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Plant diversity assessments using a standardized transect method in Cambodia, Indonesia, Malaysia, Thailand and Vietnam

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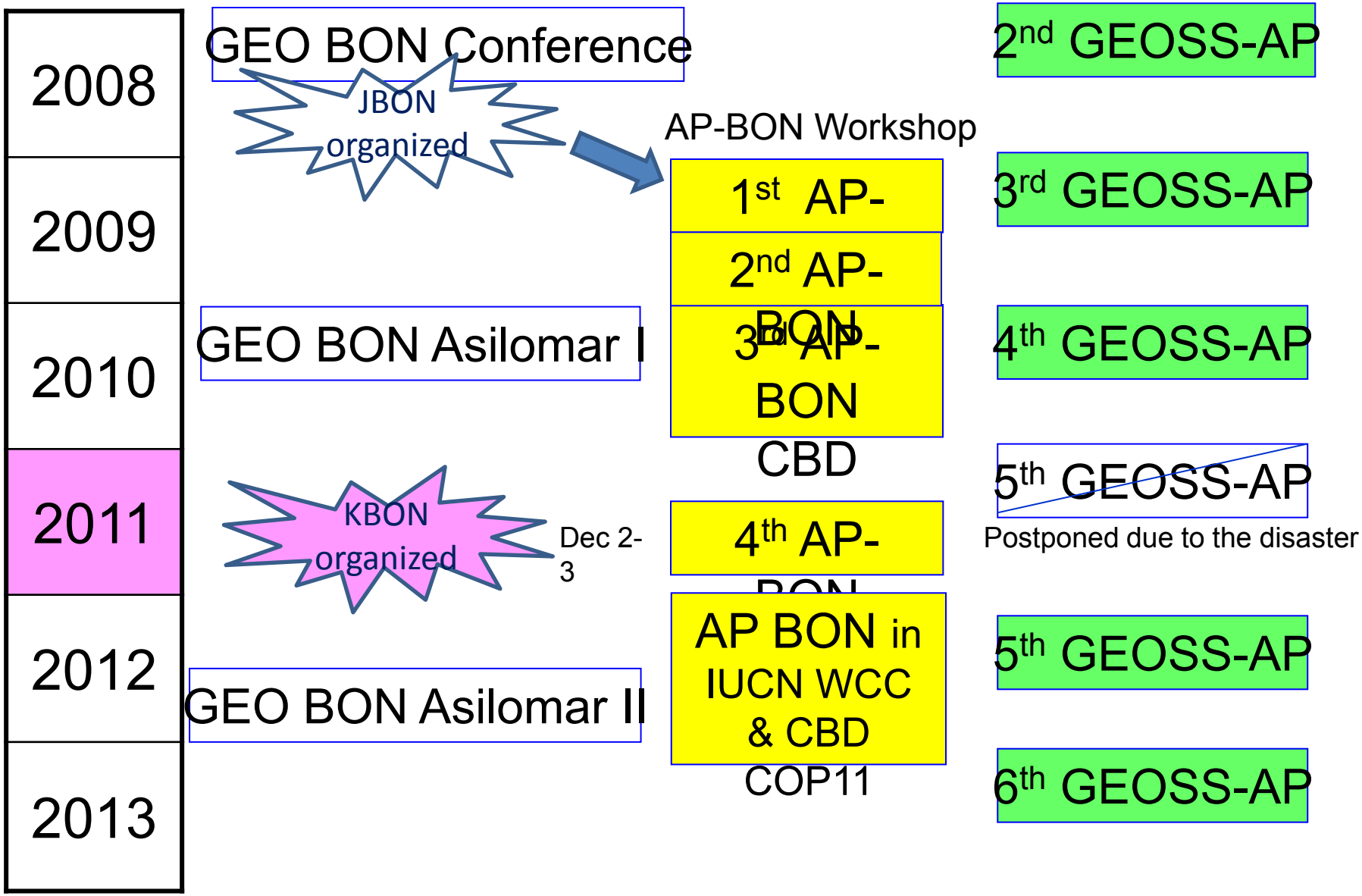
Outline of this talk

- Background
  - GEO BON
  - AP BON
  - S9 project on “Integrative observations and assessments of Asian Biodiversity”
- Methods
  - Standardized transect survey
  - Identification by DNA sequences + authentic specimens
- Preliminary finding
  - The highest species richness in tropical Asia
  - Many (50<) new species candidates

