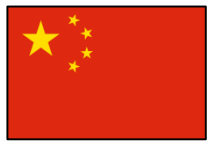
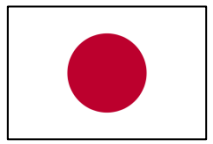
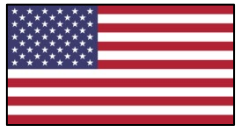
MAFF
Ministry of Agriculture, Forestry and Fisheries

Data from the PICES Project on Marine Ecosystem Health and Human Well-being (MarWeB)

Project profile

- Funding : Ministry of Agriculture, Forestry and Fisheries, Japan
- Duration: FY 2012-2016
- Key questions:

  (a) how do marine ecosystems support human well-being? and
  (b) how do human communities support sustainable and productive marine ecosystems?
- Study site: Indonesia and Guatemala
- Co-Chairs:
  Mitsutaku Makino (Japan) , Ian Perry (Canada)

What we have done in this project

- We investigated the human wellbeing (Happiness) in each country/some community (Social Science)

- We conducted the pond experiment of the Integrated Multi-Trophic Aquaculture (IMTA) in Indonesia (Natural Science)

Marine Ecosystem Health and Human Well-Being

Acronym: MarWeB

Term: April 2012 - March 2017

Project Science Team Co-Chairs:
Mitsutaku Makino (Fisheries Research and Education Agency, Japan)
Ian Perry (Department of Fisheries and Oceans, Canada)

Background

Progress is being made internationally on an ecosystem approach to the management of marine systems, in particular as applied to ecosystem-based fisheries management (EBFM; *e.g.*, FAO 2003; Hollowed *et al.*, 2011). Recent initiatives have expanded the concept of ecosystem approaches to include people in what have been called coupled marine social-ecological systems *e.g.*, De Young *et al.*, 2008;

MarWeB Advisory Report

The MarWeB Advisory Report on "*Improving aquaculture, marine ecosystems and human well-being: A social-ecological systems approach*" provides an overview of the social-ecological systems approach and the Sato-umi concept for local government officers and researchers in developing countries and for general public.

MarWeB Database

This database includes data collected during this MarWeB project:

1. Data for the comparative well-being analysis in PICES member countries and Indonesia (see Section 2 in the MarWeB Scientific Report)
2. Data from the 2014, 2015 and 2016 Aquaculture Pond Experiments in Indonesia (see Section 3 in the MarWeB Scientific Report) [These data will be publicly available after publication of the findings. Data are now available to Project Science Team members and Indonesian colleagues involved in the experiments. Other scientists interested in accessing these data before publication should contact PICES (secretariat@pices.int) with a specific request and explanation for how these data will be used.]
3. Electronic clicker survey data for the community needs assessments in Las Lisas and Monterrico in Guatemala (see Section 4 in the MarWeB Scientific Report)
4. Bibliography on the key concepts used in the project: social-ecological systems/human well-being and Sato-umi

Annual Progress Reports (PR)

PR-Year 4 (Apr. 2015 - Mar. 2016)
PR-Year 3 (Apr. 2014 - Mar. 2015)

PICES SCIENTIFIC REPORT
No. 52, 2017

Marine Ecosystems and Human Well-being:
The PICES-Japan MAFF MarWeB Project

NORTH PACIFIC MARINE SCIENCE ORGANIZATION

ISBN 978-1-927797-22-6
ISSN 1198-273X

PICES

PICES Press

Summer 2017, Vol. 25, No. 2, pp. 31-34 [download]
PICES/MAFF MarWeB project collaborates with the United Nations program on the development of Marine Protected Areas in Guatemala

Summer 2016, Vol. 24, No. 2, pp. 28–31 [download]
A community needs assessment for coastal Guatemala– Balancing ocean and human health

Winter 2016, Vol. 24, No. 1, pp. 29–30 [download]
Moving towards more sustainable shrimp and tilapia aquaculture in Karawang, Indonesia

Summer 2015, Vol. 23, No. 2, pp. 31 [download]
A good relationship between local communities and seafood diversity

Summer 2015, Vol. 23, No. 2, pp. 28-30 [download]
A psychological perspective on human well - being: An international comparison of the well - being structure

Summer 2013, Vol. 21, No. 2, pp. 18-19 [download]
PICES-MAFF Project on Marine Ecosystem Health and Human Well-Being: Indonesia Workshop

Winter 2013, Vol. 21, No. 1, pp. 26-28 [download]
New PICES MAFF-Sponsored Project on "*Marine Ecosystem Health and Human Well-Being*"

