



Networking forest plot Observations

T Yahara

Networking forest plots in SE Asia

Identification of species is not reliable
Many plots were surveyed only once; often already lost
Data are personally owned, difficult to be shared

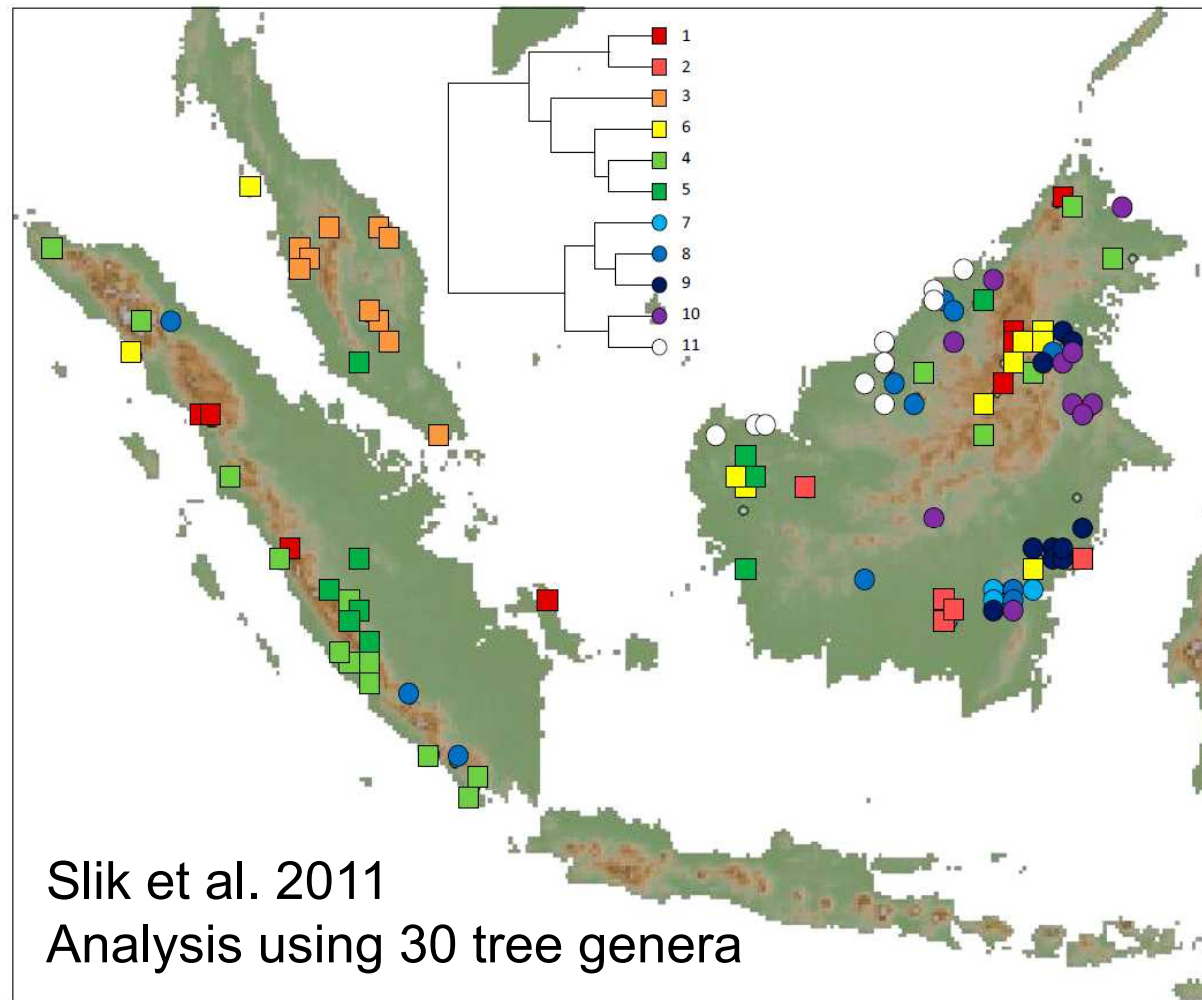


Fig. 2. Spatial distribution of the 111 forest inventory locations with their floristic affinities indicated by the color scheme in the dendrogram and the map.

Scientific name: Dipterocarpaceae *Dipterocarpus*

No. SWK1

#

Lambir_near line 1 (outside)



Scientific name: Cannabaceae *Gironniera*

No. SWK21

#

1st record

Lambir_line 1 (alt. 154 m)



Scientific name: Lauraceae *Litsea glabularia* Ng

No. SWK437

#

Lambir_line 1 (alt. 154 m)



Scientific name: Ebenaceae *Diospyros*

No. SWK439

#

Last record

Lambir_line 1 (alt. 154 m)



Vascular Plant Species Richness / Transect (500 m²)

