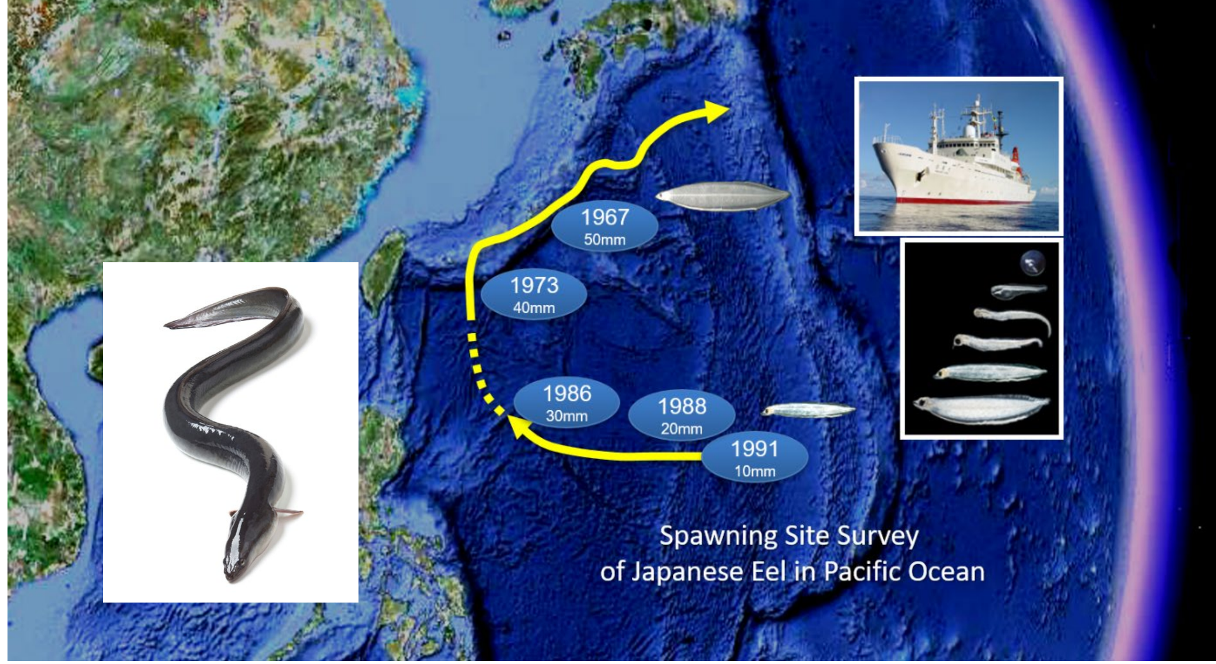
Area-Capabilities enhancements through community based Local Resources utilizations

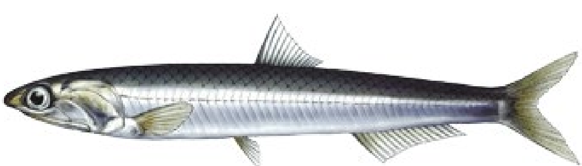
Satoshi ISHIKAWA
Kyoto Prefectural University

Fisheries Ecological studies

Satoshi Ishikawa
Dr. Agriculture

Fisheries science and Population Dynamics and population Genetics

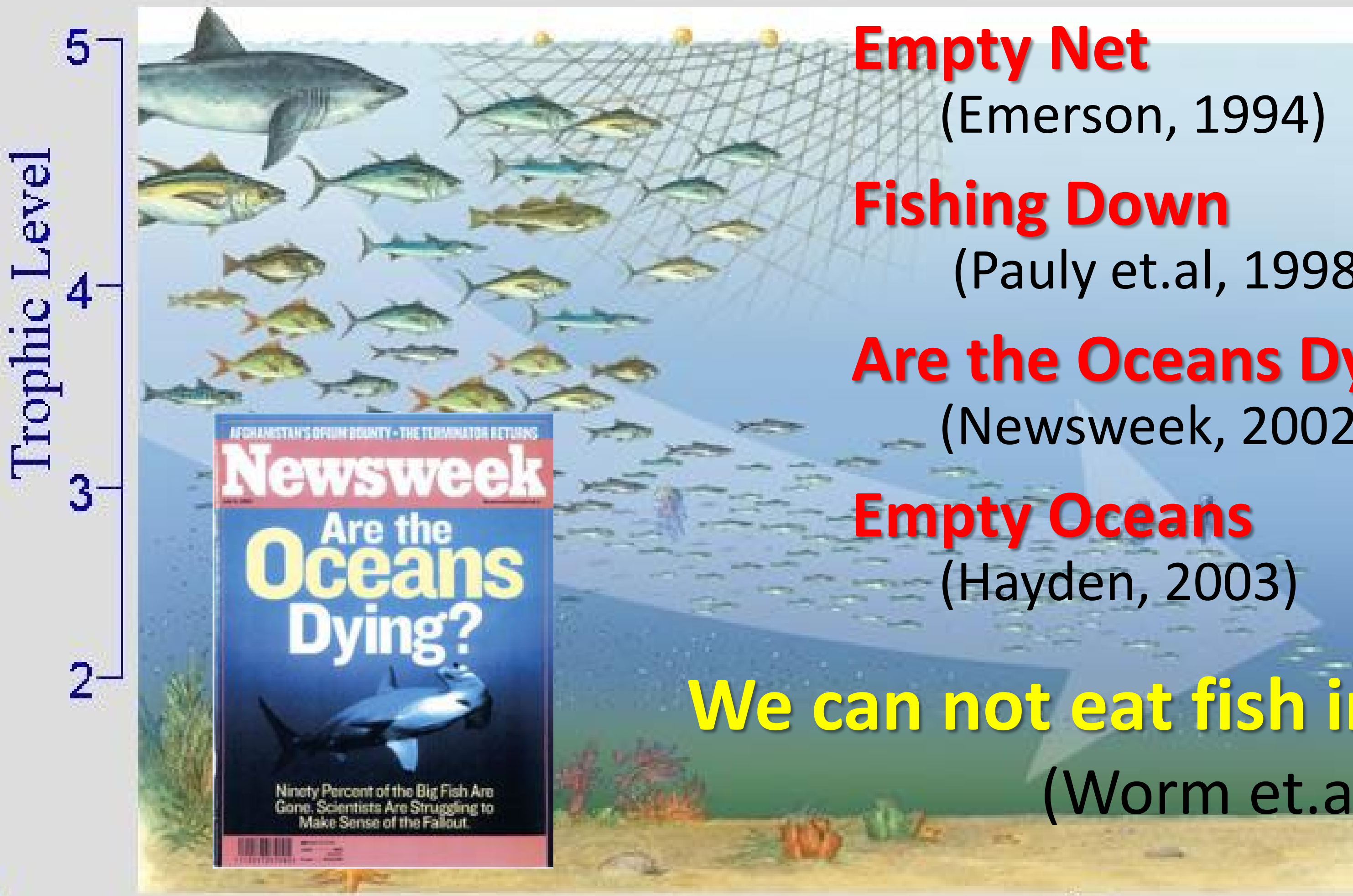




Crisis of Ocean Ecosystem

Fishing Down Marine Food Webs

Fishing down in Global trend…?