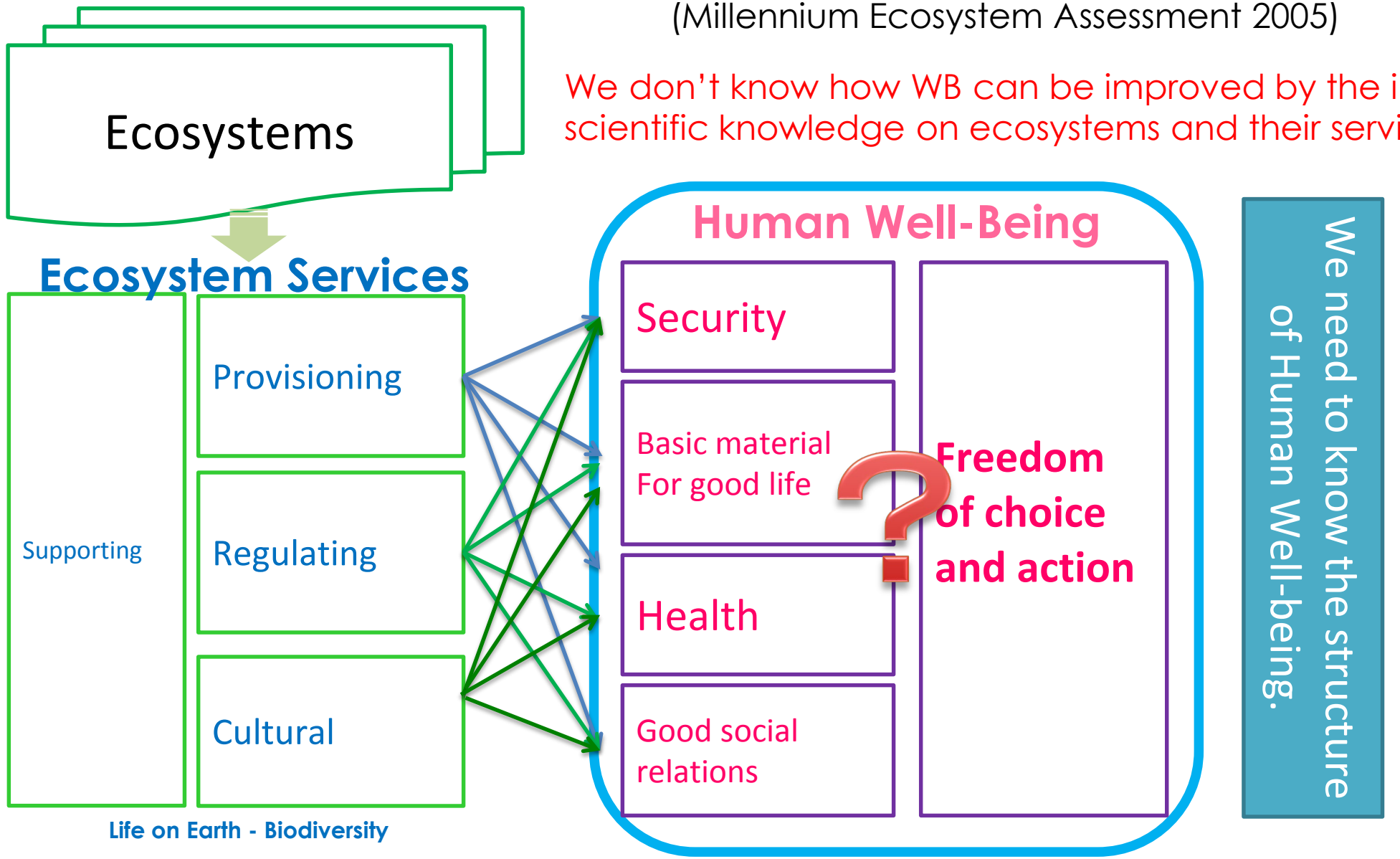
Data we have got during the project

1. Wellbeing analysis of PICES Member Countries (6) + Indonesia
2. Pond experiment results for Integrated Multi-Trophic Aquaculture (IMTA) in Karawang, Indonesia
3. Clicker Survey for Community Needs Assessments in Guatemala
4. Bibliography

Background: Relationship amongst Ecosystems, Ecosystem Services, and Human Well-beings

(Millennium Ecosystem Assessment 2005)

We don't know how WB can be improved by the improved scientific knowledge on ecosystems and their services…



We need to know the structure of Human Well-being.

We got score of satisfaction level about MA's well-being!

Q1 : In daily life, how satisfied are you with the following aspects listed below ?
Please rate each aspect according to the following.

Ex) To live with peace of mind and safety

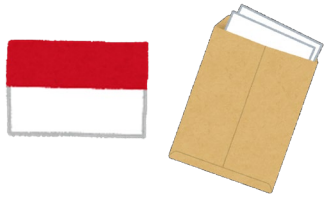
1:Very satisfied [5]
2:A little satisfied [4]
3:Neither satisfied nor dissatisfied [3]
4:Dissatisfied [2]
5:Very dissatisfied [1]

Please circle the number that accurately describes your answer!

Determine how your expectations in every aspect below

NO	Aspect of Satisfaction	Rate of satisfaction
1	To live with peace of mind and safety	[1] [2] [3] [4] [5]
2	To protect oneself from danger	[1] [2] [3] [4] [5]
3	To use energy and resources appropriately	[1] [2] [3] [4] [5]
4	To give an appropriate response when a disaster strikes	[1] [2] [3] [4] [5]
5	To secure the basics for a good life	[1] [2] [3] [4] [5]
6	To regulate life-environment (e.g. lifeline such as electricity, gas, and water)	[1] [2] [3] [4] [5]
7	To have enough food	[1] [2] [3] [4] [5]
8	To have somewhere comfortable to live	[1] [2] [3] [4] [5]
9	To get daily necessities	[1] [2] [3] [4] [5]
10	To keep one in good health	[1] [2] [3] [4] [5]
11	To have the capacity to live grow or develop	[1] [2] [3] [4] [5]
12	To feel comfortable	[1] [2] [3] [4] [5]
13	To secure clean air and water	[1] [2] [3] [4] [5]
14	To produce a good relationship	[1] [2] [3] [4] [5]
15	To cooperate with the social community	[1] [2] [3] [4] [5]
16	To hold someone in high esteem	[1] [2] [3] [4] [5]
17	To be able to support someone	[1] [2] [3] [4] [5]
18	To give a child a fair chance to succeed	[1] [2] [3] [4] [5]
19	To have a chance to achieve a goal	[1] [2] [3] [4] [5]
20	To enjoy one's hobbies	[1] [2] [3] [4] [5]

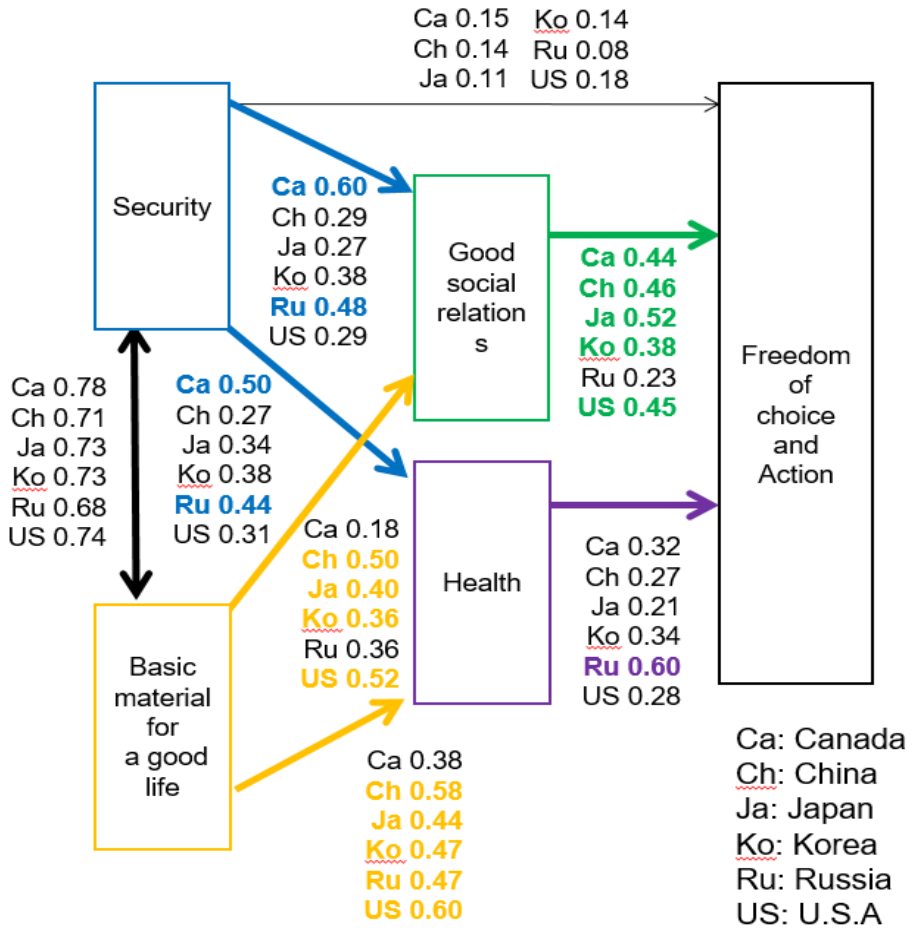
Questionnaire survey
[Web-based and Paper-based]



