

DEVELOPMENT OF SUSTAINABLE INTEGRATED MULTI TROPIC AQUACULTURE (IMTA) AS A MODEL OF SATO UMI CONCEPT IN THE COASTAL AREA OF INDONESIA

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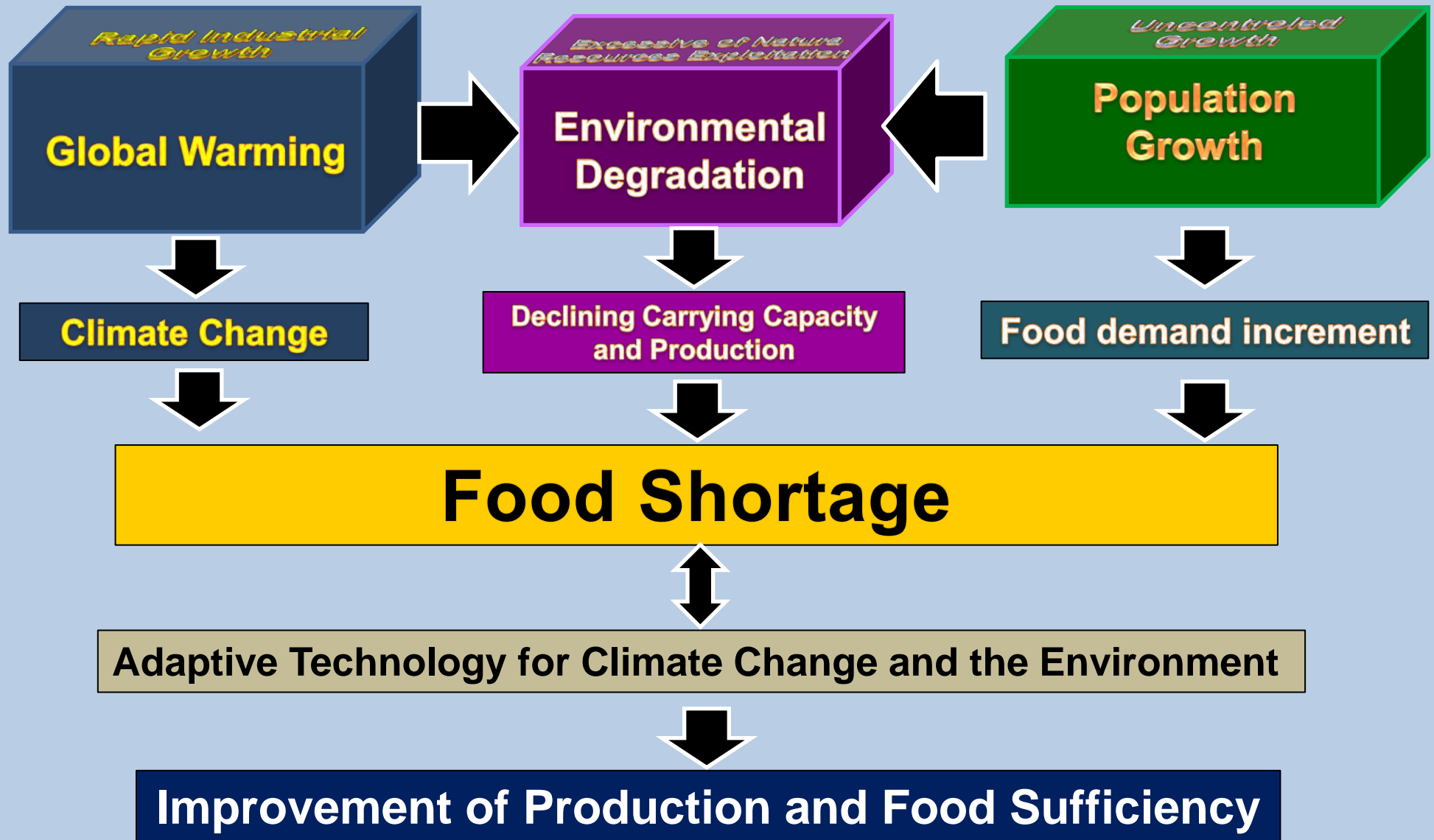
5Fisheries Research Agency, Yokohama, Japan

6Fisheries and Oceans Canada, Pacific Biological Station, Nanaimo, Canada

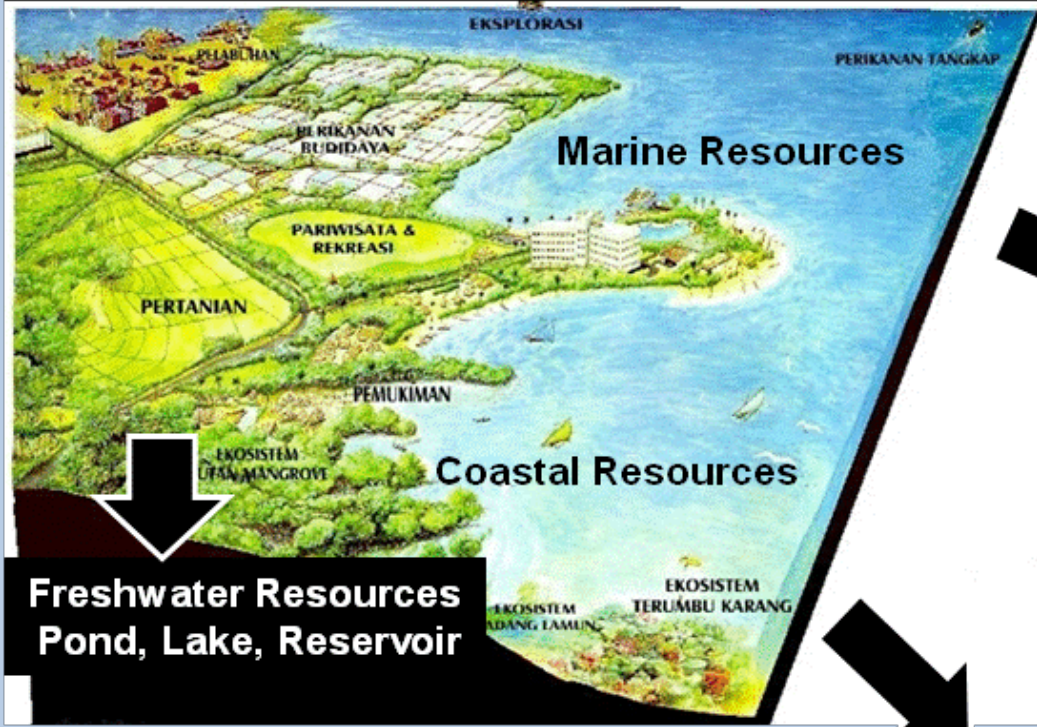
7International EMECS Center, JAPAN



GLOBAL AND NATIONAL ISSUES



Space Utilization of Fisheries, Coastal and Marine Resources



Sport and Commercial Fishing

Marine Fisheries Resources

- Pelagic Fish (Tuna, Skipjack, Etc)
- Demersal Fish : Shrimp, Sea bream, etc.
- Coral Fish : Grouper, etc

Commercial and Tourism Aquaculture

Coastal Fisheries Resources

- Breackishwater : Shrimp, Tilapia, Milk Fish, Seaweed
- Swamp area : Snakhead, Sand gobi

Breackishwater Aquaculture and Fishing

Carp, Tilapia, Gourame , Cat fish

Breackishwater Aquaculture and Swamp

Area Statistics

Value

Marine area	<u>2,915,000</u>	km ²
Shelf area	<u>1,847,700</u>	km ²
Coastline	<u>95,181</u>	km
Land area	<u>1,826,440</u>	km ²
Reef area	<u>51,020</u>	km ²
Mangrove area	<u>42,550</u>	km ²
Reefs At Risk	<u>82</u>	%

Socioeconomic Statistics

Value

Population	<u>250,000,000</u> (BKKBN, 2013)	
Coastal Population	<u>96</u>	%
GDP/Capita	<u>3,200</u> , 5,181 (IMF,2013)	US\$ /capita
Fish consumption	<u>31,64</u> (Ditjen P2HP, 2011)	Kg /capita

Source : Spalding, M.D., C. Ravilious and E.P. Green (2001) and MMF (2006)

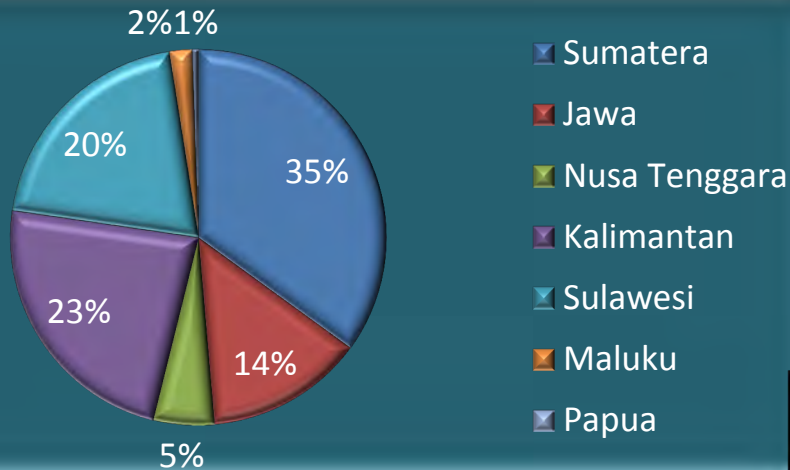
Marine Resources Statistics



- Indonesia, the world's largest archipelago : 18,000 islands, 17,000 islands with 6000 inhabited
- Covering both the Indian and Pacific Oceans, Andaman, Java, South China, Sulawesi, Banda and Arafura Seas
- Ornamental Fish : 253 species
- Coral : 400 species (57 % of the world)

BRACKISHWATER AQUACULTURE STATUS

Indonesian Brackish Water Pond Area : 1,2 Million Ha, but the utilization level only : 37,5 %



• Productivity of the brackishwater ➔ **LOW (Decrease)**

Monokulture of Shrimp

> 4 ton/ha (1980-1990) ➔ < 1 ton/ha (>1990)

High Natural Resources Exploitation

Environment Degradation

Shrimp Culture Intensification

Decreasing Carrying Capacity and Productivity

Development of technology adaptive to the environment change for improving productivity and sustainable utilization of the brackish water pond in the coastal area

- ✓ Creating new strain of fish adaptive to the environment change : Saline Tilapia
- ✓ Application Technology of the "INTEGRATED MULTI-TROPHIC AQUACULTURE (IMTA)"
- ✓ Enrichment biodiversity (product diversification)
- ✓ Mangrove reforestation
- ✓ Coastal Restoration
- ✓ Dissemination and publication

The Degradation of Mangrove Forest in Indonesia

Impact of :

Land conversion into **brackiswater pond**, housing, industrial estate, firewood, sand mining, etc.

