



# **Effectiveness of reefs in the western coastal waters of Korea**

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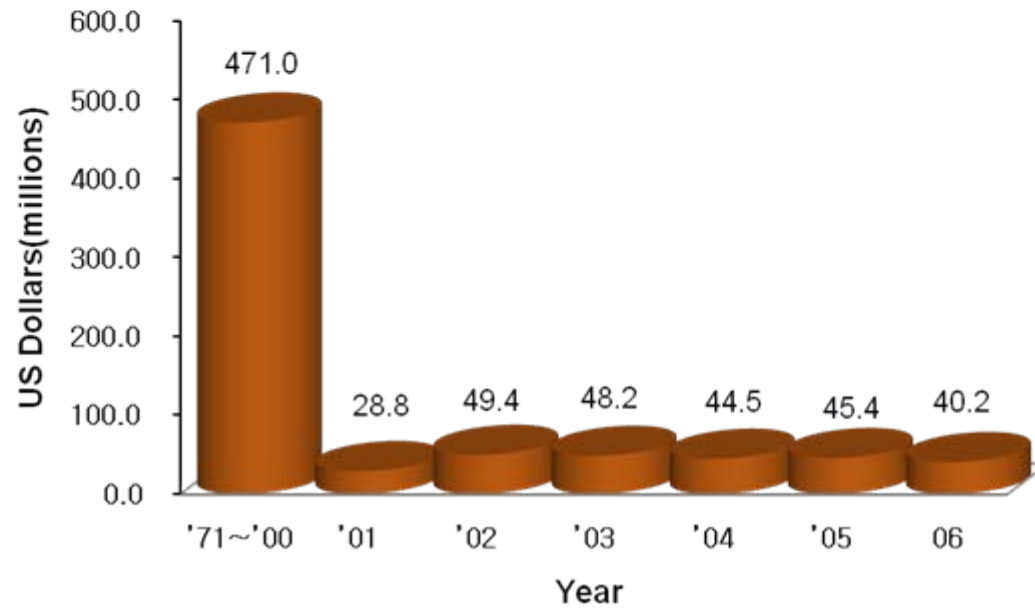


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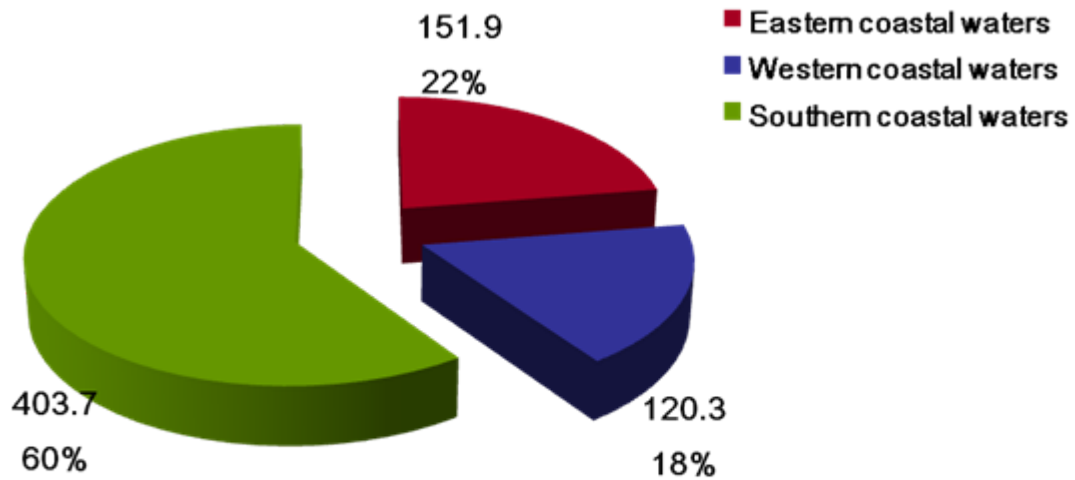
- 1. Outline of AR projects in Korea**
- 2. AR modules used in Korea**
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- 4. Examples of effectiveness of ARs**
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# 1. Outline of AR projects in Korea

