



Ministry of Oceans  
and Fisheries



KIMST

# Providing information and managing the Marine Bio Resources



# INDEX

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Providing information and the way managing  
the Marine Bio Resources



Part 1  
**Outline**

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Part 2  
**Research details and results**

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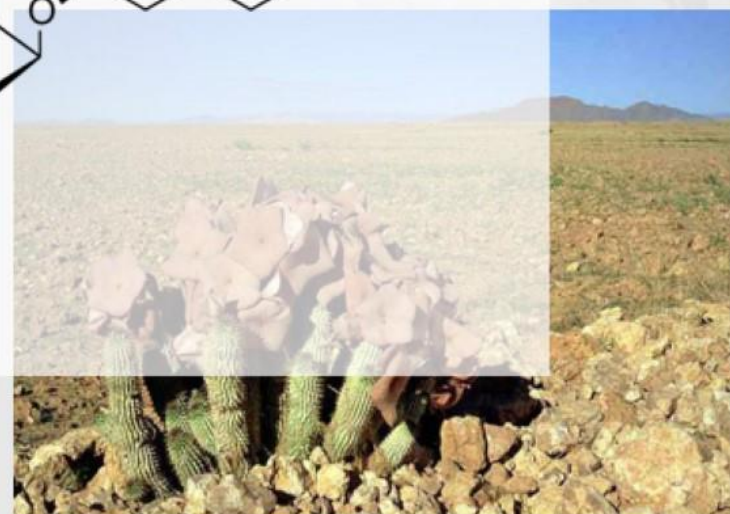
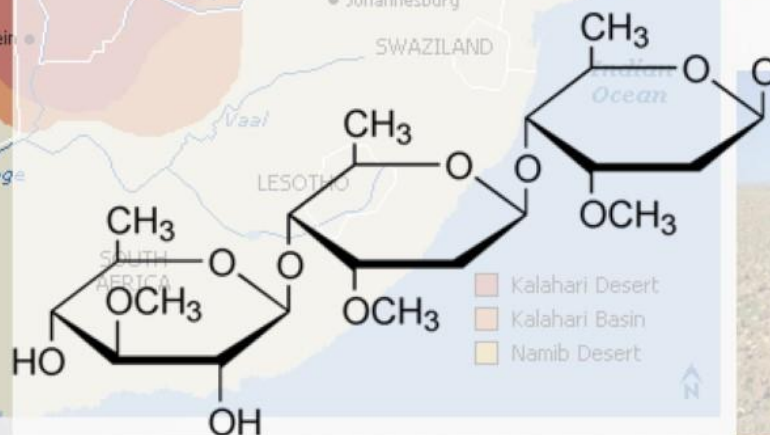
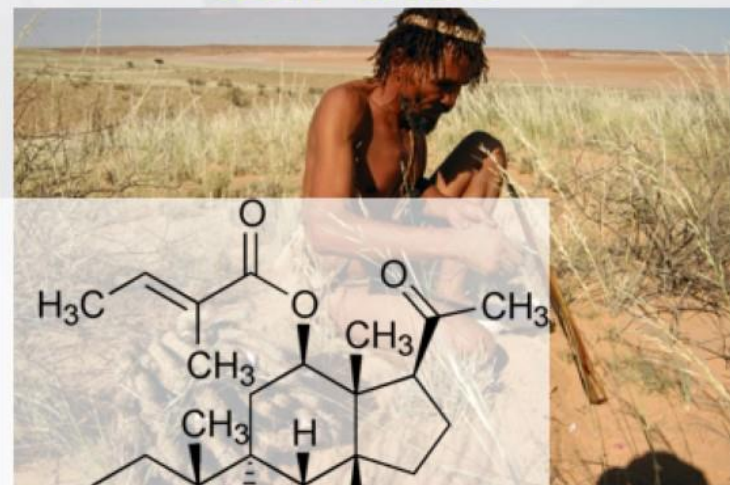


**BEFORE WE BEGIN...**



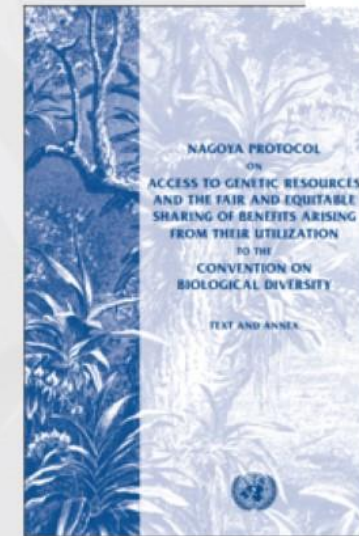


## San tribe



- CSIR discovered Appetite Suppressant ingredient
- Named 'P57' & take out patent

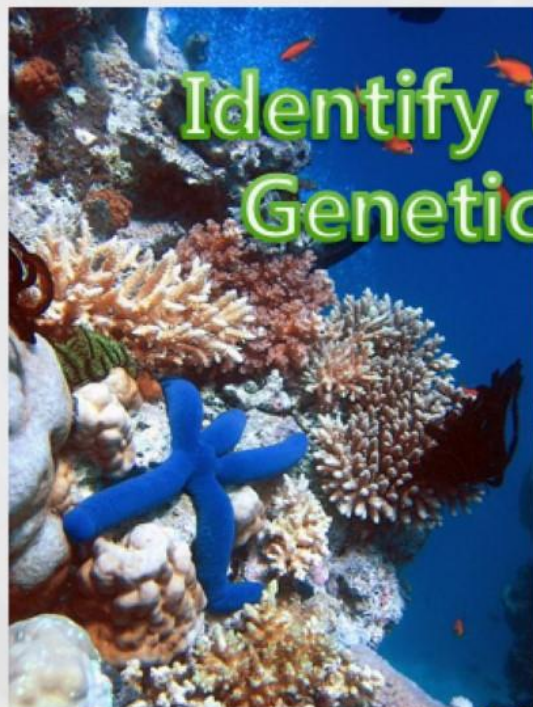
- Phytopharm had been leasing and exclusive P57 patent from CSIR since 1998.
- Started collaboration for the development and commercialization of P57 with Pfizer



- After Nagoya Protocol, CSIR and Phytopharm were accused of bio-piracy.
- CSIR signed an agreement with the San people that gives them 6% of royalties from the sale of P57-containing products and gave them 8% of all milestone payments that CSIR received from Phytopharm.
- Phytopharm returned all development and commercialization rights to CSIR.



- Cases like Hoodia will commonly occur.
- According to the study of Korean Ministry of Oceans & Fisheries, the financial burden of 350~500 million dollar per year is estimated.
- Preparation for the Nagoya Protocol is needed.



Identify the origin of Genetic Resources



**MBRIS**

MBRIS is an integrated information system which integrates services, including integrated services, citizens' concerns, and biological Resource, over simple research and its collection, as an integrated web system.

**Marine Biological Resource**  
Diversity of Marine Biological Resources  
Marine Biological Resource(MBR)  
Information of Marine Life

**Definition of Marine Biological Resource**

**Diversity of Marine Biological Resources**  
It means diversity of marine species or underwater organism based on marine ecosystem including intra/interspecific diversity and its habitat.

**Marine Biological Resource(MBR)**  
It defines gene resource which has a value for human or potential use such as genetic resource, underwater organism or its part, population and other biological composition of Marine ecosystem.

**Information of Marine Life**  
It represents marine resource, derived information from its diversity and a result of processed data.