Empty Net
(Emerson, 1994)

Fishing Down
(Pauly et.al, 1998)

Are the Oceans Dying?
(Newsweek, 2002)

Empty Oceans
(Hayden, 2003)

We can not eat fish in 2048
(Worm et.al, 2006)

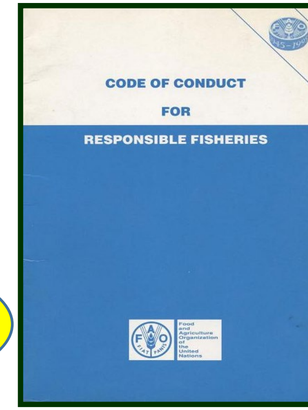
Watson and Pauly In: Atlas of the Ocean NATIONALGEOGRAPHIC

Common Fisheries Resource Management

1995 FAO

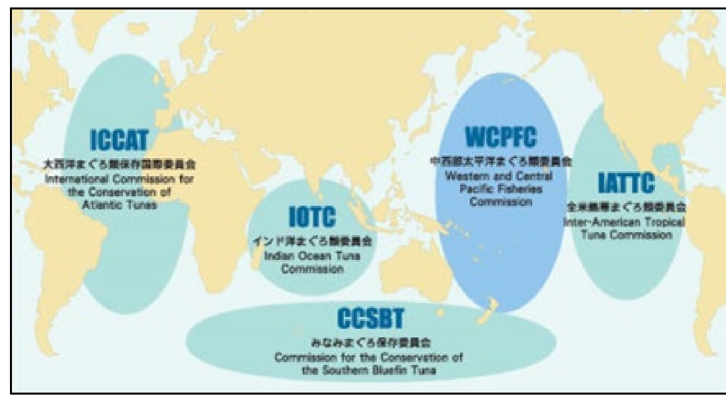
Code of Conduct for Responsible Fishery

Statistical Data Collection → Stock Assessment → Regulation Fishing Activity → Resource Management



International Commission of several important Fish Resources

Data Collection, Stock Evaluation of Particular Fish
Limits of total catch amount of each species



Large-scale Commercial Fishery can be applied.

Data required for stock assessment

- Fish catch sorted by species
- Size components of fish catch sorted by sepsis
- Age component of fish catch sorted by sepsis
- Growth rate of a target species
- Natural mortality of a target species
- Fecundity
- Spawning season
- Migration area
- Etc.　Etc.

We can plot
　the reproduction curve
and then do a stock assessment.

Then we can calculate MSY and ABC.

And you can set appropriate resource usage limits.

If the environmental drastically changed,
these parameter will be changed.

So, Data needs to be constantly updated

Two types of fisheries

Commercial fishery


Single-Species, Selective Fishery

Professional Fishery & landing sites

Data collection relatively easy

Small-scale Fishery


Multi-Species, Multi-Fishery, Mixed Catch

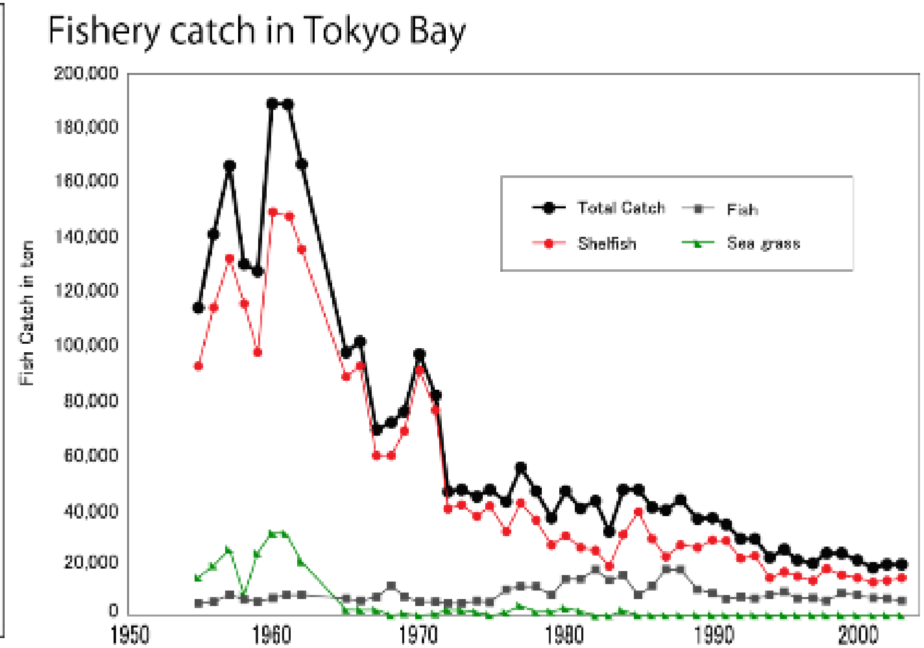
Many Fishery and Stakeholders
& many landing sites

Data collection quite difficult

Small-scale fisheries support many livelihoods

- Half of the world's fisheries catch is produced by small-scale fisheries.
- More than 12 million people worldwide depend on small-scale fisheries for their livelihood.
- Many small-scale fishers are poor and they do not have other income source and means of securing food.
- Tighter fishing regulations will make life harder for these fishermen.

