

Round table 2 – dialogue between biodiversity and climate change communities

From the botanists point of view

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Hotspots of plant diversity

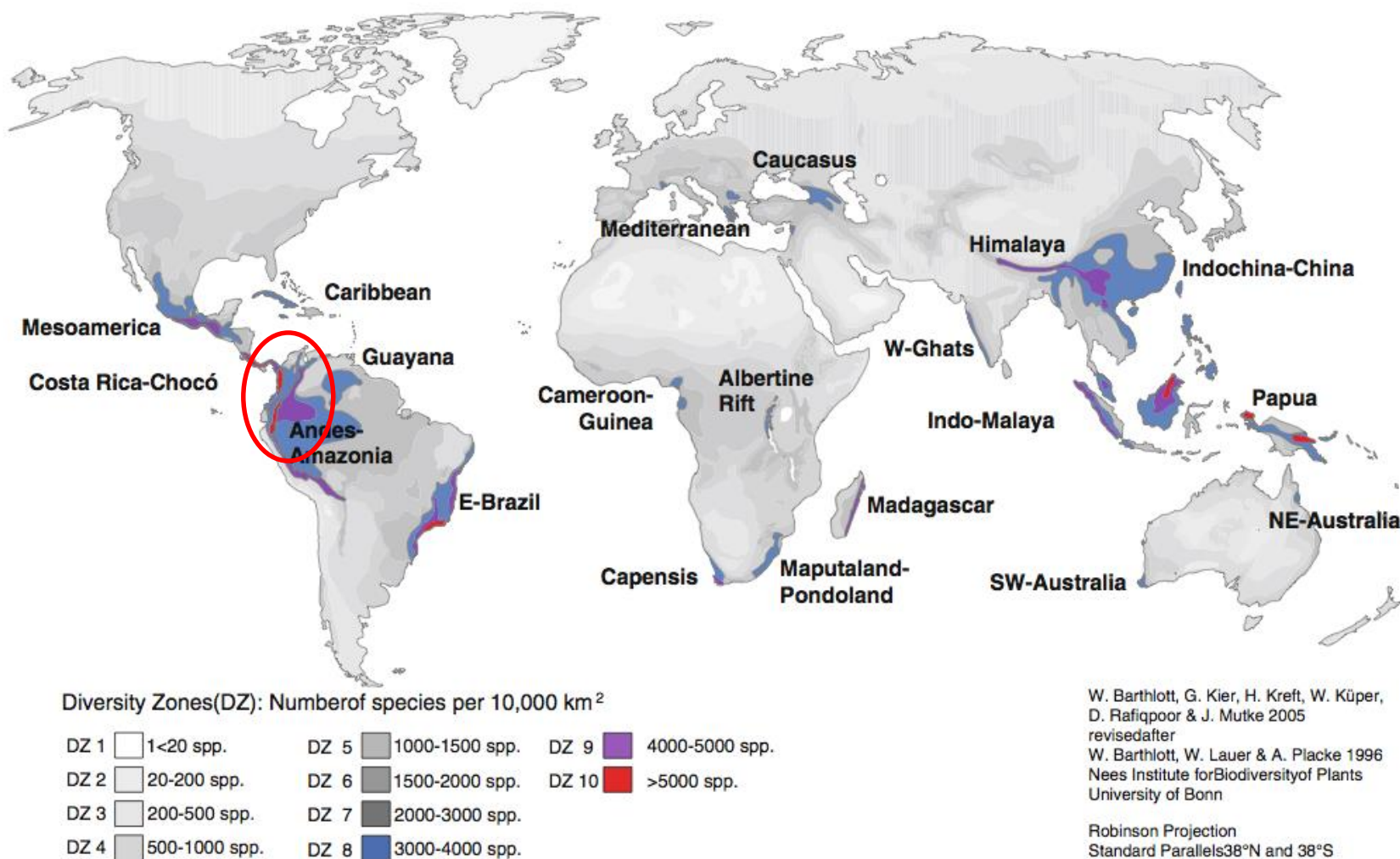


Fig. 5.1. from Mutke et al. 2011, *Biodiversity Hotspots*, J.C. Habel & F. Zachos (eds.), Heidelberg: Springer: 83–96.