## Part 1 Outline

**MBRIS**

1. Outline

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2. Goals and Vision

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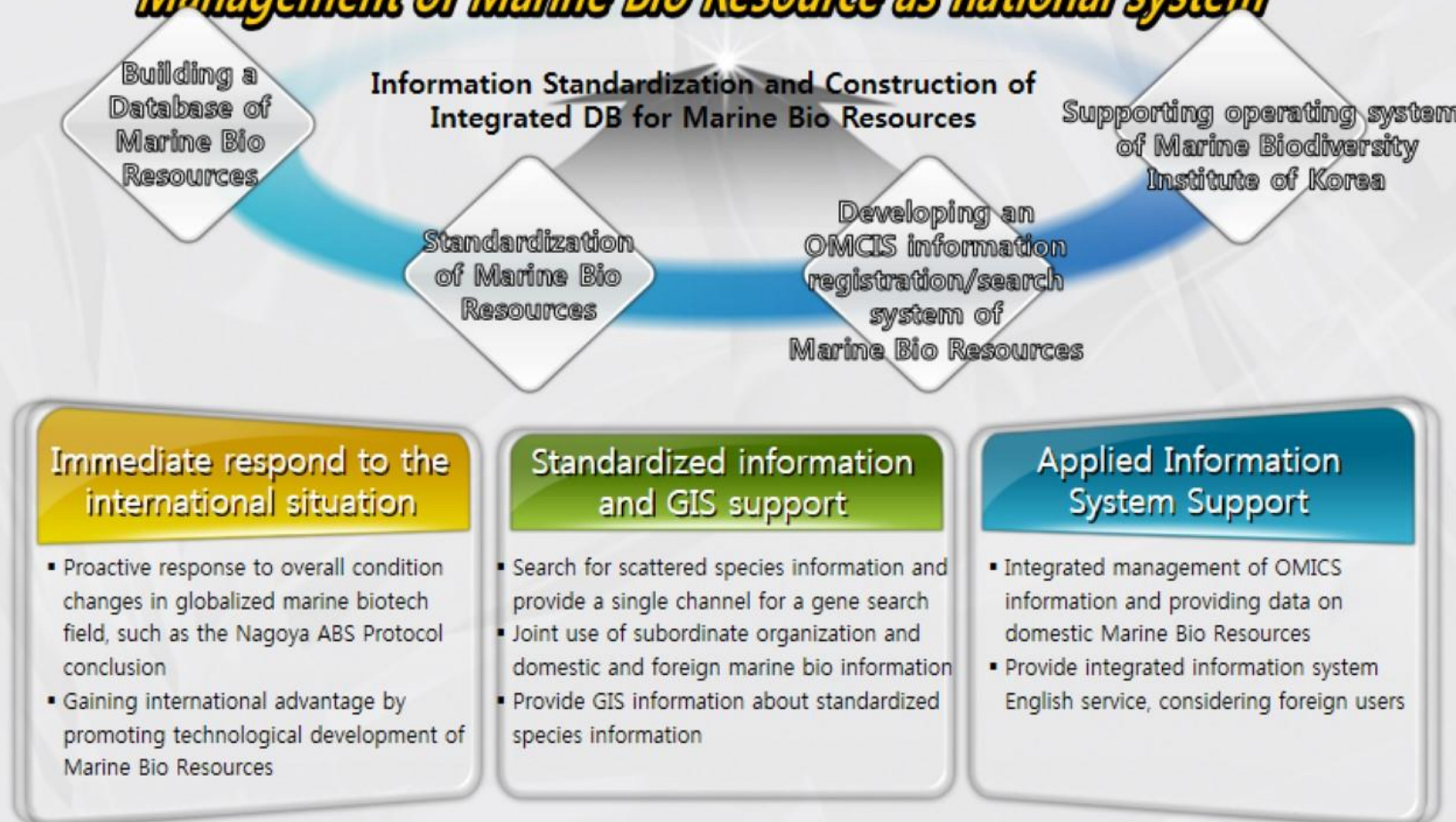
3. Annual Research Content

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Securing Marine Bio Resources and contributing to establish core technologies for the creation of industrial value beyond the academic application

***Performing the duties of overall securement, preservation,  
Management of Marine Bio Resource as national system***







## Goals

- 1 Marine Bio Resources Information Standardization
- 2 Marine Bio Resources Information Securement
- 3 Research Support
- 4 Domestic and international information service provision



## Vision

- 1 Securement of Species Diversity
- 2 Preparation of Public-Use Infrastructure



## Marine Bio Resources Integrated Information System

The screenshot displays the MBRIS website interface. At the top, the site name 'MBRIS' and the URL 'http://mbris.kr' are shown. Below this is a navigation bar with links for HOME, 회원가입, 로그인, 사이트맵, and language options (ENGLISH, KOREAN). The main content area features a large banner with the text 'MBRIS 미래 바이오 강국을 위해 노력합니다.' and a date widget showing '08 August'. A search bar is located below the banner. The bottom section contains a row of category tiles for various marine resources, including 해양절지동물, 해양산호, 해양극피동물, 해양연체동물, 해양곤충동물, 해양포충동물, 해양갑각동물, 해양조류, 해양해양동물, and 해양미생물. At the very bottom, there are five circular icons representing different services: 멀티미디어, 갤러리, 해양자식, 법령정보, and GIS서비스.

## 0 Planning and Research 1st year 2nd year 3rd year

'10.08 ~ '11.02

Planning and research for Marine Bio Resources information standardization and integrated DB implementation



'12.01 ~ '12.06

Marine Bio Resources Information Standardization

- Integrated Information System Implementation
- Integrated Database Implementation
- Data and Taxonomy Standardization



'12.07 ~ '13.06

Marine Bio Resources Public Service System Strengthening

- Integrated Information System Enhancement
- GIS Service
- Mobile Service Implementation



'13.10 ~ Current

System enhancement and operating system support for Marine Biodiversity Institute of Korea

- Integrated Information System Enhancement
- Integrated Database Update
- Operating system for Marine Biodiversity Institute of Korea implementation







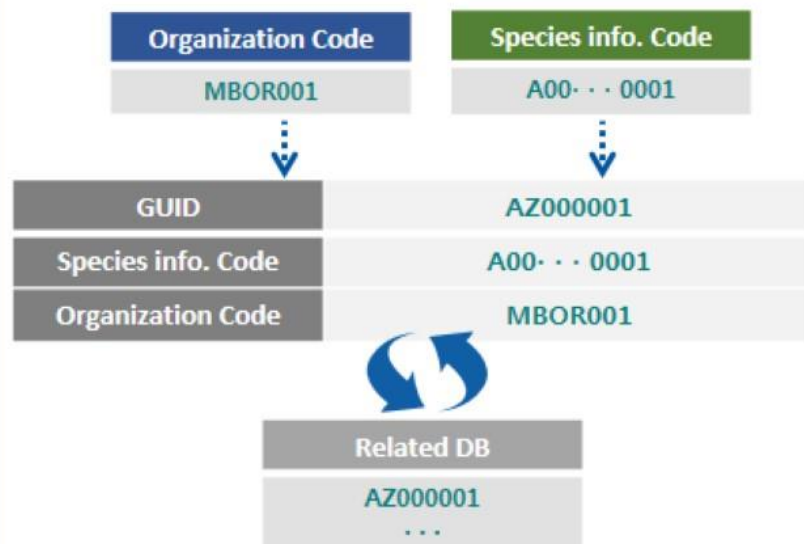
## Part 2 Research Details

**MBRIS**

1. Taxonomy Establishment
2. Entrustment Registration Organization Standard Information  
and Connection Reinforcement
3. Genetic Information Search System
4. Geographic Information Search System