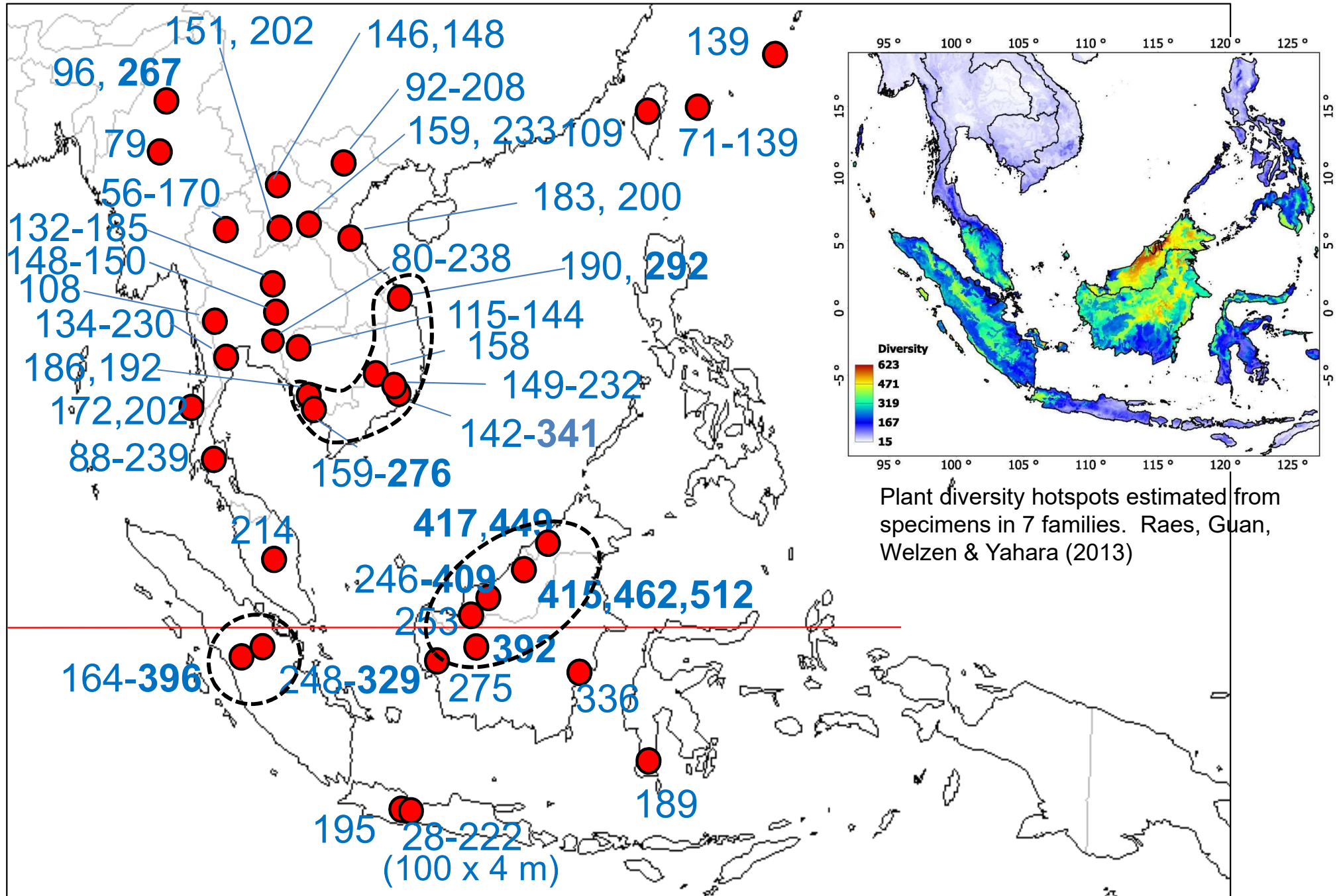


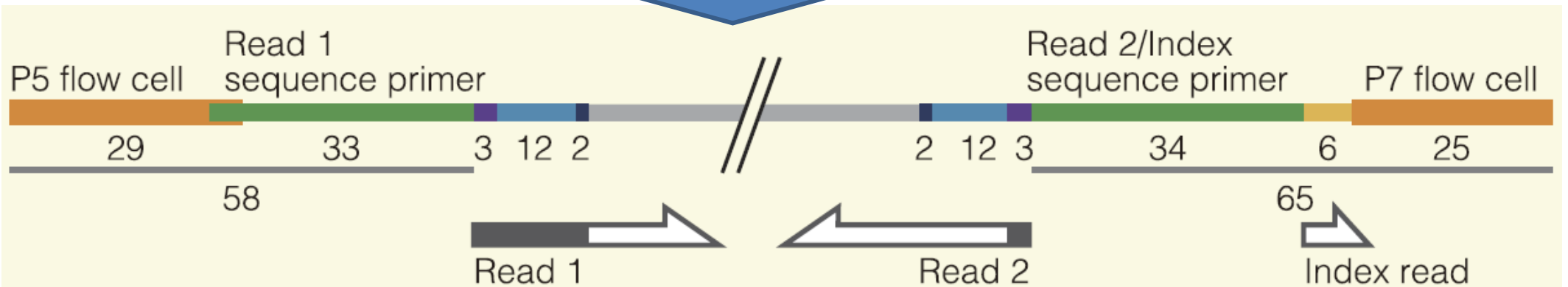
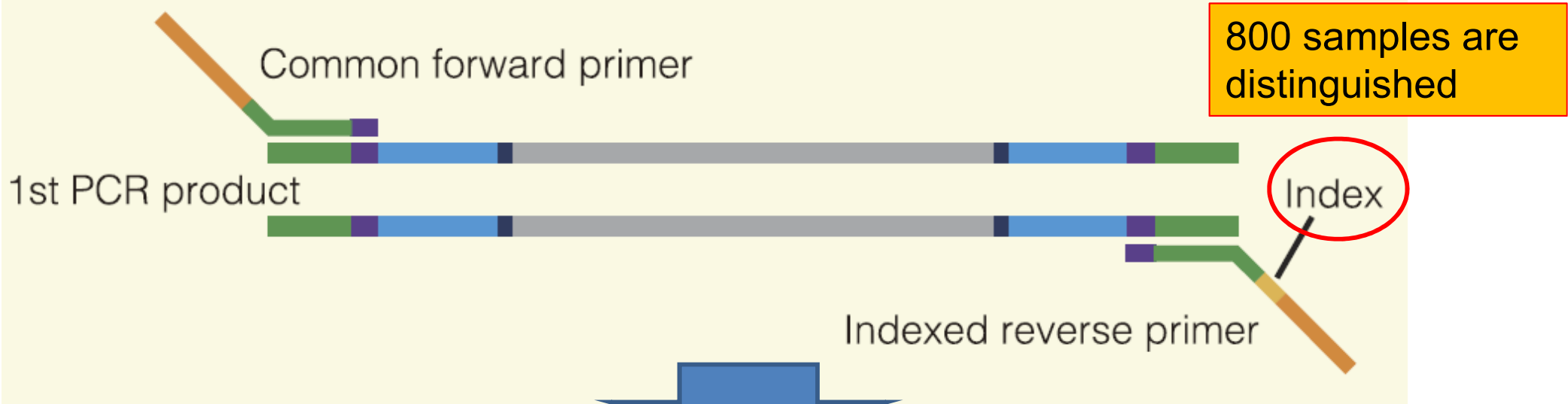
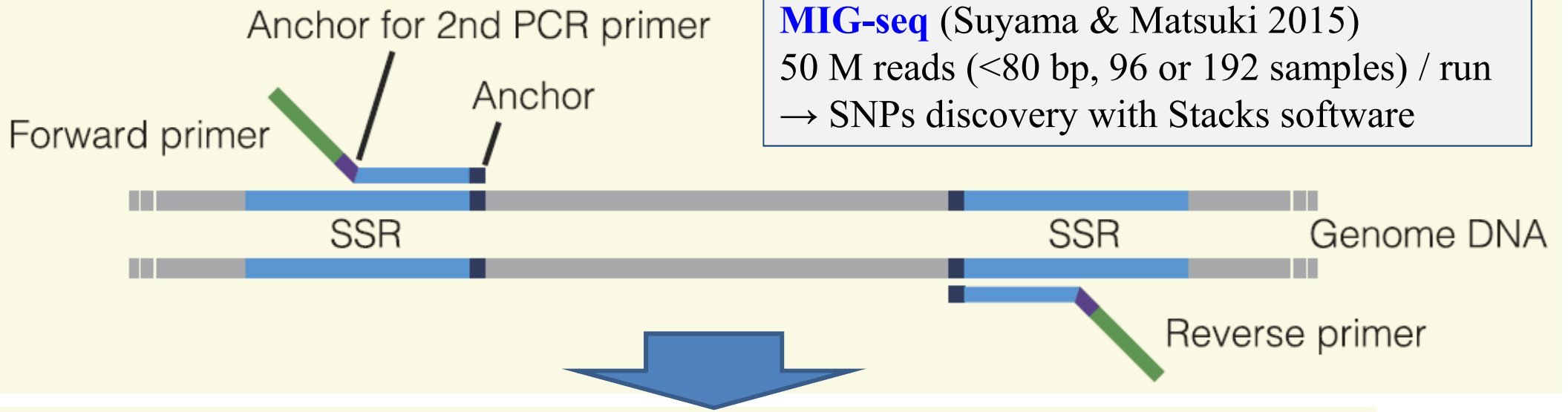
Fig. species richness observed in one transect line (500m²)

Specimens per family (2011-2017)

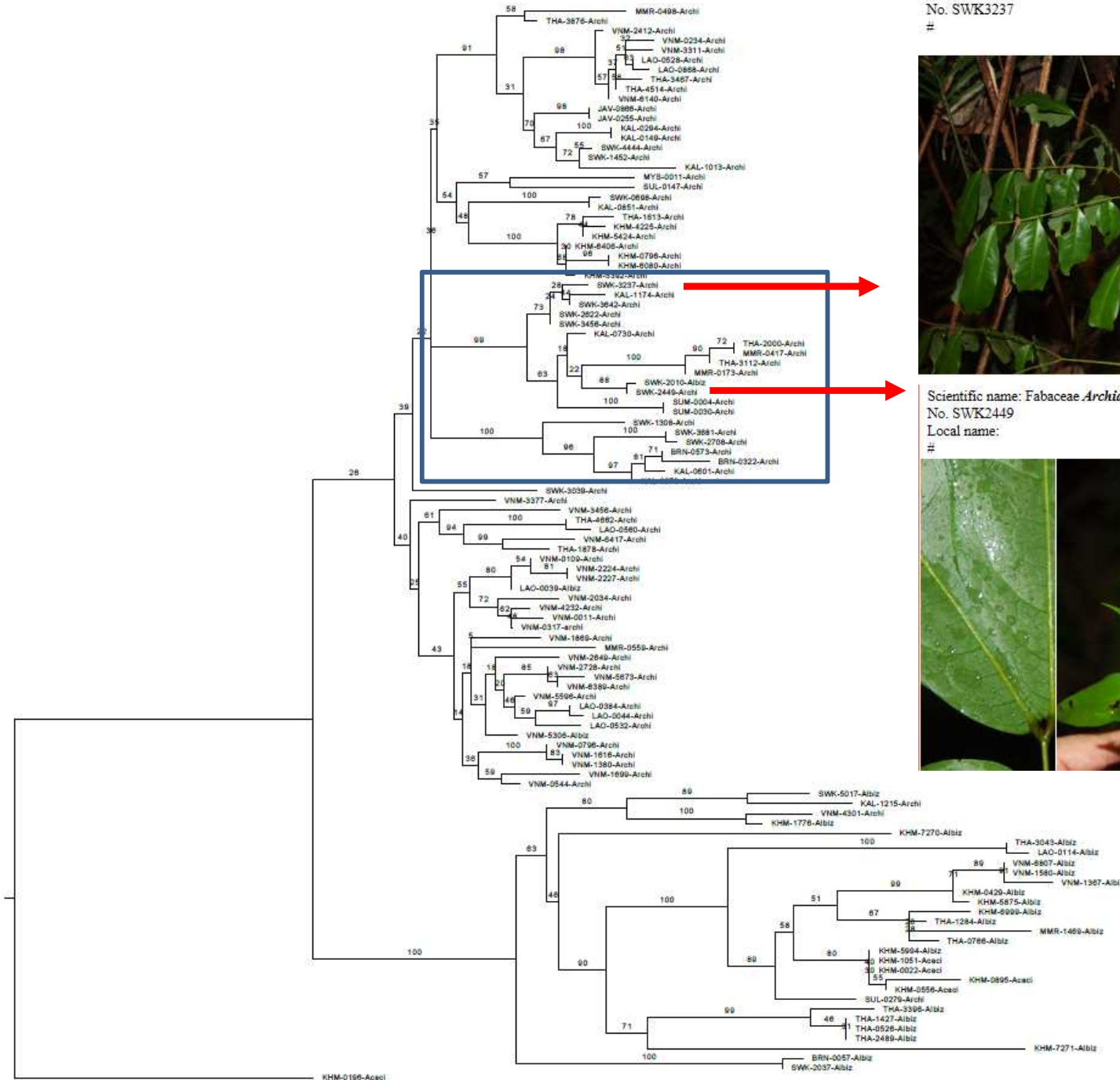
Rubiaceae	2163	Zingiberaceae	355	Sapotaceae	191
Lauraceae	1759	Sapindaceae	328	Pentaphylacaceae	183
Fagaceae	915	Lamiaceae	326	Polygalaceae	182
Fabaceae	873	Rutaceae	303	Poaceae	178
Annonaceae	849	Symplocaceae	302	Acanthaceae	176
Myrtaceae	767	Vitaceae	302	Convolvulaceae	176
Phyllanthaceae	767	Myristicaceae	297	Aquifoliaceae	163
Euphorbiaceae	619	Araceae	287	Dryopteridaceae	160
Moraceae	619	Elaeocarpaceae	282	Calophyllaceae	154
Primulaceae	525	Celastraceae	281	Pteridaceae	153
Clusiaceae	509	Smilacaceae	265	Athyriaceae	149
Malvaceae	503	Polypodiaceae	242	Ericaceae	144
Orchidaceae	499	Anacardiaceae	232	Theaceae	144
Meliaceae	477	Burseraceae	216	Combretaceae	140
Melastomataceae	449	Rosaceae	213	Asparagaceae	137
Apocynaceae	447	Oleaceae	211	Urticaceae	125
Dipterocarpaceae	447	Cyperaceae	209	Salicaceae	121
Arecaceae	410	Araliaceae	197	Dioscoreaceae	119
Ebenaceae	385	Piperaceae	194	Gesneriaceae	118

...