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The relict forests of the northern Andes

Probably the remnant fragments of a continuous forest that in the past extended between Colombia, Ecuador and Peru

Cocorá forest, Colombia

Ceroxylon quindiuense

Photos: J. Chacon

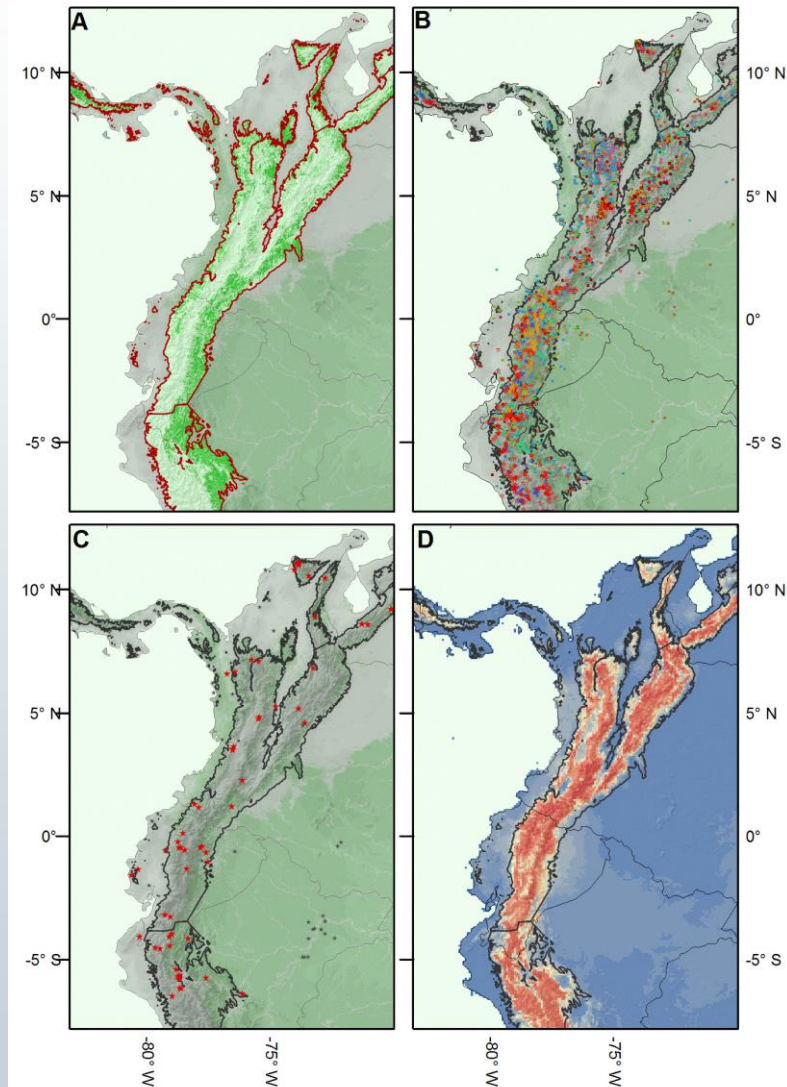
Kañaris forest, Peru

Ceroxylon parvifrons



Identification of potential forest habitats and possible shifts under predicted climate change

- A) **Current distribution of broadleaf evergreen forest**
(EarthEnv landcover dataset, Tuanmu & Jetz 2014, Global Ecol Biogeogr)
- B) **Distribution records of 12 selected plant genera of Andean montane forests** (own data + filtered GBIF data)
- A) **Locations of forest inventories with full species lists of woody plants** (Mutke, unpubl. dataset)
- A) **Overlay of MAXENT distribution models for 50 selected genera of woody plants in Andean mountain forests**
(based on genus level GBIF distribution data and BioClim climate data)



Maps from J. Mutke



- *What has been your experience when working with climate/biodiversity modellers?*
- In biodiversity science there is an increasing number of modellers, as there is a rapidly increasing amount of data freely available
- Relevant **evolutionary aspects** are not taken into account by some climate modellers (i.e., speciation, adaptation, extinction, population genetics, community ecology)
- Therefore, several recent studies use these data uncritically and sometimes inappropriately to, e.g., model potential impact of climate change on species distributions or more complex evolutionary processes