## Data Improvement

GUID(Globally Unique Identifier) granted by resource



Ensuring Data Integrity by Organization

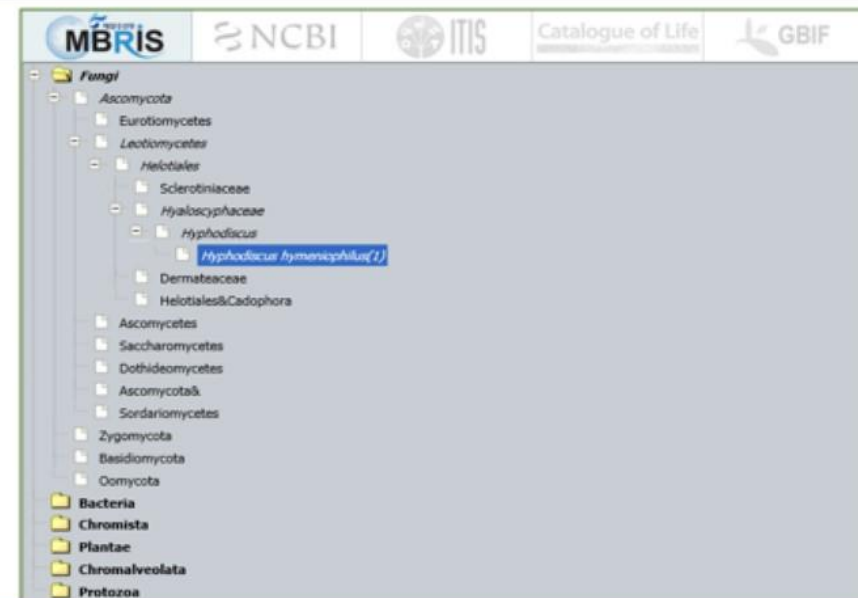


## Data Improvement

Foreign Species Information Implementation



## Taxonomy Search-Display in Tree Structure







## Research Data Entry by Organization



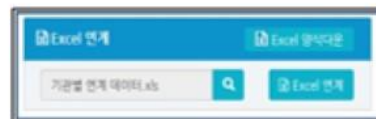
Research **Data Entry** and draw **Standardized Entries** by organization



Organizational Information Standardization

**6 Categories**  
**57 Entries**

## Data Link



1. Organizational DB Registration



2. Input DB Column Mapping



3. Species information Extraction



4. Complete Data Registration

Marine Bio Resources	# of species	Score
Marine arthropods resources	553	37,128
Marine coral animal resources	396	5,414
Marine mollusc resources	440	94,167
Marine red algae resources	765	7,871
Marine useful plankton resources	739	2,345
Marine microbial resources	1,701	9,670
Marine echinoderms resources	154	4,346
Marine phaeophyta resources	162	6,521
Marine algae plant resources	92	9,400
Marine fish resources	350	5,336
Marine fungi resources	337	12,892
Marine nematode resources	90	1,000
Marine bryozoans resources	55	629
Marine annelids resources	75	2,506
Total	5,909	199,225

Genetic Information Search

비교/검색 서비스

Species Identification System

Database

GenBank COI  
GenBank 16S  
GenBank 18S  
GenBank psbA-trnH

BLAST Search (Sequence or FASTA format) Example

ATCTTCGGGCGATGAGCAGGAATAGTCGGCACCCTAGCTATTAATCCGCGCAAGATAGGACAGCA  
GGAACCTCTCTAGGCGACGACCAAAATTAACGTAATCGTACCGCTCAGCCTTTGTAATAATCTTTATA  
GTCATACCATCATGATCGGAGGATTGCGCAACTGATTAGTCCCTCATAATCGTGCCCGACATAGCATT  
CCCACGAATAAACACATAAGCTTTGACTCTCTCCCATCATCTCTCTACTAGCTCATCCACTGTAGAA  
GCTGGCGCGGACAGGCTGAATGTCTACCTCCCTAGCAGGTAACCTCGCCACGCGCGAGCTTCAGTA  
GACCTGGCTATCTCTCACTTCACTAGCCGGTATCTCTCCATCTTGGGGCCATCACTTATTACCAAGCTA  
TCAACATAAAACCCCCGACTCTCAATACCAACCCCACTATTGCTGATCCGCTACTAATTACCGCCATCC  
TACTCTTCTATCATCCCCGACTCGCGCGGATTACAATACTACTAAGTATGAAACCTAAACACCAT  
TCTTCGATCCCGCTGGAGGGGAGACCAATCTGTACCAGCACTGTTCTGA

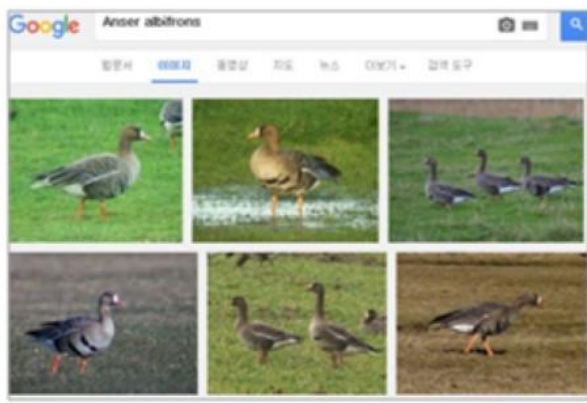
cut off : 1e - 20 Match Sequence Top10

검색결과

NO	DB	Accession	Species	Identity	align length	mismatch	e-value	bit score	data
1	COI	EF515736.1	Anser albifrons	99.69	646	2	0.0	1269	
2	COI	DQ433314.1	Anser albifrons	99.23	643	5	0.0	1245	
3	COI	JN801264.1	Anser fabalis	99.22	636	5	0.0	1231	
4	COI	FJ808625.1	Anser fabalis	98.92	641	7	0.0	1229	
5	COI	GQ481329.1	Anser albifrons	98.77	640	8	0.0	1229	
6	COI	GU571243.1	Anser anser	98.92	641	7	0.0	1229	
7	COI	GU571728.1	Anser anser	99.06	635	6	0.0	1223	

Google Image Taxonomy Nucleotide Alignment

1 Google Image Search



2 NCBI Nucleotide Search

NCBI Nucleotide

Species: Animals (29K), Proteins (22), Bacteria (559), Viruses (54), Customize...

Items: 1 to 20 of 956

1. Anser albifrons haplotype A16 control region, partial sequence, mitochondrial  
Accession: JN801264.1 GI: 457108626  
GenBank: FASTA Graphics Preview

2. Anser albifrons haplotype A17 control region, partial sequence, mitochondrial  
Accession: JN801265.1 GI: 457108627  
GenBank: FASTA Graphics Preview

3. Anser albifrons haplotype A16 control region, partial sequence, mitochondrial  
Accession: JN801266.1 GI: 457108628  
GenBank: FASTA Graphics Preview

3 NCBI Taxonomy Search

NCBI Taxonomy Browser

Search for: as complete name lock Go Clear

Display: 3 levels using filter: none

Lineage: (full) root, cellular organisms, Eukaryota, Opisthokonta, Metazoa, Eumetazoa, Bilateria, Chordata, Craniota, Vertebrata, Mammalia, Artiodactyla, Anseriformes, Anser, Anser albifrons

Anser albifrons (white-fronted goose) Click on organism name to get more information.

• Anser albifrons albifrons (European white-fronted goose)  
• Anser albifrons flaviventris (Greenland white-fronted goose)  
• Anser albifrons frontalis

4 Alignment Results

Alignment 검색 결과

Query: 1 atotttggggcatgagcaggatagtagggcaacgaactcagcattataatcogcagaa 60  
Sbjct: 1 atotttggggcatgagcaggatagtagggcaacgaactcagcattataatcogcagaa 60

Query: 61 ctaggacagocaggaaactctcctagggaagacaaattacaagtaattgtaoogt 120  
Sbjct: 61 ctaggacagocaggaaactctcctagggaagacaaattacaagtaattgtaoogt 120

Query: 121 caagcctttgtaataatttttttagtcataaoccatgatgaggaggattoggaac 180  
Sbjct: 121 caagcctttgtaataatttttttagtcataaoccatgatgaggaggattoggaac 180



## Outline: Geographic Information Search System

### Geographic Information System (GIS)

A system that analyzes and processes geospatial data which can be applied to the fields related to geographical features such as transportation and communication



Geographic Information Search System



### ArcGIS Software

- › ArcGIS Server Enterprise Standard
- › ArcGIS Desktop Basic SU
- › ArcGIS Spatial Analyst for Desktop SU



