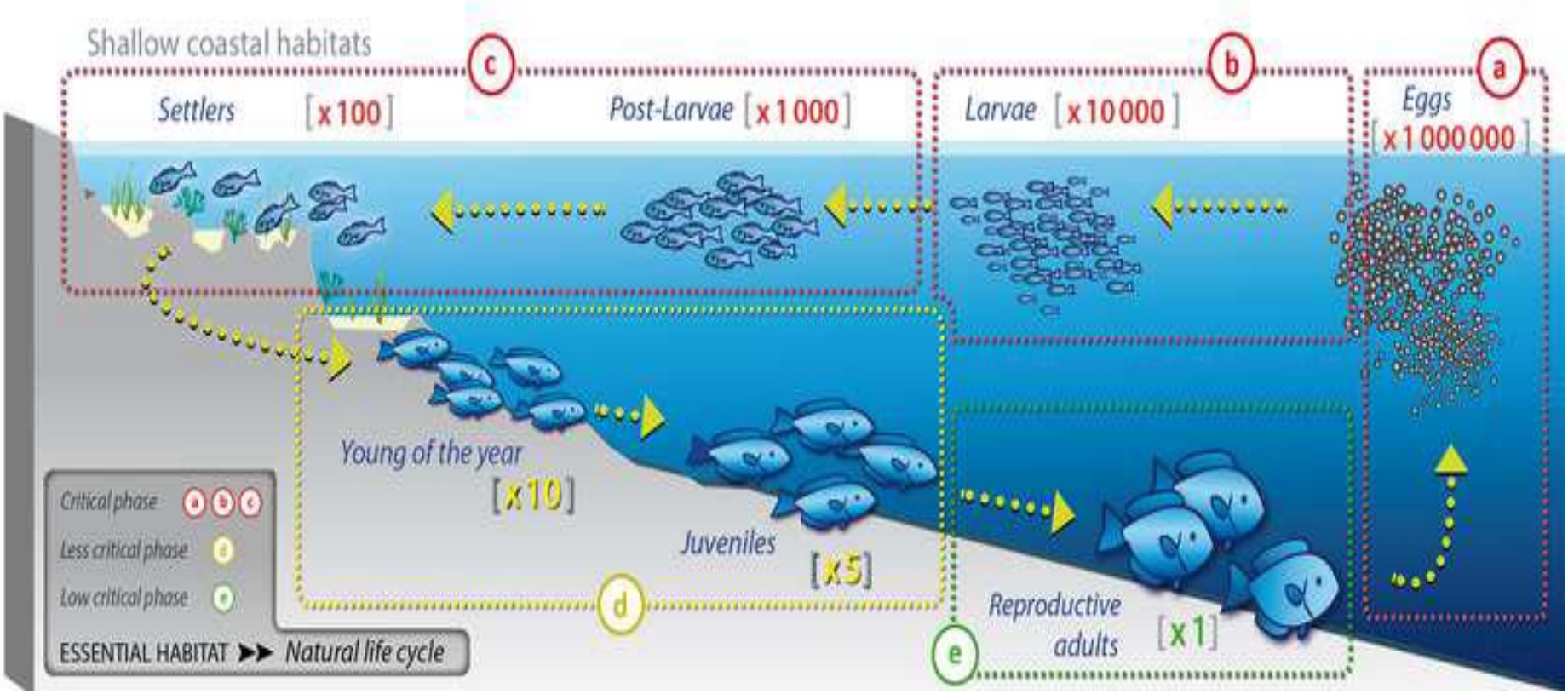
Status of Fisheries Resources Enhancement In Korea And Vietnam ODA Project

2018. 10. 18.

FIRA | 한국수산자원관리공단
KOREA FISHERIES RESOURCES AGENCY

Basic Concept

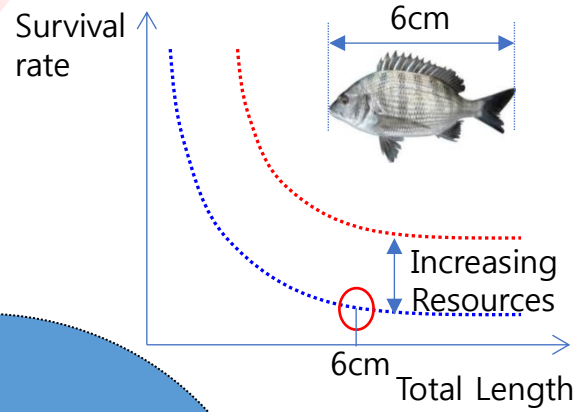
Characteristics of fishery resources



What is the differences between "Aquaculture" and "Resources Enhancement" ??

For margin

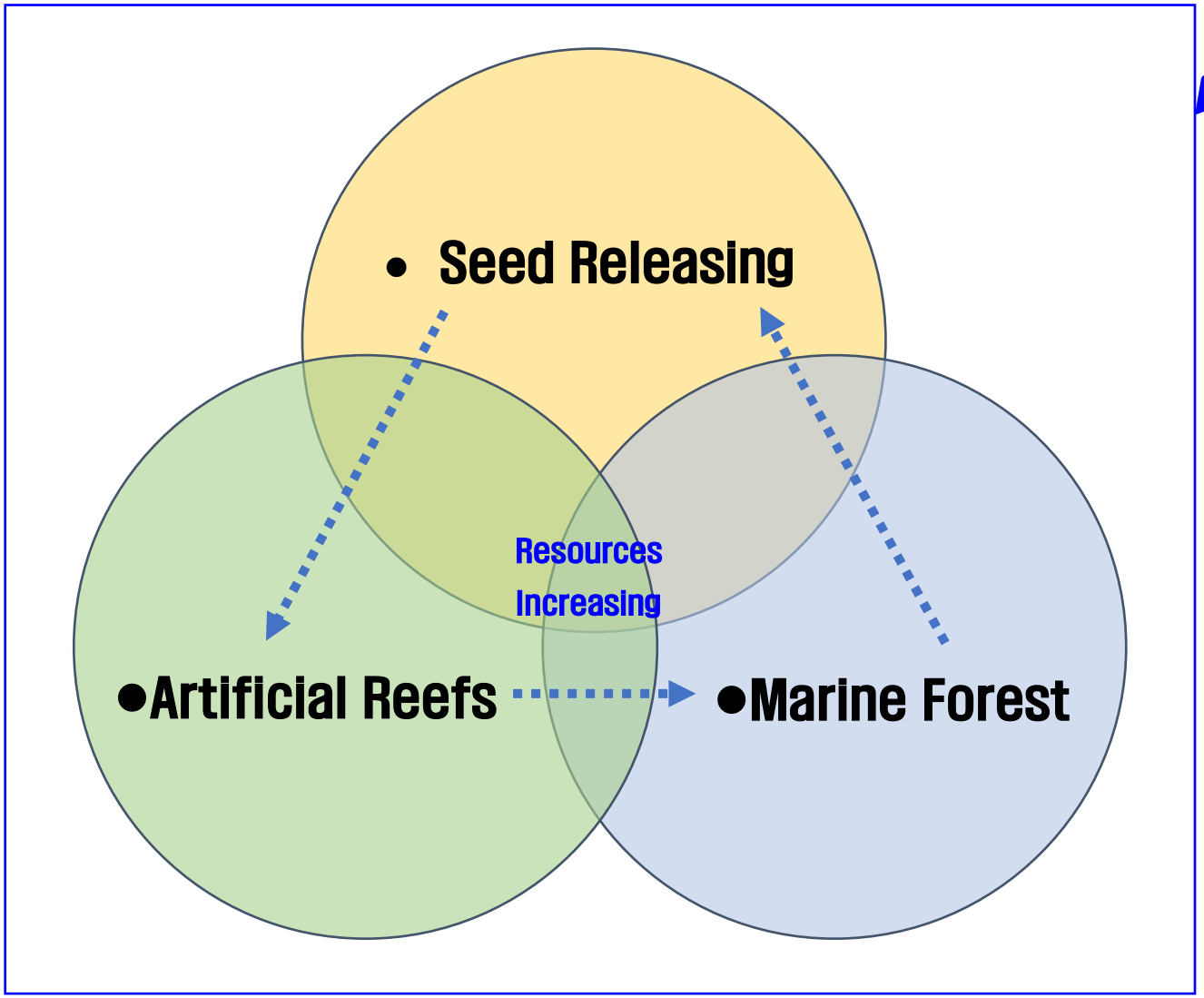
Aquaculture
(100% Man-made)