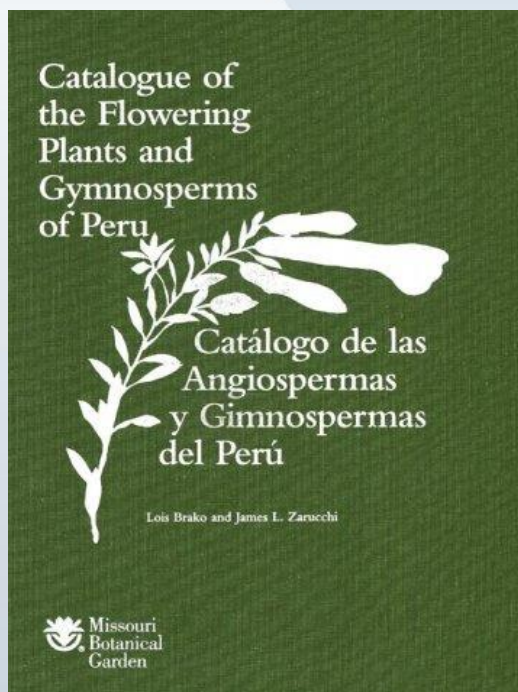
- *What has been your experience when working with climate/biodiversity modellers?*
 - Big problems with **misidentification** of taxa (sometimes >25%) and sampling bias in almost all freely available datasets like GBIF
 - Taxonomists and field biologists, who have the knowledge of plant species and ecosystems, have to play an important role for **quality control** in this context
 - Our lab is currently working both with GBIF data and large distribution datasets **checked by taxonomic specialists** to quantify these problems and their effects



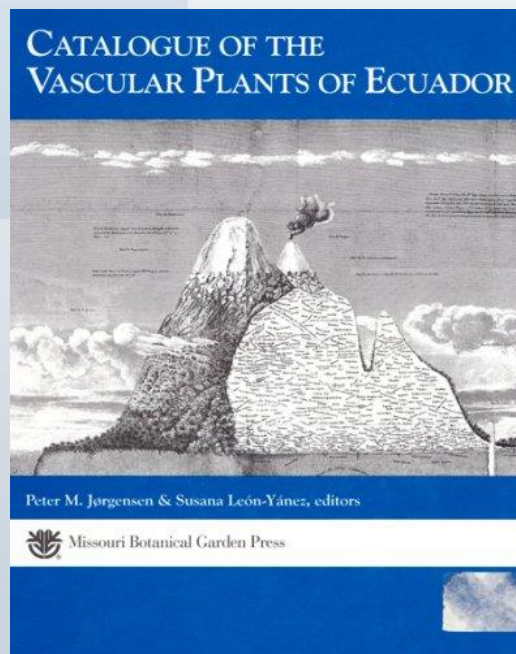
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- Quality control and precise locality data instead of geographical distribution proxies are very important!



Brako & Zarucchi 1993



Jorgensen & Yanez-León 1999

National strategies, e.g. in Peru,
(and global maps)
are largely based on “**checklists**”



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A huge repository of data is also found in GBIF, with > 500 000 000 distribution records

GBIF

Global Biodiversity Information Facility

Free and Open Access to Biodiversity Data

529,050,773 OCCURRENCES

1,605,262 SPECIES

14,048 DATASETS

656 DATA PUBLISHERS

How accurate and complete is this distribution information?

Can it be meaningfully used in mesoscale conservation planning?

Where are the major knowledge gaps?

Sharing biodiversity data for re-use	Providing evidence for research and decisions	Collaborating as a global community
Learn about GBIF	Using data through GBIF	Current Participants
Publish your data through GBIF	Enabling biodiversity science	How GBIF is funded
Technical infrastructure	Supporting global targets	Enhancing capacity



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Comparison of these data sources to extensive field studies (vouchered)

