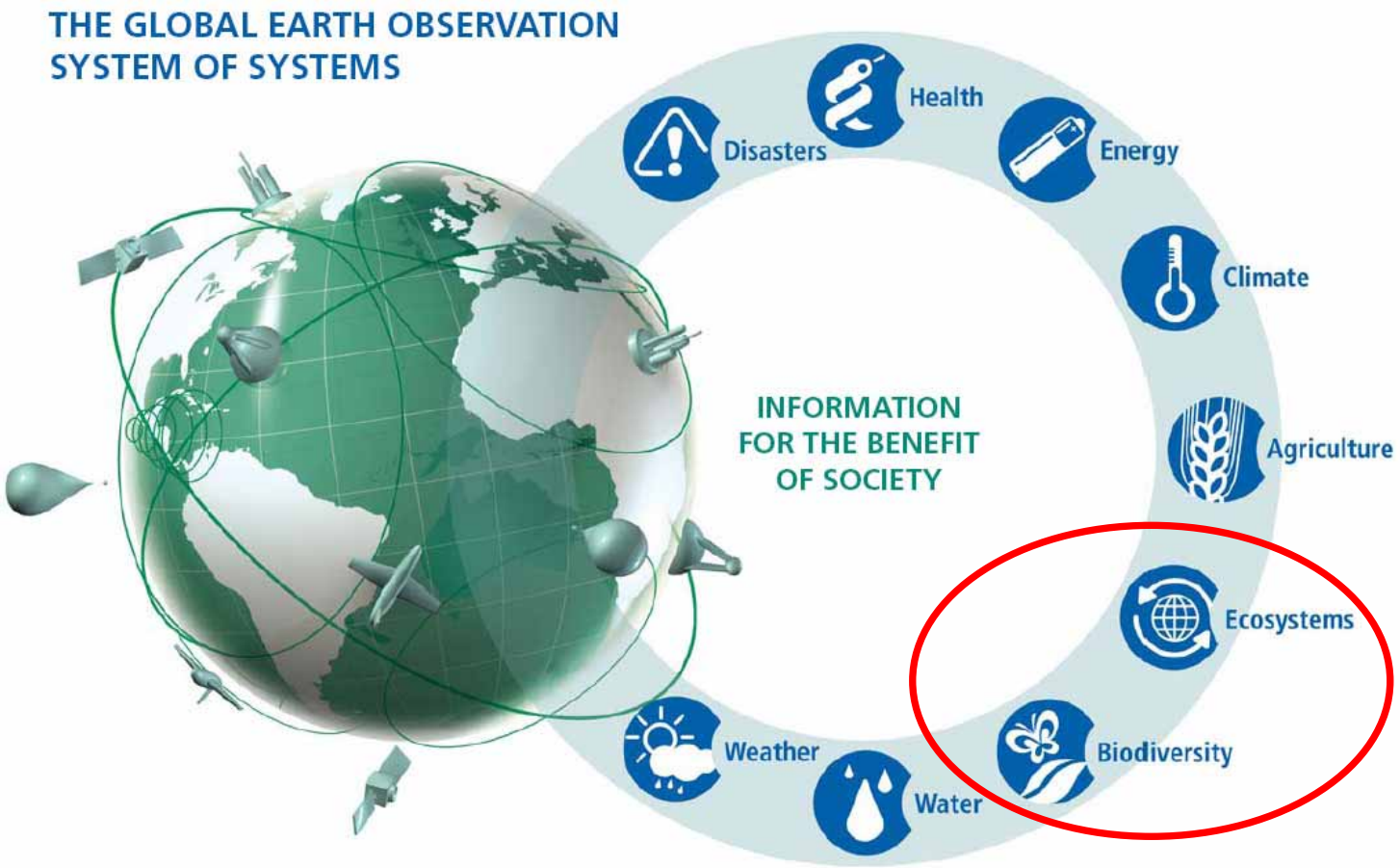
# WG3: Using GEOSS to Manage Ecosystem and Conserve Biodiversity

1) How GEOSS can contribute to monitor the change and adaptation of ecosystem and/or biodiversity in the global warming process? Or, what kind of system should be established or enhanced to do this?

2) How we can connect the large scaled observations with on-site observations?



# Using GEOSS to manage ecosystems

***10:00-12:00***

- ***EAP-ILTER：Regional Effort on Ecosystem Research and Management Under Climate Change*** (Dr Zhao Shidong, Chair, EAP ILTER, China)
- ***Challenges of JaLTER toward interdisciplinary study on ecosystem adaptation under global changes*** (Dr Shibata, JaLTER)
- ***Networking of Observations for Detecting and Adapting to Global Warming: A Korean Perspective*** (Eun-Shik Kim, Korea)
- ***The IUFRO-led Expert Panel on Adaptation of Forests to Climate Change - Linking forest policy and management with scientific knowledge*** (Alexander Buck, IUFRO)

- Australia
- China
- China-Taipei
- Mongolia
- South Korea

North American Regional LTER Network
- Canada
- Mexico
- United States

Central/Eastern European Regional LTER Network
- Czech Republic
- Hungary
- Latvia
- Poland
- Slovak Republic
- Ukraine

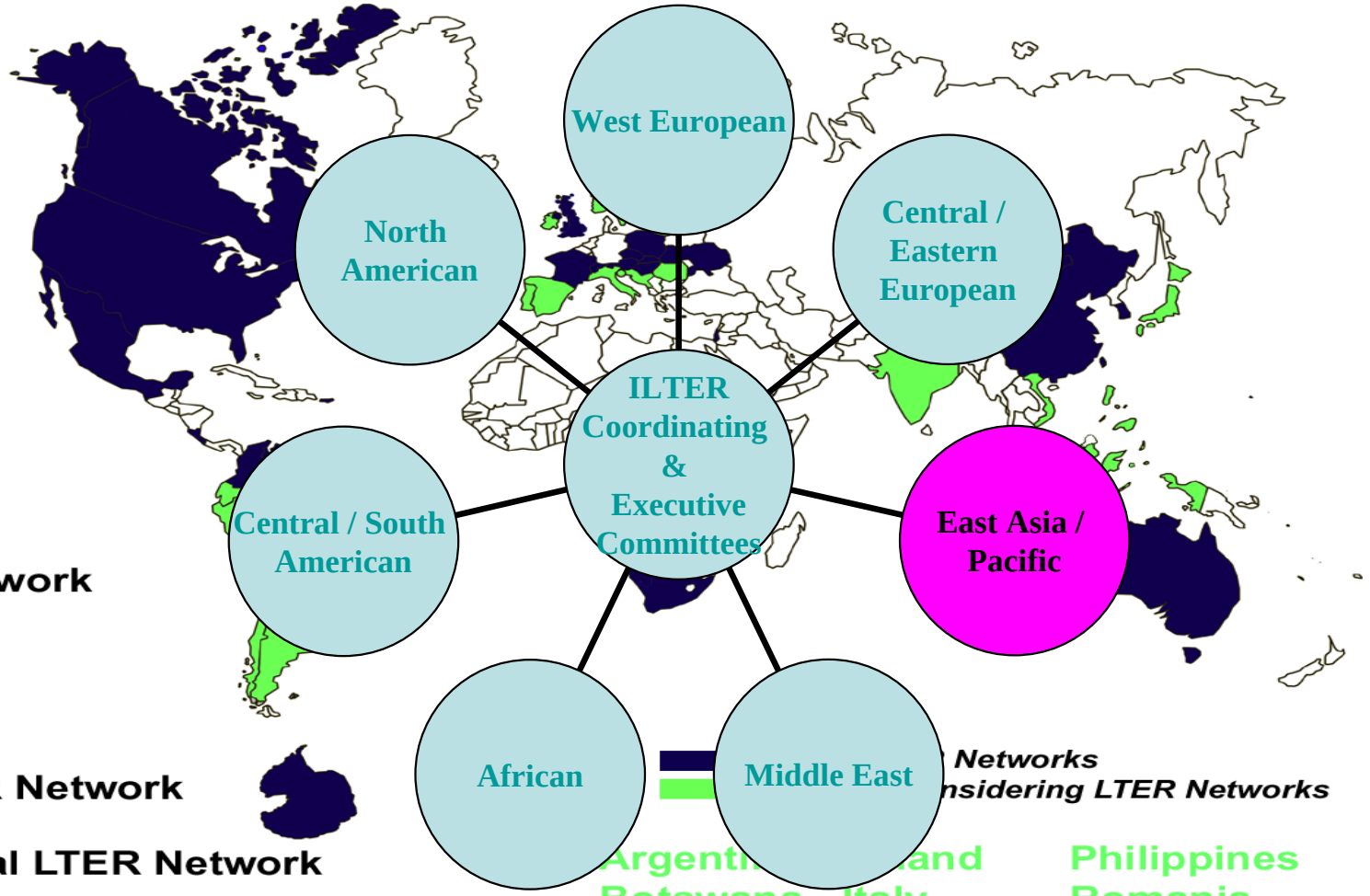
African Regional LTER Network
- Mozambique
- Namibia
- South Africa
- Zambia

Middle East Regional LTER Network
- Israel

Western European Regional LTER Network
- Austria
- France
- Switzerland
- United Kingdom

Central/South American Regional LTER Network
- Brazil
- Colombia
- Costa Rica
- Uruguay
- Venezuela

# The International Long Term Ecological Research Network

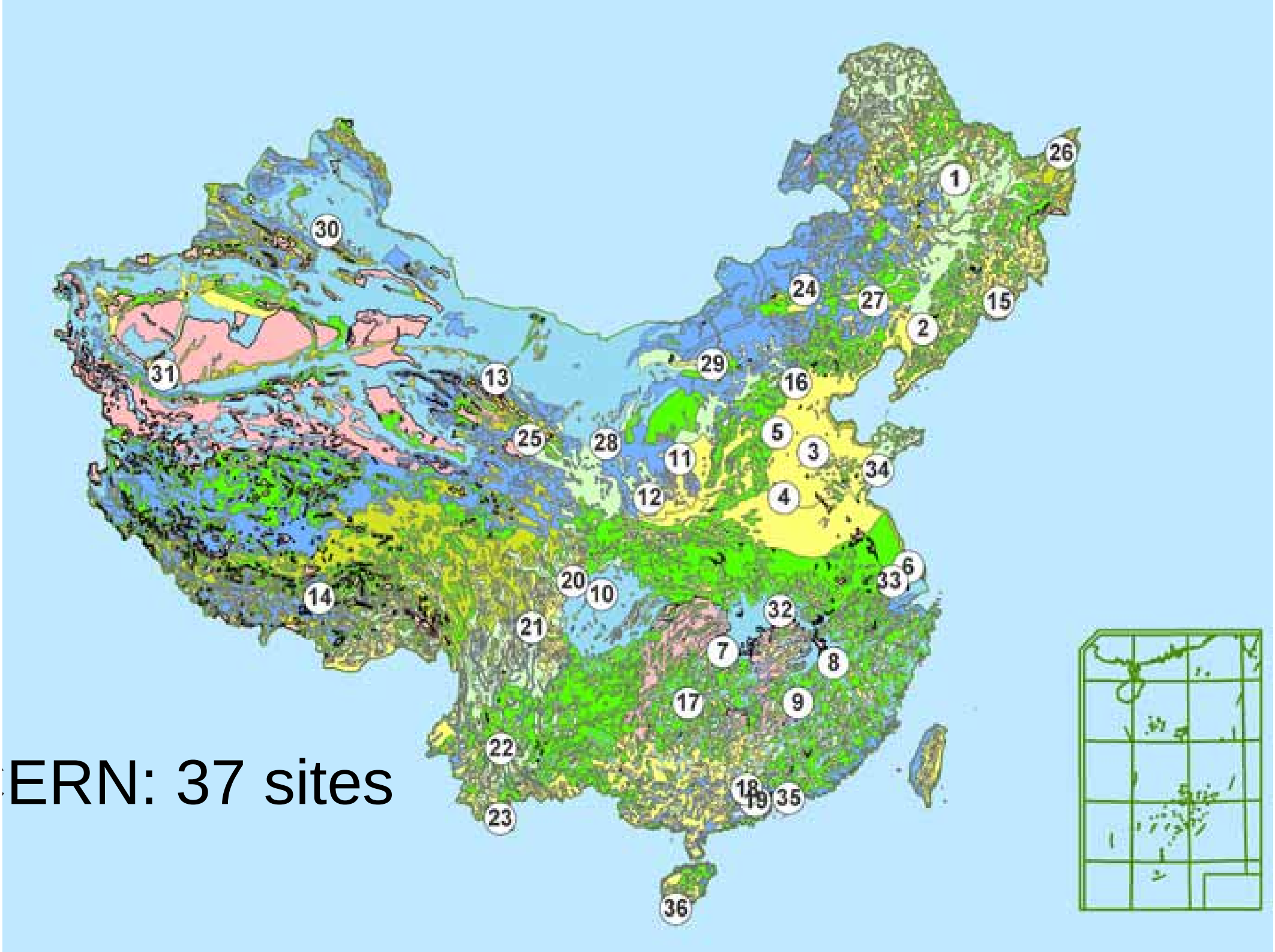



Networks
nsidering LTER Networks

Argenti land
Botswana
Chile
Ecuador
Estonia
India
Indonesia
Italy
Japan
Kenya
Lithuania
Norway
Portugal
Peru
Philippines
Romania
Slovenia
Sweden
Tanzania
Vietnam
Zimbabwe