Changes in the coastal environment will reduce fishery resources



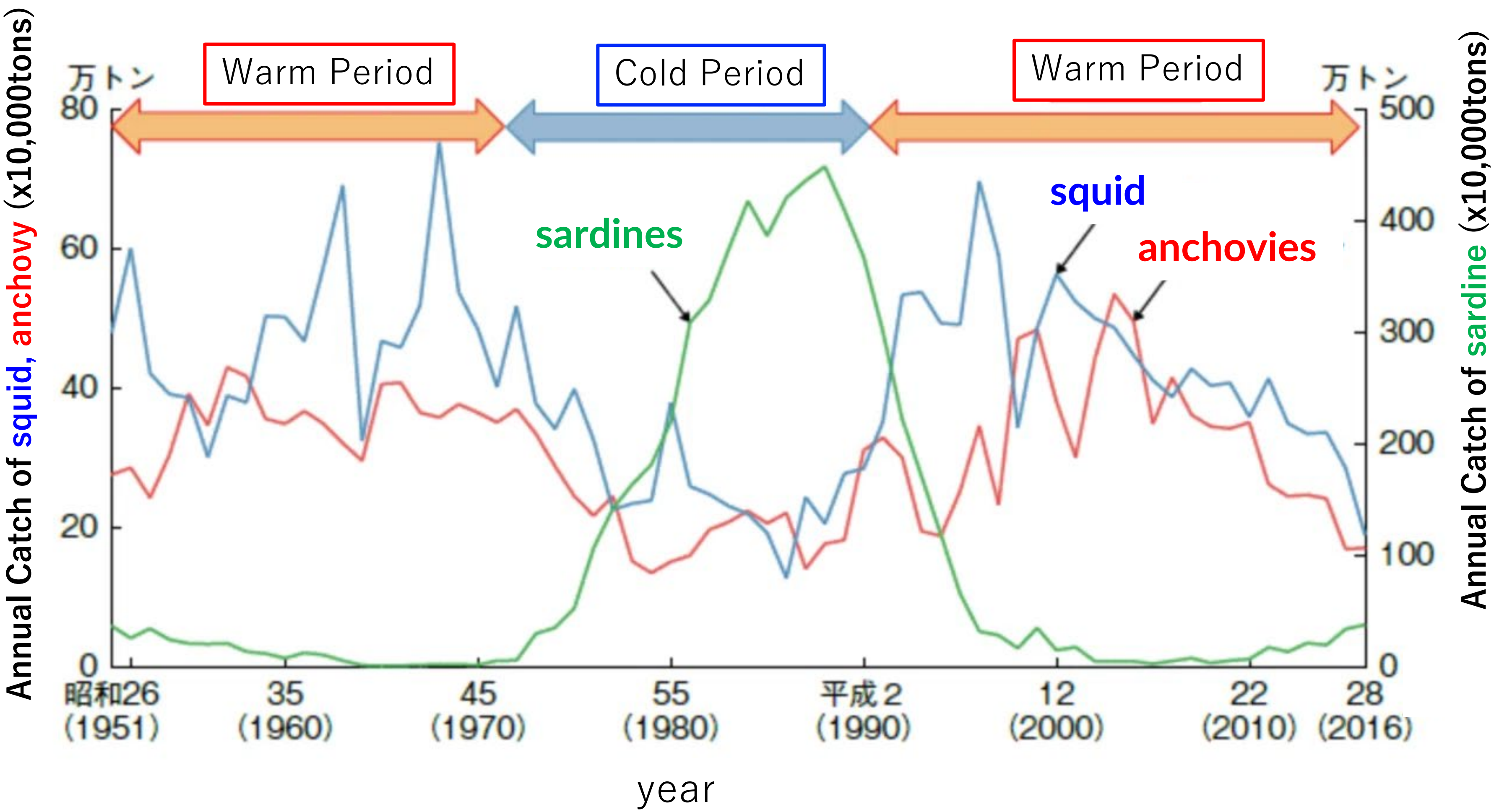
From 1940 to 1980, 90% of tidal flats were reclaimed in Tokyo Bay

Fishing pressers became lower. But, The amount of resources did not increase

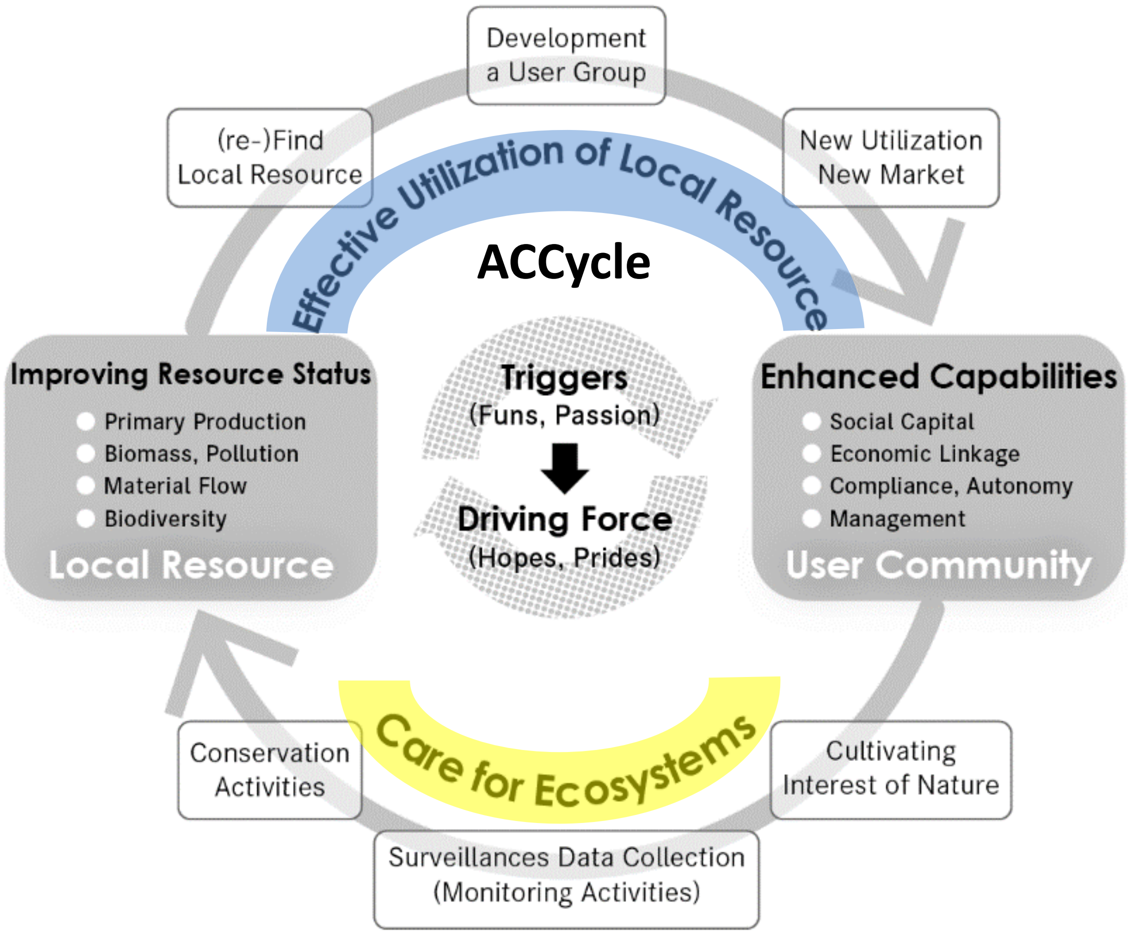
The decline of seaweed beds and tidal flats has a greater negative impact on resources than overfishing

The main cause of resource fluctuations is environmental changes (Regime shift)

Fish catch in Japan



Area-Capability Approach promotes both rural developments and care of environments



Care involves three actions:

- **accompanying,**
- **watching over,**
- **treating.**

The term "treating" means that those who can do what they can do.