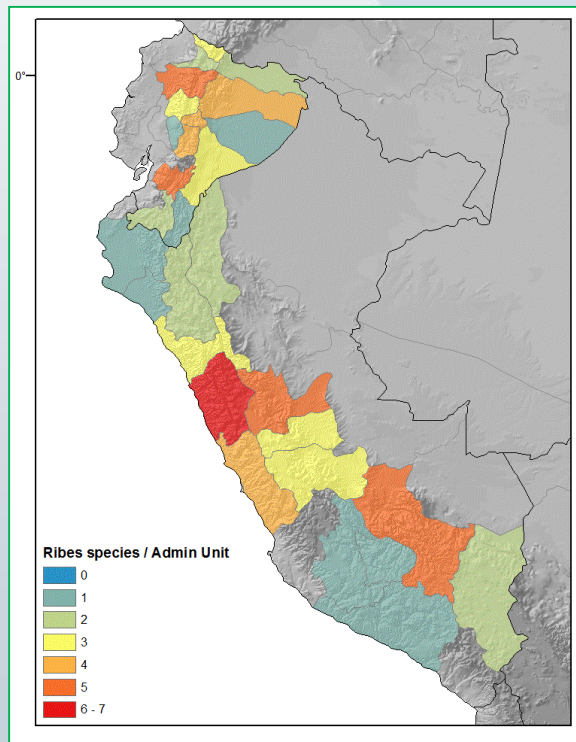
Detailed and critical herbarium records based on revisionary data

Photos: M. Weigend

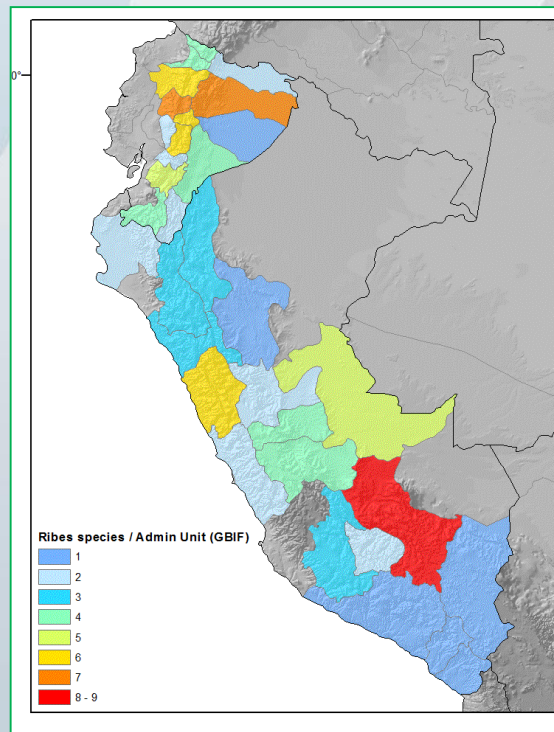
An example from the Andean genus *Ribes*



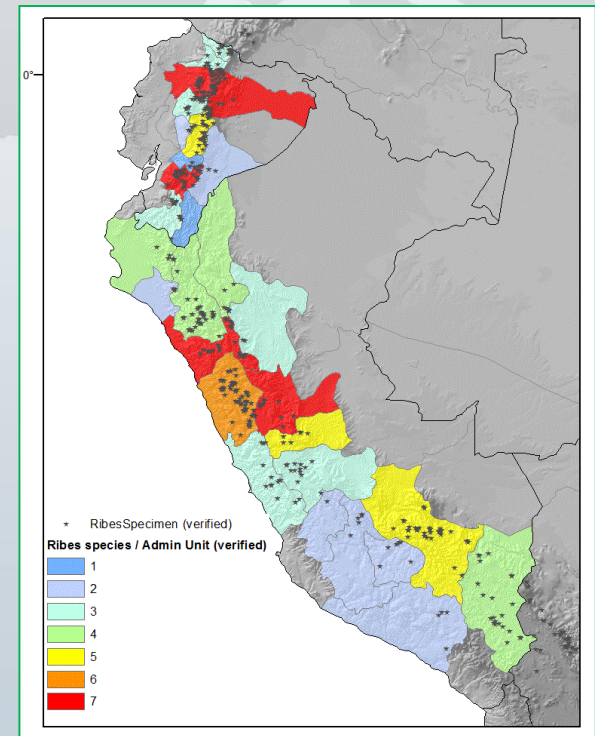
Species number per admin. unit
- **Checklists**



