Automating biological monitoring on the Northern Andes of South America: combining biology and machine learning for conservation

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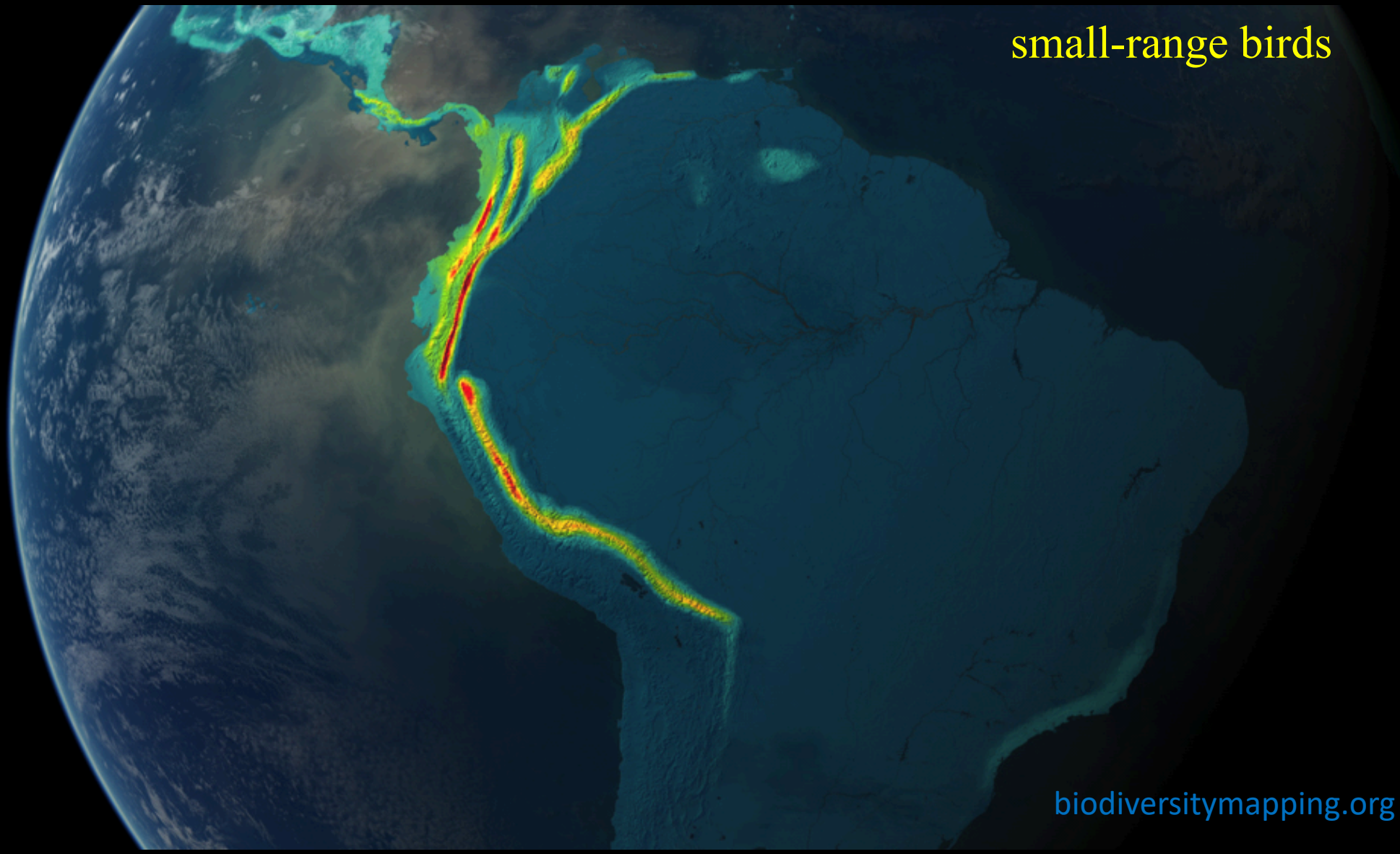
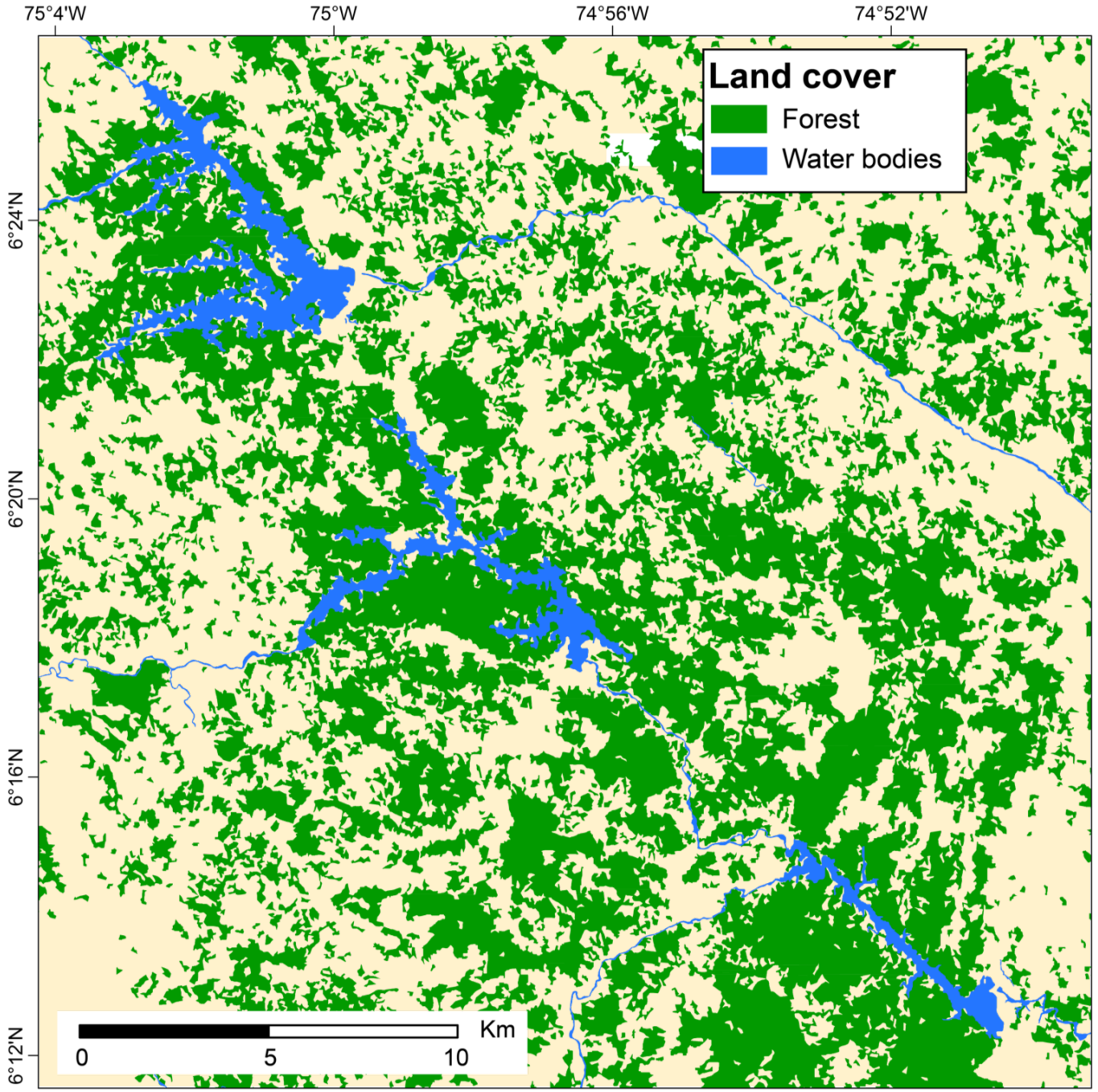
1803