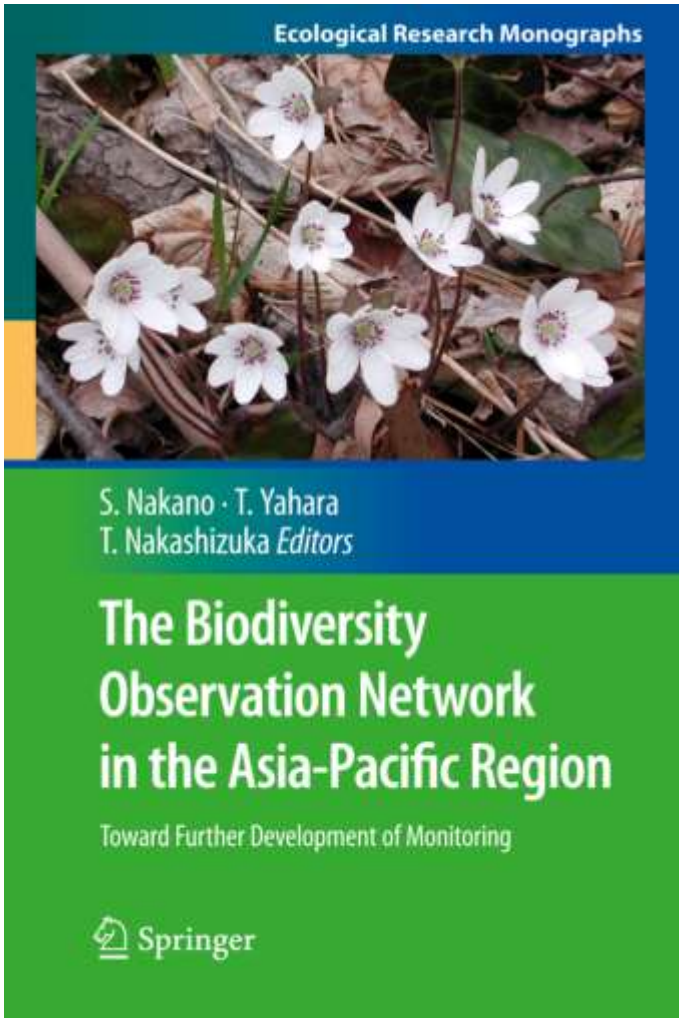
GEO: Group on Earth Observation

10 year implementation: 2005-2015

History of AP-BON and GEOSS-AP symposium



First publication of AP-BON Book



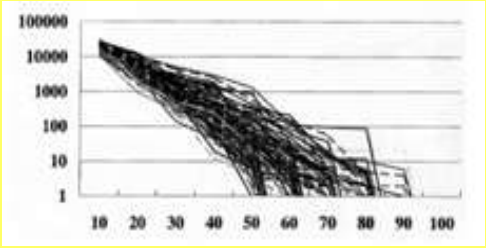
- **Part 1: General Introduction**
- **Part 2: Networks for Monitoring and Research on Biodiversity in the Asia-Pacific Region**
- **Part 3: Establishing a Biodiversity Database**
- **Part 4: New Methods and Analyses for Biodiversity Studies**
- **Part 5: Biodiversity and Ecosystem Services**
- **31 chapters, 480 pages**

Integrative observations and assessments of Asian biodiversity (sponsored by MoEJ; 2011-2015)

- Developing models & tools to assess biodiversity & ecosystem services in AP
- Developing models and tools to identify hot spots and EBSA in AP
- Research plan and outputs co-designed with MoE (user)