### Hardware(Server)

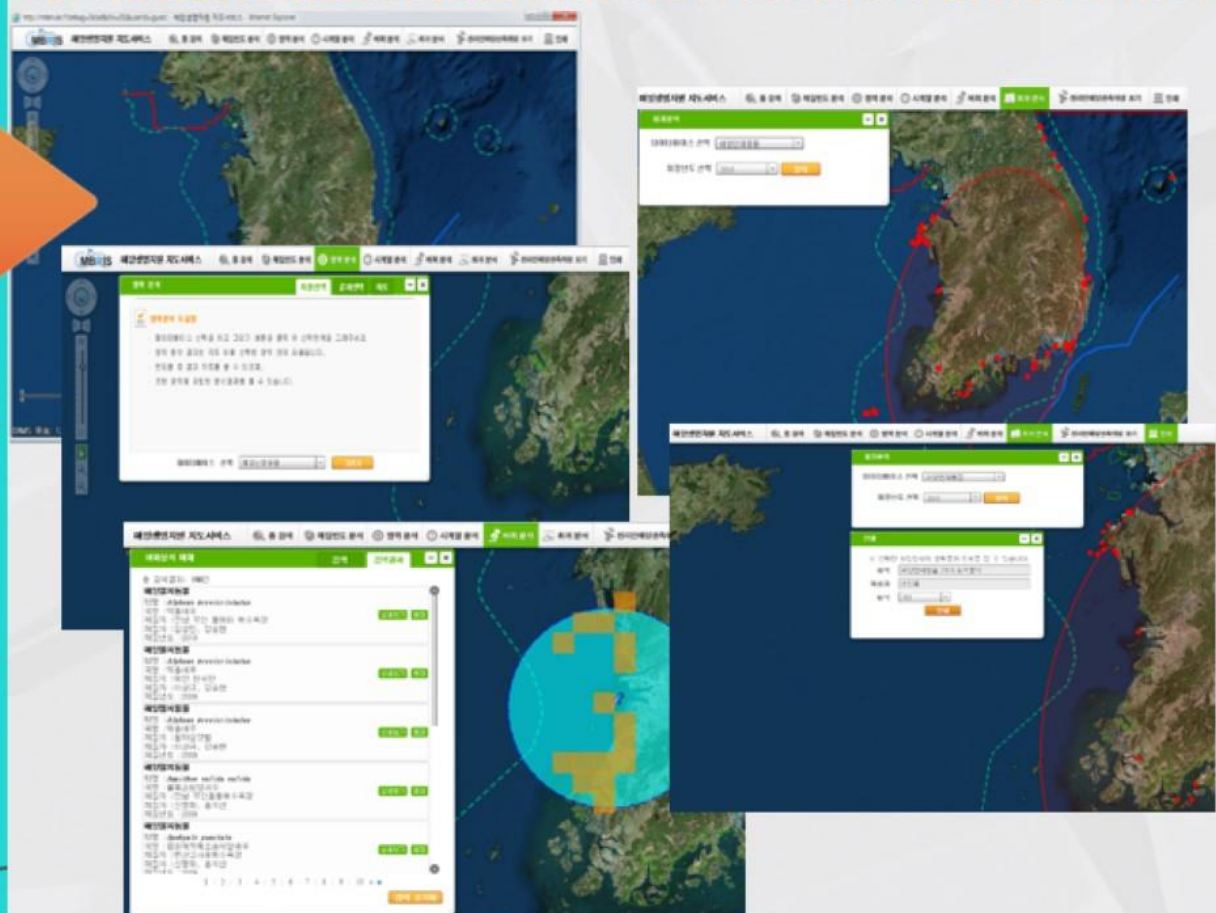
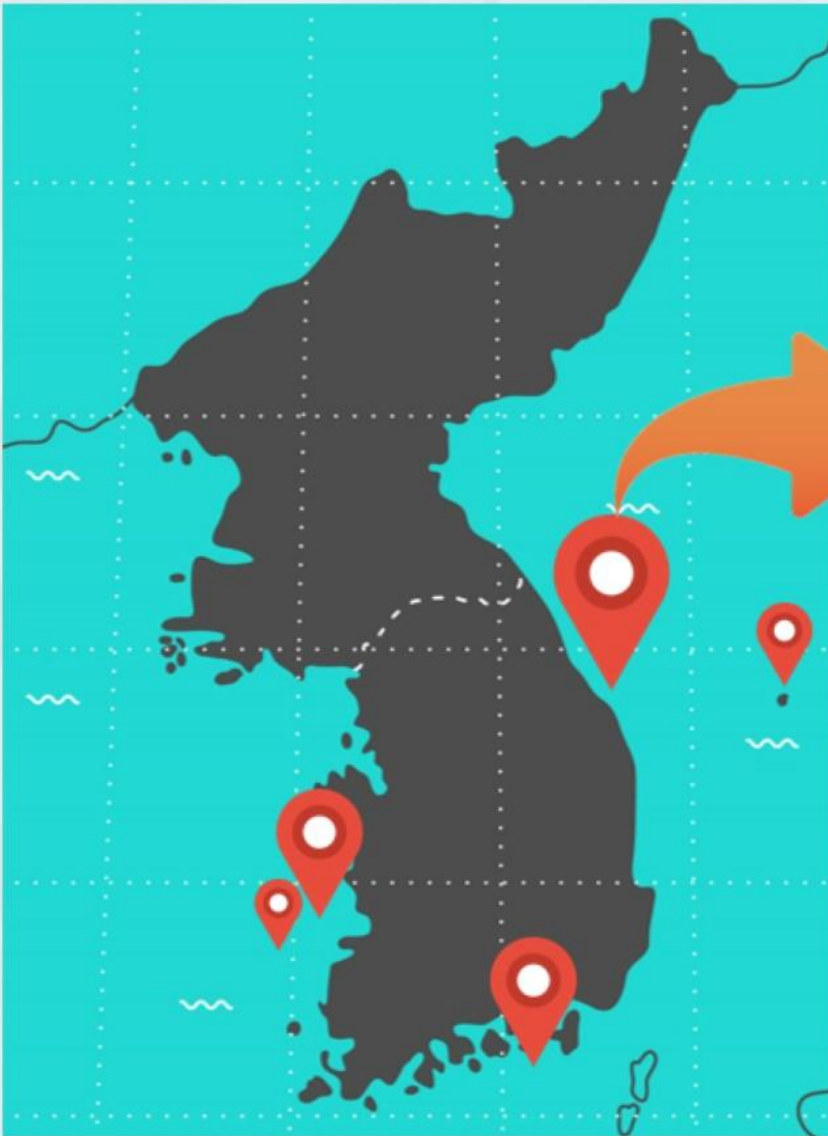
- › X3850X5 E7-4807
- › 300GB\*2
- › 1.86GHz
- › WIN Svr 2008R2
- › 32GB