MIG-seq (Suyama & Matsuki 2015)
 50 M reads (<80 bp, 96 or 192 samples) / run
 → SNPs discovery with Stacks software



MIGseq tree of *Archidendron* and *Albizia* (Fabaceae)



Scientific name: Fabaceae *Archidendron microcarpum* (Benth.) I.C.Nielsen
No. SWK3237

Malaysia_Lambir Hills NP
line 3 (alt. ca. 128 m)

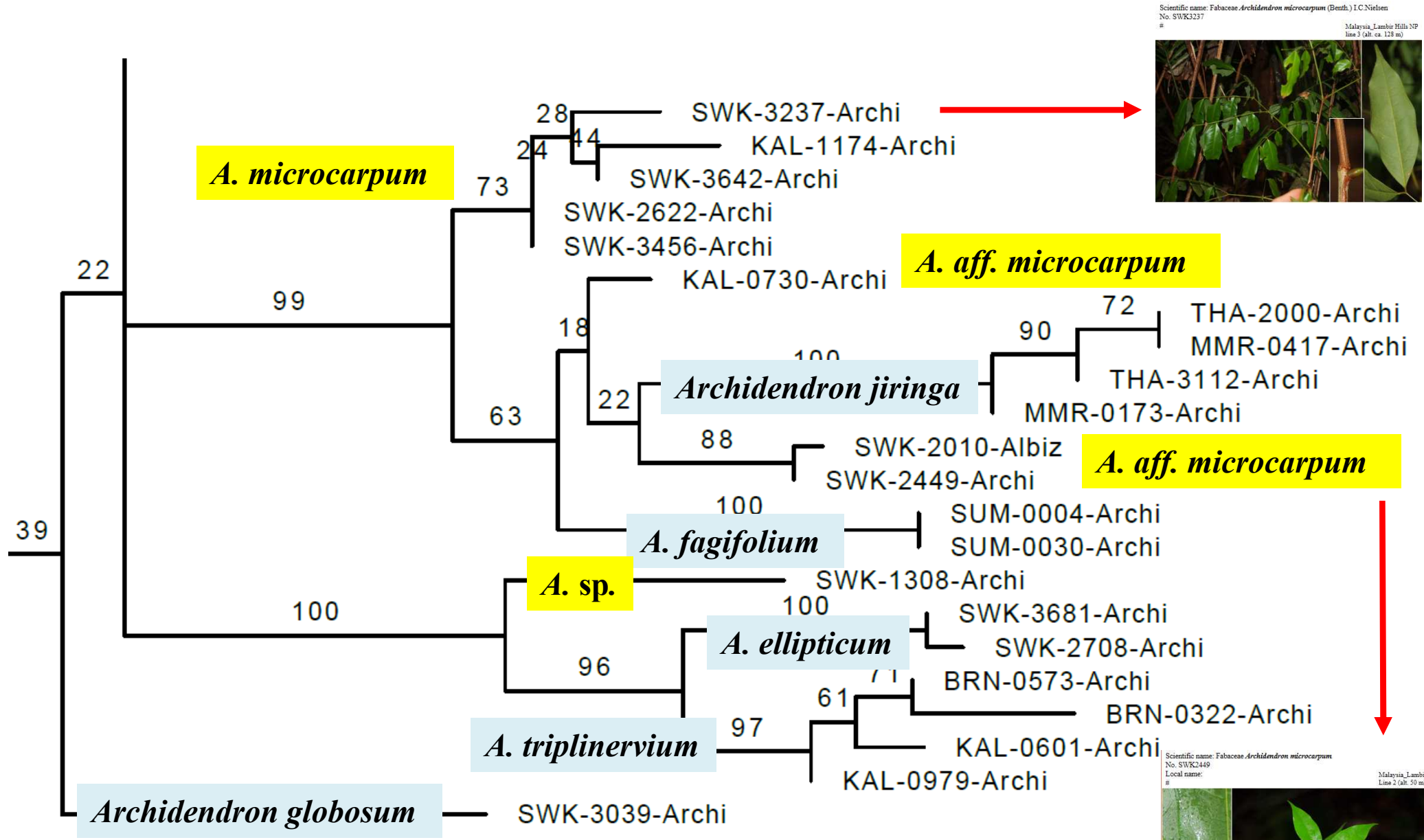


Scientific name: Fabaceae *Archidendron microcarpum*
No. SWK2449

Local name:
Malaysia_Lambir
Line 2 (alt. 50 m)



MIGseq tree of *Archidendron* and *Albizia* (Fabaceae)



New species described (> 60 spp)

Strobilanthes namkadingensis (Acanthaceae)
Monoon namkadingensis (Annonaceae)
Neouvaria laosensis (Annonaceae)
Begonia namkadingensis (Begoniaceae)
Camellia laosensis (Theaceae)
Camellia roseacea (Theaceae)
Didymocarpus middletonii (Gesneriaceae)

Gentiana laosensis (Gentianaceae)
Litsea phoukhaokhouayensis (Lauraceae)
Syzygium scabridum (Myrtaceae)
Syzygium phoukhaokhouayensis (Myrtaceae)

Toona calcicola (Meliaceae)
Asplenium kradugensis (Aspleniaceae)
Neolitsea kradugensis (Lauraceae)
Lysimachia kradugensis (Primulaceae)
Heteropanax thaiensis (Araliaceae)

Elaeagnus elongatus (Elaeagnaceae)

Prunus kaengkrachanensis (Rosaceae)

Glycosmis suberosa (Rutaceae)
Dichapetalum khaoluangensis (Dichapetalaceae)

Homalium glandulosum (Salicaceae)
Neolitsea vuquangensis (Lauraceae)
Lithocarpus vuquangensis (Fagaceae)

Erythroxylum calypteratus (Erythroxylaceae)

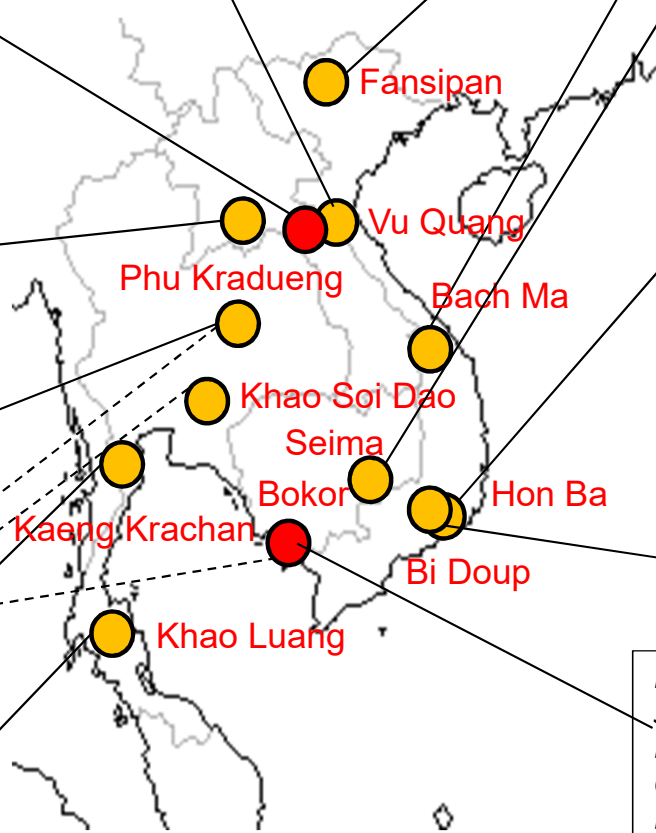
Popowia bachmaensis (Annonaceae)
Callicarpa bachmaensis (Lamiaceae)

Lagerstroemia ruffordii (Lythraceae)

Goniothalamus flagellistylus (Annonaceae)
Aporosa tetragona (Phyllanthaceae)
Lasianthus yaharae (Rubiaceae)
Lasianthus honbaensis (Rubiaceae)
Mussaenda revurvata (Rubiaceae)
Trigonostemon honbaensis (Euphorbiaceae)
Tarenna aurantiaca (Rubiaceae)
Eustigma honbaense (Hamamelidaceae)
Mussaenda honbaensis (Rubiaceae)
Garcinia hopii (Clusiaceae)
Aporosa honbaensis (Phyllanthaceae)

Calophyllum cordatum (Calophyllaceae)
Garcinia hopii (Clusiaceae)
Macrosolen bidoupensis (Loranthaceae)

Heteropanax cambodiana (Araliaceae)
Schefflera cambodiana (Araliaceae)
Dichapetalum cambodianum (Dichapetalaceae)
Garcinia bokorensis (Clusiaceae)
Elaeocarpus bokorensis (Elaeocarpaceae)
Croton phourinii (Euphorbiaceae)
Lithocarpus eriobotryifolius (Fagaceae)
Cinnamomum bokorensis (Lauraceae)
Cinnamomum dimorphandrum (Lauraceae)
Lindera bokorensis (Lauraceae)
Machilus bokorensis (Lauraceae)
Machilus brevipedunculata (Lauraceae)
Memecylon bokorensis (Melastomataceae)
Syzygium elephantinum (Myrtaceae)
Phyllanthus bokorensis (Phyllanthaceae)
Ardisia smaragdinaoides (Primulaceae)
 他10種



In most locations we visited, we discovered undescribed species.

Picture Guides of Forest Trees in Cambodia



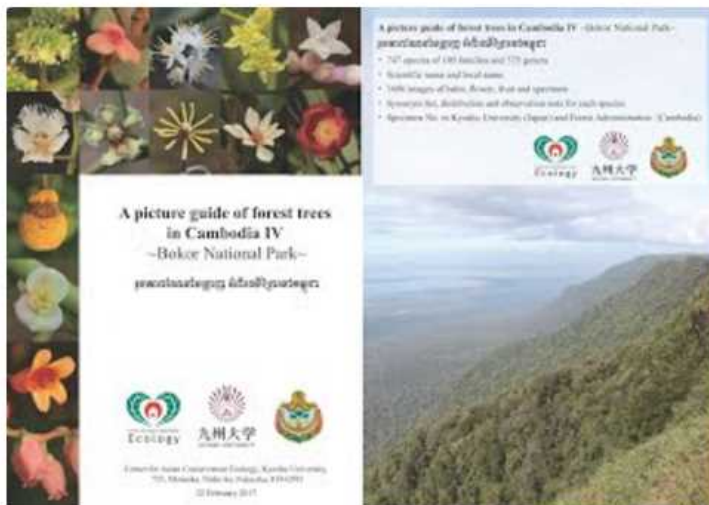
Picture guide of forest trees cambodia



Bokor National Park

A picture guide of forest trees in Cambodia IV -Bokor National Park- (610MB)

[Update history](#)
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- 747 species of 105 families and 375 genera
- Scientific name and local name
- 3696 images of habit, flower, fruit and specimen
- Synonym list, distribution and observation note for each species
- Specimen No. in Kyushu University (Japan) and Forestry Administration (Cambodia)

Annonaceae

Artabotrys sp. 2

- **Distribution:** -
- **Observation:** Scandent tree to climber, locally common in semi-evergreen forest and its vicinity in lowland. This species is characterized by large thorns on stems (up to 3 cm long), shining leathery leaves, and finely reticulated tertiary veins prominent on both surfaces.
- **Khmer name:** វៀរចេតុម៌ [Vor Chektum]
- **Specimens:** 95 m (5523 [fl & fr]), 19 m (4120 [fl & fr]).