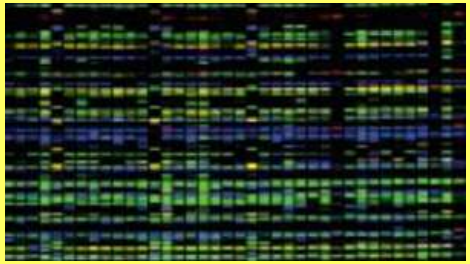
Theme 1

Modeling and mapping bio-diversity changes



Theme 2

Gene and species diversity changes

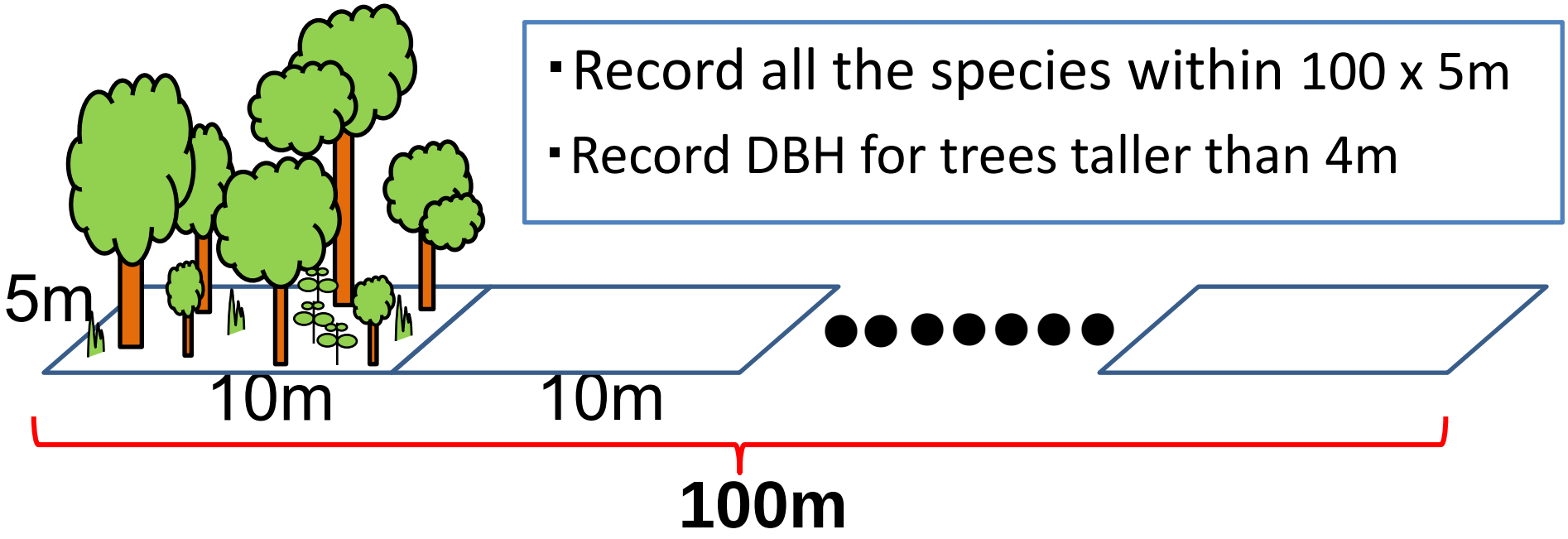


Theme 3-5

Forest, freshwater and marine ecosystems

Contribution to IPBES, GEO BON, CBD, REDD+, & National Strategy

Standardized belt transect survey



- Record all the species within 100 x 5m
- Record DBH for trees taller than 4m

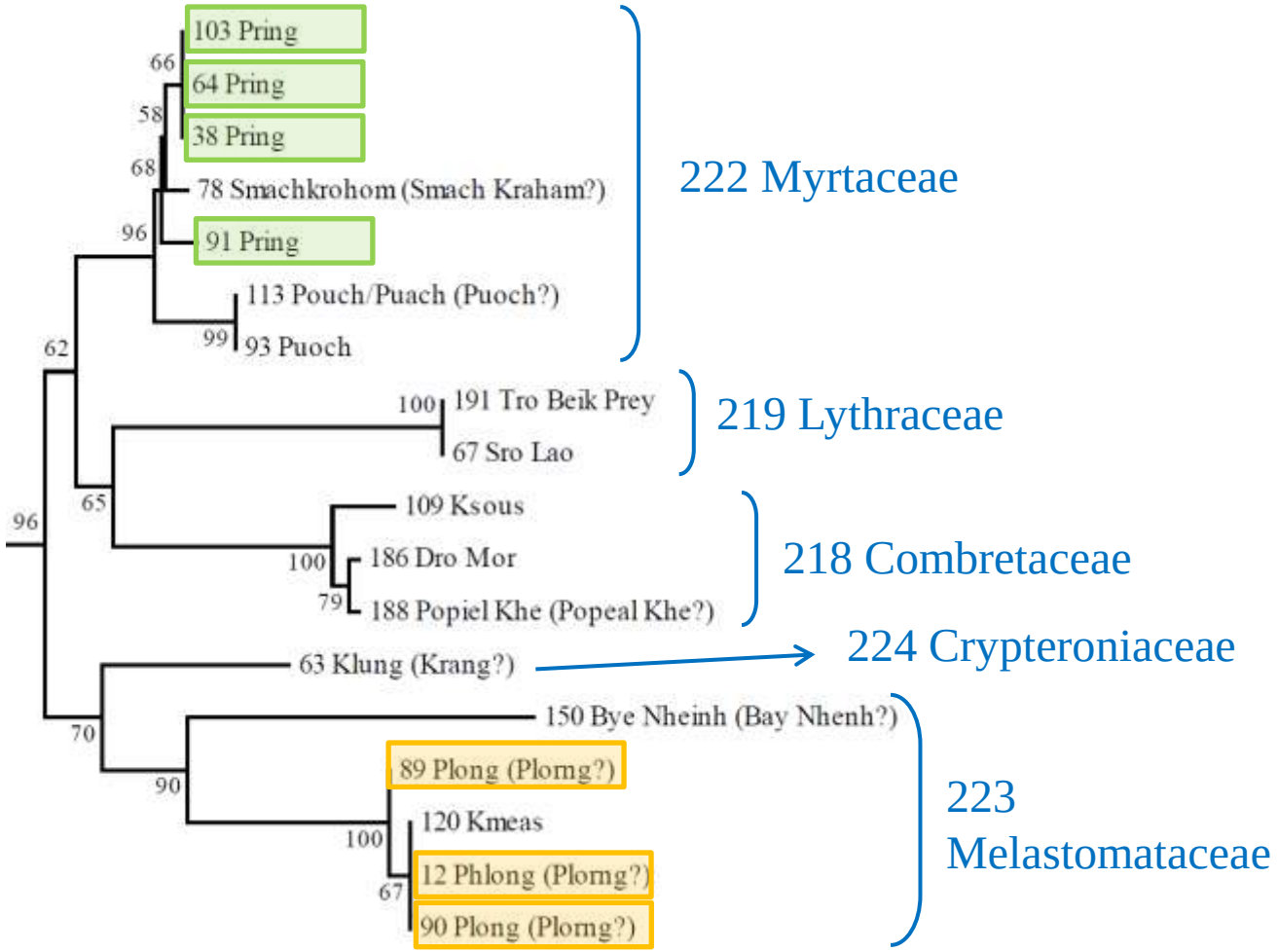
Collecting specimens and taking pictures

Identification using herbarium specimens

Transect survey in the Taman National Gunung Gene-Pangrango, West Java, Indonesia

Determine DNA sequences (rbcL & matK)

