



The LifeWatch ERIC Biodiversity
& Ecosystem eScience Conference
PLOVDIV, BULGARIA 7-10 JULY 2026

Hot cities, different winners: contrasting responses of birds and bats to urban heat islands

Presenter: Marina Querejeta

Laboratory of Ecology and Biology of Interactions (EBI, Poitiers, France)

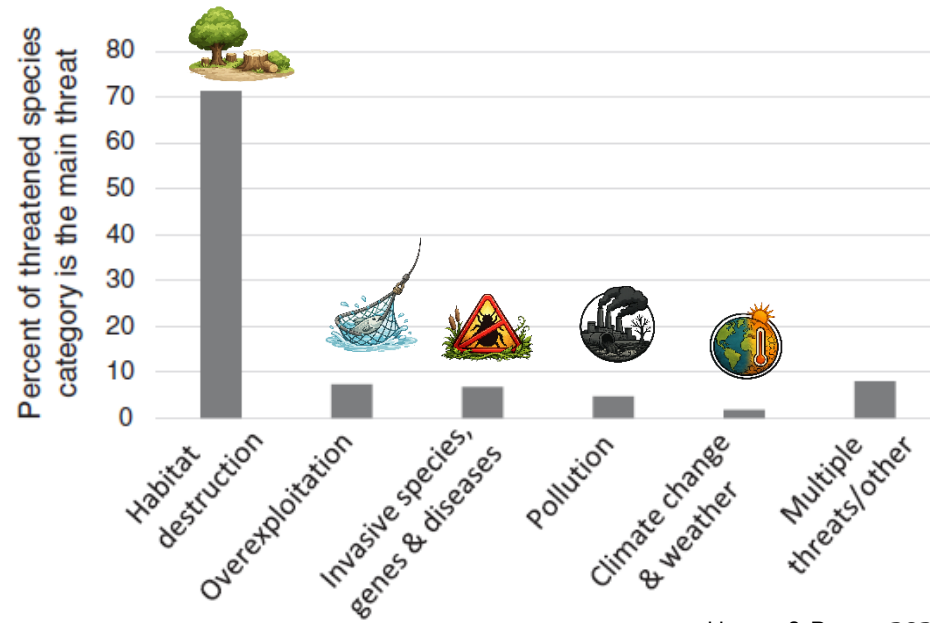
*Élie Morin, Simon Chapenoire, Alice Chéron, Hélène Paulhac, Mohamed Said Ramdani, Axel Jame, Yvonnick Guinard, Thibaut Preux,
Romain Michenaud, Jean-Louis Yengue, Dominique Royoux, Thomas Rodier, **Nicolas Bech, Sophie Beltran-Bech***

8th July 2026



Urbanisation and urban heat as a driver of species loss

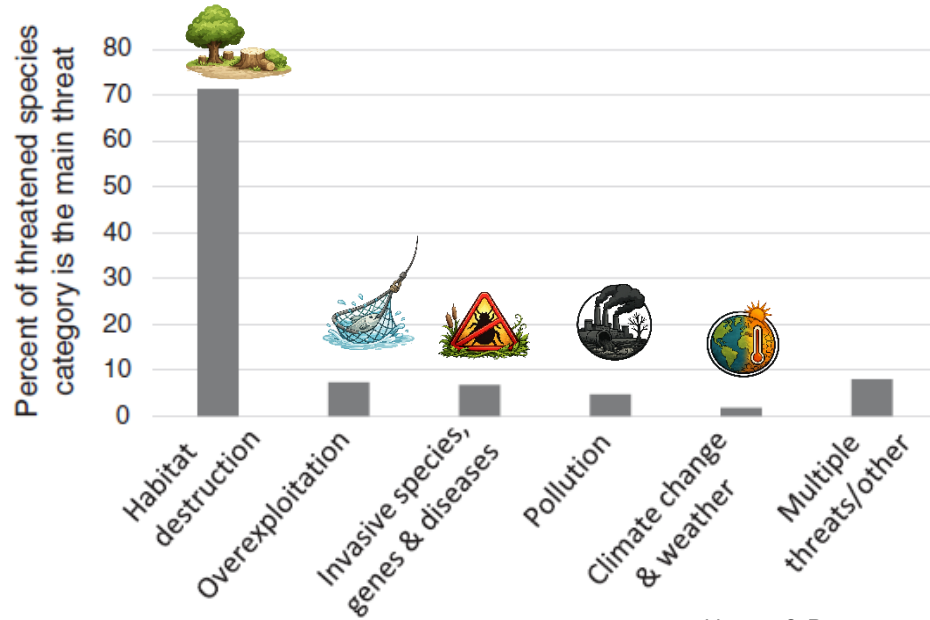
Habitat destruction as a major cause of extinction



Hogue & Breon, 2022

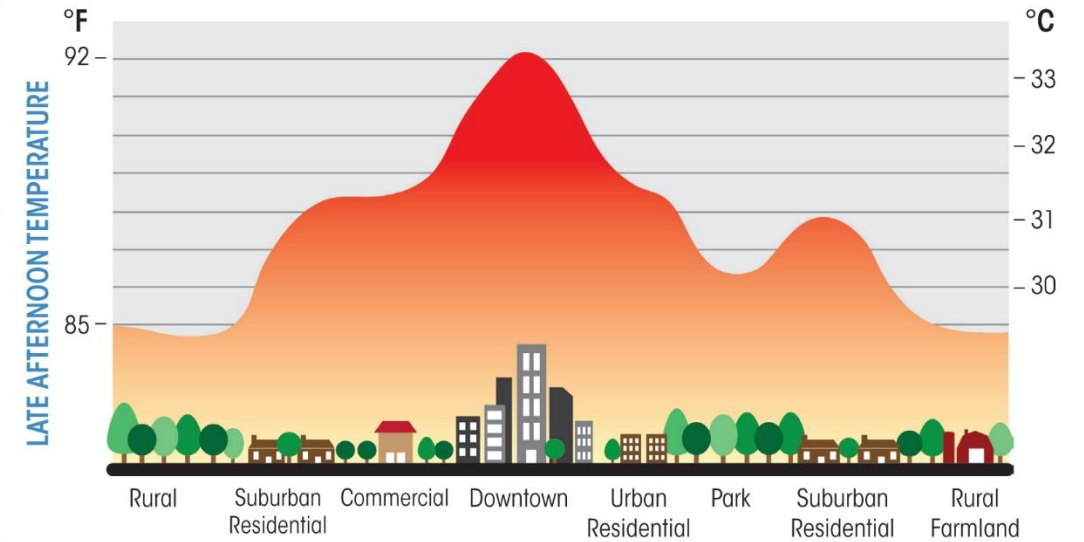
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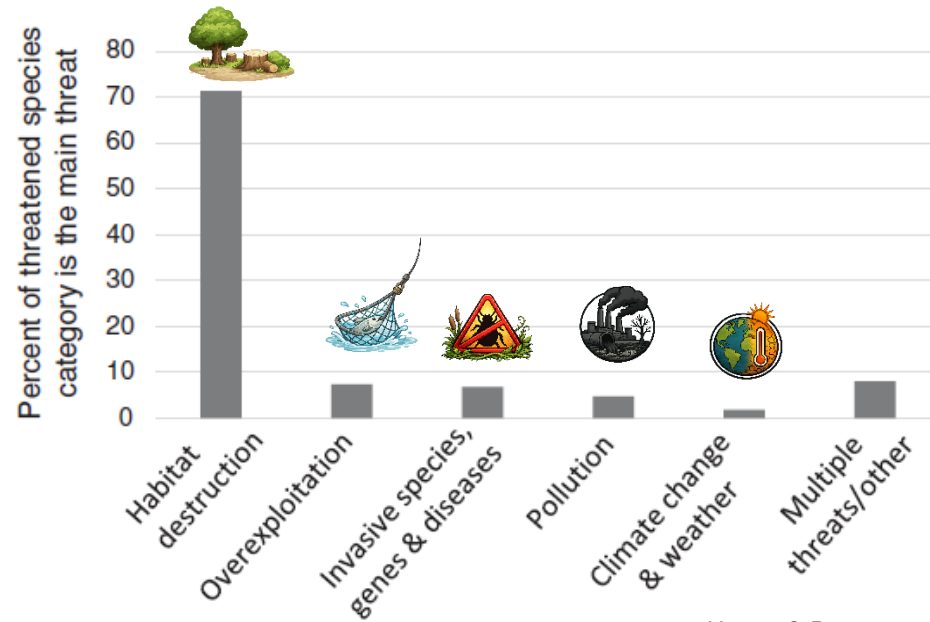
Urban Heat Island phenomenon



Salmanian et al., 2021

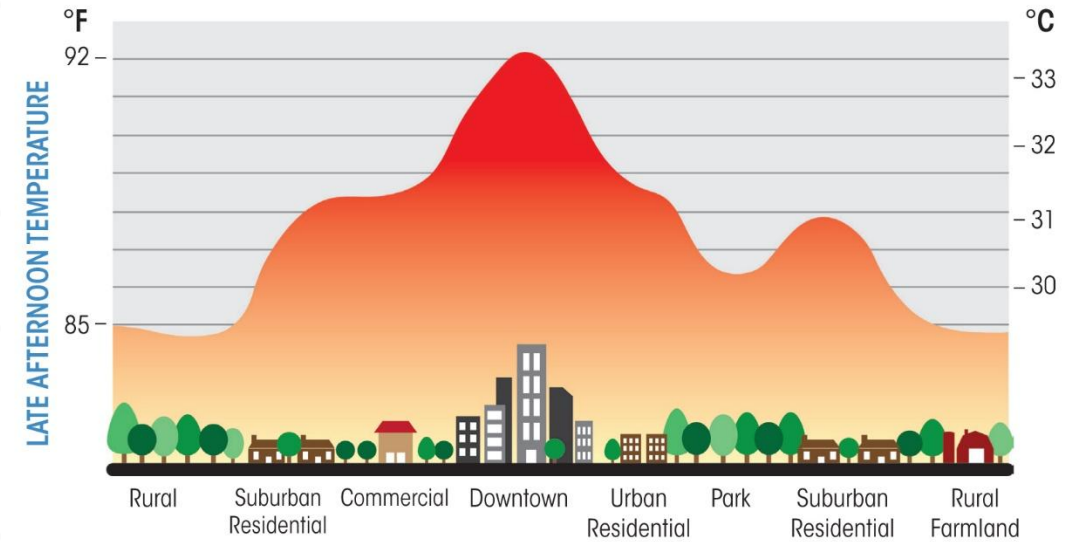
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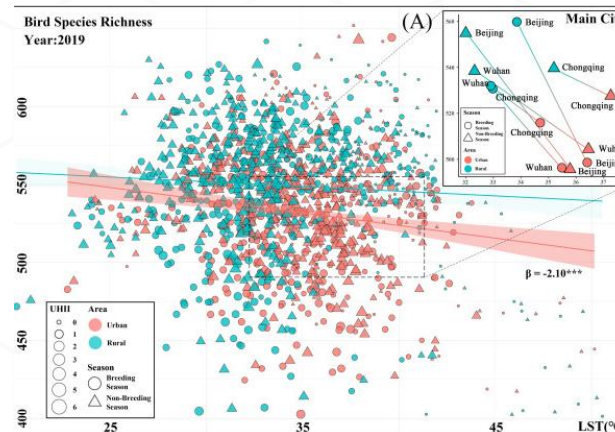