☐ Indonesia

Year 1982 : 5.209.543 ha → Year 1992 : 2.496.185 ha (52.08% loss)

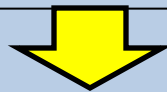
☐ Java

Year 1985 : loss 70 %



☐ Sulawesi :

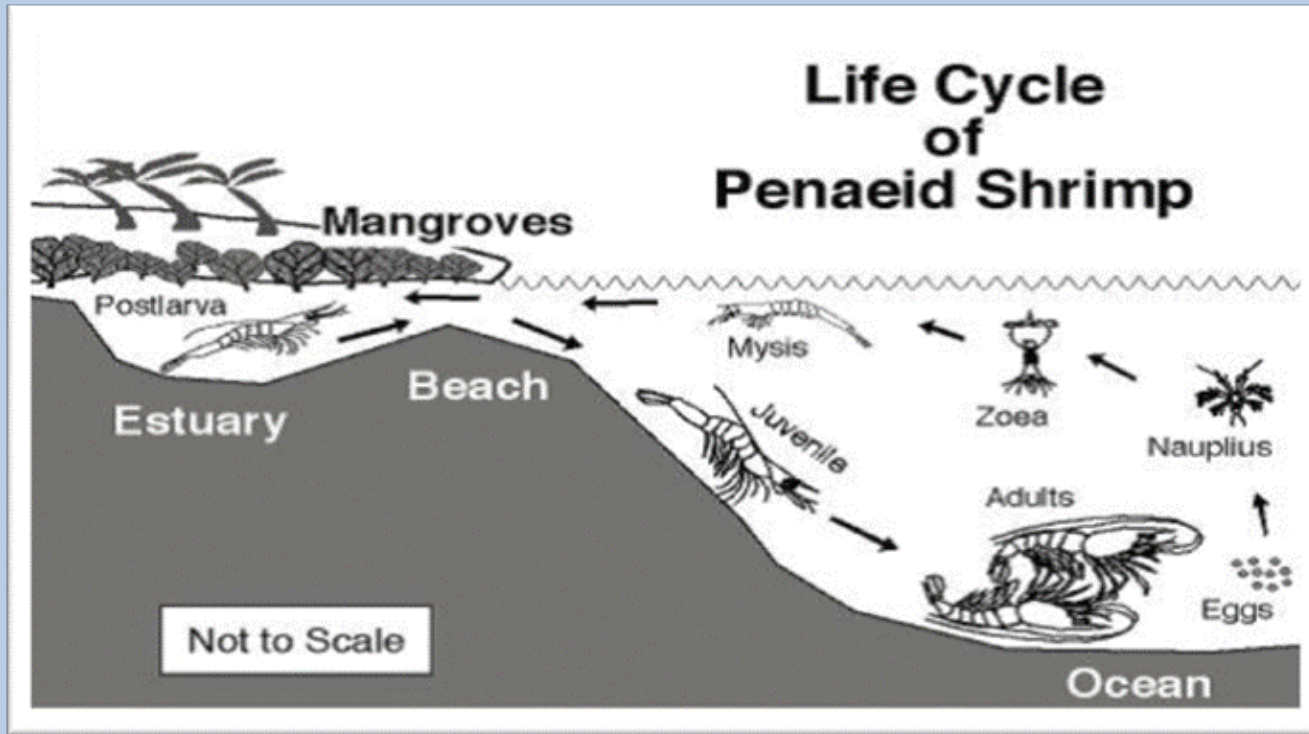
Year 1965 : 110.000 ha → Year 1985 : 30.000 ha (72.7 % loss)



Negative Impact on :
Fisheries Resources Restocking,
Diversity Degradation
Environmental Degradation
Erosion, Pollution,



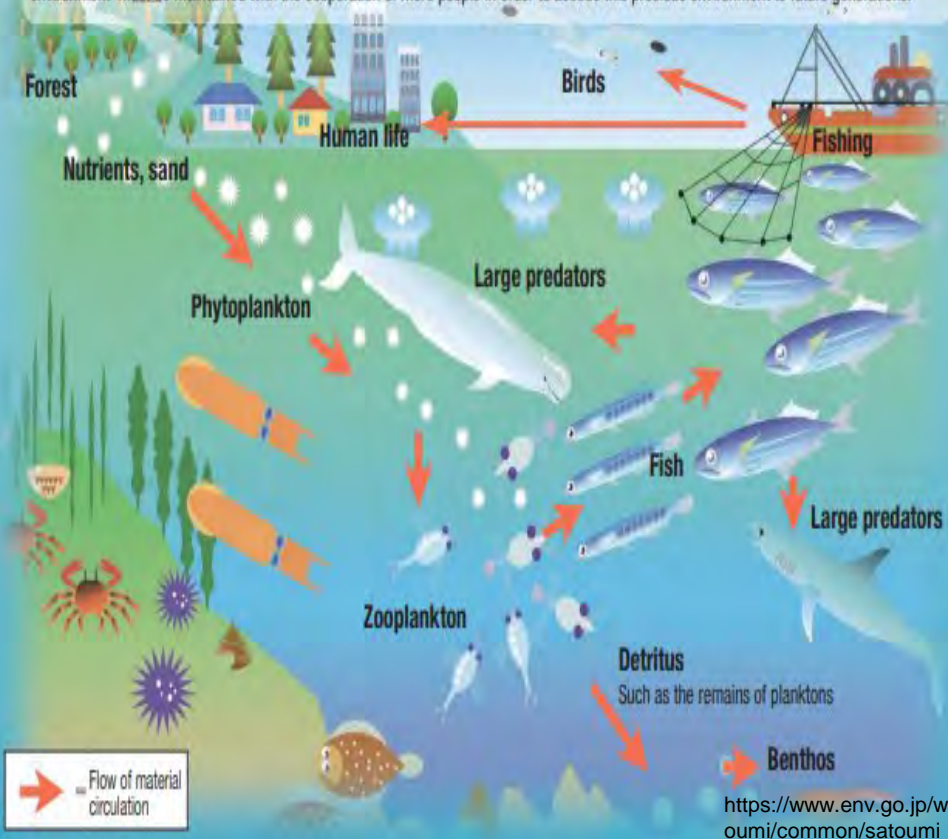
MANGROVE ROLE ON THE ENHANCEMENT OF FISHERIES RESOURCES



Definition of Sato-umi

A coastal zone where the livelihoods of human-beings and the blessings of nature harmoniously coexist with coastal area eco-systems

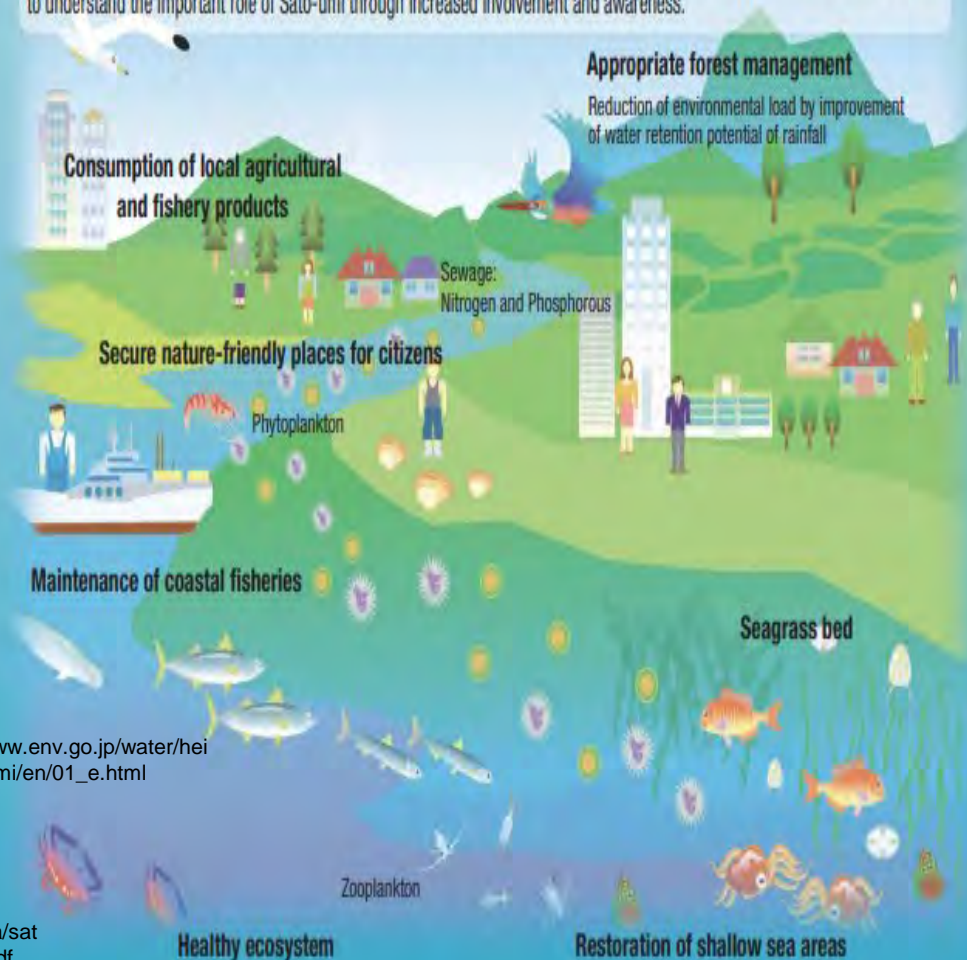
In Japanese, "SATO" means the area where people live, and "UMI" means the sea. Sato-umi is an important sea-area which has been supporting culture and cultural exchanges through such things as fisheries and the distribution of products. It is an area which includes both Nature and human-beings, as well as an area in which both high biological productivity and biodiversity are expected. Healthy Sato-umi provides numerous blessings: when the material circulation function is appropriately maintained, when integrated and comprehensive management of the land and coastal area is performed, and when the rich and diversified ecosystem and natural environment are conserved. This 'preferable coastal area environment' must be maintained with the cooperation of more people in order to accede this precious environment to future generations.



