DISSEMINATION OF SATO UMI FOR SUSTAINABLE AQUACULTURE DEVELOPMENT IN INDONESIA

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Marine Resources Statistics

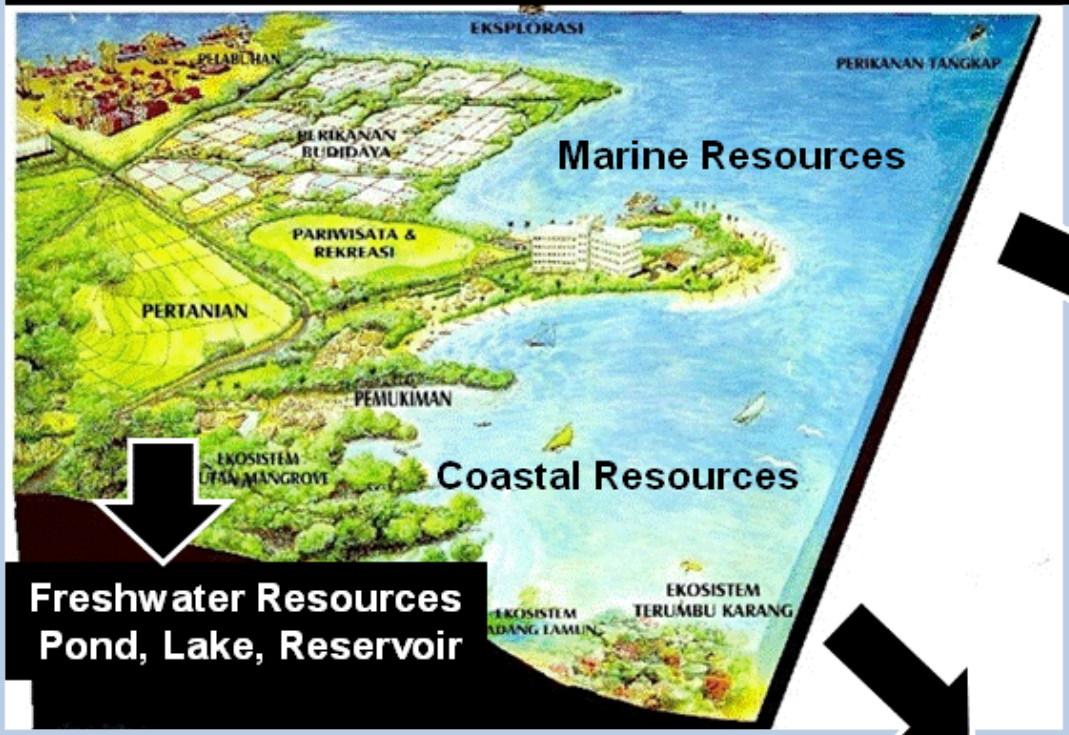
Area Statistics	Value	
Marine area	2,915,000	km²
Shelf area	1,847,700	km²
Coastline	95,181	km
Land area	1,826,440	km²
Reef area	51,020	km²
Mangrove area	42,550	km²
Reefs At Risk	82	%

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

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

- 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)

Space Utilization of Fisheries, Coastal and Marine Resources



Freshwater Resources
Pond, Lake, Reservoir

Sport and Commercial Fishing

Marine Fisheries Resources
- Pelagic Fish (Tuna, Skipjact, Etc)
- Demersal Fish : Shrimp, Sea bream, etc.
- Coral Fish : Grouper, etc

