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THE USE OF GLOBAL BIODIVERSITY DATABASES TO INCREASE TAXONOMIC QUALITY IN FOREST INVENTORIES

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National Forest Inventories REDD+ FAO

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What will we see?

- FAO Support on MRV
- Aim: Support biodiversity assessments
- What is a tree?
- Proposing an algorithm for tree species lists
- Example
- Conclusions
- Future steps

FAO Country Support

INSTITUTIONAL ARRANGEMENTS

ASSESSMENT AND REPORTING OF GHGI, INCLUDING QA/QC:

NC National Communications

BUR Biannual Update Report REDD+

FREL/FRL Forest Reference (Emission) Levels

NDC Nationally Determined Contributions

DATA COLLECTION AND ANALYSIS

NFI National Forest Inventories/ Agricultural Censuses

NFMS National Forest Monitoring Systems

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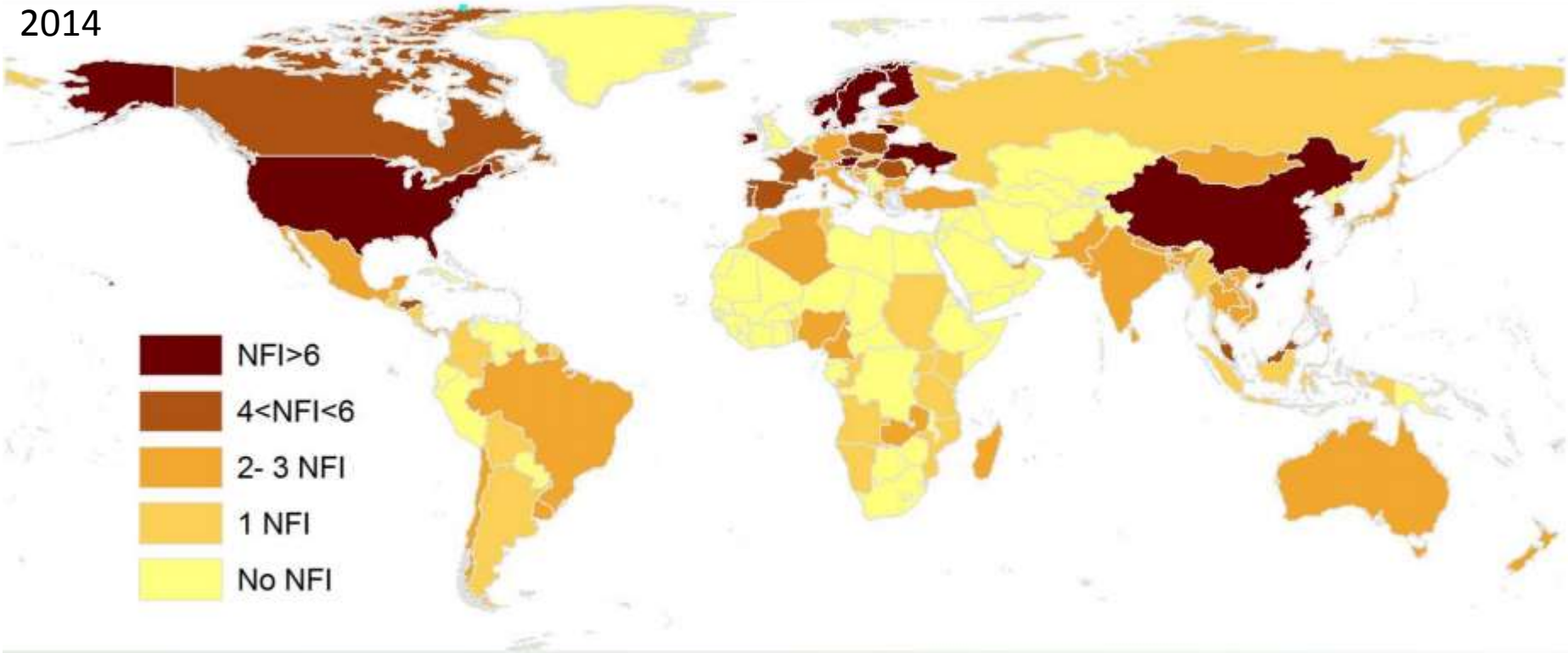
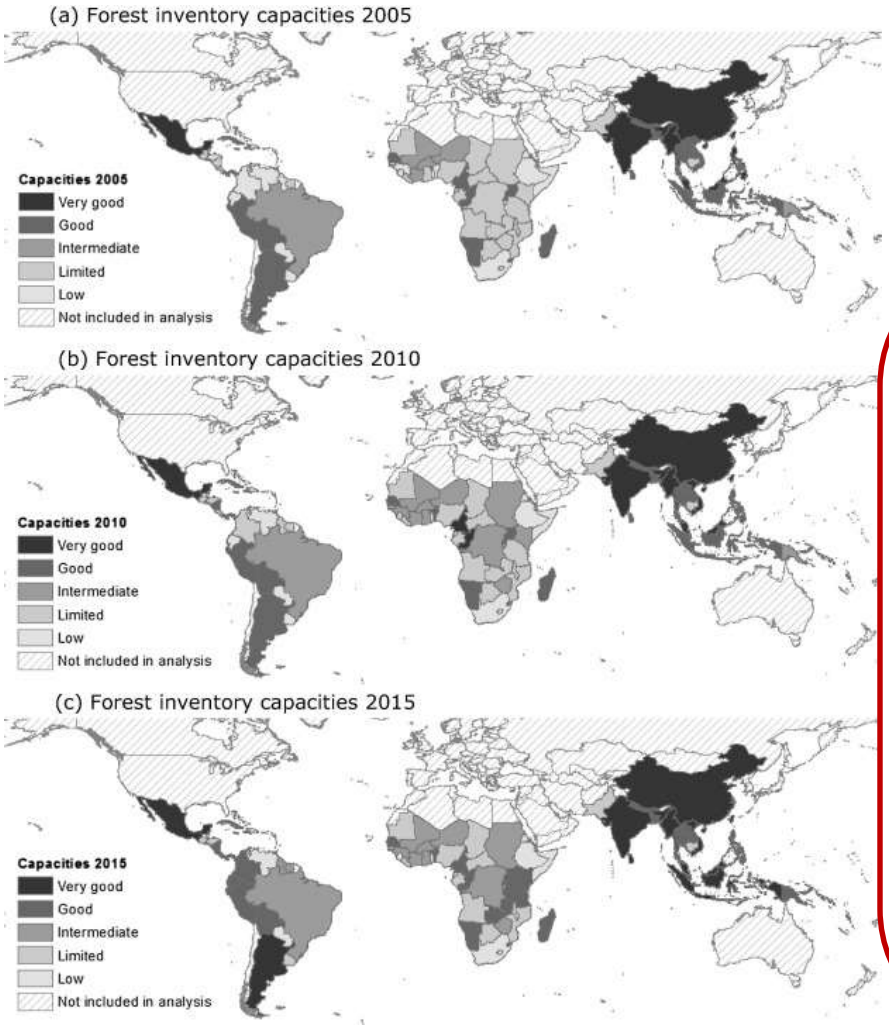
2014