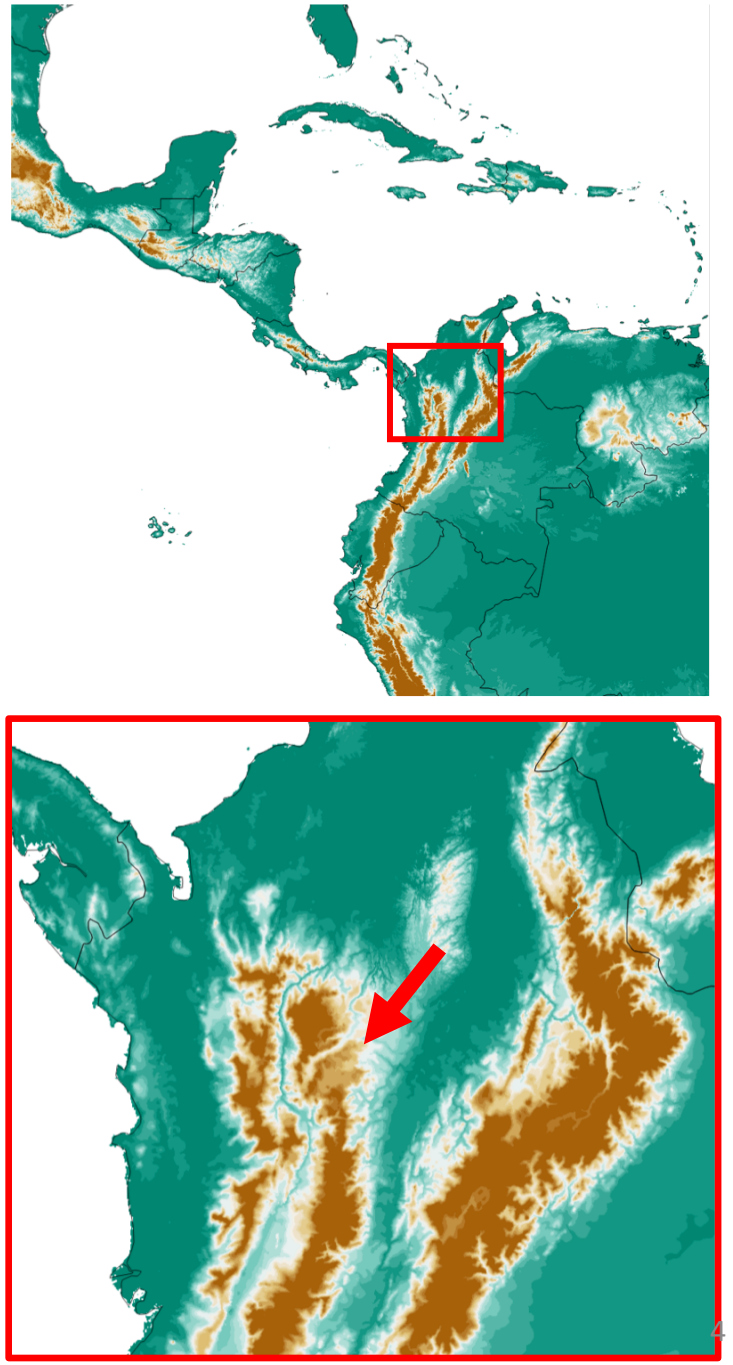
SISTEMIC
Sistemas Embebidos e Inteligencia Computacional