Commecial and Tourism Aquaculture

Breackishwater Aquaculture and Fishing

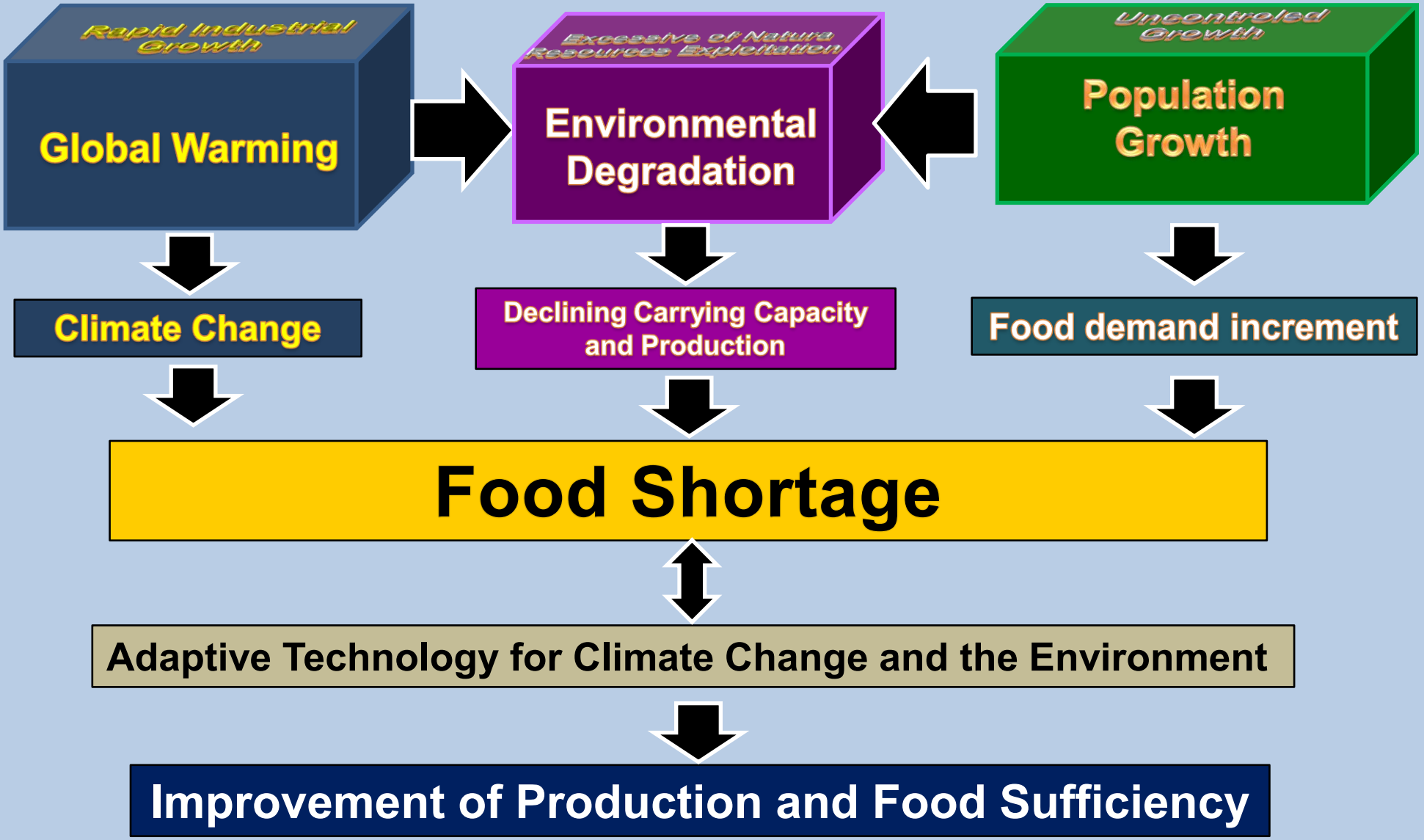
Carp, Tilapia, Gourame , Cat fish

Coastal Fisheries Resources

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

Breackishwater Aquaculture and Swamp

GLOBAL AND NATIONAL ISSUES



The Environment Impact

Source

Industrial Pollution

Intesive Fish Culture

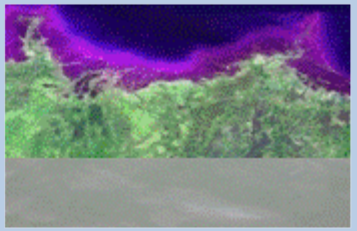
Harbour

Mining and Coastal Erotion

Effect

Red Tide

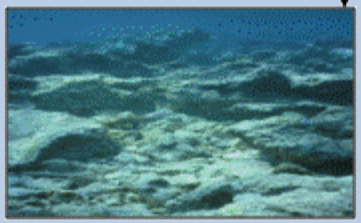
Oil spill



Turbidity and Sedimentation

Impact

Fish Mass Mortality



Coral Reef Destruction

Mangrove Degradation

Coastal Healthty Damage

Status Marine Fisheries Resources

No.	Fisheries Resources Catagories	REGION OF MARINE FISHERIES RESOURCES MANAGEMENT								
		Malacca Strait	South China Sea	Java Sea	Flores Sea	Banda Sea	Seram Sea	Pacific Ocean	Arafura Sea	Indian Ocean
1.	Large Pelagic									
	Potency	27,7	66,1	55,0	193,6	104	106,5	175,3	50,9	366,2
	TAC	22,1	52,9	44,0	154,9	83,3	85,2	140,2	40,7	293,0
	Production	36,2	35,2	137,8	85,1	29,1	37,5	152,4	34,6	188,3
	Utilization	OE	UE	OE	UE	UE	UE	OE	UE	UE
2.	Small Pelagic									
	Potency	147,3	621,5	55,0	605,4	132,0	397,4	364,8	468,7	526,6
	TAC	117,8	497,2	44,0	484,4	105,6	303,6	307,6	374,9	421,3
	Production	132,7	205,5	137,8	333,4	146,5	119,4	62,5	12,3	26,6
	Utilization	OE	UE	OE	UE	OE	UE	UE	UE	UE
3.	Demersal									
	Potency	82,4	334,8	375,2	87,2	9,3	88,8	54,9	202,3	135,1
	TAC	66,9	267,8	300,2	69,6	7,6	71,1	43,9	161,9	108,1
	Production	146,3	54,7	334,9	167,4	43,2	32,1	15,3	156,6	134,8
	Utilization	OE	UE	OE	OE	OE	UE	UE	FE	OE
5.	Reef Fish									
	Potency	5,0	21,6	9,5	34,1	32,1	12,5	14,5	3,1	12,9
	TAC	4,0	17,3	7,6	27,3	25,7	10,0	11,6	2,5	10,3
	Production	21,5	7,9	45,2	24,1	6,2	4,6	2,2	22,6	19,4
	Utilization	OE	UE	OE	FE	UE	UE	UE	OE	OE

Sources : Directorate General of Capture Fisheries, MMAF (2005)

Note : Potency, TAC and Production in 10 ton/year

OE = Over Exploited, UE = Under Exploited, FE = Fully exploited

TAC = Total Allowable Catch

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 %

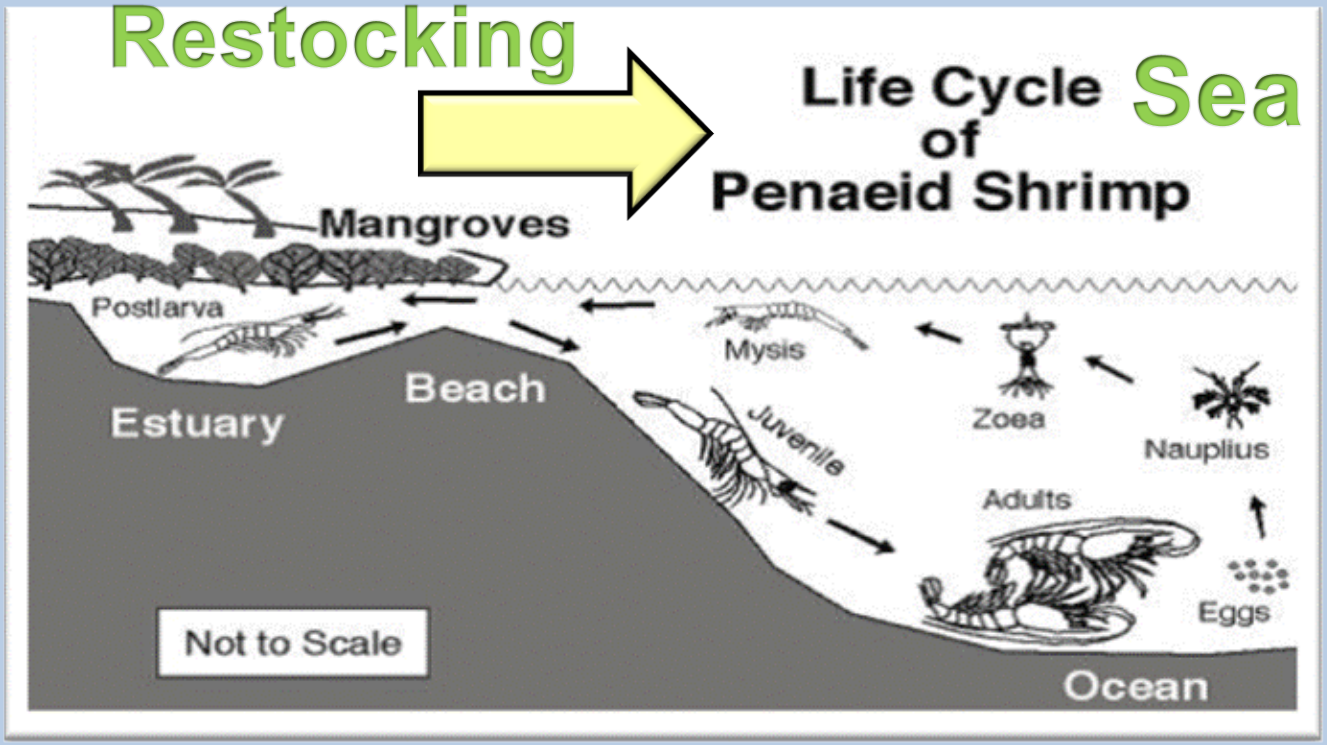
- Sulawesi :
  Year 1965 : 110.000 ha ⇨ Year 1985 : 30.000 ha (72.7 % loss)

