



里山の生物多様性と生態系サービス

Biodiversity and ecosystem service in SATOYAMA

- 里山の生物多様性と生態系サービスの变化

Change in biodiversity and ecosystem services in SATOYAMA

- モザイク構造と生物多様性

Mosaic ecosystem and biodiversity

- 他の国での類似例

SATOYAMA-like landscape and biodiversity in other country

➤ 日本の生物多様性国家戦略における生物多様性の危機

Crisis of biological diversity in NBSAP of Japan

- 開発・乱獲など人の過剰利用
Overuse of ecosystems
- 人の生活様式・生態系管理の変化
Underuse of ecosystems
- 外来種
Invasive species
- 温暖化
Global warming



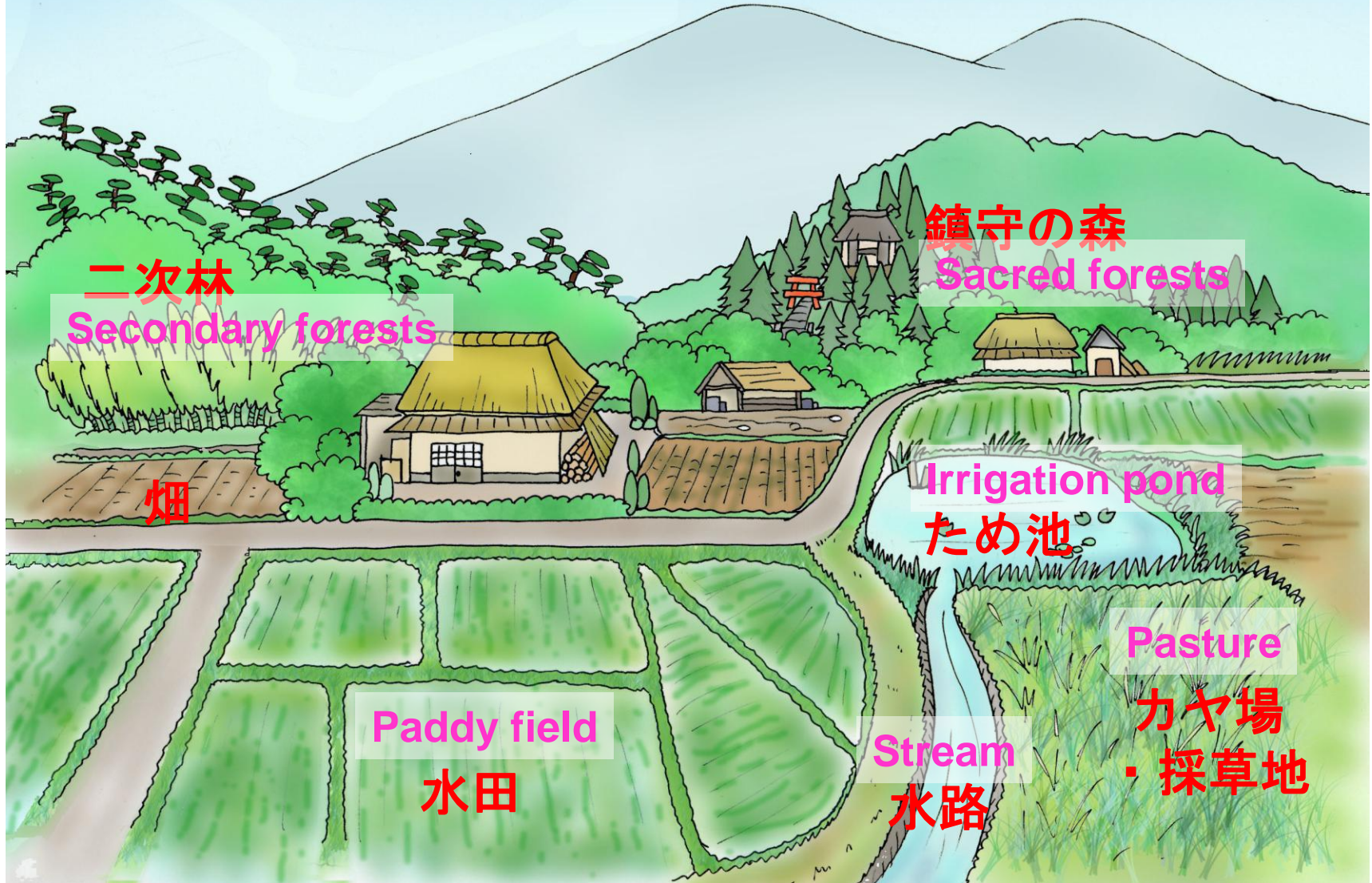
➤ 里山の生物多様性の危機

Crisis of biological diversity in SATOYAMA

- 動物では，絶滅危惧種集中地域の49%が里山域に分布
49% of hotspots of animals are in SATOYAMA areas
- 植物では，絶滅危惧種集中地域の55%が里山域に分布
55% of hotspots of plants are in SATOYAMA areas

➤ 2. 生物の絶滅の要因 2) 人の生活様式・生態系管理の変化

人の手の入った里山は生物多様性の高い場所





茅場・採草地 Grassland for horses and cows. Grasses were also used for roofing traditional houses.