Species diversity

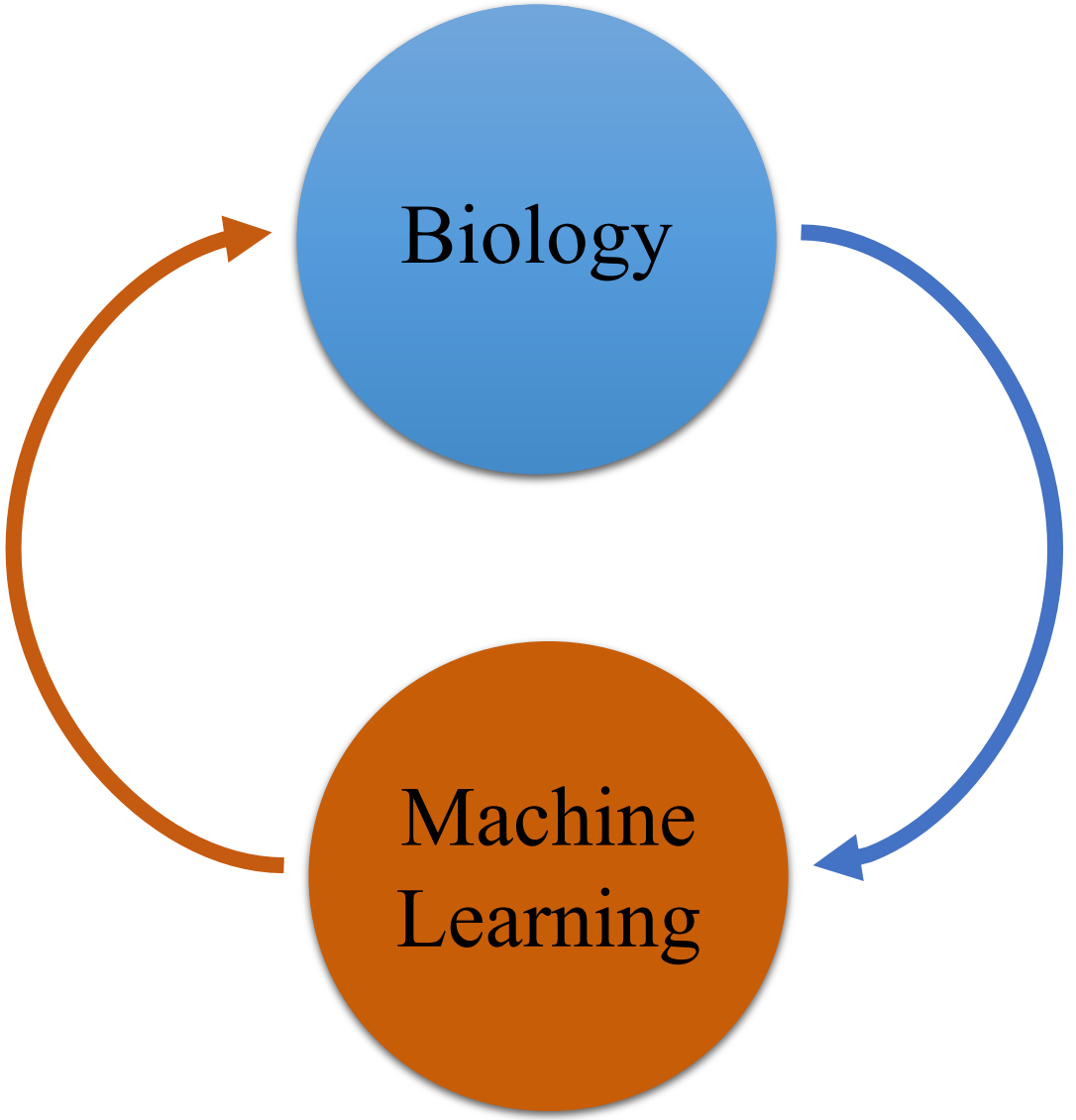


Given the rapid habitat and species loss on the Northern Andes, how can we improve our ways to get meaningful information for conservation decisions?


75°4'W
75°W
74°56'W
74°52'W
6°24'N
6°20'N
6°16'N
6°12'N
Land cover
Forest
Water bodies
0
5
10
Km



Our research loop!



Research in Biology

Species list

Base line (inventory)