# Framework of International LTER Network

Updated November 04


ERN: 37 sites
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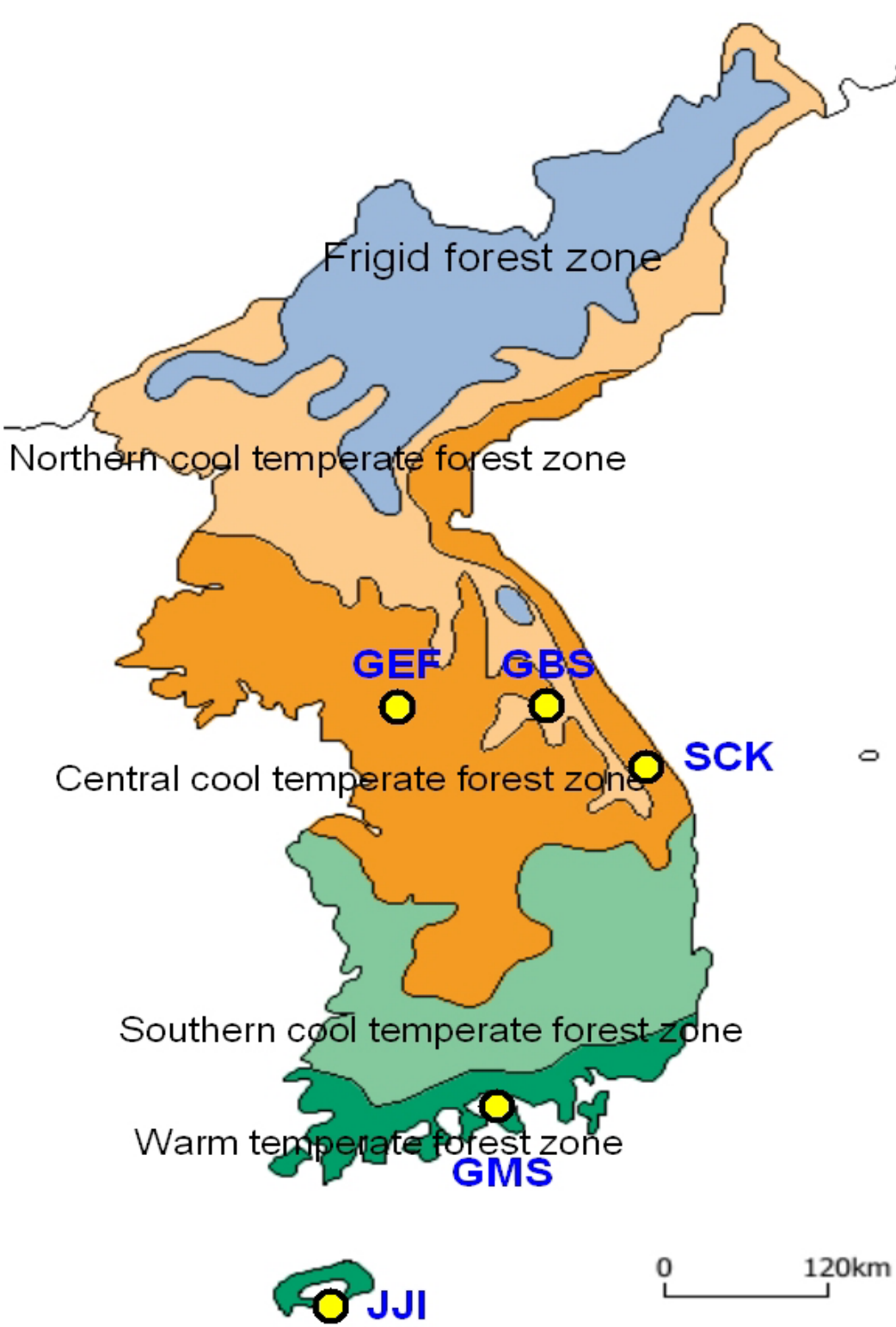
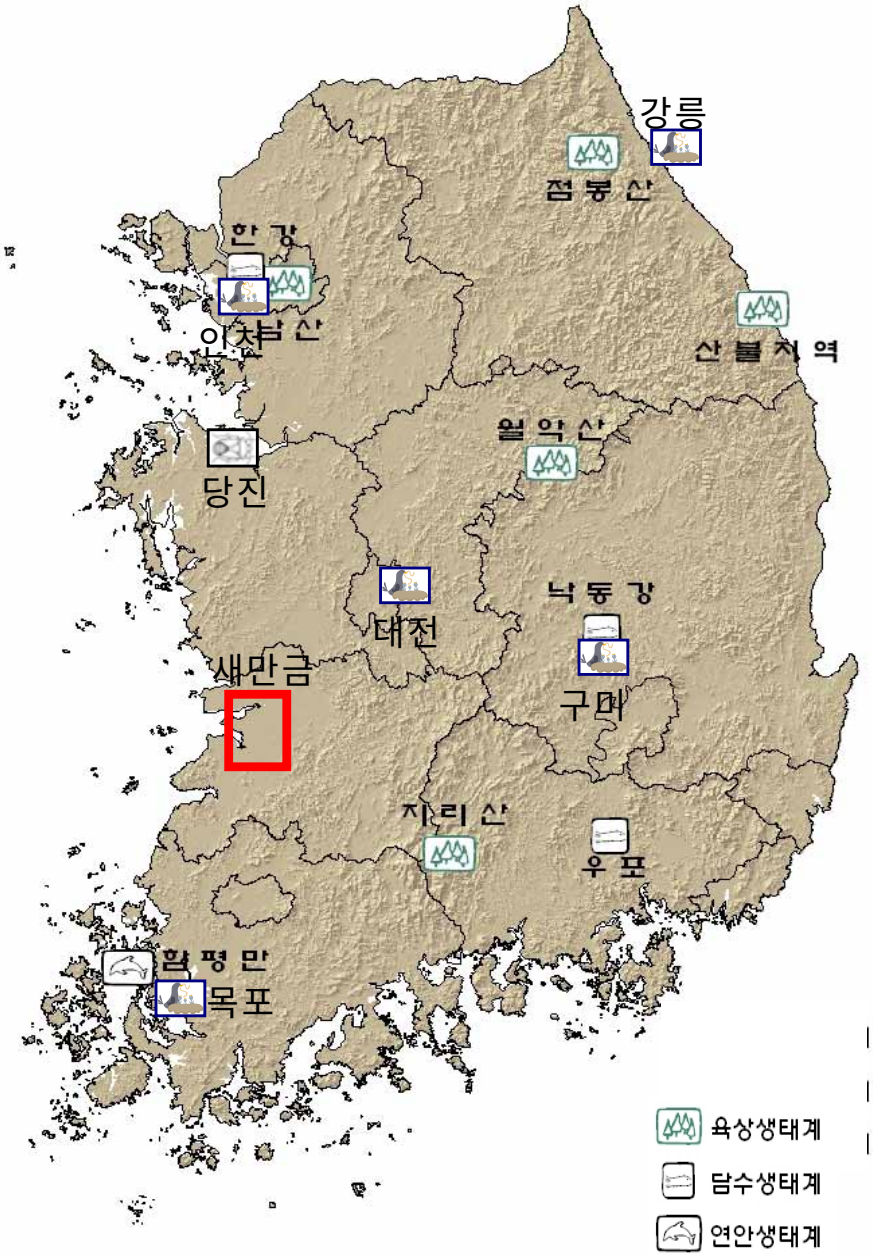



## Forest zones of Korean Peninsula and location of KLTER sites

- GEF: Gwangneung Experiment Forest
- GBS: Mt. Gyebangsan
- GMS: Mt. Geumsan
- SCK: Samchuk
- JJI: Jejudo Island