共有
このドキュメントを共有し、共有しているユーザーを確認します。

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	No	name	Sex	Age	Country	Income	Educatior	Religion	Q1-1	Q1-2	Q1-3	Q1-4	Q1-5	Q1-6	Q1-7	Q1-8	Q1-9		
2	1	Japan	2	27	1	5	4	6	3	4	3	2	4	2	2	4	1	2	4
3	2	Japan	1	26	1	7	5	5	5	4	4	5	4	5	4	4	4	4	4
4	3	Japan	2	27	1	7	5	5	4	4	4	4	5	4	4	4	4	2	4
5	4	Japan	2	26	1	7	2	5	2	2	2	2	2	3	2	2	2	2	2
6	5	Japan	2	25	1	3	4	5	4	4	3	4	4	3	3	4	3	4	4
7	6	Japan	2	24	1	11	5	1	5	3	3	4	5	2	4	4	4	2	5
8	7	Japan	1	25	1	3	3	1	3	5	3	4	3	4	3	3	2	2	3
9	8	Japan	2	23	1	2	5	1	4	4	4	5	4	4	2	4	4	4	5
10	9	Japan	2	29	1	4	1	1	4	3	3	4	5	4	5	4	3	4	3
11	10	Japan	2	22	1	11	2	5	3	4	3	3	3	3	3	3	3	3	3
12	11	Japan	1	24	1	6	6	1	4	4	3	4	3	3	3	4	4	3	4
13	12	Japan	2	25	1	1	2	5	5	5	5	1	5	5	5	2	5	4	5
14	13	Japan	1	28	1	3	3	1	5	5	4	4	3	3	3	4	3	4	4
15	14	Japan	1	29	1	3	5	6	3	3	3	3	3	3	3	3	3	3	3
16	15	Japan	2	28	1	4	2	6	4	4	3	4	3	3	3	4	4	3	3
17	16	Japan	2	25	1	3	2	5	3	3	3	3	3	3	3	3	3	3	3
18	17	Japan	2	28	1	4	2	1	3	4	3	3	4	2	4	2	4	4	3
19	18	Japan	2	23	1	3	5	1	2	4	3	4	3	3	3	4	4	2	4
20	19	Japan	2	28	1	6	6	5	4	1	4	4	4	1	1	1	4	1	4
21	20	Japan	2	26	1	4	5	5	5	4	5	5	5	4	3	3	5	5	5
22	21	Japan	1	28	1	5	5	5	3	4	4	4	4	3	3	4	3	3	5
23	22	Japan	2	20	1	11	2	1	3	3	3	3	3	3	3	3	3	3	3

Each country/sector/community has specific priority in ecosystem conservation



- "Security" is relatively important in Canada and Russia, while "Basic material for a good life" is for other countries.
- Similarly, the "Health" is relatively more important for Russian people for achieving the freedom of choice and action, while other countries are more about the "good social relations".

Hori and Makino (2018) Marine Policy 95

Published papers

1. Juri HORI and Mitsutaku MAKINO (2018) “The structure of human well-being related to ecosystem services in coastal areas: a comparison among the six North Pacific countries”, Marine Policy, 95, pp221-226.

2. [Discussion referring the part of MarWeb study] Juri HORI (2018) “The structure of human well-being related to ecosystem services: A Japanese case study to confirm the repeatability of previous findings”, The Japanese Journal of Experimental Social Psychology, 58, pp73-78.

3. [Discussion referring the part of MarWeb study] Izumi TSURITA, Juri HORI, Toshihiro KUNIEDA Masakazu HORI and Mitsutaku MAKINO (2018) “Marine protected areas, Satoumi, and territorial use rights for fisheries: A case study from hinase, Japan”, Marine Policy (IF: 2.24), 91, pp41-48.

4. [Discussion referring the part of MarWeb study] Juri HORI・ Izumi TSURITA・ Hidetomo TAJIMA・ Mitsutaku MAKINO (2017) 「The structure of human well-being derived from the marine ecosystem services of coastal areas: a comparison between regions with different utilization patterns of the ecosystem services」, Bull. Jpn. Soc. Fish Oceanogr, 81, pp293-299. in Japanese

5. [Using Indonesia, Japan and Korea data] Juri HORI・ Mistutaku MAKINO (2016) 「Analysis and international comparison of structure of human well-being provided by marine ecosystem services」, Bull. Jpn. Soc. Fish Oceanogr, 80, pp199-206. In Japanese

We got score of satisfaction & expectation level about well-being!

Since 2012---

Questionnaire survey

Social needs

Personal needs

ALL (%)

			Energy 活動	Develop-ment 成長	Achieve-ment 達成	Reset 打破	Show-off 顕示	Dominance 導引
Active needs	Change 転換	Challenge 挑戦	Exploration 探求	Sustainability 維持	Preparation 獲得	Contribution 貢献	Defense 防衛	Self-esteem 自尊感情	Recognition 承認
	Partnership 愛着	Affiliation 親和	Identification 同化	25/26/27				
	Stability ゆとり	Impression 感動	Personal らしさ	Comfort 快楽	Play 遊戯	Beneficial 利益	16/17/18	
Static needs							13/14/15	
	Healing くつろぎ	Relaxation 安心	Aesthetics 審美	07/08/09			10/11/12	
				04/05/06				
				01/02/03				

Primitive needs ⟷ Reasonable needs

Prehension needs	Mentoring 育成	Nurturance 養護	Collection 収集	Tradition 伝統	Justice 正義	Idealism 理想	Competition 競争	Appetite 食	28/29/30/31/32/33/34/35

Social needs

Personal needs

Active needs

Static needs

Primitive needs ⟷ Reasonable needs

			Reset 打破	Show-off 顯示	Dominance 導引			
			Defense 防衛	Self-esteem 自尊感情	Recognition 承認	Energy 活動	Develop-ment 成長	Achieve-ment 達成
			Partnership 愛着	Affiliation 親和	Identification 同化	Sustainability 維持	Preparation 獲得	Contribution 貢献
Change 転換	Challenge 挑戦	Exploration 探求				Comfort 快楽	Play 遊戯	Beneficial 利益
Stability 安定	Impression 感動	Personal らしさ						
Healing くつろぎ	Relaxation 安心	Aesthetics 審美						

Indonesia
Expectation: M= 3.77 (0.76)
Satisfaction : M= 3.86 (0.63)

Prehension needs

Mentoring 育成	Nurturance 養護	Collection 収集	Tradition 伝統	Justice 正義	Idealism 理想	Competition 競争	Appetite 食

Social needs

Personal needs

Active needs

Static needs

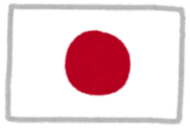
Primitive needs ⟷ Reasonable needs

			Reset 打破	Show-off 顯示	Dominance 導引			
			Defense 防衛	Self-esteem 自尊感情	Recognition 承認	Energy 活動	Develop-ment 成長	Achieve-ment 達成
			Partnership 愛着	Affiliation 親和	Identification 同化	Sustainability 維持	Preparation 獲得	Contribution 貢献
Change 転換	Challenge 挑戦	Exploration 探求				Comfort 快楽	Play 遊戯	Beneficial 利益
Stability 安定	Impression 感動	Personal らしさ						
Healing くつろぎ	Relaxation 安心	Aesthetics 審美						