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



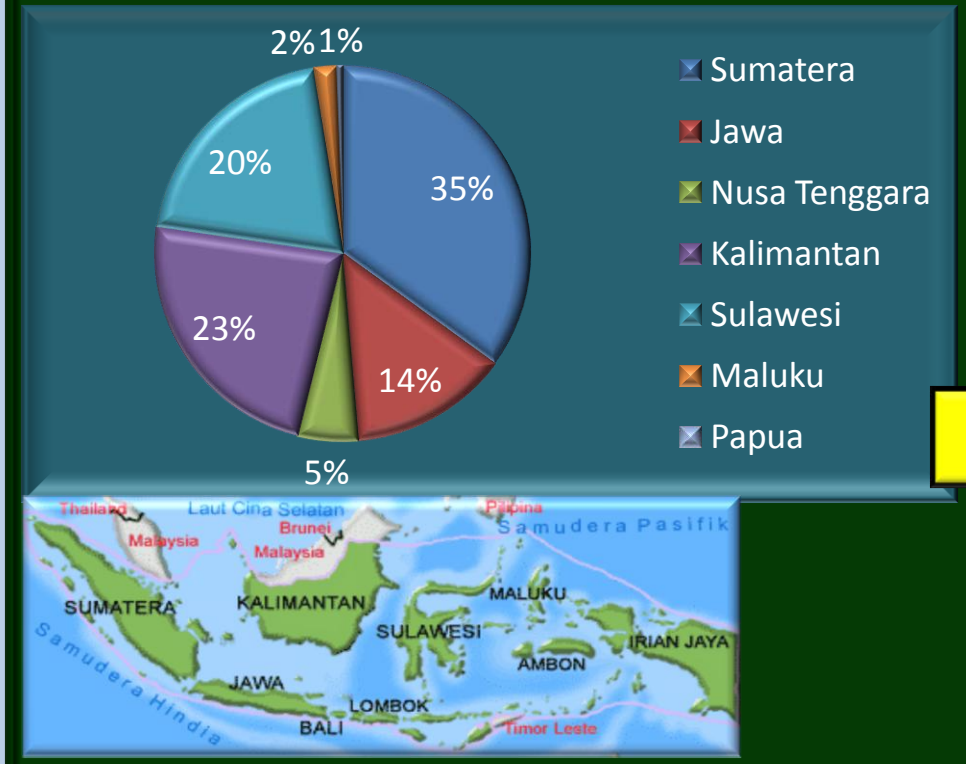



MANGROVE ROLE ON THE ENHANCEMENT OF FISHERIES RESOURCES RESTOCKING



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

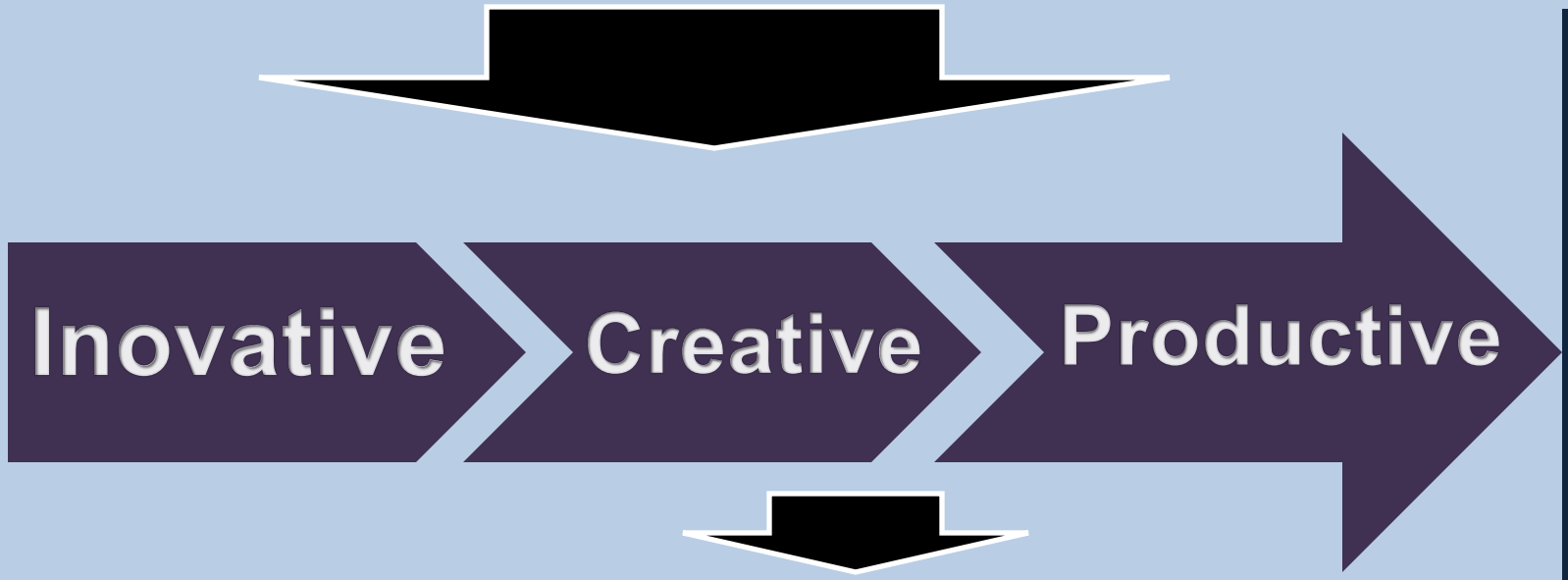
⬇

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

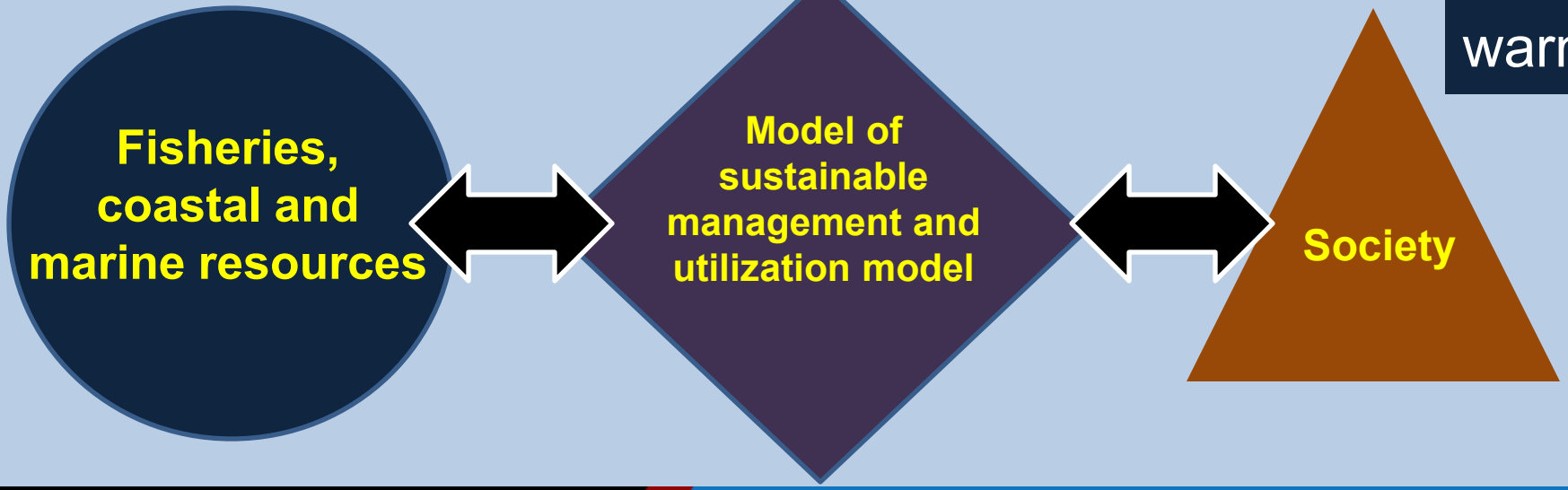
⬇

- ✓ **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**

Technology Inovation



Technology and **Fisheries Product** Adaptive to the environment and climate change, global warming



2002 World Summit on Sustainable Development

The major outcome of the WSSD was the Johannesburg Plan of Implementation (JPOI) designed as a framework for action to implement the commitments originally agreed at UNCED. The JPOI includes eleven chapters: an introduction; poverty eradication; consumption and production; *the natural resource base*; health; *small island developing States (SIDS)*; Africa; other regional initiatives; means of implementation; and institutional framework.

Regarding ocean and coastal issues, the JPOI emphasized issues related to:

- **the ecosystem approach and integrated management;**
- protection of the marine environment from land-based activities;
- integrated water resource management;
- biodiversity and marine protected areas;
- small island developing states;
- **fisheries and aquaculture;**
- global marine assessment;
- coordination of UN activities on oceans;
- capacity development.

SUSTAINABLE DEVELOPMENT FROM GREEN ECONOMY TO BLUE ECONOMY

1. The principle of sustainability has been adopted as a linebase in the effort to integrate economic, social and environment in the long term development of the equitable system

2. The basic assumption: equitable development will be conducted on an ongoing basis, long-term support if nature: the natural resources, environment, and quality of human resources.

3. Green Economy and the Blue Economy growing and rooted in the principles of sustainability (sustainability).

4. Green Economy and Blue Economic are an economic system that is capable of improving human well-being and at the same time significantly reducing environmental risks and ecological damage through resource efficiency, low carbon, and social concerns.