# 10 more Study Areas from KNLTER Group

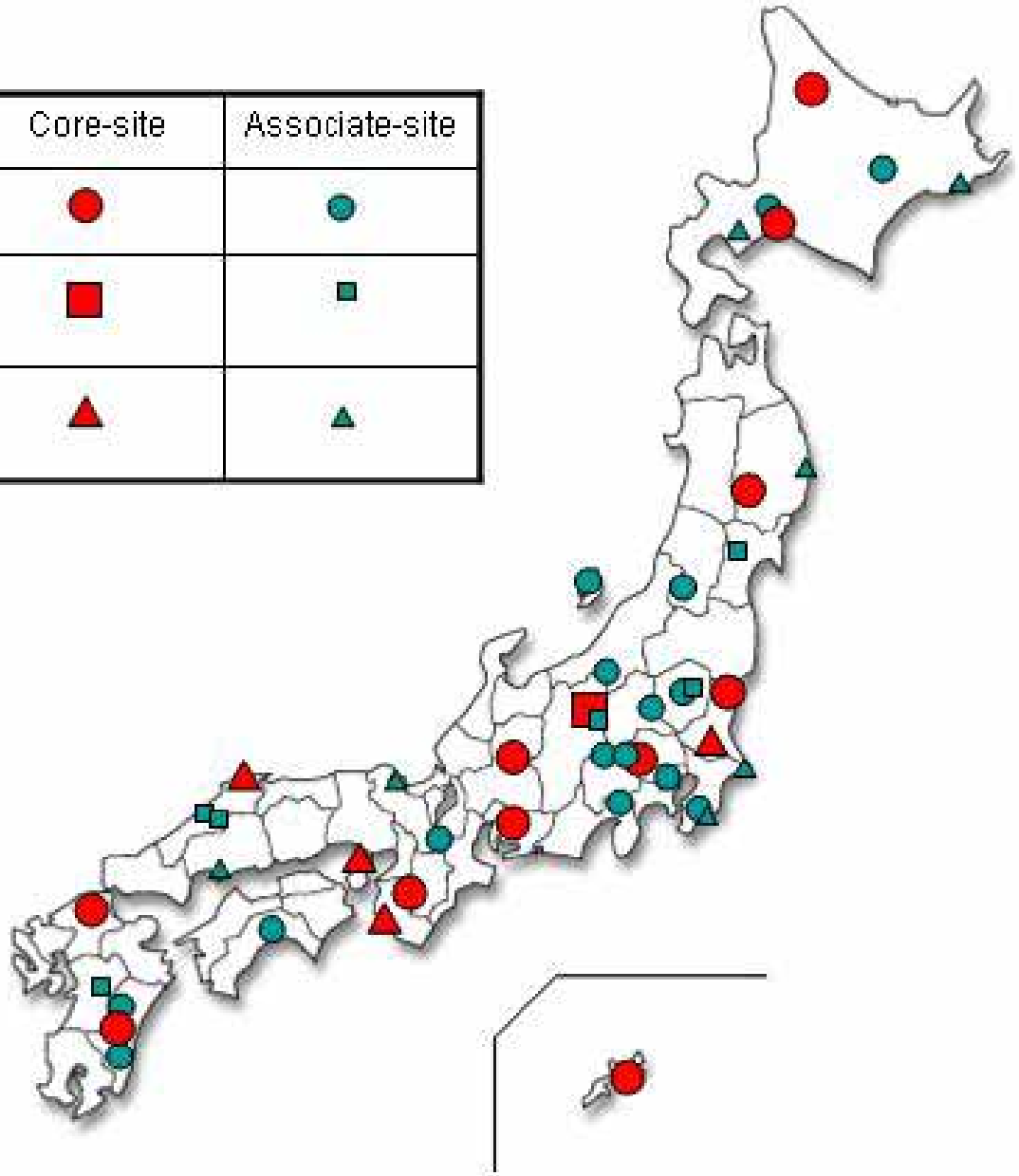



**Terrestrial Ecosystem**
4 mountains and 1 forest fire region
Meteorological towers

**Freshwater Ecosystem**
2 lotic systems, 1 wetland, and 1 reclaimed area

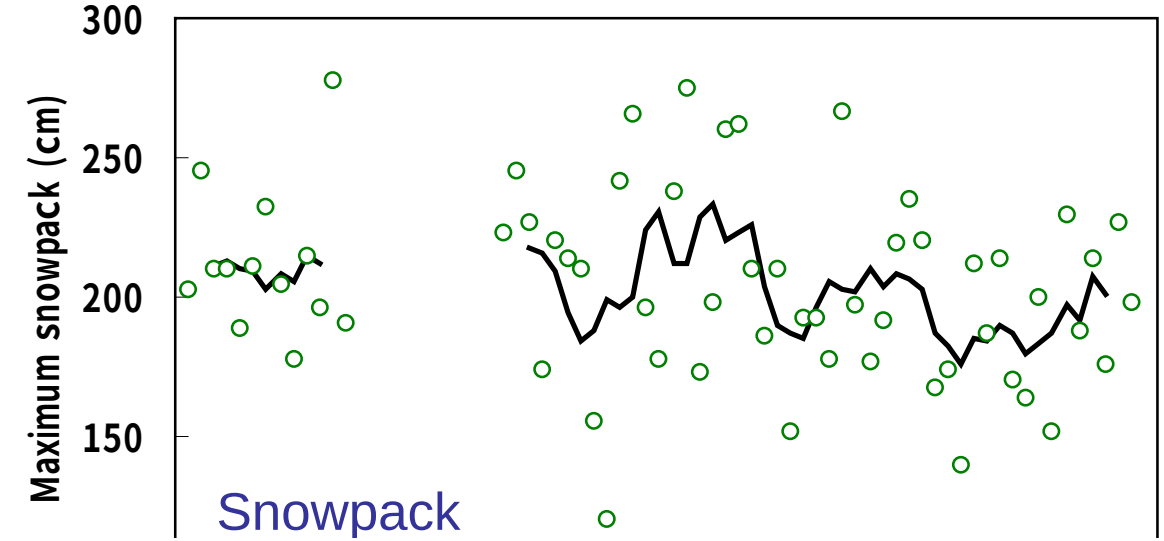
**Coastal Ecosystem**
1 coastal area

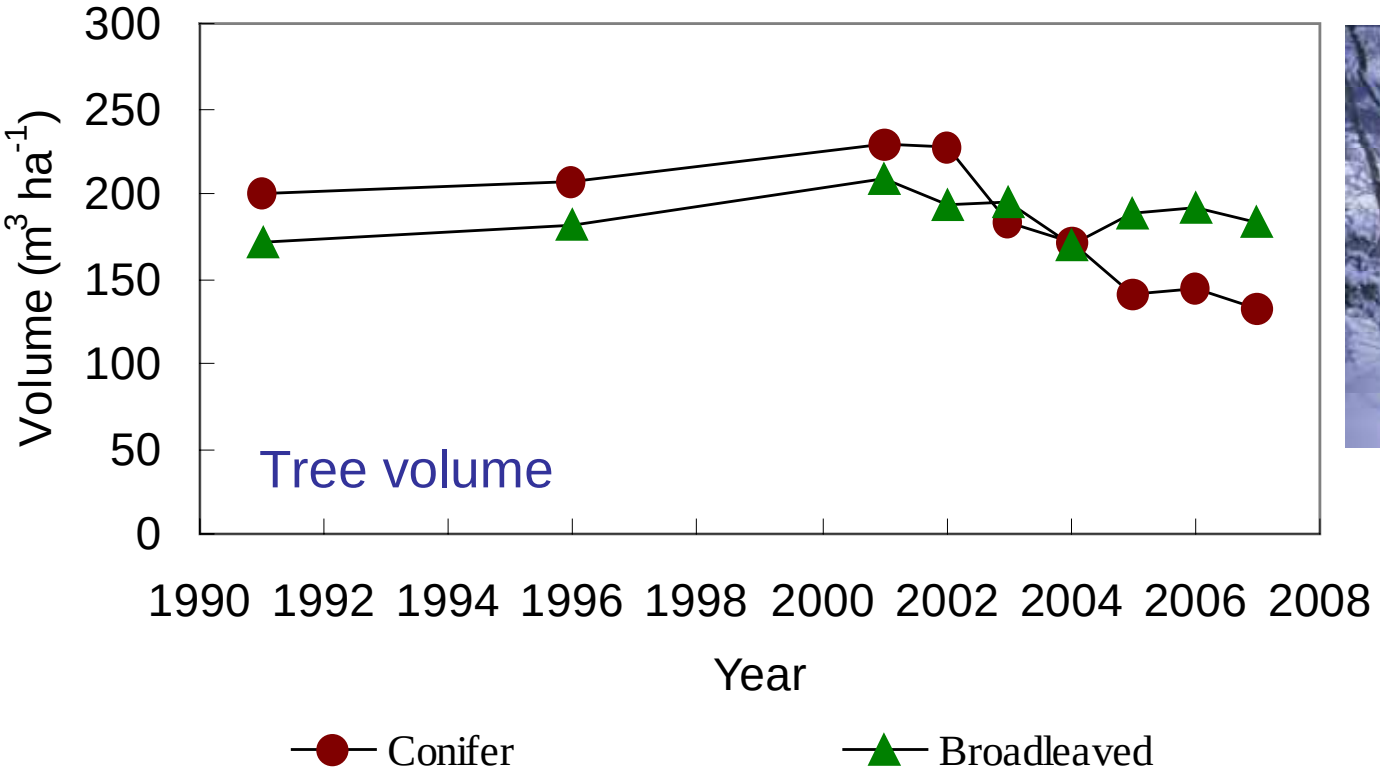
| | Core-site | Associate-site |
|---|---|---|
| Forest | ● | ● |
| Grass land | ■ | ■ |
| Lake and estuary | ▲ | ▲ |



**JaLTER site network (April 2008)**

# Challenge of JaLTER; Long-term monitoring of environment and ecosystem



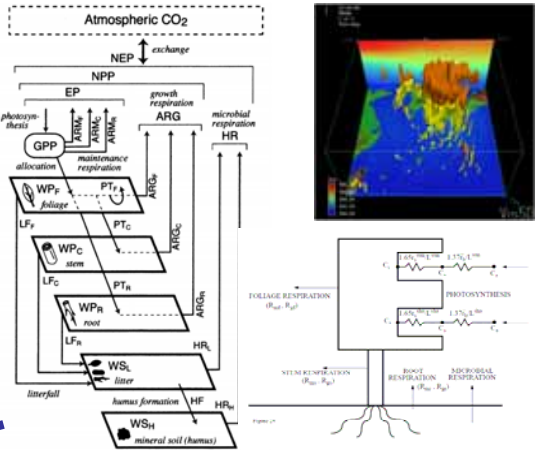

Natural mixed forest

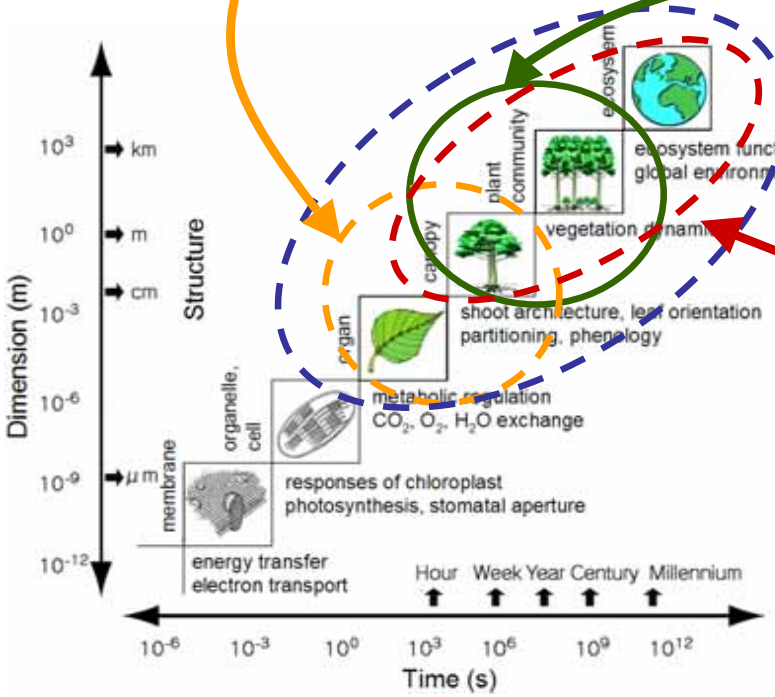
# Challenge of JaLTER: Interdisciplinary approach