Hogue & Breon, 2022

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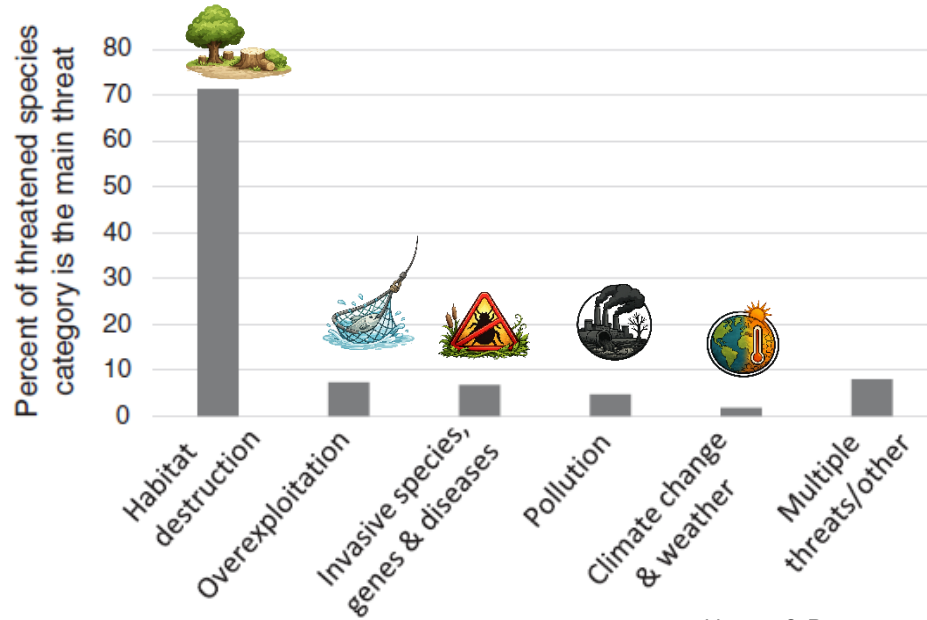
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Cai et al., 2023

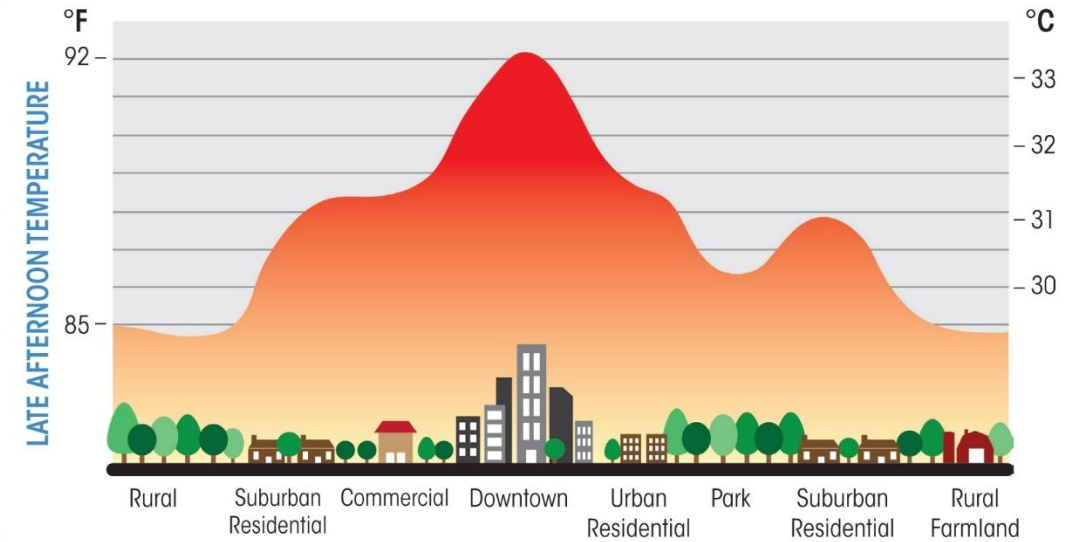
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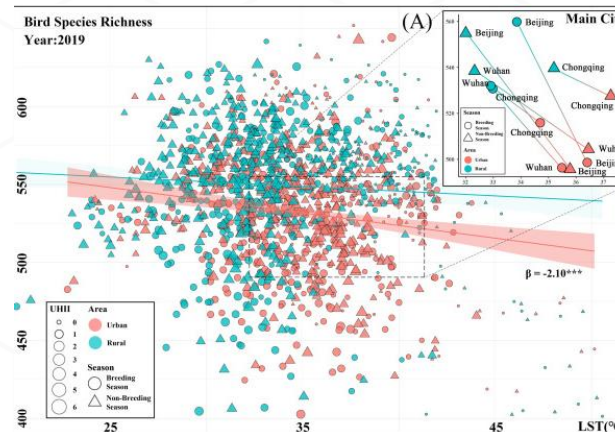


Hogue & Breon, 2022

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Salmanian et al., 2021



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URGENT

Shed light onto the effect of **urban heat of living beings** under the scenario of **global changes**



Objectives

Characterise **biodiversity patterns** of flying vertebrates along a **urban heat gradient** in the city of Poitiers, France

(1) Evaluate **the compositional shifts**

(2) Explore **taxonomic, phylogenetic & functional diversity** patterns

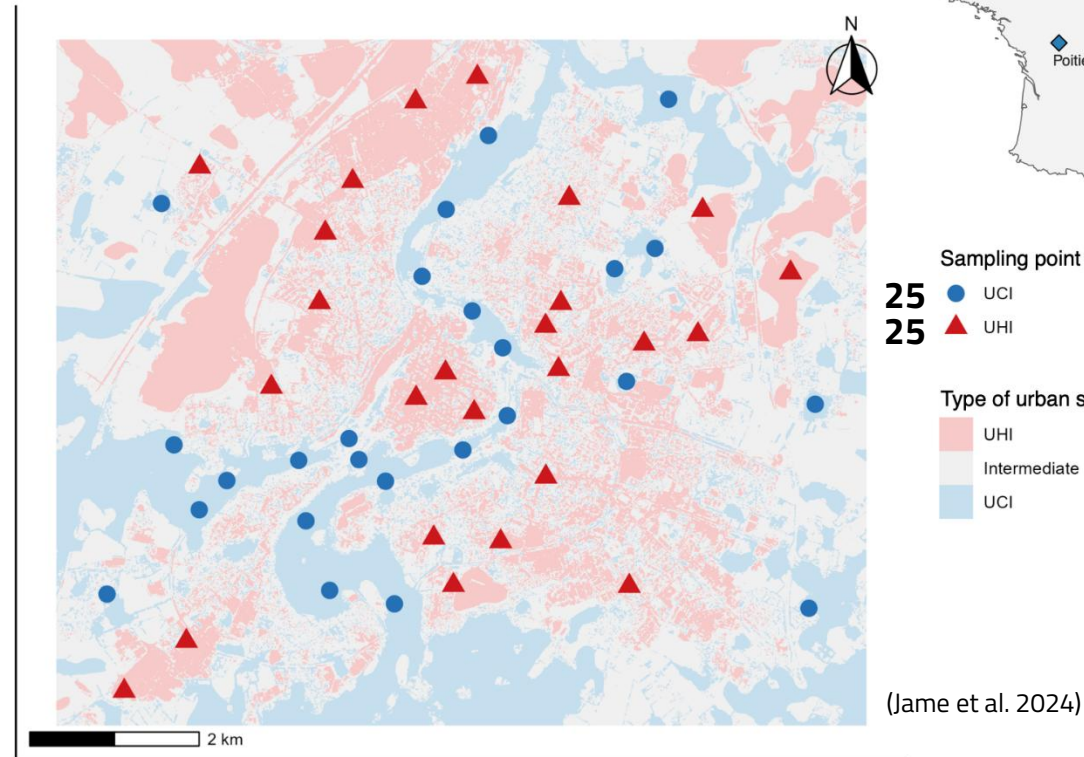
(3) Decipher whether assemblages are structured **by turnover or nestedness**

(4) **Conservation implication & perspectives**

How did we do this?



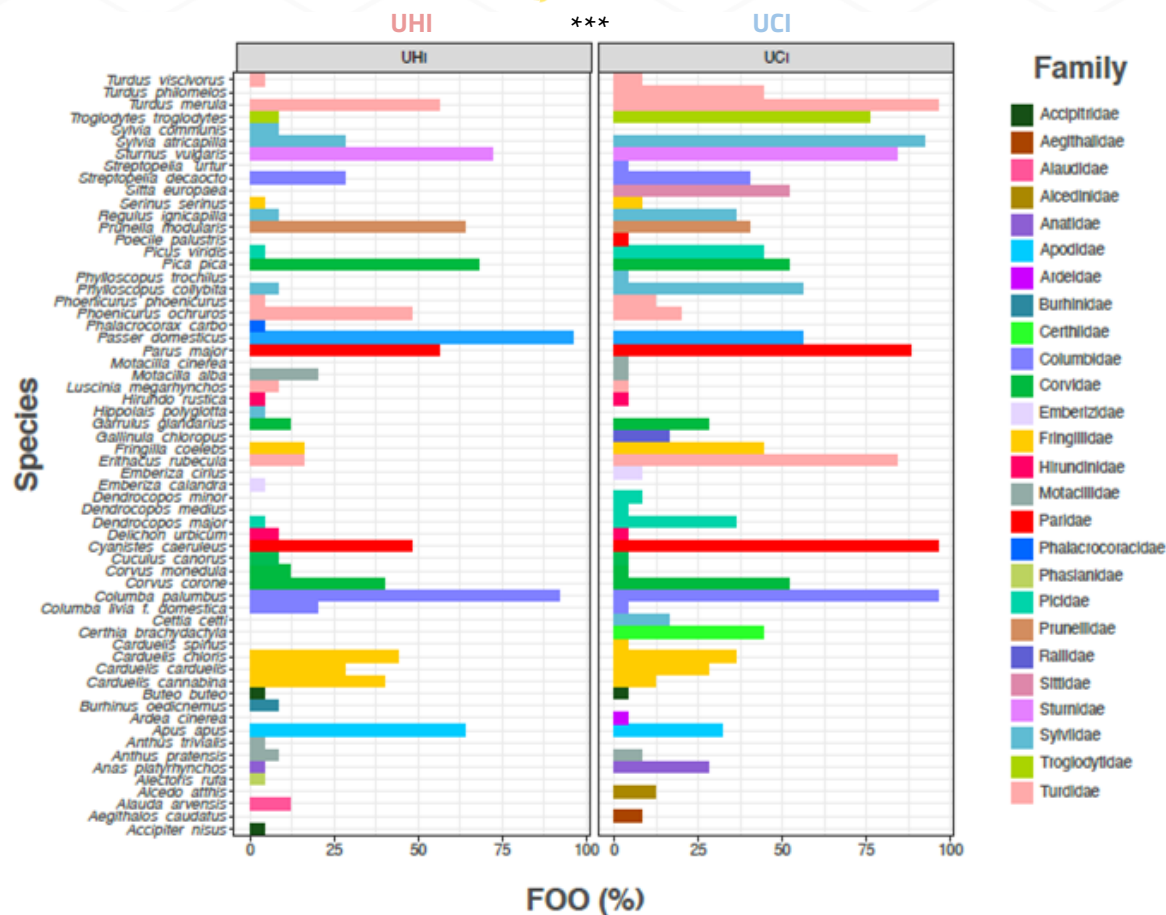
Study area: Poitiers, France



UHIs and **UCIs** mapped through LST (Landsat) & HMI (InVEST & Natural Capital Project; Sharp et al. 2020)