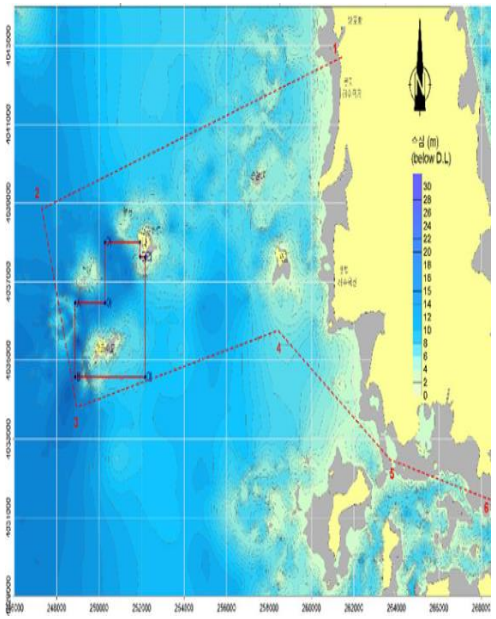
Resources Enhancement
(50% Man-made, 50% nature-made)

For mankind
(coexistence human and nature)

What dose "Marine Ranch" consist of???

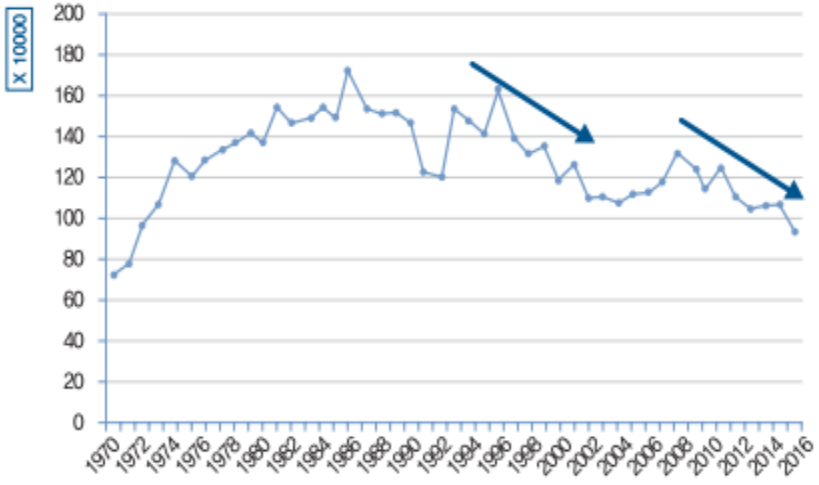


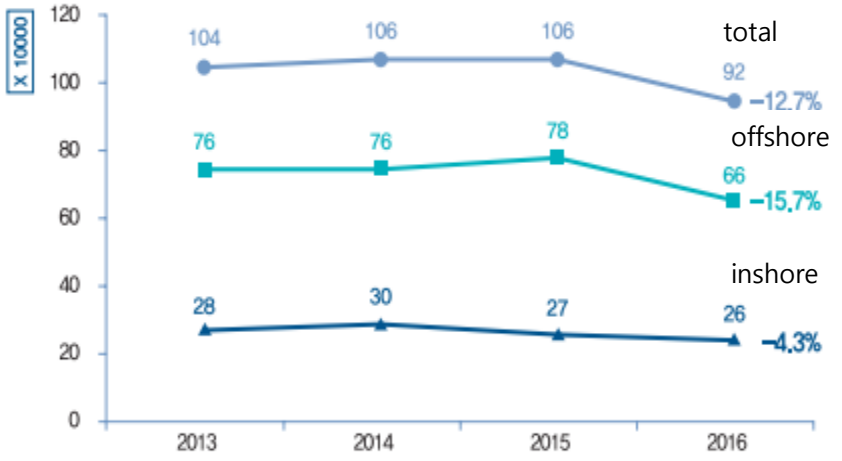
Management
- Fishing Regulation
- Government and Stakeholders



Fishing catch trend in Korea

Unit : ton





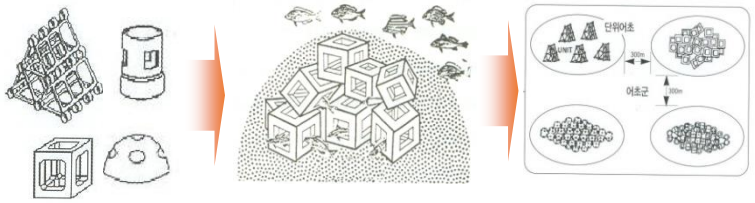
www.fips.go.kr

Fishing catches decreased by half compared to 1986(1,760,000 ton)