Indonesia
Expectation: M= 4.26 (0.44)
Satisfaction : M= 4.06 (0.56)

Prehension needs

Mentoring 育成	Nurturance 養護	Collection 収集	Tradition 伝統	Justice 正義	Idealism 理想	Competition 競争	Appetite 食



Social needs

Personal needs

Active needs

Static needs

Primitive needs ⟷ Reasonable needs

			Reset 打破	Show-off 顯示	Dominance 導引			
			Defense 防衛	Self-esteem 自尊感情	Recognition 承認	Energy 活動	Develop-ment 成長	Achieve-ment 達成
			Partnership 愛着	Affiliation 親和	Identification 同化	Sustainability 維持	Preparation 獲得	Contribution 貢献
Change 転換	Challenge 挑戦	Exploration 探求				Comfort 快楽	Play 遊戯	Beneficial 利益
Stability 安定	Impression 感動	Personal らしさ						
Healing くつろぎ	Relaxation 安心	Aesthetics 審美						

Indonesia
Expectation: M= 3.09 (0.79)
Satisfaction : M= 3.11(0.51)

Prehension needs

Mentoring 育成	Nurturance 養護	Collection 収集	Tradition 伝統	Justice 正義	Idealism 理想	Competition 競争	Appetite 食

Social needs

Personal needs

Active needs

Static needs

Primitive needs ⟷ Reasonable needs

			Reset 打破	Show-off 顯示	Dominance 導引			
			Defense 防衛	Self-esteem 自尊感情	Recognition 承認	Energy 活動	Develop-ment 成長	Achieve-ment 達成
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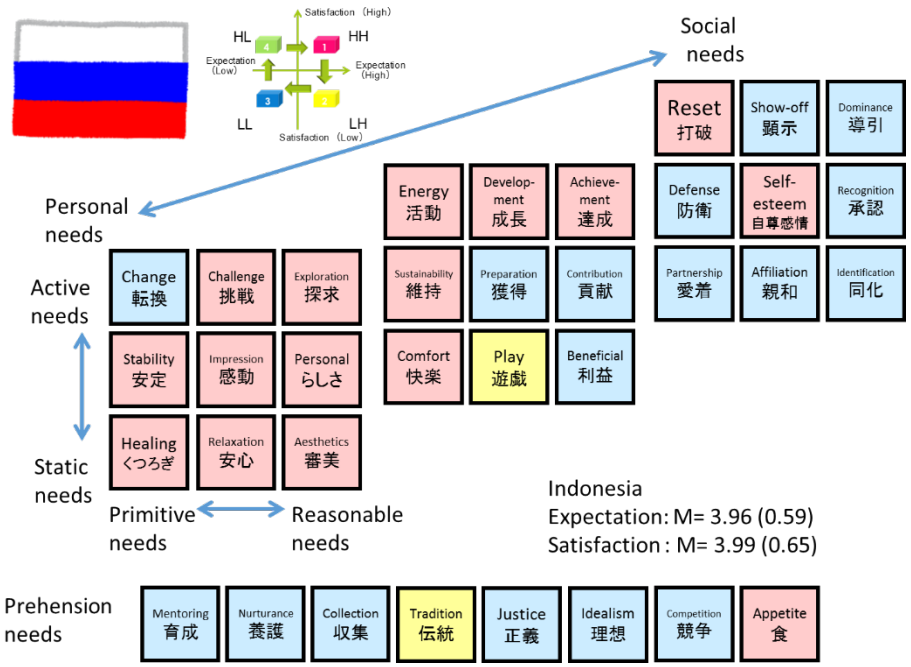
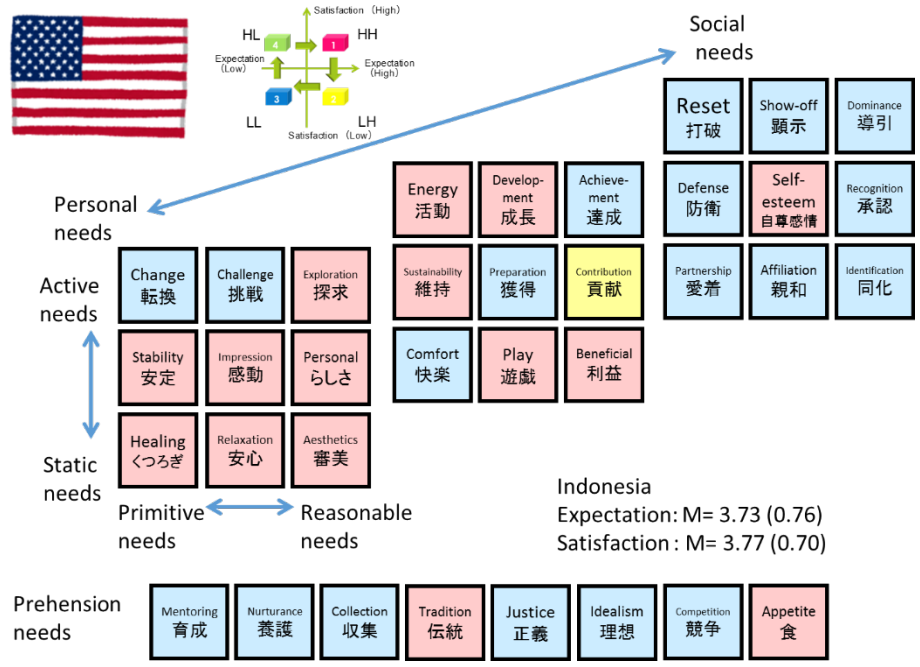
Change 転換	Challenge 挑戦	Exploration 探求				Comfort 快楽	Play 遊戯	Beneficial 利益
Stability 安定	Impression 感動	Personal らしさ						
Healing くつろぎ	Relaxation 安心	Aesthetics 審美						

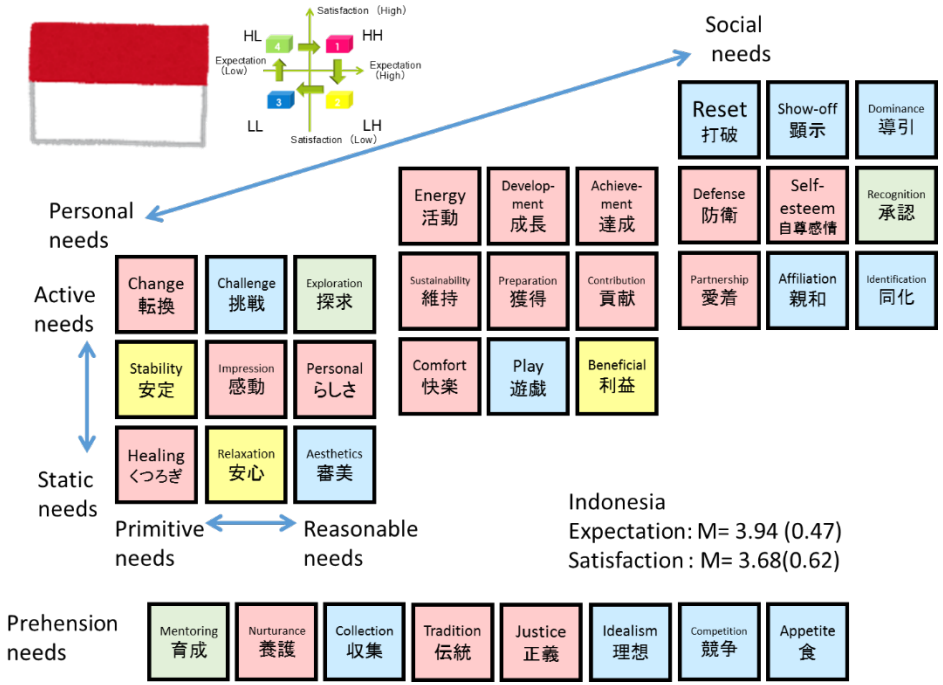
Indonesia
Expectation: M= 3.54 (0.63)
Satisfaction : M= 3.55 (0.62)