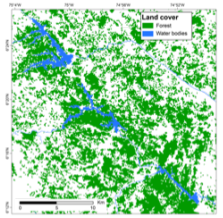
Candidate species

Endemism
Threat
Abundance
Detectability

Questions

Population
Species
Community

Demography
Conectivity
Disturbance

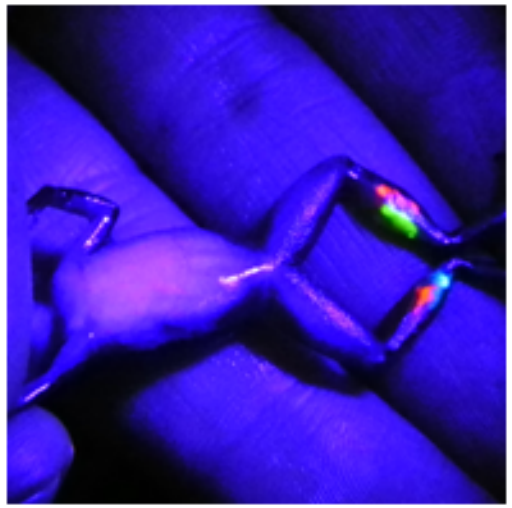


January…December

Sampling design

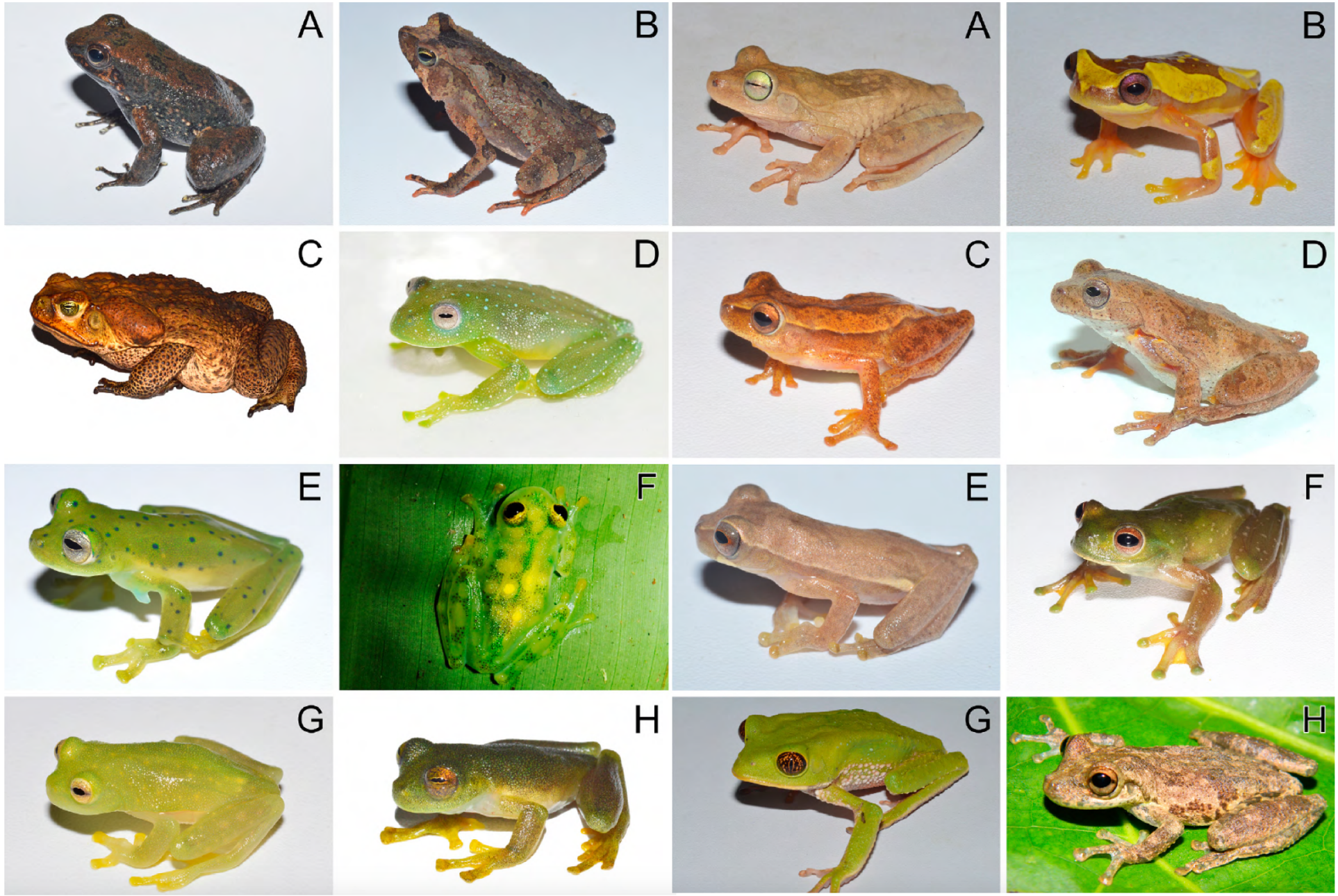
Monitoring implementation

Population monitoring

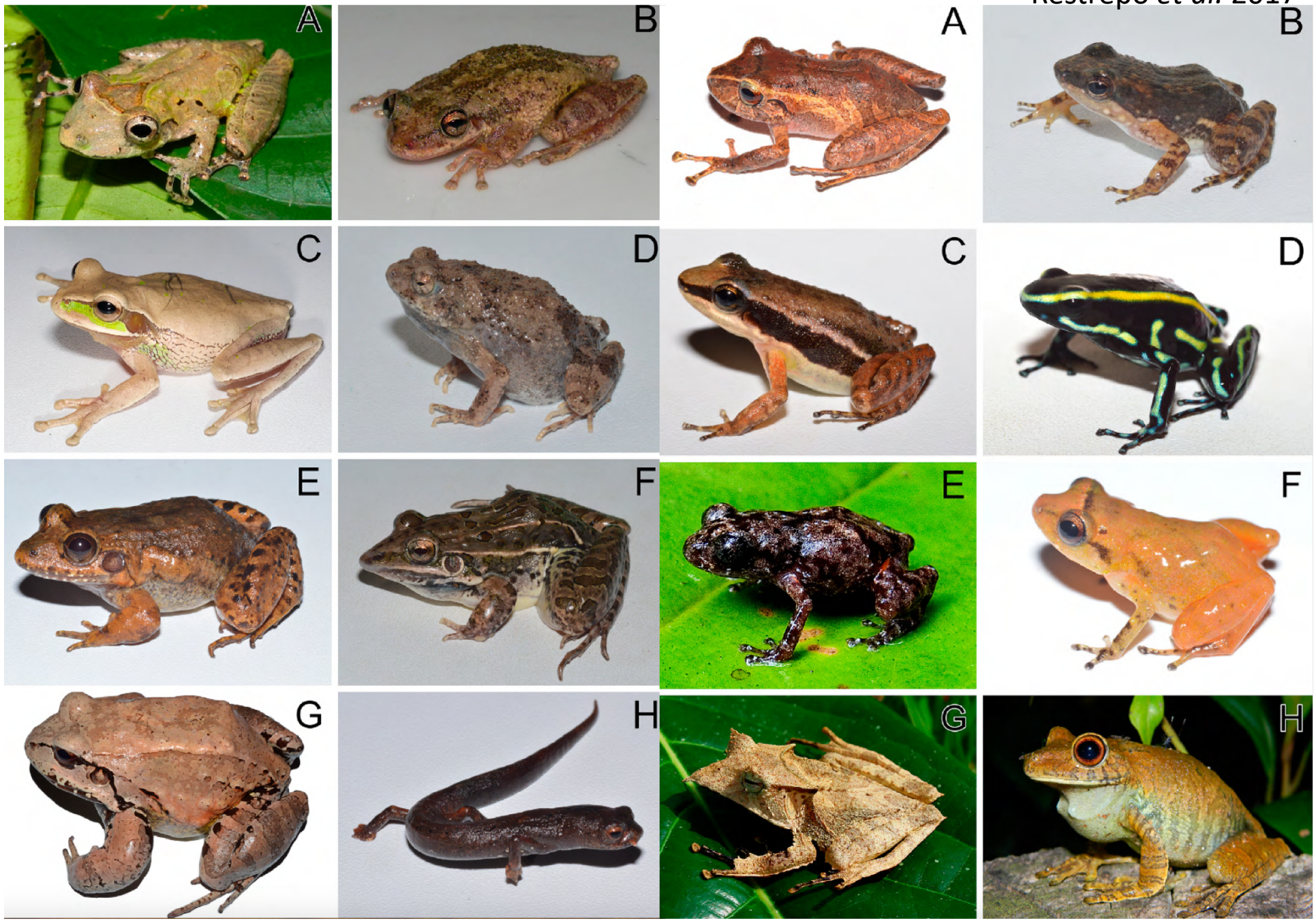


Research in machine learning

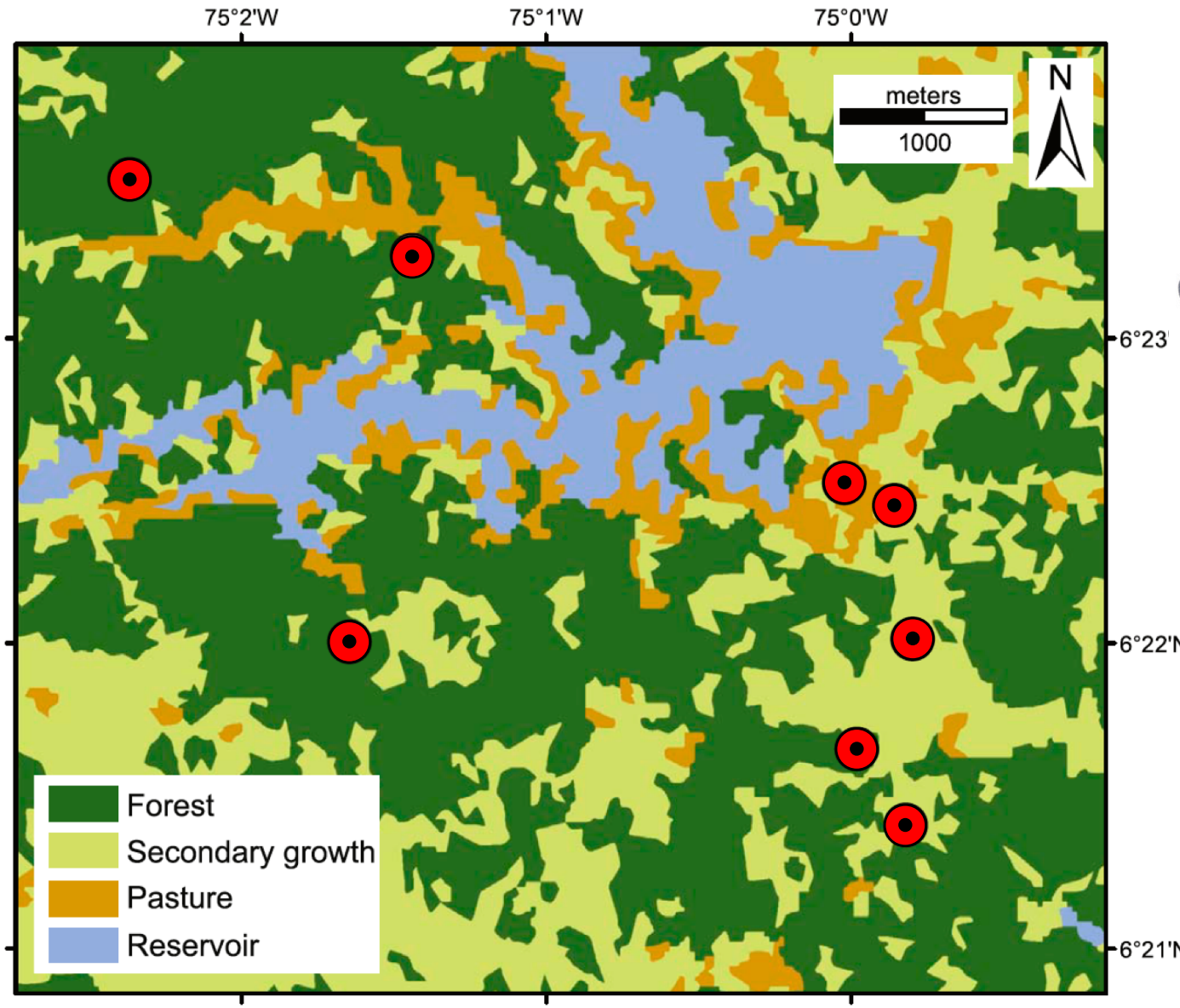
Restrepo *et al.* 2017



Restrepo *et al.* 2017