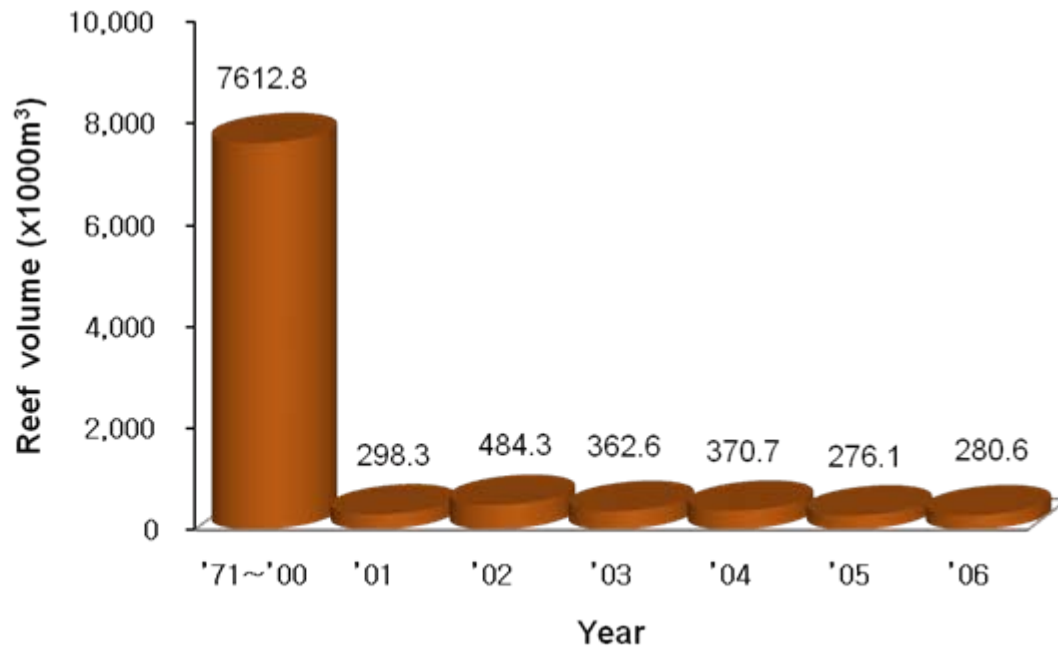
Budgets for artificial reef installation  
from 1971~2006 in Korea



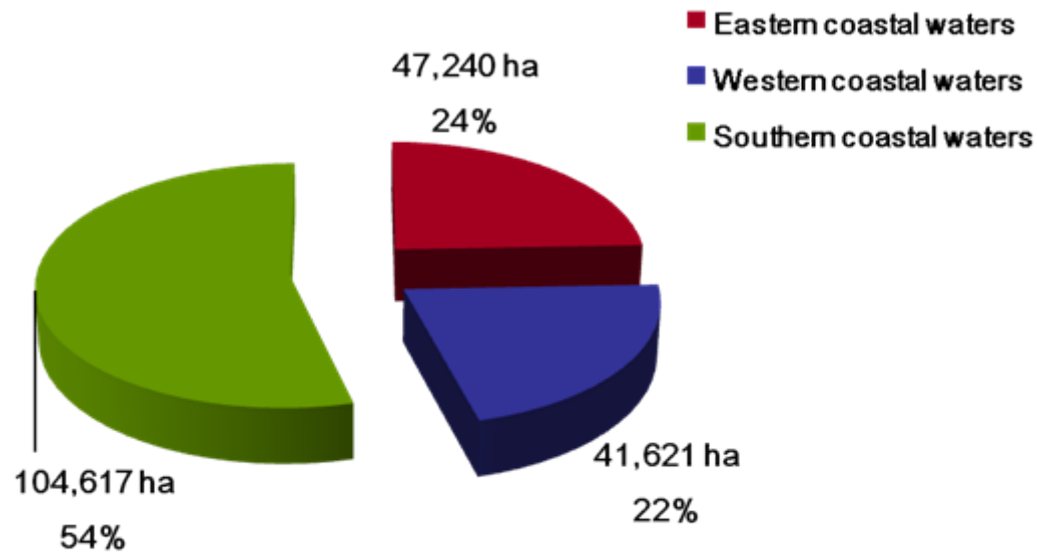
**Budgets(million US \$) for artificial reefs by each coastal waters from 1971~2006 in Korea**



**Artificial reef installation volume  
from 1971~2006 in Korea**



Artificial reef installation volume by each coastal waters  
from 1971~2006 in Korea



## 2. Types of reefs installed in Korea



**Hemisphere-branch  
type reef (5.0x3.5x2.9m)**



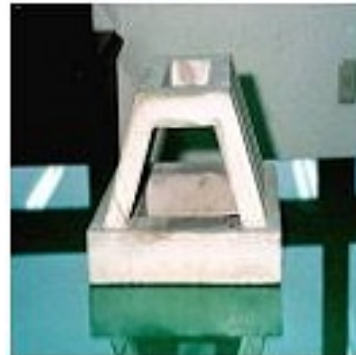
**Arch type reef  
(2.9x2.4x1.4m)**



**Saw-toothed type reef  
(2.3x2.3x1.5m)**



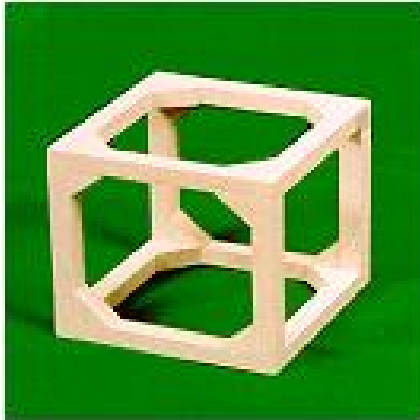
**Prominence type  
reef (2.5x2.0x1.5m)**