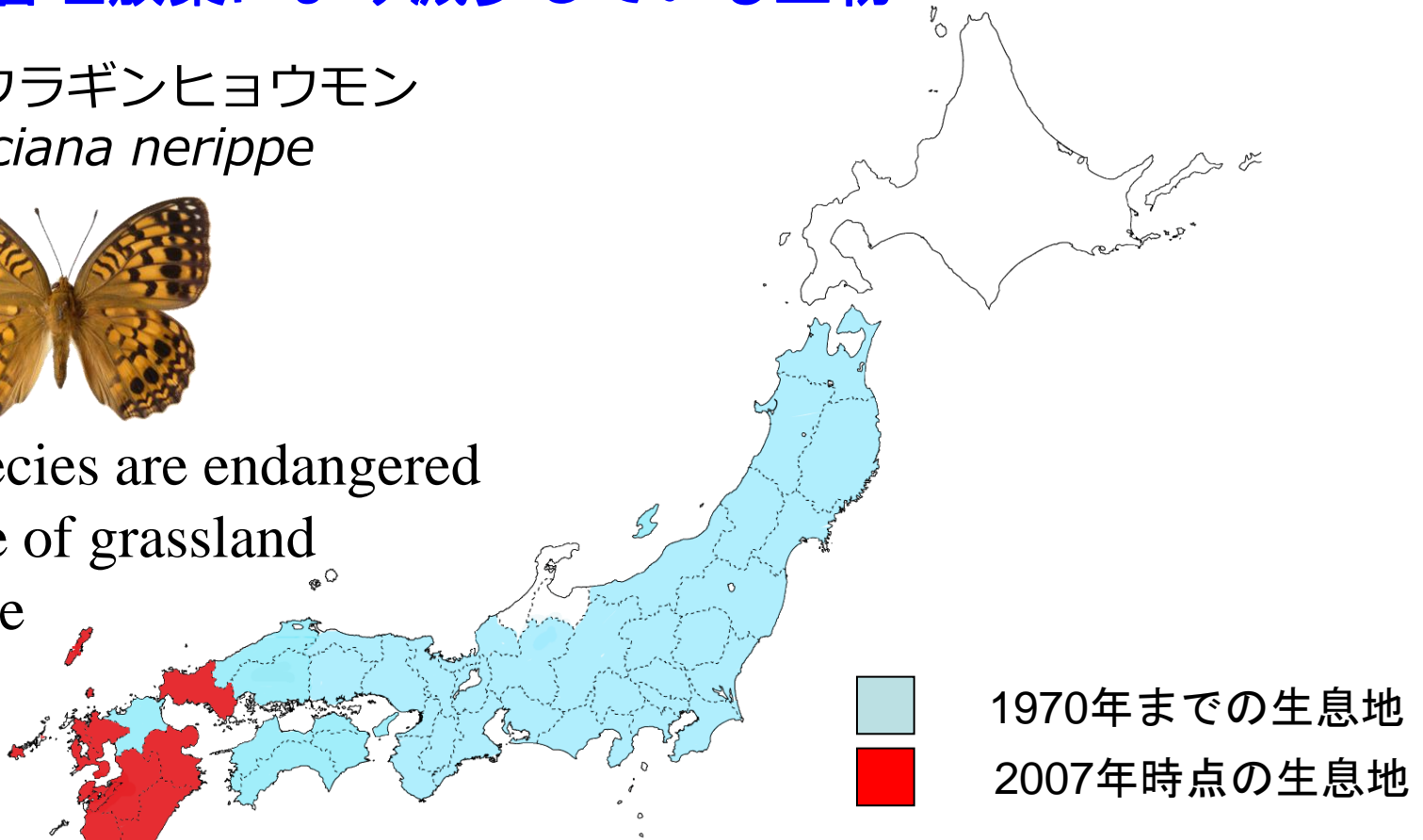
➤ 1. 日本の森林の状況 2) 生物多様性と伝統的な土地利用

里山の管理放棄により減少している生物

オオウラギンヒョウモン
Fabriciana nerippe



The species are endangered
because of grassland
decrease



草原がなくなることにより、各地で絶滅
現在では絶滅危惧Ⅰ類に指定

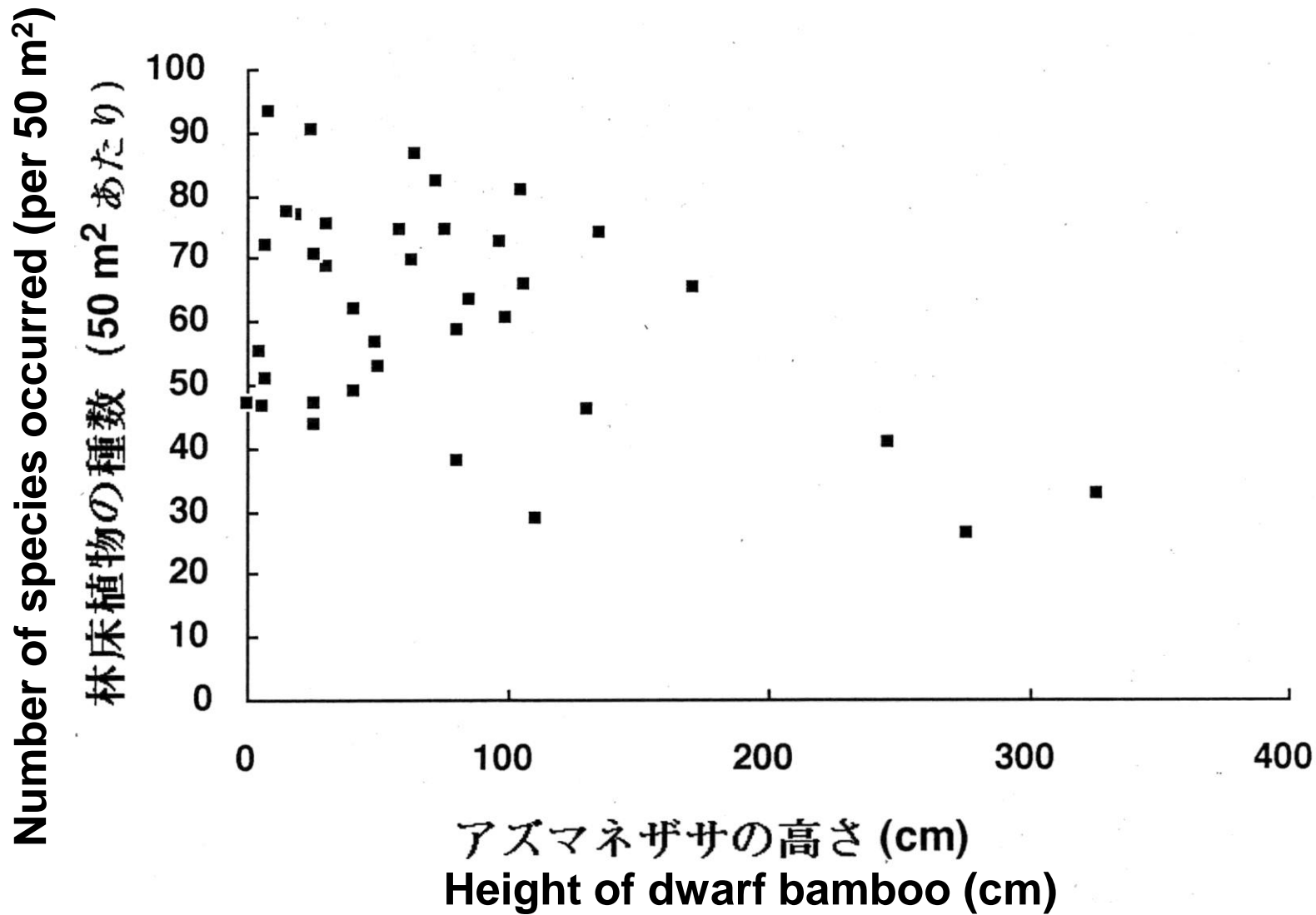


落ち葉掻き: Leaf litter and cut shrub were used to make compost



落ち葉掻きを停止した二次林：dwarf bamboo and shrub become to dominate forest floor after stopping litter collection

落ら葉かきをしなくなると植物が減る





広葉樹の伐採 : Coppice forest were used to be logged once in 15-20 years, though the practice tends to be abandoned.