## Ecosystem process

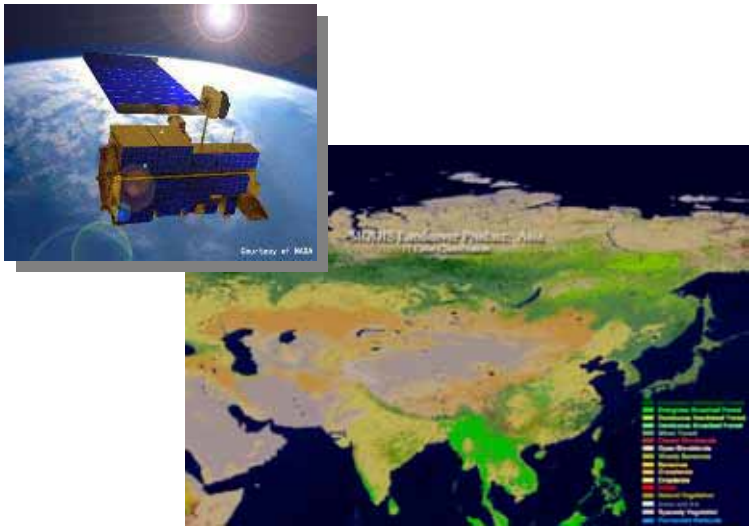
## Flux measurement

## Process model



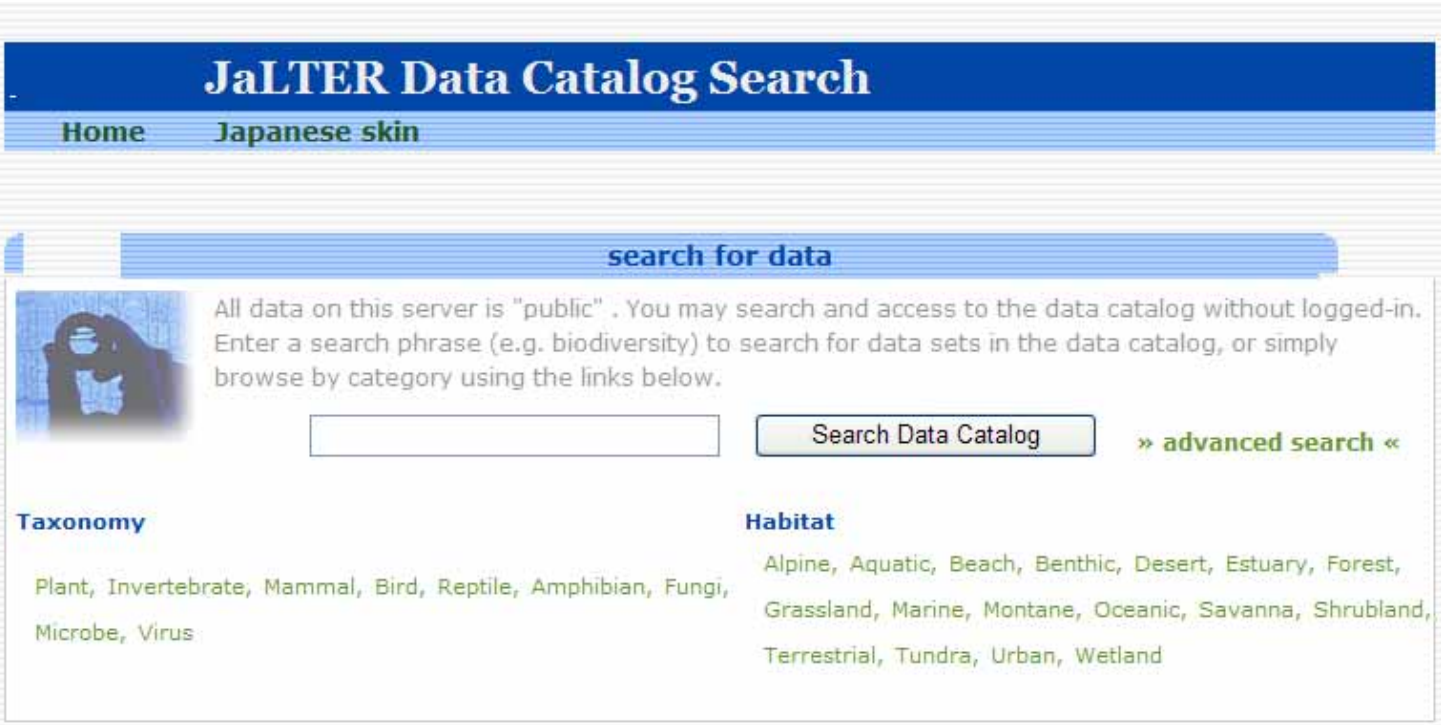



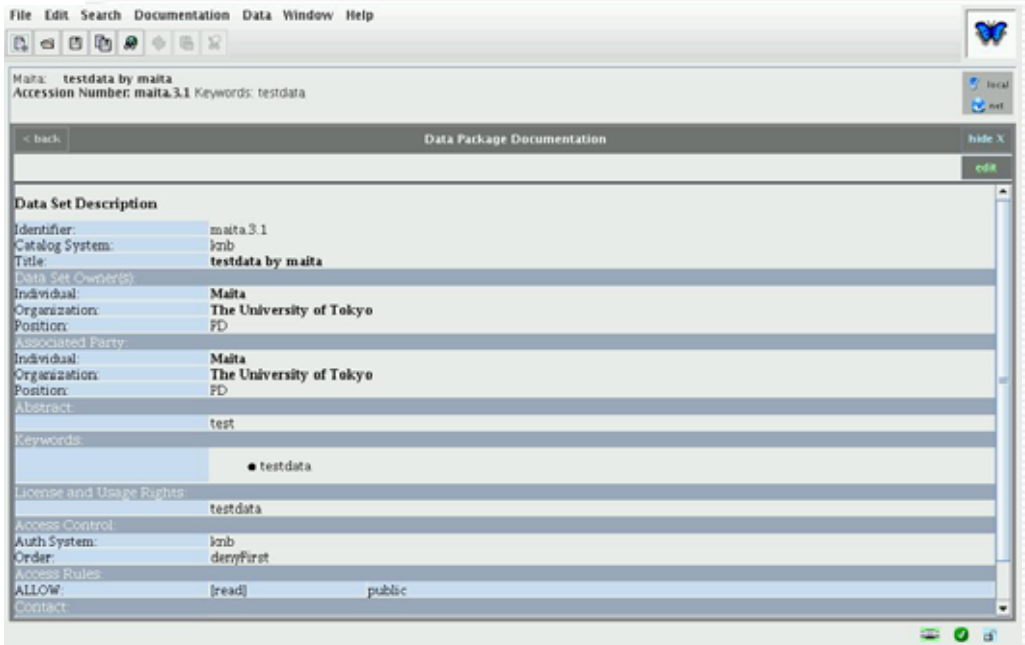

## Remote sensing

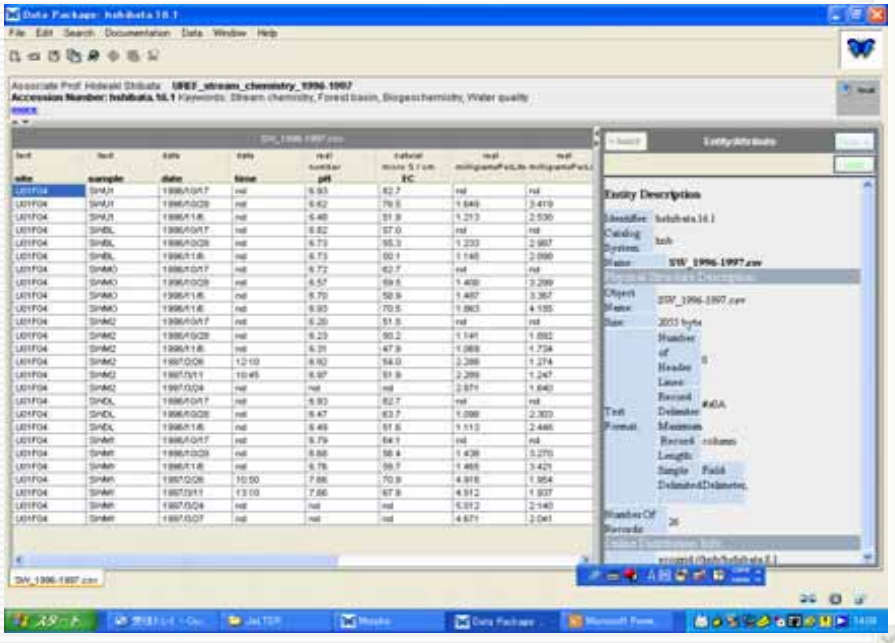


JaLTER core-site; Takayama (provided by Dr. Muraoka (Gifu Univ.))

# Challenge of JaLTER: Data archiving and sharing – EML database



# THE COLLABORATIVE PARTNERSHIP ON FORESTS


An informal, voluntary arrangement for collaboration among 14 international organizations and secretariats

Works through Joint Initiatives and other collaborative activities

Aims at promoting the management, conservation and sustainable development of all types of forests

# EXPERT PANELS


- Consist of limited number of scientists with recognized expertise
- Are established on temporary basis
- Operate on basis of Terms of Reference
- Prepare assessment reports

# Using GEOSS to protect Biodiversity

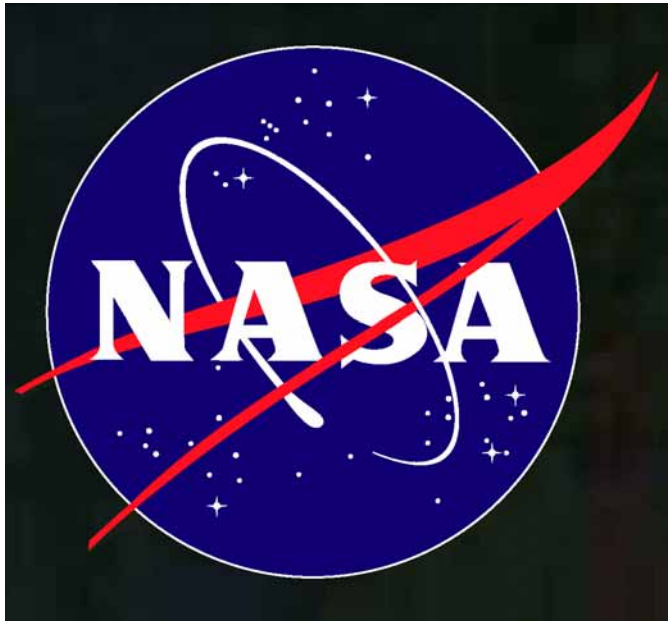
***13:00-15:00***

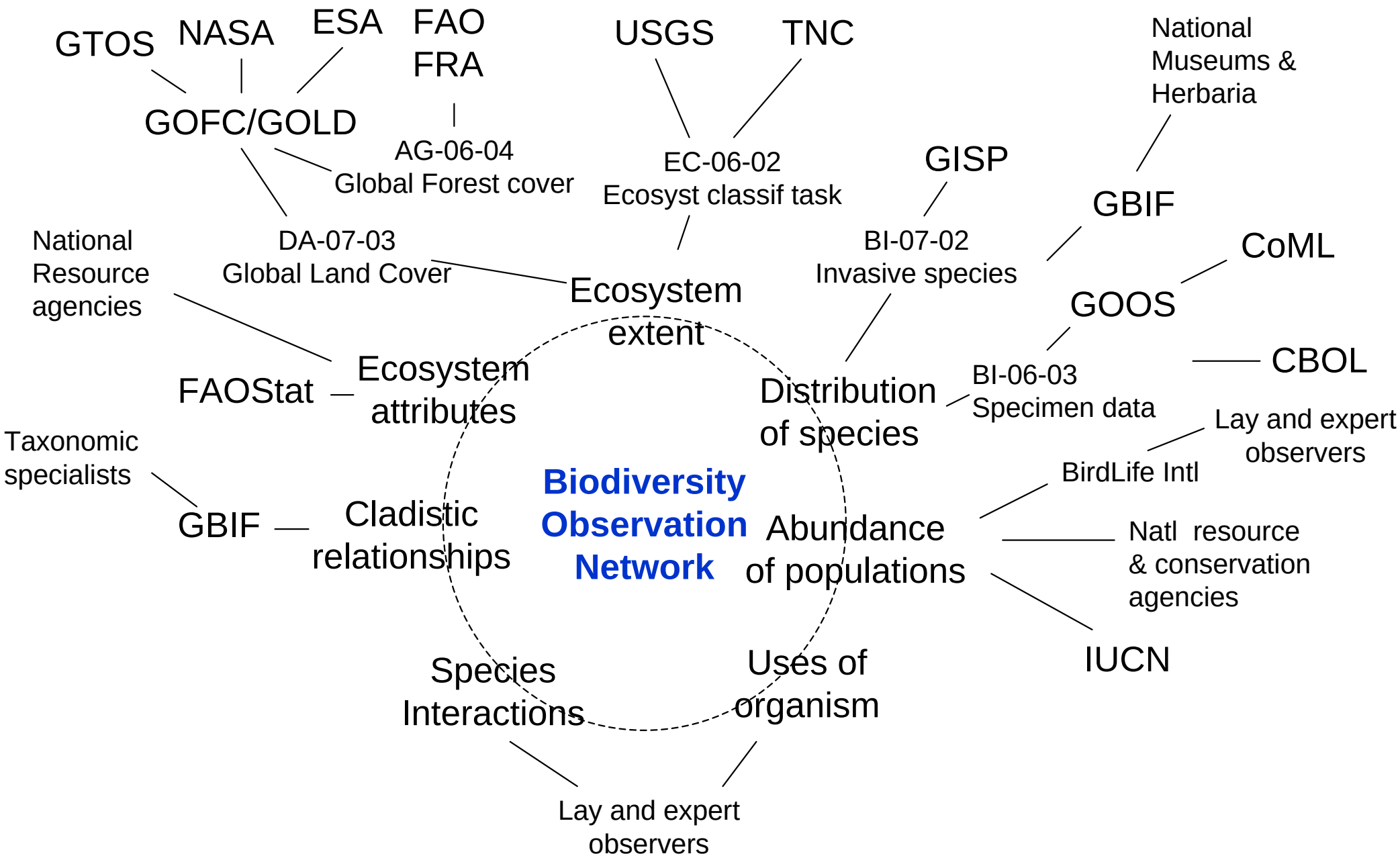
- ***Newest developments in the formation of the global Biodiversity Observation Network (GEO BON)*** (Bruno Walther, DIVERSITAS/NASA/GEO)
- ***NaGISA and DIWPA ---- as examples for strategic implimentation plan of global-scale and long-term biodiversity monitoring program*** (Dr Shirayama, Kyoto University)
- ***Monitoring Sites 1000, a nationwide project for monitoring ecosystems and biodiversity in Japan*** (Mr. Sakaguchi, Biodiversity Center of Japan, Ministry of Environment)
- ***Biodiversity and Climate Change - a role for GBIF*** (Dr. Eamonn O Tuama, GBIF)
- ***Predicting potential habitats for plants under climate change and assessing vulnerability in Japan: especially referring to buna (Fagus crenata) forests*** (Tanaka, N., Matsui, T., Yagihashi, T., Taoda, H., FFPRI Japan)