### GIS Display Method

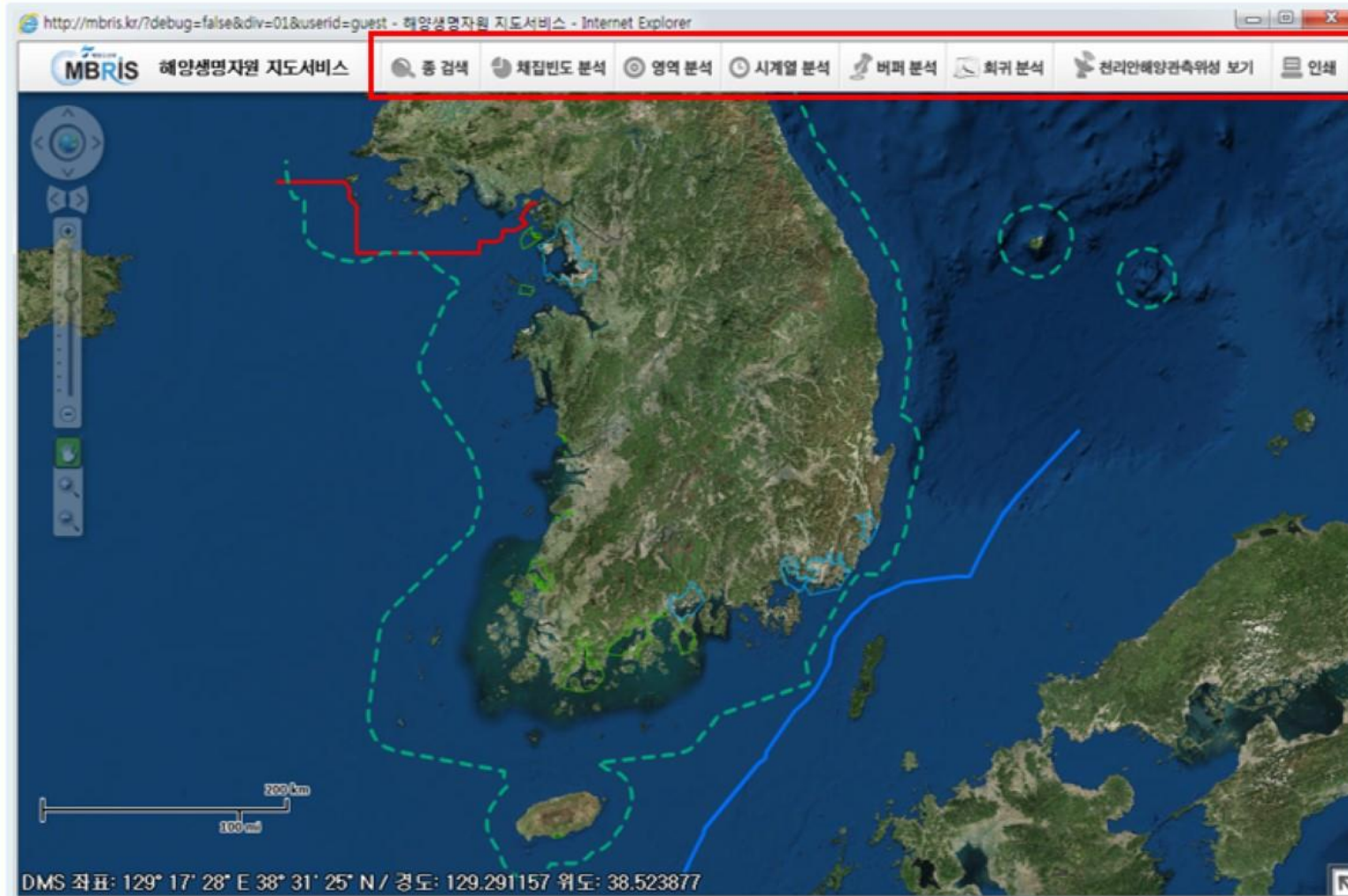
- › Provide coordinate information of the specimen collected by each entrustment organization by using ArcGIS
- › Coordinate System: World Geodetic Reference System/ Coordinate Unit: Degree

Based on coordinate value of specimen collected from Entrustment registration organization, Geographic spatial data is analyzed and processed as a research data, and it enables efficient management of Marine Bio Resources



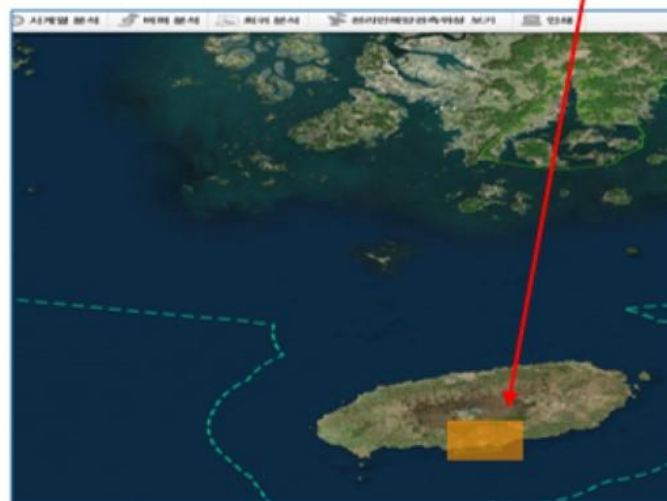
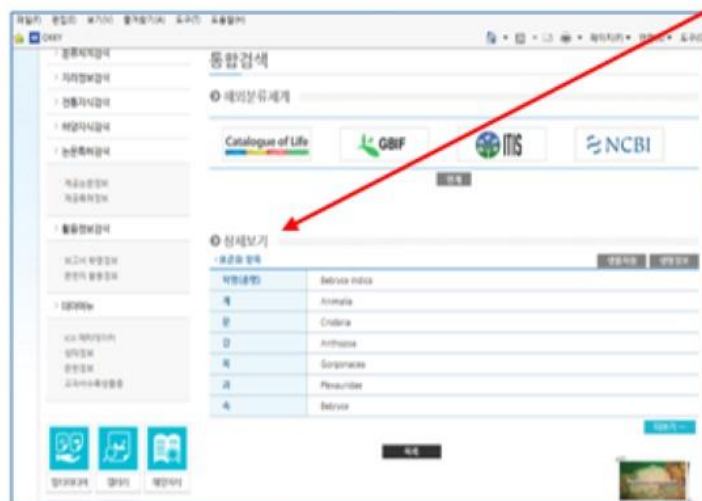


## Marine Bio Resources Map Service

Main  
Functions

- Marine Bio Resources Map Service
- Species search, collecting frequency analysis, area analysis, time series analysis, buffer analysis, regression analysis, Geostationary Ocean Color Imager display, print function

## Species Search

Main  
Functions

- When a search word is input in the [Species Search] menu at the top, results are drawn
- Scientific name, national name, locality, gatherers, collected year as a search result are drawn and detailed view, zooming feature are available
- Click details on the search results of the species
- Detailed view of the searched species opened in a new window
- Click [Expand] on the search results of the species
- The locality of the indicated species is enlarged on the map

## Notice

-When searching for species, it can be searched by the search words of Marine Bio Resources, collected year, gatherer, locality



## Collecting Frequency Analysis(1/2)

**1** 채집빈도 분석

**2** 자원선택

**3** 그리기

데이터베이스 선택

- 해양절지동물
- 해양산호동물
- 해양극피동물
- 해양홍조식물
- 해양연체동물
- 해양갈조식물

**채집빈도 분석 도움말**

- 데이터베이스 선택을 하고 그리기 버튼을 클릭 후 선택영역을 그려주세요.
- 영역 분석결과는 지도 위에 선택한 영역 안에 표출됩니다.
- 연도별 종 결과를 차트로 볼 수 있으며, 또한 영역에 포함된 분석결과를 볼 수 있습니다.

Main  
Functions

- Click [Collecting Frequency Analysis] menu on top
- Click [Draw] button after choosing which Marine Bio Resources to analyze

## Notice

-When choosing for database, choose:

- marine arthropods resources,
- marine coral animal resources,
- marine echinoderms resources,
- marine red algae,
- marine molluscs,
- marine phaeophyta,
- marine useful plankton resources,
- marine microbial resources,
- marine algae plant resources,
- marine fish resources,
- marine fungi resources,
- marine nematode resources,
- marine bryozoans resources,
- marine annelids resources

## Collecting Frequency Analysis(2/2)

Main  
Functions

- After clicking on the [Draw] button, the selected area will be marked as collected area on the map and its results are drawn in a [chart] format
- [Analysis Result] tab shows all the species information that are collected in the area drawn.
- When clicking on the [Move] button of a specific species, the map moves to the place where the species were collected and detailed information of its locality is output

## Notice

-up to 5 species selected on the map are shown on the [Chart] in the Collecting Frequency Analysis





## Area Analysis(1/2)

**영역 분석 도움말**

- 데이터베이스 선택을 하고 그리기 버튼을 클릭 후 선택영역을 그려주세요
- 영역 분석 결과는 지도 위에 선택한 영역 안에 표출됩니다.
- 연도별 추이 결과 차트를 볼 수 있으며,
- 또한 영역에 포함된 검색결과를 볼 수 있습니다.