Toward the ideal coastal environment

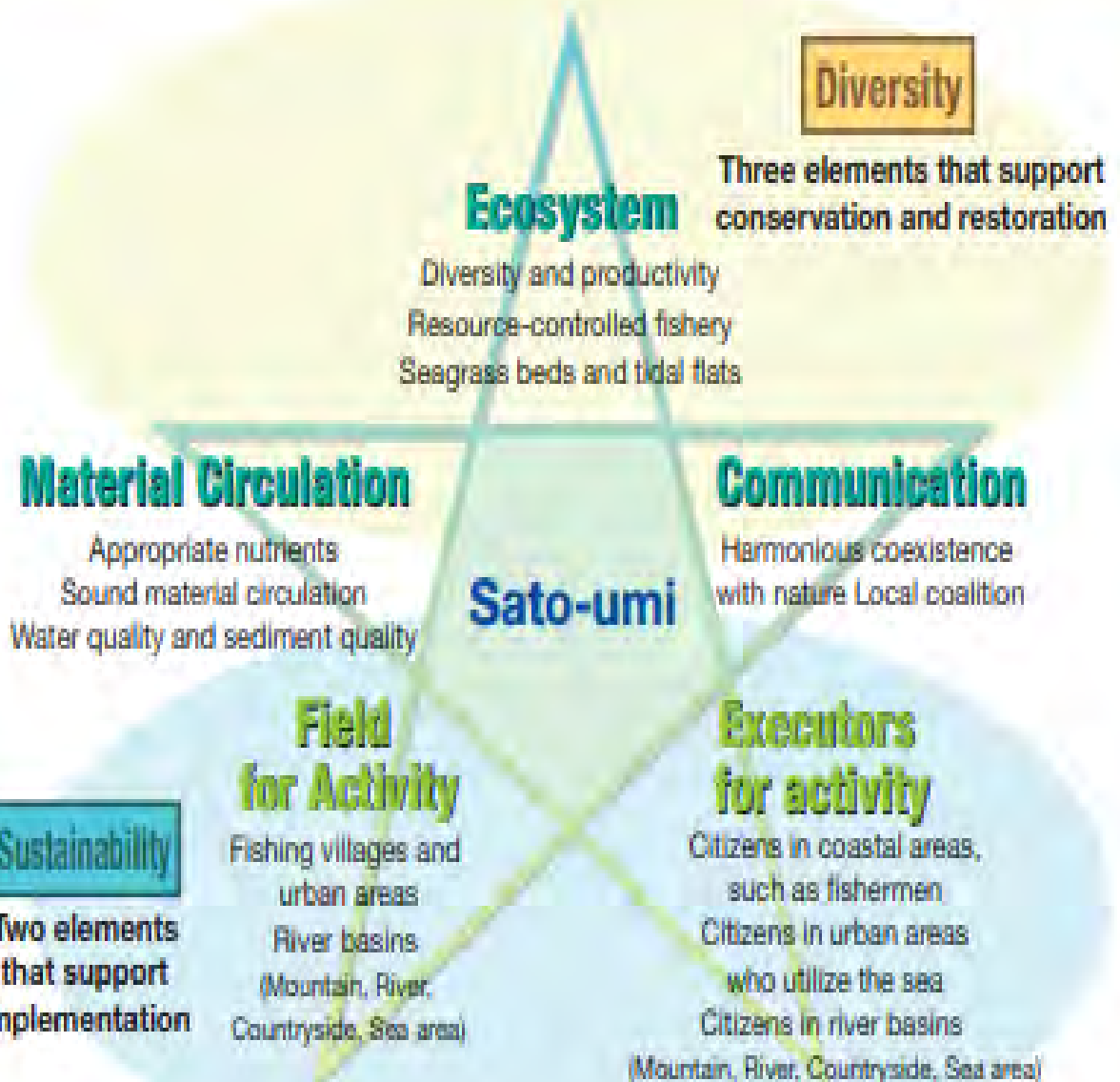
Steady, seamless and endless material circulation function is fundamental to conserve affluent and stable Sato-umi

Consumption and discharges, which accompany our activities for living, agriculture, forestry, fisheries, commerce and industry, considerably influence the water environment that is seamlessly connected from the forest to the sea. Two important measures to achieve the ideal coastal environment are: not to damage healthy natural ecosystems, and to offer opportunities for more people to understand the important role of Sato-umi through increased involvement and awareness.



The five elements that build and constitute Sato-umi

The first step for citizens, whose work is not sea-related, is to get familiar with the sea. This makes you understand the importance of the sea and realize what you have to do to conserve it. The perspectives for the creation of Sato-umi consist of five elements: ecosystems, communication, executors for activity, field for activity, material circulation.



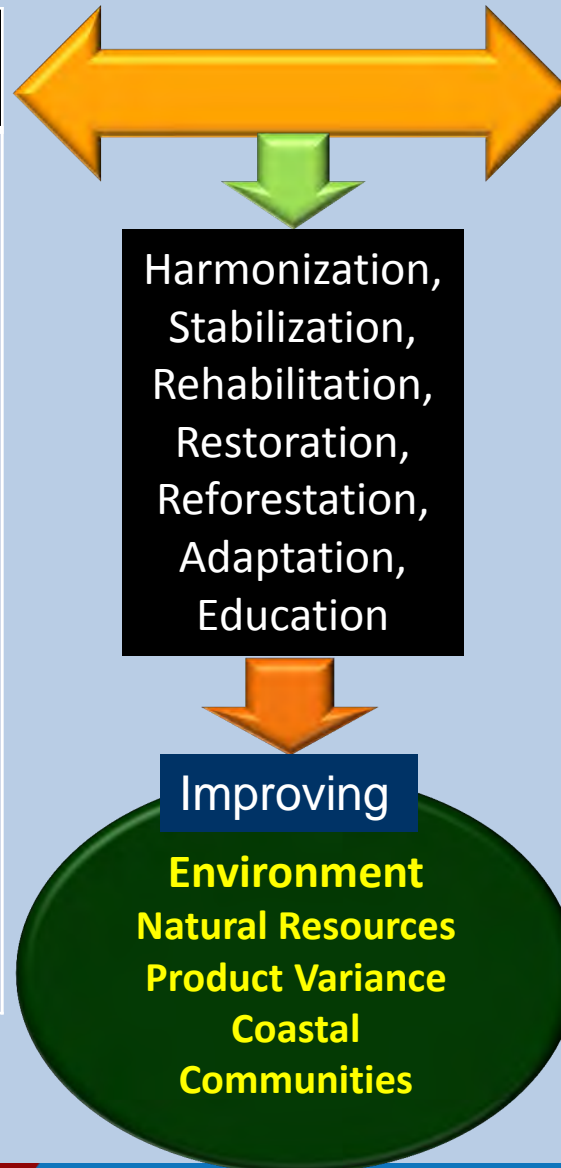
https://www.env.go.jp/water/heisa/satoumi/common/satoumi_panf_e.pdf

https://www.env.go.jp/water/heisa/satoumi/en/01_e.html

Concept of Sustainable Natural Resources Management in the Coastal Marine Areas

Sato Umi

- ❑ Harmonization Nature and Human with mutualism symbiosis spirit
- ❑ Stabilization of the environment and the availability of the natural resources
- ❑ Encouraging high productivities and biodiversities ecosystem
- ❑ Sustainable utilization of the natural resources in the coastal area.
- ❑ Stabilization and sustainability of the human welfare



Gempita-SPL/SFiCom-Gapura

Sustainable Utilization of Fisheries, Coastal and Marine Resources for the Society- Movement Action Program for Northern Coastal Area of West Java

- ❑ Coastal environment and natural resources degraded due to the rapid deforestation of mangrove and high exploitation of the land utilization by intensified shrimp culture.
- ❑ Low productivity and biodiversity
- ❑ Decreasing of the land carrying capacities and multi variance of fish diseases
- ❑ Human poorness and limited field work

INDONESIAN LOCAL WISDOM

Local Wisdom :The dynamic source of knowledge organized, developed and forwarded by a certain population that is integrated with their understanding of the natural and cultural surroundings.

Indonesian Local Wisdom : 1. Panglima Laot (Nangroe Aceh Darussalam), 2. Rumpon (Lampung), 3. Kelong (Riau), 4. Awig-awig (Bali dan Lombok), 5. Rompong (Suth Sulawesi), 6. Sasi (Maluku and Papua) and some HUL (sea of customary rights) at East Indonesia.