Urban heat and cool islands support distinct biological communities

62 species in 16 families



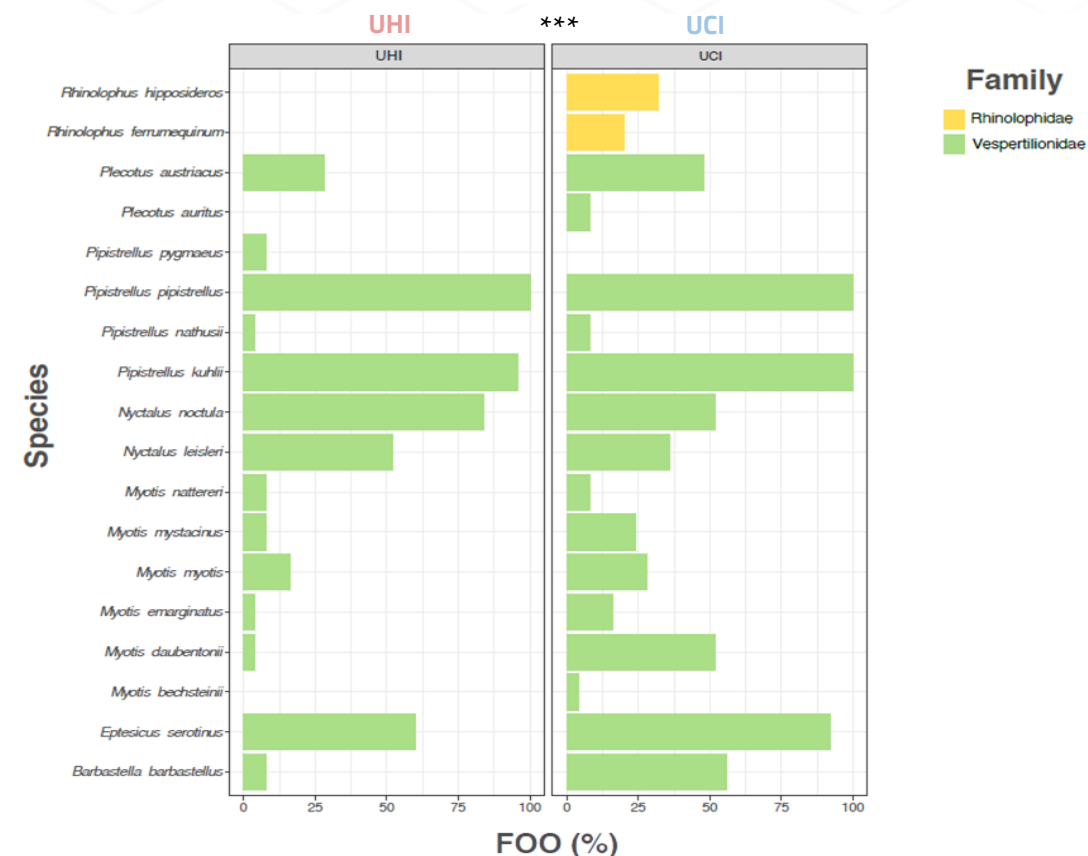
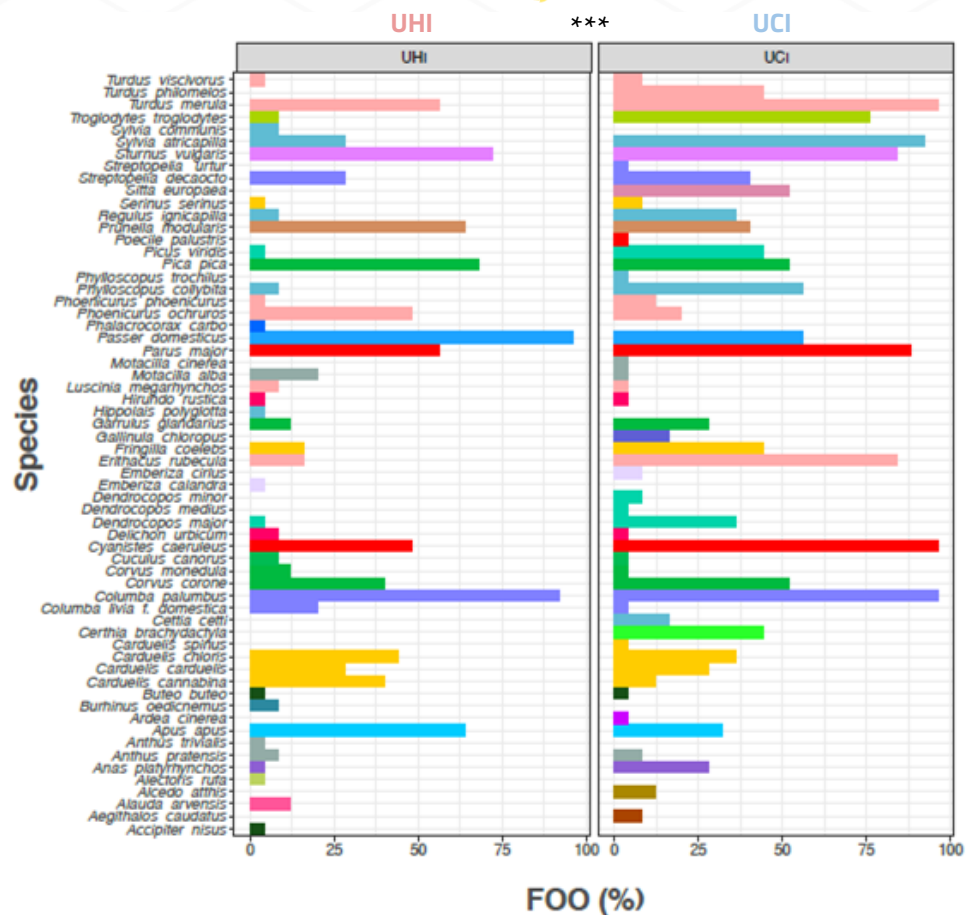
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62 species in 16 families



18 species in 2 families



Urban heat and cool islands support distinct biological communities

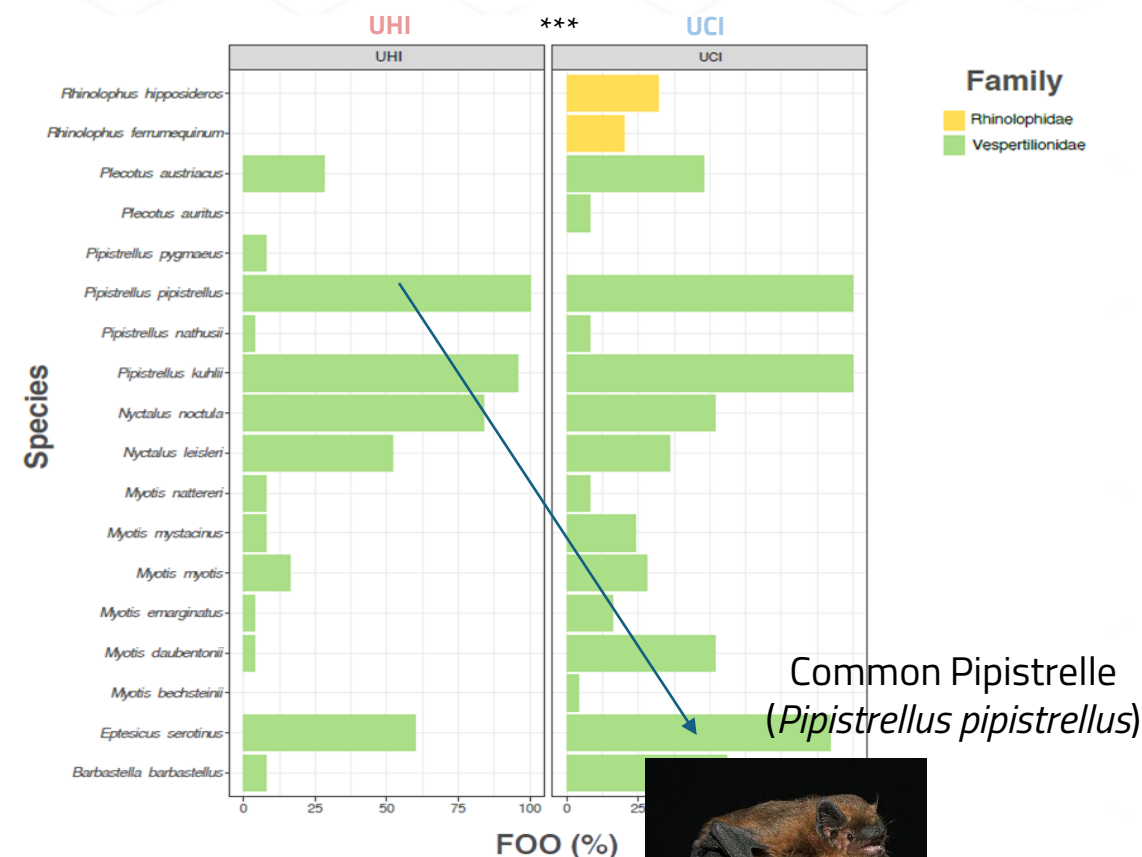
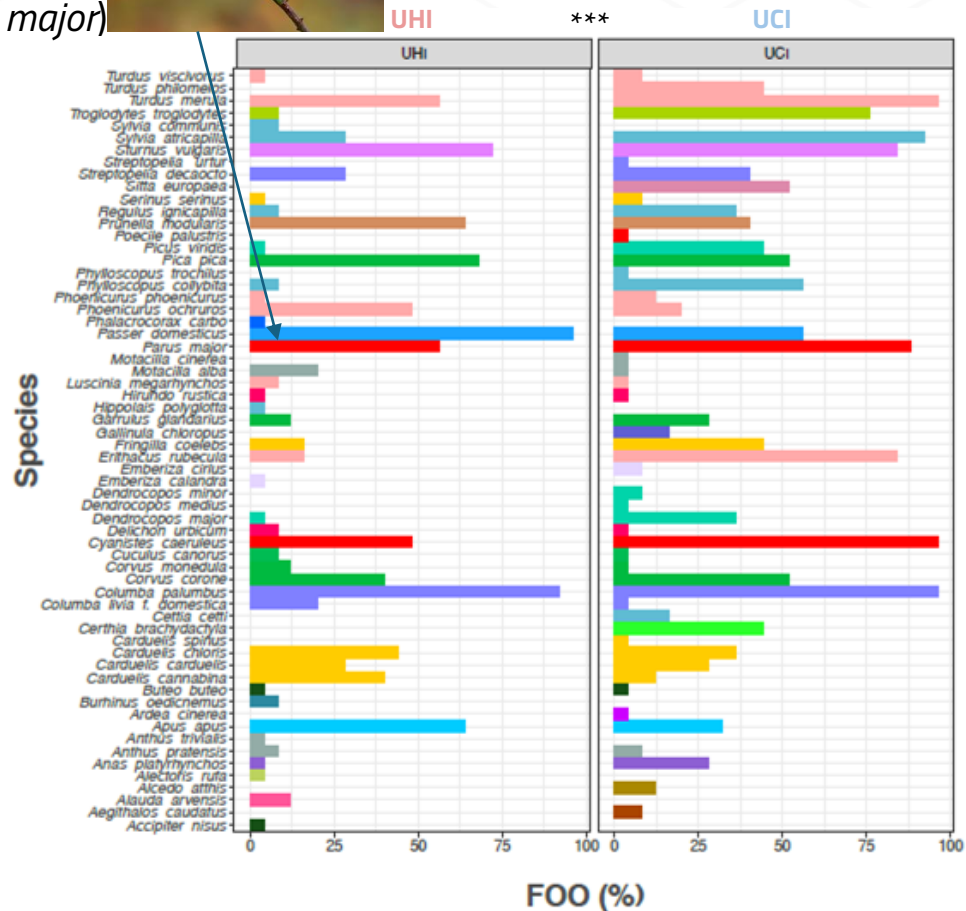
Great Tit
(*Parus major*)



62 species in 16 families



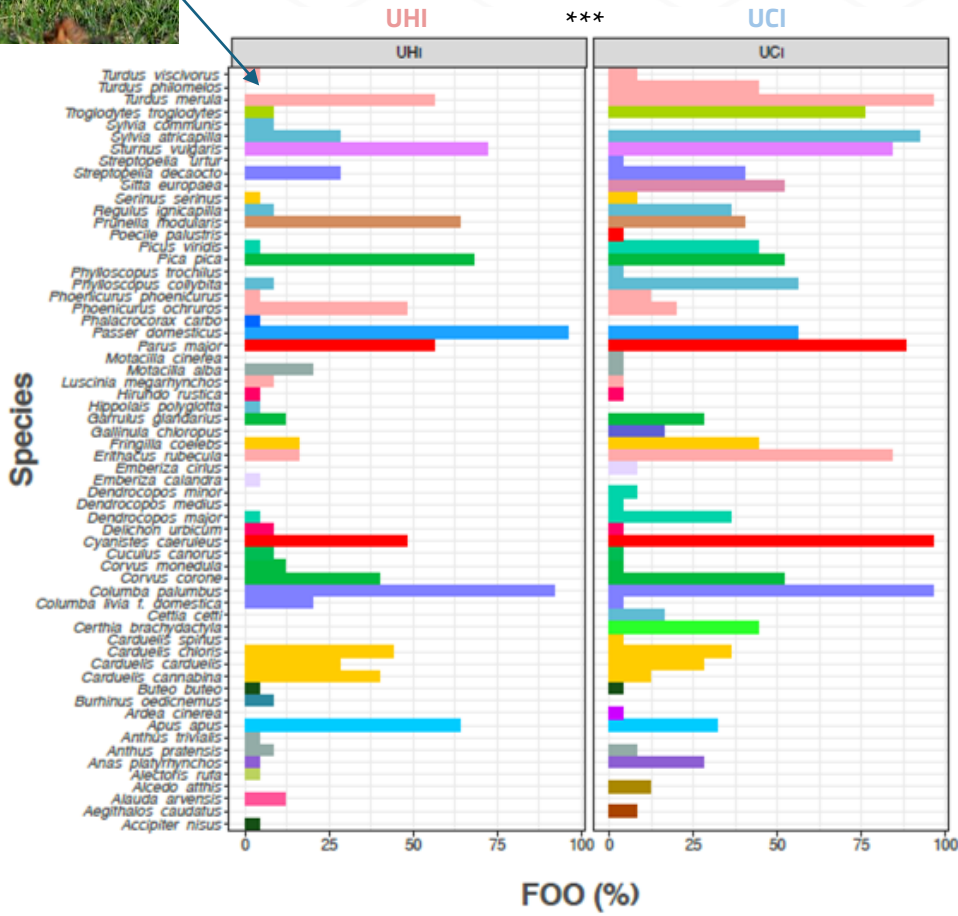
18 species in 2 families





Song Thrush
(*Turdus philomelos*)