Contents

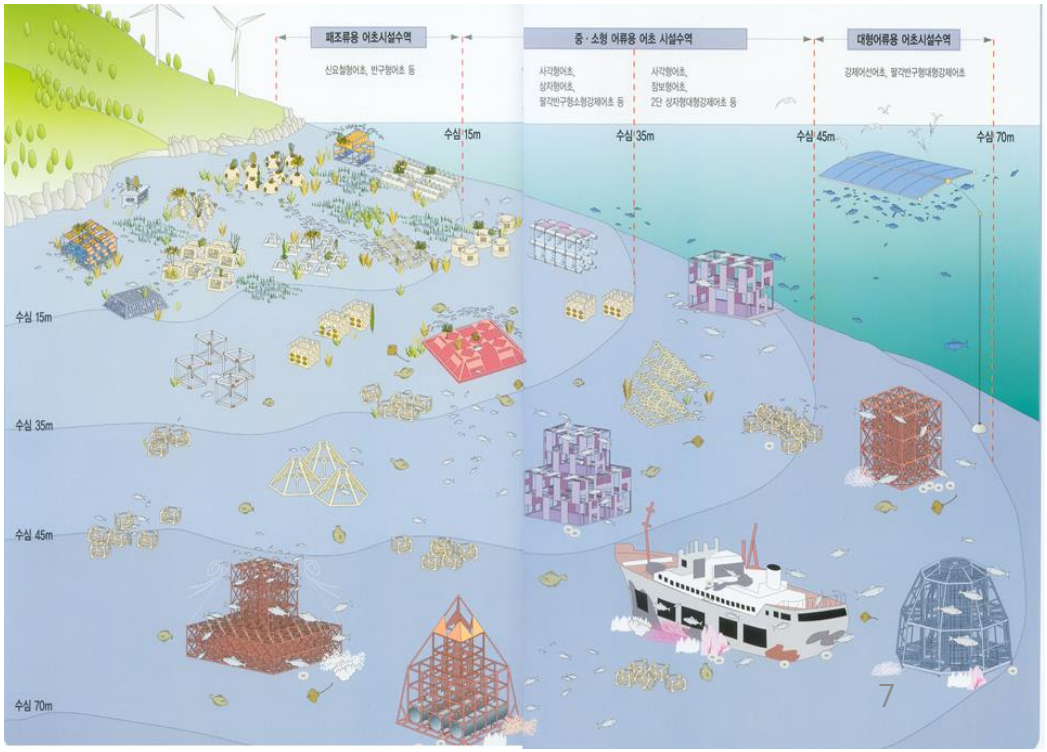
1. Artificial Reefs

Artificial Reef — **The artificial structure installed under the water to create a habitat, to provide place for the spawning and refuge for marine creature**



[natural reef]

[artificial reef]



1. Artificial Reefs

Functions of Artificial Reef

Habitat

Juveniles , rocky and Demersal fish

Feeding Ground

Feed the benthic organisms like Black scraper, Dark-banded rockfish

Spawning ground

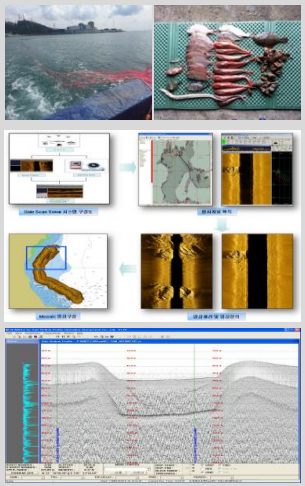
Fat greening, Sailfin sandfish, Octofpus

1. Artificial Reefs

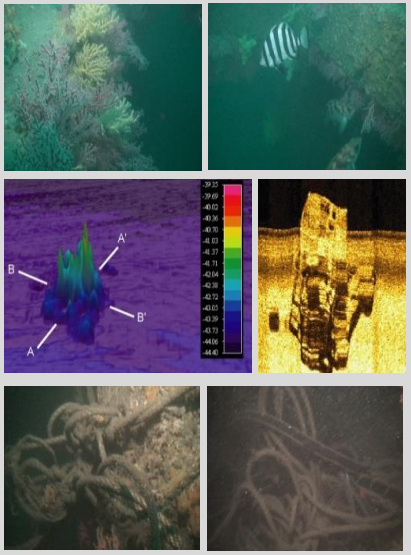
Install Artificial Reefs

Survey potential site → **Install Artificial Reefs** → **Effectiveness Survey/Management** → **Establish D/B**

1. Biological survey
2. Marine environmental survey
3. Topographical survey
4. Analysis of sediment



1. Biological survey around of the reefs
2. Check the status of the reefs
3. Make a plan for the management



1. Artificial Reefs

Status of the Installed Reefs

Installed area, amount, and used fund (11 local government, from 1971 to 2014)

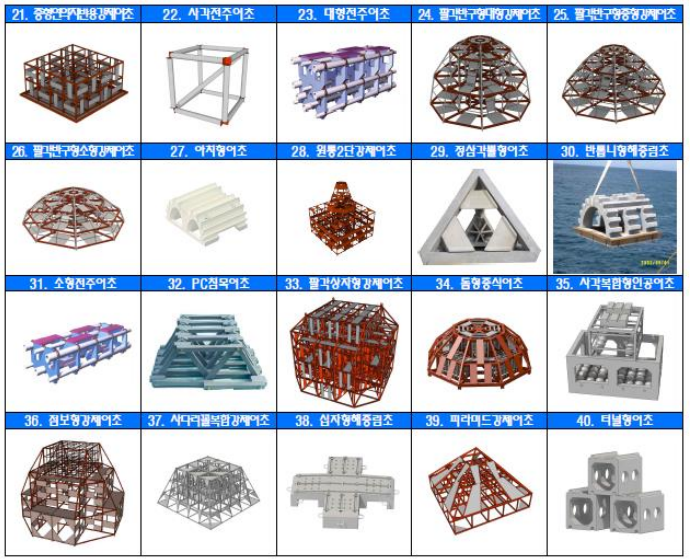
	Area(ha)	Amount(n)	Fund($ Million)
Status of the installed reefs	222,627	1,382,611	1,074.6

Effectiveness Survey




1. Artificial Reefs

77 types of artificial reef



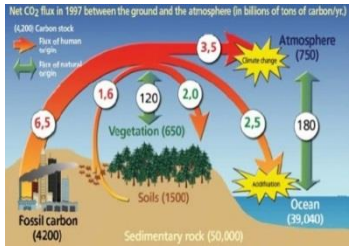
2. Creating Marine Forests

Barren Ground

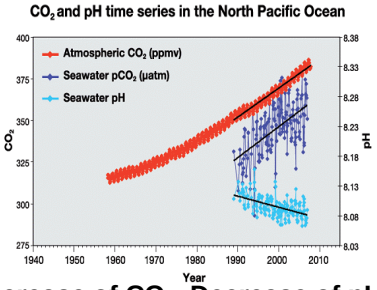
- ▶ disappeared leeflike algae and covered coralline algae on the coastal area
- The barren ground in Korean waters was first reported at Jeju island in 1992
- Increasing over 1,200ha every year, now the barren ground are over 20,000ha

Marine Desertification

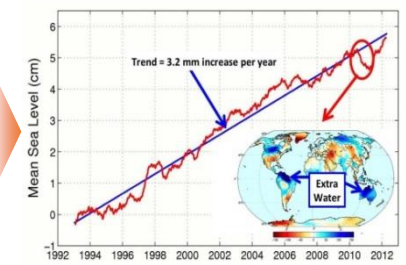
- ▶ Even all of marine organisms are disappeared and so marine is be devastated
- The barren ground intensified more, so even the coralline algae disappeared
- The rock color changes to white, all of the marine organisms are disappeared