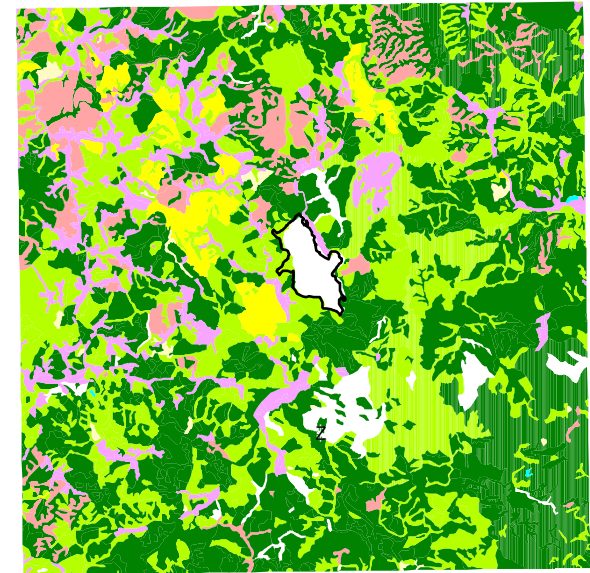
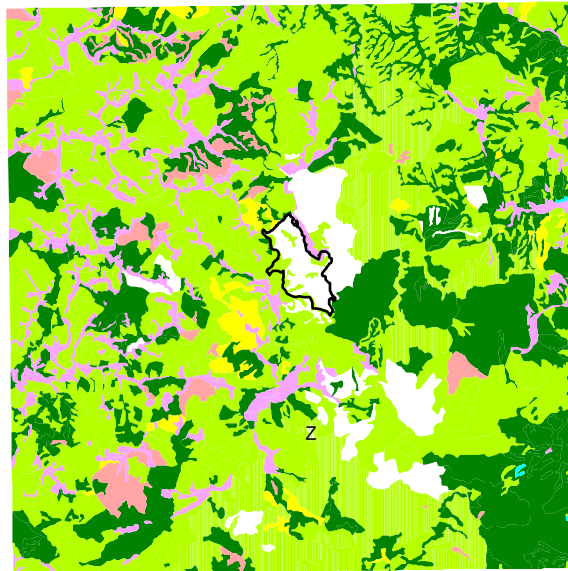
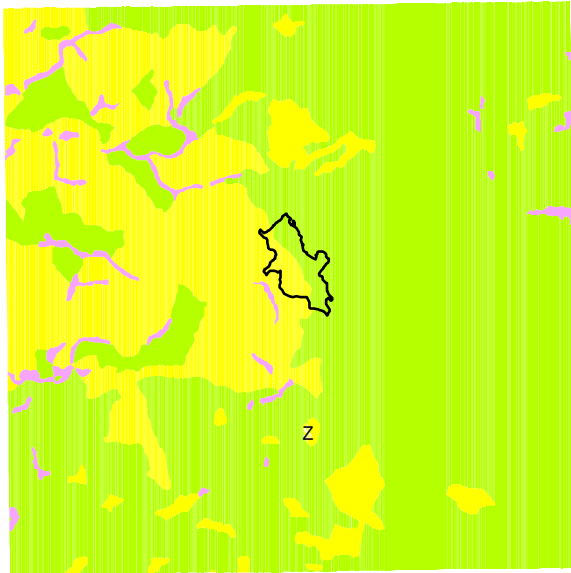
一面のスギ人工林： Uniform vegetation of conifer plantation (monoculture) has been increased

Change in forest use (Abukuma)

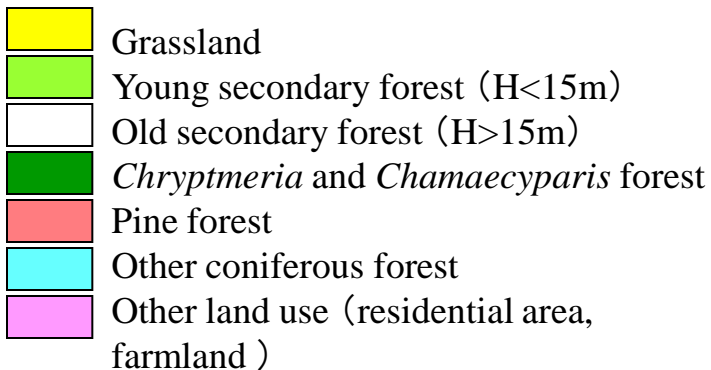
1908

1962

1997



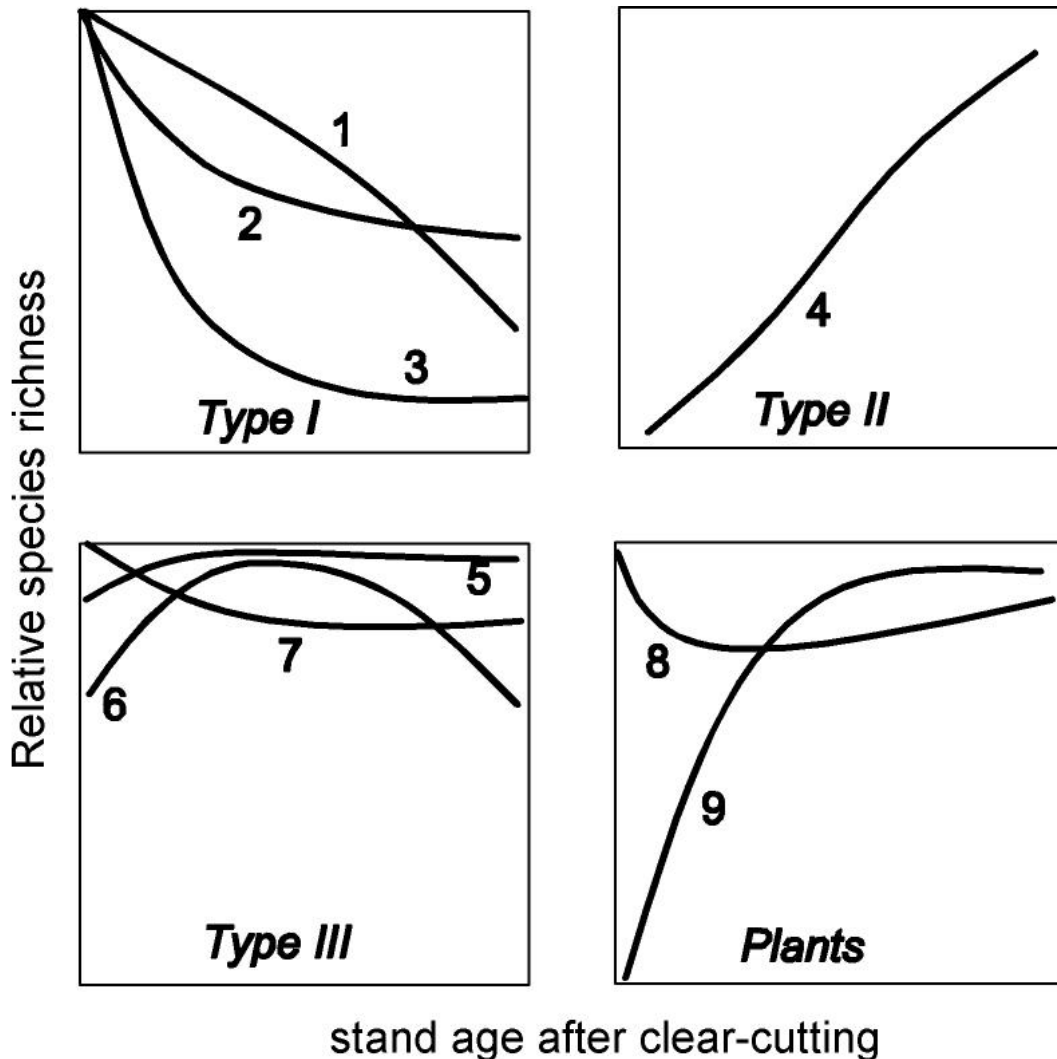
← 10km →



The map for 1908 was made from topo-map of 1/50,000. Others are made from aerial photographs. Land use categories in 1908 include 4 types only: grassland, secondary forest (young + old), *Chryptmeria* and *Chamaecyparis* forest, and other land use.