Species number per admin.
unit - **GBIF**



Species number per admin. unit
- **Revisionary data**

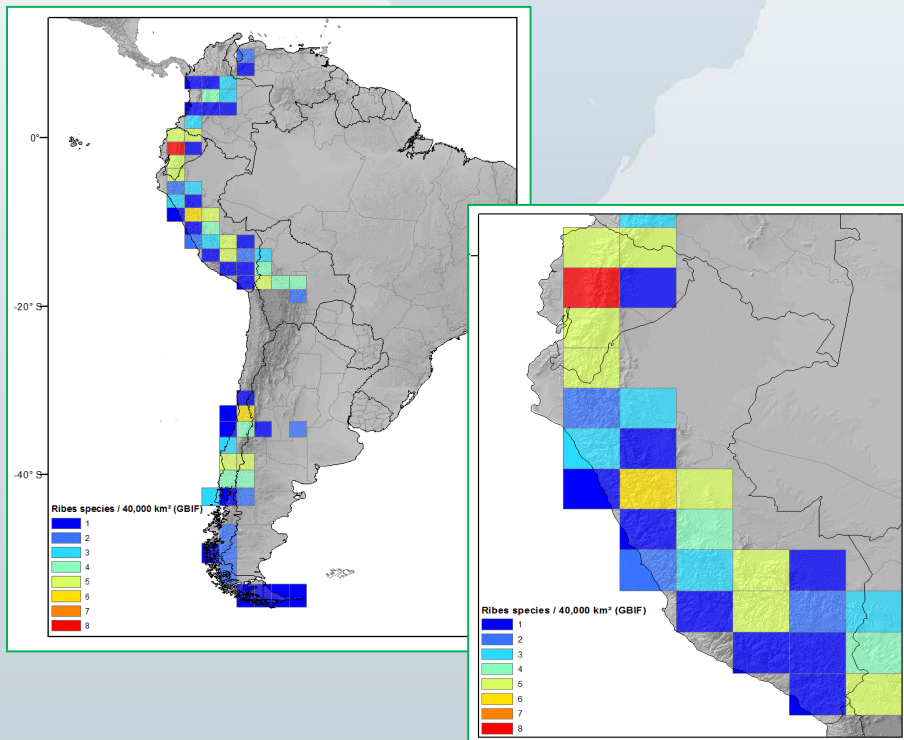


Mutke & Weigend, unpublished data

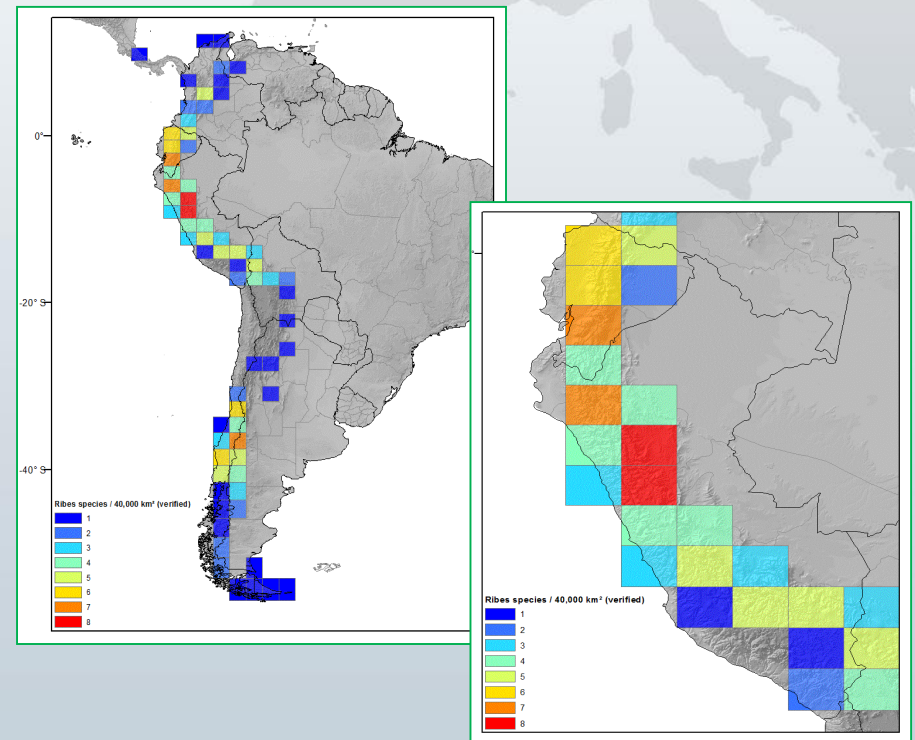
An example from the Andean genus *Ribes*