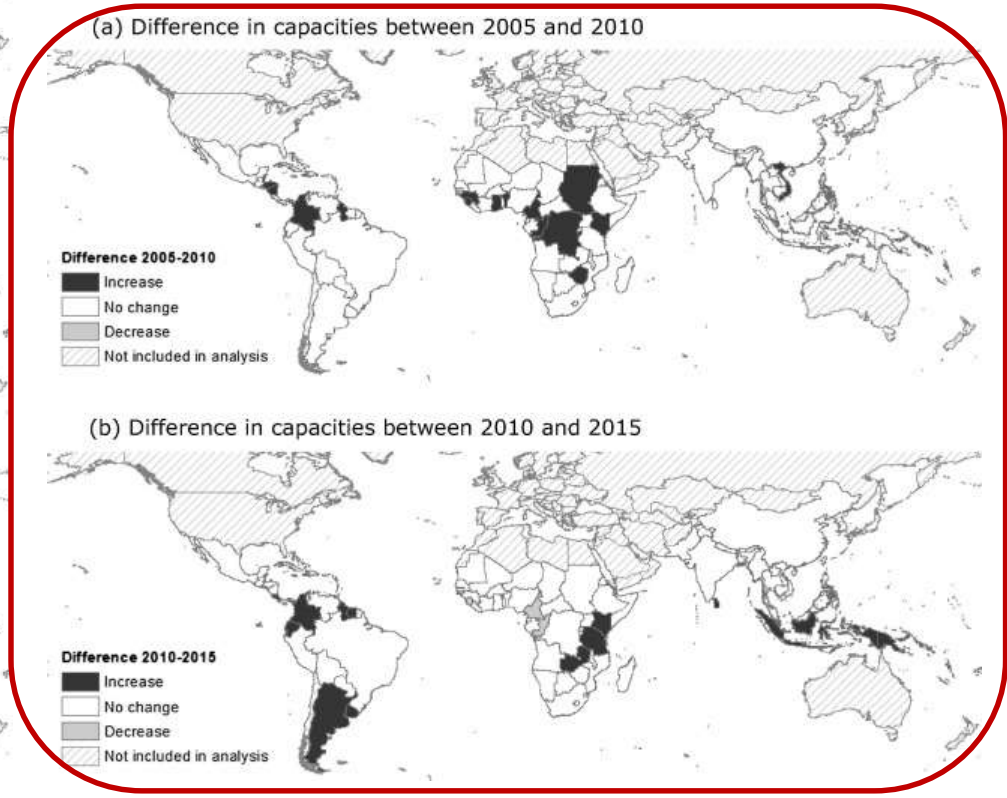


Unpublished data – based on the data collected from 128 countries who have already implemented an NFI

Capacity development in Forest Inventories



Romijn, E., Lantican, C. B., Herold, M., Lindquist, E., Ochieng, R., Wijaya, A., Murdiyarso, D & Verchot, L. (2015). Assessing change in national forest monitoring capacities of 99 tropical countries. *Forest Ecology and Management*, *352*, 109-123.



Aim: Support tree biodiversity assessments in countries

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FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE

INVENTAIRE FORESTIER NATIONAL

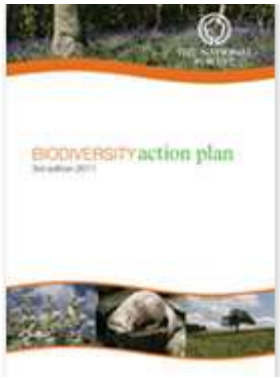
Brazil ifn National Forest Inventory

COMMISSION DES FORETS D'AFRIQUE CENTRALE COMIFAC

FOREST SURVEY OF INDIA
Ministry of Environment, Forest & Climate Change
भारतीय वन सर्वेक्षण

GFBI in statu viae

Convention on Biological Diversity



National Forest Biodiversity Reports

How?

Preliminary species list

Traditionally expert-based. Almost never harmonized at international standards of nomenclature

Often local crew members providing local names

NFI

Needs harmonized list if results to be compared out of the country or even with other studies in the same country

Biodiversity assessment

Available tools: a taxonomic cobweb

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iPlant Collaborative Taxonomic Name Resolution Service