# The context of GEO BON

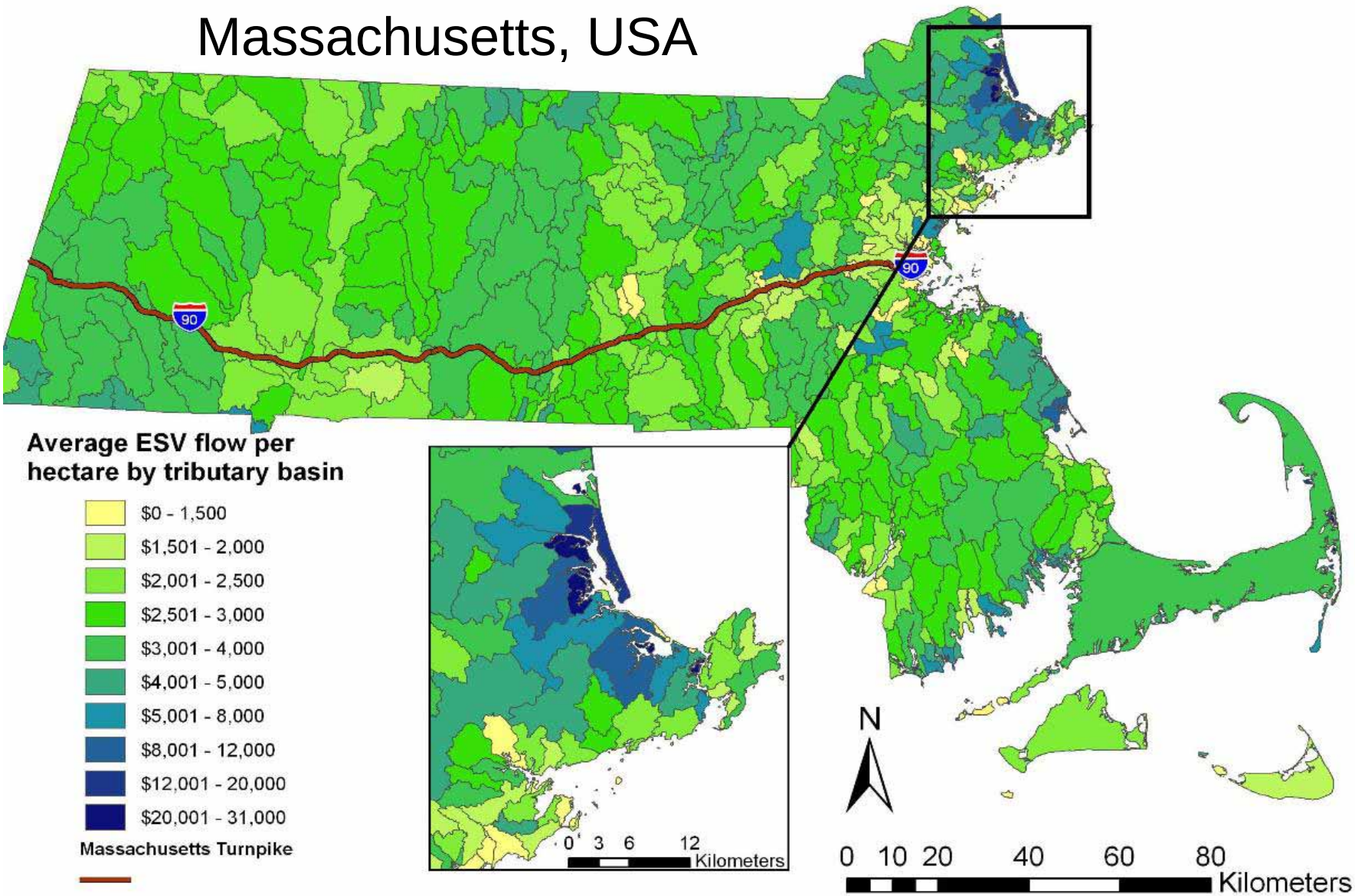
- **DIVERSITAS and NASA have been appointed to lead task of developing a global Biodiversity Observation Network**

DIVERSITAS
an international programme
of biodiversity science



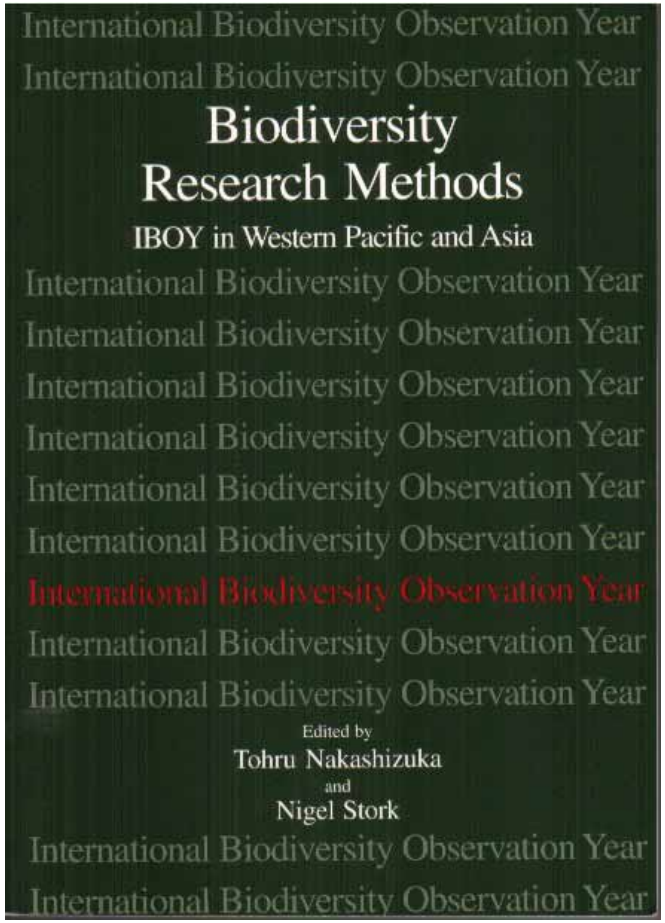

GTOS
NASA
ESA
FAO
FRA
USGS
TNC
National
Museums &
Herbaria
GOFC/GOLD
AG-06-04
Global Forest cover
EC-06-02
Ecosyst classif task
GISP
GBIF
National
Resource
agencies
DA-07-03
Global Land Cover
BI-07-02
Invasive species
CoML
Ecosystem
extent
GOOS
CBOL
FAOStat
Ecosystem
attributes
Distribution
of species
BI-06-03
Specimen data
Lay and expert
observers
Taxonomic
specialists
BirdLife Intl
Biodiversity
Observation
Network
GBIF
Cladistic
relationships
Abundance
of populations
Natl resource
& conservation
agencies
IUCN
Species
Interactions
Uses of
organism
Lay and expert
observers

# Ecosystem Service Valuation



# DIWPA-IBOY (2000-2001)
# Promoting standardized sampling & monitoring of ecosystems and biodiversity


**Forest ecosystems**
**Fresh water ecosystems**
**Coastal marine ecosystems**
**Island ecosystems**



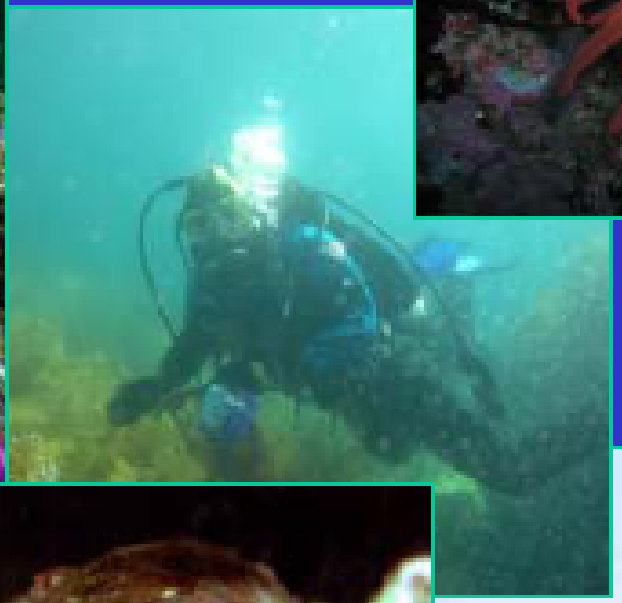

Protocol manuals
@ **DIWPA website**

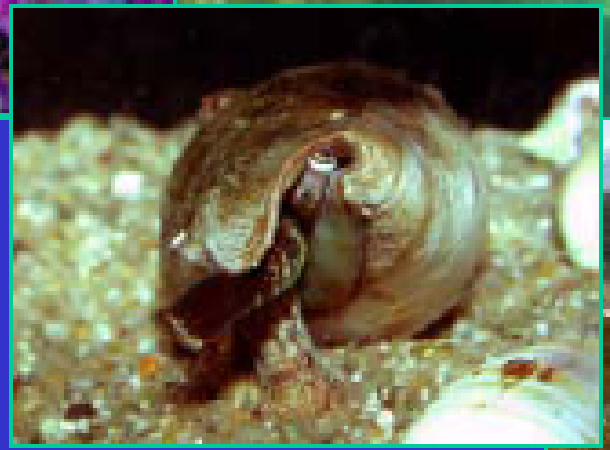
# Natural Geography In Shore Areas

## A Census of Marine Life Field Project

http://www.nagisa.coml.org/

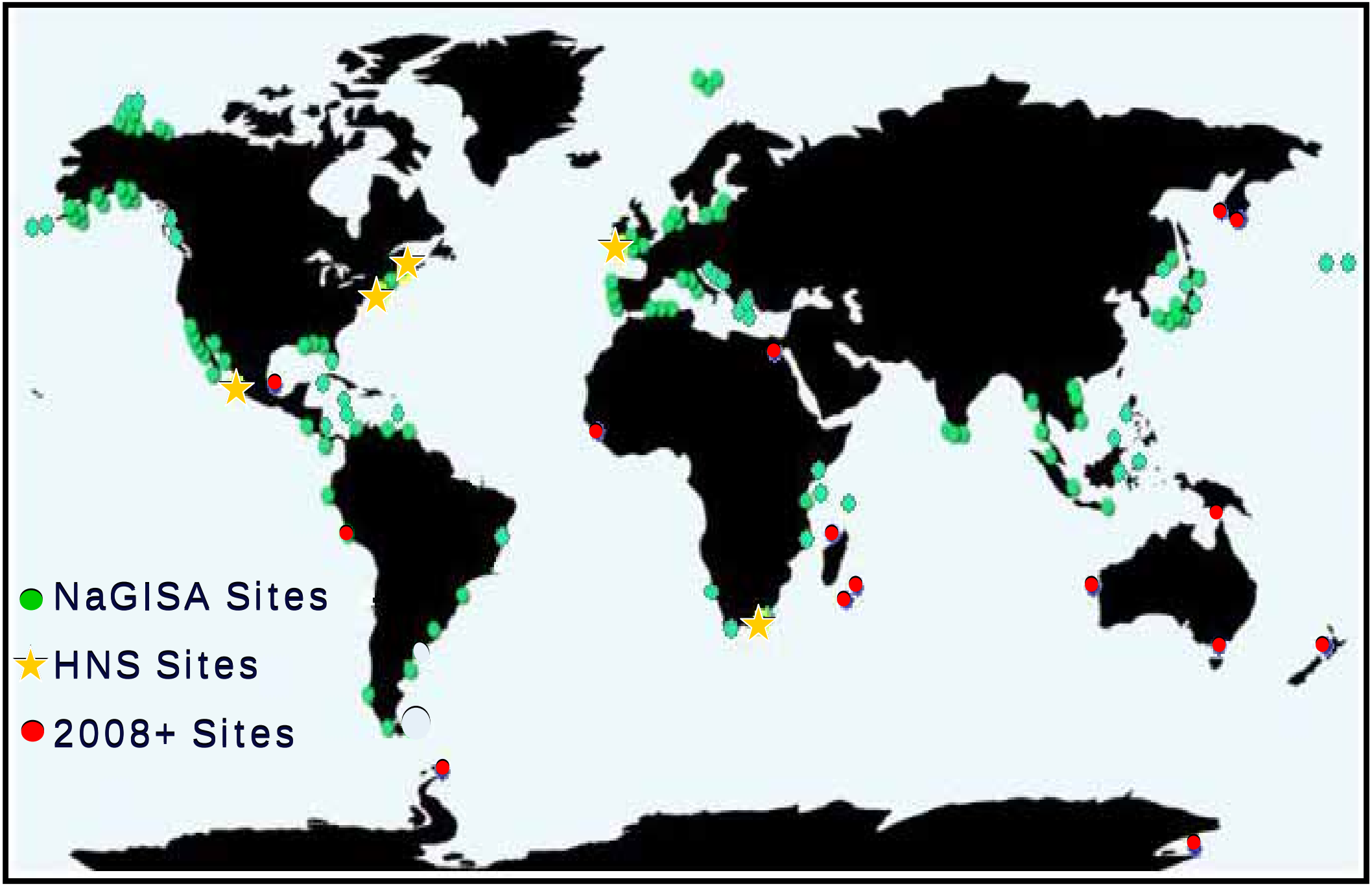





Produced by Seto Marine Biological Laboratory, Field Science Education & Research Center, Kyoto University

# Global Scope of Project 2



OBIS
OCEAN BIOGEOGRAPHIC INFORMATION SYSTEM

Search | Using OBIS | About the Data | About OBIS | | News |

# EXPLORE DATA ON LOCATIONS OF MARINE ANIMALS AND PLANTS

Obtain data tables, maps and predict distributions using environmental information

**13.7 million records** of 80000 species from 238 databases

## SEARCH BY NAME

"Great white shark" or "Carcharodon" or "Carcharodon carcharias"