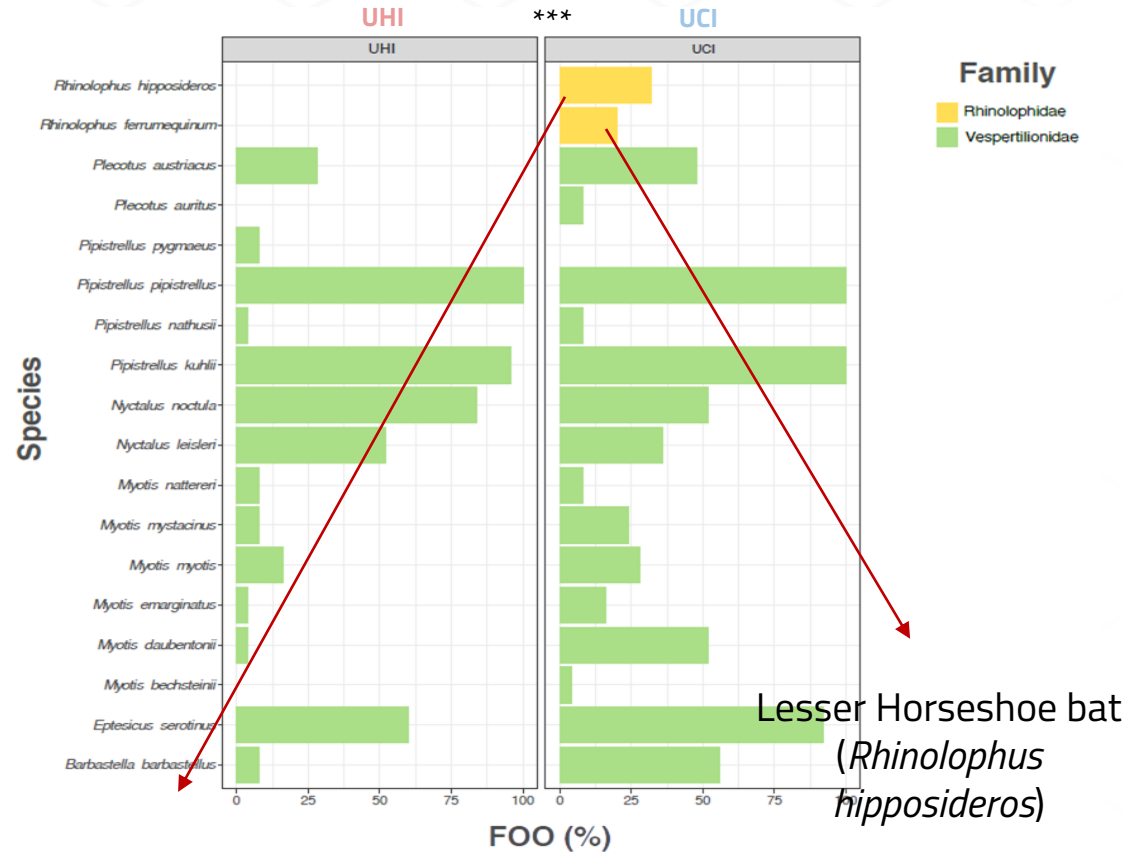




Urban heat and cool islands support distinct biological communities

UHI = Urban Heat Island
UCI = Urban Cool Island



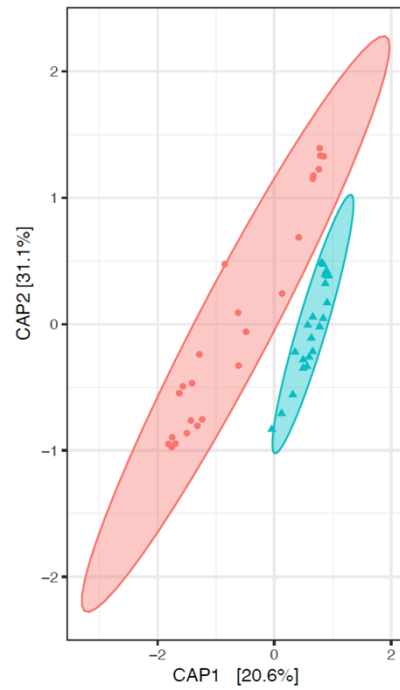
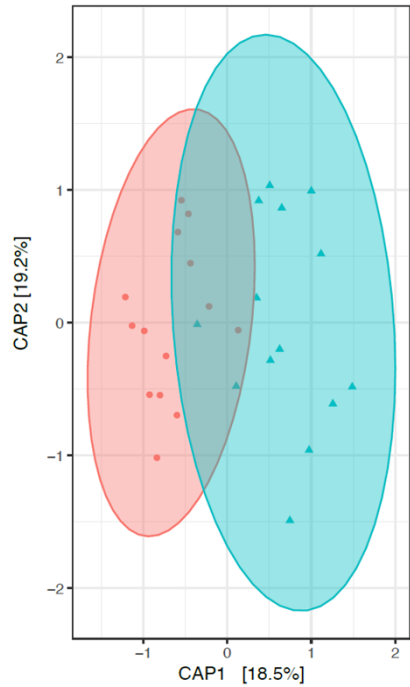


Greater Horseshoe bat
(*Rhinolophus ferrumequinum*)



Lesser Horseshoe bat
(*Rhinolophus hipposideros*)

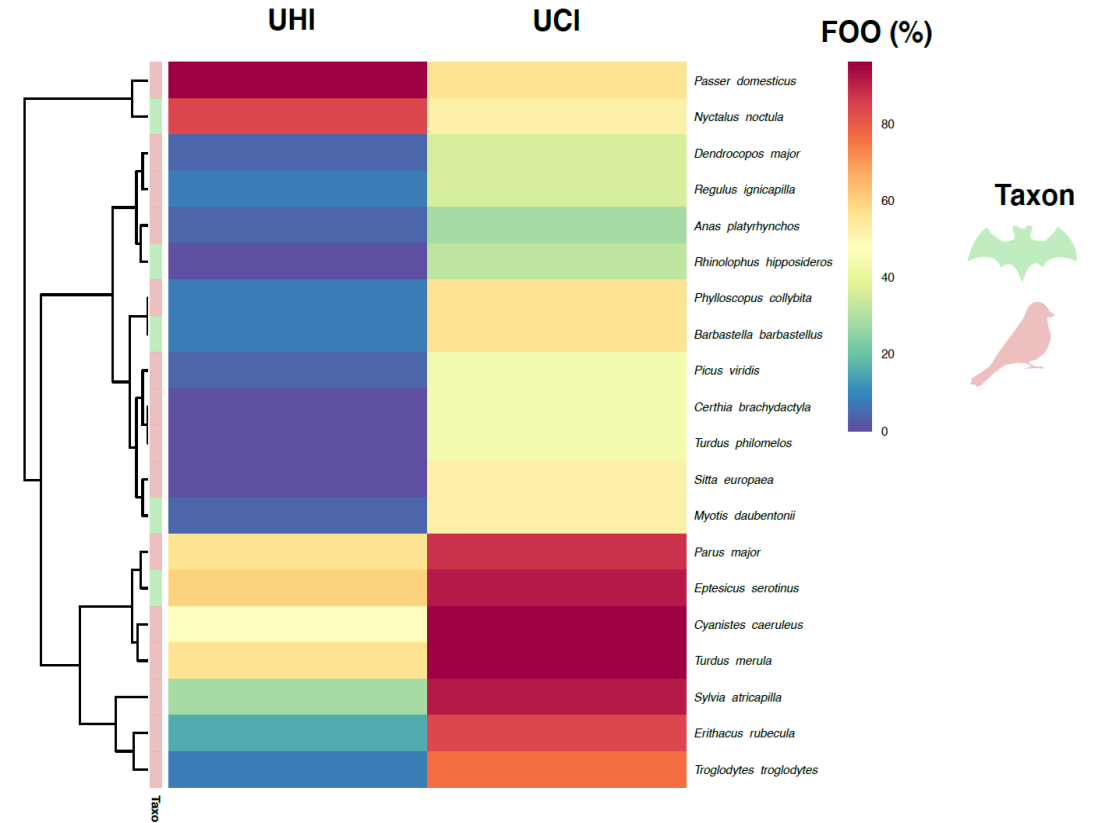
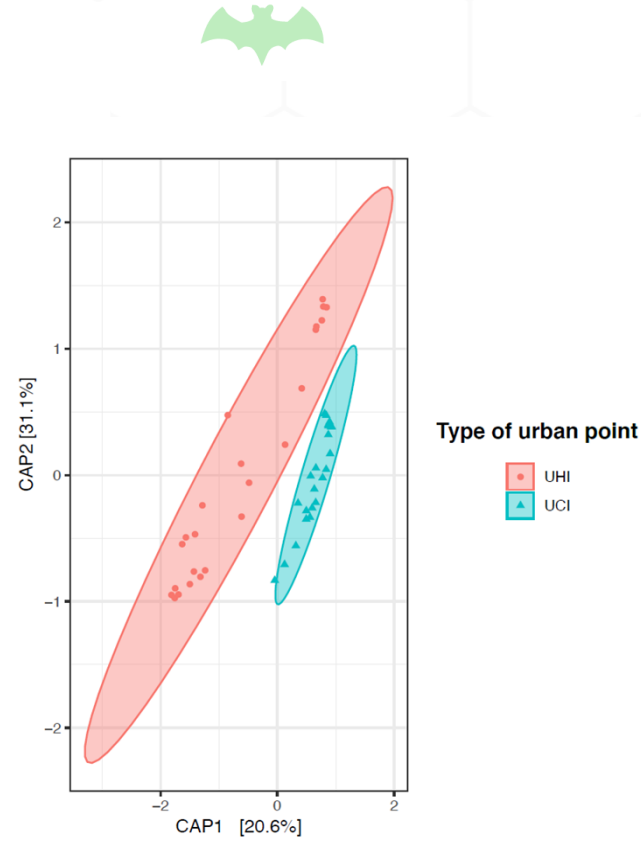
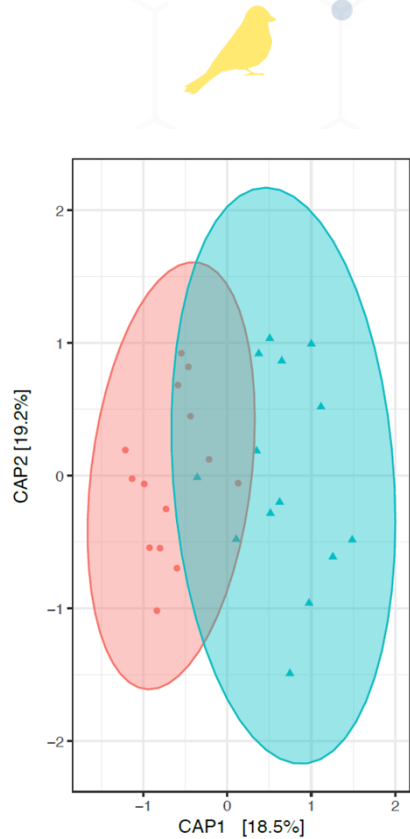
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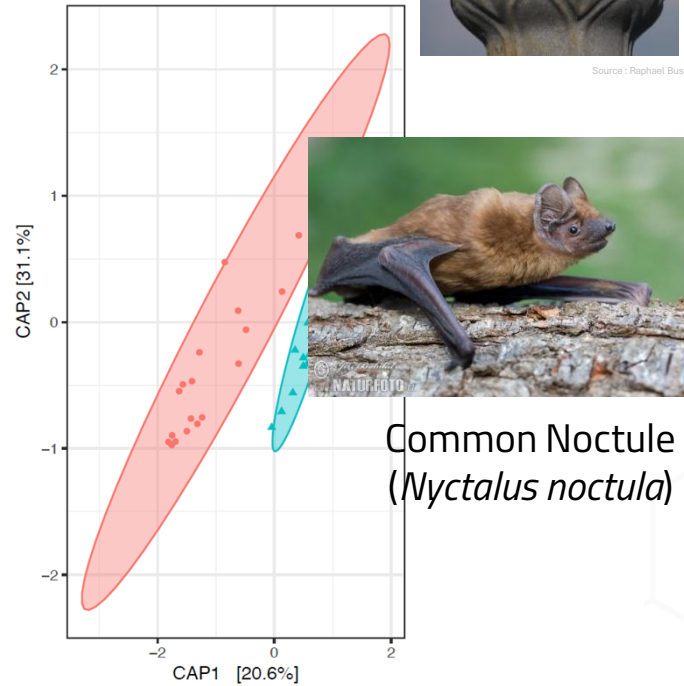
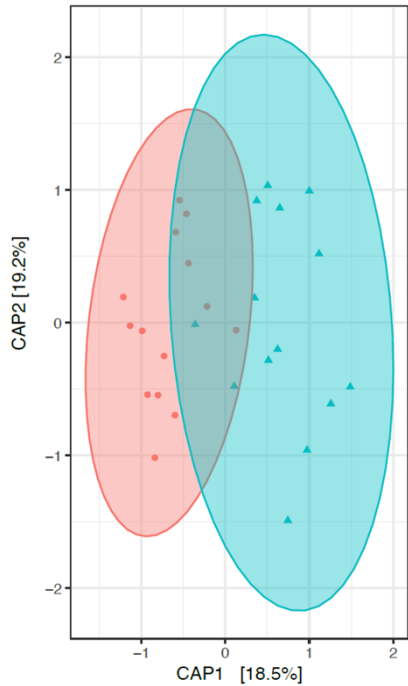
Type of urban point