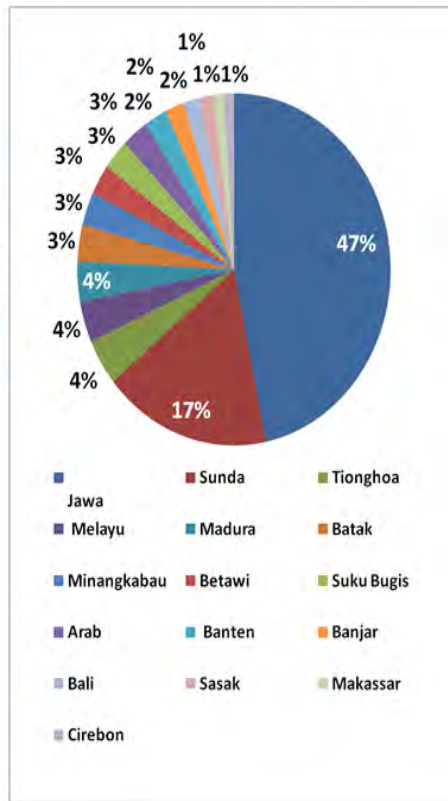
National Regulation :
Law no. 32 of 2009 : Environmental Protection and Management

DISTRIBUTION OF INDONESIAN ETHNICS



Indonesian Ethnics : 1128
(183,875 million, 300 groups)

(Source : BPS 2010)



SATO UMI DISSEMINATION STRATEGY

Problem Identification and Inventarization



Sustainable Utilization Concept
Implementation and Socialization



Research Agenda
International, National, Regional, Local



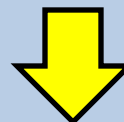
Workshop/Seminar
/Symposium



Innovation Technology
Development and
Application



Dissemination



Workshop Training

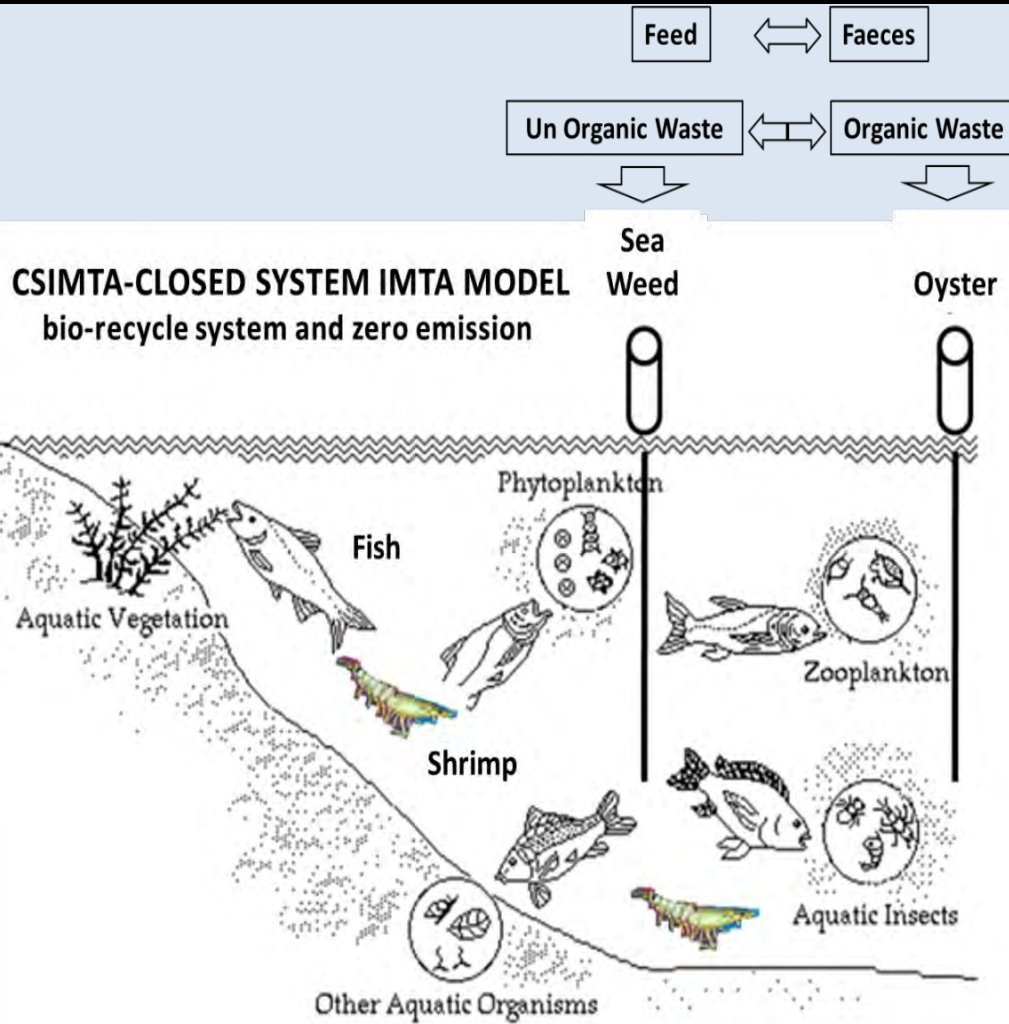


Education
University

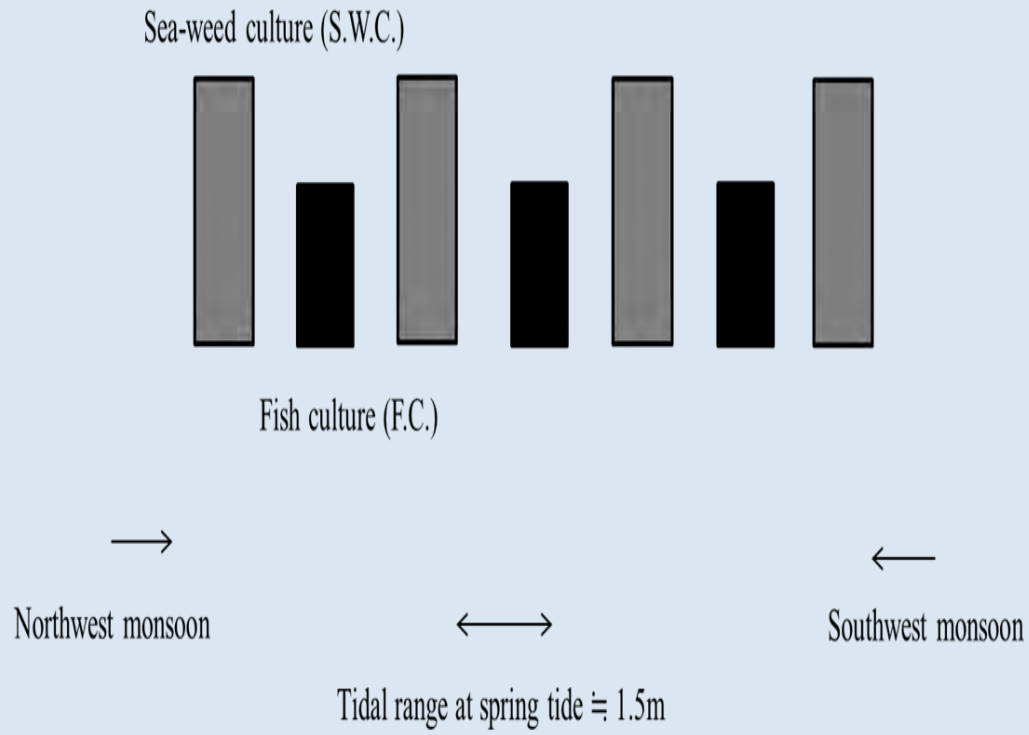


Demonstration Plot
Development

Development of Sato Umi Sustainable Aquaculture Model



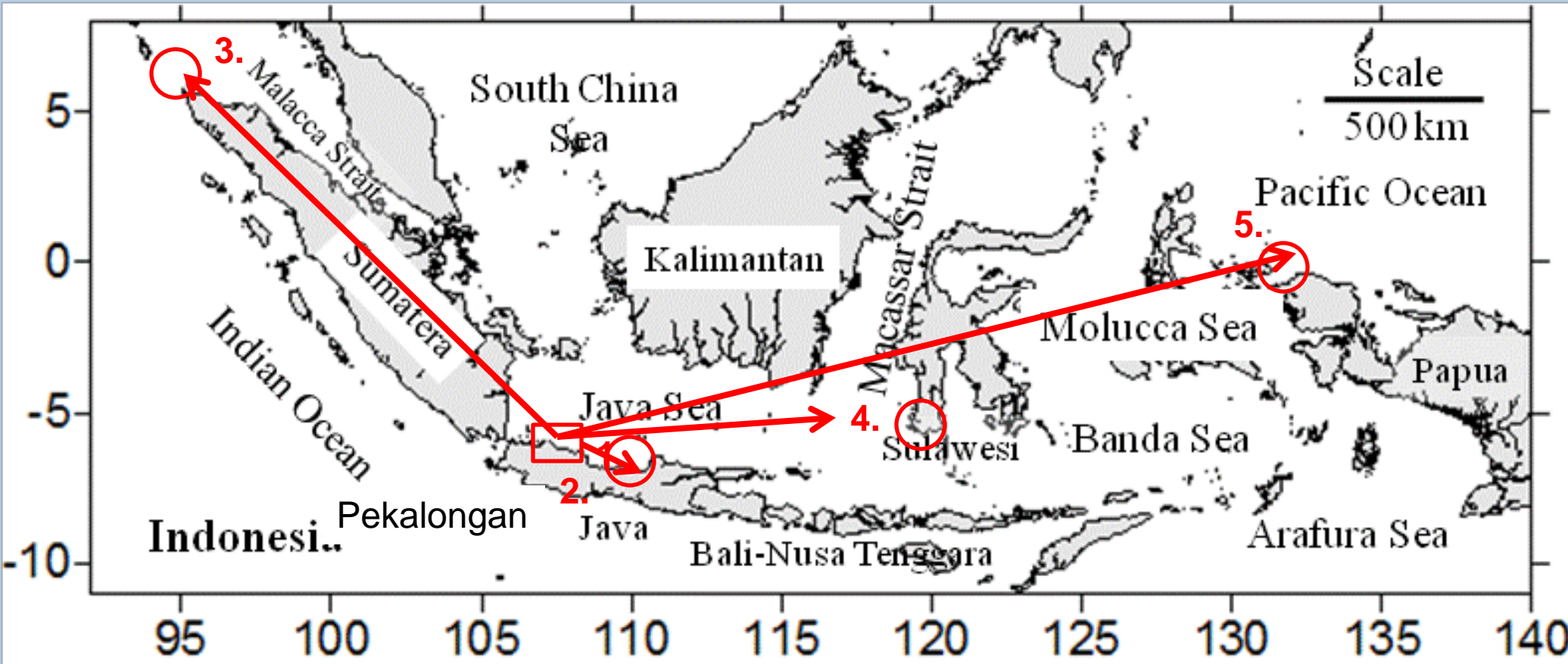
OSIMTA-OPEN SYSTEM IMTA MODEL bio-recycle system and zero emission