森林の発達にともなう生物多様性の変化

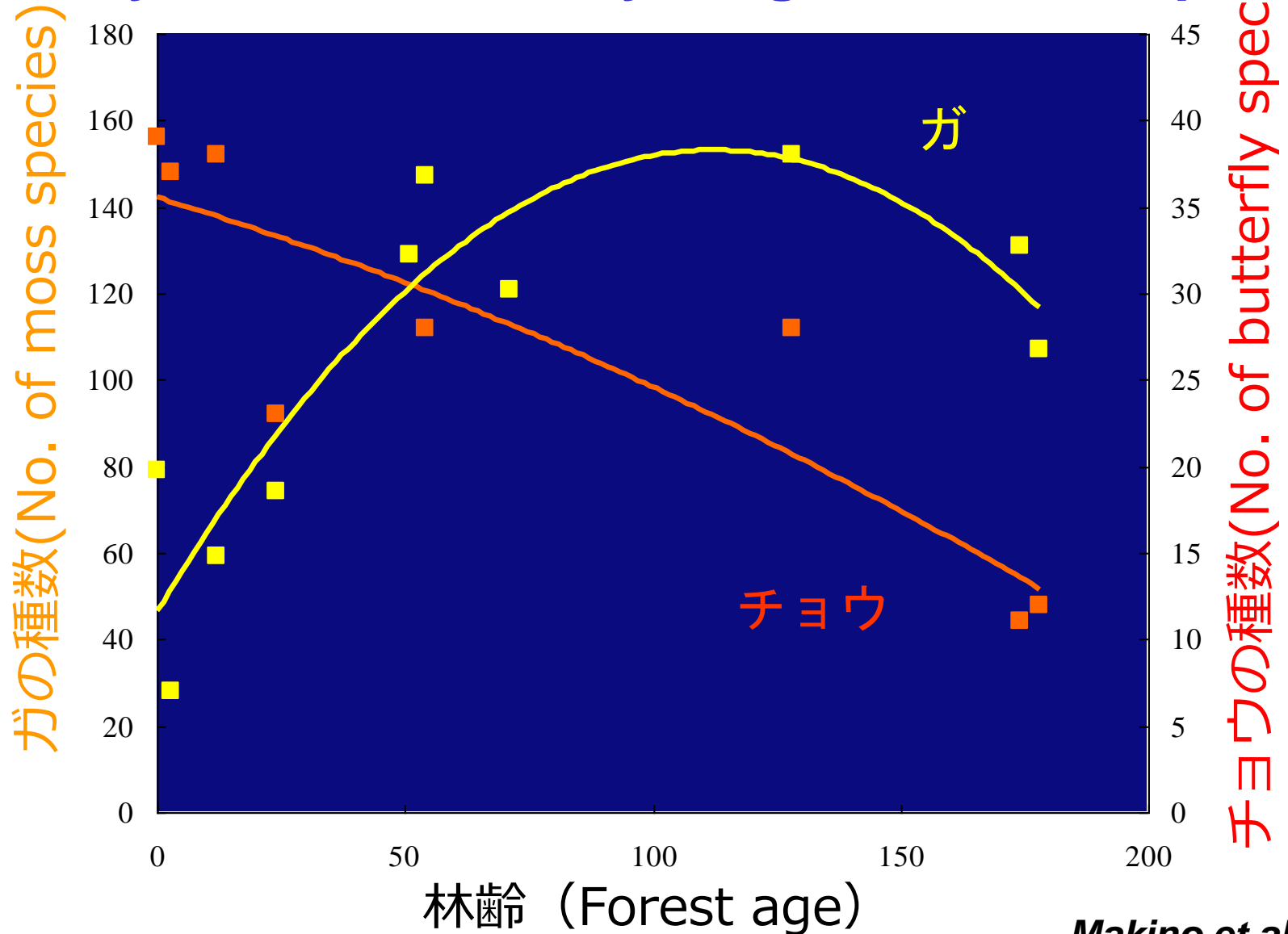
Forest development and species richness



- 1, butterflies;
- 2, tube-renting bees and wasps, and longicorn beetles;
- 3, hoverflies and fruit flies;
- 4, mites associated with mushrooms;
- 5, oribatid mites and collembola;
- 6, moths;
- 7, carabid beetles and ants;
- 8, forest floor plants;
- 9, tree layer plants (d.b.h. >5cm).

日本ではチョウは若い林に多いが...

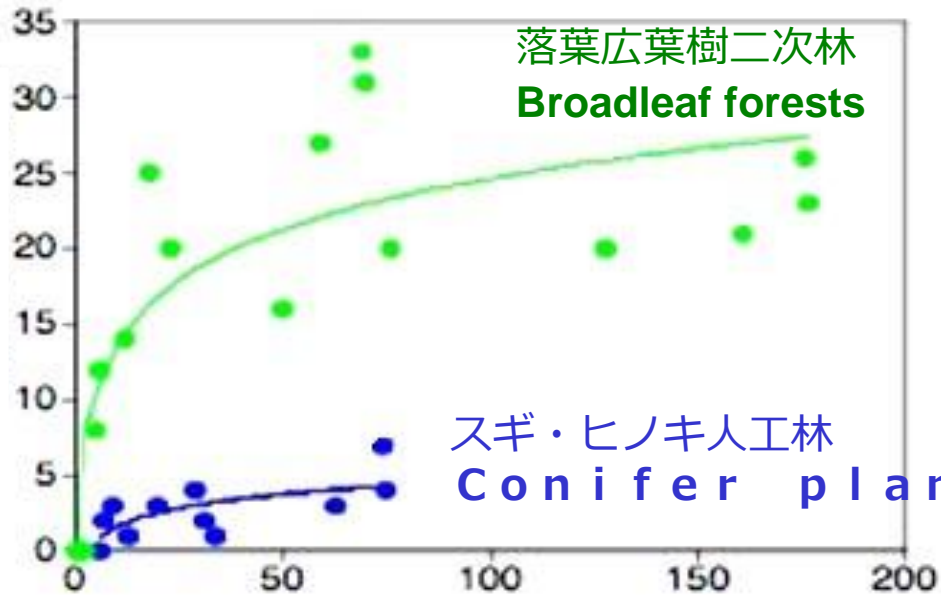
Butterfly fauna is rich in young forests in Japan