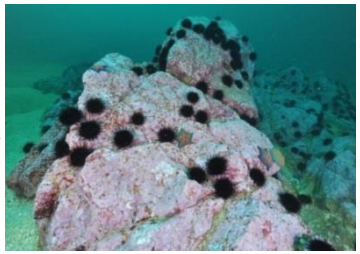
Industrial Revolution



Increase of CO_2, Decrease of pH

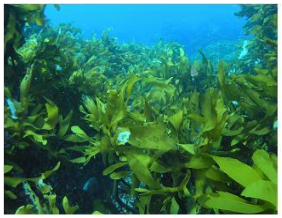


Rising Sea level and temperature



Barren ground, Desertification

Global Warming



Dominant leaflike algae

Climate Change

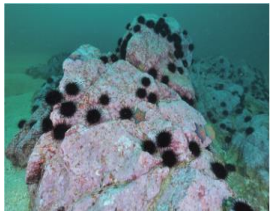
Disappeared leaflike algae

Erectro coralline algae

Marine Environment Change

Crustose coralline algae

Marine Ecosystem Change



Disappeared even coralline algae

2. Creating Marine Forests

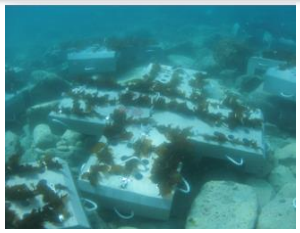
6 Functions of Marine Forest

6 Functions	Contents	Details
1. Restoration of Marine Ecosystem	·Habitat, nursery, shelter ·Increase the productivity and fisher income	·Recover the marine ecosystem ·Enhancement of fisheries resources
2. Reduction of Greenhouse Gases	·Absorb of CO_2 ·Provide dissolved O_2	·Absorb incoming CO2 from air ·A solution of the climate change
3. Clean Bioenergy Source	·Provide Bio-ethanol	·Excellent than grain, herbage and wood ·Brown algae 1 ton : 344kg energy
4. Absorption of Pollutant	·Remove N, P, heavy metals	·Filter the pollutants
5. Well-being Food	·High proteins, Low calories ·Seaweeds	·Contain the human useful materials ·Vitamin, Iodine, Magnesium
6. Source of Functional Materials	·Materials for medicine, food, industry	·Fucuidin, Seanol, Alginic acid

2. Creating Marine Forests

Creating Methods

Artificial Reefs — Install the artificial reefs with algae

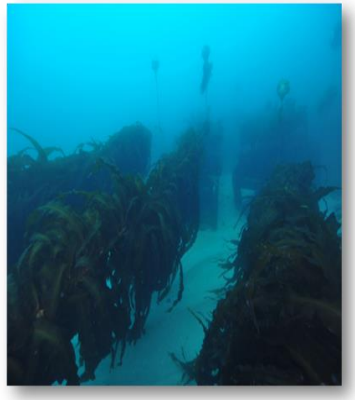
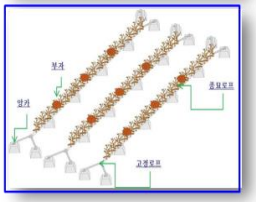

Transplant Panel — Transplant the panel with algae



Bedrock Cleaning — Remove crustose coralline algae



Underwater long-line

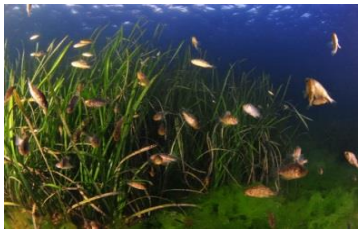




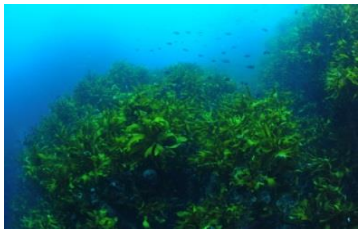
Spore-bag




2. Creating Marine Forests

KEY MAP of the creating marine forests





Status of the project

Category/Year	'09	'10	'11	'12	'13	'14	'15	'16	Total
Places(n)	7	10	11	10	9	19	21	24	111
Creating Area(ha)	121	250	715	860	1,388	2,574	3,236	3,064	12,208
Fund($ million)	10.0	15.0	13.0	15.9	18.3	32.7	35.7	34.7	175.3

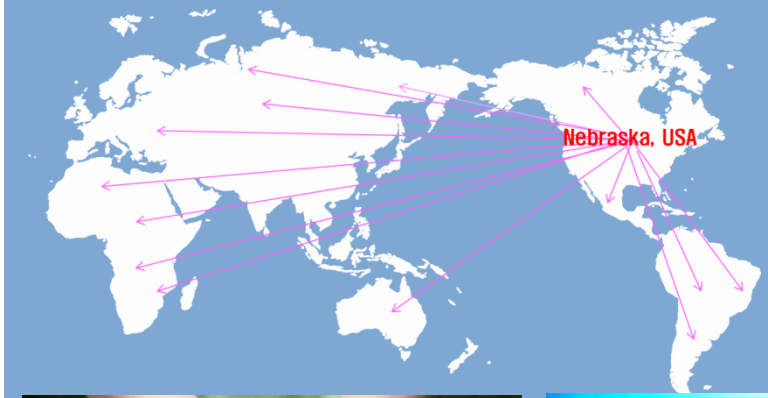
2. Creating Marine Forests

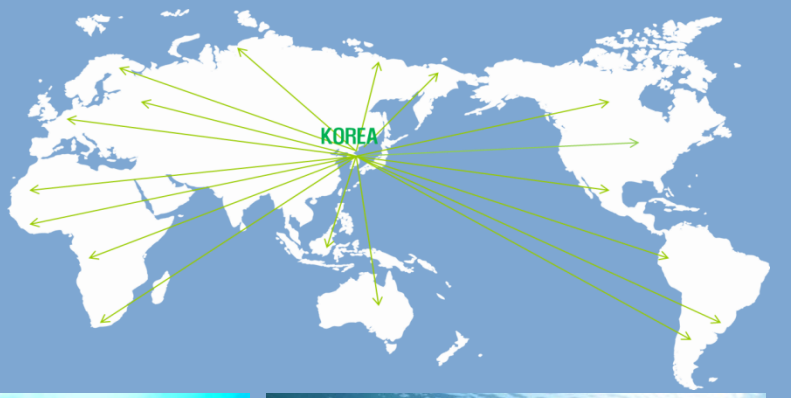
Marine Gardening Day May 10th every year in Korea: Instituted by the revision of Act on 2012