We started a passive bioacoustic monitoring



Since 2012
1-min recordings
22-44 kHz
> 360,000 sound files

Ecological Informatics 24 (2014) 200–209

Contents lists available at ScienceDirect

Ecological Informatics

journal homepage: www.elsevier.com/locate/ecolinf

Automatic recognition of anuran species based on syllable identification

Carol Bedoya [a,*], Claudia Isaza [a], Juan M. Daza [b], José D. López [a]

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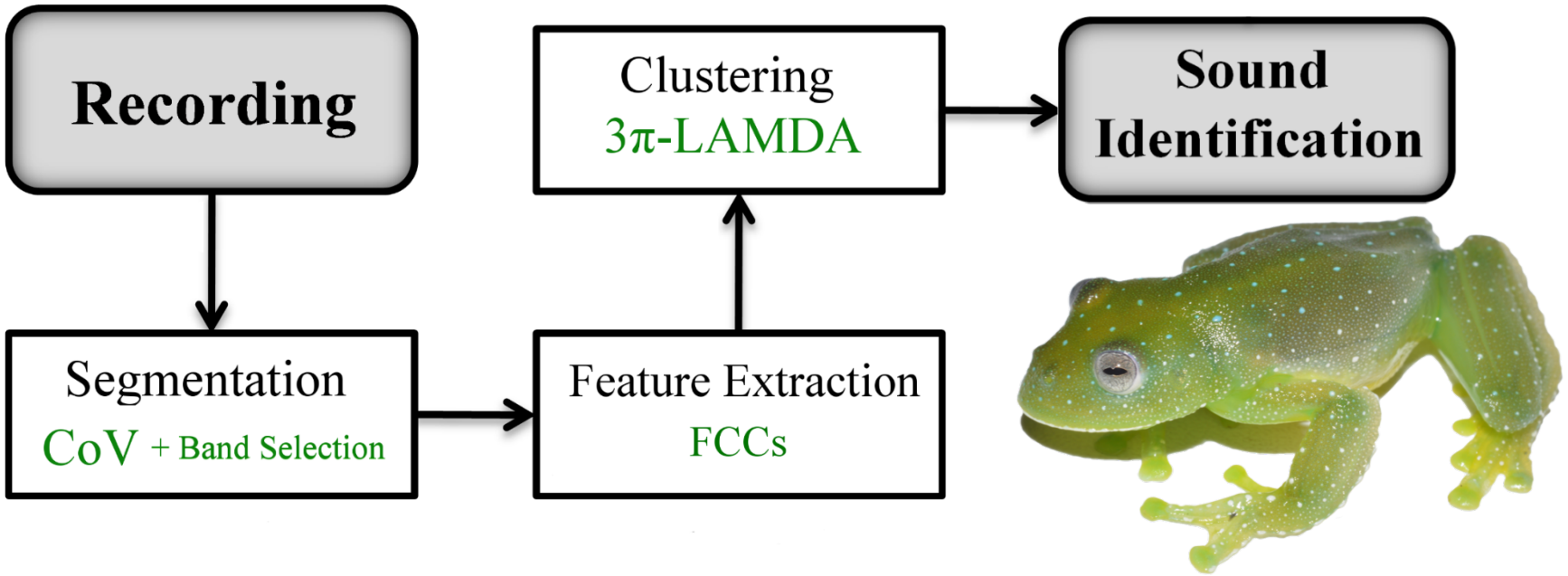

