The Second International Symposium of Mapping Asia Plants

How can we save all the plants in Southeast Asia?

Richard T. Corlett

Center for Integrative Conservation,
Xishuangbanna Tropical Botanic Garden,
Chinese Academy of Sciences,
Yunnan, China

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How can we save all the plants in Tropical East Asia?

Richard T. Corlett

Center for Integrative Conservation,
Xishuangbanna Tropical Botanic Garden,
Chinese Academy of Sciences,
Yunnan, China

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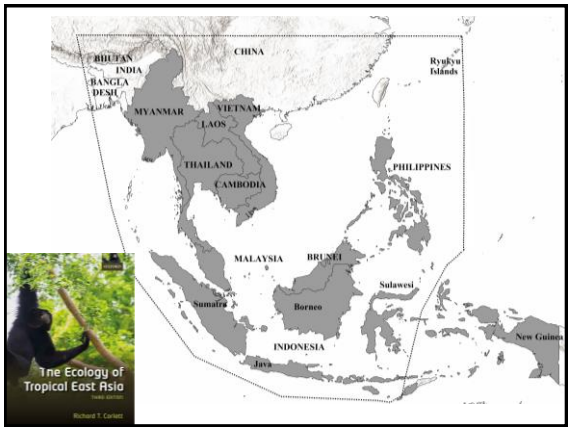

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How can we save all the plants in the Southeast of Asia?

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Center for Integrative Conservation,
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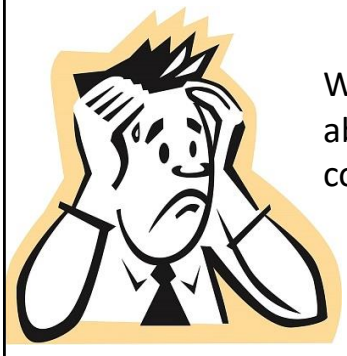

Why worry about plant conservation?

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Plant diversity is very important to us, *but…*

- Plant conservation is greatly **under-resourced** in comparison with animal conservation (<1%?);
- **Protected area systems** are far from optimal for plant conservation;
- **Criteria for 'conservation'** are much less stringent for plants than for animals.

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There are a **LOT** of **known plant species**:

350-380,000 accepted vascular plant names
[Lughadha et al. 2016 *Phytotaxa;* Freiberg et al. 2020 *Scientific Data*]

90-100,000 in Asia (in the MAP sense) ?

60-70,000 in Tropical East Asia ?

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But also, a **LOT** of **unknown plant species**:

c. 2000 vascular plant species described a year.
[Cheek et al. 2020 *Plants People Planet*]

In 2019:		
	Brazil	216
	China	**195**
	Columbia	121
	Ecuador	91
	Australia	86
	Vietnam	**82**
	India	**80**
	Mexico	72

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But also, a **LOT** of **unknown plant species**:

How many are still undescribed?

10-15%? = **40-50,000** species globally?
= 9-15,000 in Asia?
= 6-10,000 in TEA?

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But also, a **LOT** of **unknown plant species**:

How many are still undescribed?

10-15%? = **40-50,000** species globally?

Locally, 'unknowns' may exceed 25%, but typically more than half those will be 'knowns' elsewhere.

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Focussing on **TEA:**

Known species 60-70,000
+ unknown 6-10,000

How many are threatened with extinction?

Recent global and regional estimates suggest **30-40% of all plant species** are threatened
[Enquist et al. 2019 *Sci. Adv.;* Lughadha et al. 2020 *Plants People Planet*]

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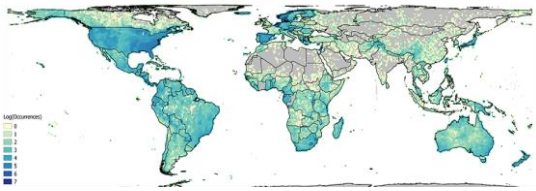
Enquist et al. 2019 used **BIEN** [Botanical Information and Ecology Network] which has >200 million georeferenced records for land plants, from:

- herbarium collections
- plots
- surveys etc.



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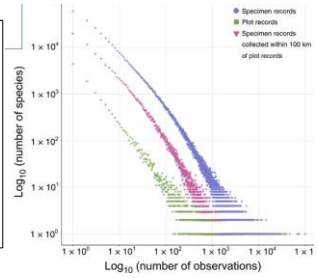
Major results:

36.5% of species had **≤ 5** observations
28.5% of species had **≤ 3** observations

Global species abundance distribution for all plant species. Each point is the total number of individuals observed for one species.



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Focussing on **TEA:**

Known species 60-70,000
+ unknown 6-10,000

30-40% = **20-30,000 threatened species** in TEA

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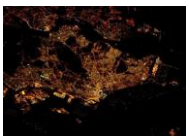
However, **<20 species** are <u>known</u> to have gone extinct in TEA and only 0.2% globally since 1750 [Humphreys et al. 2019 *Nat. Ecol. Evol.*]

An estimated 30-38% of Singapore's flora has gone extinct since 1822, but this is an extreme case [Kristensen et al. 2020 *Conserv. Biol.*]



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What about diversity **below the species level?**

Genetic diversity has been seriously neglected in the conservation of wild plant species, although it is a major consideration for crop plants and their wild relatives.

Greatly increases the challenge of effectively conserving wild plant diversity, but…

How much is enough?

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What are the **major threats**?

1. 'The only known location was converted to a ……' [rubber plantation, car park, …]
2. Overexploitation, e.g. orchids, medicinal plants…
3. Climate change…?

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How can we **save them <u>all</u>?**

1. Improve **the inventory**.
2. Make the **data accessible** on-line.
   You can't plan conservation of a plant species when the only location data is on a specimen label at Kew.
3. Do a **conservation assessment** for <u>all</u> spp.
   Start with rapid assessments by region to identify highly threatened species and those that are data deficient.

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How can we **save them <u>all</u>?**

4. Re-design **PA systems** for plants.
   Expand to include the full range of edaphic, topographic, and other extremes.
5. Greatly expand ***ex situ* conservation**.
   a. Conventional **seed banking** where possible.
   b. Cryobiotechnology for species with seeds that can't be kept in seed banks or which are short-lived [*see* Pence et al. 2020 *Biological Conservation*].
   c. Living collections where necessary.

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How can we **save them <u>all</u>?**

6. **Integrate *in* and *ex situ*** conservation.
7. Manage endangered species (E & CE) at the **individual level** in living collections.
   Like zoos do for animals in order to minimize loss of genetic diversity [Wood et al. 2020 *Conservation Biology*]
8. Massively expand **ecological restoration** and **plant reintroduction**.
   We need to learn how to do this well!

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How can we **save them <u>all</u>?**

Finally…

Plant conservation programs seem to be most successful at the **local to subnational level**, c. 1000-100,000 km^2.

- Can involve all stakeholders: government, NGOs, amateurs etc., and coordinate them.
- Can get to know the whole Flora.
- It is a practical scale for conservation planning for plants.
- …

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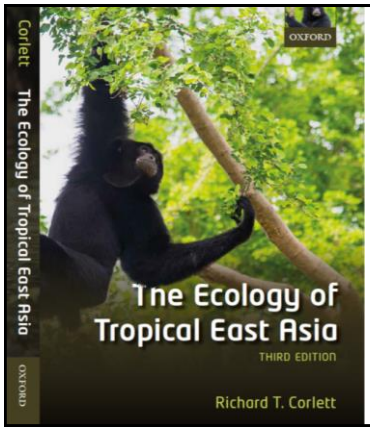

Thank you!

Corlett@xtbg.org.cn

I can send the papers I cite.

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