Arbor Day & Marine Gardening Day

Arbor Day : tree planting day

Marine Gardening Day : algae planting day

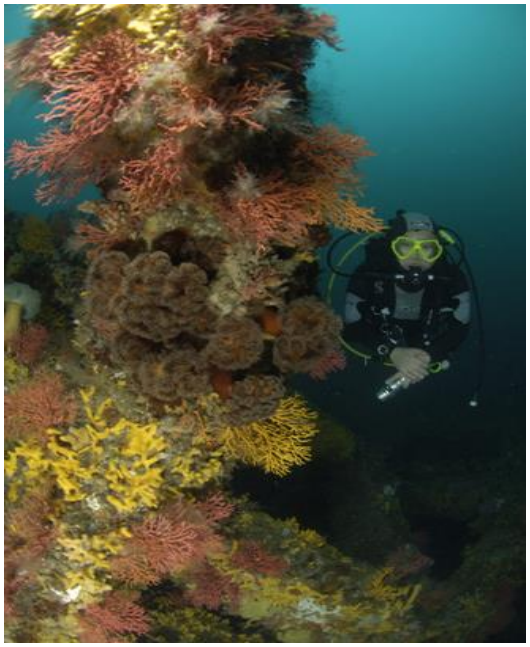


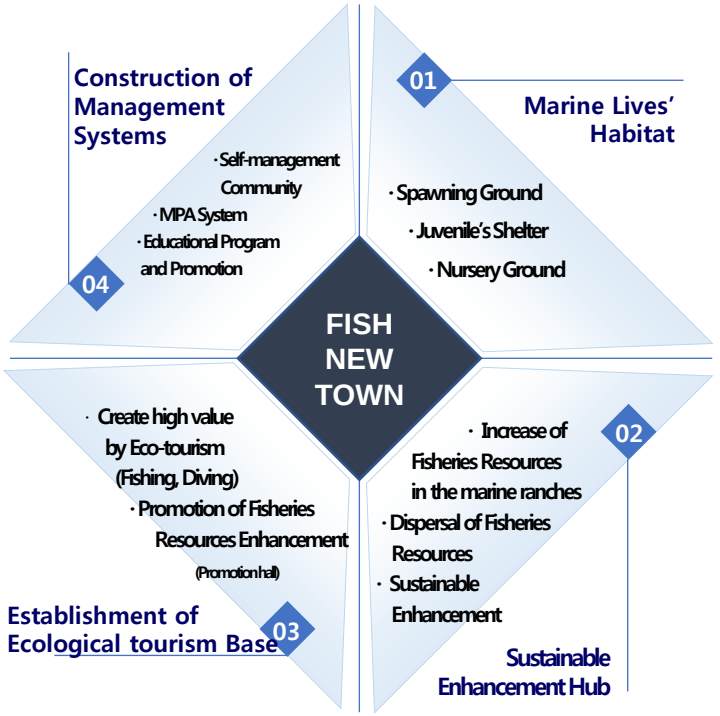


3. Creating Marine Ranches

Marine Ranches

- Create the suitable marine eco-sites that marine organisms could be living well
- Fisheries Creating System, that makes the sustainable reproduction of fisheries resources





Create Habitat	Install Artificial Reef for Fishes and Shells
Create Marine seeds	Marine Seeds Culture and Release
Improve Environment	Improve Benthic layer, Remove Wastes
Create Eco-tourism	Fishing, Experience Ground, Theme Park

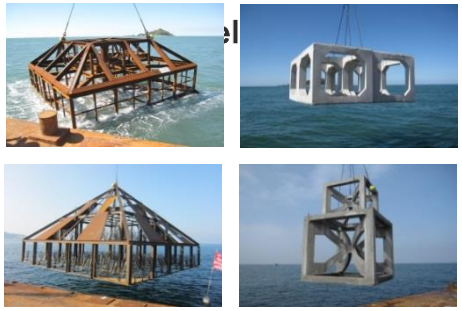
FISH NEW TOWN

3. Creating Marine Ranches

Creating Methods

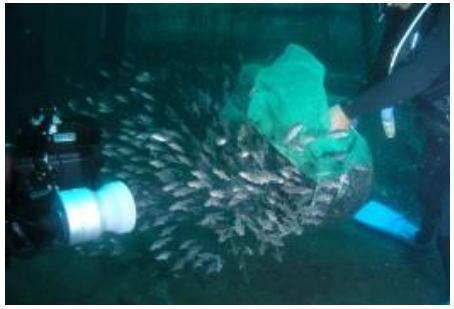
1 Create Fisheries Habitat

Install artificial reefs for



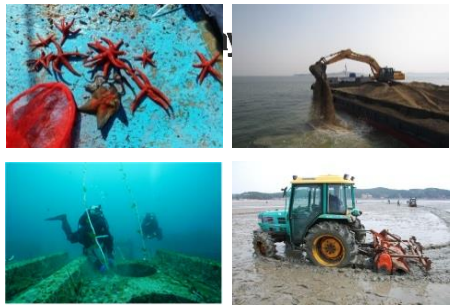
2 Create Fisheries Resources

Marine seeds culture and



3 Improve Ecological Environment

Remove herbivores, Improve benthic



4 Create Eco-tourism

Fishing, Sea pension, Experience

5 Specialization projects

Special projects by sea features

3. Creating Marine Ranches

Key map of marine ranches

Status of marine ranches

Categories		'06	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	Total
Fund($ million)		4	7	9	12	17	17	19	21	24	19	19	168
Scale (place)	Doing	4	7	9	12	17	17	18	20	24	19	19	-
	New	4	3	2	3	5	4	5	4	6	-	4	40
	Finished	-	-	-	-	4	4	2	2	5	4	5	26
	Accumulative	4	7	9	12	17	21	26	30	36	36	40	-

4. Release of Marine Seeds

Release of marine seeds — Produce and release healthy seeds through genetic management

Target species

Marine : 50 species

All

Abalone, Olive flounder, Tiger puffer, Sea cucumber, Greenling fish, File fish(2 species), Rockfish(4 species), Scorpion fish(2 species), Seabream(3 species), Sole(2 species), Seabass(2 species), Sevenband grouper, Grunt, Pacific cod, Scallop(2 species), Purplish washington clam(Total 25 species)

East Sea	Scallop, **starry flounder, Han clam, surf clam , Spiny lebbeid shrimp, Morotoge shrimp,** Smooth lumpsucke(Total 7 species))
West Sea	**river puffer, Fleshy prawn, Kuruma shrimp,** stripe mullet, Nive croaker, Swimming crab, Small yellow croket, cockle, Japanese Swimming crab, rockworm, **blue spotted mud hopper,** Meretrix lusoria (Total 12 Species)
South Sea	**Kuruma shrimp**, Swimming crab, Keen's gaper, cockle, **spotted parrot fish,** Small yellow croket, Nive croaker, **Han clam**, **Fleshy prawn**, Japanese Swimming crab, **Horsehair crab**, rockworm, **blue spotted mud** (Total 13species)
Jeju Area	Kelp grouper, Variousluy coloured avalone, Spotted parrot fish, opaleye, Small yellow croket (Total 5 Species)

Fresh water :15 species

Mitten crab(2 species), Carp(2 species), Catfish, Mandarin fish, Perch, Eel, Turtle, Ayu, Snail, Bullhead, Loach, Asian clam

Releasing strategy

* Mitten crab : river or lake
* Freshwater classification

Han river(Including im-jin river), Nak-dong river(Including east part of korea)

Geumgang river, Seomjin river, Youngsan river (Including west part of korea)

5. Monitoring TAC (Total Allowable Catch)

TAC system

Fisheries resources manage system , the system sets the catch limit by species and allows the catch in the limit(UN Ocean law)

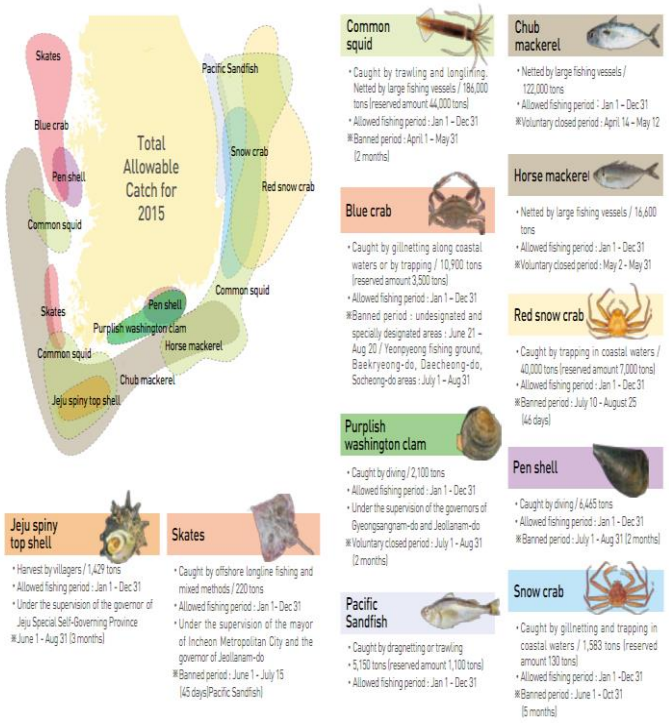
Target Species **4sp.('99) → 11sp.('16)**