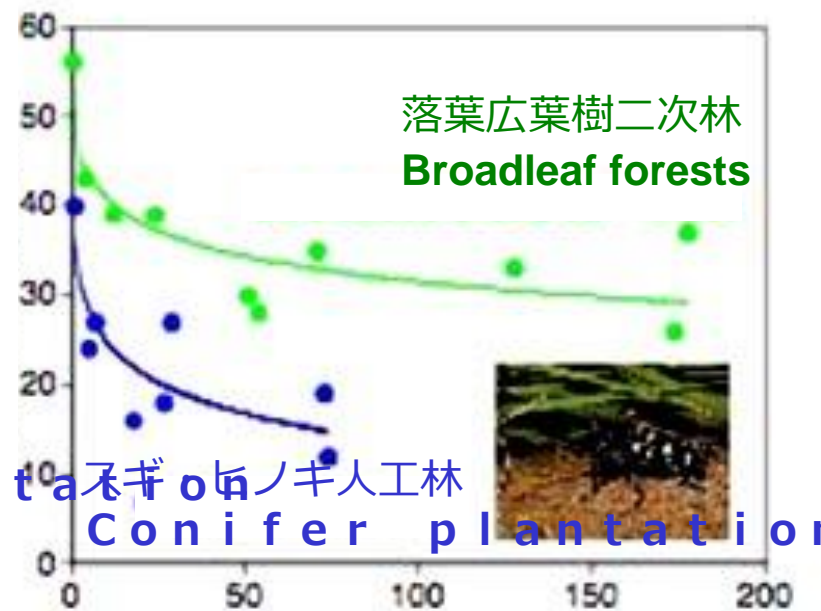
スギ・ヒノキ人工林と落葉広葉樹二次林

Conifer plantation and broadleaf secondary forests

樹木 (tree species)



カミキリムシ (hornbeetle)



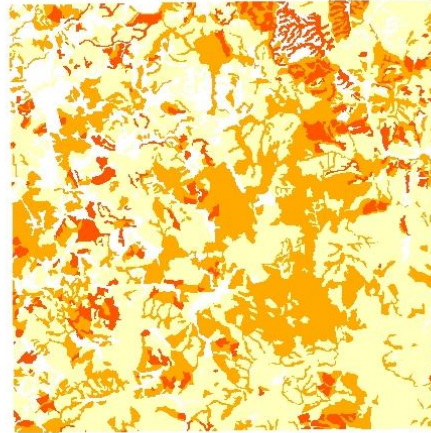
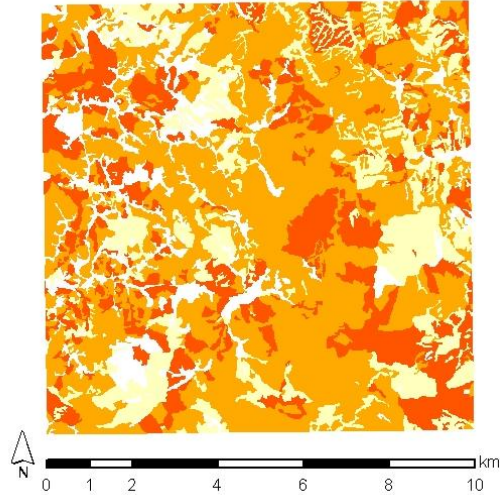
Some species need a variety of ecosystems for their survival.
Ex. Habitat use of stork (*Ciconia boyciana*)



生態系サービスの変化を地図にする

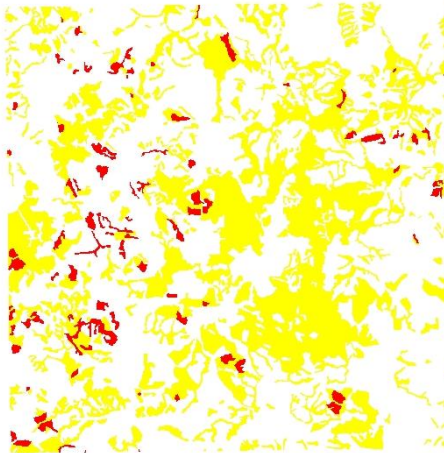
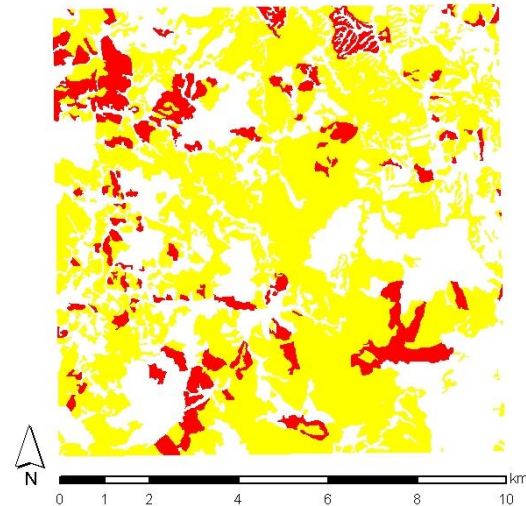
1962

1997



送粉サービス

**Pollination:
Diversity of flower
bees**



害虫制御サービス

**Natural enemy of
crop pests:
Diversity of
parasitic wasps**

Miyamoto et al., unpubl.

