

# Strategic Afforestation:

## Identifying Exclusion Zones for Global Biodiversity Conservation

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### 1. Background

- Large-scale Carbon Dioxide Removal (CDR) through carbon sequestration is essential as we enter an era of “global boiling”

#### Afforestation – a major CDR option

- ✓ Cost-effective
- ✓ land-based – It may negatively impact human life (e.g. food security issues and increased natural disasters)
- ✓ can lead to biodiversity loss – even species extinction risk can happen

- Tree planting is not a simple solution

- It must be carefully planned and implemented to achieve the desired outcomes
- It is essential to explore strategies that balance biodiversity conservation with climate change mitigation – biodiversity-based climate solutions

Research question is where should we avoid afforestation expansion?



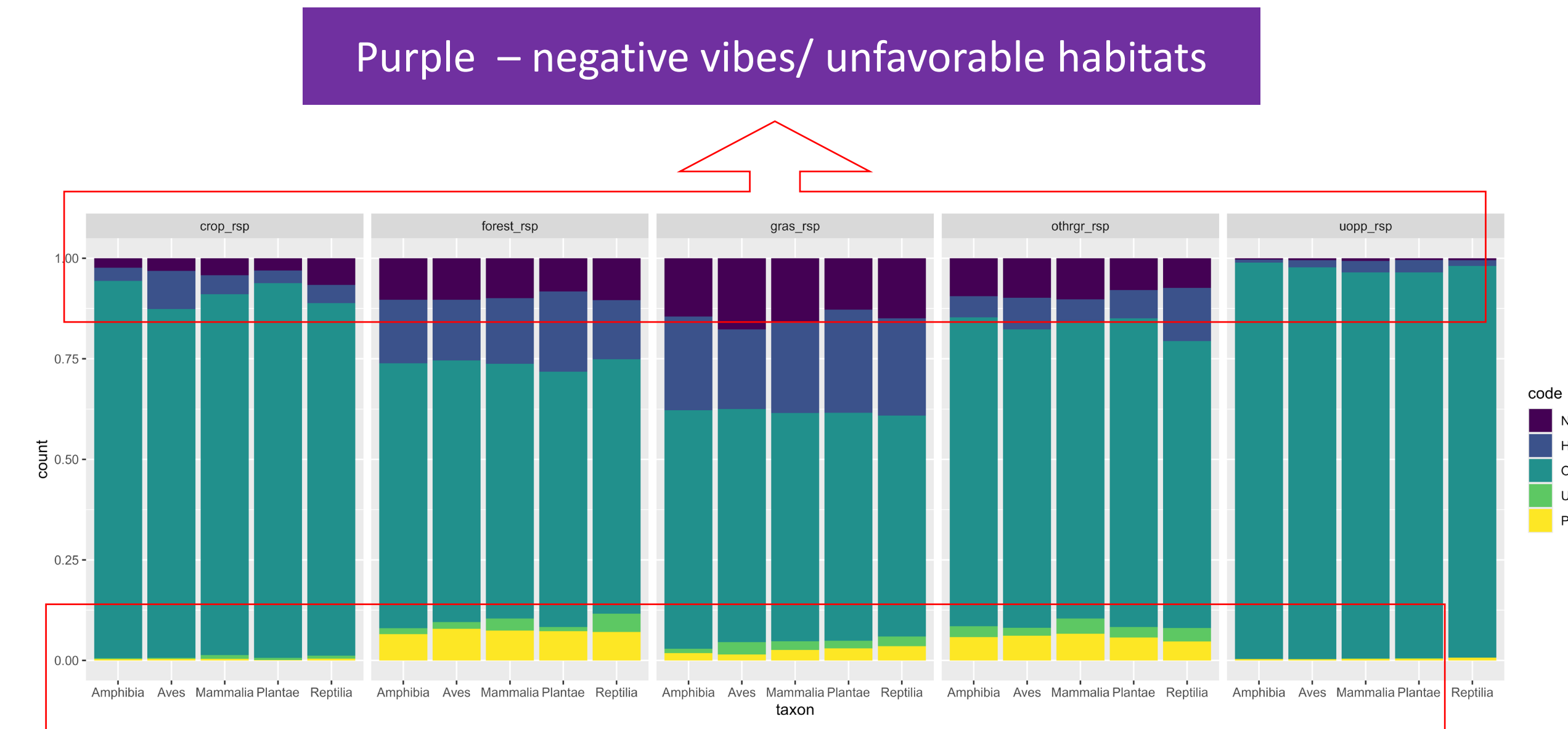
### 2. Methods

- This analysis extends the scope of previous studies related to the choice of land-based climate mitigation that influences global biodiversity loss
- We used the results of AIM/BIO which is based on data from the Global Biodiversity Information Facility (GBIF)
- Explanatory variables used for modeling- Land-use variables were obtained from the economic and land-use allocation model (AIM/Hub and AIM/PLUM)

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### 3. Conceptual Framework



- Major taxonomic groups
1. Amphibia
  2. Aves
  3. Mammalia
  4. Plantae
  5. Reptilia



Habitat maps ← AIM/BIO results

Sensitivity to the forested landscape

1. Positive
2. Negative

Zonation 5- spatial prioritization software, It supports  
-conservation planning  
-land-use planning  
-ecological impact avoidance