Chub mackerel, Jack mackerel, Red snow crab, Pen shell, Snow crab, Blue crab, Common squid, Sandfish, Purplish Washington clam, Skate ray, Jeju top spiny shell

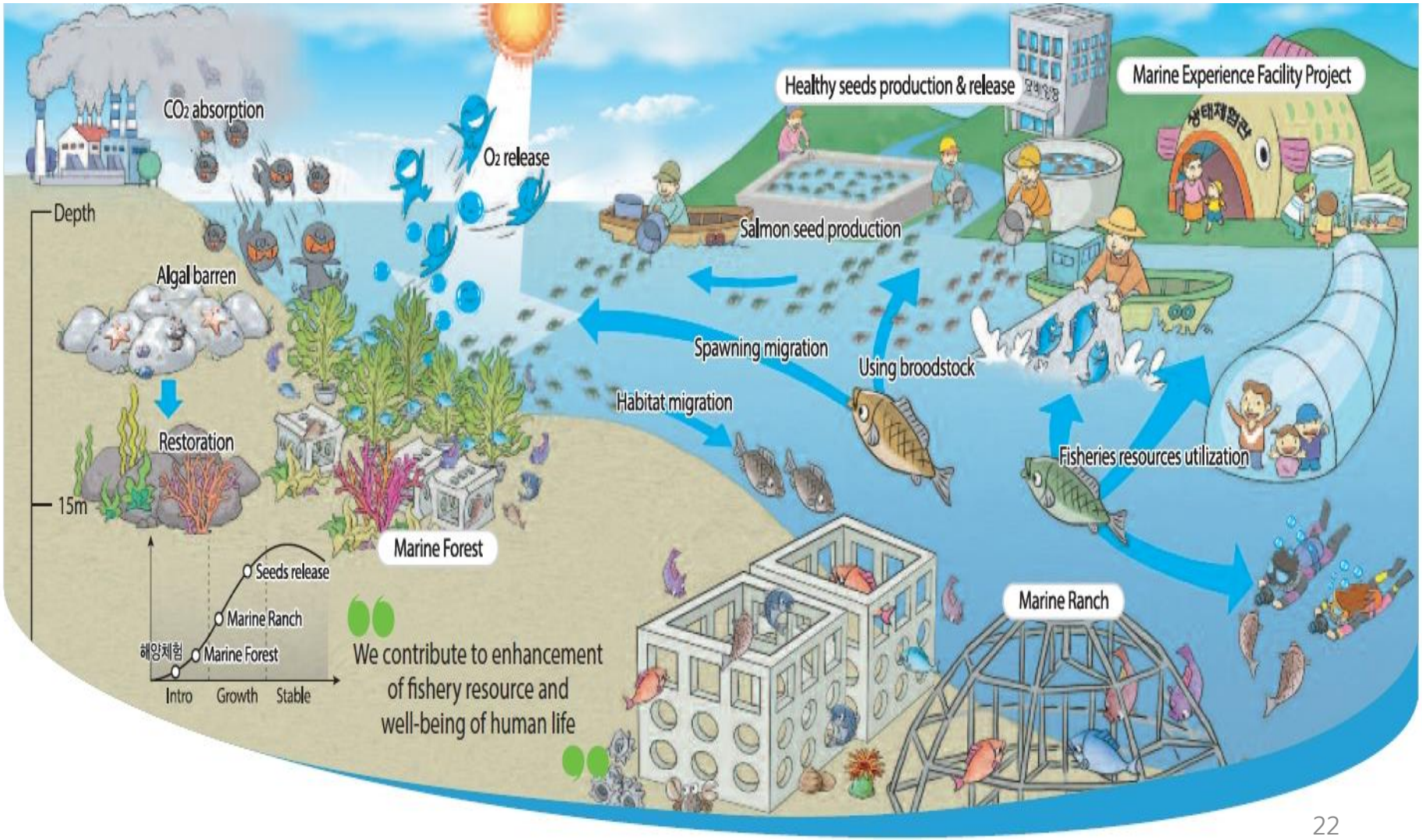
Survey sites **118 Landing Market**

Status of investigators

Region	East	West	South	Jeju Island	Total
Investigators	25	14	23	8	70



KEY MAP Of Fisheries Resources Enhancement Projects



6. ODA Project of Vietnam

Introduction **Founding a model of coastal fisheries resources restoration&management in Vietnam**

- Global interest in the depletion of coastal fisheries resources is getting increased
- Most of the Association of Southeast Asian Nations have difficulty in maintaining sustainable reproduction of coastal fisheries resources
- Developing countries are requiring Korea to transfer the technology
- Even though Vietnam has ability of production and process of fishery resources, coastal fisheries resources are on the decrease
- Support needed for restoration&management of fisheries resources

Knowledge sharing & Technology transfer

Supporting economic development of Vietnam

Keep continuous cooperative relationship (Fishery field) between Korea & Vietnam

Extending R&D

Overseas expansion (field of fisheries resources or other related enterprise)

Stabilized secure of fisheries resources from abroad

6. ODA Project of Vietnam

Effets of Vietnam Project

Economical Industrial Aspects

Creating jobs

Competitiveness

Constructing Infrastructure

Social Aspects

Food supply

Protect ecosystem

Change in perception

Technical Aspects

Securing technology

Setting foundation

Outstanding workforce

6. ODA Project of Vietnam

Flow Chart of Vietnam Project

Flow Chart	Contents	Remarks
Project Start		
1st Field Research (Natural Science Survey) completed		1 Year ($ 145,000)
Ocean Environmental Survey	- Physics(Current, Wave, WT) - Chemicals(Salinity, Ph, ect) - Sediments - Topography(Water depth)	
2018 ODA Project of Vietnam [Training Invitation]		
2nd Field Research (Social Science Survey) discussing		
AR Design	- Target Species(Fish, Seaweed, Shellfish, etc.) - AR Materials, Height, Arrangement, etc.	
AR Stability Analysis	- Stability Analysis against Wave - Stability Analysis against Sediments	
Installation of AR	- Deployment AR - Seed(Juveniles) Releasing	2~4 Year ($ 783,000)
Monitoring and Outcome assessment	- Fish Attraction?? - Ecological Enhancement?? - AR Stability?? - Increased Fisheries Productivity?? - Overall Benefit??	4~5 Year ($ 783,000)

6. ODA Project of Vietnam

Progress of the Project

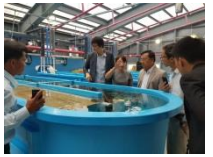
1st Field Research

- 18.06.17.~18.06.23. (7days)
- Meeting with executives of Vietnam
- Visit the Korean Community Association in Vietnam
- Visit local fish market near Hoi An (major fishery products)
- Visit fishing village society near Cham Island (survey analysis)
- Underwater investigation (topography, marine ecosystem etc.)



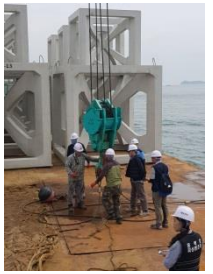
2018 ODA Project of Vietnam Training Invitation Program (18.09.02.~18.09.07.)