Fig. 18. *Artabotrys* sp. 2 (A–F Tagane *et al.* 4120, 20 July 2012). A fruiting branch, B lower leaf surface, C flower, D fruits, E thorns on stem, F specimen (bar = 10 cm), G flower.

25

New spp: 64/747 = 9%
27,000x0.09=2,430

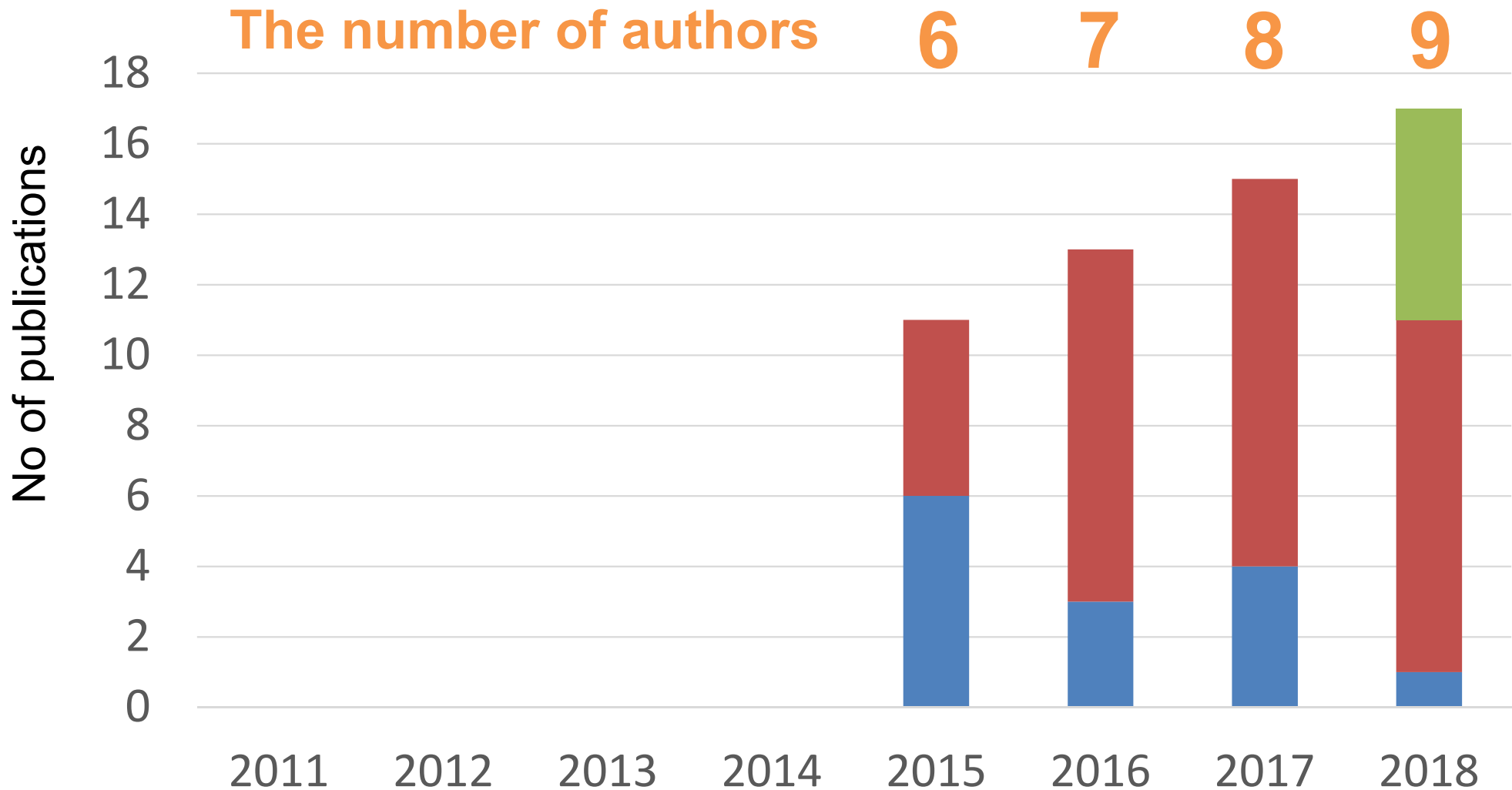
Many more species to be described



• • • Let's work together

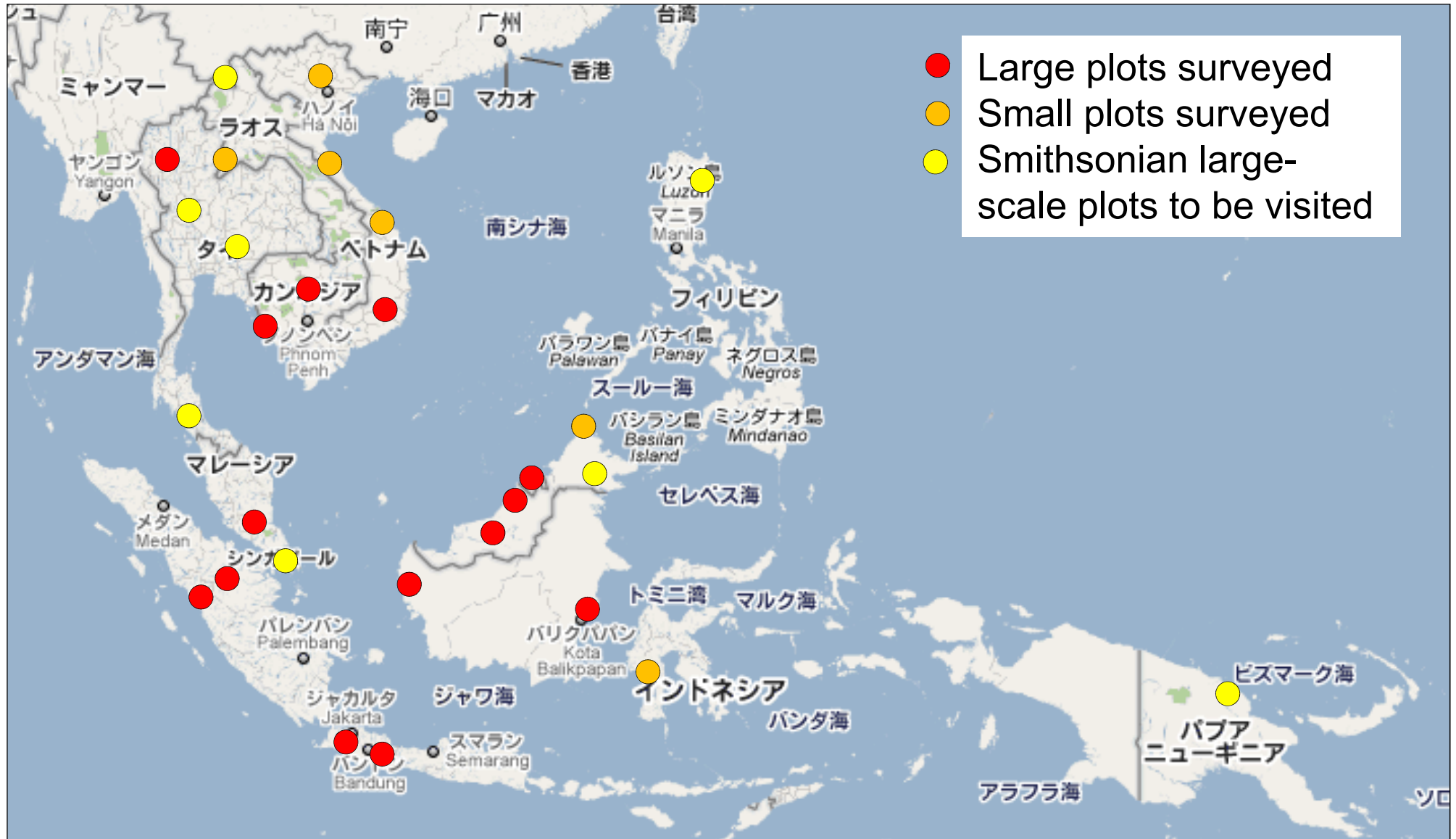
Many more species to be described

We need more researchers who can describe new species



Networking observation sites

Candidate supersites in SE Asia



Lambir Hills National Park, Sarawak

Roadside forests under stronger human impacts are not monitored.