Brackishwater Aquaculture

Onshore Marine Aquaculture

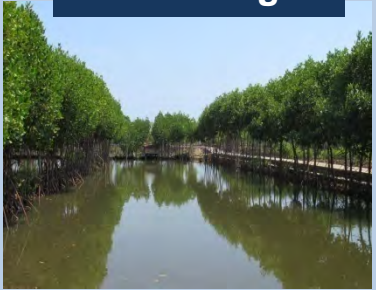
Expansion Dissemination Program



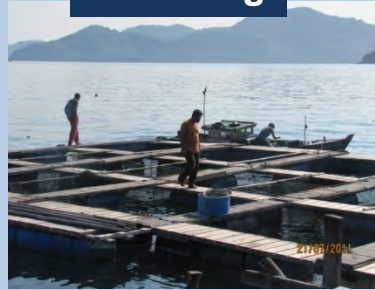
1. Karawang



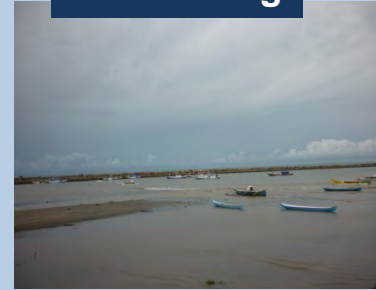
2. Pekalongan



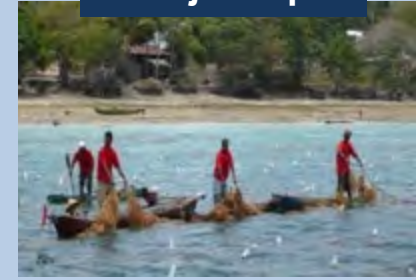
3. Sabang



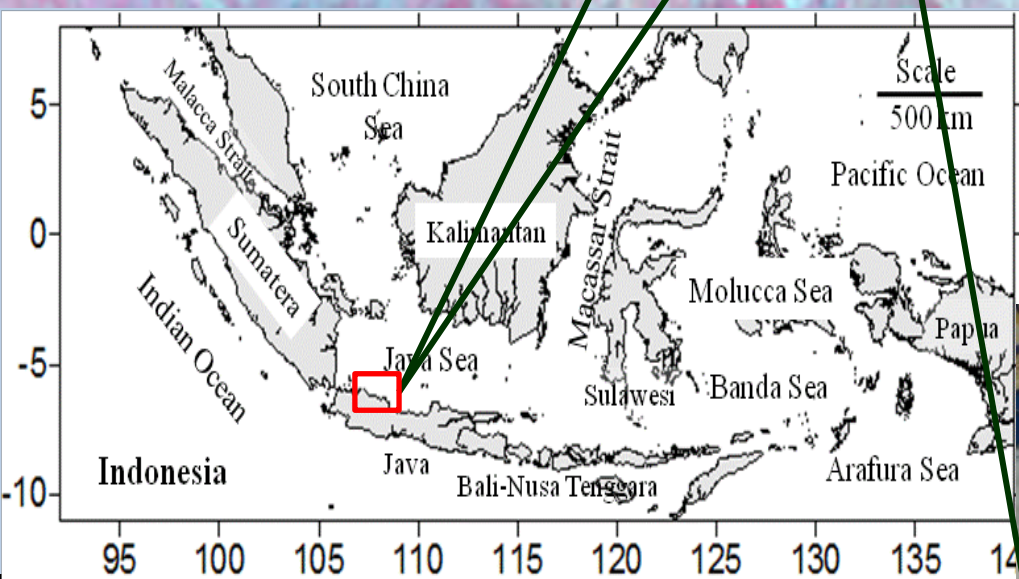
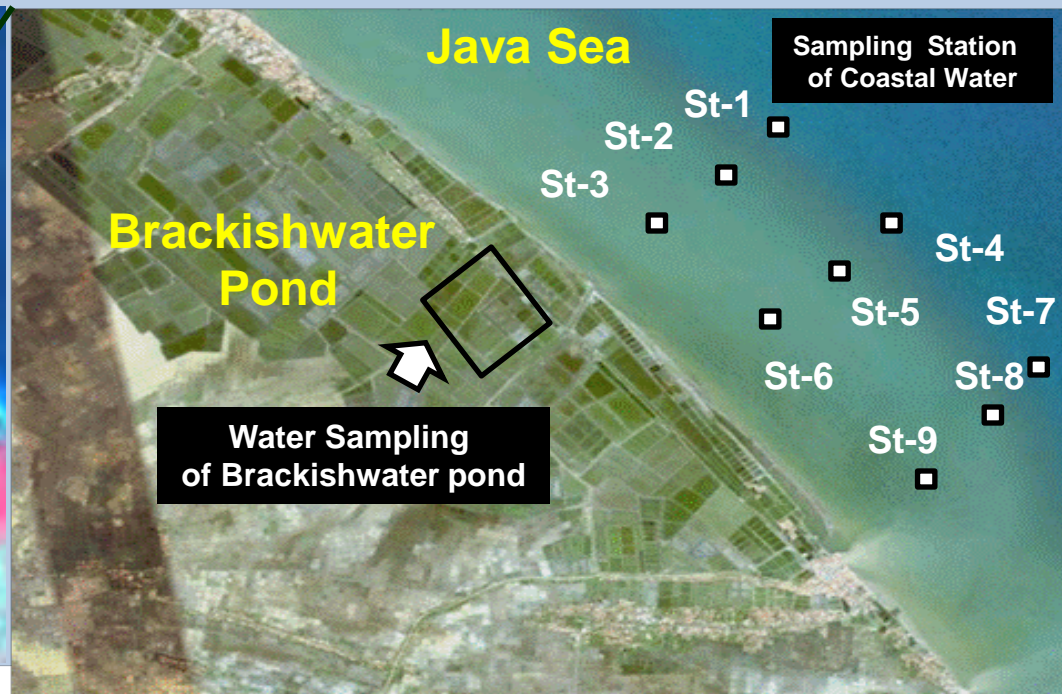
4. Bantaeng