Caring requires an attachment to nature.
And, to increase attachment, it's necessary to **cultivate interest.**

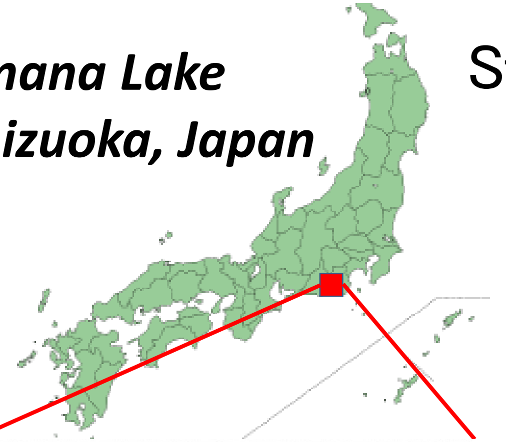
Strengthening the relationship between humans and nature through local resource utilization

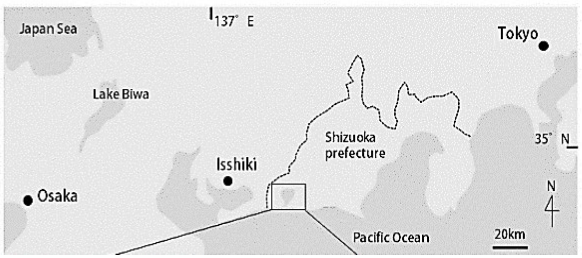
Example of Area-Capability Approach (ACA)

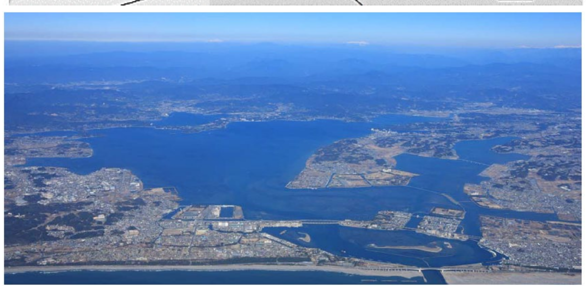
- *AN important point is* ***Community building*** *and* ***cultivate interests on ecosystem of users*** *through local resource utilizations*

Hamana Lake
Shizuoka, Japan

Stock enhancement of the tiger prawn in Hamana Lake







Water area = 6,880ha
Periphery = 128km
Depth = 5m

- There are traditional and modern fisheries, including both capture and aquaculture activities.
- Fishermen have been conducted as small scale commercial fishery

1960~1980 In Japan
Rapid economic growth and industrialization

Large seagrass beds and tidal flats were reclaimed for industrial developments. And many aquatic resources were deteriorated due to habitat losses.

Fishermen's life became worse.
Many fishermen criticized the habitat losses and protested governmental decisions of industrialization.

Government started *stock-enhancement project named "Tsukuru-Gyogyo" in local level*.
For this project, stock enhancement (SE) centers were established at each prefecture.

Stock Enhancement (SE) Centers was in charge of the seedling release project.

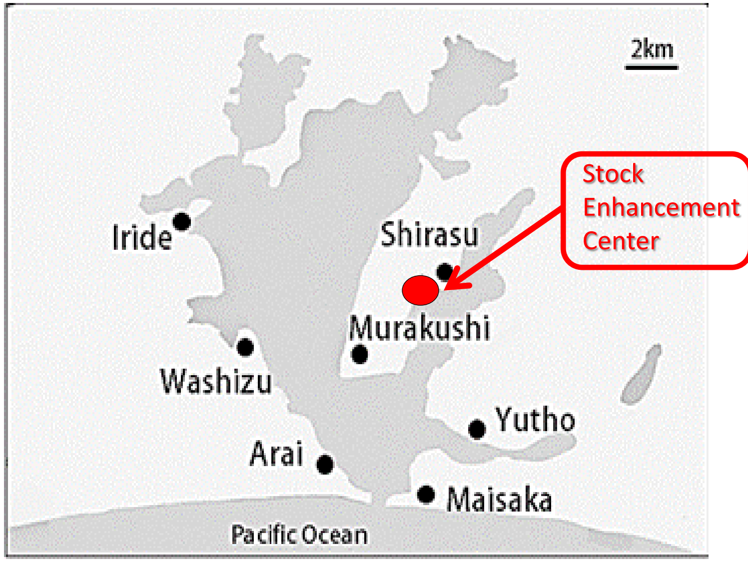
Basic strategy of Fishery Stock Enhancement in Japan

1. SE Center conducts artificial breeding of target species.
2. SE Center improve aquaculture technology (density, bait, water conditions etc.)
3. SE Center and local fishermen group conduct intermediate aquaculture
4. SE Center establish release technology (size of fish, location, timing, number etc.)
5. SE Center and fishermen release juvenile fish.
6. SE Center and fishermen collect data of fish catch.
7. SE Center estimate impacts of release to stock enhancement.

In many cases,
there were no technology of breeding, and aquaculture,
there were no information about release points and timing,
there were no catch data for impact assessment.

SE Center staffs had to solve many difficulties by themselves.

Around Hamana Like



- There were 7 fishermen villages.
- They competed for fishery stocks.
- There were no collaborations.
- Each village had each landing sites.
- There were no exact fishery statistics.
- They did not have a sense of stock enhancement.

But, industrialization was affected on this area and fishery stocks were deteriorated rapidly.

1978 Stock enhancement Center Established and governmental stock enhancement project was started.

In the beginning, There is no experts, no technology *and no collaborations and no participation from villagers (fishers)*

Many fishers believed stocks recover naturally in near future.

Prof. Fushimi
He was a staff of stock enhancement center in chargee of the project.

Dr Fushimi conducted environmental survey to decide intermediate aquaculture site and technology developments of artificial breeding by himself.
And Released 3million larvae

1980, Young fishermen of Shirasu village locating near intermediate aquaculture site, started collaboration (help) with Dr Fushimi.

1981 30 million larval shrimp were released

Shrimp Catch was increased,

Start environmental monitoring and conservation actions

1983 Fishermen of other villages started collaboration

100million seeds were released

1985 The governmental project was terminated

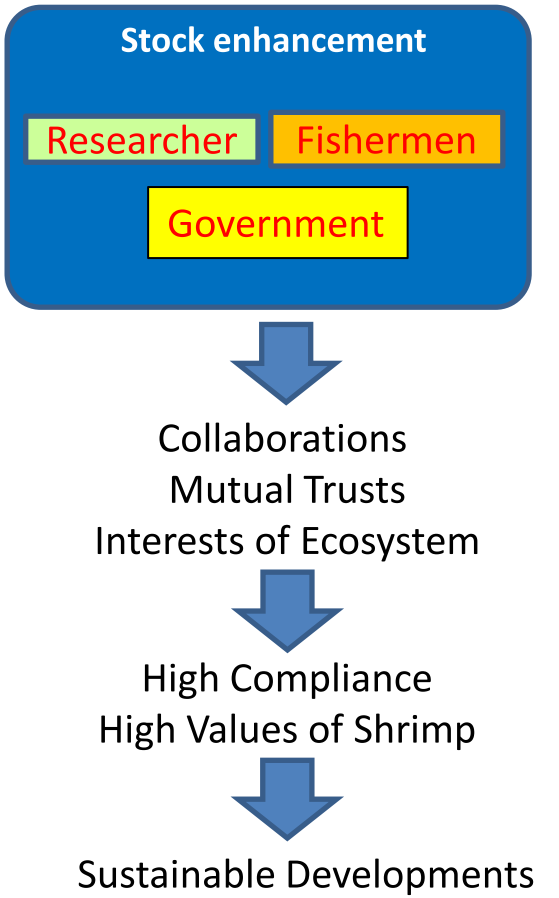
Fishermen donated money for stoke enhancements