One of the best studies plots

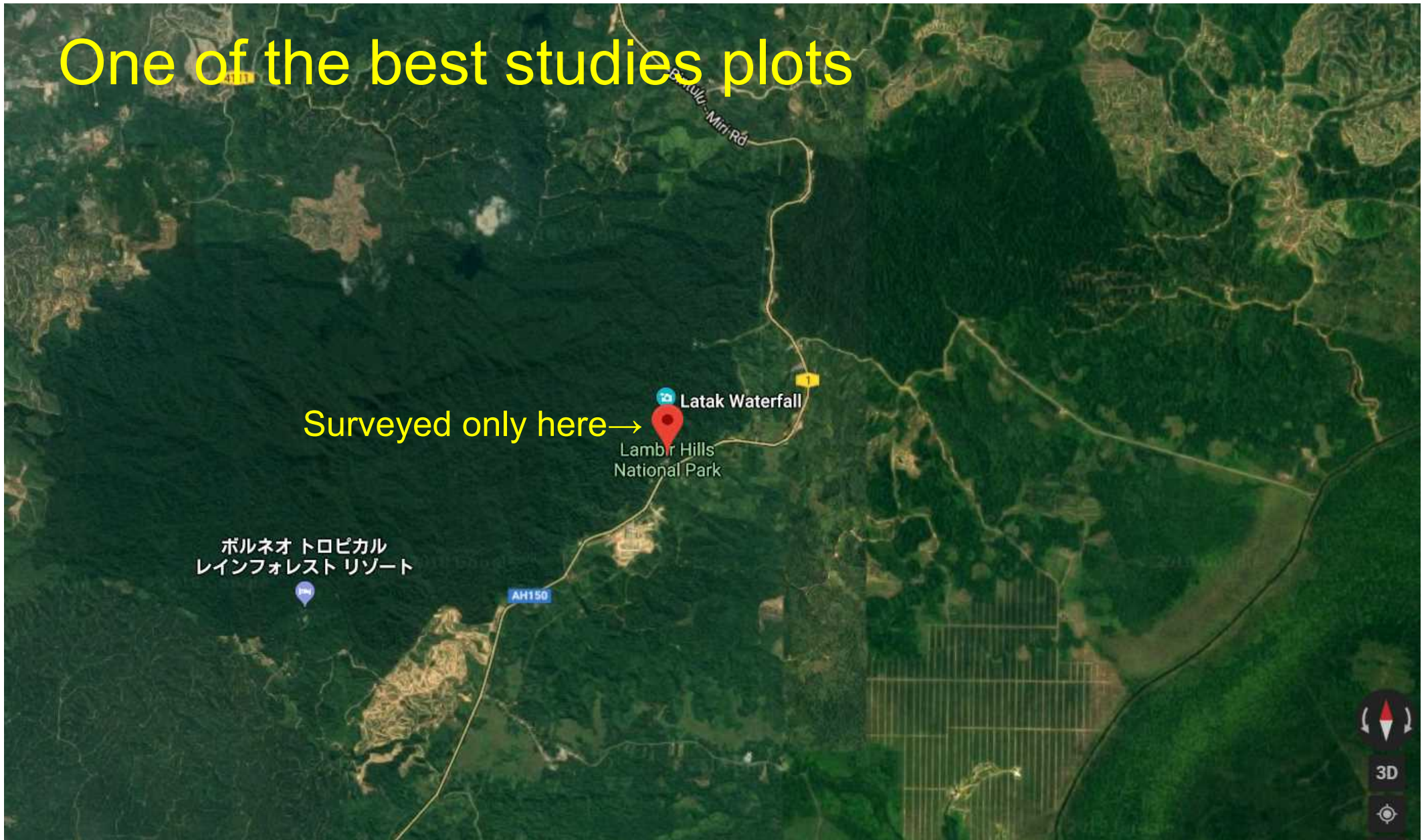
Surveyed only here →

Latak Waterfall

Lambir Hills
National Park

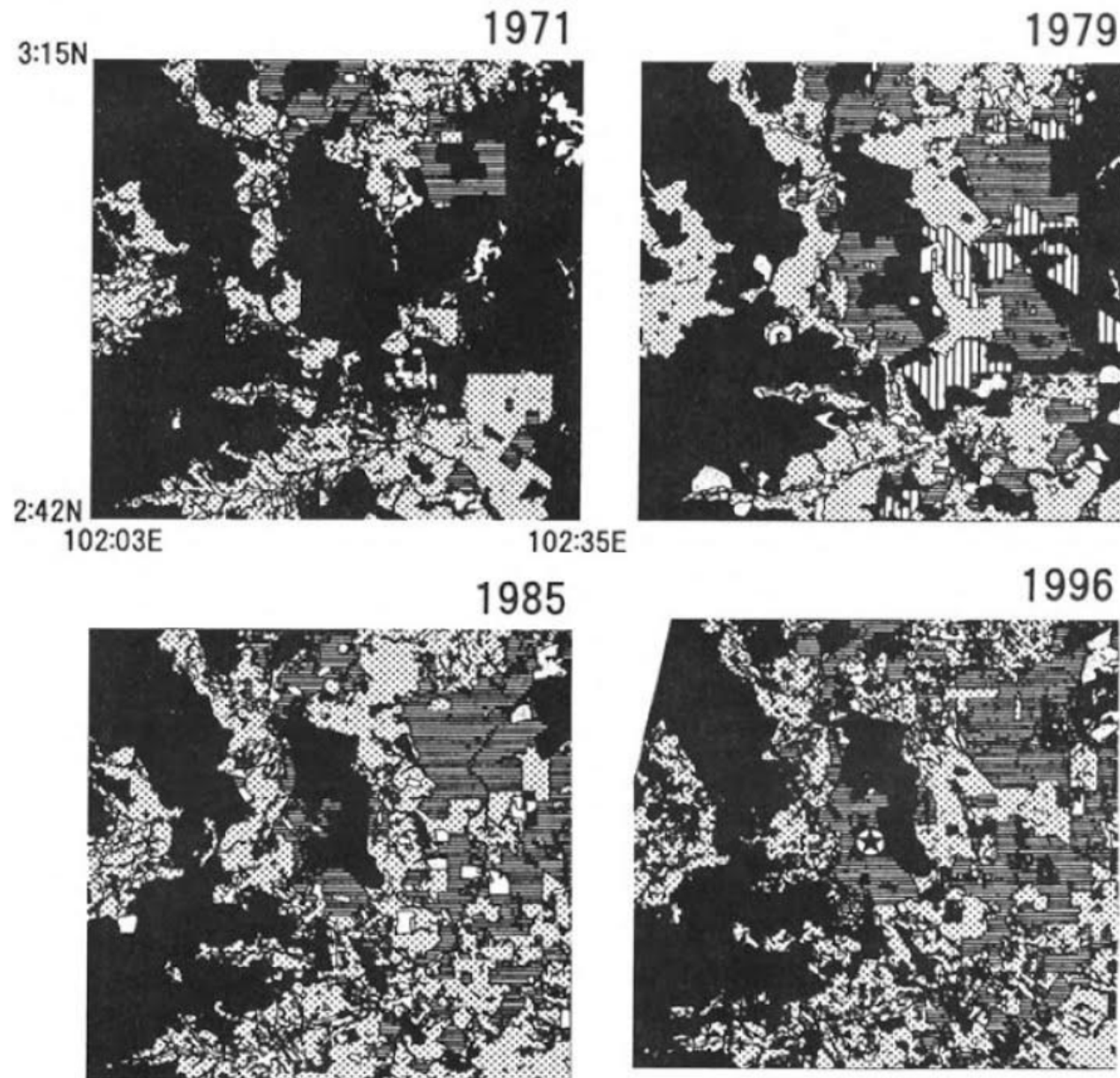
ボルネオ トロピカル
レインフォレストリゾート

AH150



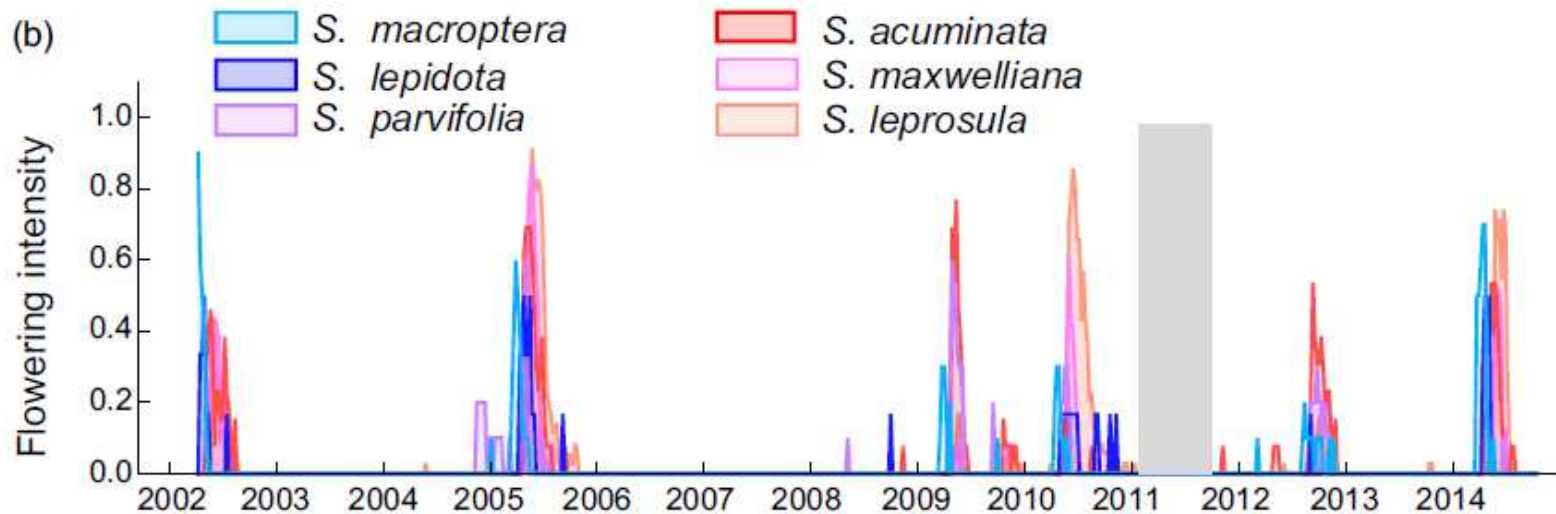
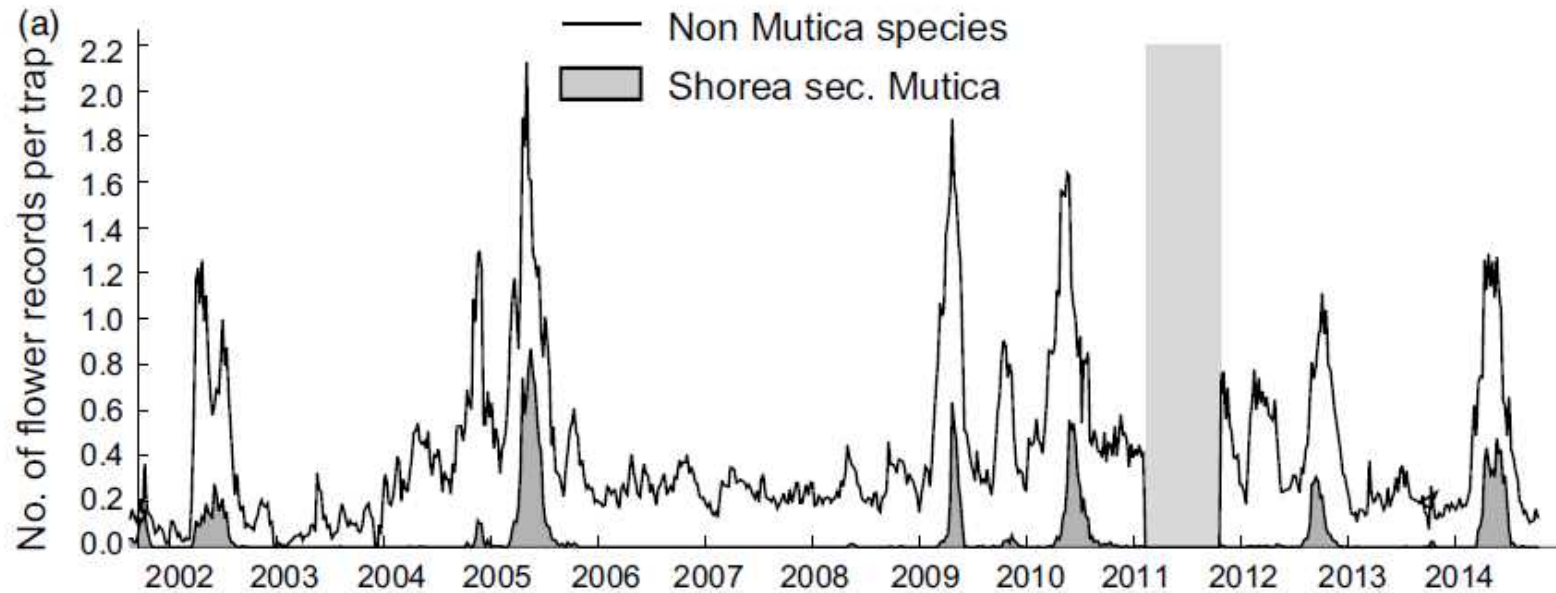
Pasoh Forest Reserve, Peninsular Malaya