5. Raja Ampat

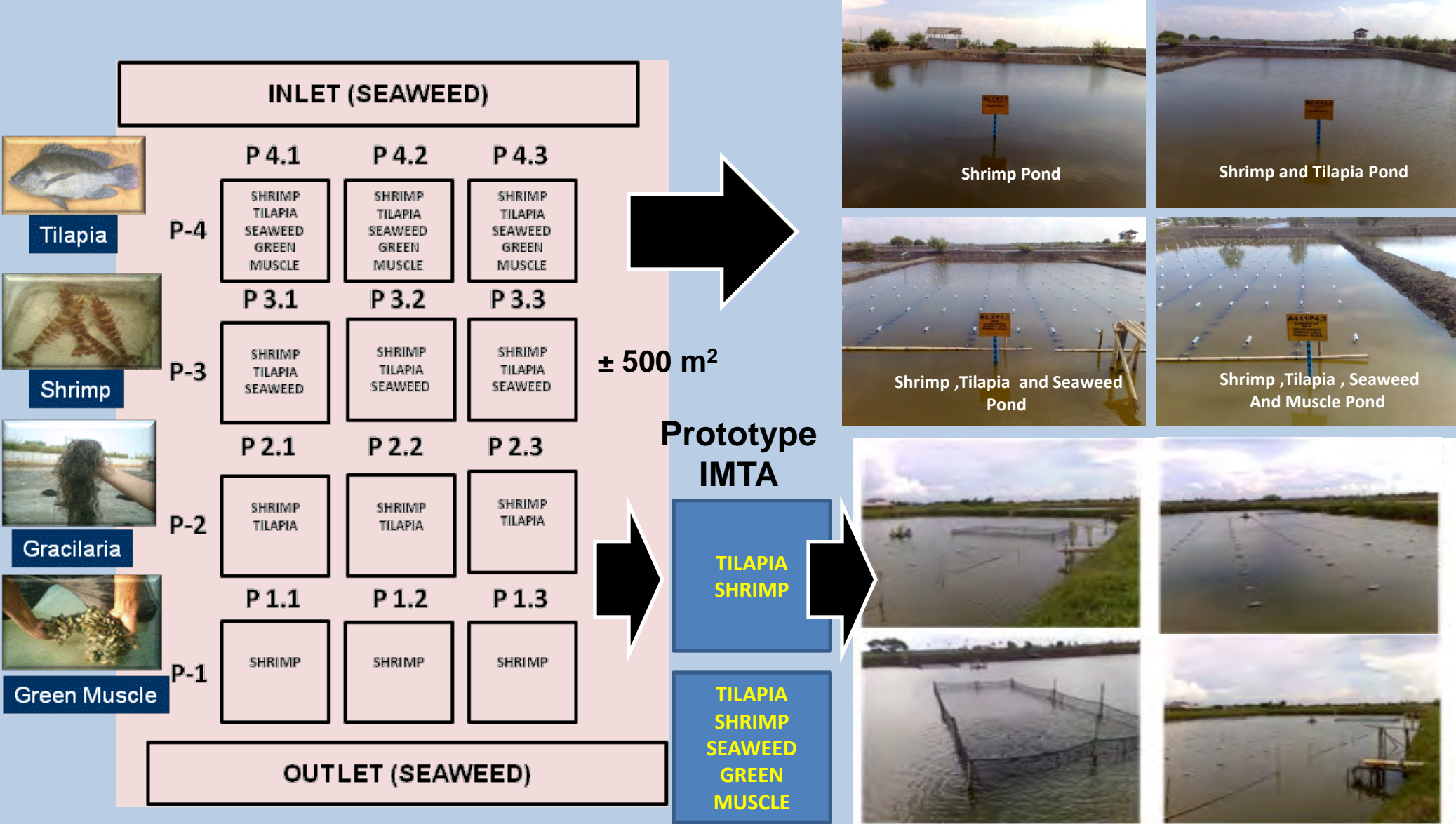


SITE LOCATION- CLOSED SYSTEM IMTA



EXPERIMENTAL DESIGN

INTEGRATED MULTI-TROPIC AQUACULTURE (IMTA) : Bio-recycling-System



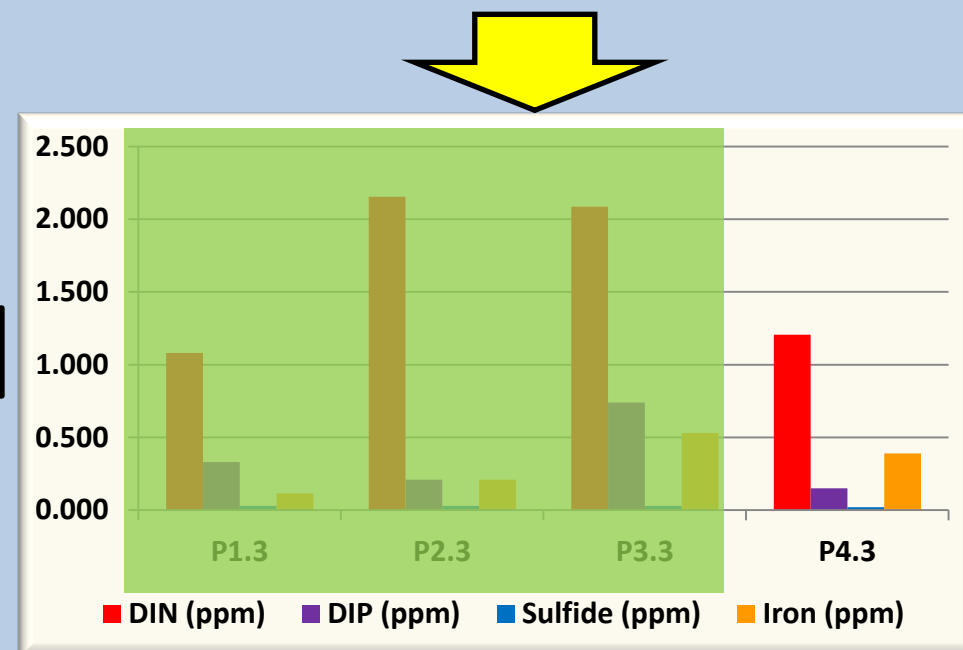
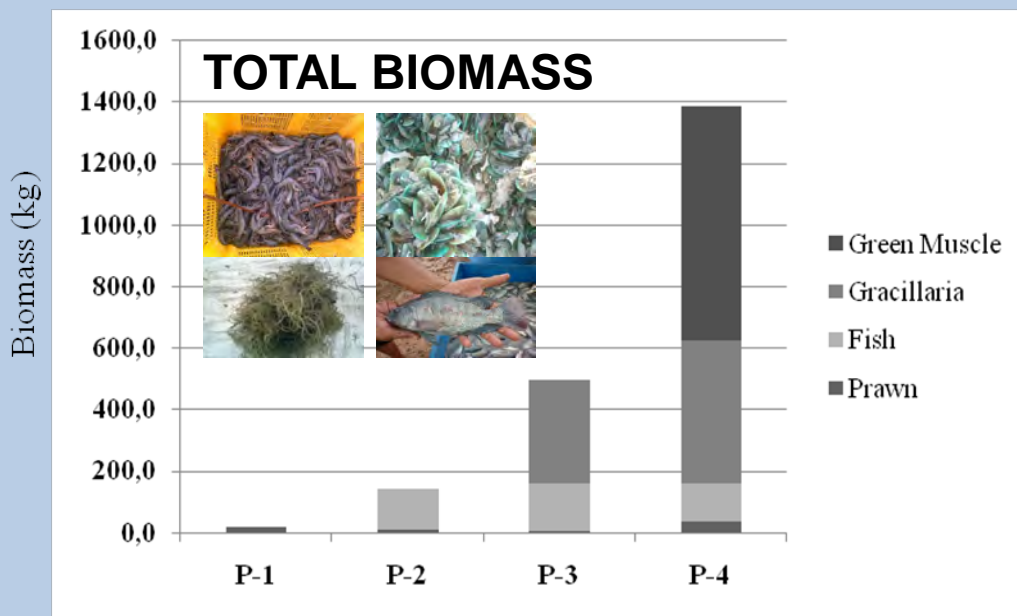
WATER QUALITY PROFILE AND TOTAL BIOMASS OF THE TREATED BREACKISHWATER POND

Physical

Chemical

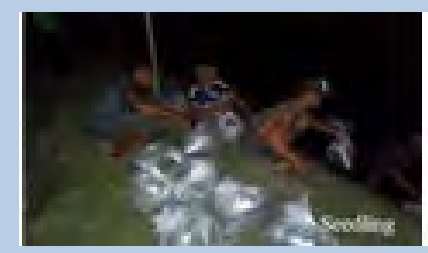
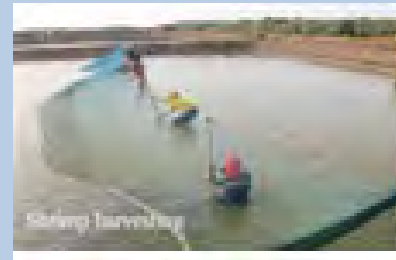
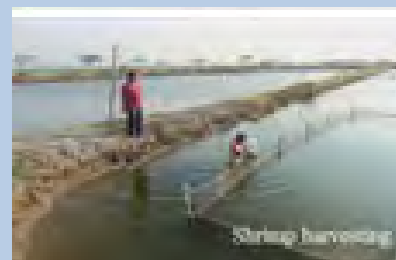
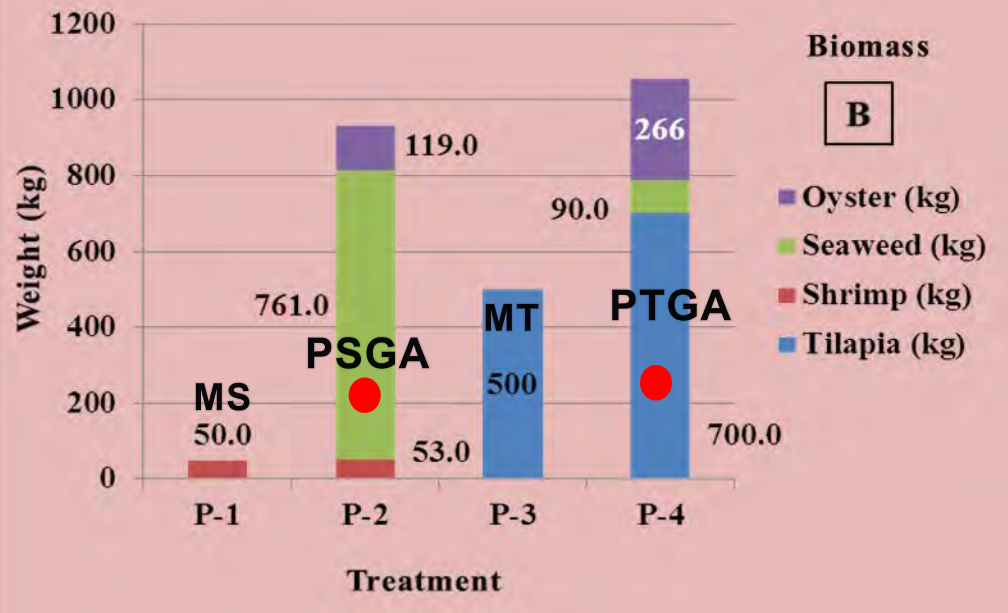
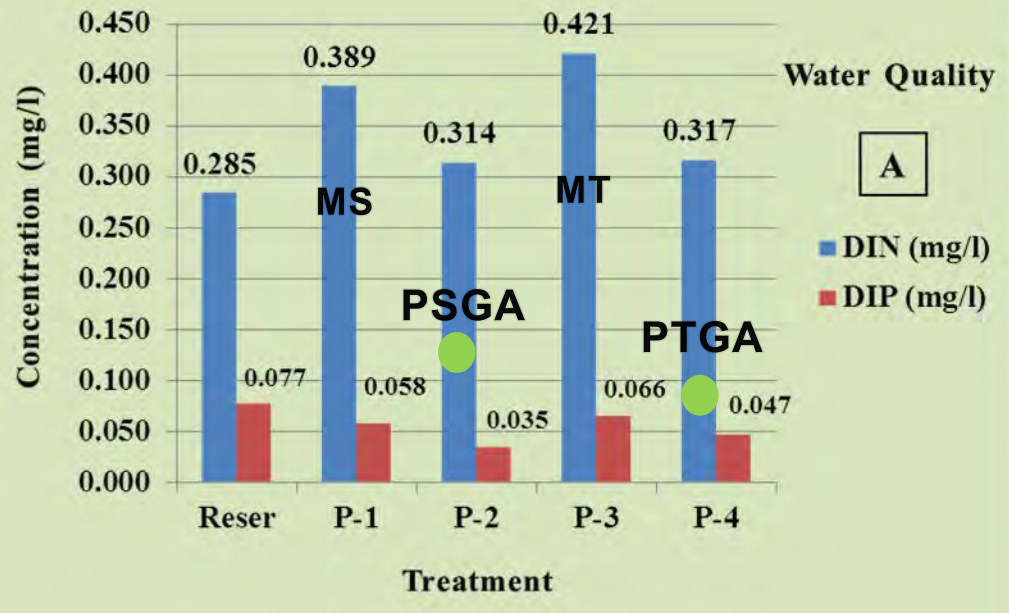
Treatment	Temp (o C)	Salinity (ppt)	pH	DO (ppm)	Turbidity (NTU)	TSS (mg/l)	BOD ₅ (mg/l)
P-1	30.81	24.94	7.92	6.02	121.83	36.5	1.66
P-2	30.77	23.11	7.87	6.16	127.46	22.33	0.71
P-3	30.92	22.48	7.90	6.43	157.08	22.83	0.24
P-4	30.94	22.91	7.91	6.47	177.67	18	1.18

Treatment	DIN (ppm)	DIP (ppm)	Sulfide (ppm)	Iron (ppm)
P1.3	1.081	0.33	0.03	0.12
P2.3	2.154	0.21	0.03	0.21
P3.3	2.086	0.74	0.03	0.53
P4.3	1.207	0.15	0.02	0.39