Species associated with young stands

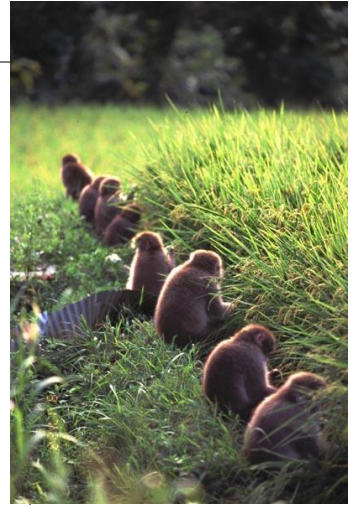
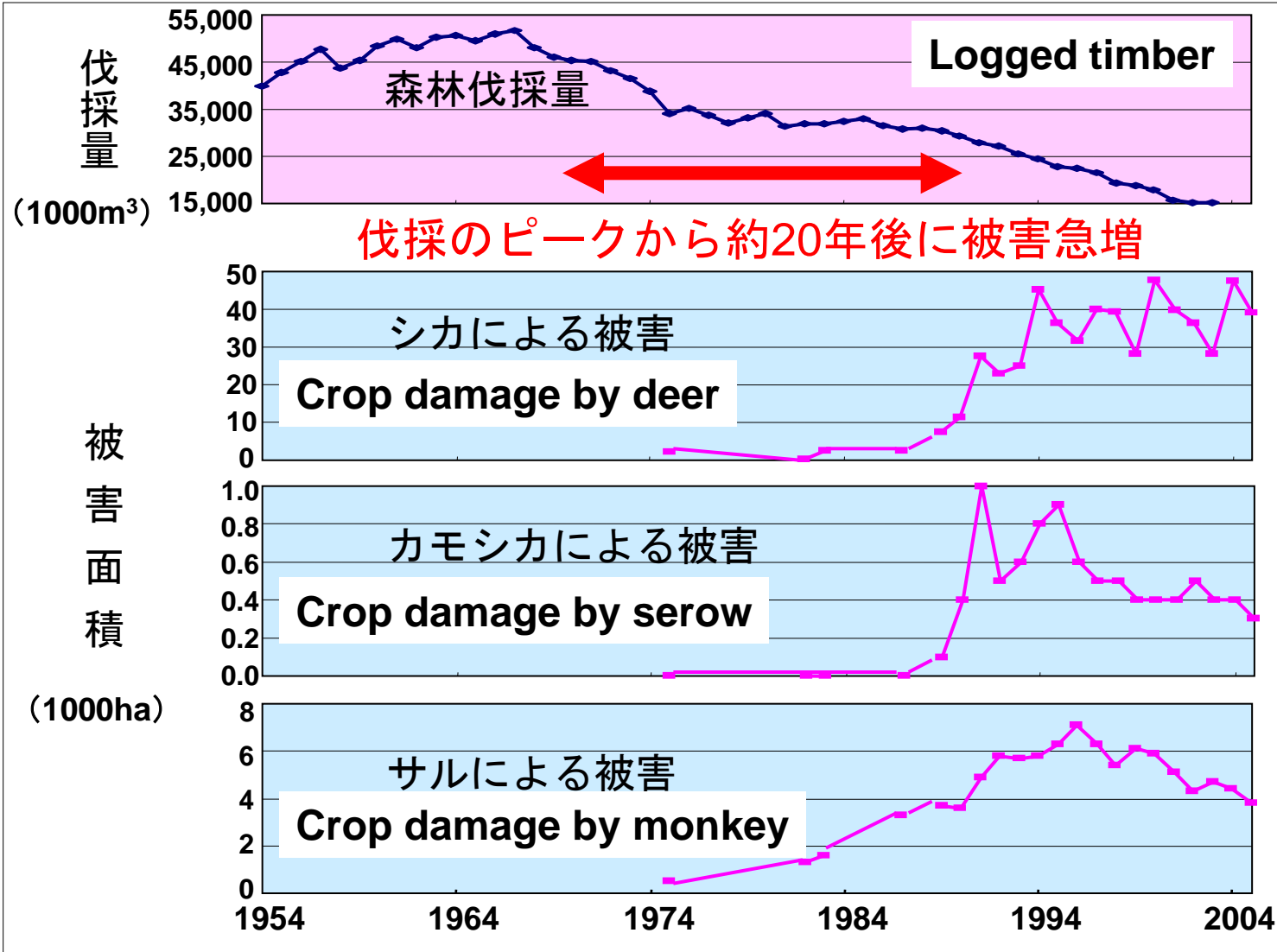


ナラ枯れ : Disease of *Quercus* spp. Bark beetles tend to mass-attack thick trees.



➤ 2. 野生動物の生息地改変と農業被害

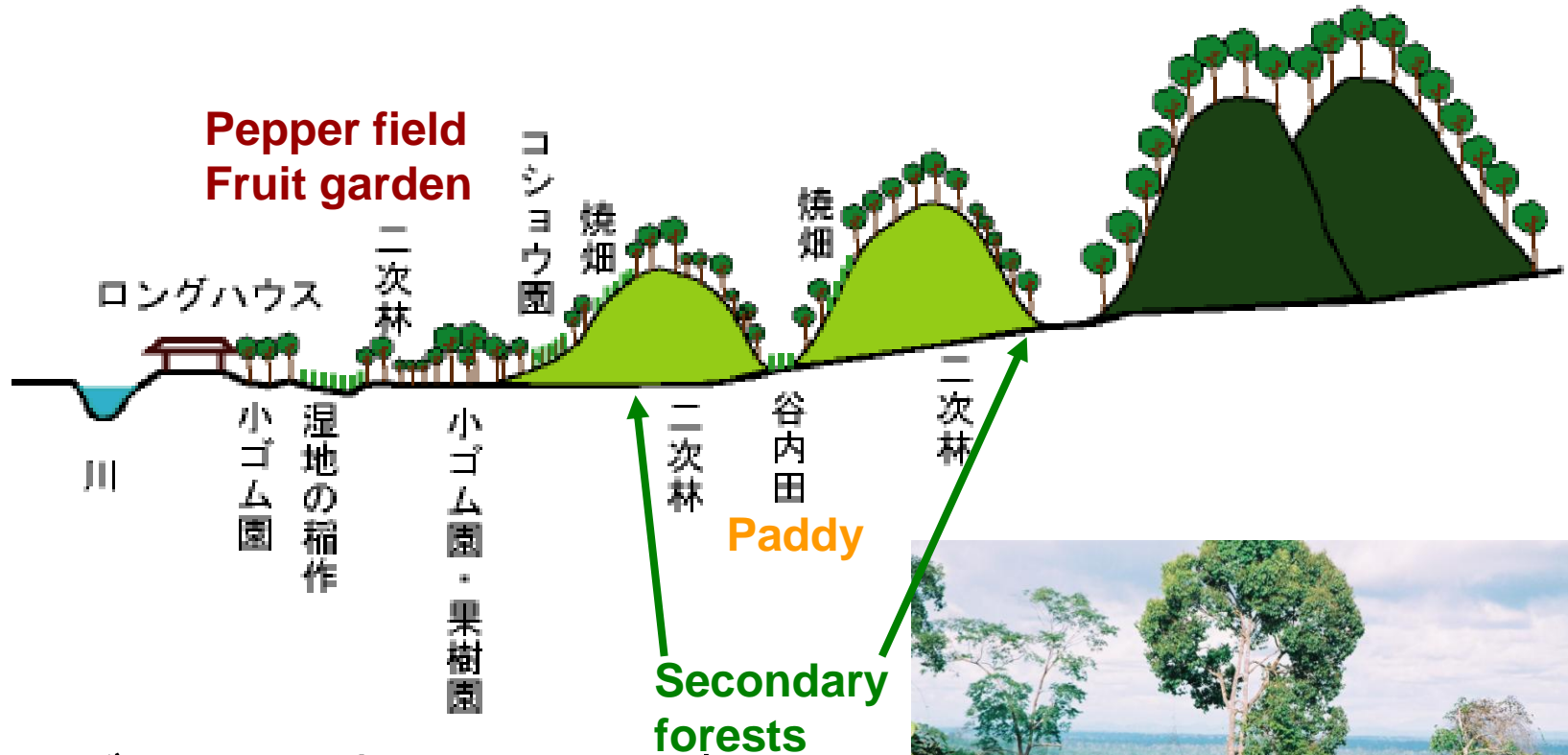
全国の森林伐採量と農業被害面積の関係



➤ 1. 生物多様性を保全してきた伝統的な土地利用 ②熱帯地域の焼畑農業

SATOYAMA-like landscape in Sarawak (Iban)