데이터베이스 선택: 해양산호동물 그리기

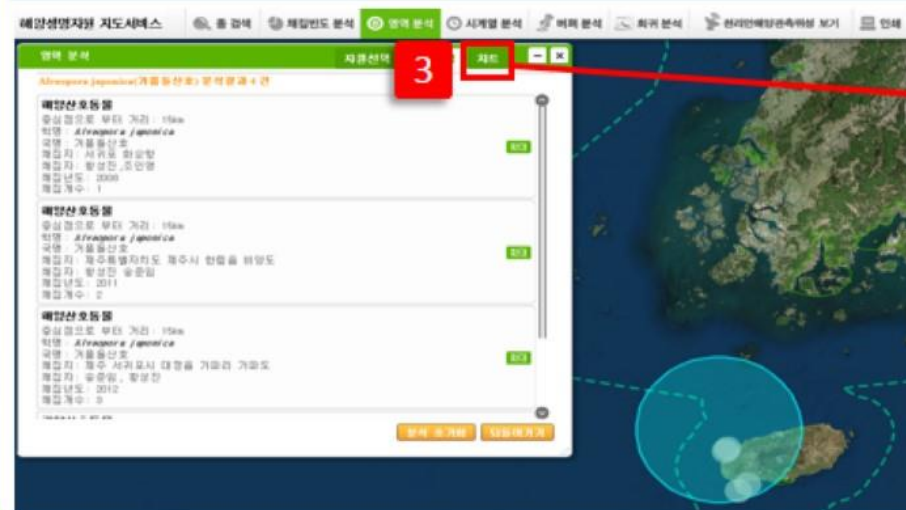
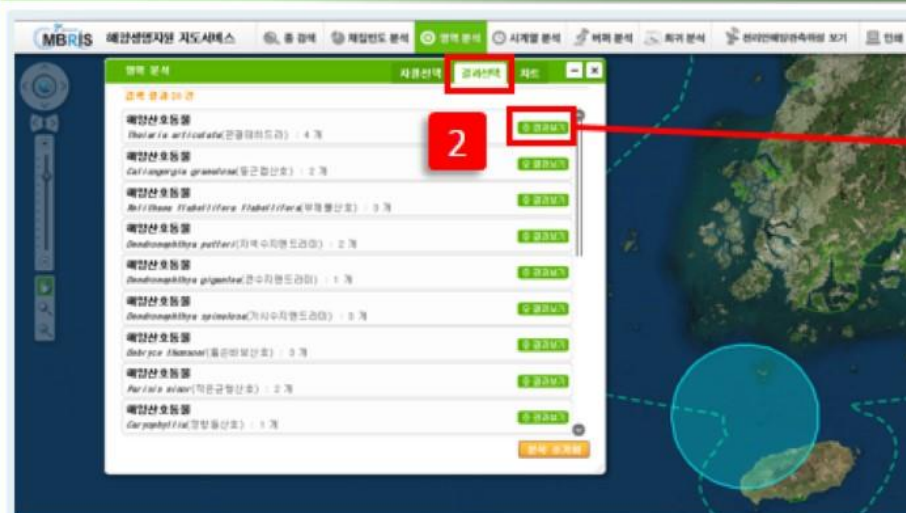
Main  
Functions

- Click on the [Area Analysis] menu on top, choose which Marine Bio Resource to analyze, and click [Draw] button

## Notice

-When choosing for database, choose:  
 marine arthropods resources,  
 marine coral animal resources,  
 marine echinoderms resources,  
 marine red algae,  
 marine molluscs,  
 marine phaeophyta,  
 marine useful plankton resources,  
 marine microbial resources,  
 marine algae plant resources,  
 marine fish resources,  
 marine fungi resources,  
 marine nematode resources,  
 marine bryozoans resources,  
 marine annelids resources

## Area Analysis(2/2)



## Main Functions

- When you draw a circle on the map, you can see which part of the area are collected and the area analysis results are shown in a list
- [Show Results] button displays detailed information of the species
- Check annual differences of the number of the selected species on the [Chart]

### Notice

- In order to view annual results from the [Chart], the selected species must have the data of more than 2 collected years
- Maximum search area is 100km



## Time Series Analysis



## Main Functions

- Click [Time Series Analysis] on top, choose database(type of resource), start year, start month, finish year, finish month and [Apply]
- You can see that the localities are expanding on the map as time advances annually/monthly through scroll bar

## Buffer Analysis

MBRIS 해양생물자원 지도서비스

버퍼 분석

데이터베이스 선택: 해양생물지동물

반경 선택(Km): 50

위치 선택

버퍼 분석 결과

해양생물자원 지도서비스

버퍼 분석

버퍼 분석 결과

총 검색결과: 190건

해양생물지동물

학명: *Alpheus brevirostris*

국명: 막솔새우

채집지: 전남 무안 풀머리 해수욕장

채집자: 김성민, 강승현

채집년도: 2010

상세보기

해양생물지동물

학명: *Alpheus brevirostris*

국명: 막솔새우

채집지: 여안 천수만

채집자: 이상규, 강승현

채집년도: 2009

상세보기

해양생물지동물

학명: *Alpheus brevirostris*

국명: 막솔새우

채집지: 울하곶곶

채집자: 이상규, 강승현

채집년도: 2009

상세보기

해양생물지동물

학명: *Alpheus validus*

국명: 불룩손삼발새우

채집지: 전남 무안 풀머리 해수욕장

채집자: 신명화, 홍지선

채집년도: 2009

상세보기

해양생물지동물

학명: *Alpheus punctatus*

국명: 짧은채찍막솔새우

채집지: 전남 고사포해수욕장

채집자: 신명화, 홍지선

채집년도: 2009

상세보기

1 2 3 4 5 6 7 8 9 10

검색 초기화

Main  
Functions

- Click [Buffer Analysis] on top, choose database(type of resource), input radius (km), [Select Location]
- Species information in the radius around the point of mouse click is output