And Fishermen started release by themselves

Changes in the area

Voluntarily Actions of Fishermen

- Intermediate aquaculture of larval shrimps
- Environmental monitoring
- Stop fishing of small shrimps
- Set fishery rules by themselves and start patrolling
- Unify the wholesaling system
- Donation for stock enhancements



Mutual trust among Government, Fishermen and Researchers

- Fishery Statistics were collected
- Stock evaluation was done for regulations

Care of nature create new values of fishery products in the markets

Community-based stock enhancement of Tiger Prawn, Batan Bay. Philippines

Researchers

Seed Production Technology
Disease Inspection
Monitoring after seed release
Environmental Assessment
Stock Evaluation

Aquaculture of juveniles
Local Regulation and Catch data
Environmental rehabilitation

Community

Community Based
Mangrove Rehabilitation

Community Based
Aquaculture and Release

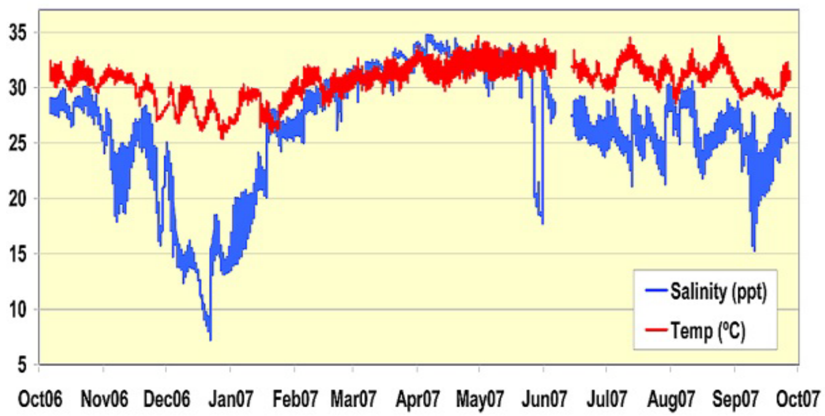
Symposium
Workshop

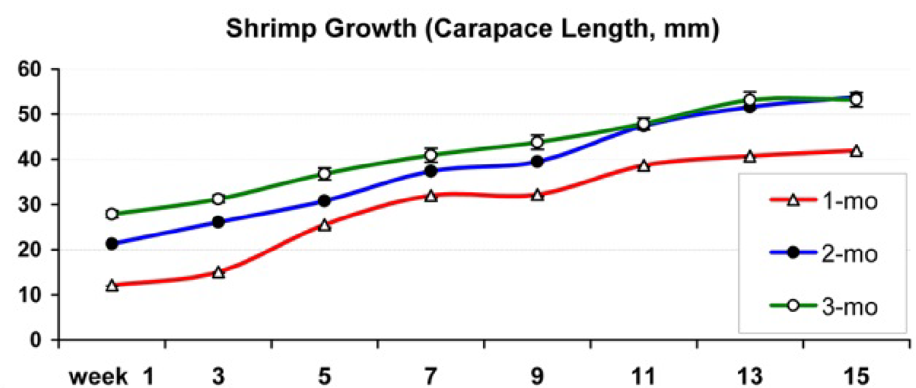
Government NGOs

Understanding and Supports

Project formulation and Information Exchange

Intermediate Aquaculture ponds and experiments





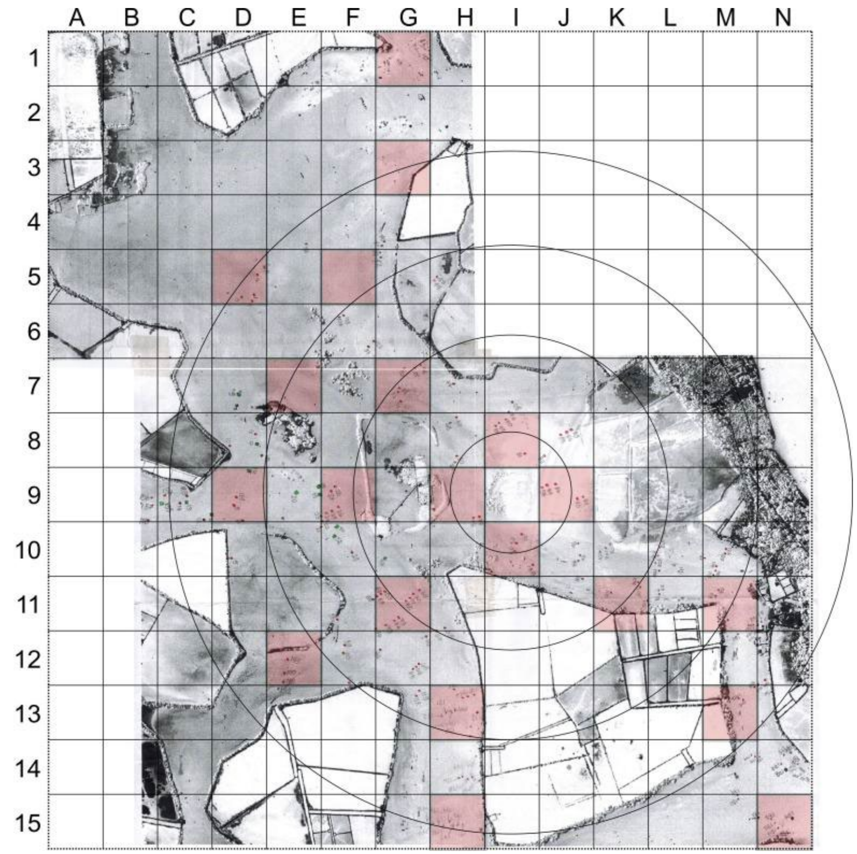
Improve aquaculture technology and collect environmental information

Environmental survey and stock assessments

Monitor actual catch from 20 monitoring zones (right)

The gear to be monitored are corral net (tigbakoe), the most dominant gear used in the area (below)

Monitoring started in January 2013, conducted twice monthly



Results: Timeline of rearing and releases

2013July: 1st rearing (129,000 stocked)
Aug: No re

Pr
2014 Feb: 2nc
April: **15,00**

2014 June: 3rd re
July: **120,0**

2014 Nov: 4th re
Dec: Series

2015Apr: 5th re
May: **250,0**

2015 Jun: 6th re
Jul: high r

Once the re-catches were confirmed, fishermen recognized the effectiveness of the release and began to cooperate proactively.