Ecological Indicators 75 (2017) 95–100

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Ecological Indicators

journal homepage: www.elsevier.com/locate/ecolind

Automatic identification of rainfall in acoustic recordings

Carol Bedoya [a,*], Claudia Isaza [a], Juan M. Daza [b], José D. López [a]

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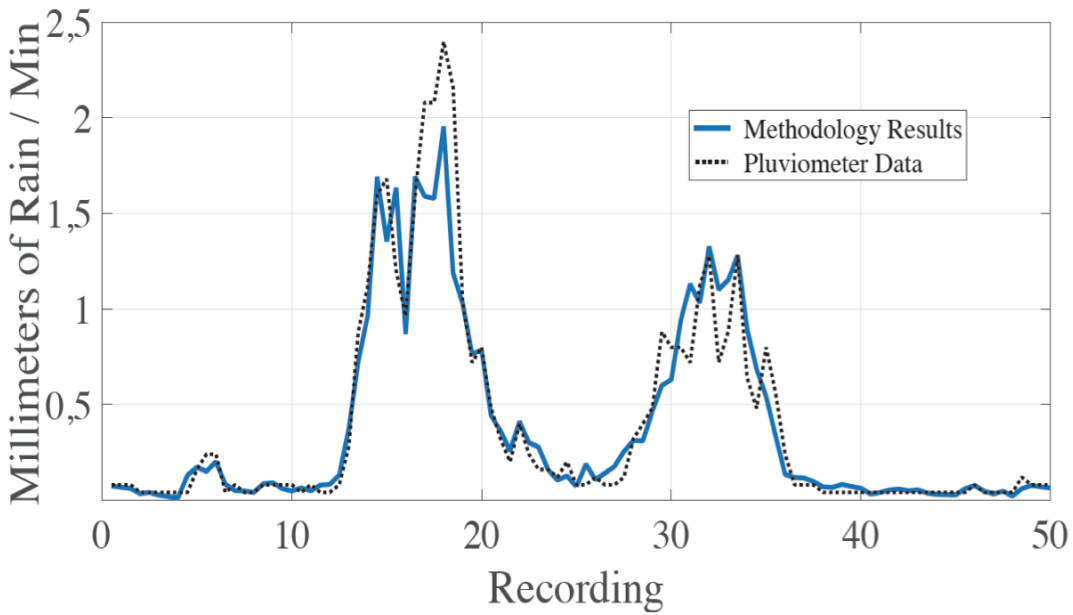
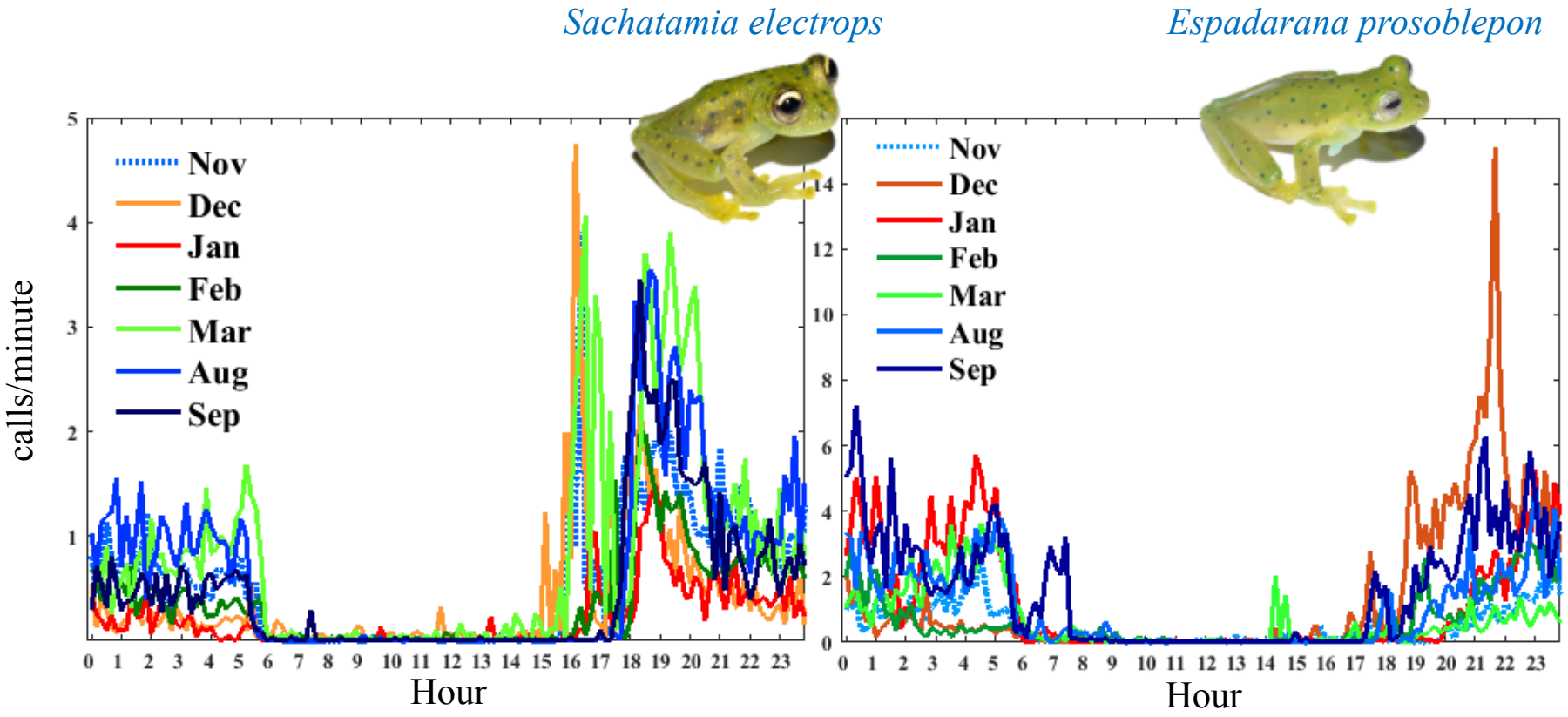