ITIS Integrated Taxonomic Information System

The Plant List A working list of all plant species

Tropicos®

GLOBAL BIODIVERSITY INFORMATION FACILITY

NATIONAL BIODIVERSITY NETWORK 2016 NBN 2017 DATA SHARING PARTNER

ILDIS INTERNATIONAL LEGUME DATABASE & INFORMATION SERVICE

Catalogue of Life

gni Global Names Index

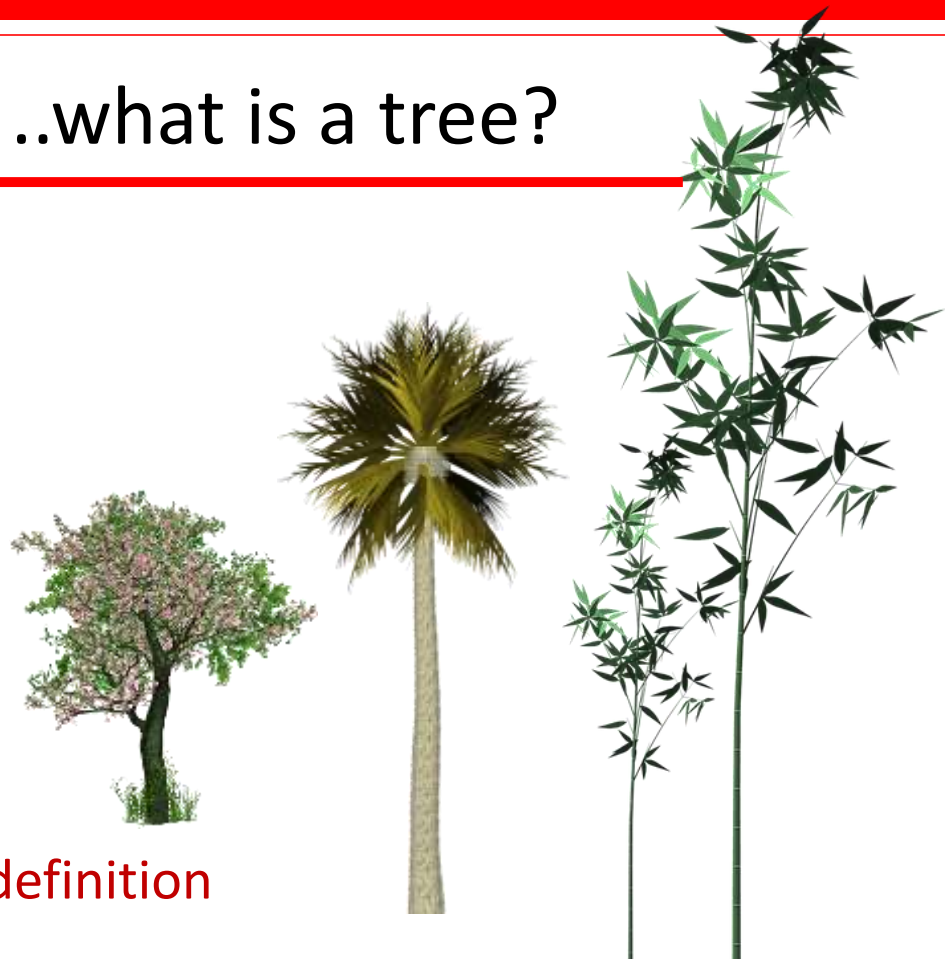
Scientific Names Exchange (about)

The International Plant Names Index

… and many more. See, for example, the integrated R environment

RopenSci

Yeah, but ..what is a tree?



Taxonomic definition ≠ Inventory definition

Beech, E., Rivers, M., Oldfield, S. & Smith, P. P. (2017). GlobalTreeSearch – the first complete global database of tree species and country distributions. *Journal of Sustainable Forestry*. DOI: 10.1080/10549811.2017.1310049

BGCI. (2017). GlobalTreeSearch online database. Botanic Gardens Conservation International. Richmond, U.K. Available at www.bgci.org.

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Country	Cover (%)	Minimum area (ha)	Minimum height (m)	Area restrictions	Height restrictions	Main FAO 2010 ecozones
Malaysia/PNG	10	1	3			Tropical rainforest
Indonesia	30	6.25	5	Exclude plantations		Tropical rainforest/Tropical mountain system
Uganda	30	1	4			Tropcial Rainforest/Tropical moist forest
Viet Nam	10	0.5	5	Mínimum 20 m wide and at least 3 tree lines	Plantations: 1.5 m in slow growth. 3 m in fast growth (>1000 trees/ha)	Tropical moist forest/Tropical rainforest
Nepal	10	0.5	5			Tropical moist forest/Tropical mountain forest
Madagascar	30	1	5			Tropical mountain forest/Tropical moist forest
Zambia	10	0.5	5			Tropical dry forest/Tropical moist forest
Tanzania	10	0.5	3			Tropical dry forest/Tropical shrubland
Ethiopia	20	0.5	2			Tropical mountain forest/Tropical shrubland