**Bungalow type reef  
(2.2x2.2x1.4m)**



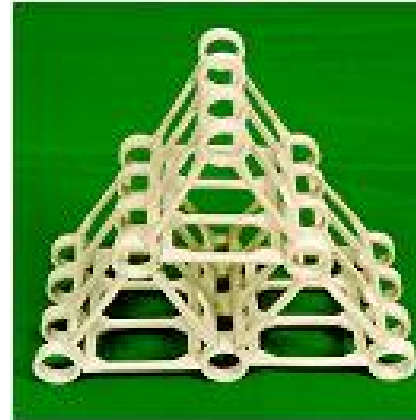
**Regular trigonal pyramid  
type reef (3.1x3.1x2.9m)**



**Dice reef**  
**(2.0x2.0x2.0m)**



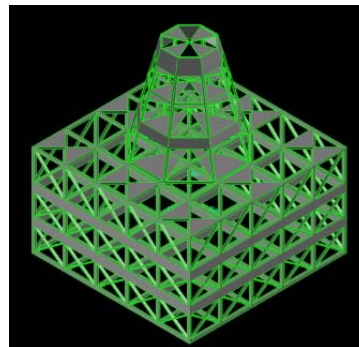
**Hexagon reef**  
**(6.0x5.2x3.0m)**



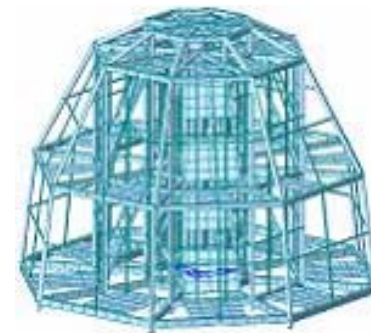
**Jumbo reef**  
**(6.8x5.0x6.0m)**



**Box reef**  
**(3.0x3.0x3.0m)**



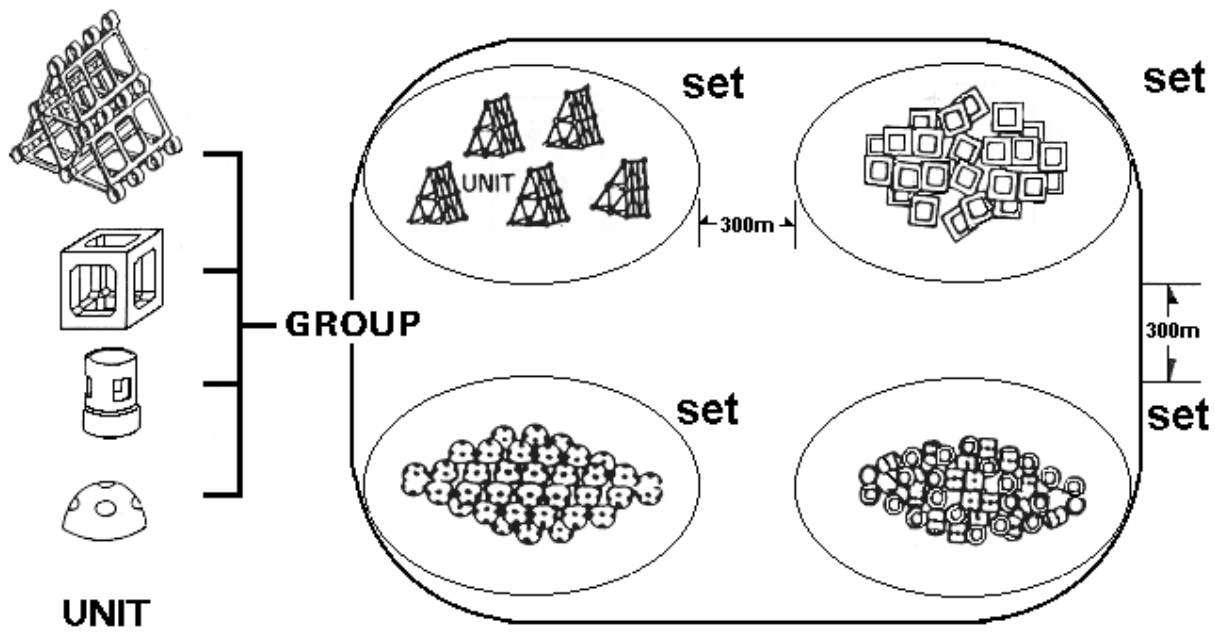
**Octagonal steel reef**  
**(11.0x11.0x13.2m)**