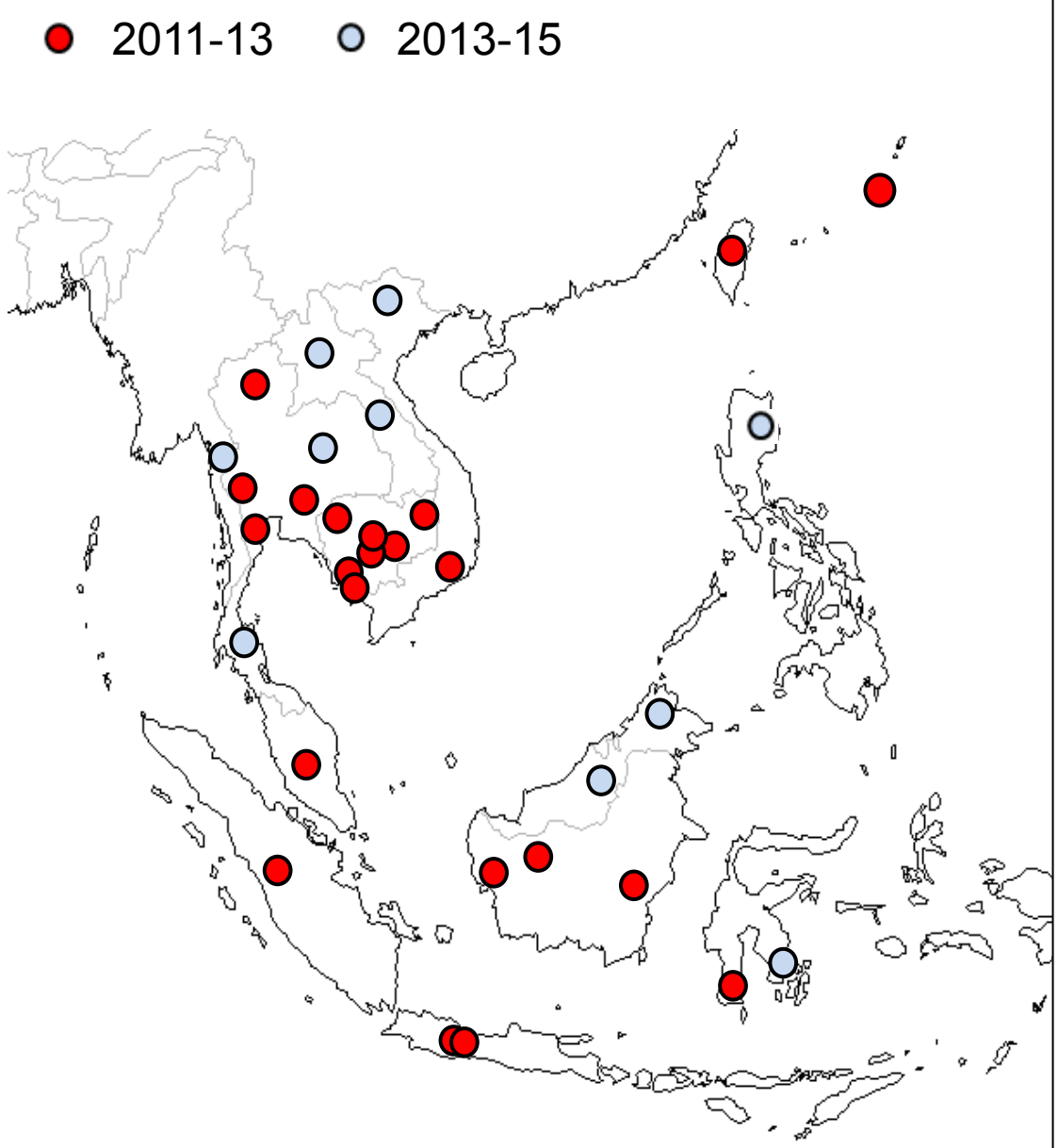
Myrtales



A case in Kg. Thom, Cambodia.
Same local name (Pring and Plong), but different species

5 families in Myrtales

Collaborative transect surveys in tropical Asia



Indonesia (LIPI, Andalas Univ., Hasanudin Univ.)
Gn. Gede Pangrango NP
Gn. Halimun NP
Bantimulung Bulusarung NP
Gn. Gadut (Sumatra)
Mandor, Serimbu (W. Kalimantan)

Cambodia (FA)
Cardamon,Kampong Chhnang, Kampong Thom, Koh Kong, Kratie, Ratanakiri, Bokor NP, Siem Reap

Malaysia (FRIM)
Fraser's Hill Protected Area

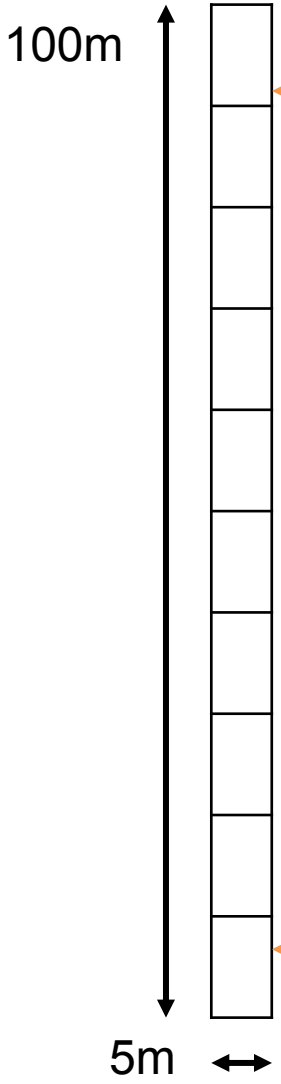
Thailand (BKF, KU)
Doi Inthanon NP
Kaeng Krachan NP
Maeklong, Kao Soi Dao