5. BLUE ECONOMY: Economic growth increases, people's welfare, but the sea and the sky remains blue.

BLUE ECONOMY POLICY IN INDONESIA

1. Developing good governance management system of the marine and coastal resources based on the principle of sustainable
2. Improving the efficiency of natural resource and economic value to the welfare of society
3. Increase the diversity of activity economic value added and competitive with the concept of sustainable development
4. Increase the accessibility of local communities to the economic resources
5. Encourage the development of innovative and creative investment to improve efficiency and value-added natural resource
6. Develop natural resource management system in balance between utilization and conservation of the environment

BUSINESS AND INVESTMENT MODEL BLUE ECONOMY (innovation and creativity)

1. MULTIPLE REVENUE (doubles results)
2. SPACIOUS BUSINESS OPEN OPPORTUNITIES:
   1) RAW MATERIALS AND ENERGY SAVE (reduce cost)
   2) DIVERSIFIED PRODUCTS / services (more products, money and job)
   3) HIGH PRODUCTIVITY (more money)
   4) INCREASING VALUE ADDED (more money)
   5) QUALITY IMPROVEMENT (more money)
   6) NO WASTE: WASTE AS RAW MATERIALS DERIVED PRODUCTS (more money and job)
   7) EFFICIENT NATURAL RESOURCES AND COSTS, BUT INCREASED REVENUE (more money for less environmental risk)

3. INCREASING EMPLOYMENT OPPORTUNITIES (+)
4. REVENUE IMPROVEMENT SOCIETY (+)
5. NO dESTRUCTIVE and pollutes the environment (reduce cost and tax)
6. EFFICIENT AND NATURAL enrich (+)

INNOVATION AND CREATIVITY : products, production systems, and management

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

Harmonization, Stabilization, Rehabilitation, Restoration, Reforestation, Adaptation, Education

Improving

Environment
Natural Resources
Product Variance
Coastal Communities

Gempita-SPL/SFiCom-Gapura

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

GREEN AND BLUE ECONOMY

SUSTAINABILITY: ◦ Efficiency nature (Nature's Efficiency) ◦ No waste - no rest for waste: waste from one process becomes the raw material of the production process is another ◦ Social care (social capital and equity): increased income, more results (multiple revenue), more employment, more opportunities for people. ◦ Innovation and creativity: innovative and creative business gave birth to double the yield, increase employment, but does not damage the environment.

SATO UMI-GREEN ECONOMY-BLUE ECONOMI-SFICOM GAPURA

IMTA

1. Multi Product
2. Sustainable
3. Zero Waste Emition

PRODUCT INOVATION

1. Product Variations
2. Traceable
3. Marketable

NATIONAL REGIONAL GLOBAL

VALUE ADDED FISHERIES PRODUCT

SHRIMP

Kulit, kepala (udang, kepiting, rajungan, cumi)

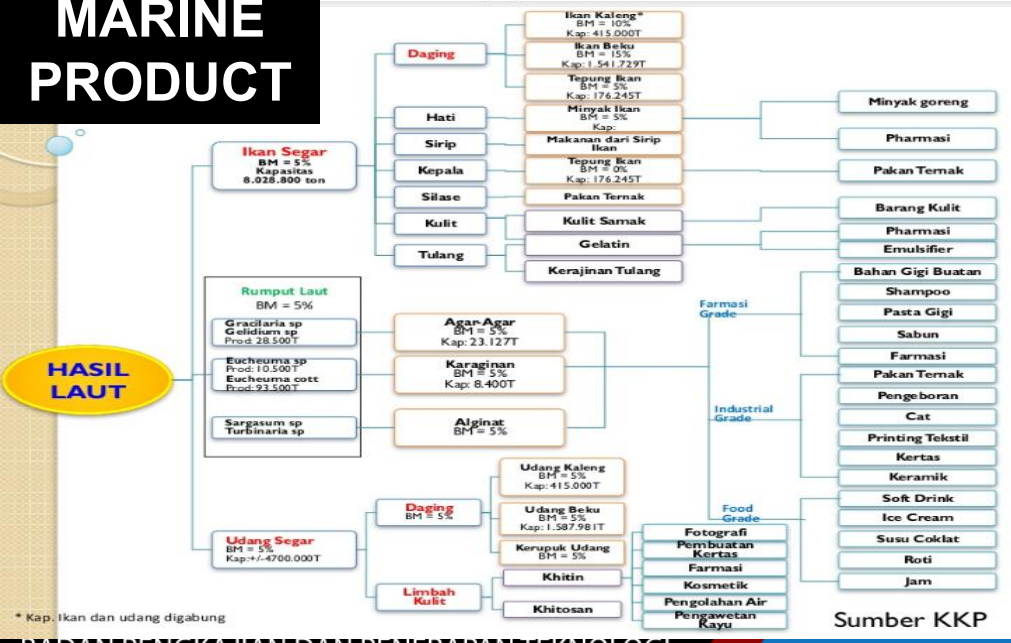
Chiti n

Chitosan

- **Industrial Grade** (pengolahan air, kertas, mengolah limbah, penghilang ion logam)
- **Food Grade** (pengawet alami, fat blocker, rasa, aditif, anti kolesterol, keseimbangan makkanan)
- **Medical Grade** (kosmetik, salep, obat2an, benang operasi, bedah tulang, balut luka)
- **Pertanian** (Pupuk, perawat benih, fungisida, bakterisida, nematocides)

Ditjen P2HP, Dit PPN

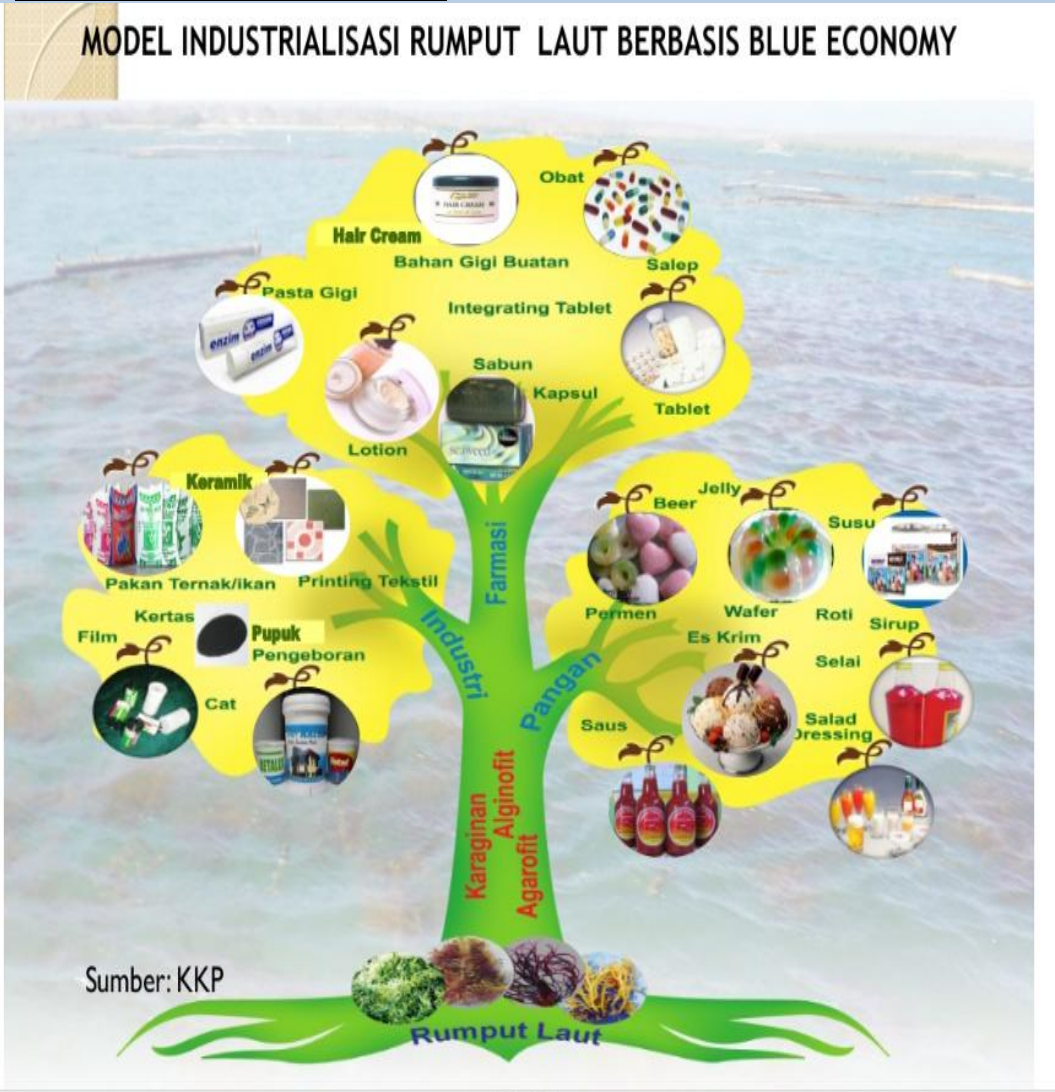
MARINE PRODUCT



* Kap. Ikan dan udang digabung

Sumber KKP

SEAWEED



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.