**Octagonal hemisphere steel reef**  
**( $\Phi$ 12.8x6.0m)**

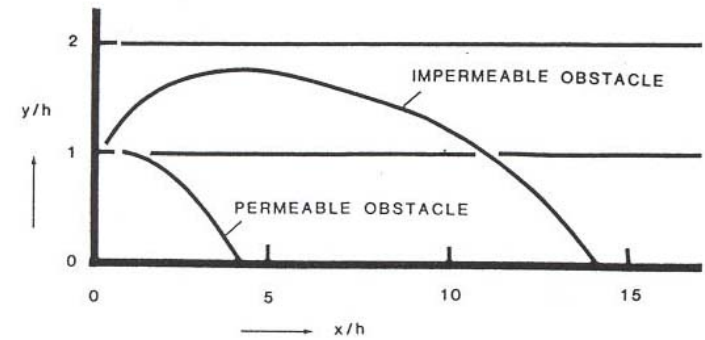
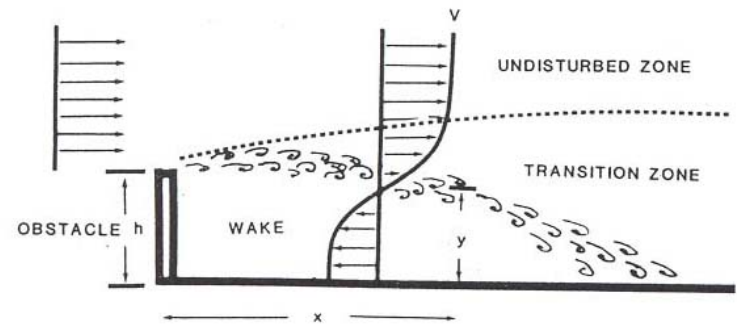
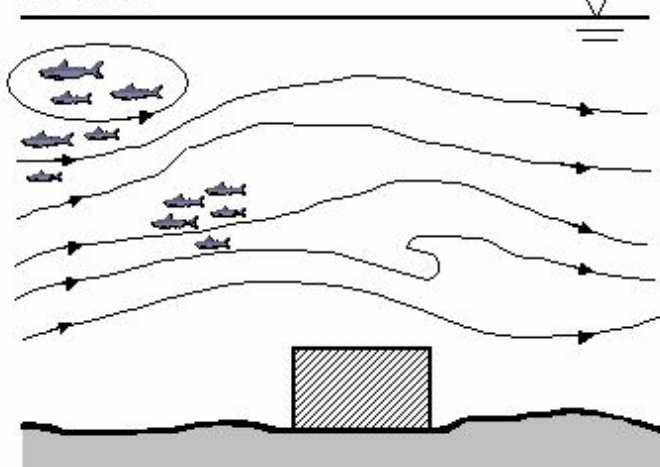