← イバンの「里山(ムノア)」 → 原生林 (プラウ)
Fragmented primary forests

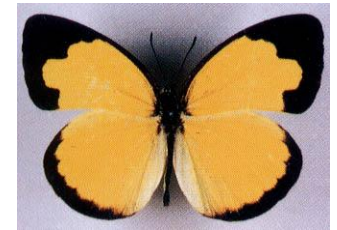
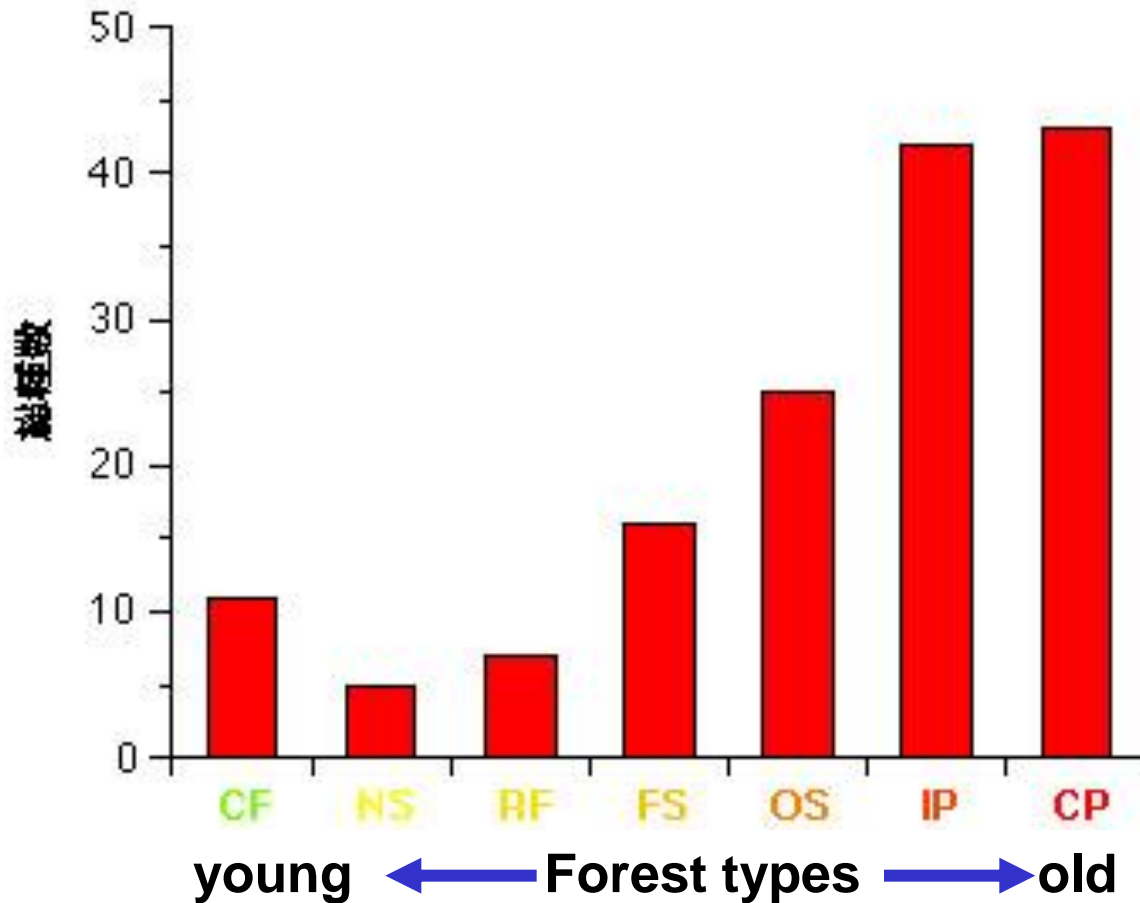
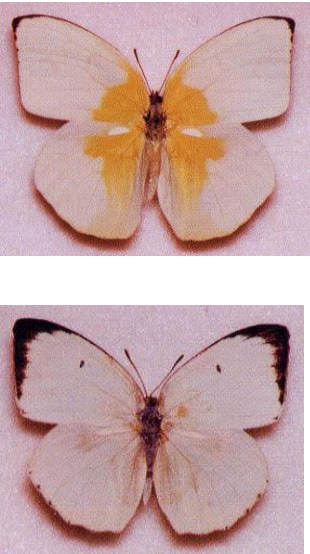