Altamirano et al, 2015

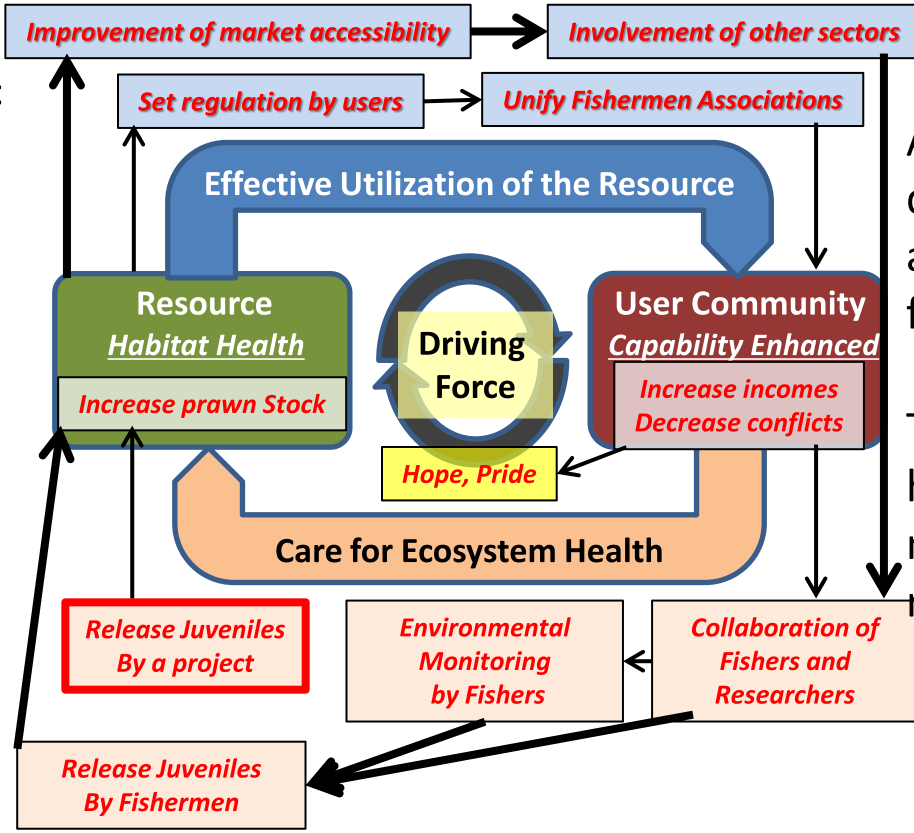
Area-capability cycle of stock enhancement of prawns

Governmental or academic project increase prawn stock

stock enhancement derive wide range collaboration

One collaborative action led unify the associations

Increasing stock cultivate interests on nature of fishers



AC cycle completion decreased conflicts among fishers and facilitate collaborations

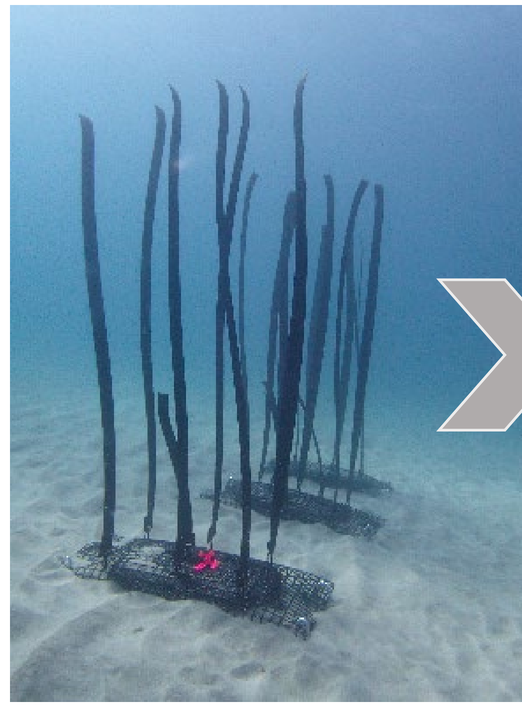
The increased interest has led to increased monitoring and care resources.

Participation to stock enhancements cultivated community bonds and high compliance minds of fishers, and make additional values.

Conservation and Promote Co-management of marine resources using artificial seaweed "C-lant"

A Countermeasure against rocky shore desertification

Made of polyethylene with high durability and bio-based performance.



Creating spawning and nursery grounds and increasing natural seaweed beds

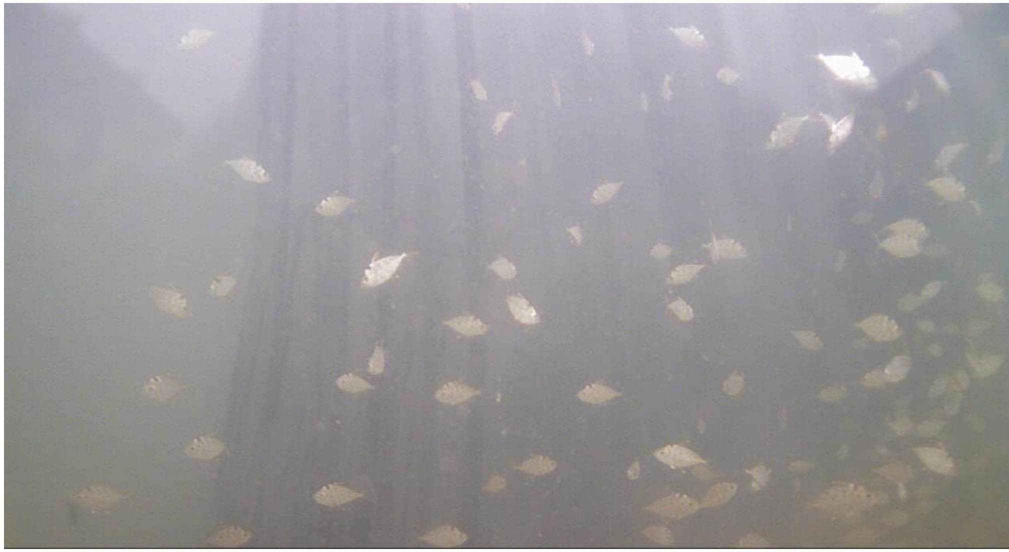
Tokai Aquanotes Co., Ltd

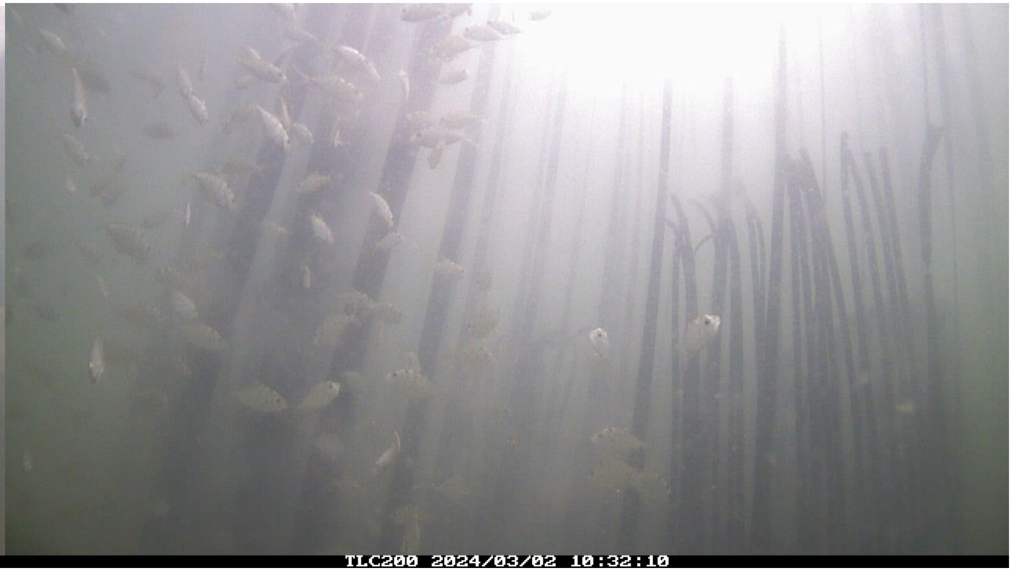
March 2024: Coastal C-lants installed in Kep Province, Cambodia

Tokai Aquanotes Co., Ltd

One day after installation

- We could sea many fish around C-lant bed.
- We showed these picture to local fishers
- We asked the community members to care this site.