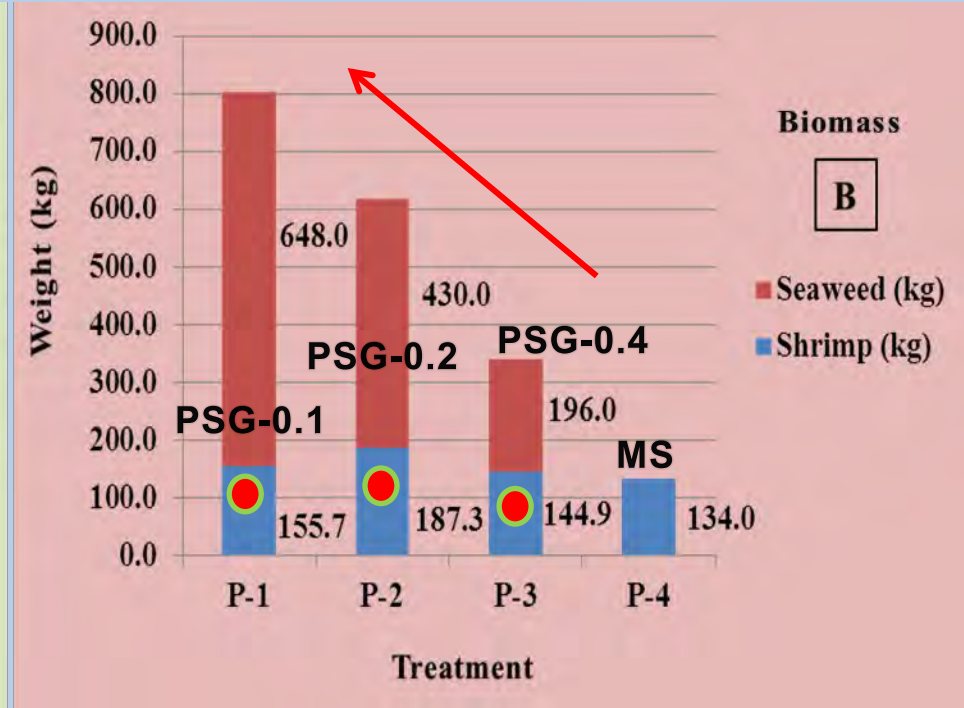
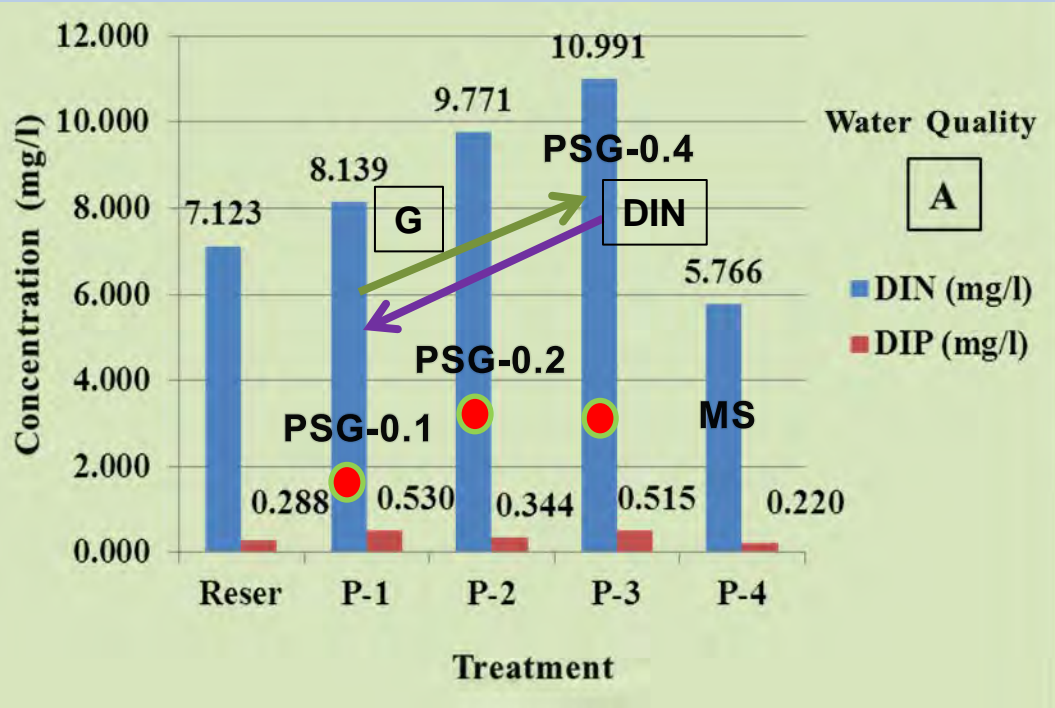
Demonstration Plot of BPPT-PICES-I

The **FIRST** experiment result by using a large pond of 4000 m² with 4 (four) ponds treatment of Shrimp (P-1) and Tilapia (P-3) ponds only as a monoculture system, and Shrimp + Gracilaria (seaweed) + Anandara, sp (oysters) of P-2, and Tilapia + Gracilaria (seaweed) + Anandara, sp (oysters) of P-4 as the IMTA model with water resources from the similar reservoir pond as a control has provided a good result in a good water quality stability i.e. DIN and DIP of the IMTA (P-2 and P-4) are lower than monoculture (P-1 and P-3)

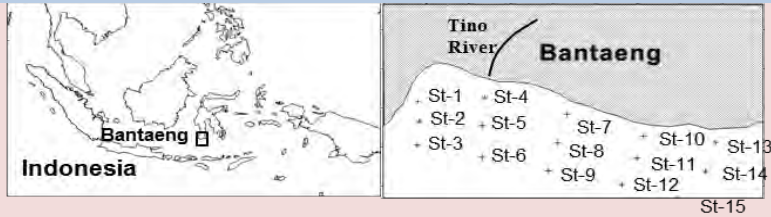


Demonstration Plot of BPPT-PICES-III

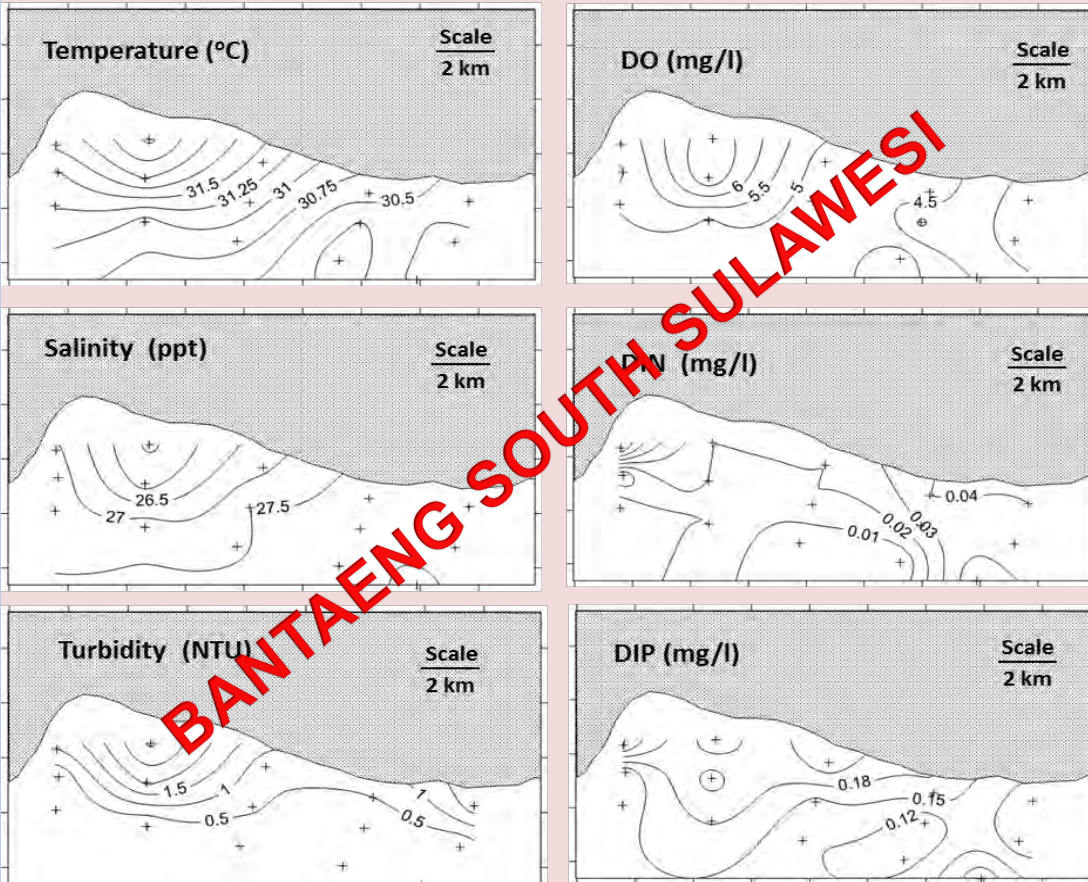
The **SECOND** experiment with slight differ on the treatment in which P-1, P-2 and P-3 are the IMTA with shrimp and various density of seaweed with 0.1 kg, 0.2 kg and 0.4 kg per m², respectively and monoculture of Shrimp (P-1) shows that DIN of the IMTA pond tends to decrease when seaweed production increase. The DIP was increases as well as shrimp production