Urban heat and cool islands support distinct biological communities

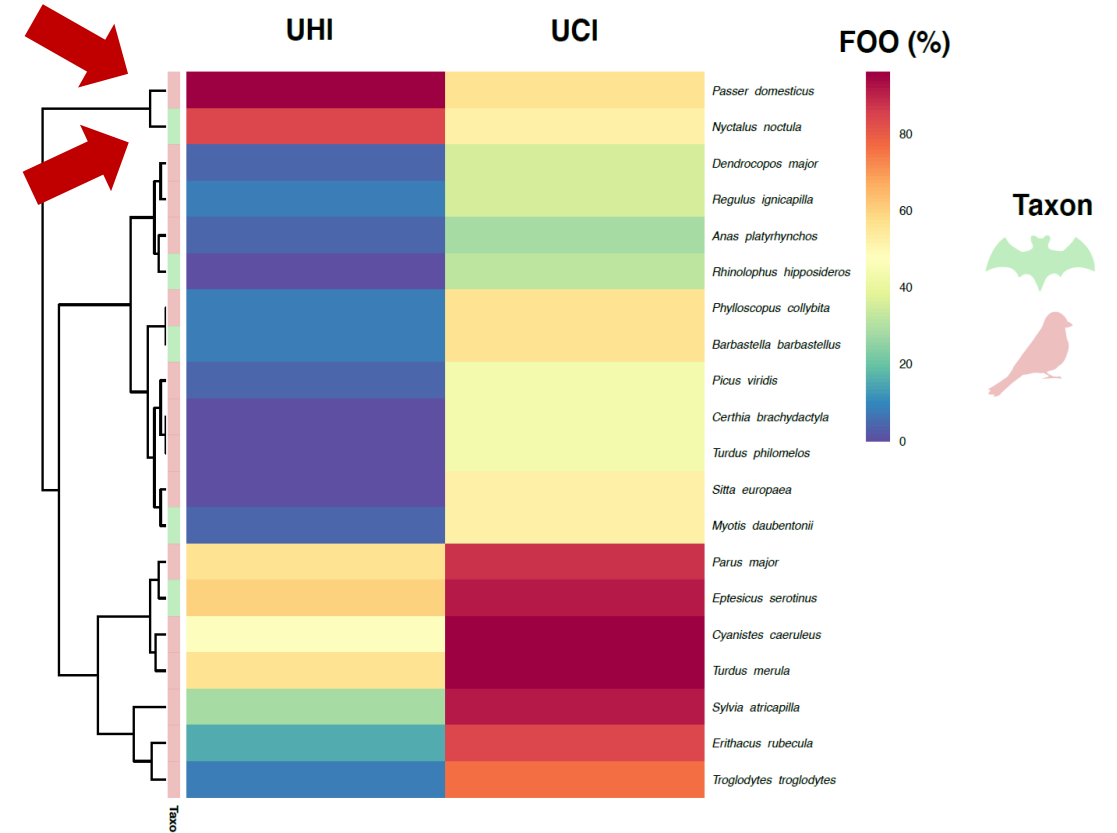


Urban heat and cool islands support distinct biological communities



House Sparrow
(*Passer domesticus*)

Only 2 species out of 20 are indicators of UHIs

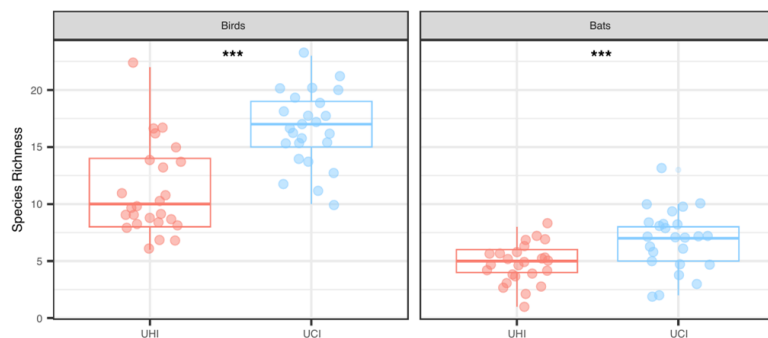


Contrasting diversity patterns between bird and bat assemblages

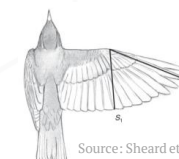
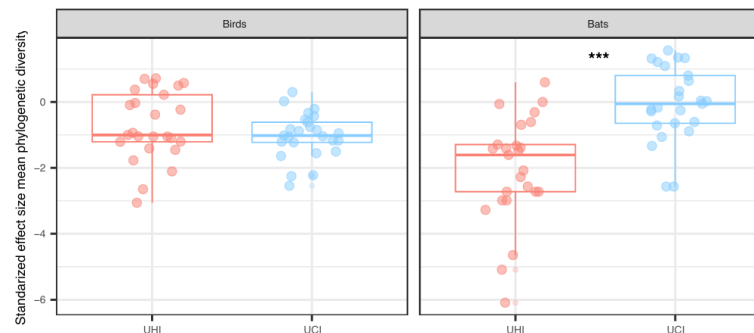


UHI = Urban Heat Island
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Taxonomic diversity

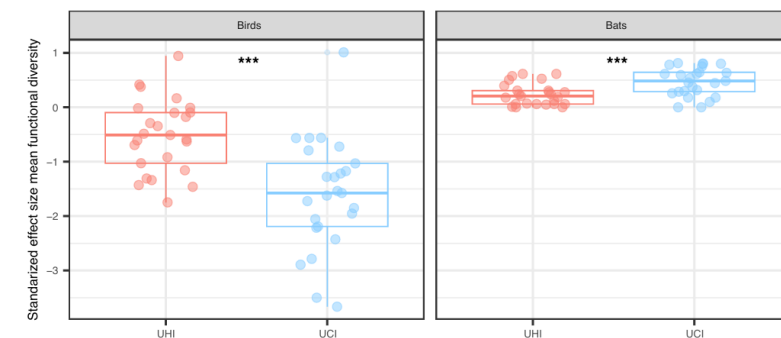


Phylogenetic diversity



Source: Sheard et al., 2020

Functional diversity

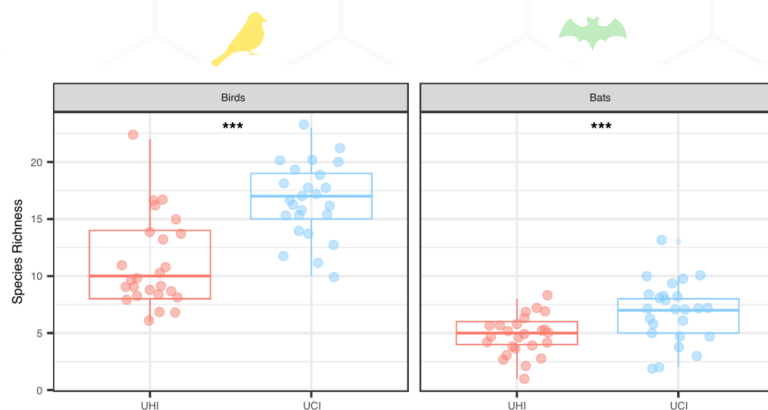


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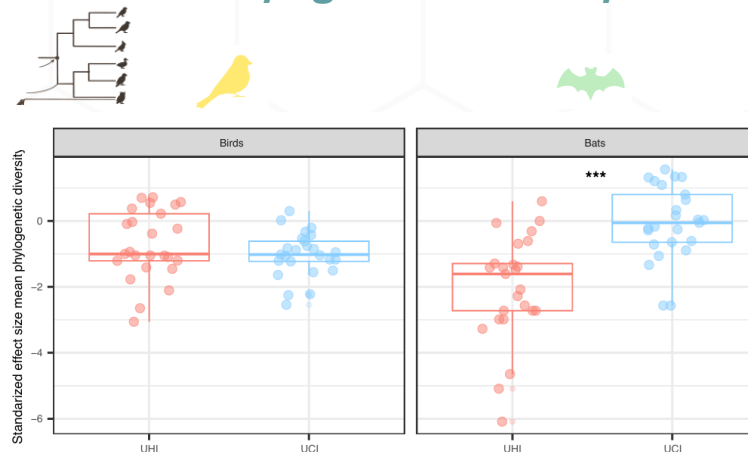


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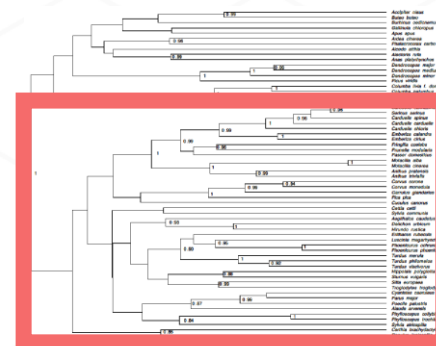
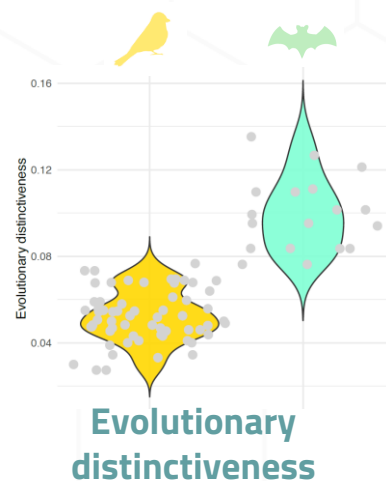
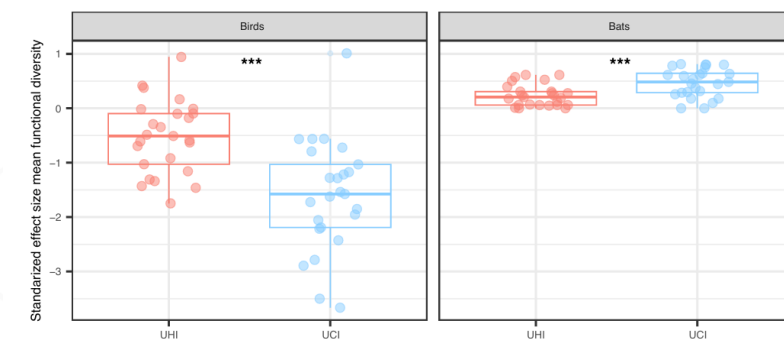
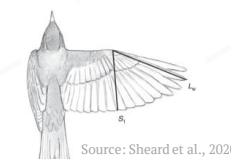
Taxonomic diversity