Okuda et al. (2003) Pasoh: Ecology of a Lowland Rain Forest in Southeast Asia



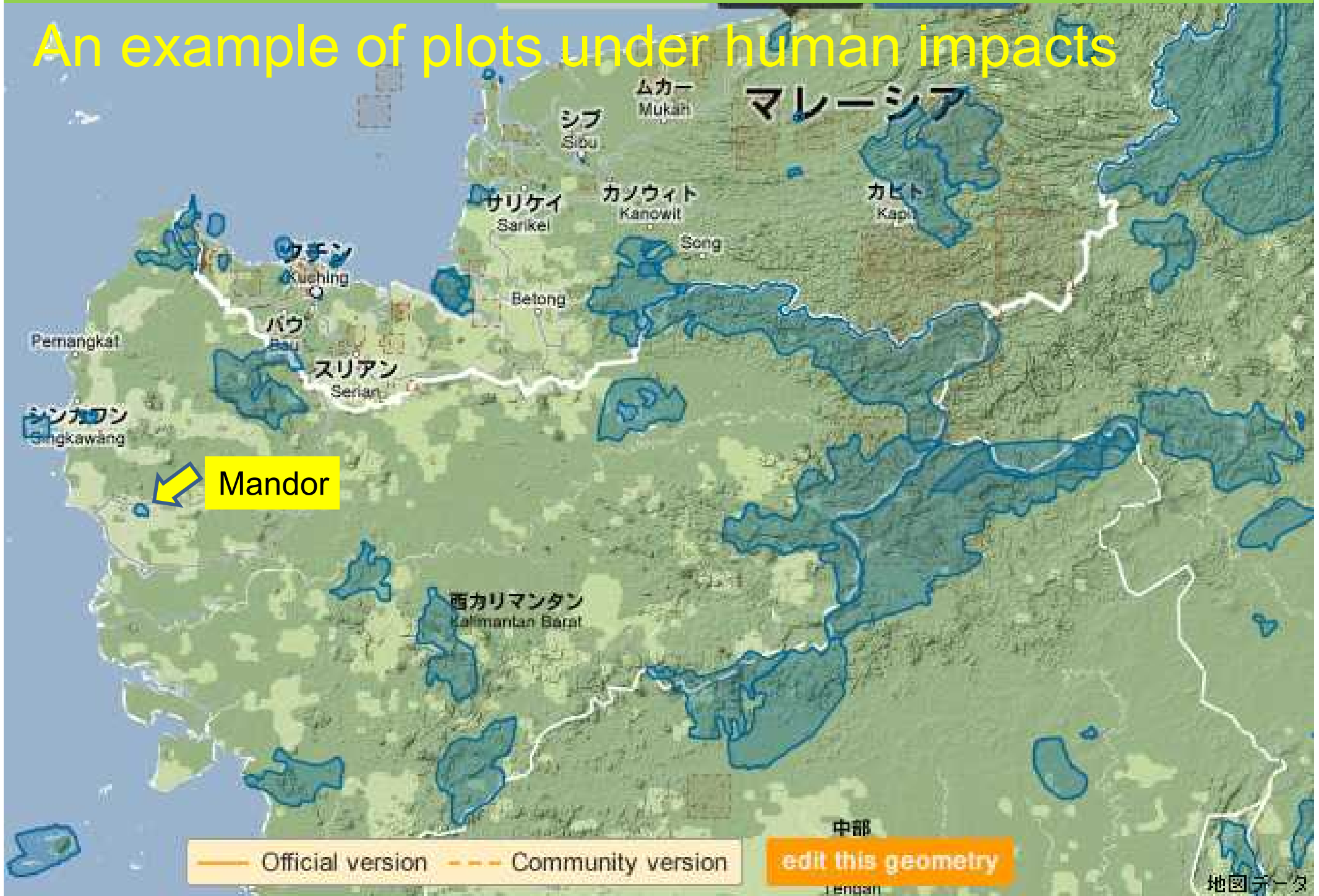
Pasoh Forest Reserve, Peninsular Malaya

Flowering records in Pasoh, Malaysia (Chen, Satake, Sun et al. 2017)