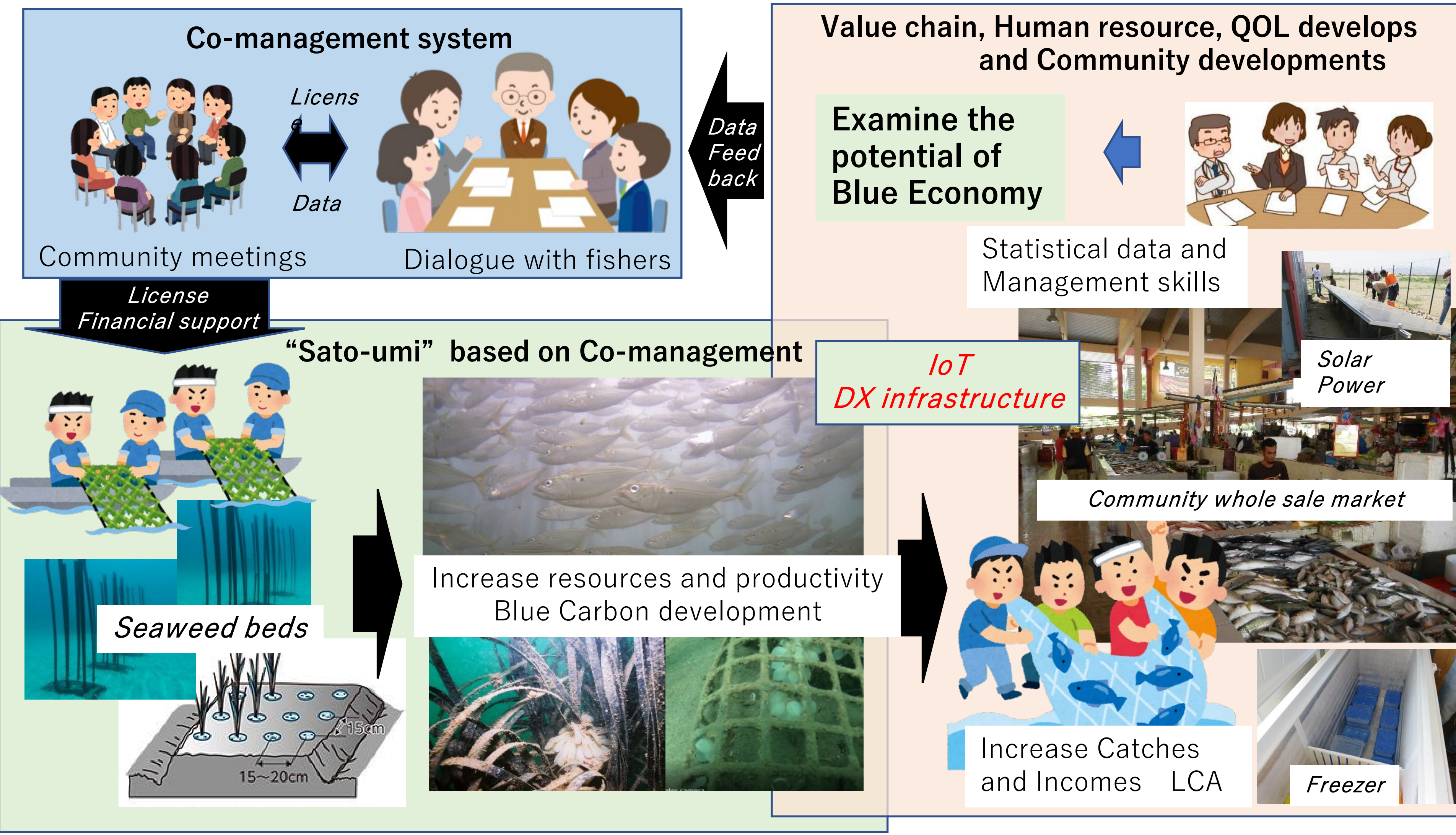
After one year!!

They had a new fishing ground.

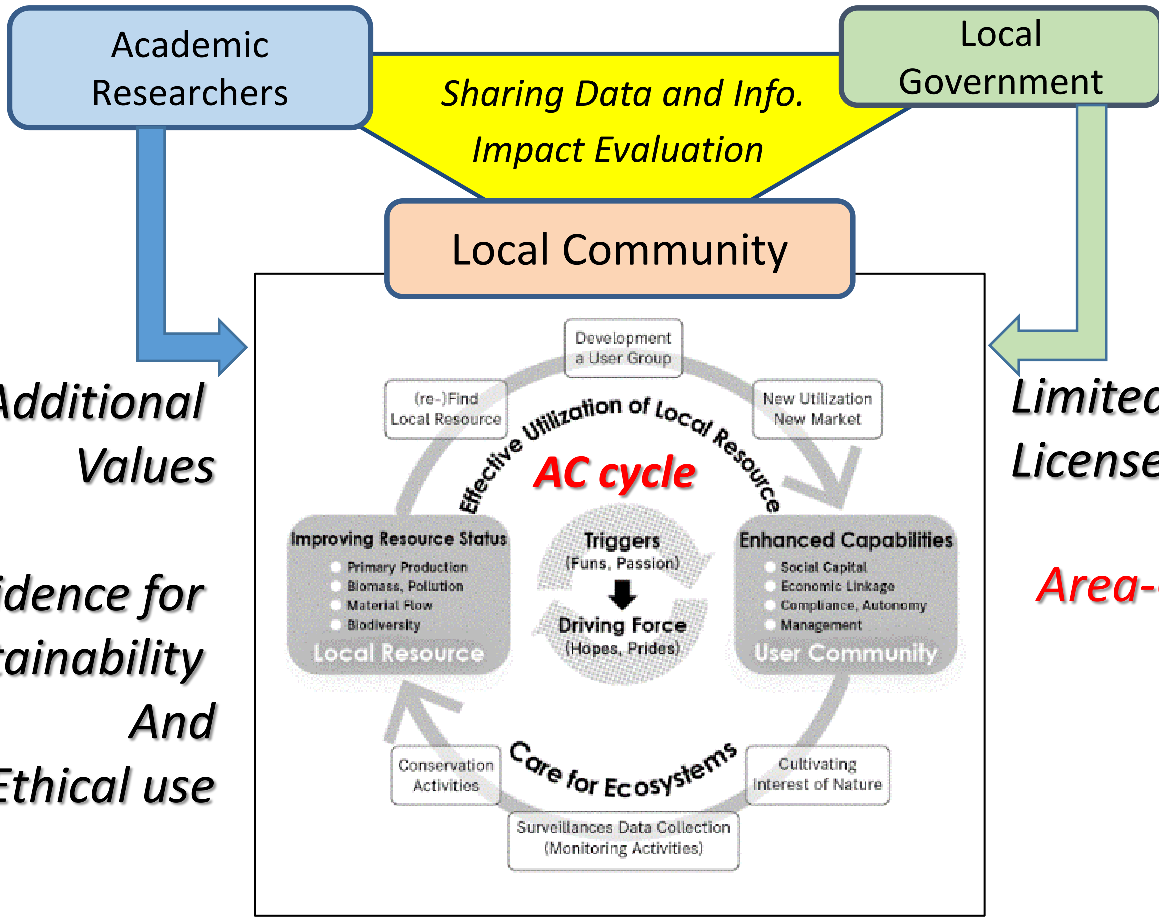
- Community members decided their own regulation for fishing around C-lant.
- 18 Fishers conducted fishing around C-lant and get larger benefits from fishing comparing before.
- Daily income from fishery is approximate 39USD/ Day.
- The fishing ground places near their village, and there is no need to pay for fuel for boats, so profits are higher than before.