### 3. Deployment of reefs in Korea



# Lee wave & wake zone caused by ARs

Lee Wave

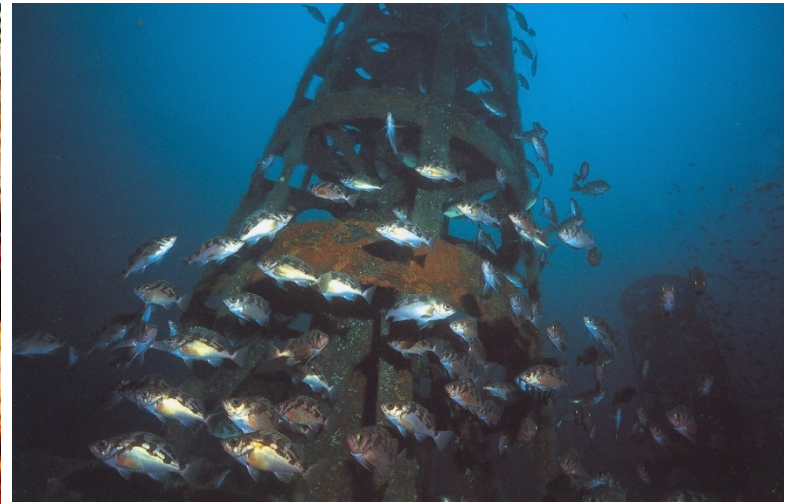


Range of turbulence of current due to two dimensional obstacle

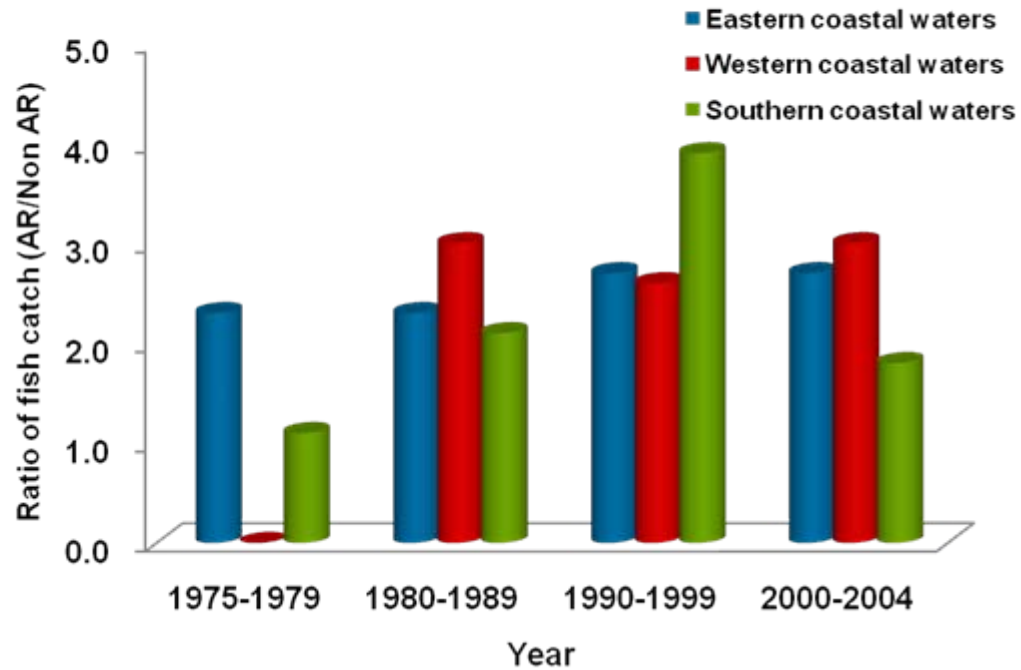
## 4. Examples of Effectiveness of ARs

-Being mainly estimated by (1) the observations of fish species through SCUBA diving and (2) fish catch through such fishing gears as angling, gill net and seine net.

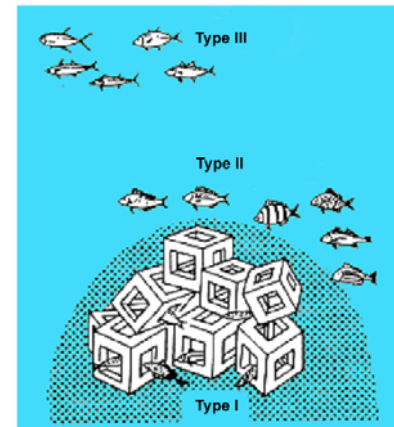
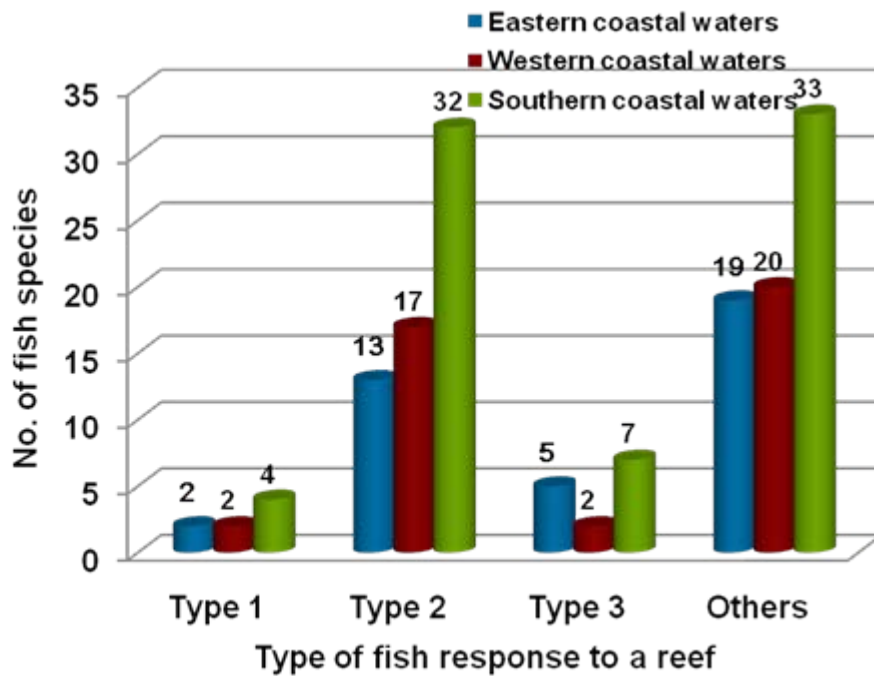
-In Korea the reef productivity index, which means annual fish catches per unit bulk volume of reefs, was reported by 2 kg.