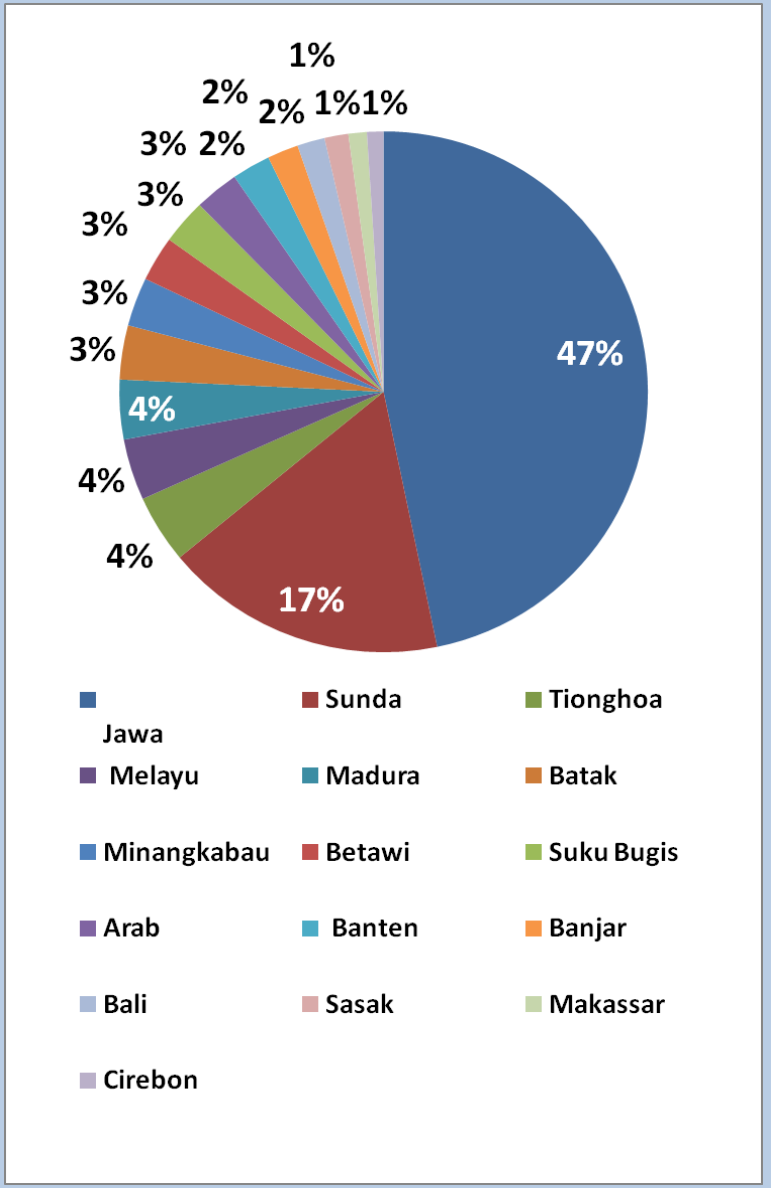
Indonesian Local Wisdom : 1. Panglima Laot (Nangroe Aceh Darussalam), 2. Rumpon (Lampung), 3. Kelong (Riau), 4. Awig-awig (Bali dan Lombok), 5. Rompong (Sulawesi Selatan), 6. Sasi (Maluku) and some HUL (sea of customary rights) at East Indonesia.

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

International Regulation :

- ❑ Convention for the Preservation and Protection of Fur Seals 1911
- ❑ Convention for the Preservation and Protection of the Halibut Fishing of the Northern Pacific 1923
- ❑ Convention for the the Regulation of Whaling 1931.
- ❑ FAO 1995 : Code of Conduct for Responsible Fisheries (CCRF)
- ❑ International Plan of Action (IPOA) dan Ilegal Unreported Unregulated (IUU) fishing.

DISTRIBUTION OF INDONESIAN ETHNICS



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

(Source : BPS 2010)

Human Interaction and Material cycling in Sato-umi
(Yanagi, 2009)

Human interaction can increase and decrease productivity and bio-diversity.

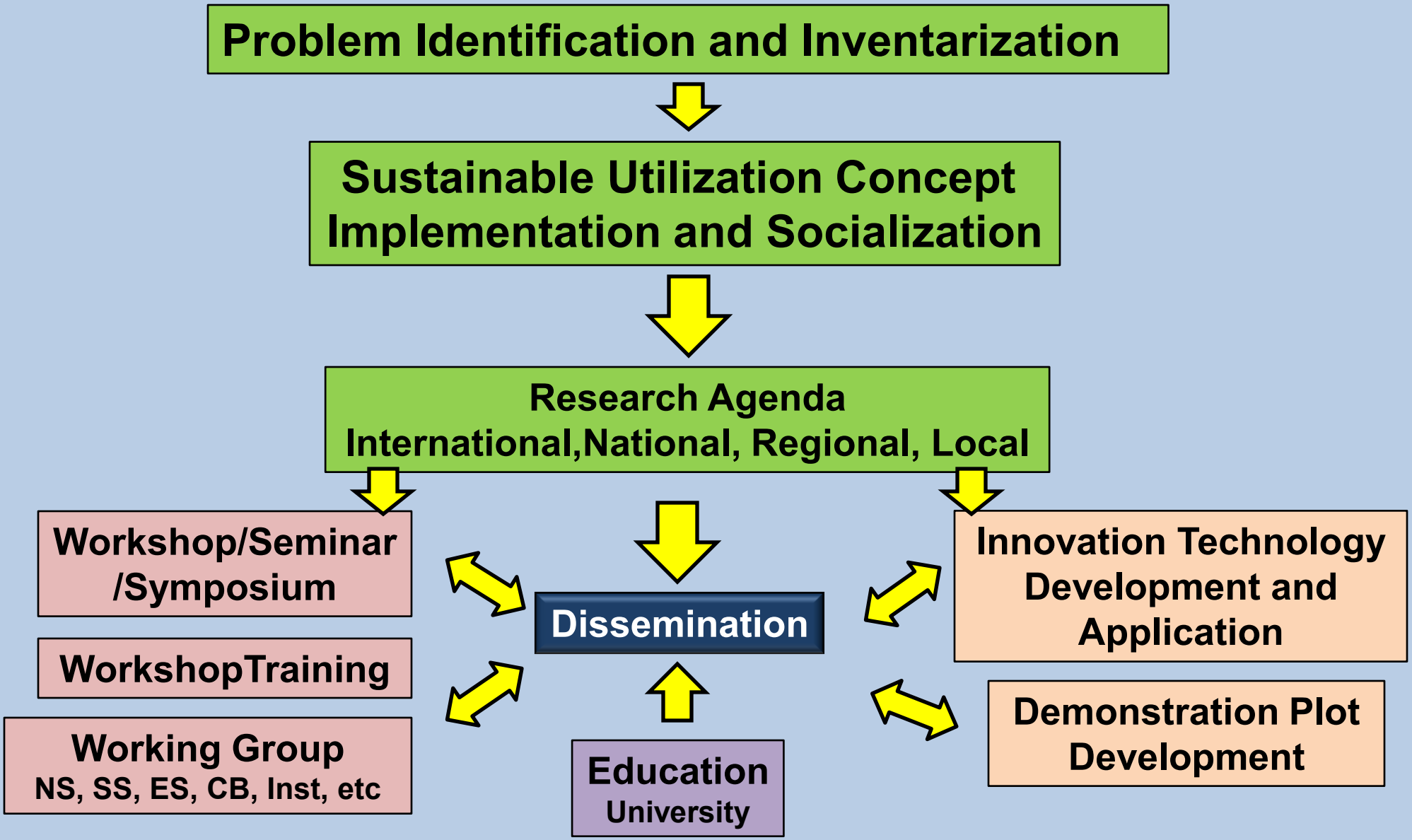
Sato-umi is to improve productivity and bio-diversity.