Vietnam (ITB) Honba NR

China-Taipei (台湾林業試験場)
蓮華池

Recording all species in 100m x 5m

An example of transect record: data from Mandor Nature Reserve, W Kalimantan



No	Specimen	Date	Subplot		Family	Name
1	1	14-Sep		1	Dipterocarpaceae	Shorea stenoptera
2	2	14-Sep	out		Rubiaceae	Mussaenda
3	3	14-Sep		1	Thymeleaceae	Goniostylis
4	4	14-Sep		1	Connaracaea	Ellipanthus
5	5	14-Sep		1	Sapindaceae	Nephelium
328	328	16-Sep		10	Fabaceae	
329	329	16-Sep		10	Celastraceae	Lophopetalum エダミドリ
287	0	16-Sep		10	Burseraceae	Santiria 287
330	330	16-Sep		10	Dichapetalaceae	Dichapetalum?
5	0	16-Sep		10	Sapindaceae	Nephelium 小葉4枚
36	0	16-Sep		10	Gnetaceae	Gnetum 1
331	331	16-Sep		10		
332	332	16-Sep		10	Burseraceae	Dacriodes
333	333	16-Sep		10	Sapindaceae	Nephelium
334	334	16-Sep		10	Thymeleaceae	Goniostylis

Scientific name: Dipterocarpaceae ***Shorea stenoptera*** Burck
No. 1
#

First record

Scientific name: Rubiaceae ***Lasianthus*** aff. ***angustifolius***
No. 32
#

A pictured guide as an output of a transect survey

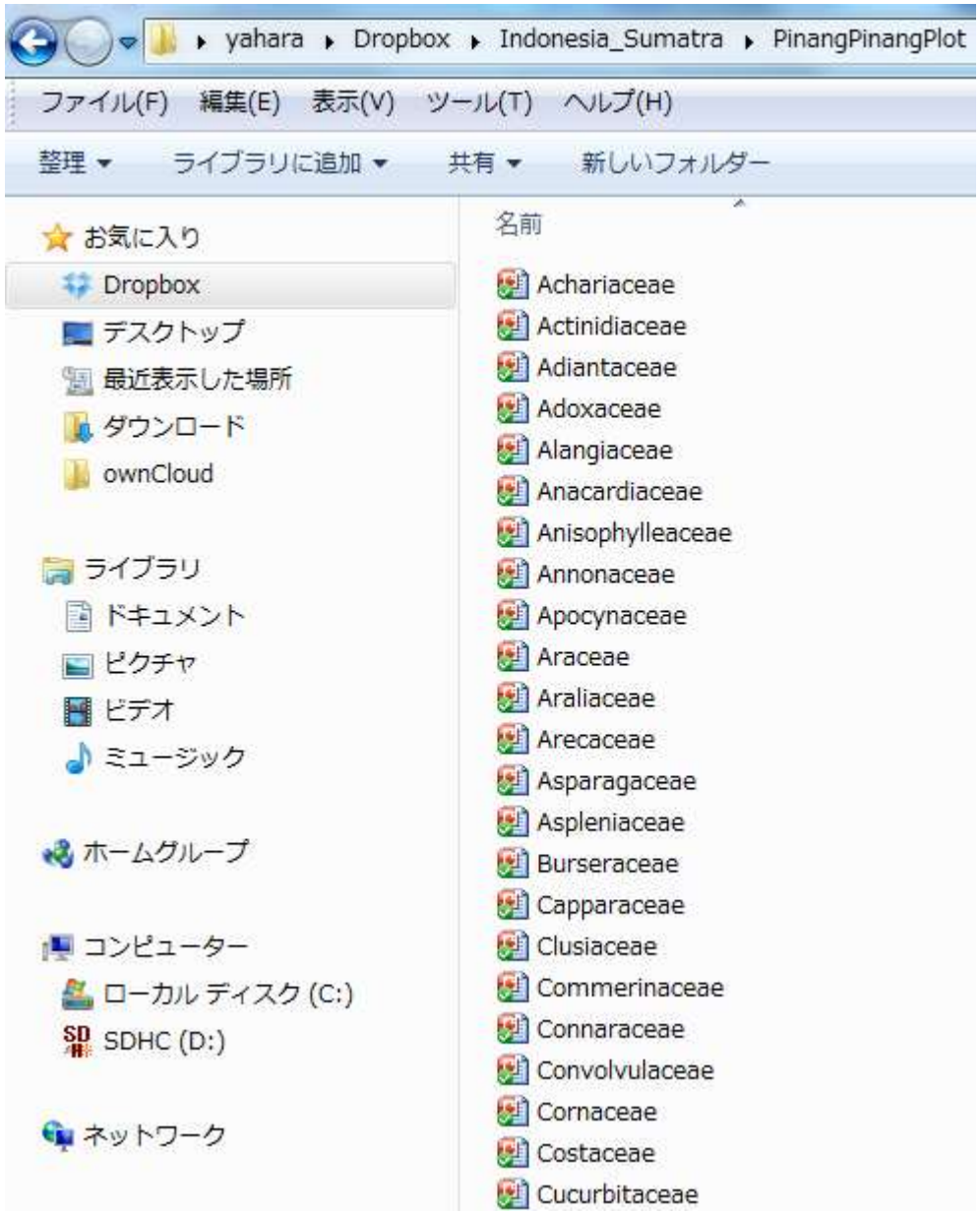
Scientific name: Fabaceae ***Bauhinia menispermacea*** Gagnep.
No. 112
Flora Malesiana describes this species with "**petals yellow** with a dark red centre, narrowly obovate", but flower color may vary between Kuchin and Mandor.