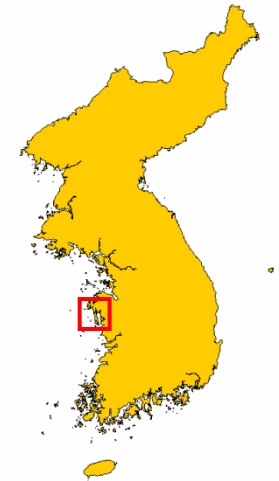
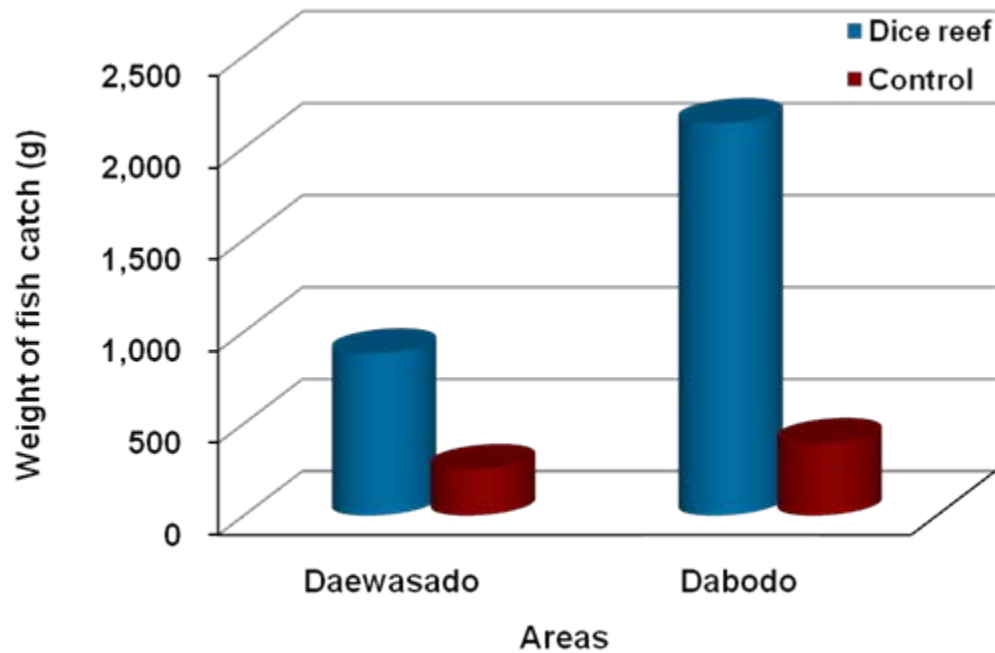
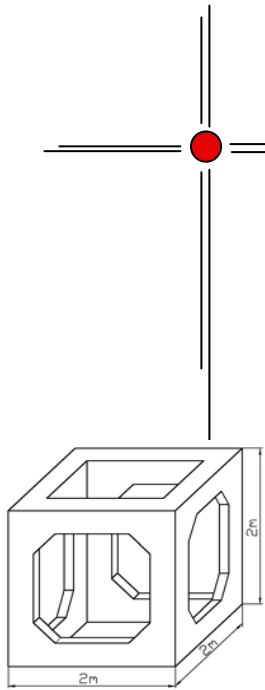
Effectiveness of artificial reefs at each coastal waters from 1975~2004 in Korea



## Classification of reefness of fishes caught at reefs in each coastal waters of Korea (Kim et al., 1989)



**Comparisons of catch per unit effort by trammel gill net in dice reefs installed at Daewasado and Dabodo in the western coastal waters of Korea**



## Catch per unit effort by trammel gill net in dice reefs at Daewasado and Dabodo in the western coastal waters of Korea

Scientific name	Weight of fish catch(g)			
	Nov. 2005		May 2006	
	Daewasado reef	Control	Dabodo reef	Control
<i>Paralichthys olivaceus</i>			166.0	
<i>Hexagrammos otakii</i>			42.0	
<i>Sebastes schegeli</i>		126.0	126.0	
<i>Liparis tessellatus</i>	582.0			
<i>Pseudorhombus</i>	64.0			
<i>Hemitripteris villosus</i>	66.0			
<i>Okamejei kenojei</i>	170.0		548.0	
<i>Pleuronectes yokohamae</i>		126.0	800.0	284.0
<i>Hemitripteris villosus</i>			338.0	110.0
<i>Platycephalus indicus</i>			114.0	
<b>Total</b>	<b>882.0</b>	<b>252.0</b>	<b>2134.0</b>	<b>394.0</b>