forest

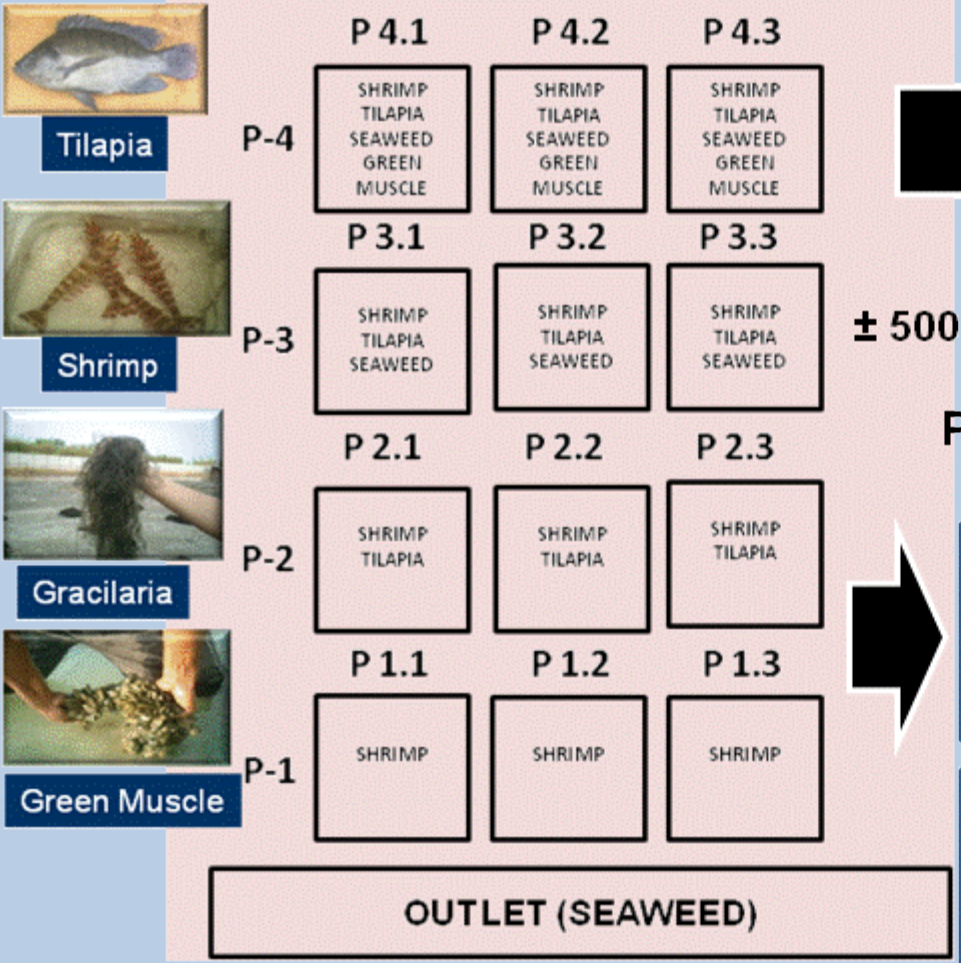
bird

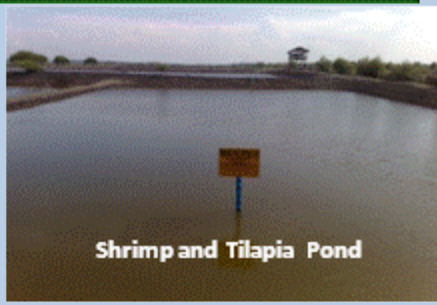
Material cycling in the coastal sea

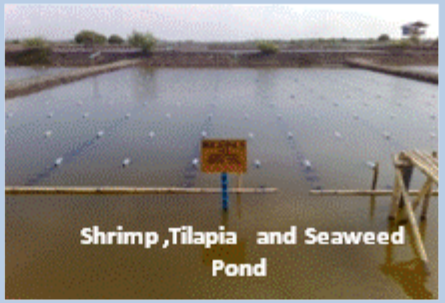
SATO UMI DISSEMINATION STRATEGY

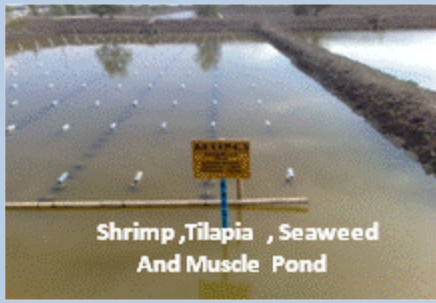


DEMONSTRATION PLOT
INTEGRATED MULTI-TROPIC AQUACULTURE (IMTA) : Bio-recyling-System