Scientific name: Thymelaeaceae ***Gonystylus***
No. 334
#

Last record

Mandor

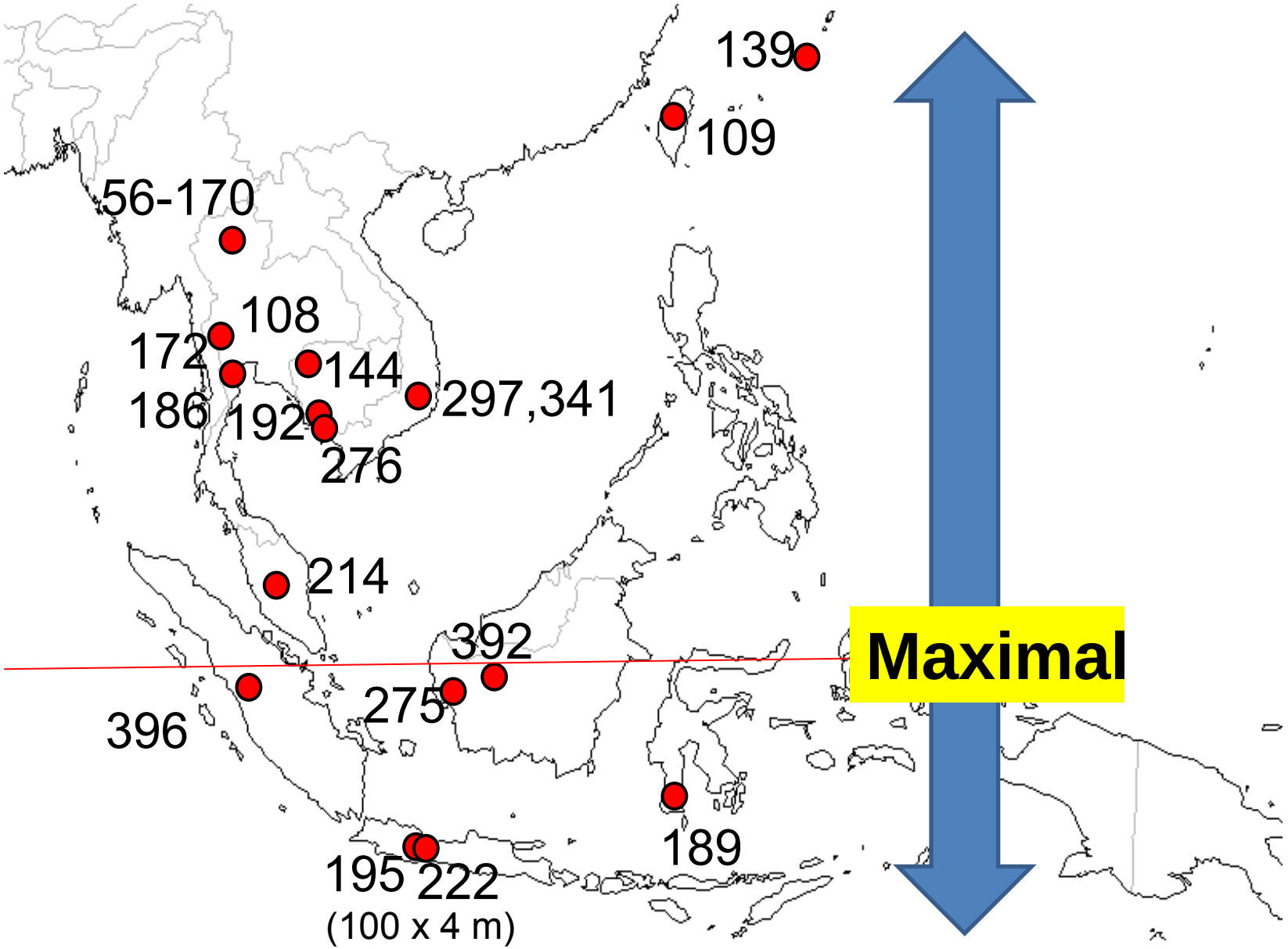
Sharing data obtained from transect surveys



Scientific name: Rubiaceae ***Lasianthus rubrohirsutus*** sp. nov.
No. 454
#

Scientific name: Arecaceae ***Areca***
No. 533
#

Vascular Plant Species Richness / Transect (500 m^2)