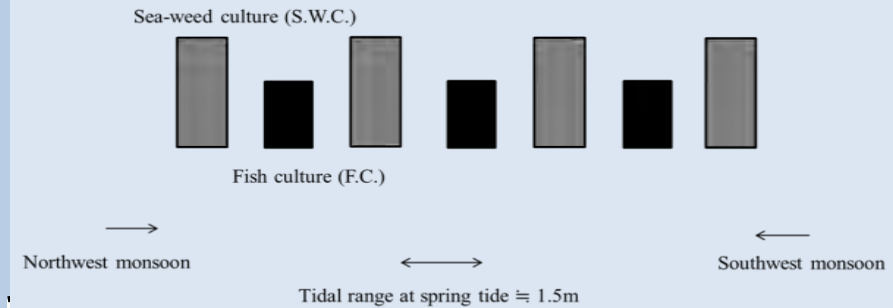
Site Location of Open System Model IMTA



Water Quality and Marine Aquaculture of OSIMTA Model

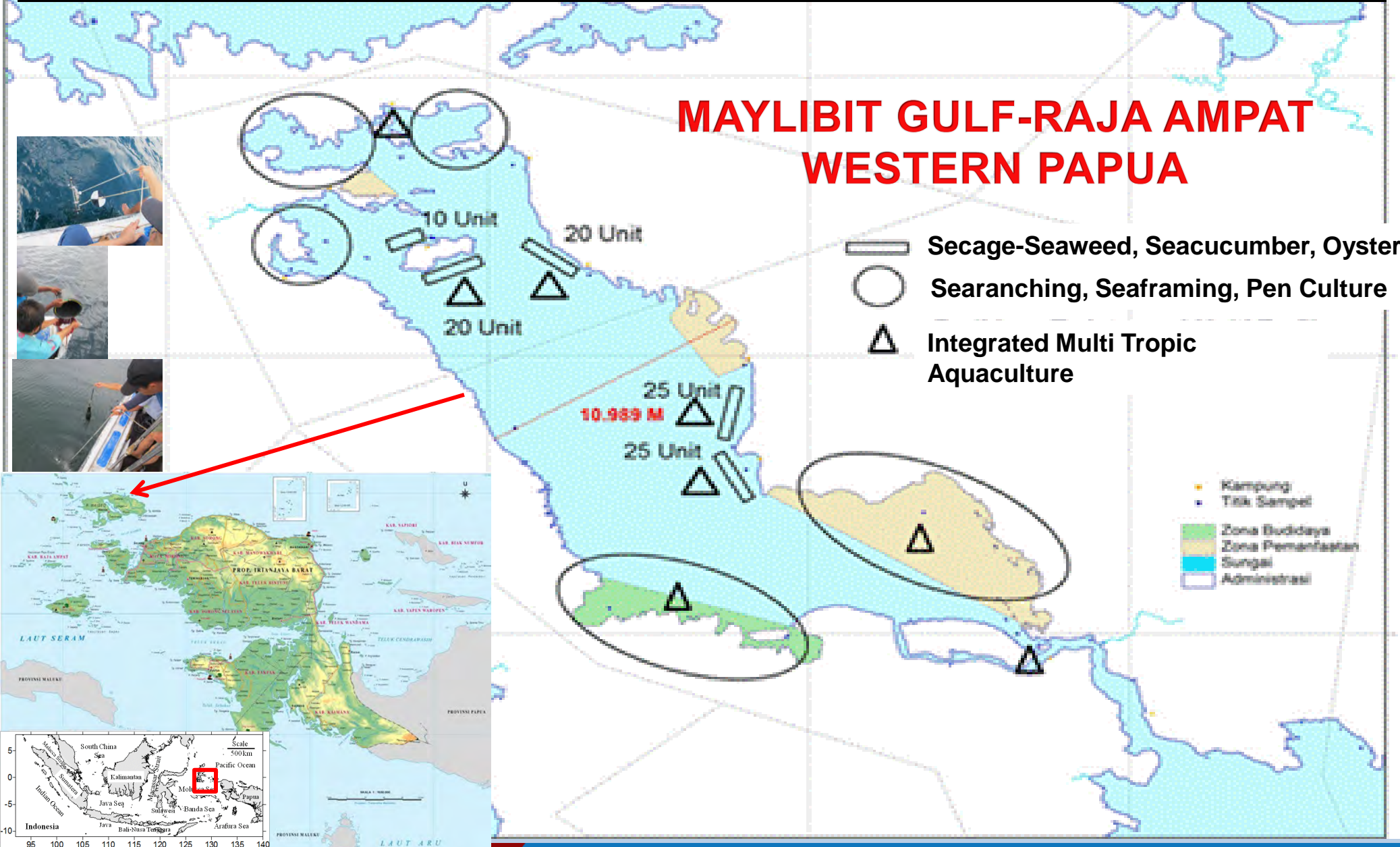


OSIMTA-OPEN SYSTEM IMTA MODEL bio-recycle system and zero emission



Site Location of Open System Model IMTA

MAYLIBIT GULF-RAJA AMPAT WESTERN PAPUA



Sylvo Fishery and IMTA Karawang



Sylvo Fishery and IMTA-Pekalongan



Fisheries at Bantaeng, South Sulawesi



MAYLIBIT GULF-RAJA AMPAT WESTERN PAPUA



Workshop



DISSEMINATION ACTIVITY TRAINING



Workshop at Bantaeng, South Sulawesi



Workshop and Field Trip at Seribu Island Jakarta



PRESS INFORMATION OF SATO UMI IMPLEMENTATION

← → ↻ 🔒 <https://www.google.co.id/search?safe=strict&source=hp&ei=RkTPW7HxNofGvgTXiLbwCA&q=Konsep+>

Google Konsep Sato Umi 🔍

Semua Gambar Video Berita Maps Lainnya Setelan Alat

Sekitar 5.880 hasil (0,46 detik)

BADAN PENGAJIAN DAN PENERAPAN TEKNOLOGI - Sato Umi ...

<https://www.bppt.go.id/.../1820-sato-umi-untuk-keseimbangan-alam-dan-lingkungan> Norton

25 Okt 2013 - Indonesia akan menerapkan konsep Sato Umi dari Jepang untuk mengelola sumber daya perikanan, pesisir, dan kelautan berkelanjutan.

BPPT Terapkan Konsep Sato Umi Dukung Program Pengembangan...

<https://www.bppt.go.id> > DAFTAR BERITA LAYANAN INFORMASI PUBLIK Norton

5 Okt 2017 - National Seminar on Science Technology for Sabang Marine Tourism Development and The 4th Internasional Workshop on Sato Umi resmi ...

Konsep Sato Umi Budidaya Perikanan Ramah Lingkungan | Suara ...

sp.beritasatu.com/home/konsep-sato-umi-budidaya-perikanan-ramah.../32167 Norton

Konsep Sato Umi Budidaya Perikanan Ramah Lingkungan Rabu, 13 Maret 2013 | 16:59. Ilustrasi budidaya perikanan [google]. Berita Terkait.

Gambar untuk Konsep Sato Umi



Sato Umi BPPT - Поиск в Google

← 🔒 <https://www.google.ru/search?q=Sato+Umi+BPPT&newwindow=1&client=firefox-b&dcr=0&ei=XxTJWY7sJaKe6AShwZi4Dg&start=10&sa>

Most Visited Getting Started

Google Sato Umi BPPT 🔍

Bce Картинки Новости Карты Видео Ещё Настройки Инструменты

Результатов: примерно 1 370 000, страница 2 (0,49 сек.)

Berita | Dppk Kota Pekalongan Gelar Workshop Sato Umi | Web Site ...

<https://www.pekalongankota.go.id/.../dppk-kota-pekalongan...> Перевести эту страницу
Dalam laporannya Kepala Pusat pendidikan dan latihan (Pusdiklat) BPPT Prof Suhendar I Sachoemar menjelaskan Sato Umi merupakan konsep pengelolaan ...

Kunjungan Lapangan Para Partisipan The 3rd International Workshop ...

www.pksdmo.lipi.go.id/.../Kunjungan-Lapangan-Para-Partisi... Перевести эту страницу
Partisipan workshop adalah para ahli SATO UMI dan para ahli dari berbagai ... Gd. II BPPT Lantai 3 yang kemudian dilanjutkan dengan field trip (kunjungan ...

BPPT Kembangkan Konsep Perikanan Baru - Warta Ekonomi

m.wartaekonomi.co.id/.../bppt-kembangkan-konsep-perikan... - Перевести эту страницу
13 мар. 2013 г. - Sementara Direktur Pusat Teknologi Produksi Pertanian-BPPT, Nenie Yustiningsih dalam kesempatan tersebut menyampaikan, SATO-UMI ...

Konsep Sato Umi Budidaya Perikanan Ramah... - Masyarakat ...

https://id-id.facebook.com/permalink.php?story_fbid...id... Перевести эту страницу
Konsep Sato Umi Budidaya Perikanan Ramah Lingkungan [JAKARTA] Badan Pengkajian dan Penerapan Teknologi (BPPT) menawarkan konsep terbaru ...

DPPK Kota Pekalongan Gelar Workshop Sato Umi - Koran Online ...

www.pekalongan-news.com > Pemkot Перевести эту страницу
27 нояб. 2014 г. - Dalam laporannya Kepala Pusat pendidikan dan latihan (Pusdiklat) BPPT Prof

SUMMARY

- ❑ To improve and optimize the utilization of marine culture and brackish water pond area that is caused by environmental damage due to the excessive exploitation by intensive aquaculture activities, mangrove degradation and lack of technology as well as to anticipate the climate change and global warming, it is time for Indonesia to apply SATO-UMI Concept.
- ❑ The Integrated Multi Tropic Aquaculture (IMTA) Model on the bases of bio-recycle system and Sato Umi concept to reduce and minimize the inorganic and organic waste from the remaining feed, faeces and the other sources should be applied and developed to maintain sustainable aquaculture in the coastal area :
 - Close System Integrated Multi Tropic Aquaculture (CSIMTA) Model for brackish water pond
 - Open System Integrated Multi Tropic Aquaculture (OSIMTA) Model for Marine Culture Area.
- ❑ To disseminate and expansion of the application of SATO-UMI concept for sustainable development of aquaculture within the coastal area of Indonesia, the international workshop and training on SATO-UMI for sustainable aquaculture has been conducted in 2013 (Jakarta), 2014 (Karawang-West Java) and Pekalongan (Central Java), 2015 and 2016 in Jakarta and Bantaeng (South Sulawesi) and Jakarta in 2017.

Thank You



ACKNOWLEDGMENT

- ❑ PICES (North Pacific Marine Science Organization)
- ❑ International EMECS Center, Japan
- ❑ Ministry of Research Technology and High Education, Indonesia
- ❑ Agency for the Assessment and Application of Technology (BPPT), Indonesia
- ❑ National Center for Brackishwater Aquaculture, Karawang, Indonesia