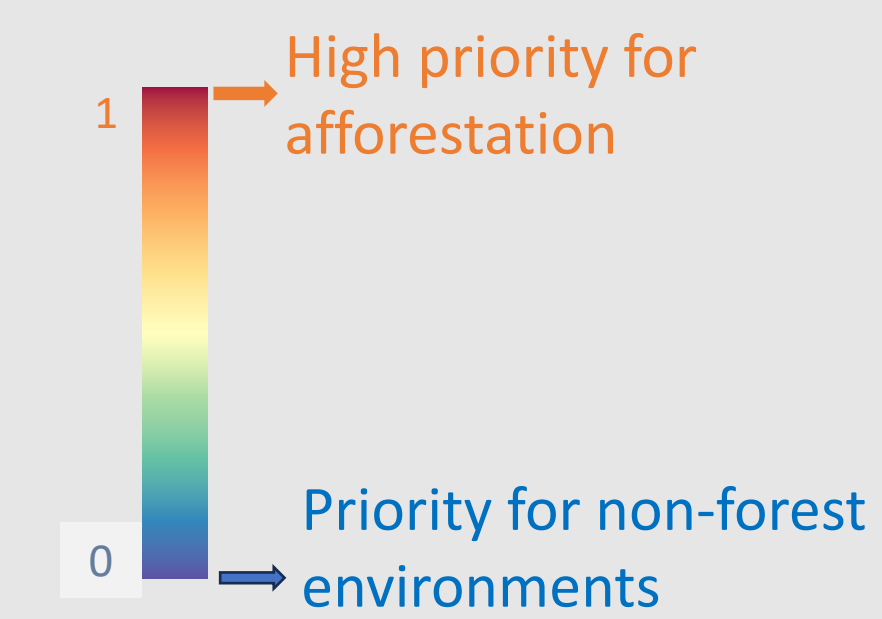
Analysis of Spatial Conservation Prioritization

Suitable areas for afforestation ✓

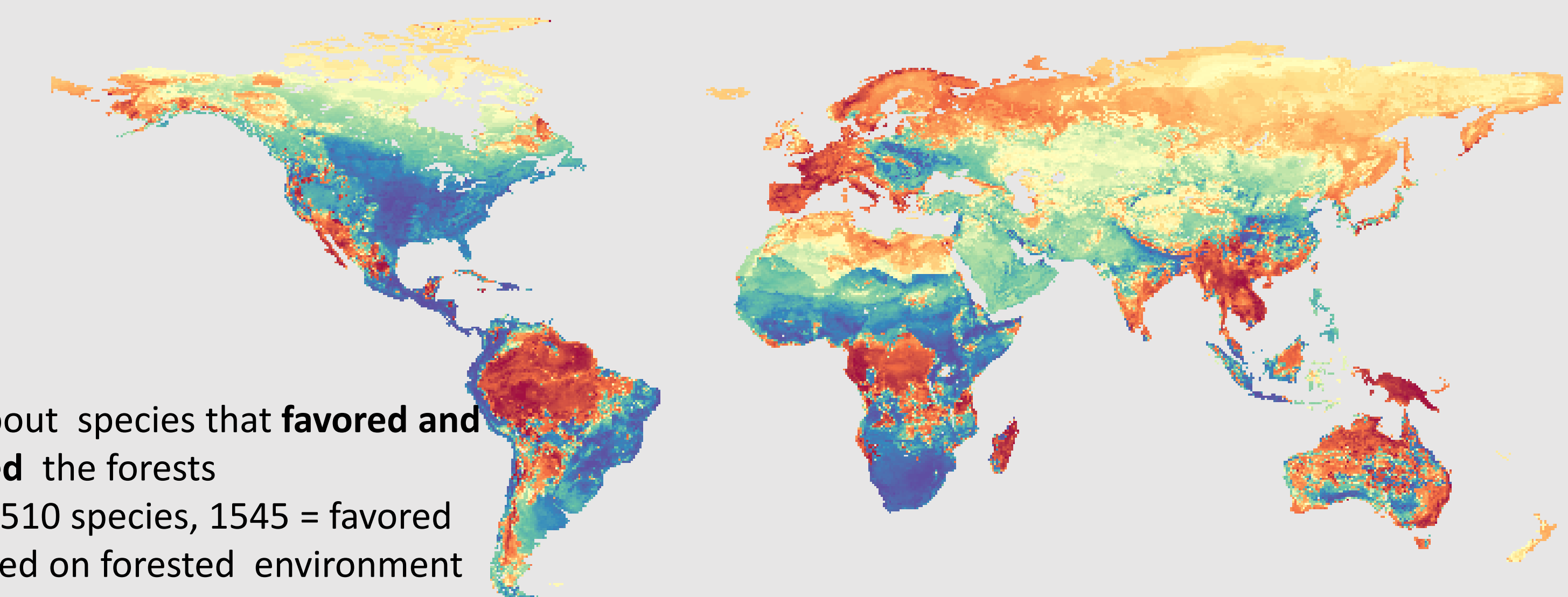
Avoided areas for afforestation ✗

### 4. Results & Discussion

- This is about species **favored** in a forested environment
- Among 8510 species, 673 = favored forested environment



- This is about species that **unfavored the forests**
- Inverse spatial prioritization of biodiversity under the consideration of afforestation
- Among 8510 species, 872 =negative effects on the forested environment



- This is about species that **favored and unfavored** the forests
- Among 8510 species, 1545 = favored +unfavored on forested environment

Zonation weight +1 for favored species, and -1 for unfavored species

### 5. Further steps

- Weight each species using a combination of IUCN Red list categories and regional occurrence proportion
- Mask the protected areas of the world
- Predict the afforestation excluding areas based on AIM/Hub and AIM/BIO analysis for 2050, 2070, and 2100 under various climate scenarios