Phylogenetic diversity



Functional diversity



Order Passeriformes



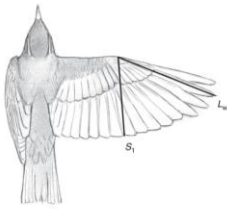
Environmental filter & ecological opportunity
(Losos, 2010)

Contrasting diversity patterns between bird and bat assemblages

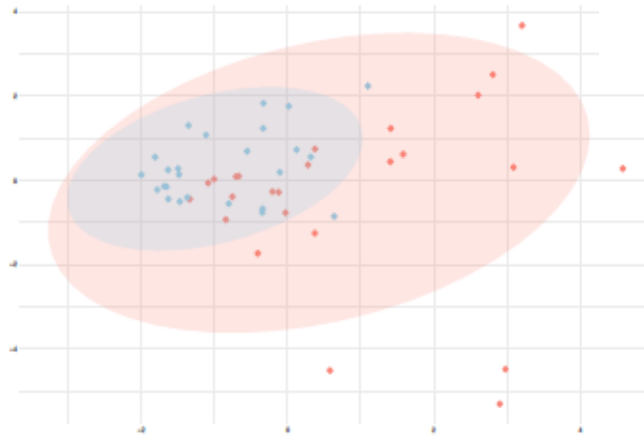


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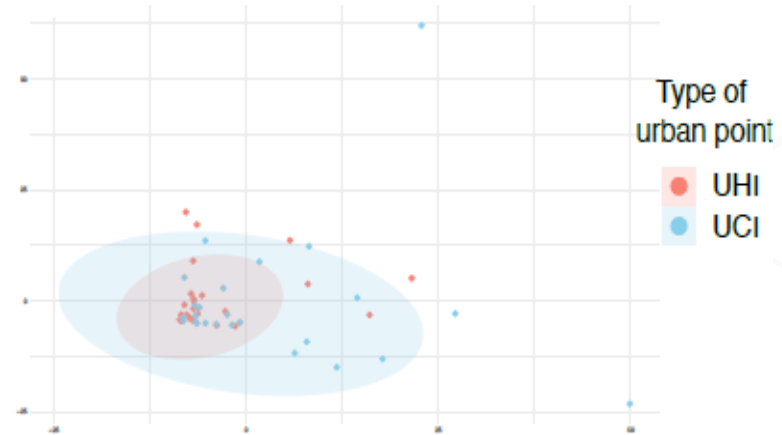
Functional space



Axis 2



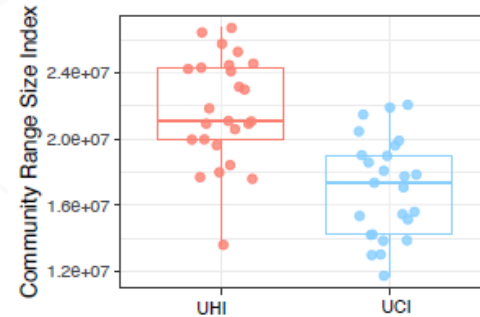
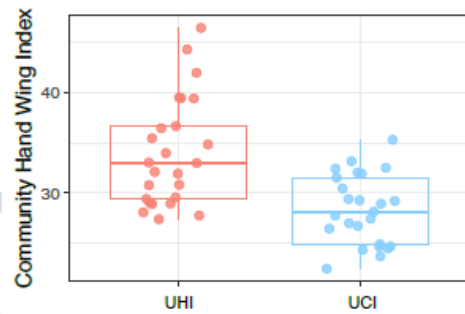
Axis 1



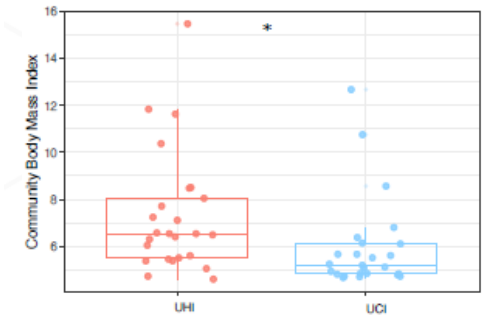
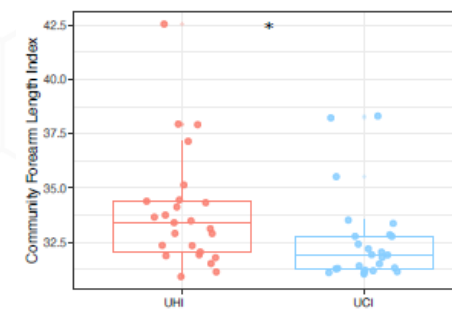
Certain birds and bats functional traits are conserved within UHIs



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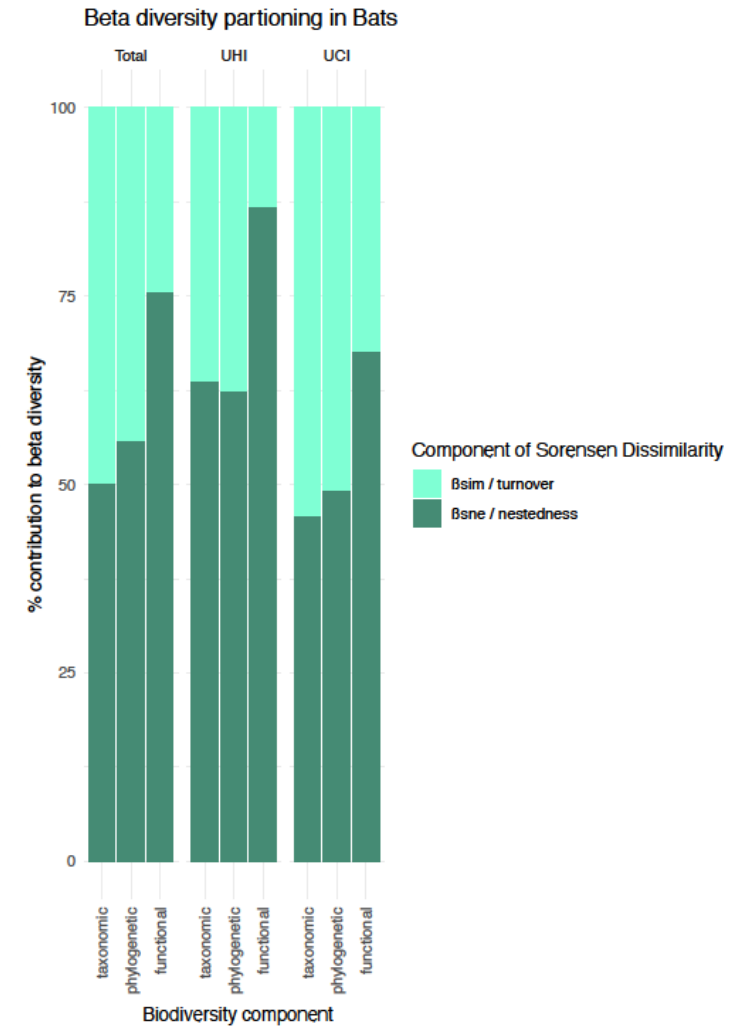
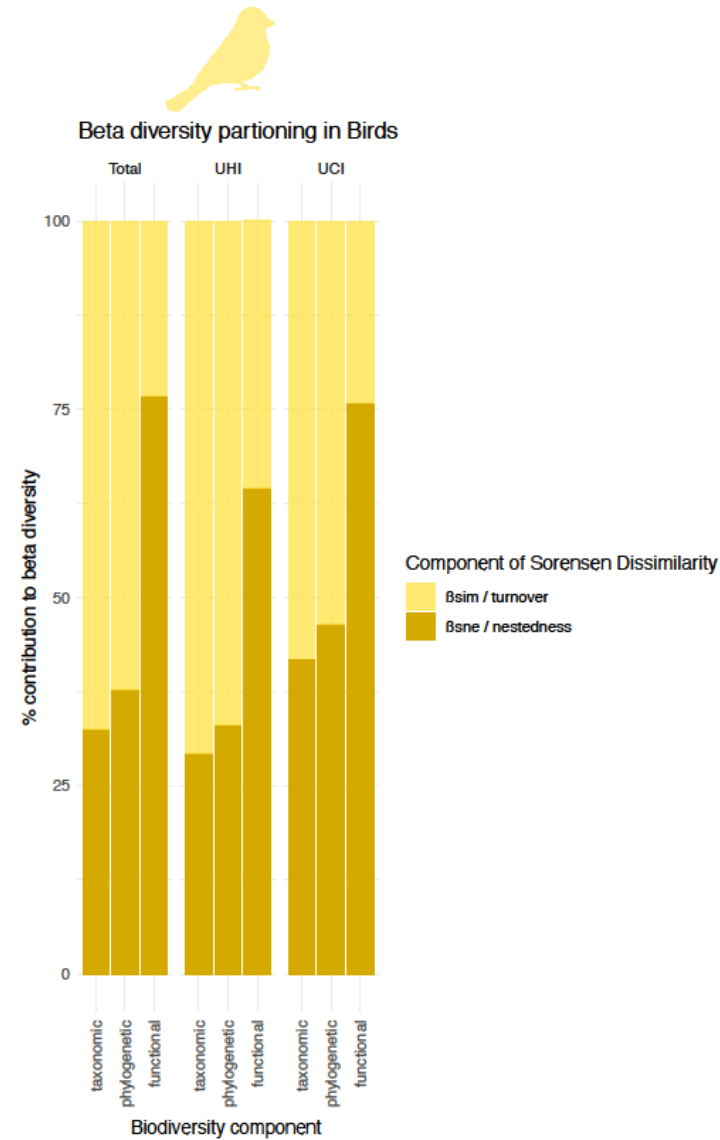
Increased HWI & geographical ranges are associated with **higher dispersal abilities**