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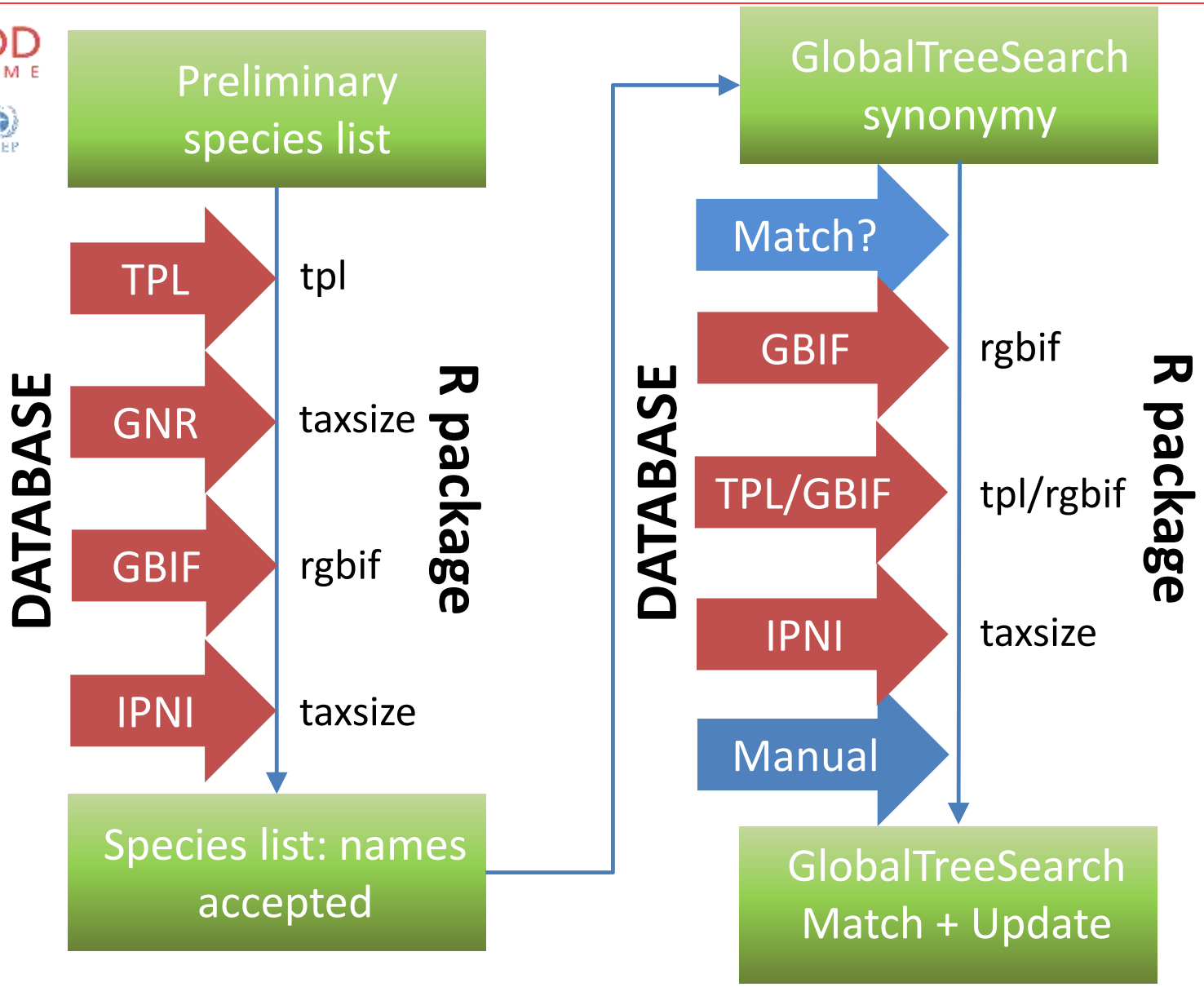
TAXON IN LIST	INTENDED NAME	ISSUES IN GlobalTreeSearch
Betula	Betula alba	Genus
Araliaceae	Brassaiopsis castaneifolia	Family
Coriaria napalensis	Coriaria nepalensis	Grammatical mistakes
Cyathea spinulosa	Cyathea spinulosa	Not in GlobalTreeSearch
Desmodium oojeniense	Ougeinia oojeinensis	Synonym
Erica	Erica	Hemihomonym (both a plant and a spider)
Myroxylon	Myroxylon	Isonym (Leguminosae vs. Salicaceae)
Terminalia tomentosa	Terminalia coriacea	Heterotypic synonym (downgraded to a more including species)
Vitex heterophylla	Vitex pinnata/Vitex quinata	Two synonyms in GlobalTreeSearch
Bambusa ventricosa	Bambusa ventricosa	Bamboo (Not a tree!)