Search >>

Advanced Search including date, depth, dataset Browse by taxonomic groups

## SEARCH BY GEOGRAPHY

Click on the map to set the query box 5° search area

Search >>


OBIS is a project of the CENSUS OF MARINE LIFE

# Challenge of JaLTER: Interdisciplinary cross-site study


## --- Monitoring sites 1000 ---

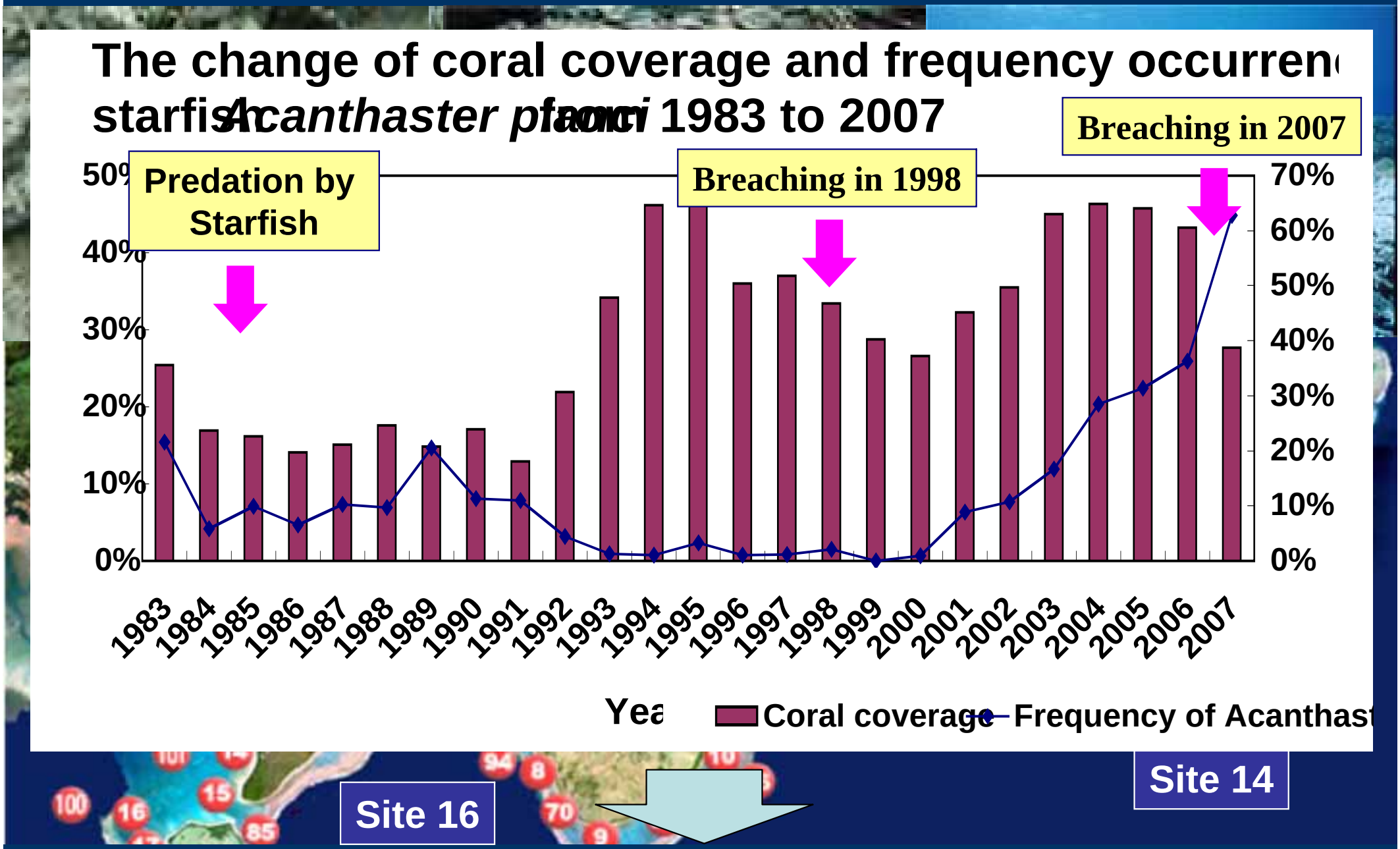
Ministry of Environment, Japan

- ✓Biodiversity & Ecosystem
- ✓Tree growth
- ✓Litter-fall
- ✓Seed production
- ✓Forest-floor insects
- ✓Bird community

Forest and estuary sites are strongly over-lapped by JaLTER-site.

Mr. Sakamoto will explain details in the afternoon session.

# Results of Coral Reef Monitoring in Sekisei-syouko




**Application to restoration of coral reefs and eradication of star fishes**

# GBIF Mission

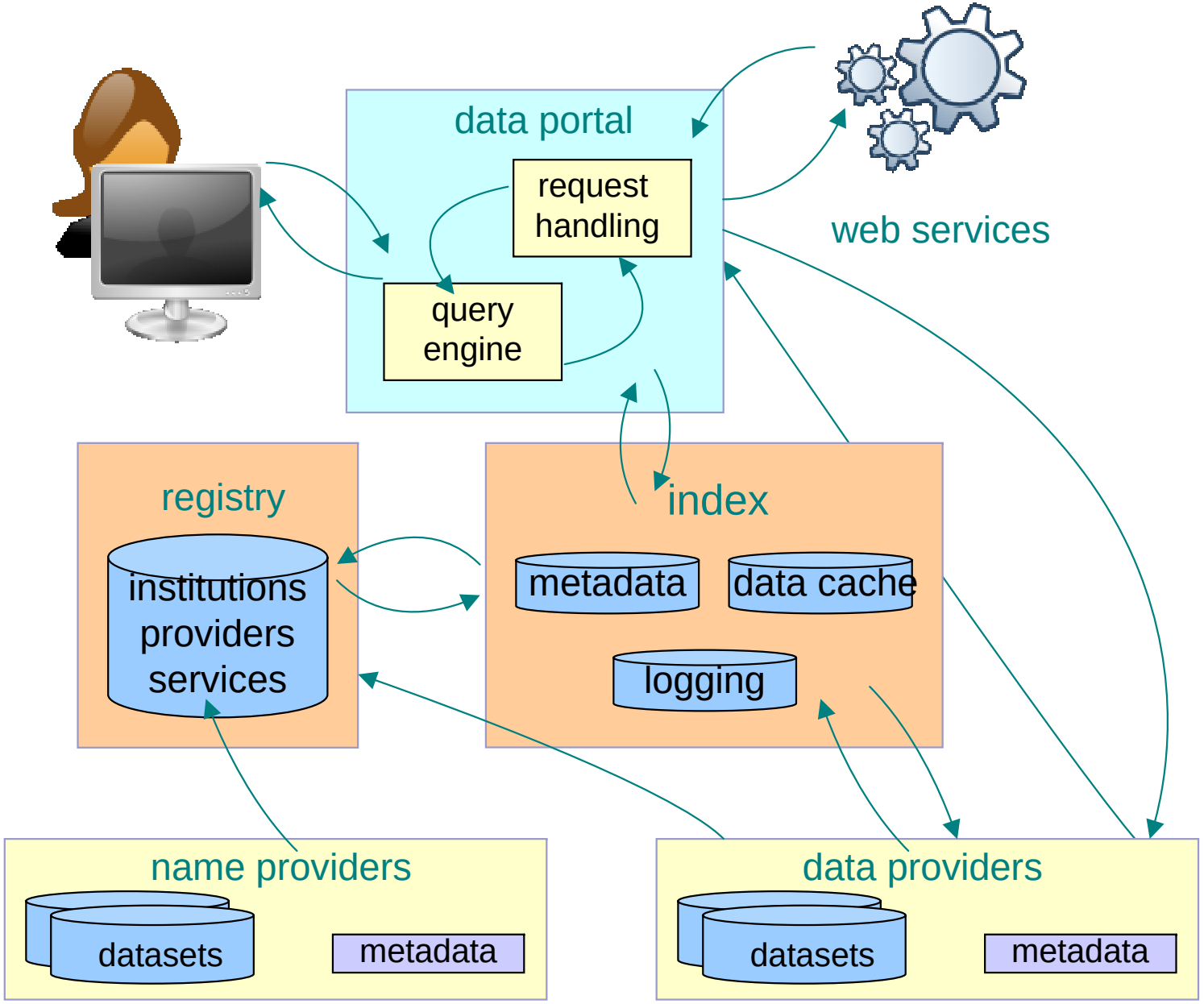
… to make the world's **biodiversity** data freely and universally available via the Internet.

What is biodiversity?

GBIF follows the broadly outlined CBD recognition of levels of biological diversity:

- Molecules / genes
- Species
- Ecosystems / ecology

# Components of GBIF Architecture



GBIF Portal - Species: Cerastoderma edule - The Global Biodiversity Information Facility: - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://data.gbif.org/species/13790179

Getting Started Latest Headlines https://www.checkmyt...

Disable Cookies CSS Forms Images Information Miscellaneous Outline Resize Tools View Source Options

**Actions for *Cerastoderma edule***

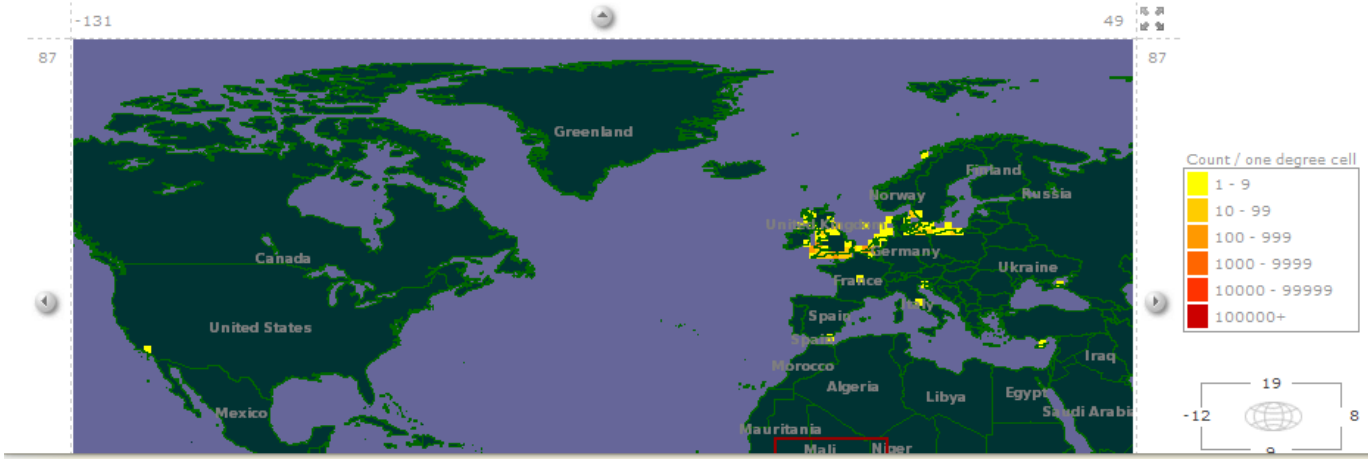
| | |
|---|---|
| **Explore:** | Occurrences Names and classification |
| **List:** | Countries with occurrences Datasets with occurrences |
| **Download:** | Darwin Core records One-degree cell density overlay for Google Earth Placemarks for Google Earth (limit 10,000) |

## Names and classification

**According to Catalogue of Life: 2007 Annual Checklist: The Integrated Taxonomic Information System**

| | |
|---|---|
| Name | *Cerastoderma edule* (Linnaeus, 1758) |
| Classification | »Kingdom: Animalia »Phylum: Mollusca »Class: Bivalvia »Order: Veneroida »Family: Cardiidae »Genus: *Cerastoderma* »Species: *Cerastoderma edule* |
| Status | Accepted name |
| Synonyms | *Cardium edule* |
| Common names | English: Common Cockle, Common Edible Cockle<br>Danish: Almindelig Hjertemusling, Hjertemusling<br>Dutch: Kokkel<br>French: Bucarde, Coque, Coque Commune<br>German: Herzmuschel<br>Italian: Cuore, Cuore Edule<br>Portuguese: Berbigão Vulgar<br>Spanish: Berberecho, Berberecho Común, Chica, Gurrimaña, Gurrimaño, Perdigón, Verdigón |
| Record identifier | ITS-80901 |
| Record URL | http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=80901 |
| Review date | 25-Jan-2001 |
| Feedback | Feedback to Catalogue of Life: 2007 Annual Checklist on the classification of *Cerastoderma edule* (Linnaeus, 1758) |