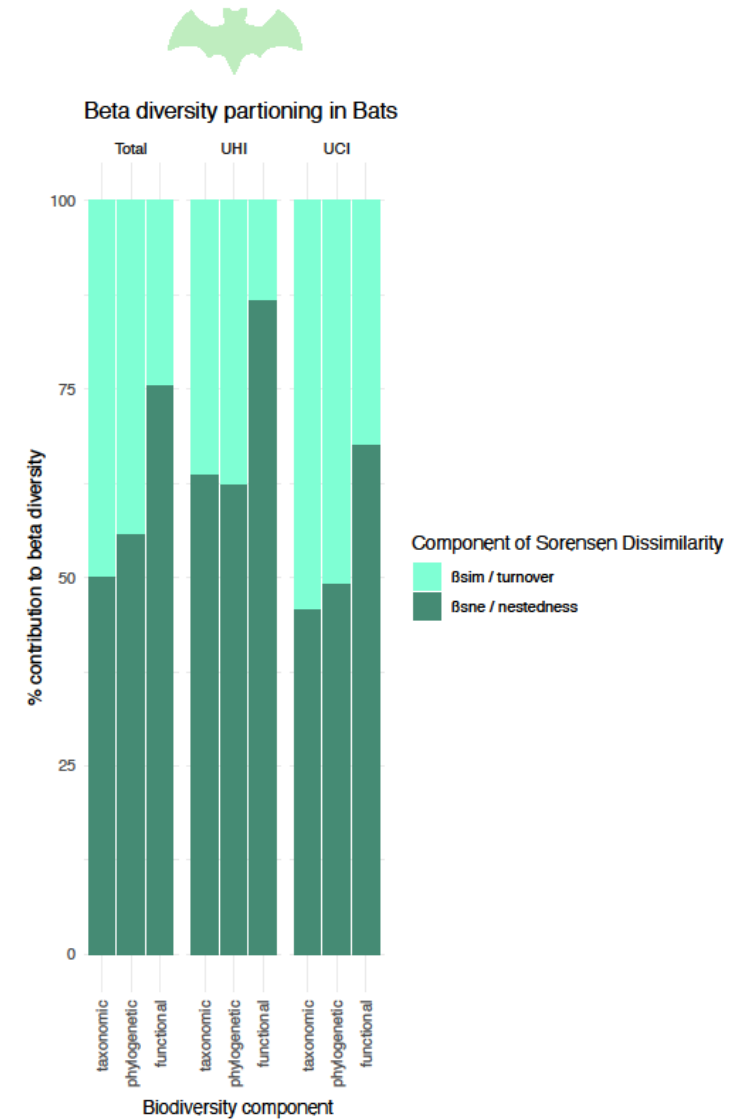
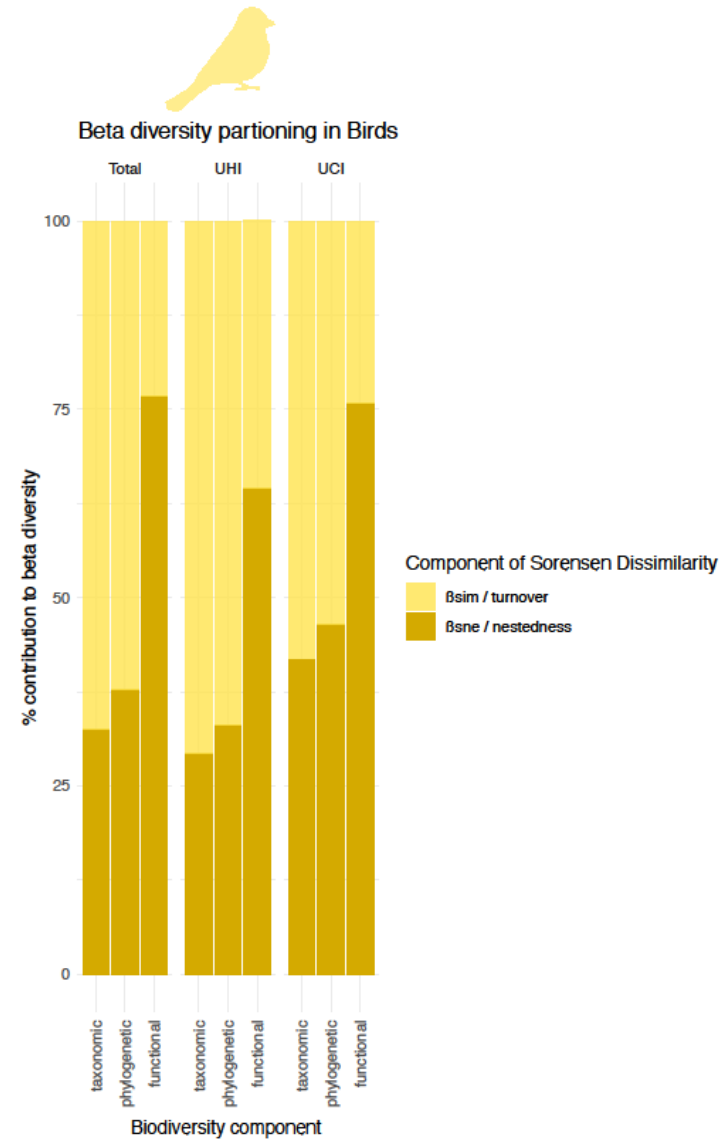
Increased forearm length & body mass are related with **flying faster**

In both cases, traits related with **higher dispersal ability** are conserved in **UHIs** → better equipped to **colonize novel/disturbed environments**

Birds' species are replaced, bats are nested



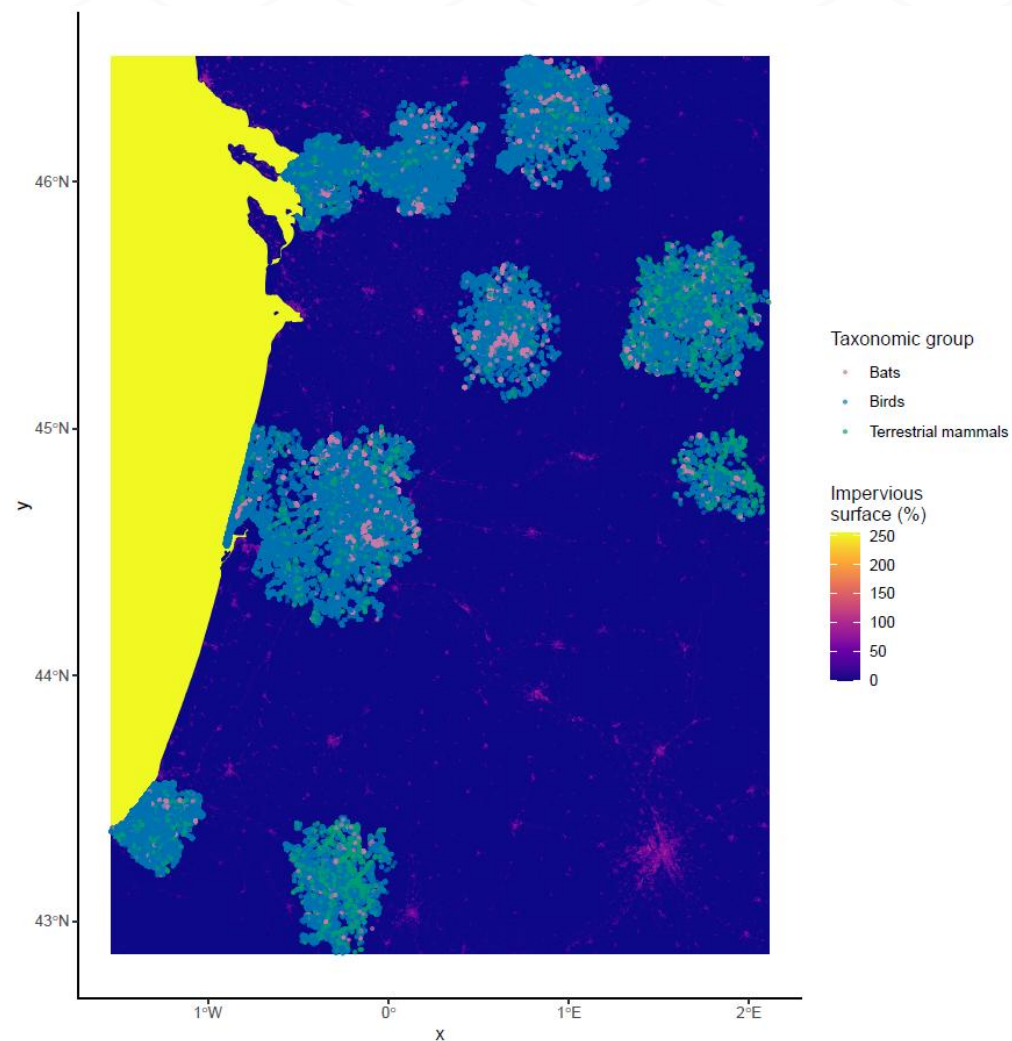
Birds' species are replaced, bats are nested



Urbanisation gradient impacts vertebrate communities



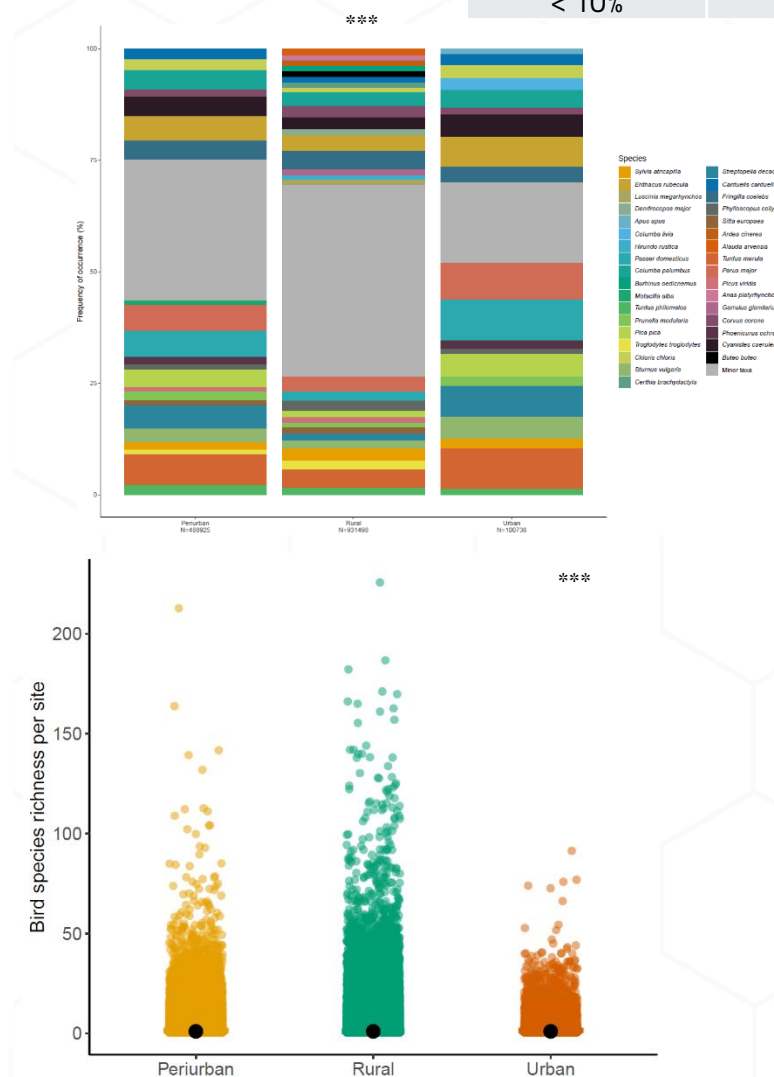
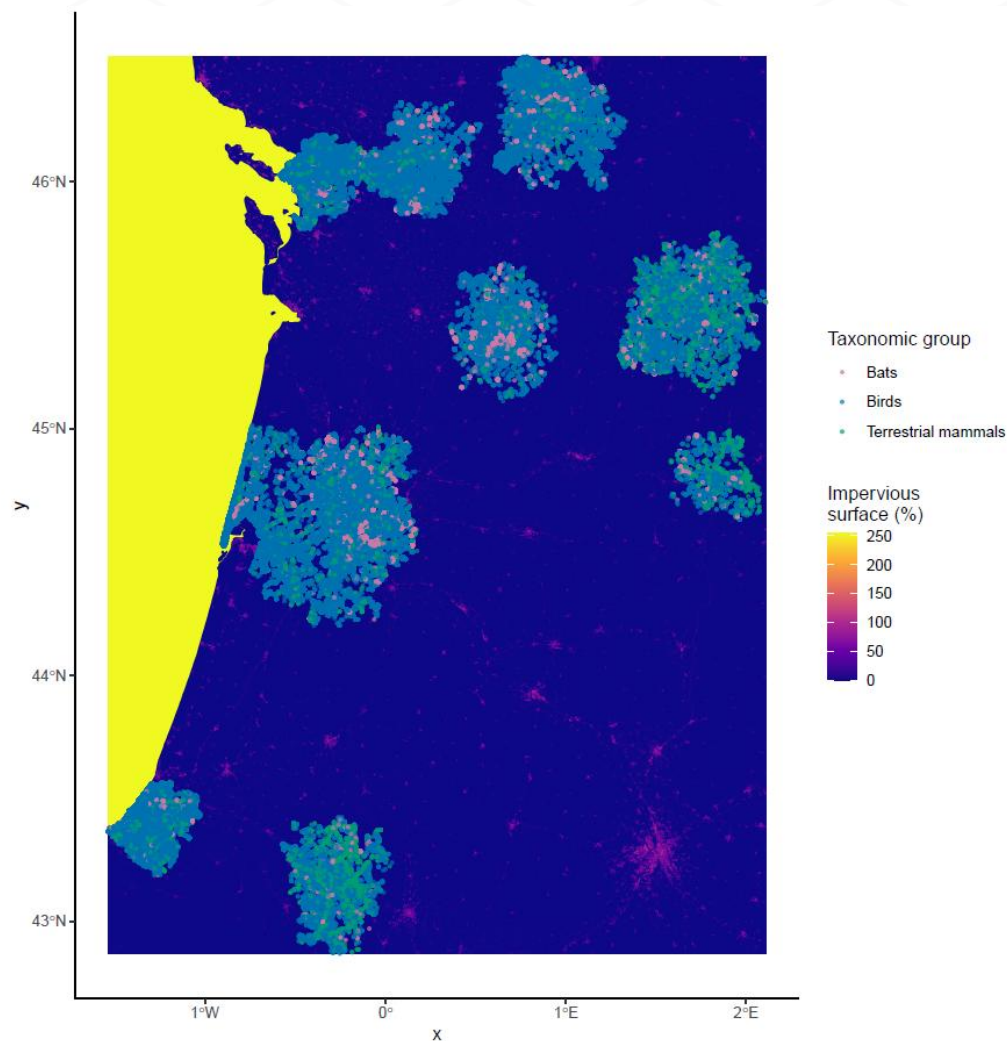
Impervious surface (%)	Urban class
> 50%	Urban
10–50%	Periurban
< 10%	Rural