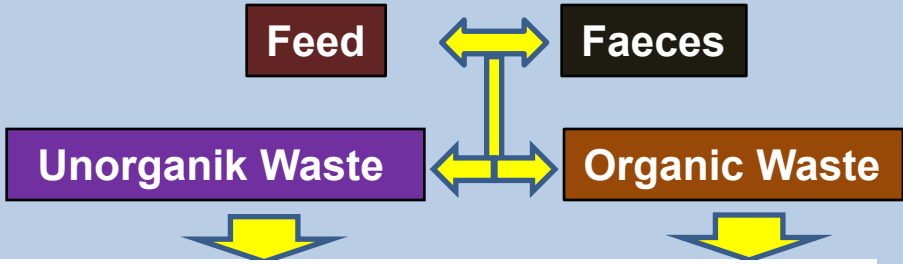


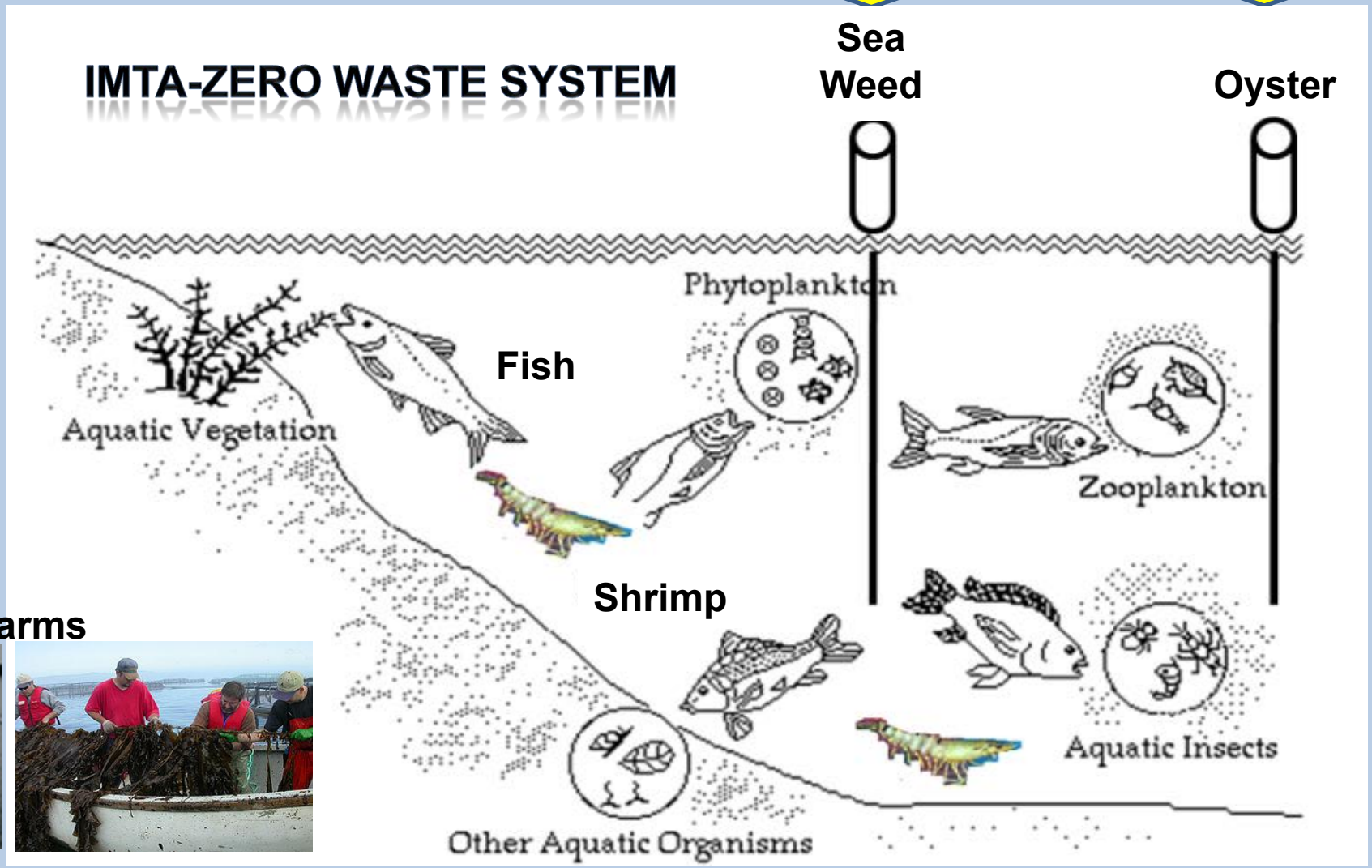






BIORECYCLING SYSTEM ON THE INTEGRATED MULTITROPIC AQUACULTURE TECHNOLOGY (IMTA)