Prehension needs

Mentoring 育成	Nurturance 養護	Collection 収集	Tradition 伝統	Justice 正義	Idealism 理想	Competition 競争	Appetite 食







It is still under analysis (and the results will be published on some journal)

Data we have got during the project

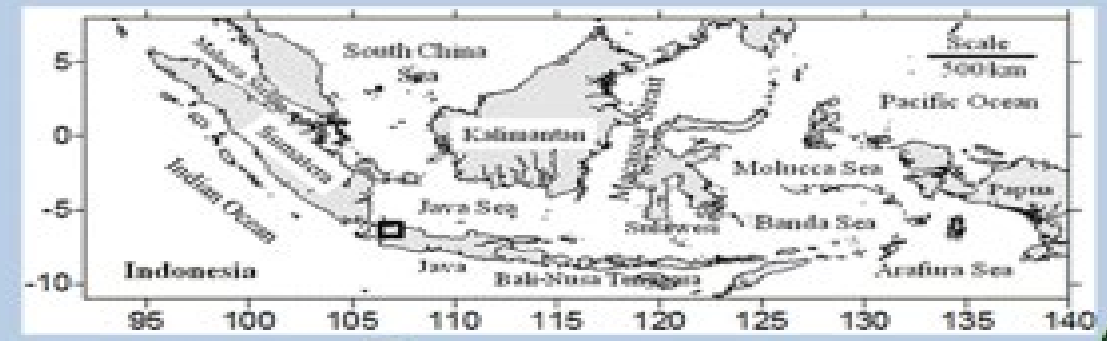
1. Wellbeing analysis of PICES Member Countries (6) + Indonesia

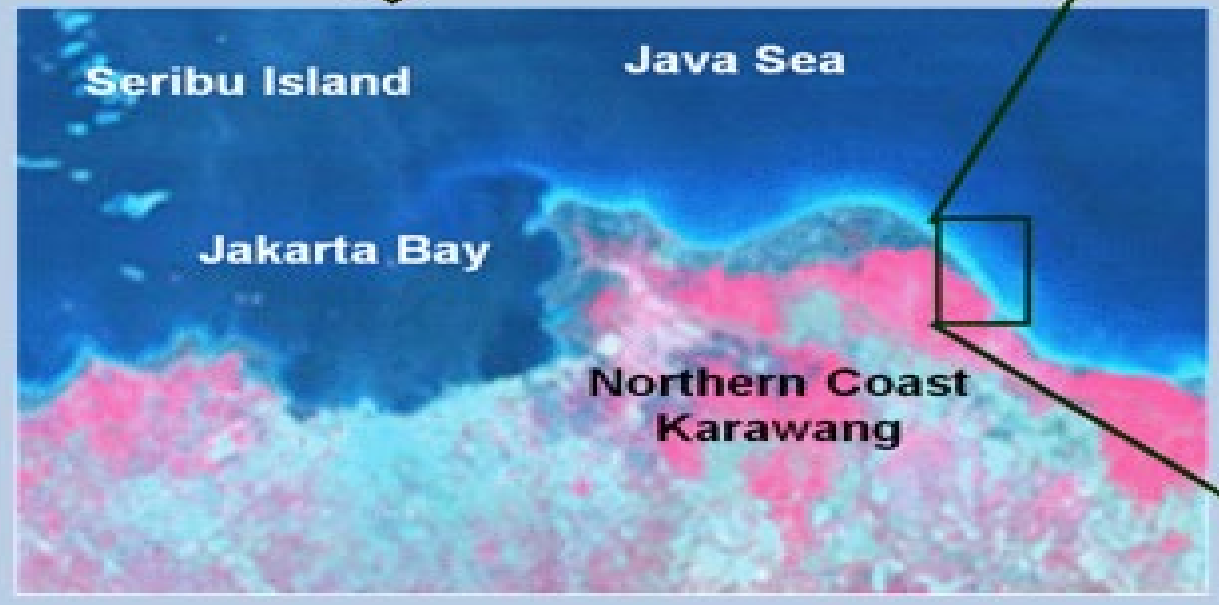
2. Pond experiment results for Integrated Multi-Trophic Aquaculture (IMTA) in Karawang, Indonesia

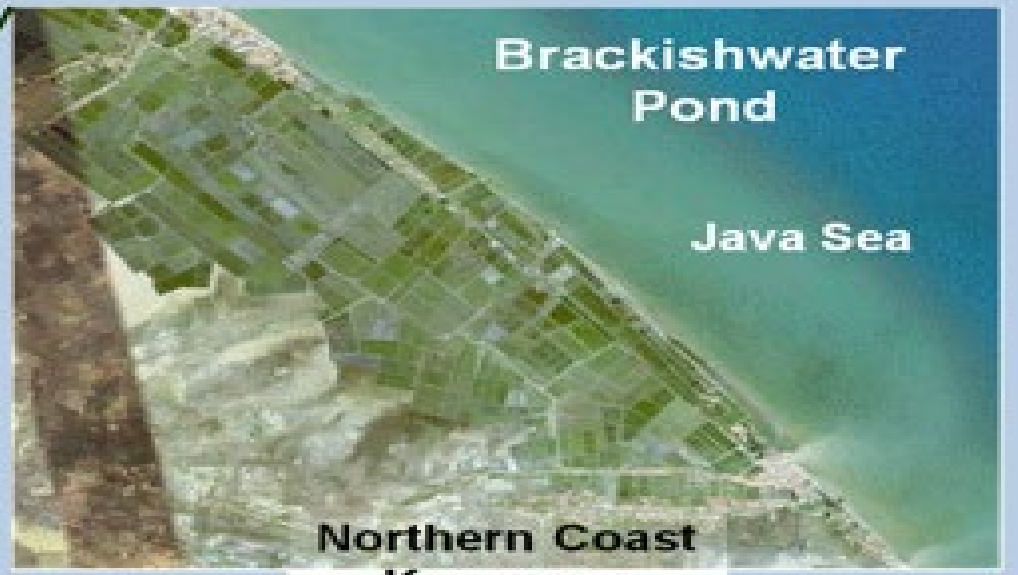
3. Clicker Survey for Community Needs Assessments in Guatemala