## 5. Post-placement management of ARs



**Planning of artificial reef management**

**Survey of the state of reef installation**  
(Location, height and bulk volume of reef)

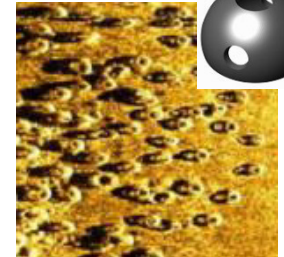
**Remove of derelict fishing gear from reefs**

**Evaluation of artificial reef function**

**Economic assessment of reefs**  
(Benefit cost analysis, etc.)

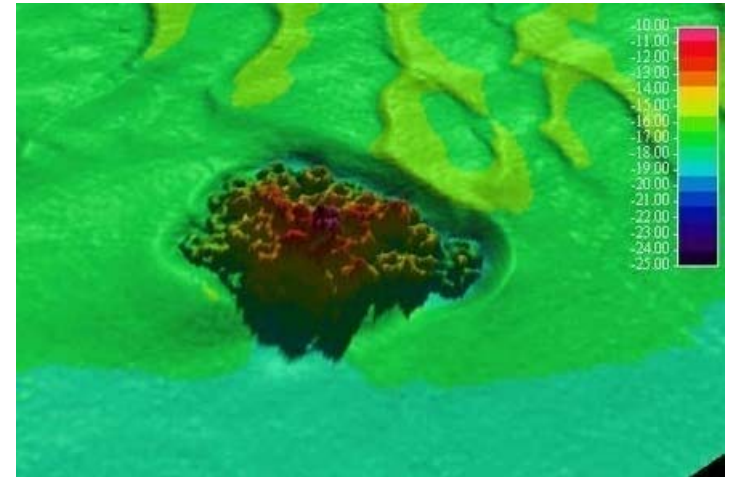
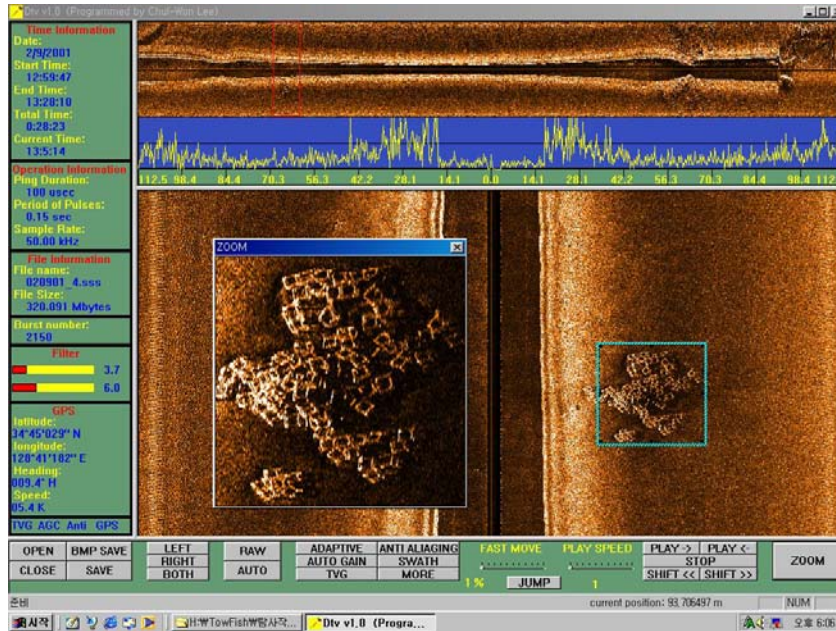
**Enforcement work of reef**  
(Status Quo of overturned reefs and enlargement of existing reefs)