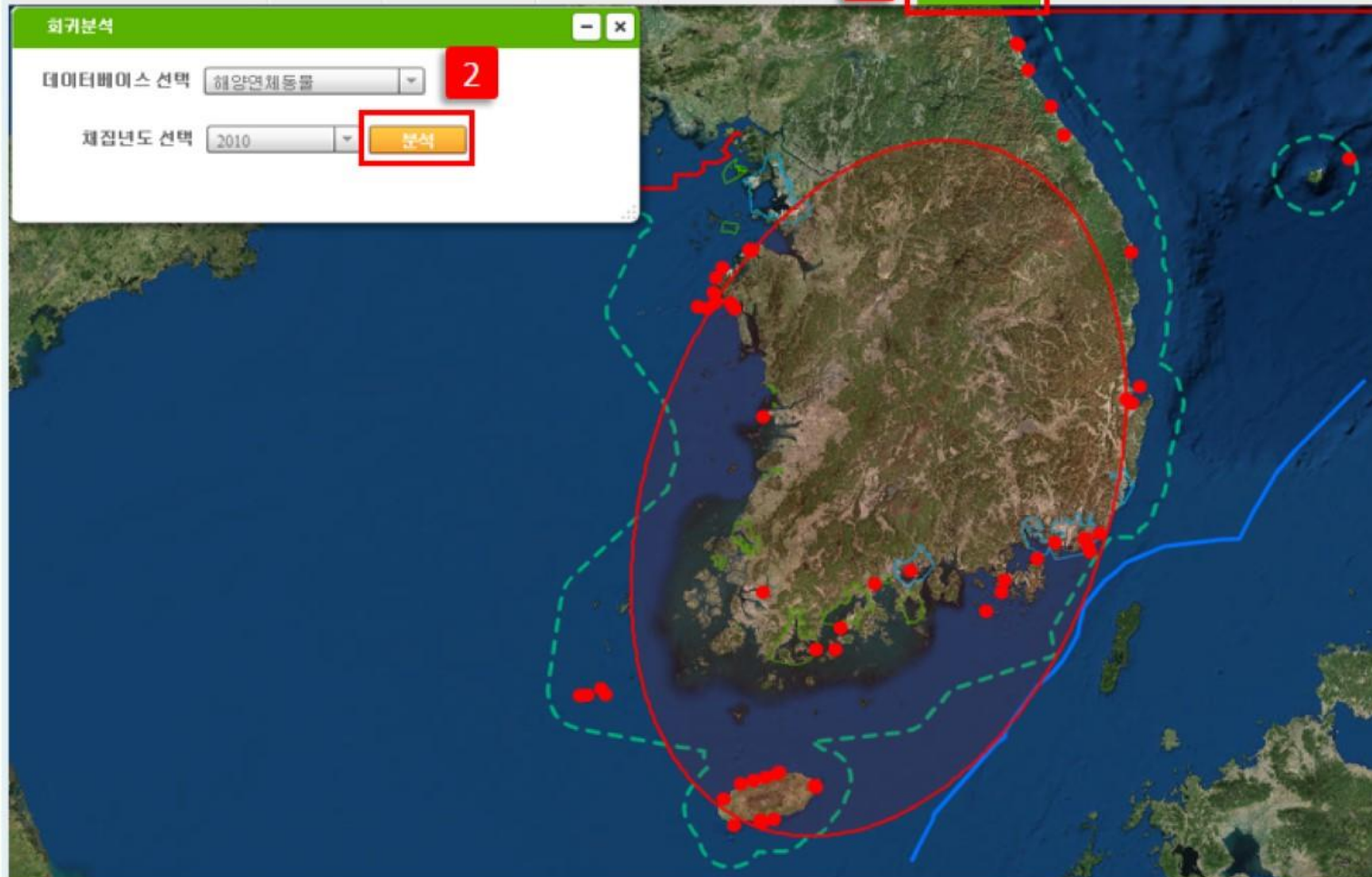
## Notice

- Standard unit of radius is km
- Minimum radius is 10km and maximum is 100km
- The [See Details] and [Expand] functions of the searched specimen are same as [Search Species] menu



## Regression Analysis

해양생명자원 지도서비스 🔍 종 검색 📊 채집빈도 분석 📍 영역 분석 ⌚ 시계열 분석 1 📁 회귀 분석 🗺️ 천리안해양관측위성 보기 📄 인쇄

Main  
Functions

- Click [Regression Analysis] menu on top, choose database(type of resource) and collected year, and click [Analyze] button
- The regression analysis results are visually output according to the selected resource and the collected year

## Notice

- Regression Analysis is a statistical method that finds the best linear functional relation between dependent variables and independent variables. It is a method that estimates the effects on one or more of the dependent and independent variables (Source/NAVER encyclopedia of knowledge)
- Collected year is between 2009 and 2013

## Geostationary Ocean Color Imager Display

The screenshot shows the MBRIS (Marine Bio Resources Information System) interface. At the top, there is a navigation bar with various icons and a search bar. Below this, there is a section titled '천리안 해양관측위성' (Chollian Ocean Color Imager). The main area displays a satellite image of the Korean peninsula and surrounding waters. A red box labeled '1' highlights the '천리안해양관측위성 보기' button. A red box labeled '2' highlights the '선택' button in the table. A red arrow points from the '선택' button to the satellite image displayed below the table.

## 주요기능

- Click on the [Geostationary Ocean Color Imager Display] menu on top, a new window opens, click on the [Shoot] button, choose date, and select the time using the [Select] button
- Check Korean satellite photo taken by Geostationary Ocean Color Imager according to the date and time

## Notice

- Geostationary Ocean Color Imager is one of three marine payloads, the payload Chollian launched in June 2010, the 2500 \* 2500km area centered on the Korean peninsula for the first time in the world to shoot eight times a day with 500m resolution operating in geostationary orbit.  
(Source/NAVER encyclopedia of knowledge)



## Printing

### Main Functions

- After the analysis required on the Marine Bio Resources Map Service, click [Print] menu on top for its output
- You can specify title, author, and format to print in a specific file format