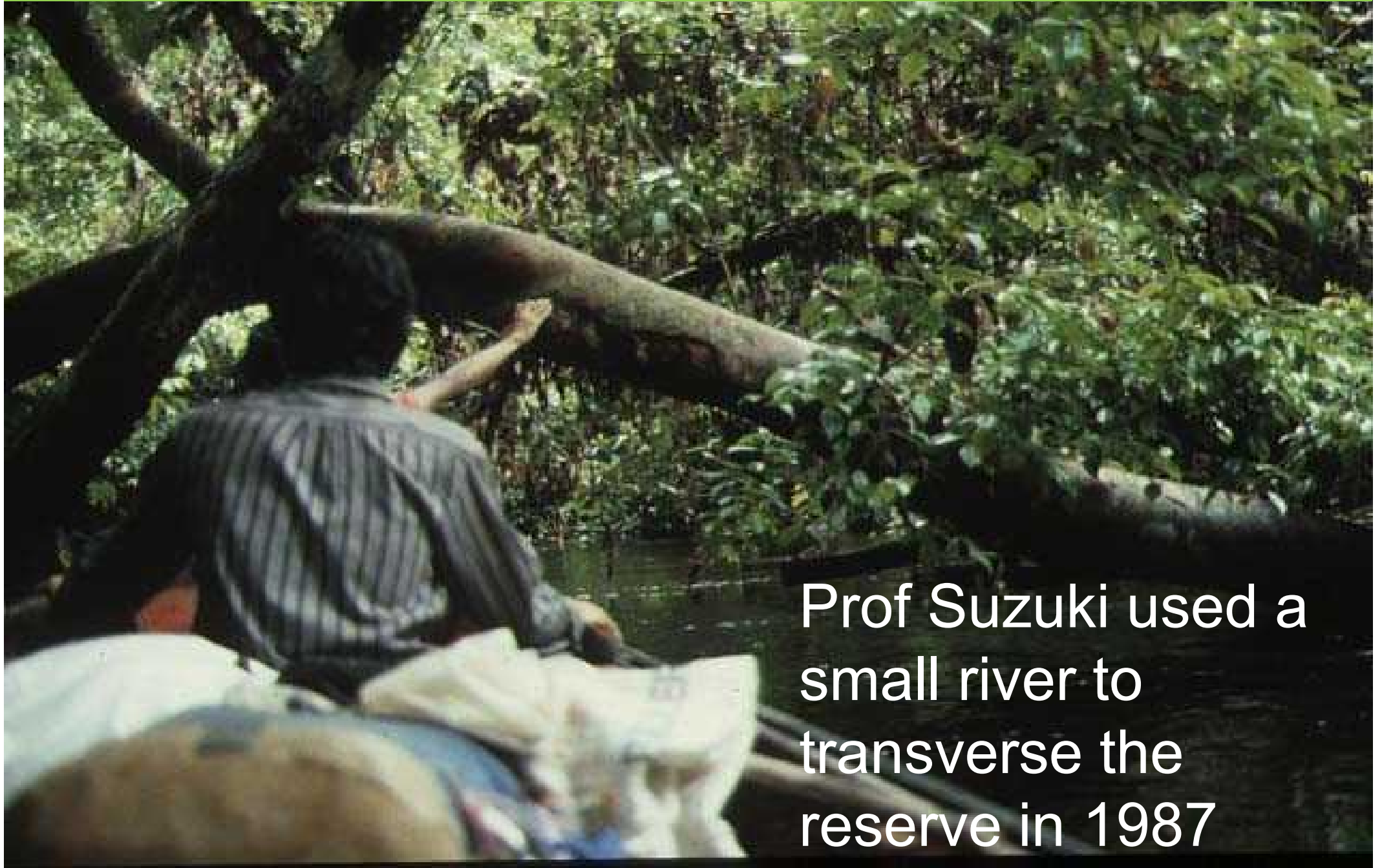


Mandor Nature Reserve in West BoKalimantan

An example of plots under human impacts



Mandor Nature Reserve in West Kalimantan



Prof Suzuki used a small river to transverse the reserve in 1987

Mandor Nature Reserve in West BoKalimantan

In 2012, we could move by motor cycles

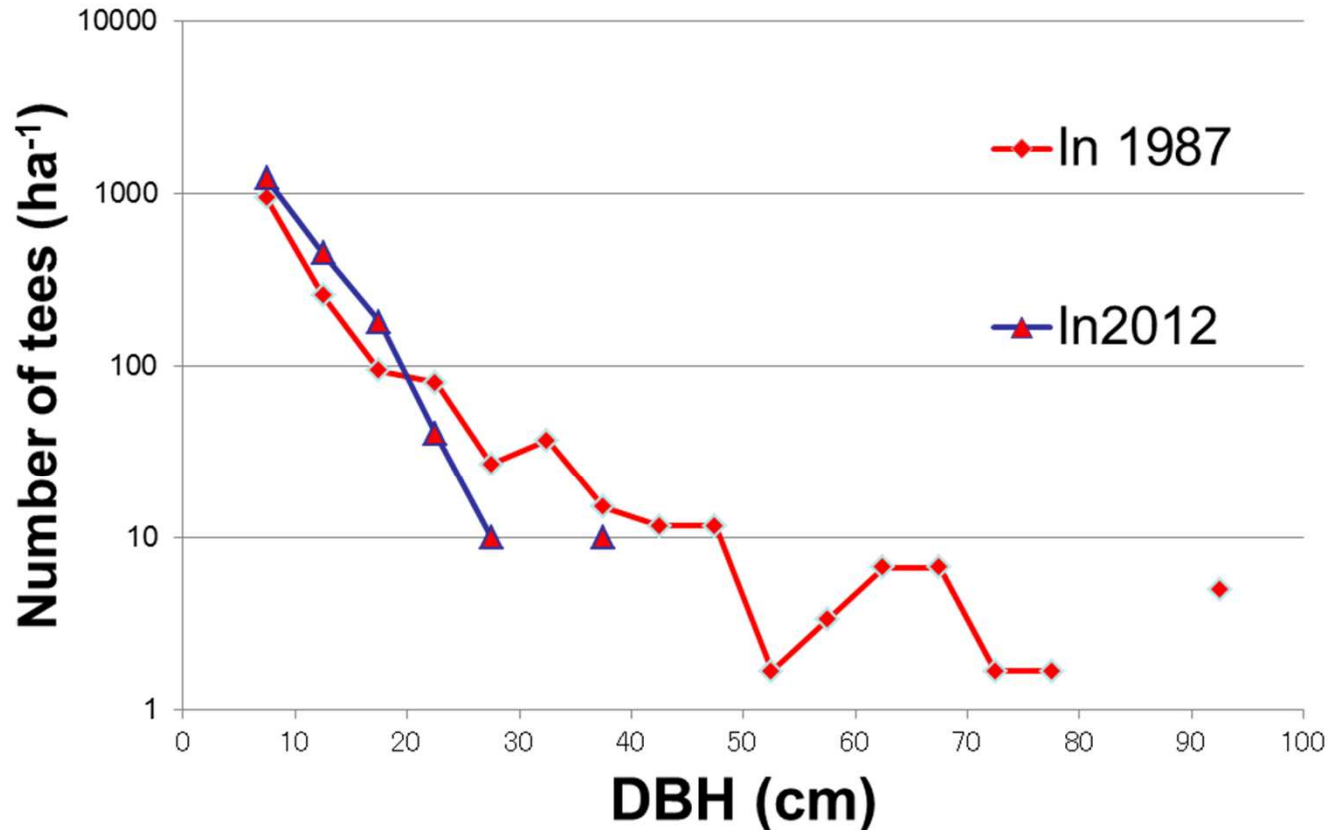


Mandor Nature Reserve in West Kalimantan



Mandor Nature Reserve in West BoKalimantan

Change in DBH frequency from 1987 to 2012



Plots in 1987 and 2012 were 0.6 ha and 0.1 ha, respectively

Kampong Thom, Cambodia

Downloaded from <http://rstb.royalsocietypublishing.org/> on January 8, 2015

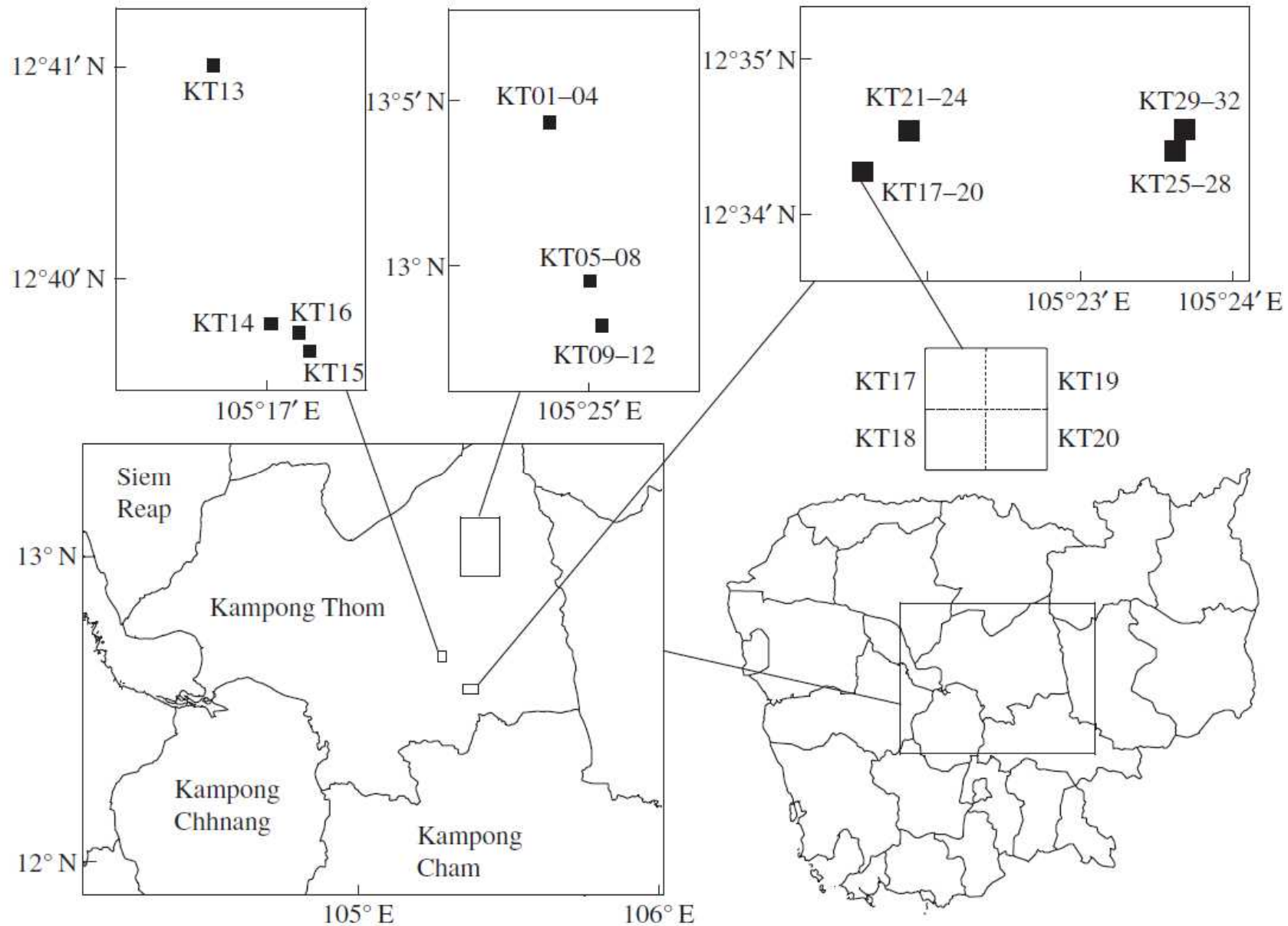


Figure 1. Location of PSPs in Kampong Thom. KT01–04, KT05–08, KT09–12, KT17–20, KT21–24, KT25–28 and KT29–32 are placed side by side and clustered in a 1 ha plot in primary evergreen forest. KT13, KT14, KT15 and KT16 are placed separately in secondary deciduous forest.