**Input of surveyed data in database**



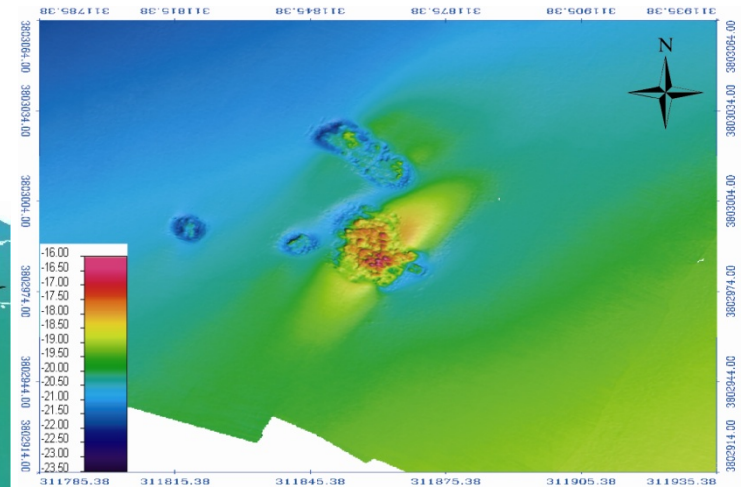
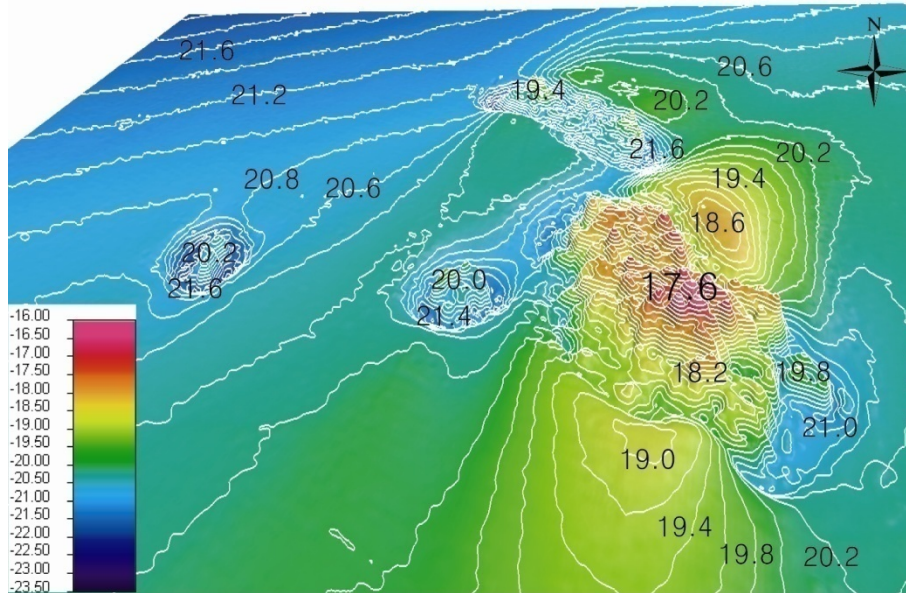


# Estimation of installed reef volumes & stabilizations

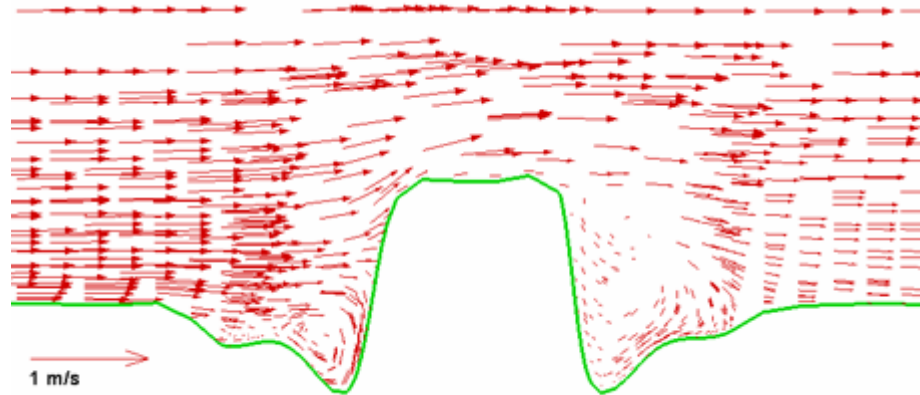
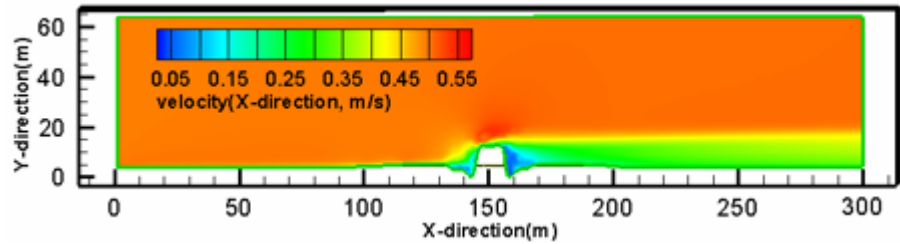


$$\psi = \frac{\rho f u^2}{2(\rho_s - \rho) g d}$$

# Analysis of scour and accumulation around AR



# Disturbance of current around AR





**Thank you.**