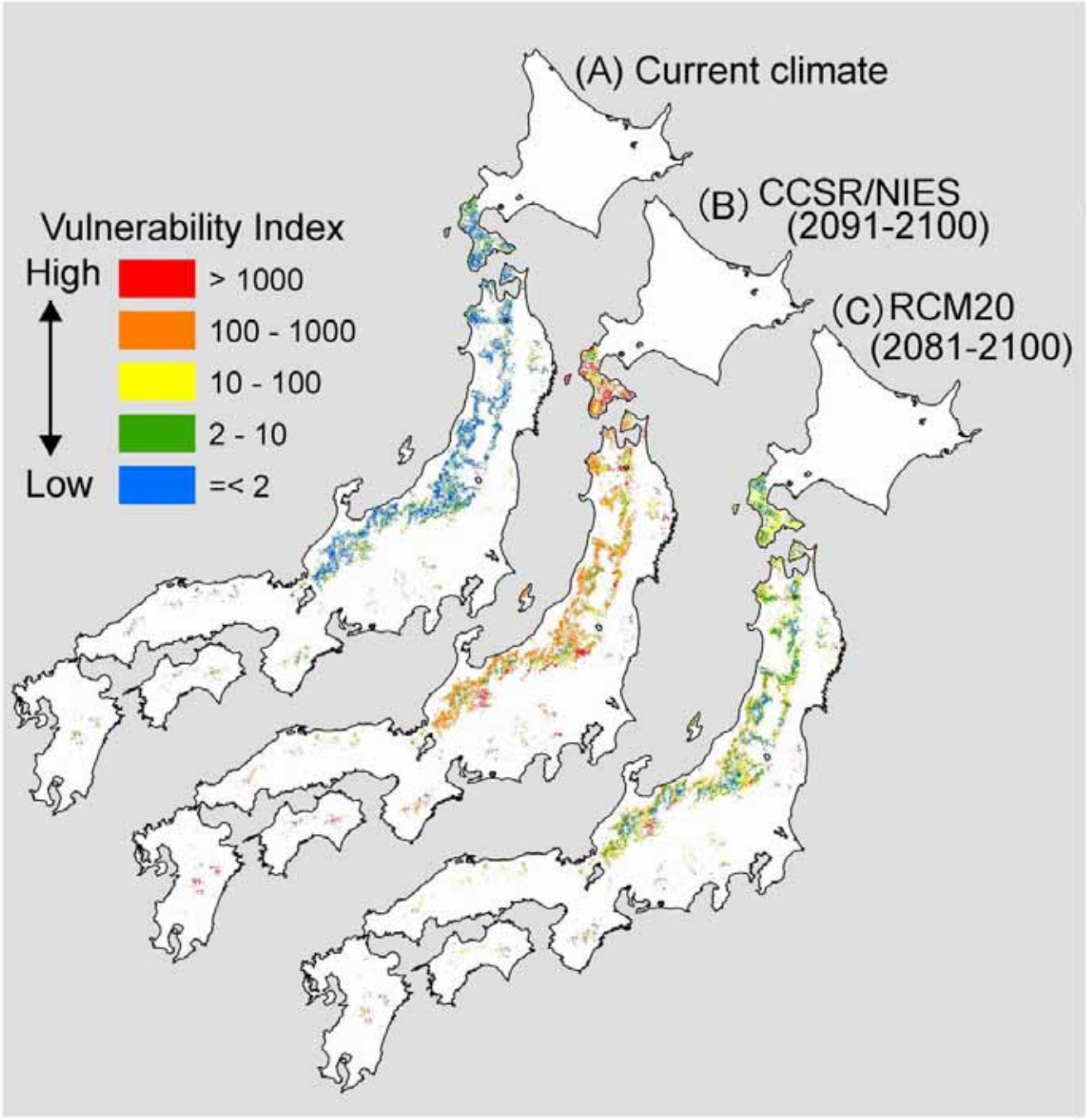
## Occurrence overview




Done

# Vulnerability Index for buna forests (VI)

VI = 1 / Occurrence probability



# Linking remote sensing and on site observation *15:30-16:30*

- ***A vegetation transition model at the topographical scale and its application to the Mongolian Forest-Steppe ecotone*** (R. Ishii, Frontier Research Center for Global Change)
- ***Introduction of Three-dimensional digital analysis of aerial photographs and Phenology monitoring camera system*** (Dr Oguma, NIES Japan)

# General discussion and wrap up session summary *16:30-17:30*

# Development of Spectral Imager

Hemispherical Spectro-radiometer

Field of view

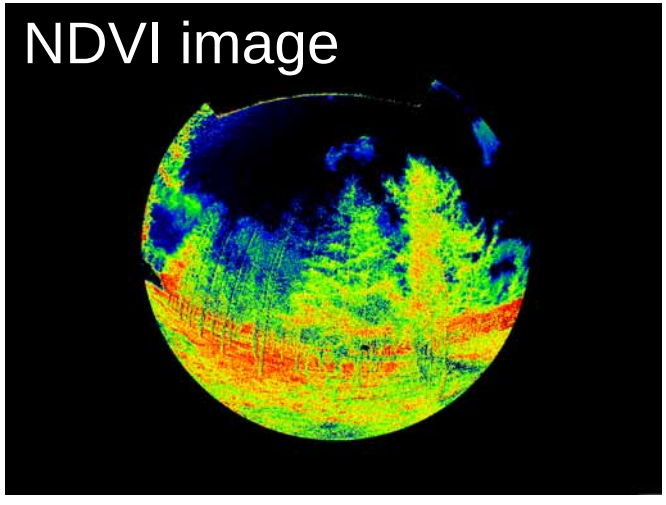
$CO_2$ Flux Site

**Mixture signal**

Natural forest

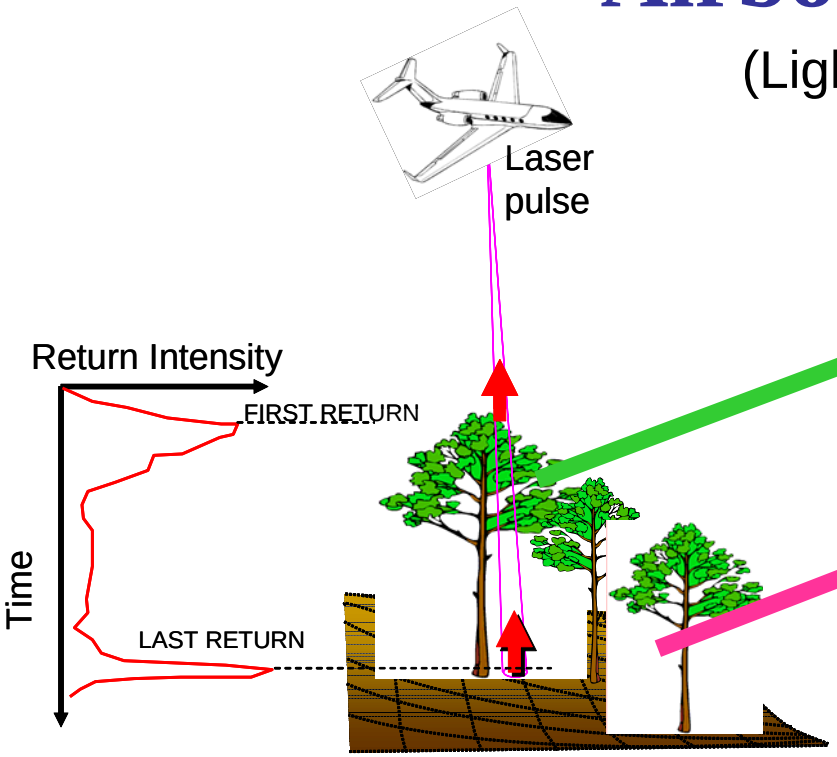
- All weather
- Low cost
- Easy operation
- Battery or Solar battery operation

Phenology Camera is required

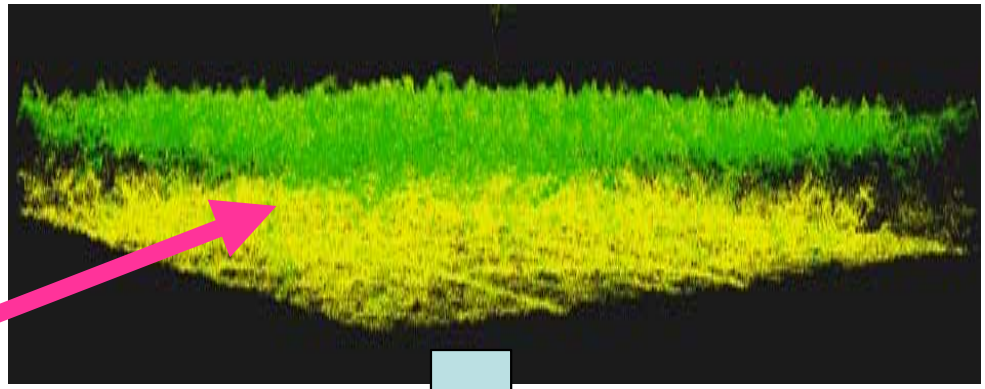


# Airborne Lidar Systems

(Light Detection And Ranging)



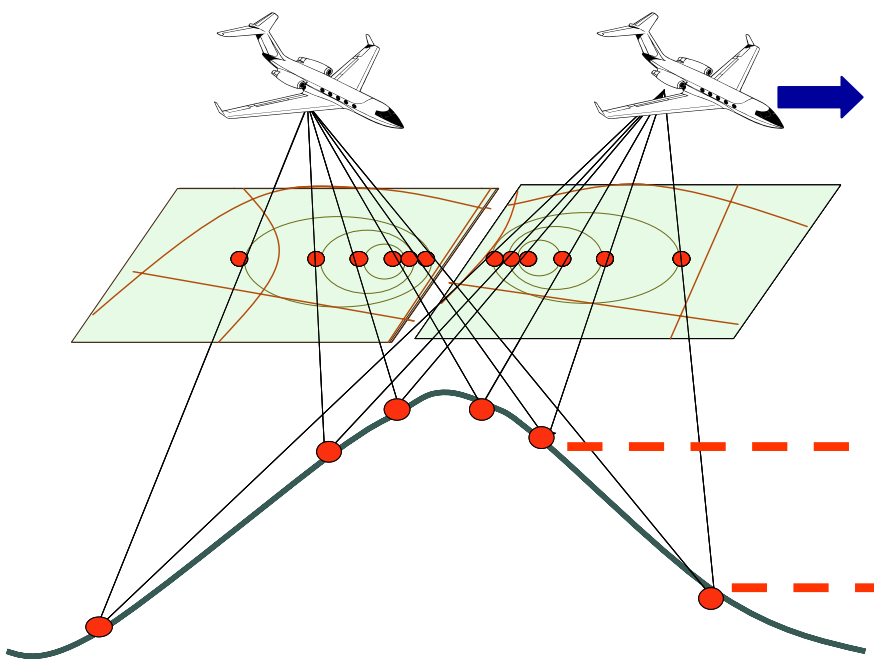

Raw point cloud (x,y,z coordinates)

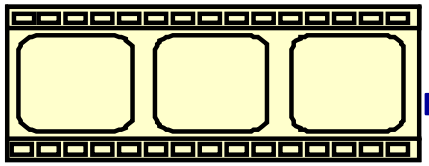


Larch tree

Tomakomai $CO_2$ Flux research site

# Three-dimensional digital analysis of aerial photographs

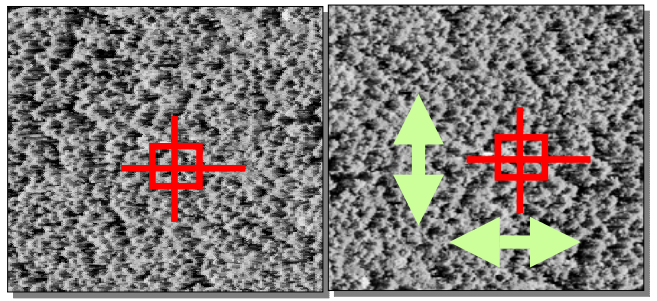




film

Scanner

Scanned digital data in the 10-micron pitch

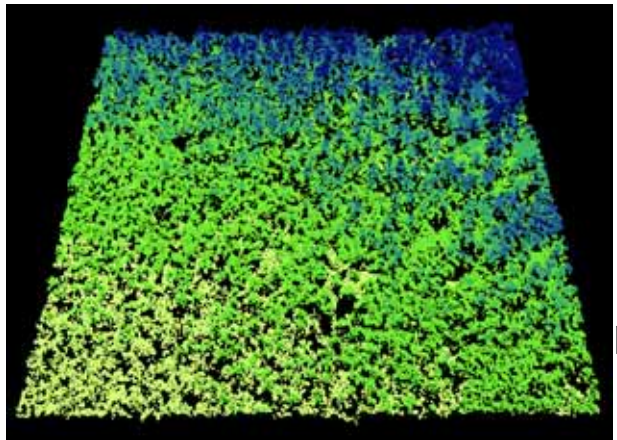


The software searches for the same target photographed from the different angle

Calculation of three dimension coordinates

Conventional method

Requirements;
・Skills
・Time ・・・



Digital surface model

Colored image by DCHM in 1946

Colored image by DCHM in 2002

# Target area & Sample site

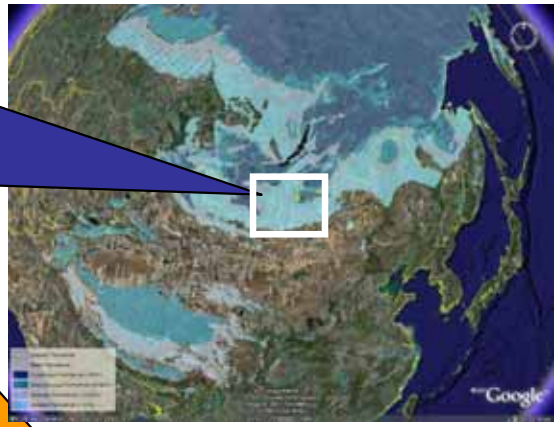
Gachuurt (30km North-East of Ulaanbatar)