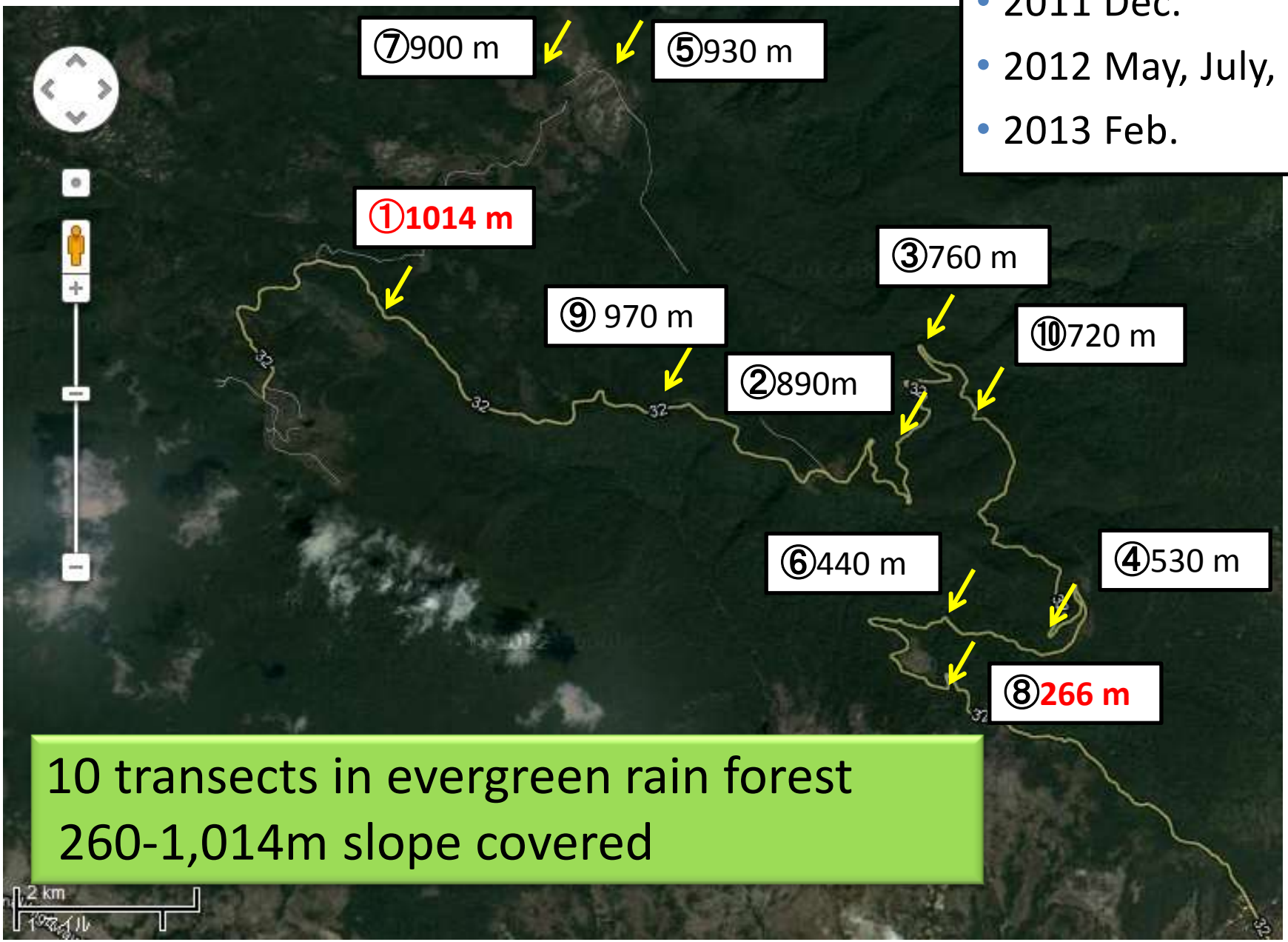



Bokor National Park, Cambodia
[Alt. (0-) 266 - 1014m]

Locations of transects

Field survey

- 2011 Dec.
- 2012 May, July, Oct.
- 2013 Feb.



10 transects in evergreen rain forest
260-1,014m slope covered

Plant diversity assessment in Bokor National Park

- **2,559 specimens** in Bokor National Park
  - **Woody plants** (including liana) **1,230 specimens**
  - **Small shrubs & Herbs** **1,329 specimens**

Identification for **Woody plants**

97 Family 566 spp.

- **Within transects … 440 spp. (78%)**
  - **Within transect (> 4m trees) … 265 spp. (47%)**
- **Out of transects … 126 spp. (22%)**

Transect survey is effective to describe regional flora with quantitative data.

Plant diversity assessment in Bokor National Park

97 Family 566 spp.

- **New species … 21 spp. + α**
- **New records in Cambodia … 62 spp.**
- **Endemic species … 35 spp.**

Flora of Bokor is characterized by high plant diversity and endemism; a "**Hotspot**" in Indochina.

Scientific name: Elaeocarpaceae ***Elaeocarpus***
Local name:
Specimen No.: 1761 [=1484, 2484]