- Know-how about development & administration skills of fishery resources
- Enforce capability



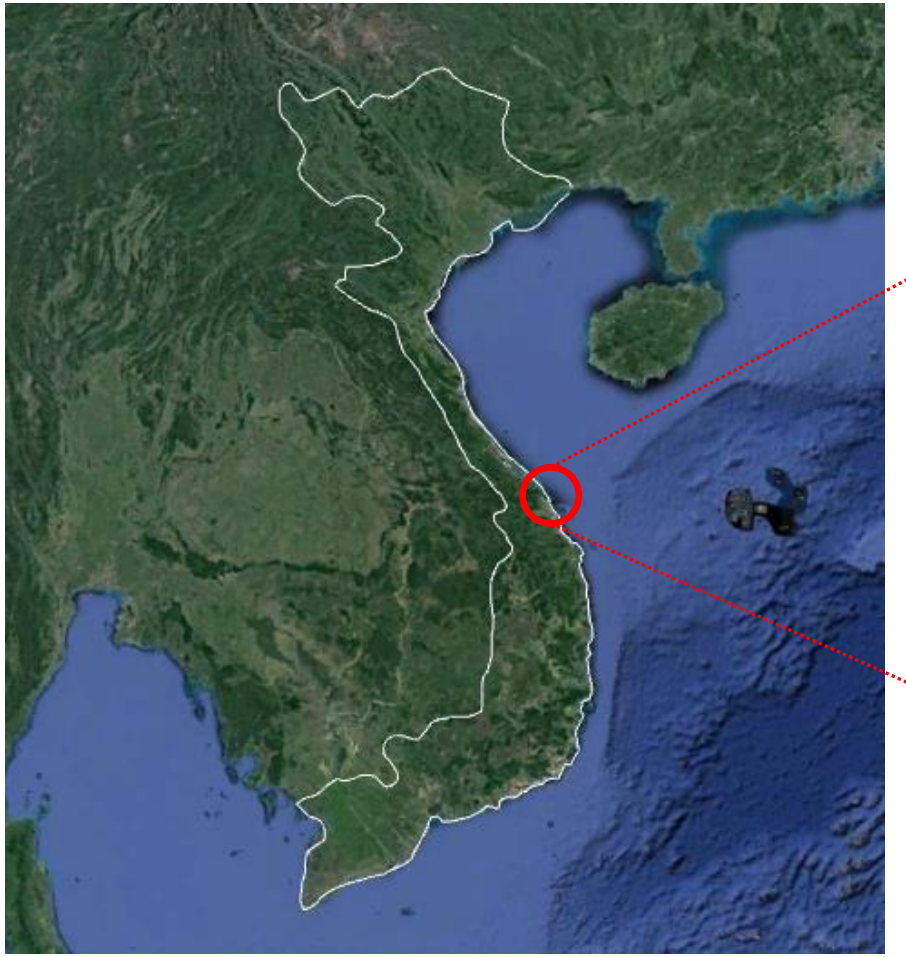

2nd Field Research

- Scheduled about the end of October
- Investigation of social and cultural status around Cham Island (Fisheries, Tourism, Current State of Fishing Village Society)
- Establish the plan of follow-up management



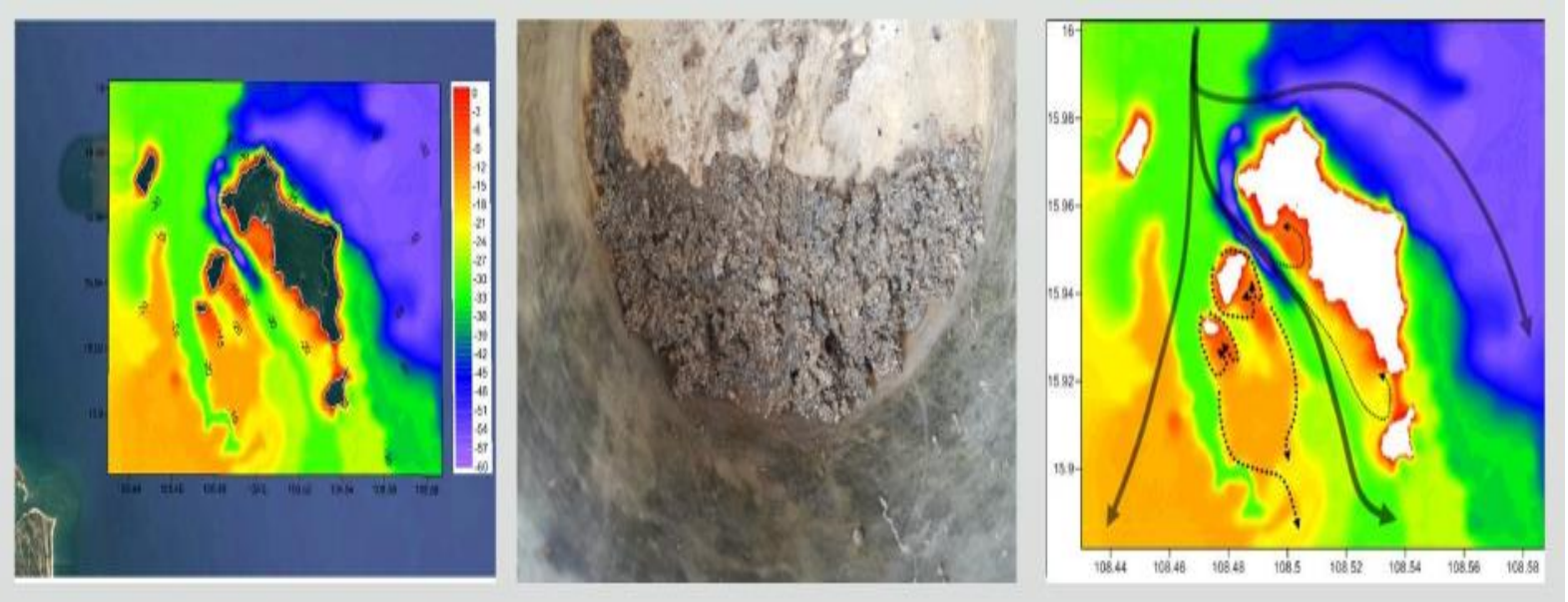

6. ODA Project of Vietnam

Site : Cham Island in Vietnam



6. ODA Project of Vietnam

Ocean Environmental Survey



Topography | Sediments Type | Ocean Physical Factors

+ **Ocean Chemical Factors(Salinity, pH, DO, etc)**

6. ODA Project of Vietnam

Target Species Survey(Around Cham Island)

Result of Fishermen Interview

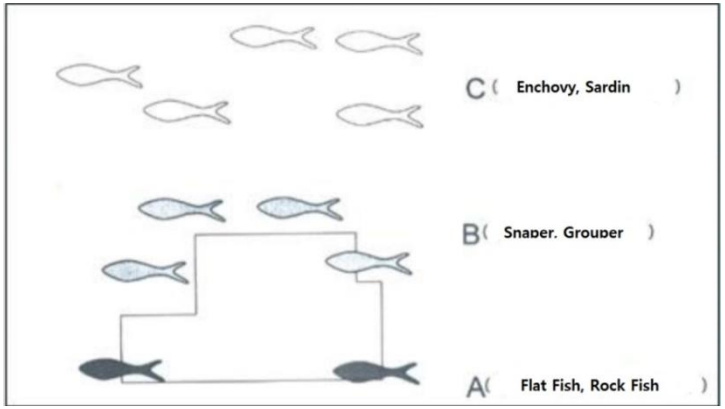
- Fishing boat(Fishing village) : 30
- Income : Captain $50, Crew $10/day
- Mainly preferable species : Crab and Shrimp
- Mainly captured species : Small Fishes
- Fishing method : Mainly trolling, net
- Fishermen's opinion : Positive unless not disturb trolling, no knowledge on "Artificial Reef"