Future Aqua Farms

PHYSICAL-CHEMICAL Water Quality Profile of the Treated Breackishwater Pond

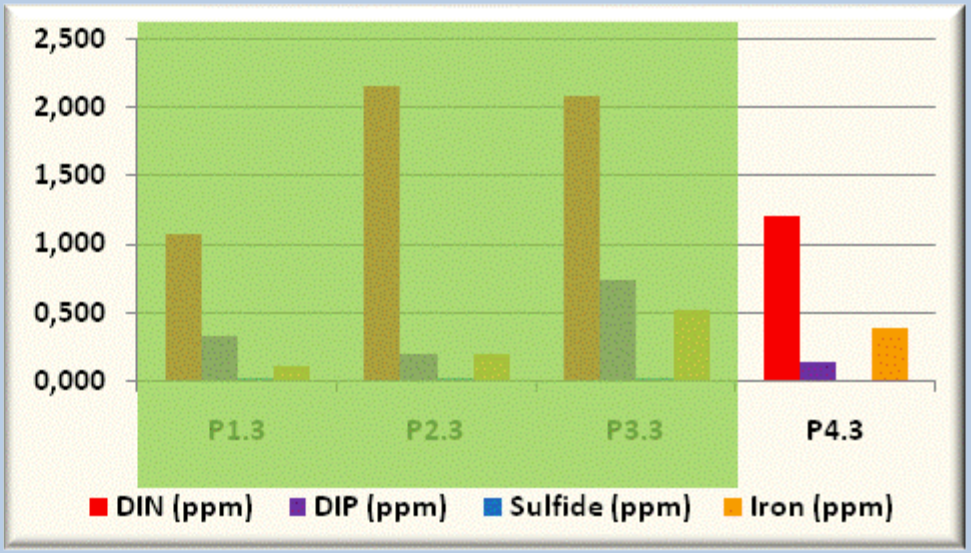
Physical

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

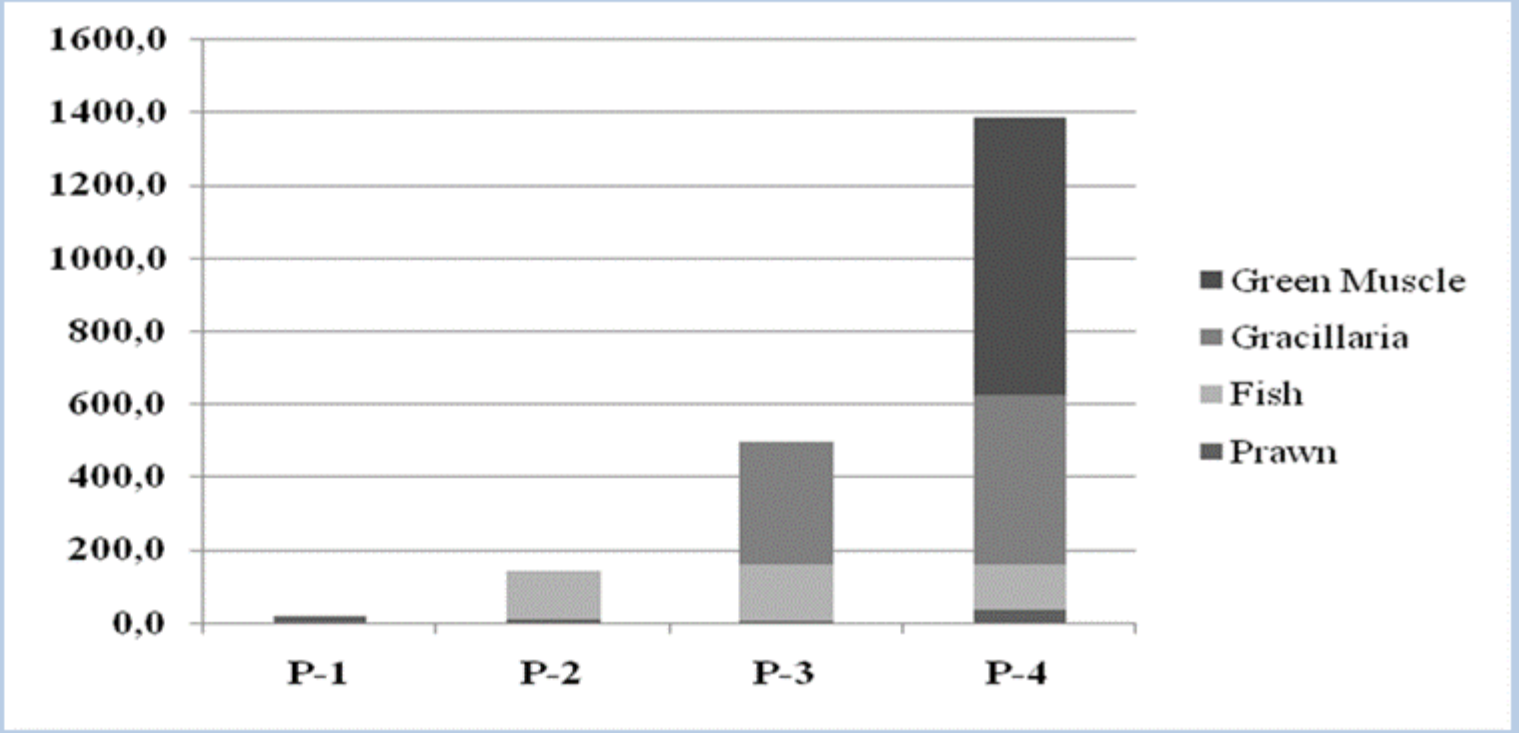



Chemical

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

Total Biomassof the Treated Farm in Brackishwater Pond

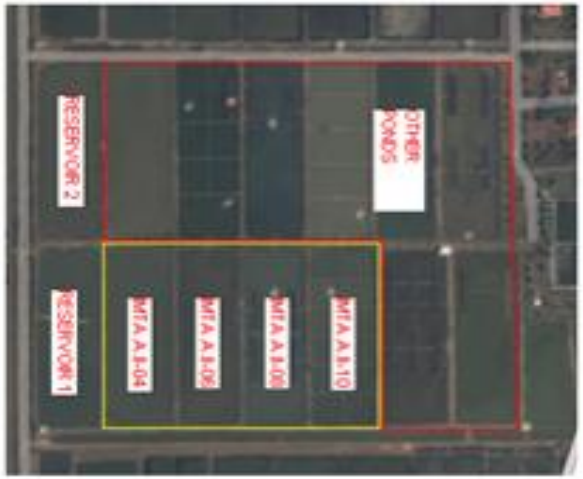


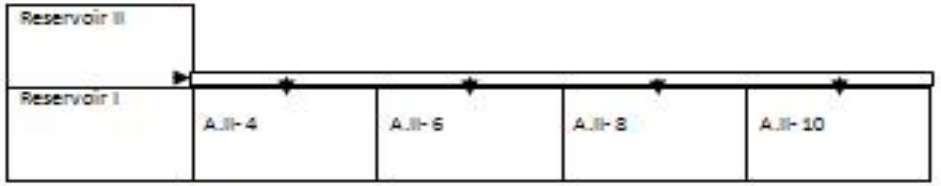
DEMONSTRATION POND-IMTA-2014

DEMONSTRATION PLOT IMTA – SATO UMI 2014 PROJECT

No.	Activities	Stocking date	VOLUME	Pond address
1.	Tilapia "Salina" stocking	7 July 2014	15.000 seeds	A.II- 8
2.	Tilapia "Salina" stocking	10 July 2014	15.000 seeds	A.II- 10
3.	*Gracilaria sp.* stocking	20 July 2014	500 kg	A.II- 4
4.	*Gracilaria sp.* stocking	21 July 2014	500 kg	A.II- 8
5.	Shrimp stocking	28 July 2014	30.000 seeds	A.II- 4
6.	Shrimp stocking	30 July 2014	30.000 seeds	A.II- 6
7.	*Anadara sp.* stocking	21 August 2014	100 kg	A.II- 4
8.	*Anadara sp.* stocking	22 August 2014	100 kg	A.II- 8

Pond map:





Each pond extent of 4.000 m²
A.II- 4 = Shrimp (*L. vannamei*) + *Gracilaria sp.* + *Anadara*
A.II- 6 = Monoculture *L. vannamei*
A.II- 8 = Tilapia "Salina" + *Gracilaria sp.* + *Anadara*
A.II- 10 = Monoculture Tilapia

DEMONSTRATION PLOT

Preparation of transporting juvenile to the ponds

Shrimp stocking

Anadara sp.

Stocking of*Anadara sp.*

Shrimp harvest at A..II- 6

Shrimp harvest at A..II- 6

Shrimp harvest at A..II- 6

Harvested shrimps

Shrimp weighing

Diversity Product of GAPURA

Tilapia











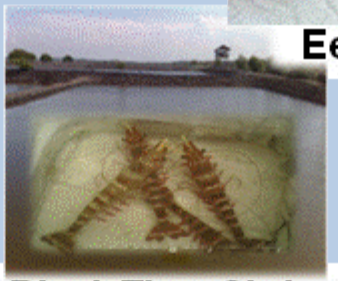

Production Technology of Saline Tilapia (Breeding and Genetic Improvment)

Softcell Crab

Bio recycle System and Zero Emmition



Eel

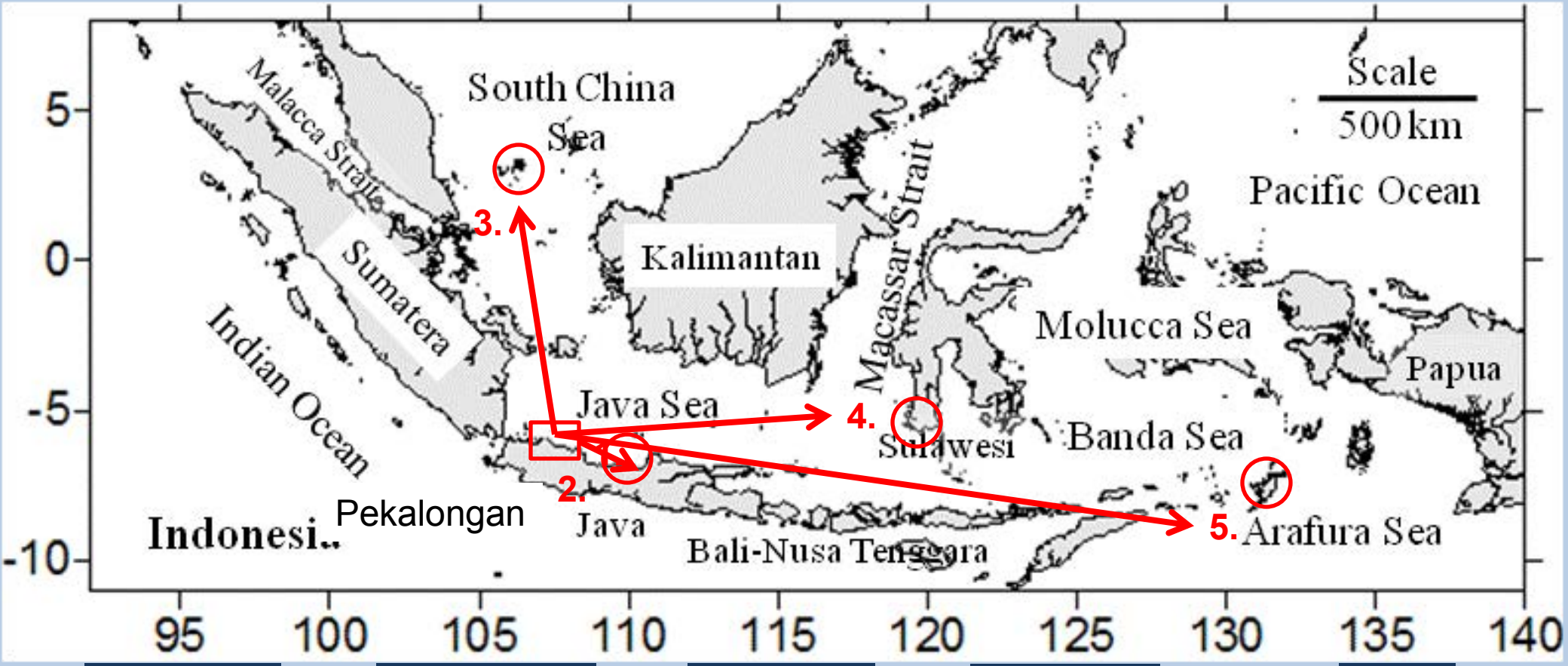


Black Tiger Shrimp


Sea Weed/ Gracilaria

Green Muscle

Expansion Dissemination Program



1. Karawang

2. Pekalongan

3. Anambas

4. Bantaeng

5. Tual

Workshop

DISSEMINATION ACTIVITY

Field Trip

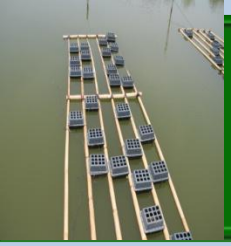
DISSEMINATION ACTIVITY

DISSEMINATION ACTIVITY TRAINING-March 2014

DEMONSTRATION PLOT
Sylvo Fishery and IMTA Karawang



DISSEMINATION ACTIVITY

DEMONSTRATION PLOT

Sylvo Fishery and IMTA-Pekalongan

DISSEMINATION ACTIVITY

DEMONSTRATION PLOT
Bantaeng



DISSEMINATION ACTIVITY



DISSEMINATION ACTIVITY

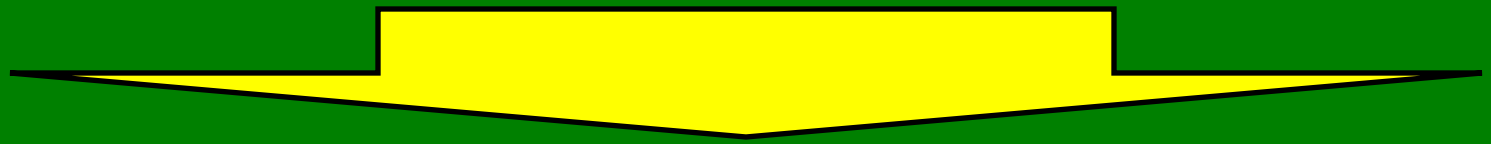
DISSEMINATION ACTIVITIES






Conclusing Remark

SATO UMI AND BLUE ECONOMY:
Economic Growth, Revenue and Welfare Society ⇨ Increase,



But the Sea and Sky are BLUE

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Agency for the Assessment and Application of Technology

North Pacific Marine Science Organization

Ministry of Agriculture, Forestry and Fisheries

Fisheries Research Agency of Japan

Pekalongan City

Thank You