Species number per 200 km grid
- **GBIF**



Species number per 200 km grid
- **Revisionary data**



Mutke & Weigend, unpublished data



- *What were the outcomes of these interactions? Would you regard them as successful?*
- We have an intense and very fruitful interaction in our lab between GIS modellers and taxonomic specialists (in-house and external) to get an **in depth understanding of Andean plant diversity patterns**
- Former studies modelled possible impacts of climate change on plant diversity patterns and the implications for conservation planning at global scales (Sommer et al. 2010, Proc R Soc B) and for Sub-Saharan Africa (e.g. McClean et al. 2005, Ann Mo Bot Gard, McClean et al. 2006, Divers Distrib):
- <http://www.nees.uni-bonn.de/research-/systematics-evolution-ecology/biogeography-and-macroecology-biomaps/>



- *What suggestions would you have to improve/strengthen the interaction between the two communities?*
- Climate and biodiversity data bases freely available to the public (aerial photographs or satellite images normally cost many thousand dollars!)
- Studies on the potential impact of global change on ecosystems should always involve climate scientists, modellers, but also biologist and landscape ecologists in **interdisciplinary teams**.
- There are potential pitfalls when the characteristics or limitations of the climate data, or the ecological traits of the ecosystems and species are ignored



- *What suggestions would you have to improve/strengthen the interaction between the two communities?*
- The spatial and temporal scales have to be more congruent, with climate data currently not useful at ecosystem/landscape level at least in the more spatially heterogeneous parts of the world (e.g., the Andes)
- We need to know more about the interactions of climate change and land use change – both from an geophysical as well as a socioeconomic perspective. From the viewpoint of the ecologist, it would be, e.g., very helpful to have data on original climate vs. the situation after deforestation