- We asked them to note logbook for their fishing catch. And We proposed the Co-management of coastal fishery to them and the local government.
- We think this is a good trigger for starting Co-mamagement of coastal fishery.

Seaweed bed creation enables co-management

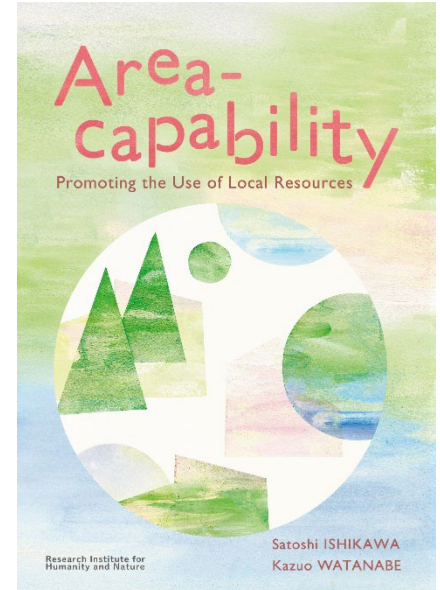


Area-capability approach (ACA)



Additional Values

Limited entry Licenses



Evidence for Sustainability And Ethical use

Area-Capability Cycle (AC cycle) as a model for collaboration Among local community, local government and academic researchers Targeting sustainable rural development

<u>"Increasing of AC cycles"</u>
<u>is most important target for sustainable rural development</u>

"Many AC cycles"
means
Many resources
Many Communities
and
Many Choices of Lives

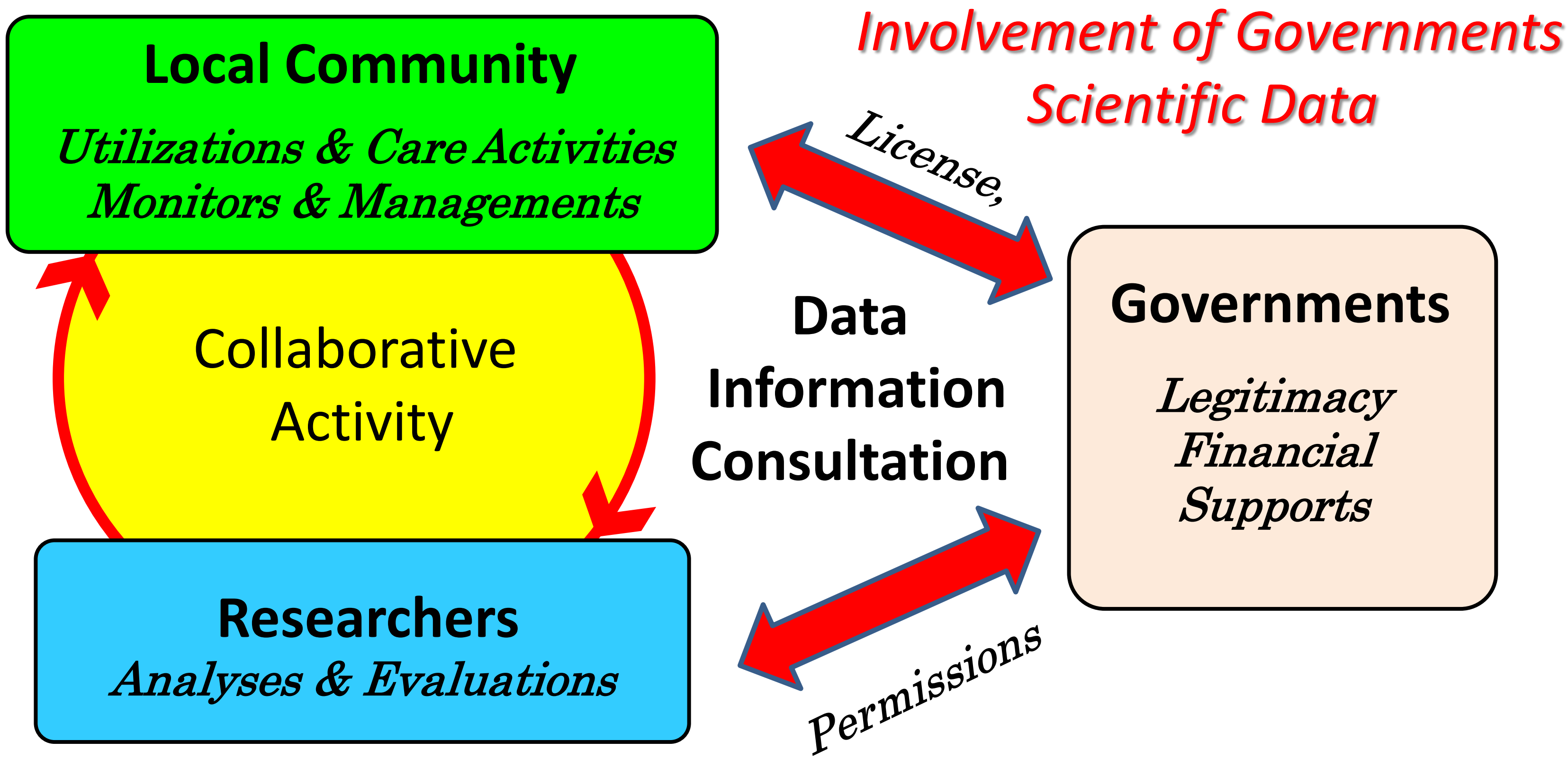
Thinking about how to create AC cycles is the real way of management


Traditional foods and folk crafts are important local resources.


<u>Local culture is a treasure trove of local resources</u>

Thank you for your attentions!

Make limited entry and Legitimacy of community use are Keys for Area-Capability Cycle



How to make good relationship among community, researchers and the government.

Collaborative activity is important!!