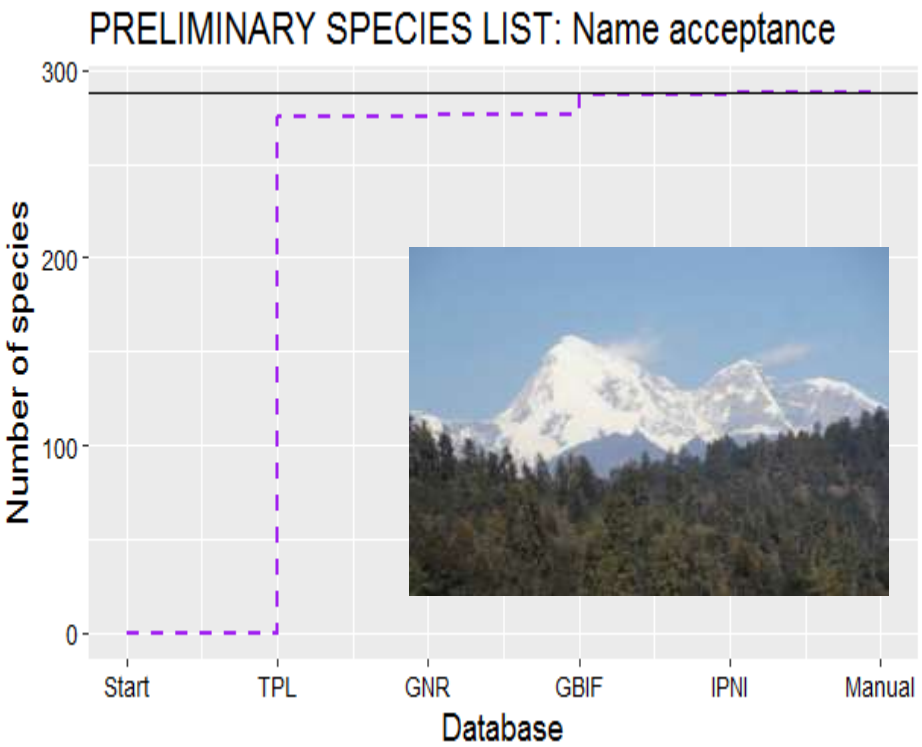
So..how do I overcome this mess?