4. Bibliography

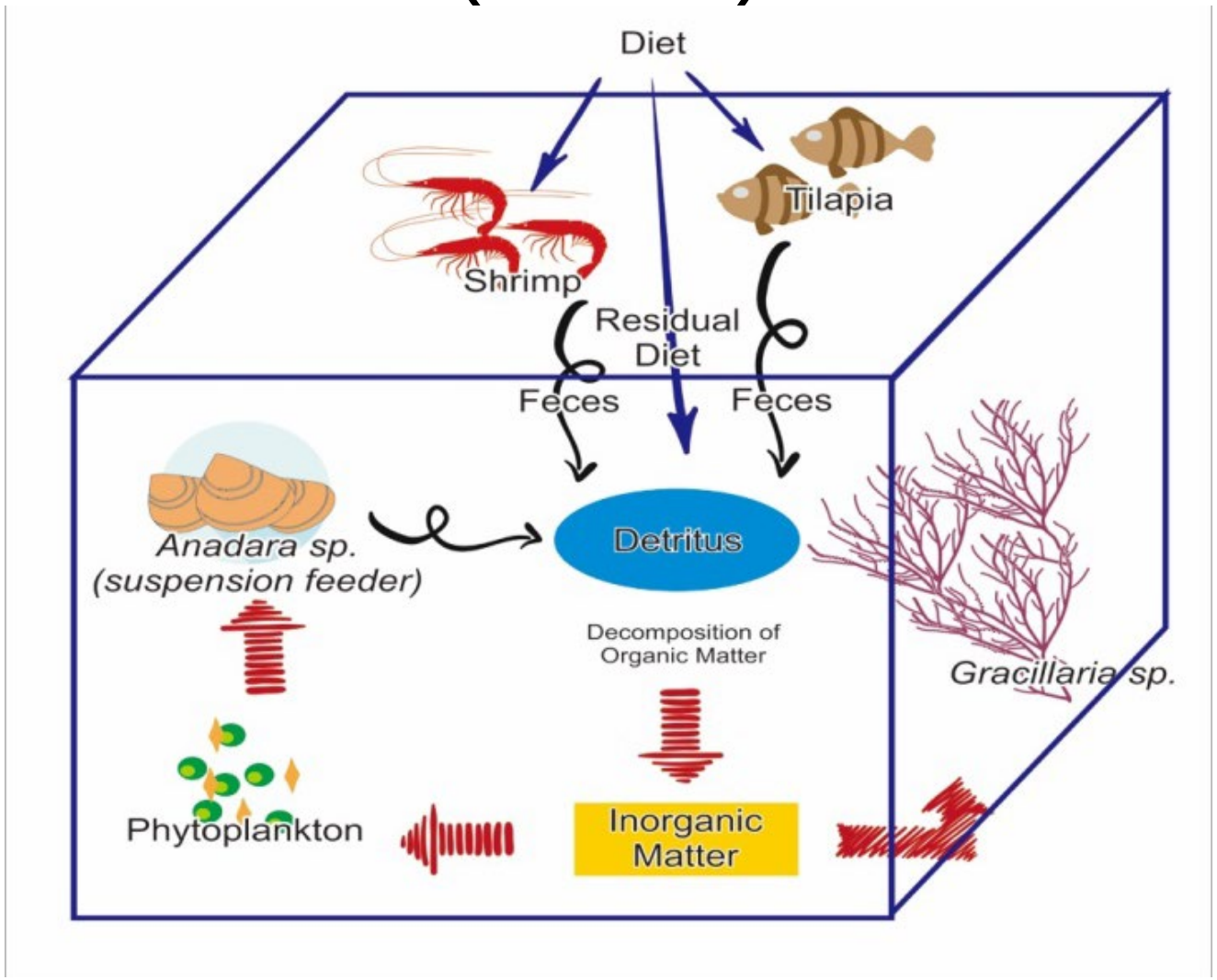
SITE LOCATION







The Integrated Multi-Trophic Aquaculture (IMTA)

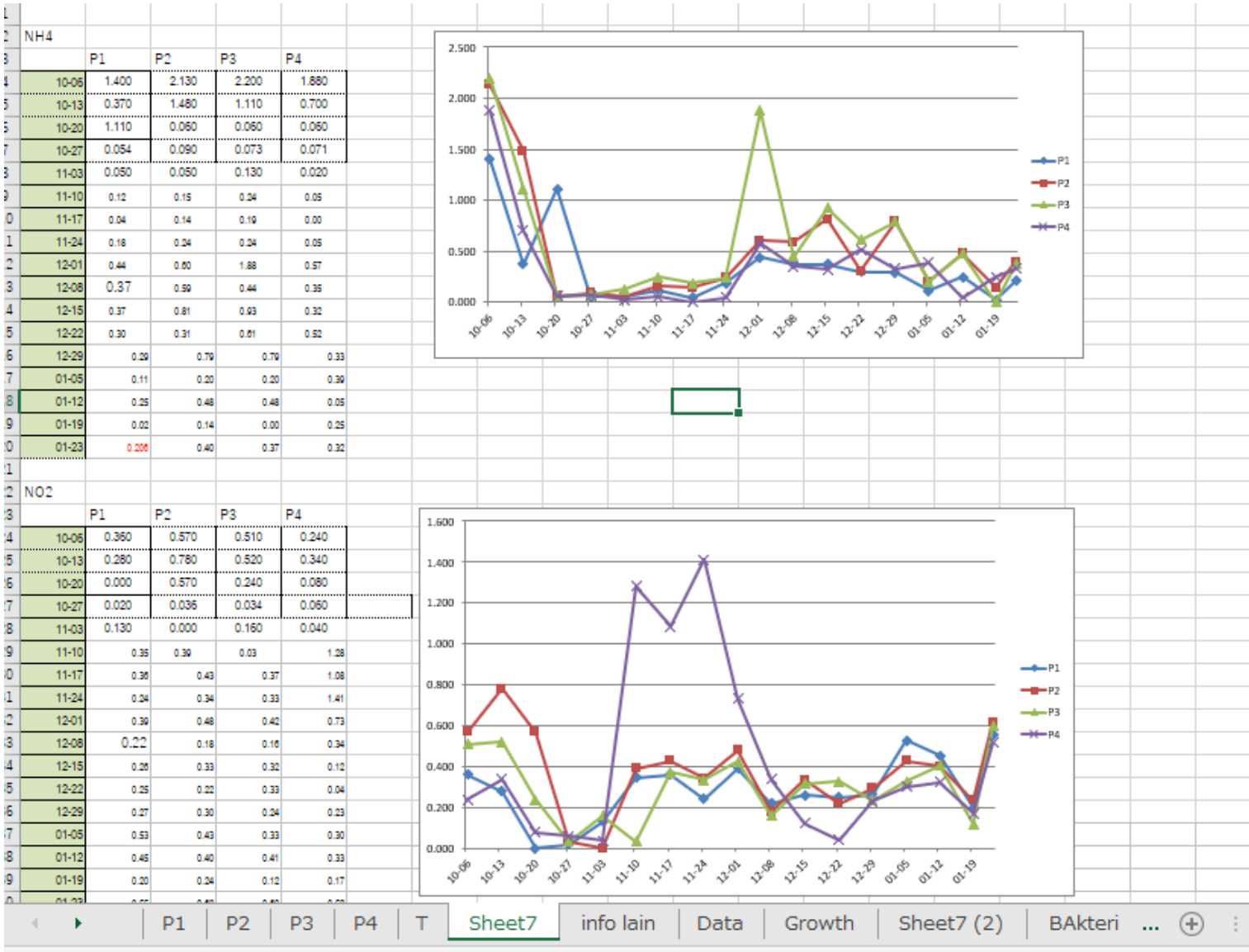


MEASURED PARAMETERS

A wide suite of chemical and biological parameters were measured over the 120 day experiment