*Vegetation*

*Permafrost Distribution*

Continental Scale

*Desert-Steppe-Taiga*
**Latitude:**
**Precipitation gradient**

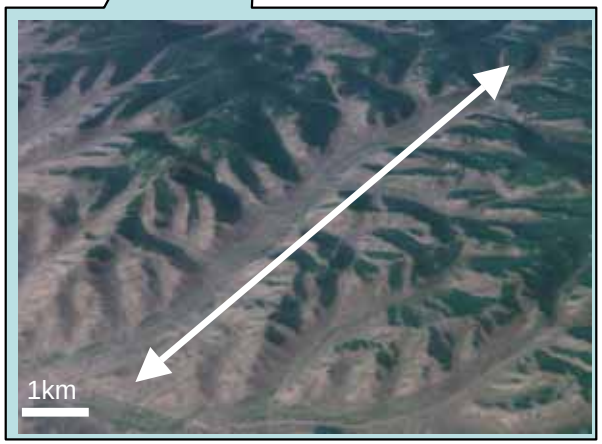


*South end of Permafrost*

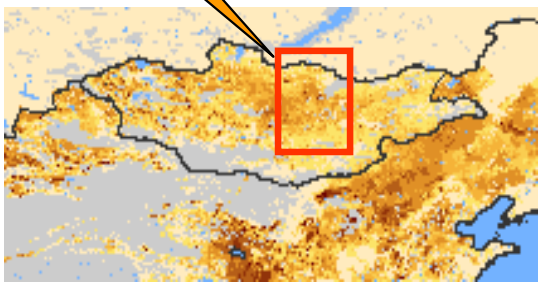
Regional-Scale

*Steppe - Larch forest*
**Slope direction:**
**Water?**
***Discontinuous***

***Water is the principal factor to determine the Vegetation***



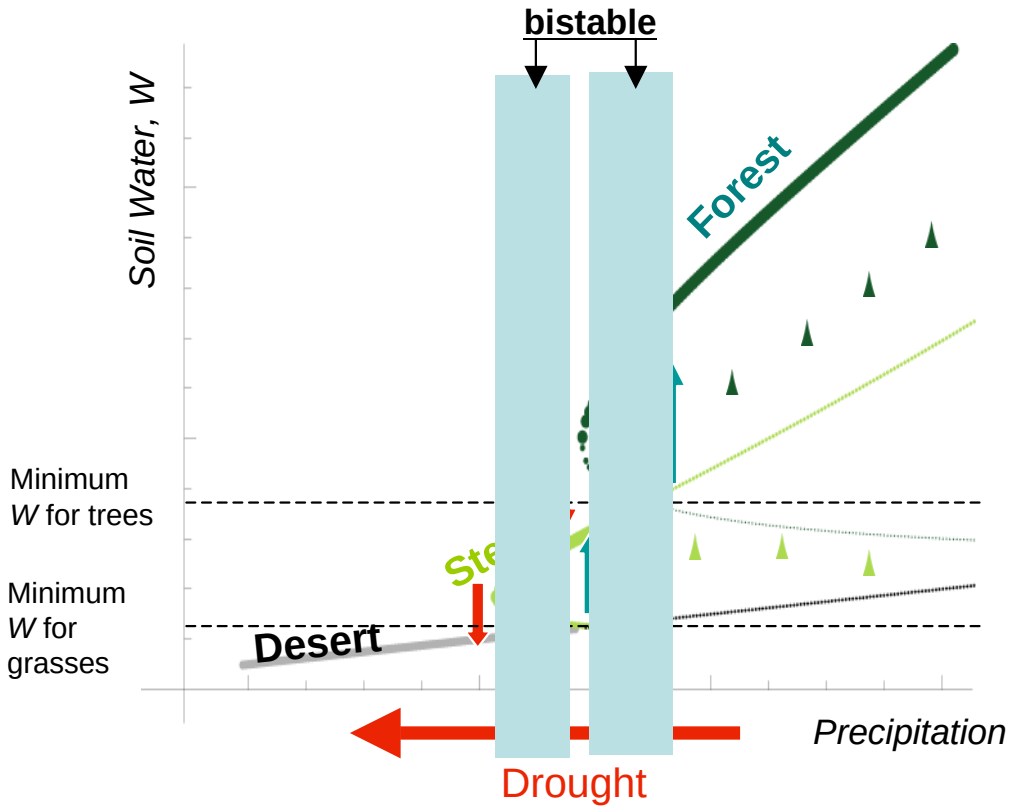

*Livestock Distribution*



*North end of Nomadic Pasturization*

# MODEL 1

## RESULTS EQUILIBRIA of Soil Water




●●● : Stable

... : Unstable

Positive correlation between Biomass-Soil Water: [Facilitation] enhances the succession (▲), while Negative interaction [Competition for resources] stabilizes the vegetation to the stable steady states:*climax*.

Points

1. Multiple stable steady states of vegetation might occur for a given precipitation.
2. Grazing pressure enlarge the bistable precipitation-range.

Qualitative Predictions

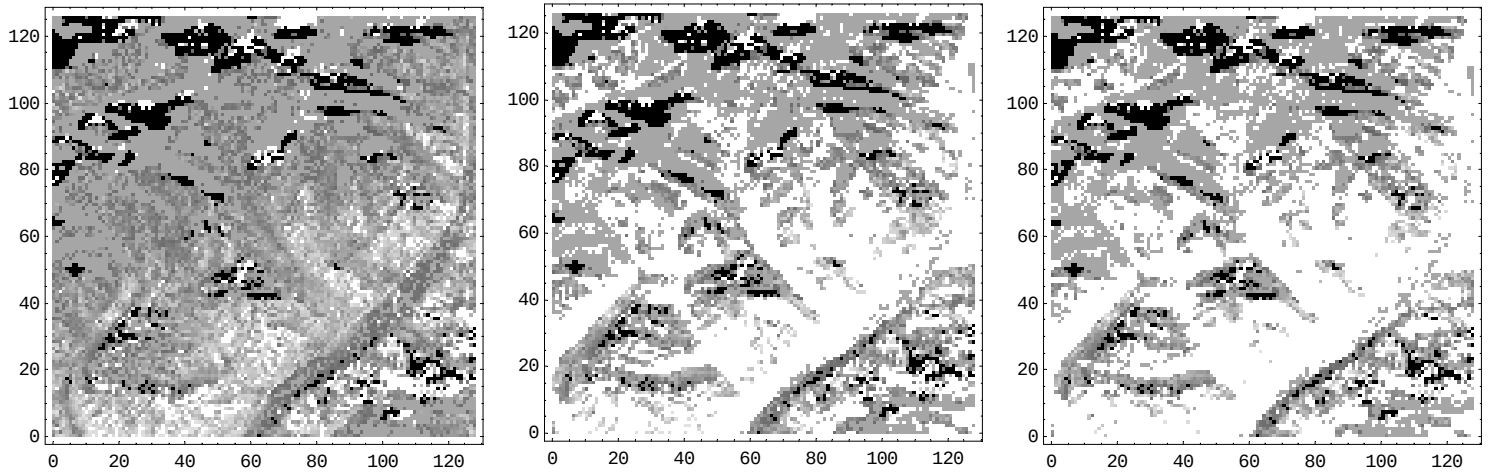
1. Drought might induce catastrophic vegetation-transitions Forest→Grassland→Desert (**Red arrows**)
2. Because of the Histeresis, it is difficult to recover the vegetation once it is shifted.

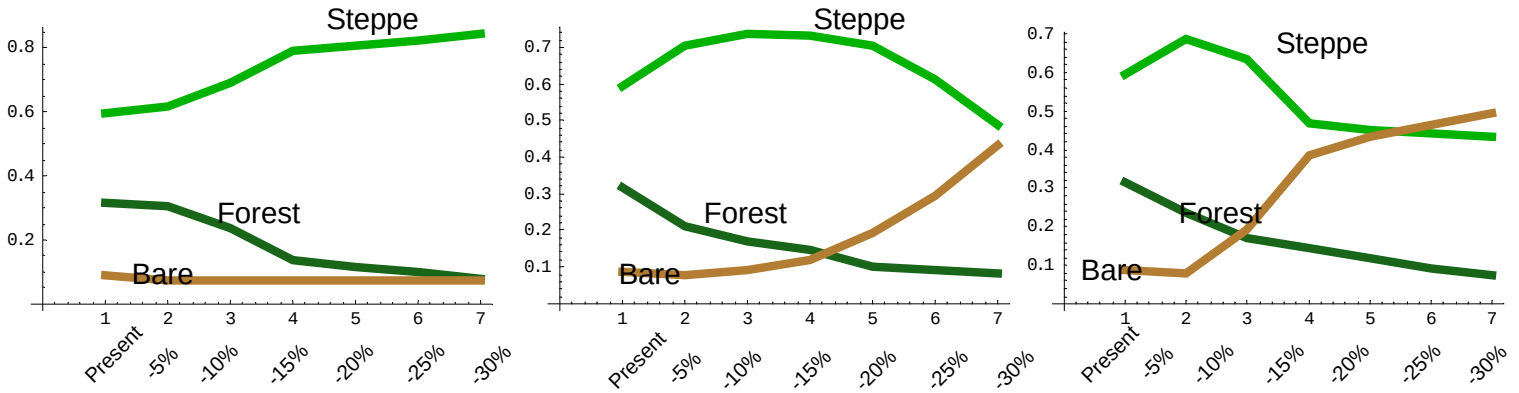
# MODEL 1+2　Spatial Projection of 40yrs future

i) Reduce precipitation

ii) Reduce precipitation
＋Livestock+50%
“Monotone distribution”

iii) Reduce precipitation
＋Livestock+50%
“Idealfree distribution”




Deforestation & Desertification might proceed heterogeneously acording to the topography

# Lacking of specialists in taxonomy

- Training parataxonomists through workshop
- 1st workshop on  Polychaetes held in 27-29 September, 2003
- 9 workshops have been held

# Joint sampling with developing country scientists


# To use GEOSS for the management adaptive to climatic change

- **Observation**
  - In situ, process oriented observation
  - Long-term continuity with repeatable way
  - Multi-scale, integrated observation sites (including human dimension)
  - Devices linking in-situ and remote sensing
- **Network**
  - Enhance networks (multi-scale, multi-organization, multi-disciplinary)
- **Information**
  - Increase data sharing, interoperability and integration for user's scenario
- **Predicting models**
  - Basing on impact-response scenario
- **Capacity Building**
  - For developing country and voluntary observation

## Summary Report

# Using GEOSS for managing Ecosystem and conserving Biodiversity

The Asia-Pacific region includes a variety of ecosystems, ranging from low to high latitudes. However, human populations and economies are growing rapidly in this region, thereby causing stronger interactions with global warming. This effect is expected to continue and increase.

To establish an effective observing system for monitoring impacts of global warming and developing adaptive measures, Asia-Pacific nations must coordinate their observation networks and improve interdisciplinary collaboration and observation capacity under the framework of GEOSS, with the aim of conserving ecosystems and biodiversity in the Asia-Pacific region.

GEO is expected to strengthen the following GEOSS Tasks:

- Ecosystem Classification and Mapping
- Regional Networks for Ecosystems
- Global Ecosystem Observation and Monitoring Network
- Capturing Historical Biodiversity Data
- GEO BON (Biodiversity Observation Network)