Kampong Thom, Cambodia

Sep. 2010



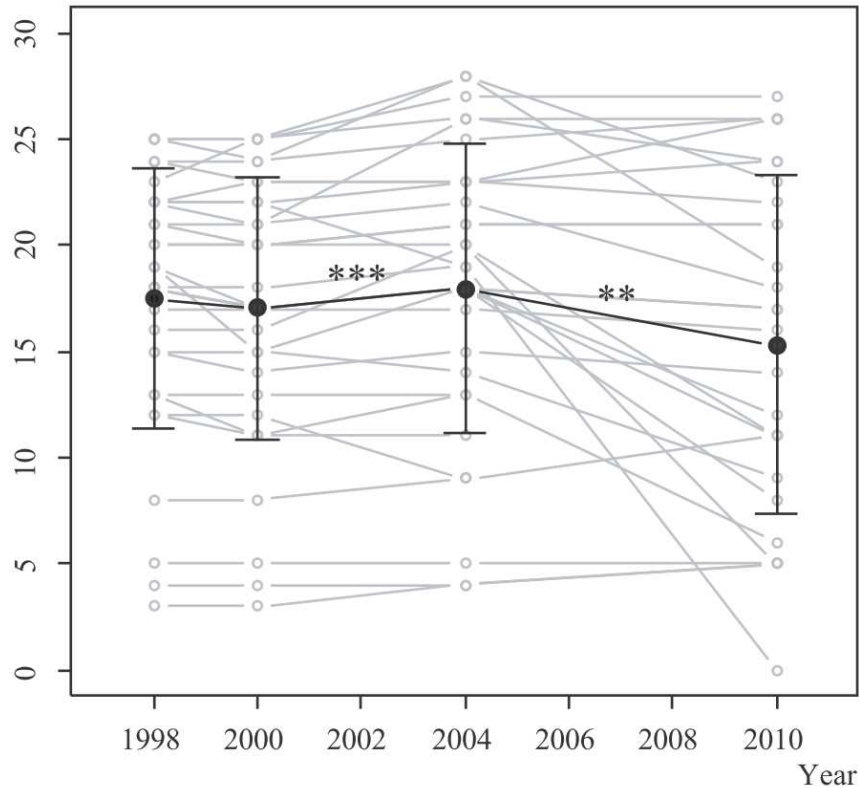
Jan. 2011



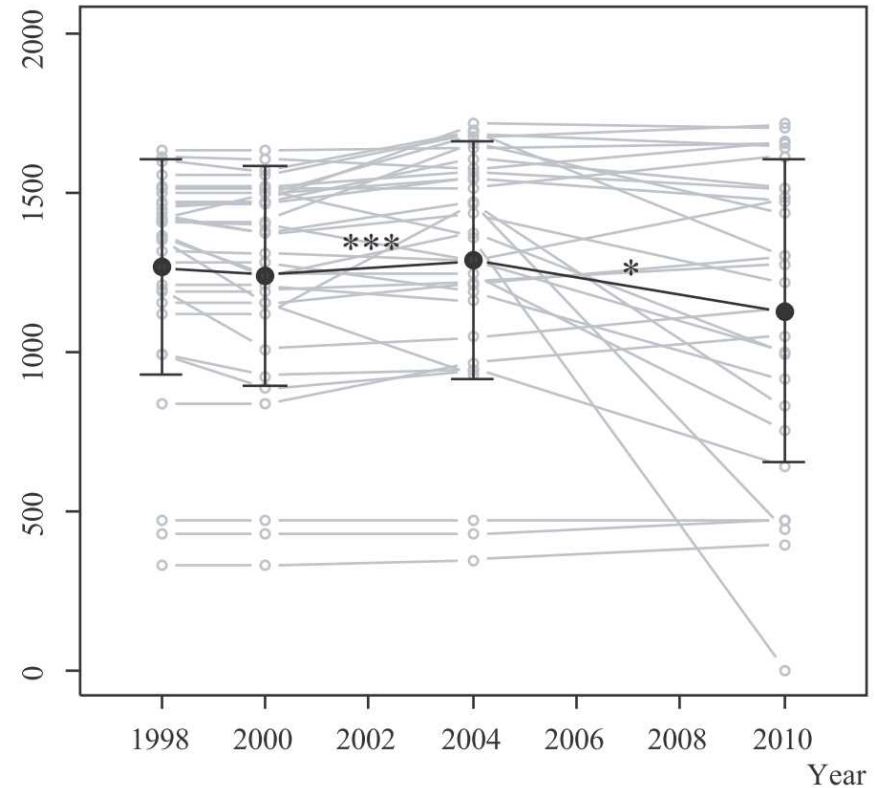
Recently, tropical lowland forest of Cambodia is rapidly disappearing; assessments are urgently needed.

Kampong Thom, Cambodia

Species richness (SR)



Phylogenetic diversity (PD)

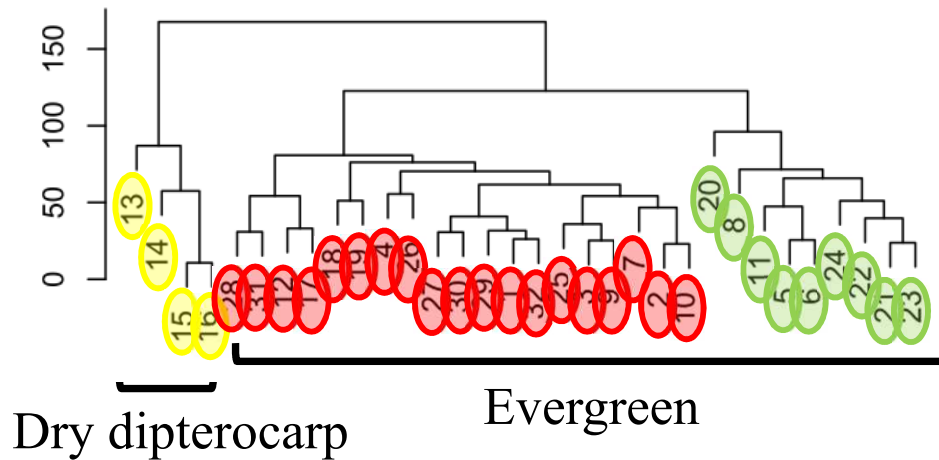


Both SR and PD largely decreased from 2004 to 2010 in some plots due to illegal logging.

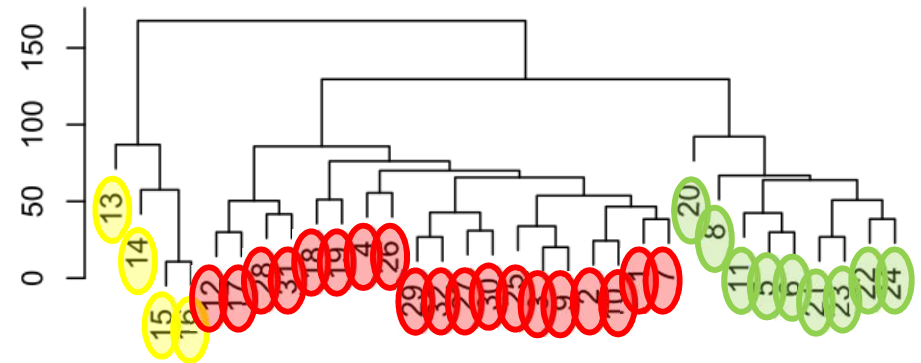
Kampong Thom, Cambodia

Mean pairwise phylogenetic distance (MPD) among plots

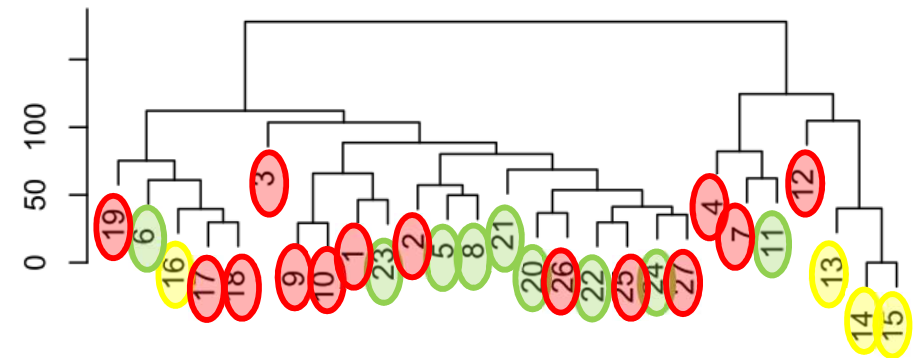
1998



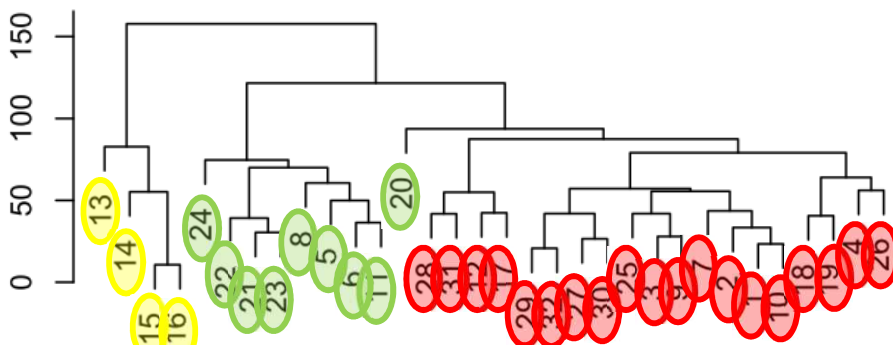
2000



2010



2004



Some evergreen plots became phylogenetically similar to dry Dip. plots.

Bi-Doup Nuiba National Park, Vietnam

Plant diversity is the highest in Indo-china



Deo Khanh Le slope, Vietnam

960m



Scientific name: Lauraceae *Cinnamomum* sp. nov.

Local name:

No. V8945

#

Vietnam Biduop Nui Ba
Deo Khanh Le (Alt. 967 m)



790m



Scientific name: Myrtaceae *Syzygium* sp. nov.

Local name:

No. V8934

#

Vietnam Biduop Nui Ba
Deo Khanh Le (Alt. 824 m)



Linking interests with needs

- Interests of scientists
 - Why specie richness is the highest in Sarawak?
 - How is general flowering triggered?
 - How do random process and niche differentiation determine forest community structure?
- Needs of society
 - How many new species are in Sarawak?
 - How does rain forest respond to climate change?
 - How can we protect tree diversity under land use change?

Network of plant diversity assessment

- **Cambodia:** Sokh Heng, Chhang Phourin, Ma Vuthy, Samreth Vanna (Forest Administration)
- **Vietnam:** Son Van Dang (ITB), Nguyen Van Ngoc, Hoang Thi Binh (Dalat University), Hoang Thanh Son (Vietnamese Academy of Forest Sciences)
- **Laos:** Phetlasy Souladeth (National University of Laos)
- **Thailand:** Somran Suddee, Sukid Rueangruea, Dokrak Ma (Forest Herbarium)
- **Myanmar:** Mu Mu Aung (Forest Research Institution)
- **Malaysia:** Saw Leng Guan, Lim Chung Lu, Yao Tze Leong (FRIM), Bibian Anak Michael Diway, Julia Anak Sang (FRC), Mohizah Bt. Mohamad (Sarawak Herbarium), staffs of Zedtee SDN.
- **Bornei:** Ferry Slik (Universiti Brunei Darussalam)
- **Indonesia:** Dedy Darnaedi, Marlina Ardiyani, Arief Hidayat (LIPI), Anes Syamsuardi (Andalas University), Ibrahim Dberjadin, Ngakan Putu Oka (Hasanudin University)
- **Japanese fieldwork members:** Shuichiro Tagane (Kagoshima University), Hironori Toyama, Akiyo Naiki (Ryukyu University), Meng Zhang, Noriaki Okabe, Ai Nagahama (Kyushu University), Hidetoshi Nagamasu, Mamoru Kanzaki (Kyoto University), Eiji Suzuki (Kagoshima University), Shinji Fujii (University of Human Environments)