Parameter	Frequency	
DO (mg/l)	weekly	Field
Temperature (°C)	daily	
Transparency (cm)	daily	
Water level (cm)	daily	
pH	daily	
Salinity (‰)	weekly	
Chlorophyll-A (µg/l)	every 2 weeks	Lab
Plankton	every 2 weeks	
NH^4-N (mg/l)	weekly	
NO^2-N/NO^3-N (mg/l)	weekly	
PO^4-P (mg/l)	weekly	
Alkalinity as mg/l ($CaCO^3$)	every 2 weeks	
Total Organic Matter (mg/l)	weekly	
Total bacteria (cfu/ml)	every 2 weeks	
Total vibrio (cfu/ml)	every 2 weeks	
WSSV	tentative	

Now, data is under the limited access to the project members (Sorry….)



NH4

	P1	P2	P3	P4
10-06	1.400	2.130	2.200	1.880
10-13	0.370	1.480	1.110	0.700
10-20	1.110	0.060	0.060	0.060
10-27	0.054	0.090	0.073	0.071
11-03	0.050	0.050	0.130	0.020
11-10	0.12	0.15	0.24	0.05
11-17	0.04	0.14	0.19	0.00
11-24	0.18	0.24	0.24	0.05
12-01	0.44	0.60	1.88	0.57
12-08	0.37	0.59	0.44	0.35
12-15	0.37	0.81	0.93	0.32
12-22	0.30	0.31	0.61	0.52
12-29	0.29	0.79	0.79	0.33
01-05	0.11	0.20	0.20	0.39
01-12	0.25	0.48	0.48	0.05
01-19	0.02	0.14	0.00	0.25
01-23	0.206	0.40	0.37	0.32

NO2

	P1	P2	P3	P4
10-06	0.360	0.570	0.510	0.240
10-13	0.280	0.760	0.520	0.340
10-20	0.000	0.570	0.240	0.080
10-27	0.020	0.036	0.034	0.060
11-03	0.130	0.000	0.160	0.040
11-10	0.35	0.39	0.03	1.28
11-17	0.36	0.43	0.37	1.08
11-24	0.34	0.34	0.33	1.41
12-01	0.39	0.48	0.42	0.73
12-08	0.22	0.18	0.16	0.34
12-15	0.26	0.33	0.32	0.12
12-22	0.25	0.22	0.33	0.04
12-29	0.27	0.30	0.24	0.23
01-05	0.53	0.43	0.33	0.30
01-12	0.45	0.40	0.41	0.33
01-19	0.20	0.24	0.12	0.17

Researching together

- It is inevitable for us to, at some point of time, withdraw the efforts from the sites.
- Therefore, as one of the most important processes for a social-ecological system research, collaboration with local stakeholders, especially in terms of dissemination of the results and capacity building of local researchers/technicians are needed to develop the research works by their own initiatives.

Data we have got during the project

1. Wellbeing analysis of PICES Member Countries (6) + Indonesia

2. Pond experiment results for Integrated Multi-Trophic Aquaculture (IMTA) in Karawang, Indonesia

3. Clicker Survey for Community Needs Assessments in Guatemala

4. Bibliography

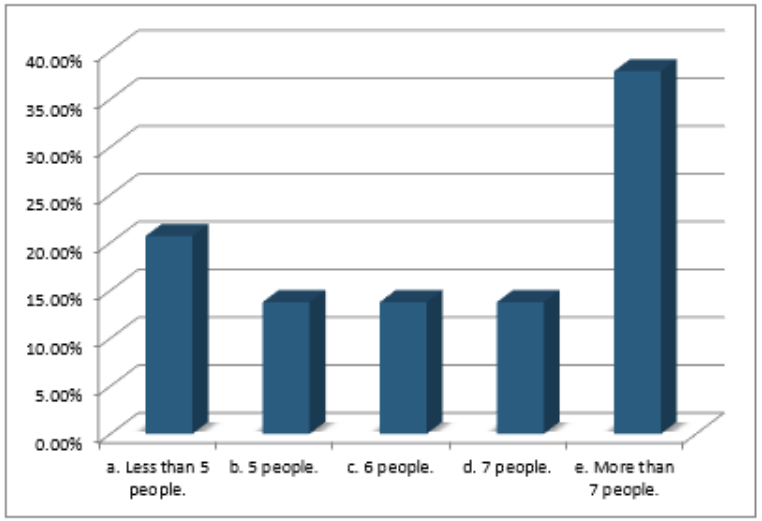
Social science & Aquaculture studies: Monterrico, Las Lisas & La Barrona

We tried to understand the detailed needs in the community by “Clicker Survey” method

4. How large is your family? How many individuals are home at dinnertime?

	Responses	
	Percent	Count
a. Less than 5 people.	20.69%	6
b. 5 people.	13.79%	4
c. 6 people.	13.79%	4
d. 7 people.	13.79%	4
e. More than 7 people.	37.93%	11
Totals	**100%**	**29**

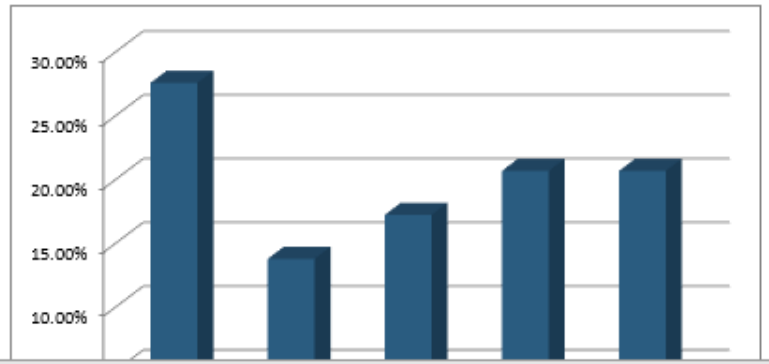
4. How large is your family? How many individuals are home at dinnertime?