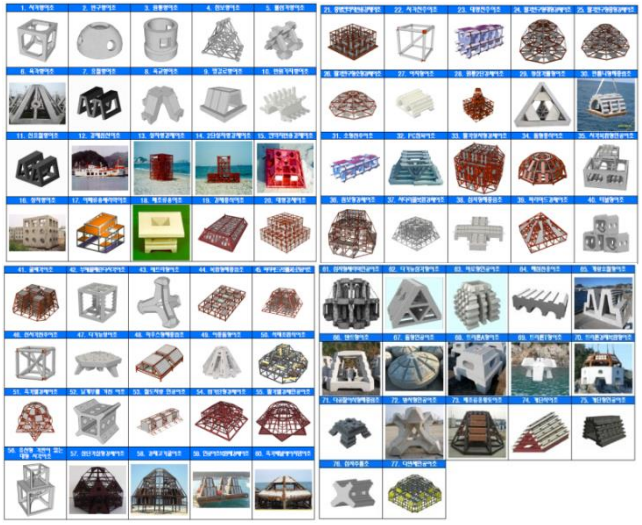
6. ODA Project of Vietnam

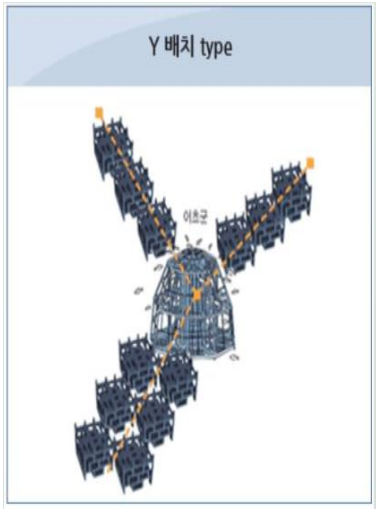
Target Species Survey(Cham Island)

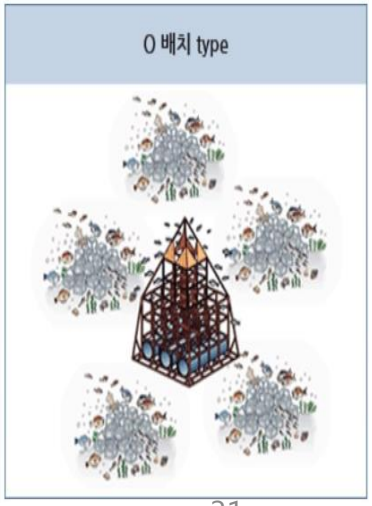
6. ODA Project of Vietnam

Determining of Artificial Reef Specification





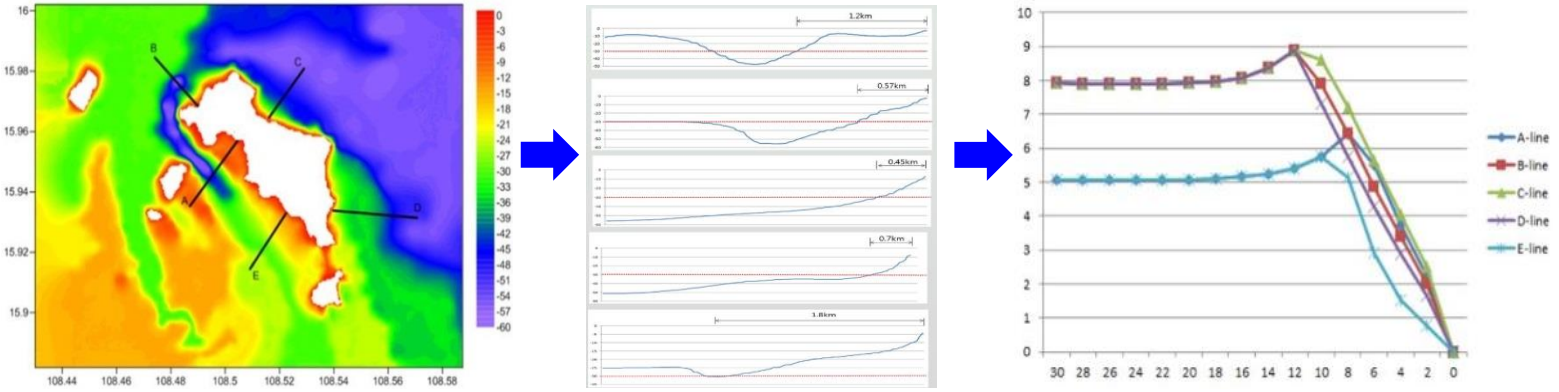




6. ODA Project of Vietnam

Stability Analysis of Artificial Reef

Analysis against



- Using **50 years frequency** in order to secure the stability of artificial reefs
- In case of 50 years frequency at Cham island, maximum wave height was analyzed as **8.64m(SW direction)**
- Used theory : Small amplitude wave theory
- Wave breaking depth at Cham island : **8~12m depth**
- Water particle velocity : **2.61m/sec** -> A design factor for artificial reefs

6. ODA Project of Vietnam

Sediments Analysis for Artificial Reef

- We will analyze of bottom sediments at Cham island using “Unified Soil Classification System”
- Cham island bottom sediments type was “Fine sand”
- We think that this sediments type is good site to install for artificial reefs

6. ODA Project of Vietnam

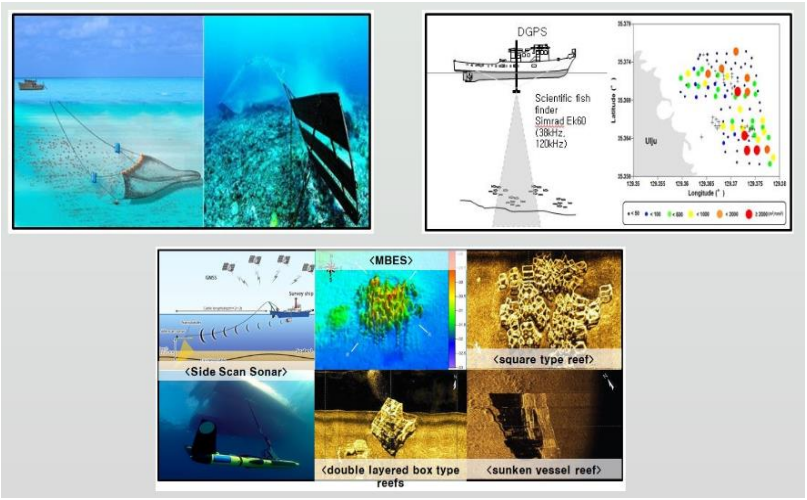
Selection suitable site for Artificial Reef

6. ODA Project of Vietnam

Installation of Artificial Reef

6. ODA Project of Vietnam

Outcome assessment and Economical analysis



Thank You