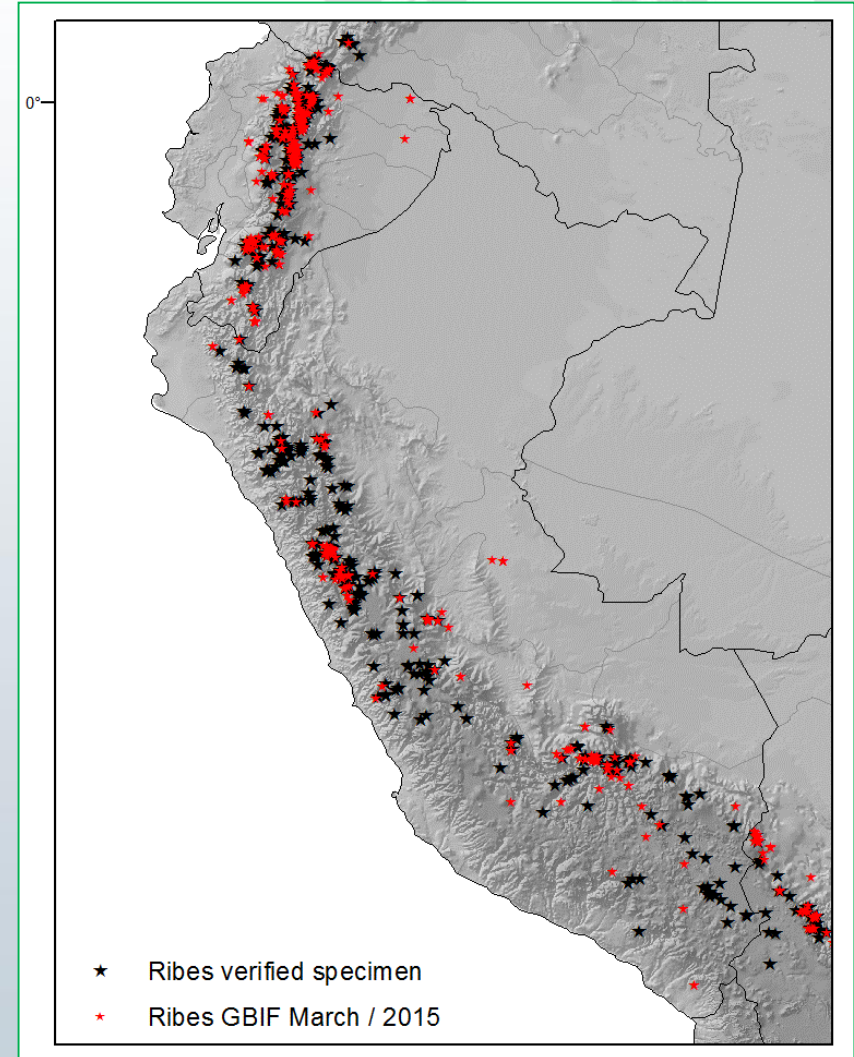
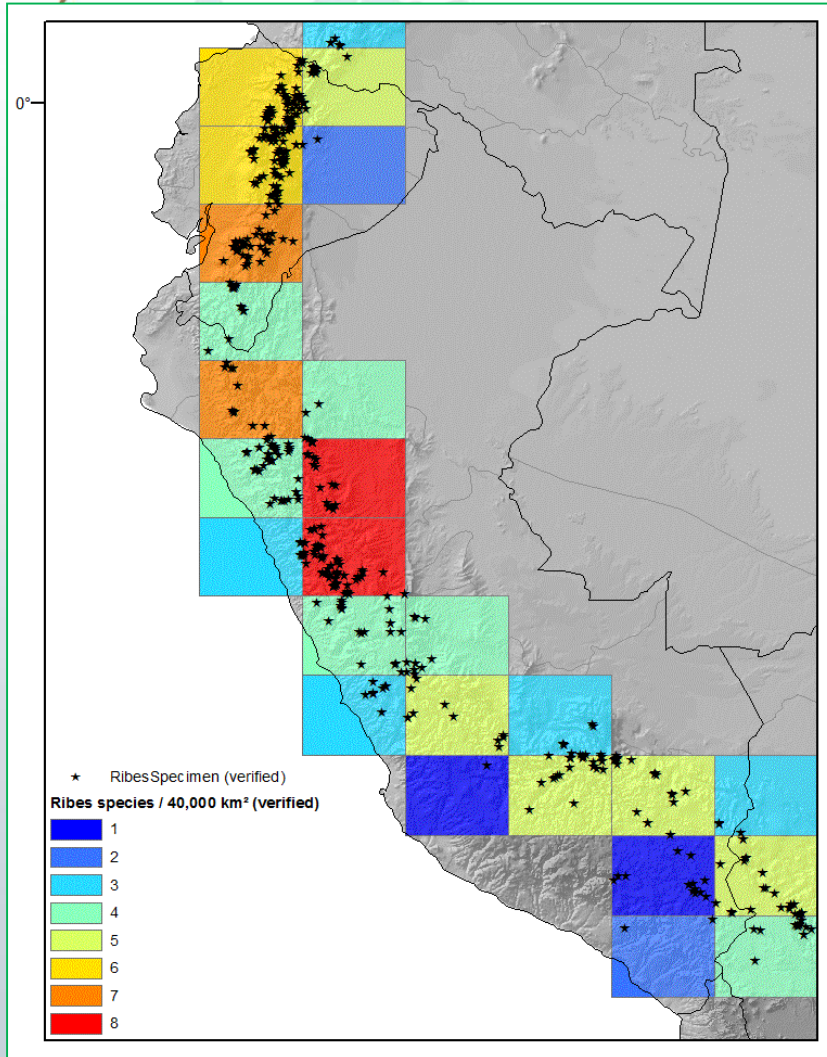


- *What suggestions would you have to improve/strengthen the interaction between the two communities?*
- It would be good to have more spatial explicit information about quality and reliability of the climate data:
 - Locations of climate stations used as data sources?
 - How were these data interpolated or downscaled in the complex Andean topography with lots of, e.g., windward/leeward effects?
- From the biodiversity side, the use of broad-scale, fictitious "distribution patterns" and "ranges" have to be replaced with explicit (geo-referenced) locality data in order to understand complex distribution patterns and correlate them to climate and global change



- *What suggestions would you have to improve/strengthen collaborative work between LAC and EU communities?*
 - Coordinated research calls with a sufficient time-frame for preparation, in order to accommodate the administrative idiosyncrasies of the respective partner countries
 - Easier access to biodiversity resources (consistent with the Access and Benefit Sharing Agreements), as such collaborative work is hampered by the bureaucracy of some LAC government institutions
 - Joined summer schools and exchange of PhD students

Thank you!



Mutke & Weigend, unpublished data