5. How many children (less than 10 years old) are at home for dinner?

	Responses	
	Percent	Count
a. No children.	27.59%	8
b. 1 child.	13.79%	4
c. 2 children.	17.24%	5
d. 3 children.	20.69%	6
e. 4 children or more.	20.69%	6
Totals	**100%**	**29**

5. How many children (less than 10 years old) are at home for dinner?



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4. Bibliography

Bibliography Data - Excel

牧野 光琢

ファイル F　ホーム H　挿入 N　ページ レイアウト P　数式 M　データ A　校閲 R　表示 W　実行したい作業を入力してください Q　共有 ZS

	A	Authors	year	title	journal	keyword	Abstract
1							
2	Methodology	Dijkstr Gutte Swar Wier van c Seydel, E.I	2010	Public par	Public Un	biotechno genomics measurem public par science–society relat	Nowadays, new technologies, like genomic
3		Dijkstr Gutteling, J.M.	2012	Communic	Science Communication, 34,3, 363-391.		Communication and the way this commun
4		Fredric Grew Coffe Algoe, S.B.	2013	A function	PNAS., 11	gene regu social genomics	To identify molecular mechanisms underly
5		Geller, Dvos Thio, Dugg Lewi Baile Kahr	2014	Genomics	Genome Medicine, 6,11, 106.		Advances in genomics are contributing to
6		Juma, Yee-Cheong, L.	2005	Reinventir	Millennium Project. Lancet, 365. 1105-1107.		
7		Jagade Bin Salem, S.	2014	Transgeni	Journal of	GMO cloned ani labeling transgene	Transgenic and cloned animal production
8		Juengst, E.T.	1998	Groups as	Kennedy I	Cultural D Decision M Epidemiol Eugenics Freedom Genetic R	Some argue that human groups have a sta
9		Kelly, M Edwa Stark Fulle Jame Goer Burk	2012	Values in	CTS: Clini	ethics anc values anc multidisci research e priority - setting	The speed and effectiveness of current ap
10		Lander Hain Hirsc Strech, D.	2014	Current pr	PLoS One, 9, 12		A recent report from the British Nuffield Co
11		Lumbr Porta Hernandez-Aquado, I.	2007	Assessing	Journal of Epidemial Community Health, 61, 755-756.		Genomic discoveries need to be translated
12		Pin, R. Gutteling, J.M.	2009	The devel	Science Communication, 31, 1, 57-83.		This article describes a meta-analysis that
13		Salvate Loca Straz Borg D'An Lenzi, L.	2015	Paediatric	Pathobiol	Parent opi Focus gro Sick child Paediatric Neurological disease	Over the last years, the storing of biologica
14							
15	Background	Adams J. Be M. Steinhardt	1997	The conce	American Journal of Health Promotion. 11. 208-218		The impact of individual perceptions on he
16		Ajzen, I.	2011	The theory	Psycholog	theory of p review future directions	The seven articles in this issue, and the ac
17		Armita C. Be Char E.H. Allison.	2012	The interp	Ecoloadap	governanc sustainab tra	
18		Atleo, R.	2011	Principles	Vancouver: UBC Press.		
19		Atran, Axelrod, R.	2008	Reframing	Negotiation Journal, July 2008, 221-		
20		AquaBounty	2017	Our Salmon.			
21		Barclay Voye Mazu Payn Maul Kinc M. &	2017	The impor	Fisheries	Social eva Human di Qu	
22		Barry, S.J.	2014	Using soc	Environme	Cows Public lan Soc	
23		Bentru Day, Reser, J.P.	2012	Uses, mea	Society &	environme impact as:	

Thank you !!
Please enjoy your stay in Yokohama

Sheet1

準備完了

2 件の新しい通知

ここに入力して検索

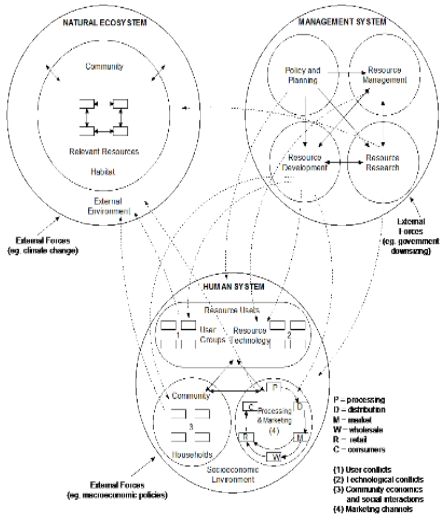
10:10
2018/10/25

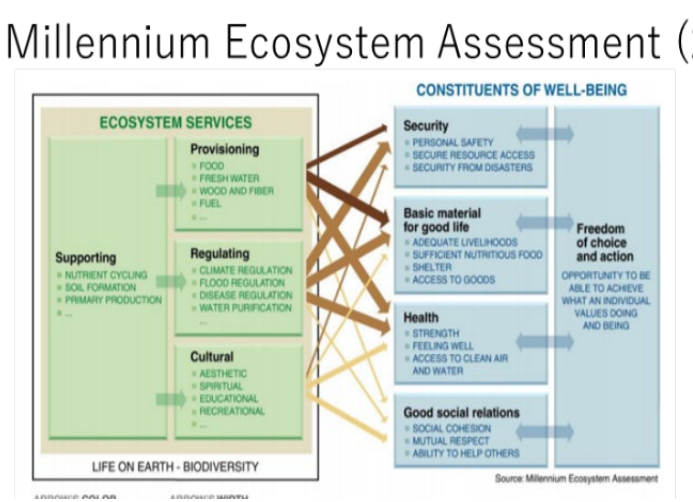
Sato-umi

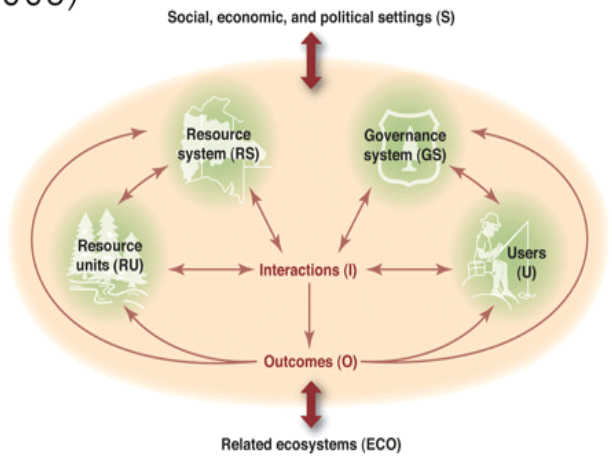
- The Japanese concept of *sato-umi* represents one version of this humans-in-nature approach, in which a healthy ecosystem is seen to nourish human well-being, but human activities are seen as necessary for sustaining ecosystem health.
- *Sato* means community or village, and *umi* means sea or coast. Therefore, *sato-umi* refers to human communities that have long-standing relationships with marine environments, and in which human interactions have resulted in high marine productivity and biodiversity

What is a social-ecological system?

- Social-ecological systems are integrated complex systems that include social (human) and ecological (biophysical) subsystems in two-way feedback relationships.
- Such concepts can provide an integrated understanding of how ecosystem changes affect human social systems, and vice versa. This integrated understanding is crucial to improve the stewardship of marine ecosystems.







Social-ecological systems and PICES

- The PICES integrative science program, FUTURE (Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Marine Ecosystems: 2010-2020), also has significant activities and strong linkages with ecosystems and people.

- Please join S6 FUTURE Plenary in the morning, Oct. 31 (Wednesday)