Back to Biology

Activity patterns in time and space

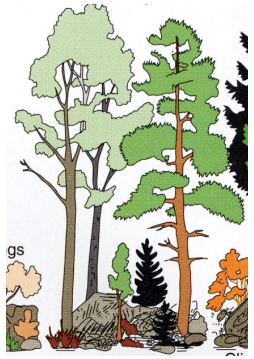


Cano *et al.* 2016

Predicting occupancy in anuran assemblages

assemblage

=



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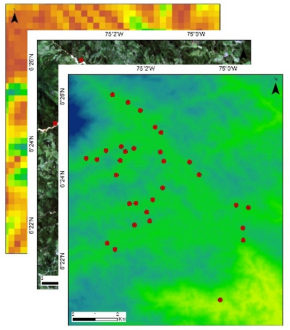

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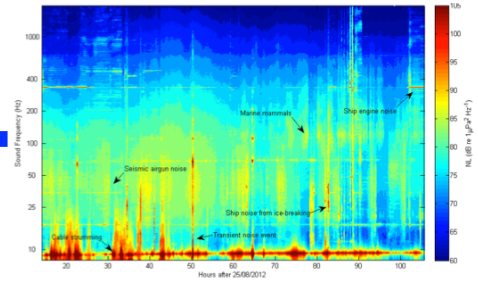
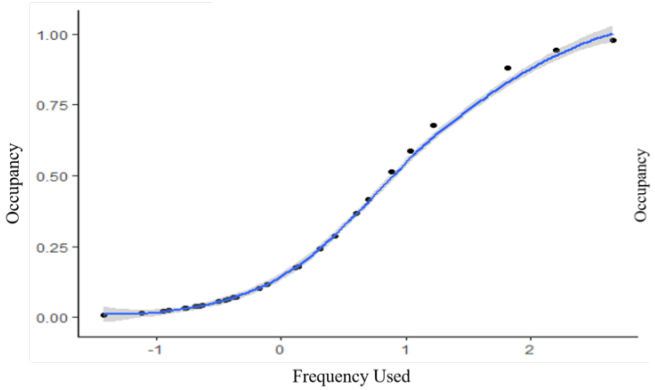
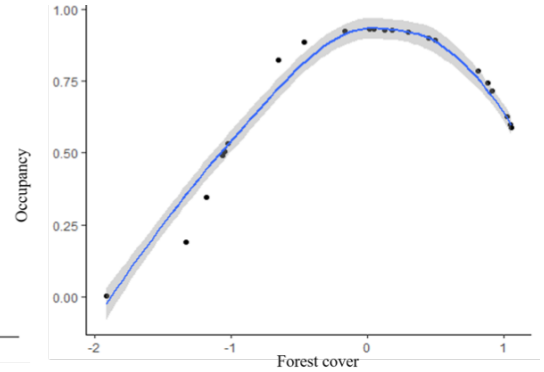
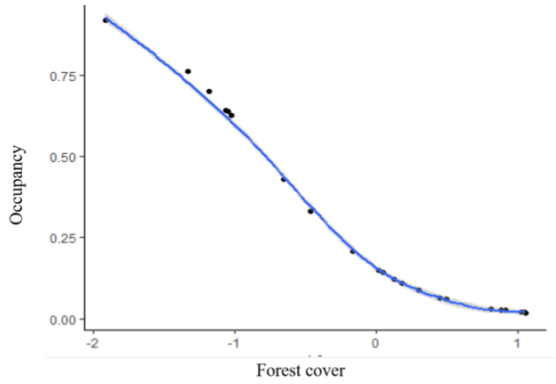