イバン人の利用している森も
生活の糧を得るための「里山」

・・・回復過程の異なる様々な大きさの二次林をベースにして、その中に焼畑、田、小ゴム園、コショウ園、果樹園などが点在するモザイク景観

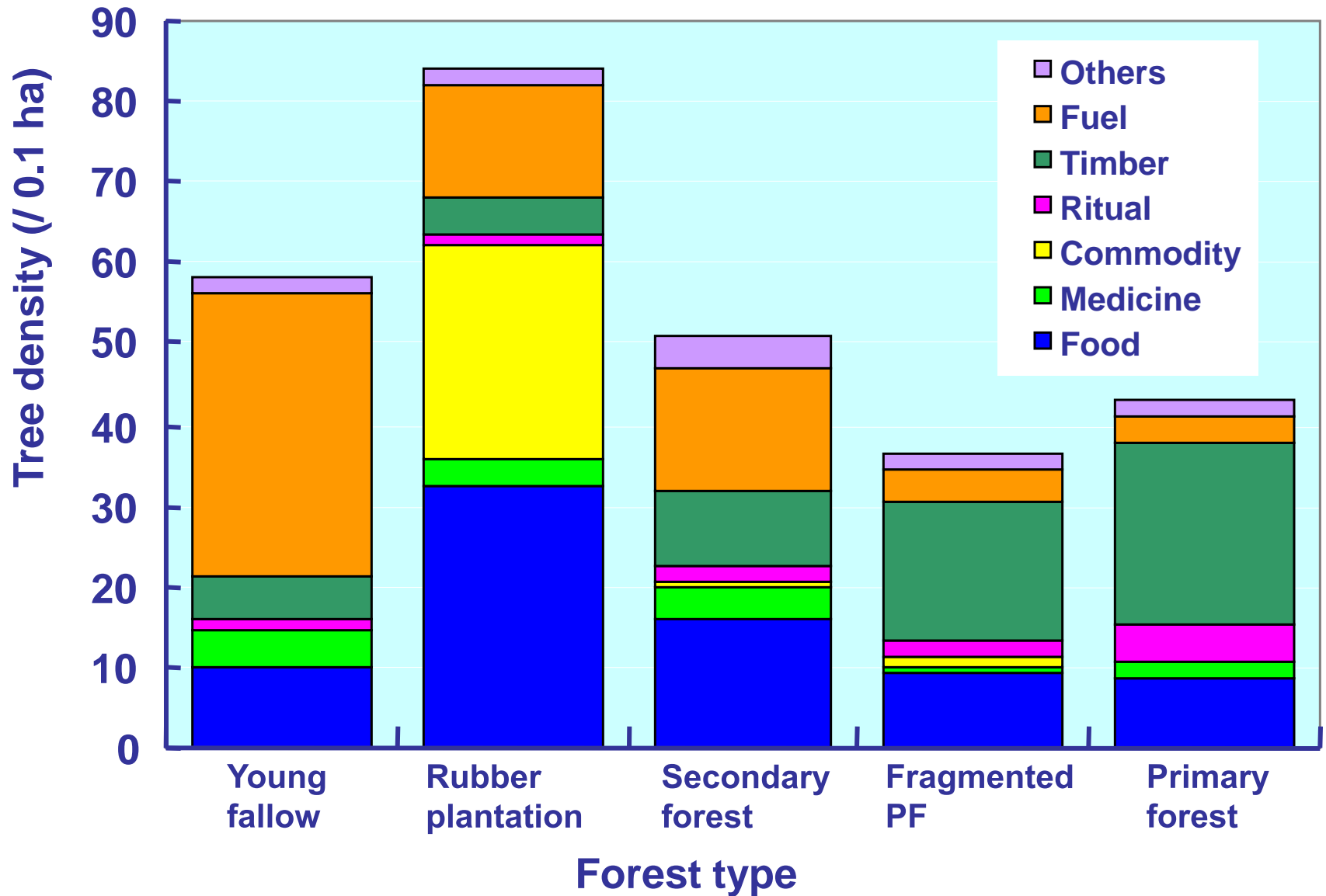
熱帯雨林地域におけるチョウの多様性と森林の発達

Butterfly species richness and forest development in tropical rain forest area



シジミチョウ・セセリチョウを除く

Plant resource utilization and forest types



コーヒーの結実率と森林分布

森林

コーヒーの花粉を運ぶ送粉者は森林に営巣する

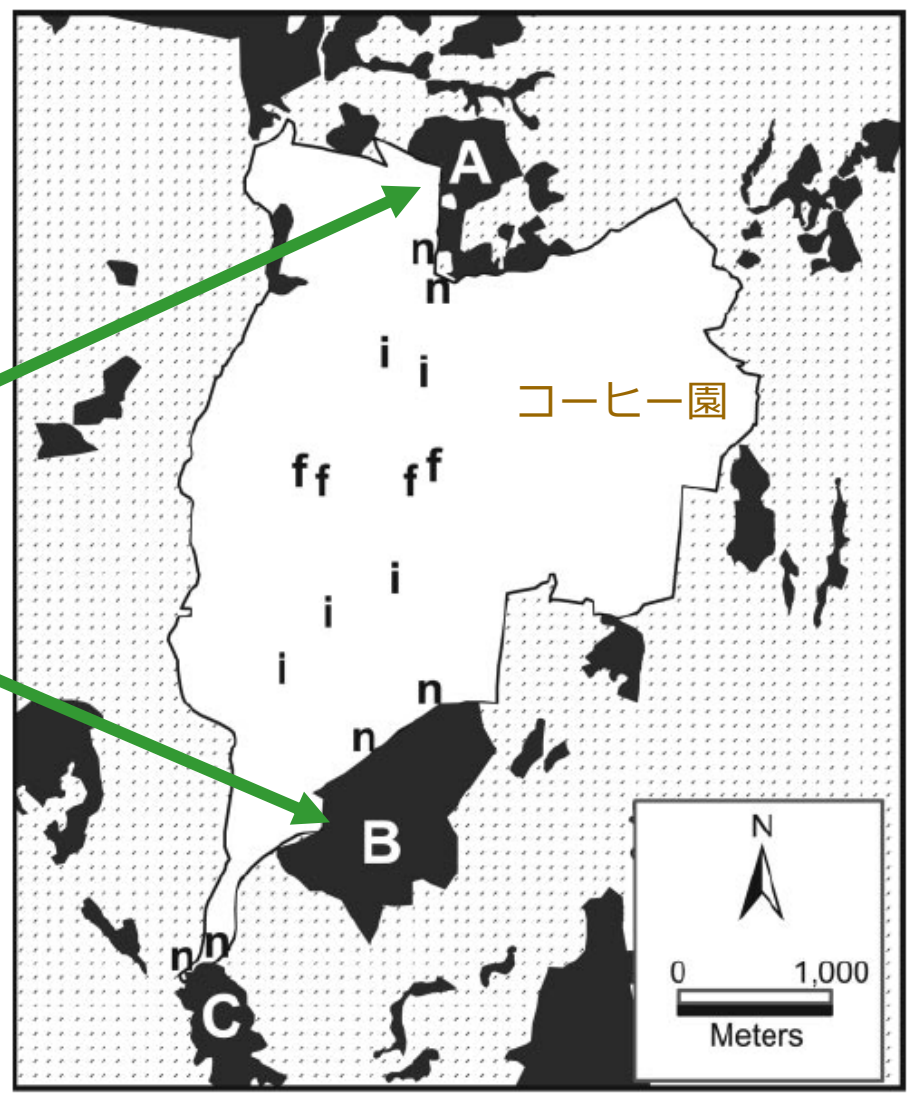


Fig. 1. Map of study area and sites. Finca Santa Fe (1,065 ha) is in white; stippled area is a mix of coffee, pasture, and sugar cane; black areas are forests. The three focal forest patches are labeled A (46 ha), B (111 ha), and C (34 ha). Study sites are labeled n, i, and f for near, intermediate, and far distance classes.

コーヒーの送粉サービスの経済評価

Table 1. Estimates of economic value of forest patches A and B (Fig. 1) to study farm, under seven different assumptions for minimum patch size required to sustain pollination services

森林A・Bを保全する場合の最小サイズ (ha) それぞれの場合に花粉が十分に得られるコーヒー園の面積 (ha) 森林A・Bによってもたらされる経済利益 (US\$)

None	235	30,000
5	270	35,000
10	363	47,000
15	450	58,000
20 [‡]	480	62,000
25	480	62,000
30	480	62,000

*Near area defined as within 1.0 km of forest.

†Results rounded to the nearest \$1,000 (see *Methods*).

‡Same as assuming threshold of 18 ha (the size of the riparian strip; see *Methods*), because there are no patches >18 and <20 ha.



▶まとめ Summary

日本の里山では、特定の生物群の多様性が高くなっている

Some groups of organisms are rich in SATOYAMA landscape.
最近の里山では管理がすたれ、景観モザイクも単純になっている

Increasing monoculture, declining management activities have reduced biodiversity of SATOYAMA.

里山の生物多様性によってもたらされていた生態系サービスも衰退している

Some ecosystem services provided by biodiversity have also declined.

日本以外にも里山的景観はあるが、里山特有の生物の存在は不明。モザイク構造は重要。

SATOYAMA like landscapes are seen in other countries, though the biodiversity is not always increased in such landscape. Mosaic dynamics are commonly seen and associated with some ecosystem services.