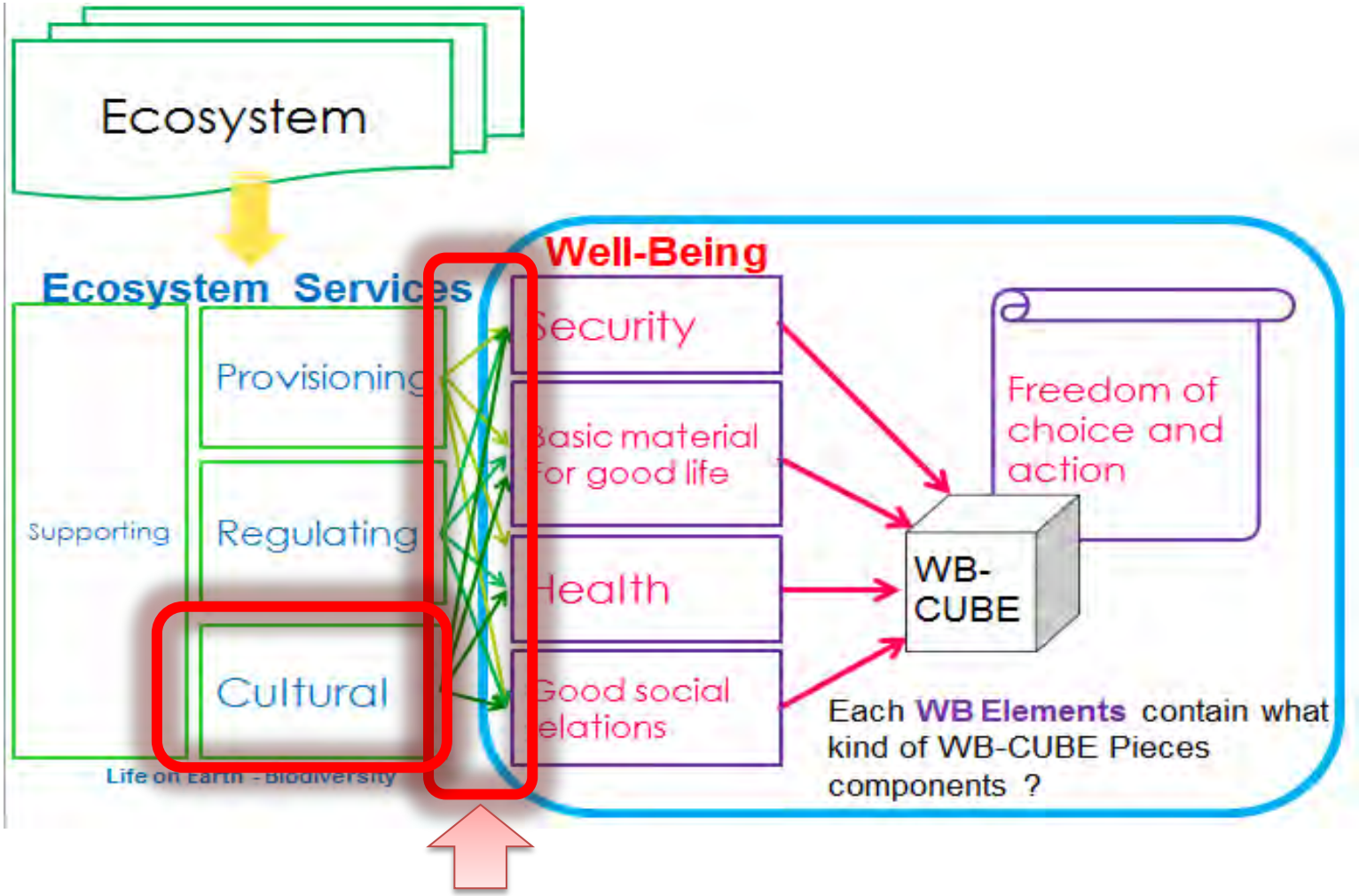
The Well-Being Cube, developed by S-HD, is a promising tool for linking to marine science activities in the other Expert Groups.



APs to facilitate/coordinate these links



S-HD hopes other EGs will pay attention to the MA framework, and link their scientific outputs to some Ecosystem Services. Then, S-HD can link them to the Human Well-Being, which is the social end-objective under the MA framework.



Also, other social science tools can be applied, qualitatively and quantitatively, to examine what has occurred and to develop conditional predictions of what is likely to occur in the social, cultural and economic aspects under global changes.

Articles on PICES Press from S-HD in 2013

- Vol. 21 (1)

Why Do We Need Human Dimensions for the FUTURE Program? (Makino and Keith)

- Vol. 21(2)

Social and Economic Indicators for Status and Change within North Pacific Ecosystems (Keith and Makino)

- Vol. 21 (2)

Socioeconomic Indicators for United States Fisheries and Fishing Communities (Ron and Stephen)

Please have a look!!

Conclusions: Why Do We Need HD?

- The social sciences provide tools and concepts for approaching aspects of marine SES which are not addressed by the natural sciences.

- Social science can improve the value of the information produced by the natural sciences, and natural science can improve the value of information produced by the social sciences for decision making, better management, and better understanding.

Let's research together!!

Thank you very much