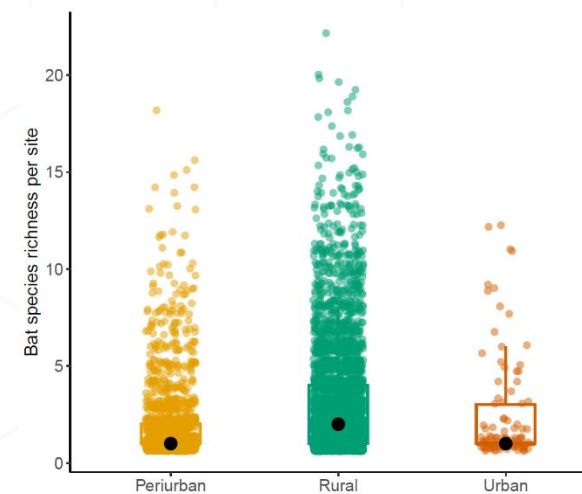
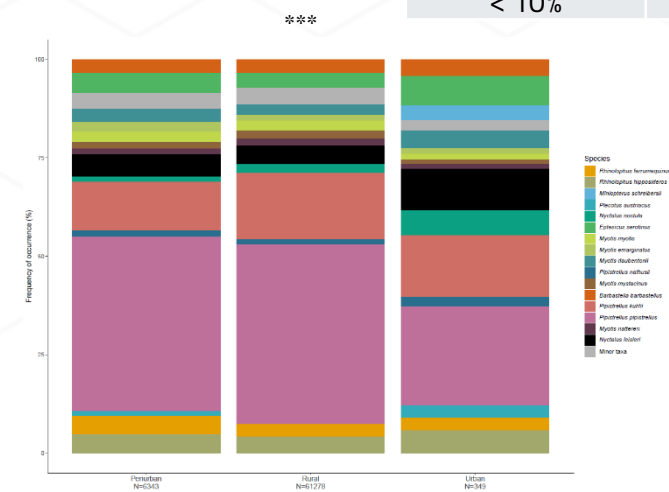
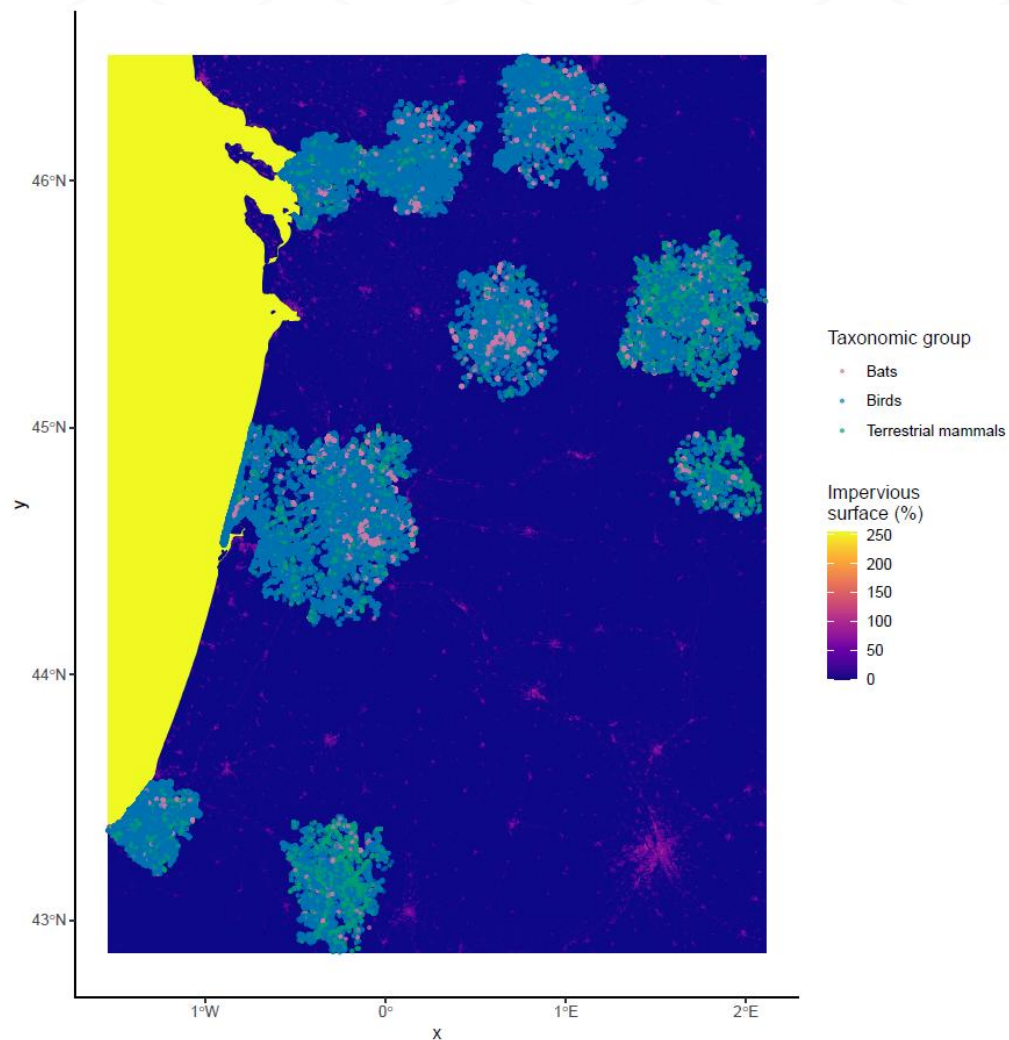
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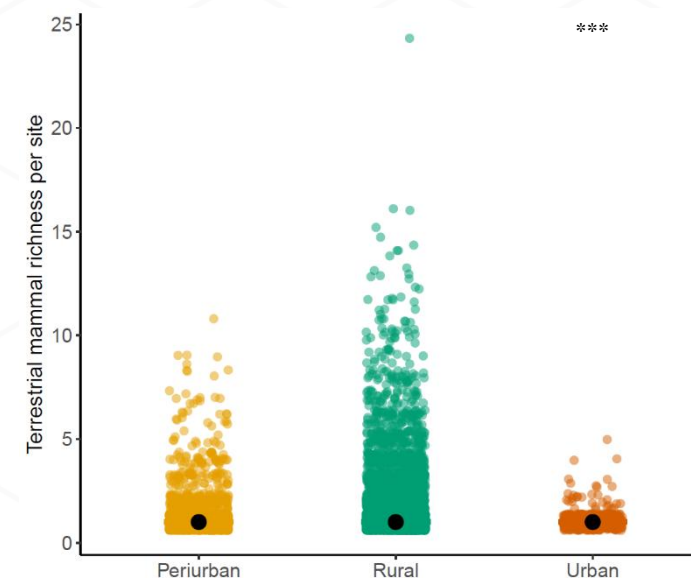
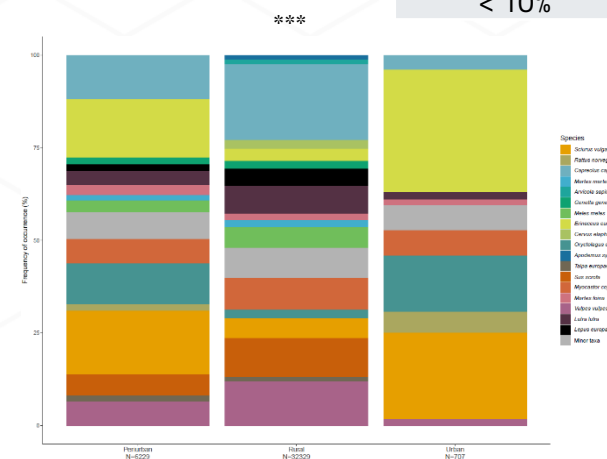
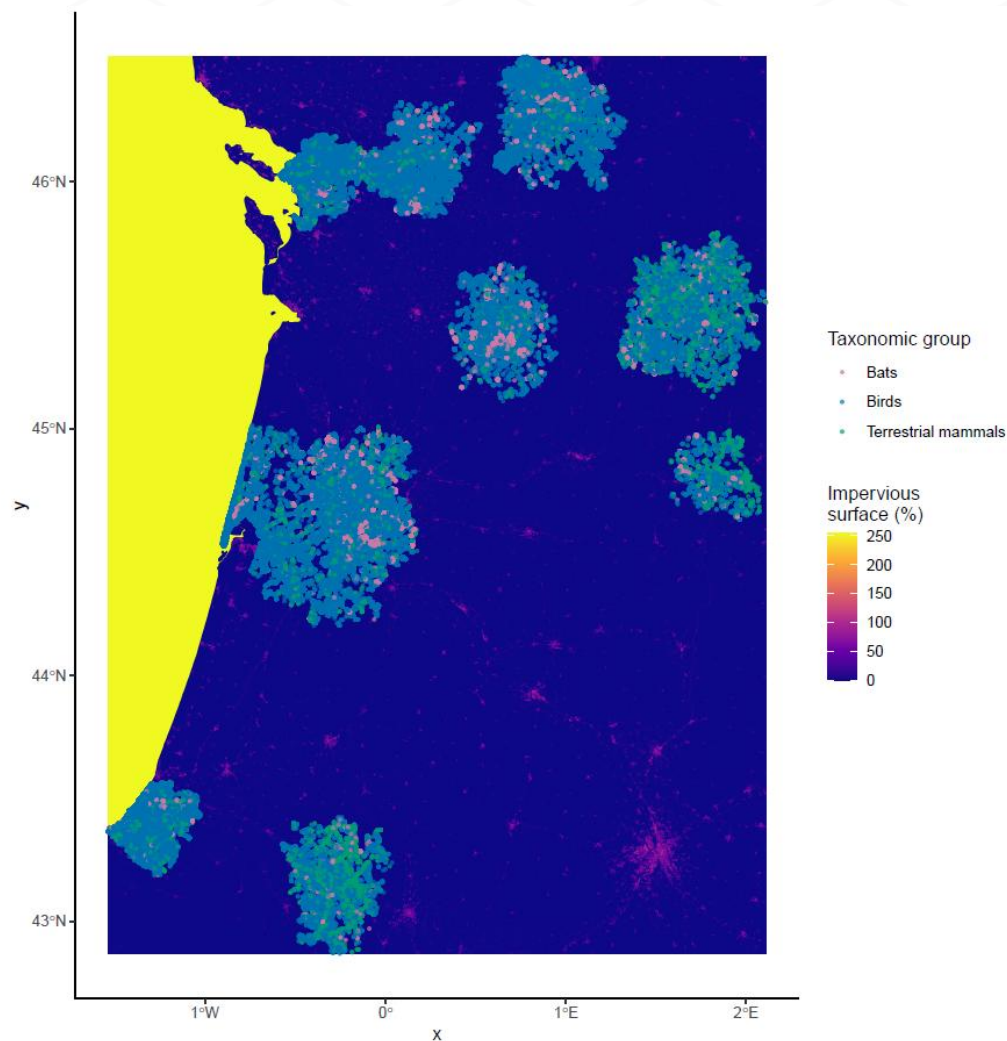
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Conservation implications



- **Protect and connect green–blue infrastructure** (native vegetation, wetlands and ecological corridors) to sustain both bird and bat diversity.
- **Mitigate urban heat and artificial light** by increasing vegetation cover and reducing local thermal and light pollution.
- **Manage complementary UHI and UCI habitats**, as both contribute unique taxonomic, functional and phylogenetic diversity.
- **Integrate biodiversity into urban planning**, considering both local habitat quality and the surrounding landscape to build climate-resilient cities.



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THANK YOU!

Questions?

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