Natural Environment Survey and Biodiversity Conservation by Gap Analysis in Hokkaido, Japan

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Gap Analysis?

Identify differences, or gaps, between habitats and existing protection networks by superimposing various geographical information using GIS.

Species distribution or (potential) habitat information
Distribution – Species A
Distribution – Species B
Distribution – Species X

Landcover (vegetation, soil map)

Land ownership and stewardship (Nature reserves, land ownership map)

Overlaid – gap analysis
Association map of biodiversity and protection status
Proposal of proactive conservation policies
- Can reduce economical and biological costs compared with traditional reactive approach

“Coarse-filter” approach
- Complements “fine-filter” approach for protecting particular species.

Utilize remote sensing and GIS to their maximum potential
Natural Environment Survey in JAPAN

Ministry of the Environment

*National Surveys on the Natural Environment*

- Vegetation map (Land cover map)
- Animal Distribution (Mammal, Bird, Fish, etc.)

Natural Environmental Information GIS

[Image: Biodiversity Center of Japan]

[Link: http://www.biodic.go.jp]
Natural Environment Survey in JAPAN

Animal Distribution Map

Sika Deer
Cervidae
Cervus nippon

the distribution of mammals, birds, amphibians & reptiles, freshwater fish and insects.

2^{nd} Survey (1978), 3^{rd} Survey (1983)
4^{th} Survey (1988-92), 5^{th} Survey (1993,94)
6^{th} Survey (1999-2002)

tree frog
wild boar
gray heron
Vegetation map (Land cover map)

plant community units classified according to plant sociology
2\textsuperscript{nd} Survey (1978-79)
5\textsuperscript{th} Survey (1993-98)
6\textsuperscript{th}-7\textsuperscript{th} Survey (1999-)

Land use map (National Land Numerical Information)
Natural Environment Survey in JAPAN

Parks (30 National Parks, 56 quasi-national park)
Gap Analysis in JAPAN

Hotspot Estimated from Species Richness

Hot spot
Gap Analysis in JAPAN

Hotspot of Species Richness and Parks
Gap Analysis in JAPAN

Percentage Gap Calculated for each Prefecture
Gap Analysis in JAPAN

Percentage gap calculated for each prefecture

Hokkaido had a relatively low gap percentage despite its large gap area, because its protected area is relatively large.

<table>
<thead>
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<th>Rank</th>
<th>Prefecture</th>
<th>Gap %</th>
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23 Parks in Hokkaido

(6 National Parks, 5 quasi-national park, 12 Prefectural Natural Park)

Many parks were designated in high altitude.
Gap Analysis for Rare Species

Mountain Hawk Eagle (*Spizaetus nipalensis*)

- a Large-sized Raptor
- an Endangered Species
- Little Information in Hokkaido, JAPAN

**Identify Conservation Gaps**

between Potential Habitat and Parks

- **Species Distribution**
- **Environmental Factors**

MaxEnt

Potential Habitat of Mountain Hawk Eagle

Overlay

Protected Area (Parks) in Hokkaido, JAPAN
Potential Habitat of Mountain Hawk Eagle

Limiting Factors

- the amount of forest
- the habitat fragmentation

18.2% of Hokkaido is a potential habitat.
Conservation Gaps of Mountain Hawk Eagle

Conservation Gaps (Circles)

Unprotected area with high habitat probability
86% of wetlands in Japan are located in Hokkaido. Wetlands are one of the most diverse ecosystems.

46% of wetlands were loss in about 50 years.
Complementary Analysis for Effective Reserve Network Design

**Place Prioritization for Reserve Network Design**

Complementary Analysis

Native Aquatic Plants Database

*Identify Conservation Gaps*

For Wetland Biodiversity
Conservation Gaps for Effective Reserve Network Design

9 Wetlands (pink points)

Conservation Gaps
Protected Wetlands
Low Priority
Protected areas
Cooperation for Biodiversity Conservation

comprehensive partnership and cooperation focusing on the establishment of a Conservation GIS Consortium

- Rakuno Gakuen University
- Conservation International Japan
- EnVision Conservation Office
- ESRI Japan

http://cgisj.jp/