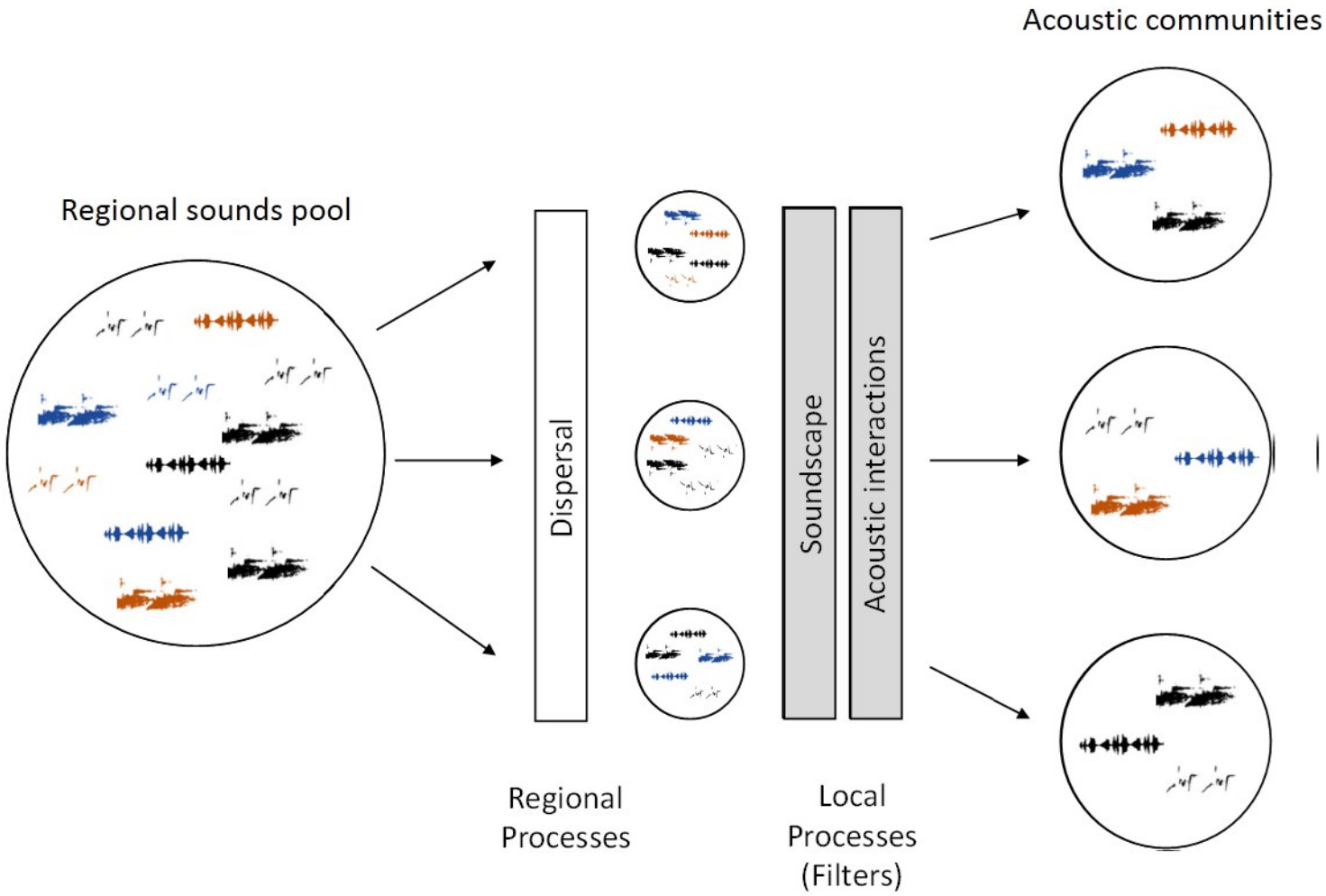






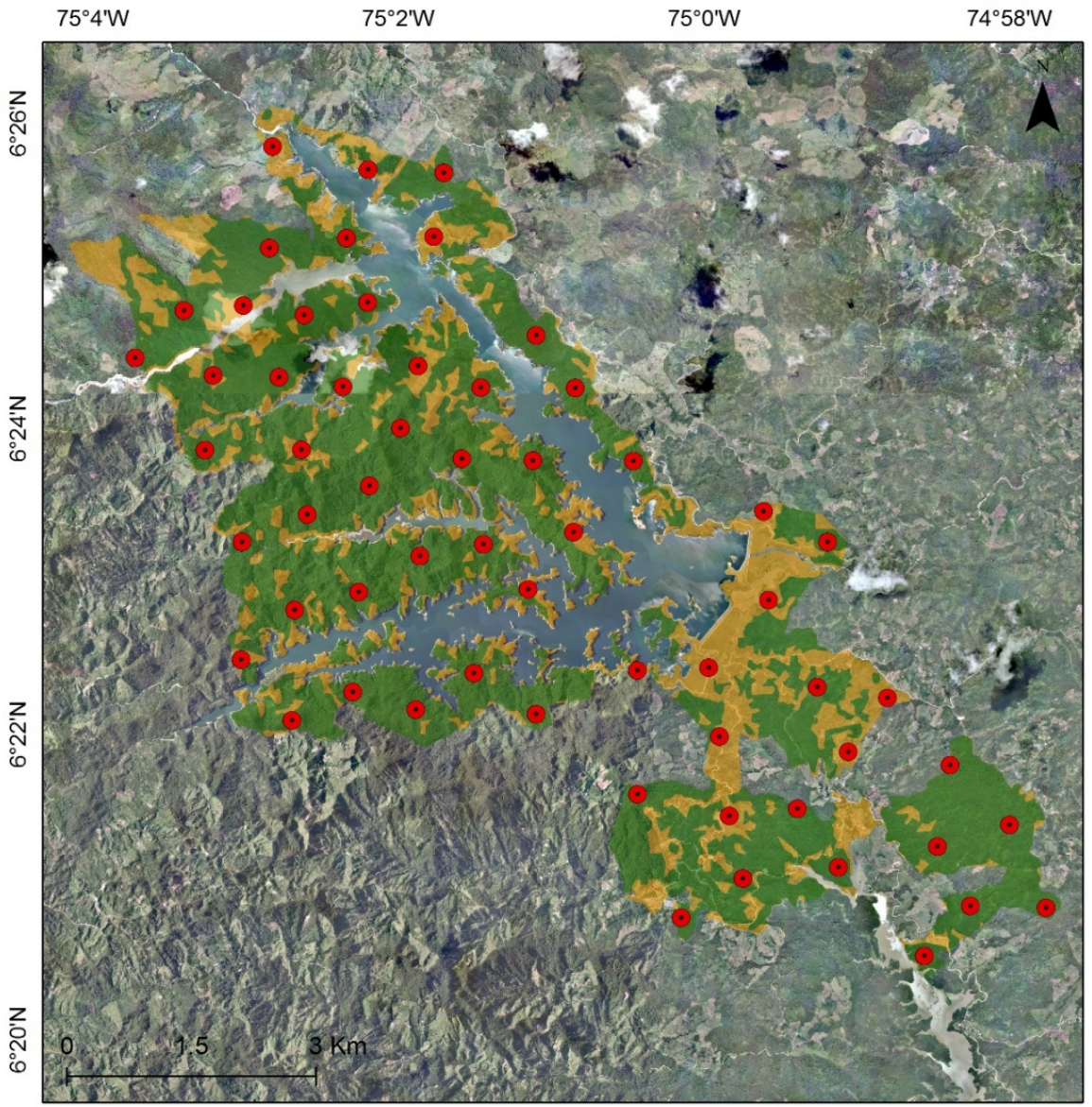
Cano *et al.*

From community to metacommunity



Sánchez-Giraldo *et al.*

Expanding the sampling strategy



Back to machine learning

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Identifying disturbed habitats: A new method from acoustic indices

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Concluding remarks

- ✓ Ecoacoustics is a very effective approach for monitoring at different scales (populations, species, communities).
- ✓ Each discipline (biology and computer science) is moving to a more refined questions.
- ✓ Our main short-term challenges are better ecological understanding, reliable acoustic devices and data management.

Monitoring plans on the Northern Andes will be based on an integration of biology and more sofisticated analytical solutions

Thanks!!

Claudia Molina
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