Scientific name: Euphorbiaceae ***Croton***
Common name:
No. 2528

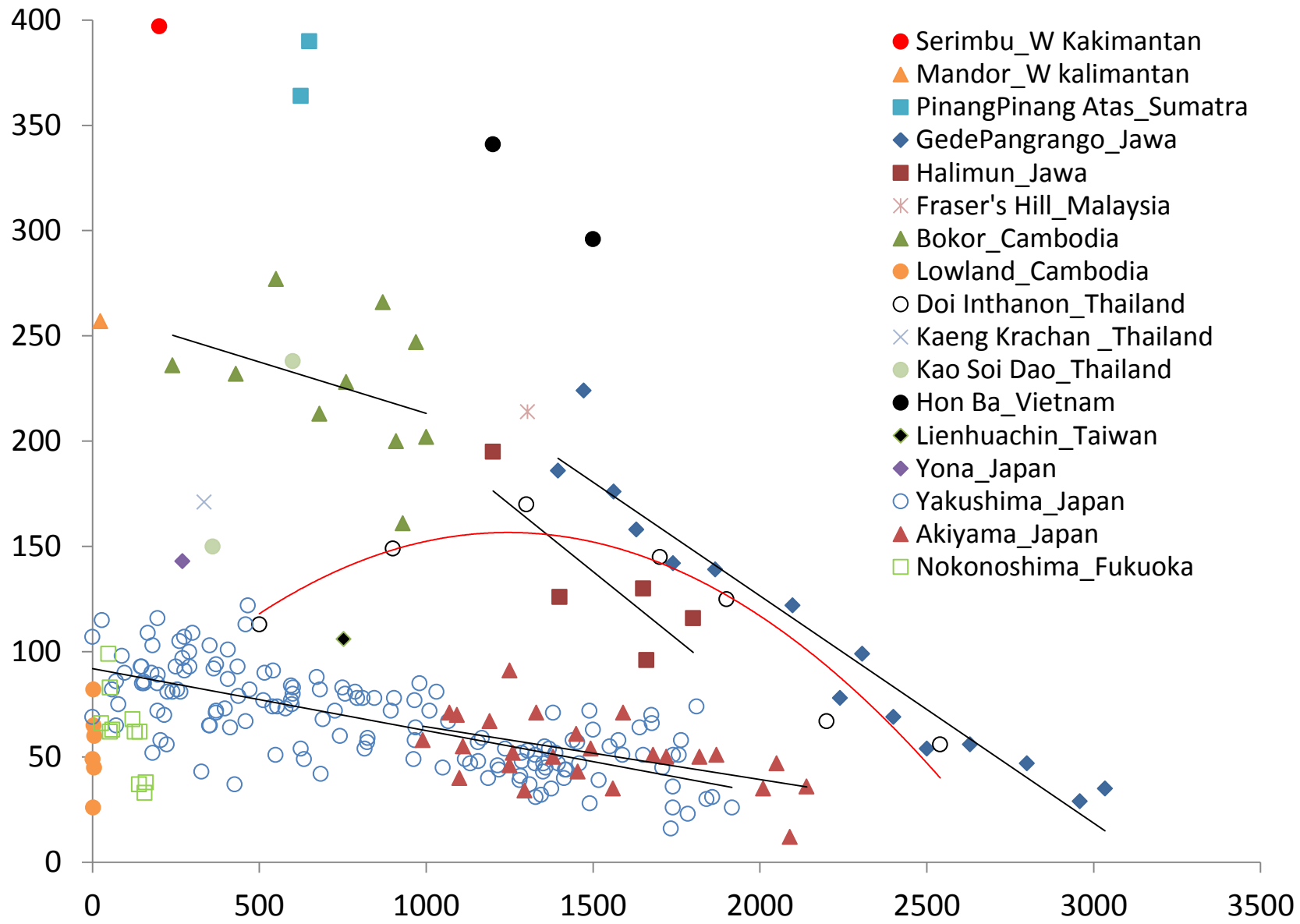
Scientific name: Myrtaceae ***Syzygium sp.***
Local name:
Specimen No. 1756

Proportion of candidate new species of Lauraceae

	Cambodia		Vietnam		Malaysia		Indonesia		Total		
	Bokor		Hon Ba		Fraser's Hill		Gn Gadut (Sumatra)				
	Known	Unknown	Known	Unknown	Known	Unknown	Known	Unknown	Known	Unknown	
Actinodaphne	2	0	1	6	5	0	3	0	11	6	0.35
Alseodaphne	0	0	1	0	0	0	0	0	1	0	0.00
Beilscmiedia	2	2	4	5	1	0	2	3	9	10	0.53
Cinnamomum	6	2	2	6	2	1	2	4	12	13	0.52
Cryptocarya	3	0	2	1	1	0	4	2	10	3	0.23
Dehaasia	2	2	0	0	0	0	1	0	3	2	0.40
Endiandra	0	0	1	0	1	0	2	1	4	1	0.20
Lindera	1	0	0	0	2	0	1	0	4	0	0.00
Litsea	6	1	7	3	6	0	8	5	27	9	0.25
Machilus	1	1	0	5	0	0	0	0	1	6	0.86
Neolitsea	4	2	2	2	2	3	1	2	9	9	0.50
Nothaphobe	1	0	0	0	0	0	0	0	1	0	0.00
Phoebe	3	0	1	0	1	0	0	0	5	0	0.00
Total	31	10	21	28	21	4	24	17	97	59	
		0.24		0.57		0.16		0.41		0.38	

Including known but undescribed spp

Plant Species Richness/500m² vs Altitude



Key messages

- Standardized transect survey is an effective way to describe local flora.
  - By walking around (typical behavior of taxonomists), at least some (usually many) species are neglected.
- We recorded more than 10,000 plants including many rare and threatened species for which precise locations (GPS data) are recorded and pictures of living plants (see below) and images of specimens are data-based.
- This database will enable staffs of Protected Areas to develop plans of better conservation management.