# **OTHER SERVICES**

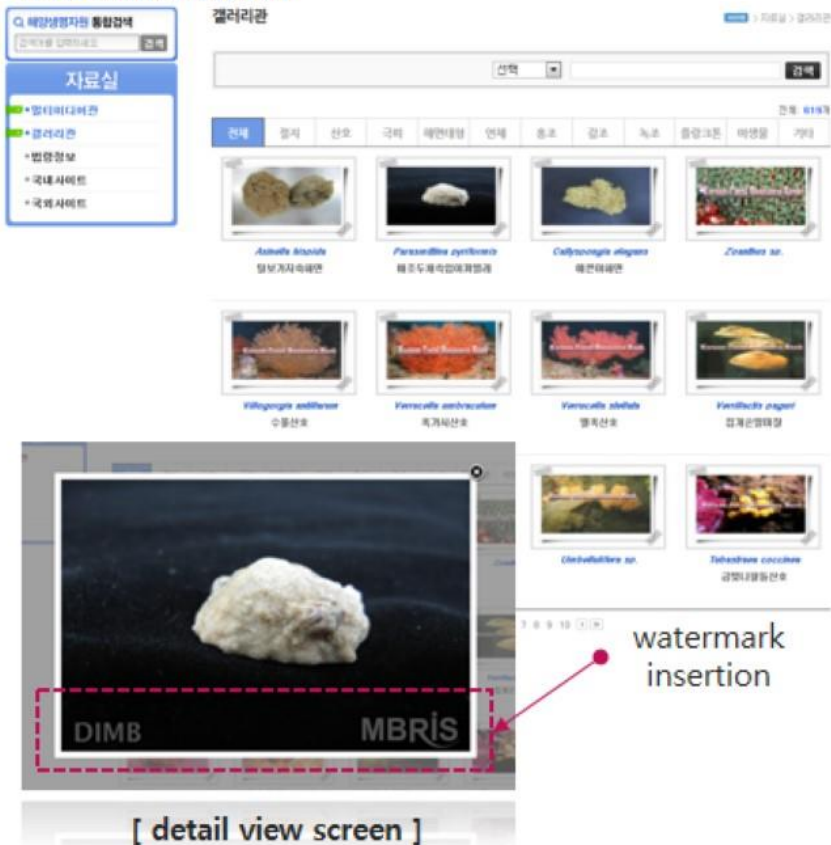




### Gallery and multimedia service

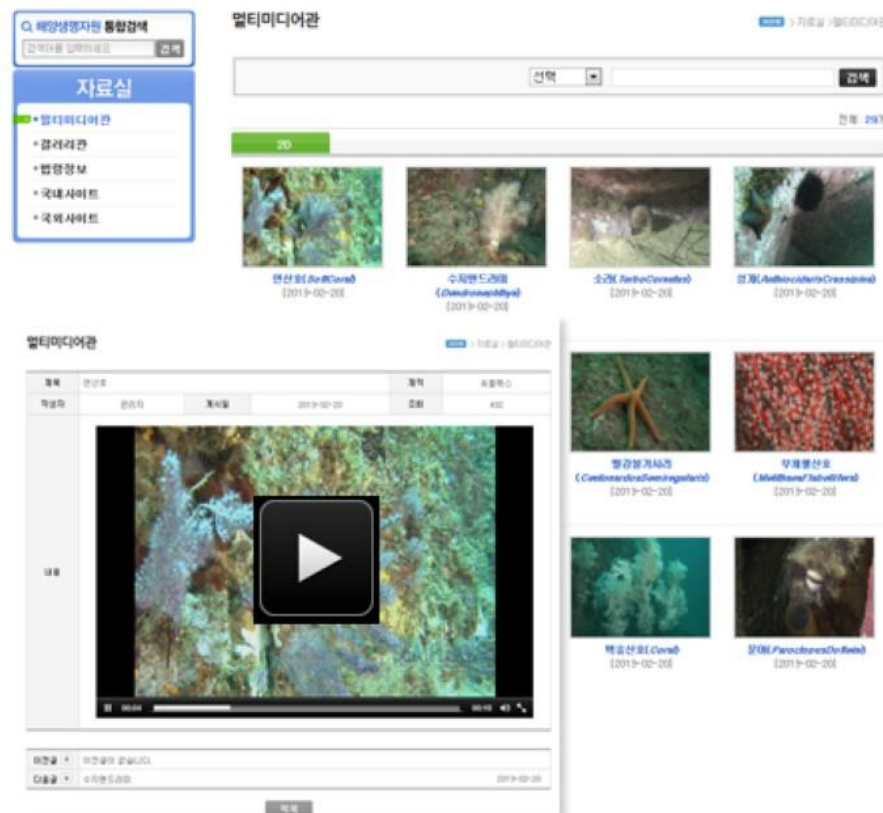
#### Gallery

- Image of named Marine Bio Resource
- Nationwide service contents by security management like watermark insertion



#### Multimedia

- Multimedia about Marine Bio Resource
- Play video by video player
- Auditory service by audio production on video itself



### Mobile service

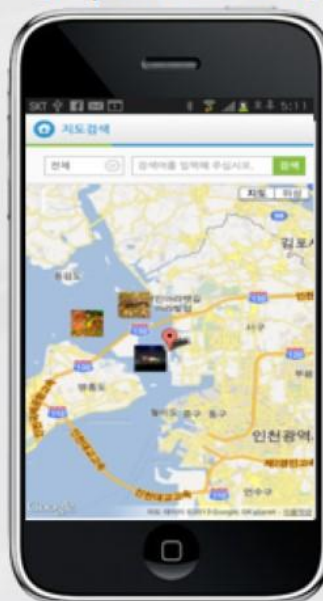
Mobile service(WEB)	Mobile service(APP)
<ul style="list-style-type: none"> <li>Mobile service adequate to smartphone and smart office environment</li> <li>Introduction about Marine Bio Resource integrated information system and Marine Bio Resource</li> </ul>	<ul style="list-style-type: none"> <li>Resource searching, location based map searching service, and augmented reality service</li> <li>Support Android, iOS</li> </ul>



[Main screen]



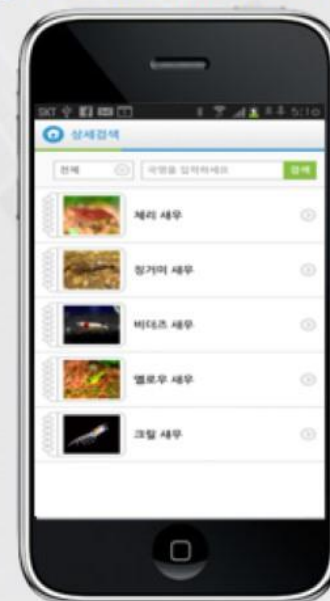
[Map search screen]



[Detail search screen]



[Detail information screen]

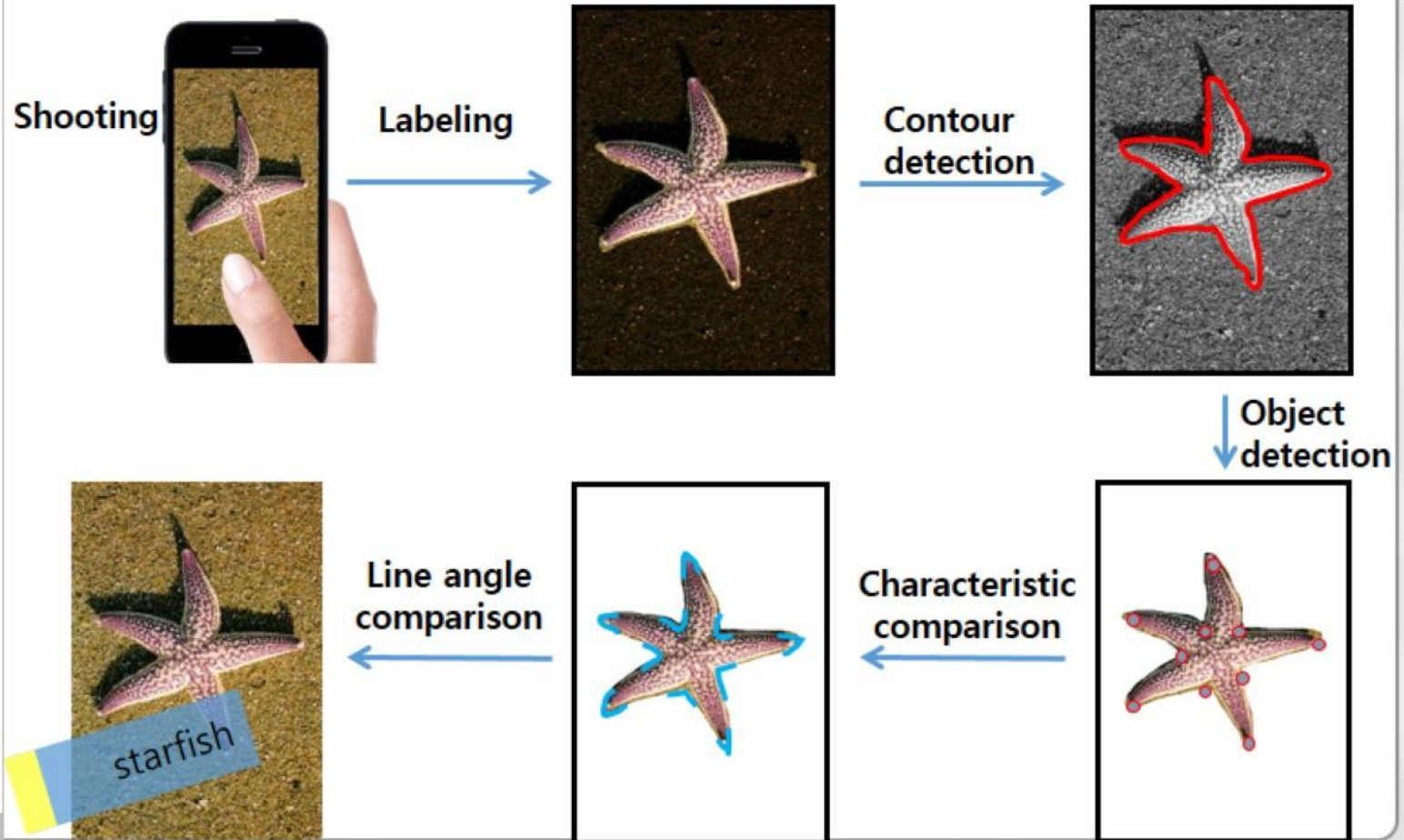




### Mobile web-app development and enhancement

#### Mobile web-app enhancement plan

- ✓ Marine Bio Resource perception & detail information
  - User photo shooting
  - Marine Bio Resource photo analysis
  - Convenient supply of recognized photo detail information



MBIS enables construction of integrated database of distributed marine resources in Korea. MBRIS enables clarification of high valued biomaterials for industrial value creation, over simple research and its collection, as an integrated web site. The goal of the MBRIS project is to produce globally consistent data, maps, and reports that are hybrids of model results and observational marine resources.





A decorative graphic featuring a large, light gray arrow pointing right on the left side. A horizontal dashed line with small gray plus signs extends across the middle of the slide, ending in a large, light gray arrow pointing right on the right side.

# Thank You