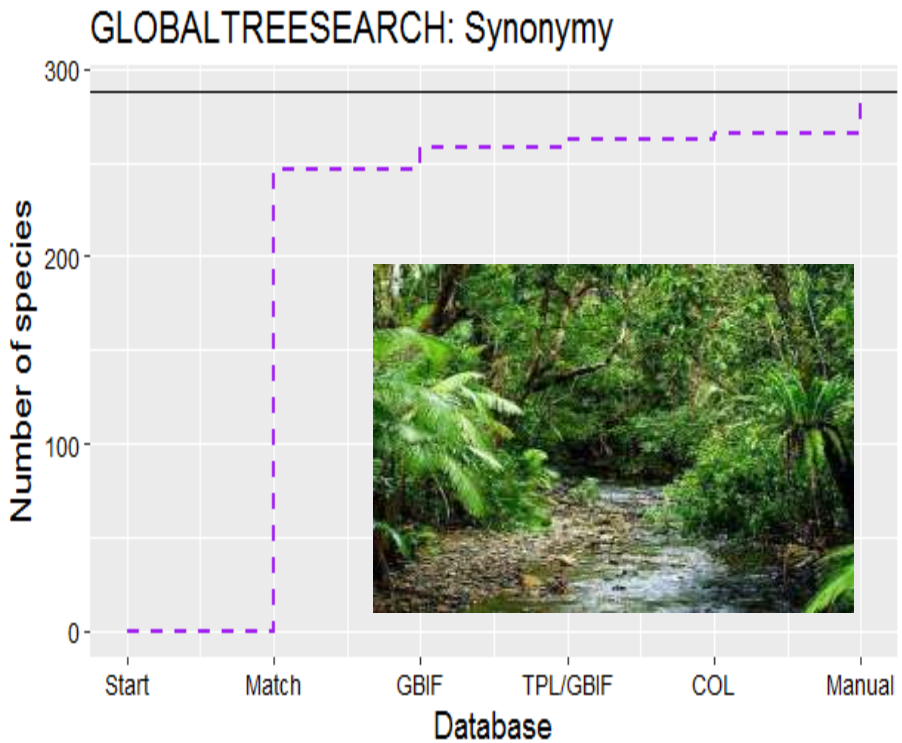
Proposing an algorithm


Preliminary species list
DATABASE
TPL
GNR
GBIF
IPNI
tpl
taxsize
rgbif
taxsize
R package
Species list: names accepted
GlobalTreeSearch synonymy
DATABASE
Match?
GBIF
TPL/GBIF
IPNI
Manual
rgbif
tpl/rgbif
taxsize
R package
GlobalTreeSearch Match + Update

Example Bhutan

Preliminary species (taxon) list: 288 species





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TAXON	REASON
Betula	Genus
Brassaiopsis	Genus
Coriaria nepalensis	Not in GlobalTreeSearch
Cyathea spinulosa	Not in GlobalTreeSearch
Daphniphyllum himalayense	Not in GlobalTreeSearch
Erythrina	Genus
Persea fructifera	Not in GlobalTreeSearch
Plectocomia himalayana	Not in GlobalTreeSearch
Polyalthia simiarum	Not in GlobalTreeSearch
Salix calyculata	Not in GlobalTreeSearch
Salix disperma	Not in GlobalTreeSearch
Salix lindleyana	Not in GlobalTreeSearch
Salix longiflora	Not in GlobalTreeSearch
Salix myrtillacea	Not in GlobalTreeSearch
Salix obscura	Not in GlobalTreeSearch
Salix oreophila	Not in GlobalTreeSearch
Terminalia	Genus
Terminalia tomentosa	**Terminalia coriacea**
Wallichia oblongifolia	Not in GlobalTreeSearch
Walsura tubulata	Not in GlobalTreeSearch

Conclusions

- The existence of so many databases (and R taxonomy tools!) is proof that an effective, practical, fast and harmonizing taxonomical tool is still needed

- The algorithm's stepwise approach takes advantage of the differentiated objectives, outputs and computing and efficiency capabilities to resolve names, identify accepted names, and synonym searches of several R packages

- Besides the example (quality control of preliminary species lists), the algorithm can update the reference GlobTreeSearch database and provide preliminary species list on its own, to be approved by country experts

- GlobTreeSearch are looking continuously for additions or corrections to their database. The algorithm is able to find gaps in GlobTreeSearch to update it.

Future steps

- Not yet fully finished, we aim to prepare an R package and possibly an interactive tool in SEPAL (FAO-based computing platform).

- The tool currently is able to do searches at country level. Upcoming developments will allow searches at multiple administrative subdivisions as well as provided spatial polygons.

- GBIF could benefit from the use of such a tool to harmonize species taxonomies.

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THANK YOU