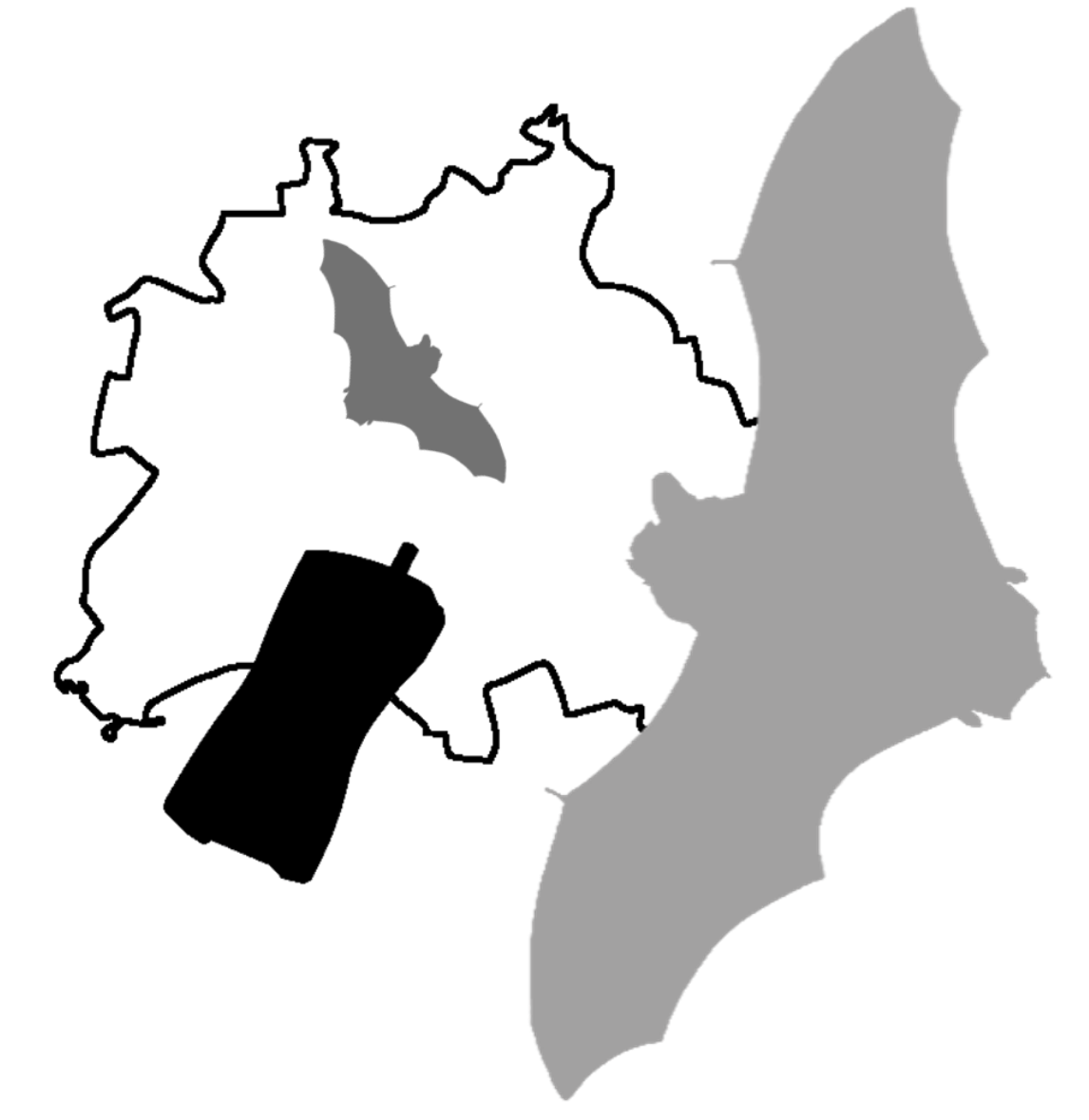


# Identifying urban areas for bat conservation with citizen science data

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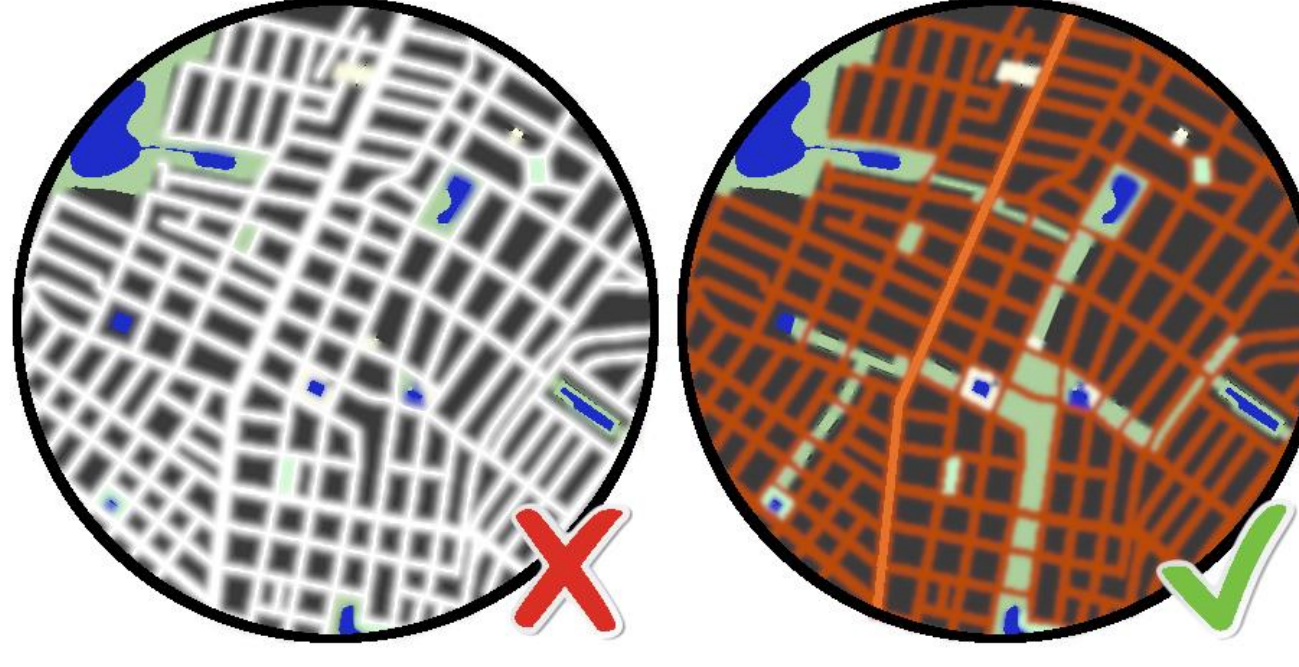


## BACKGROUND

Global change, including urbanisation, threatens many of the >1,400 bat species. Here, we used passive acoustic monitoring to investigate **habitat use of bats in urban ecosystems** in order to establish **evidence-based recommendations** on how to improve urban spaces so that they contribute to bat conservation. We involved more than 200 **citizen scientists**, which can help increasing conservation willingness among the public and eventually among stakeholders.

## CONCLUSIONS / RECOMMENDATIONS

Urban spaces can be managed in ways so that they retain their (recreational) value for people but also contribute to bat conservation, thereby counteracting urban biodiversity loss:

Artificial light at night	Canopy cover	Water bodies	Connectivity
			
<p>Reduce artificial light to the minimum necessary e.g. through dimming protocols and motion-activation and <b>use long-wavelengths ('warm') light</b></p>	<p>Provide canopy cover, e.g. along streets and in green spaces and <b>maintain a large number of green spaces</b>, particularly forest patches</p>	<p>Distribute numerous <b>water bodies homogeneously</b>, such that from any point in town distance to a water body is short, especially from green spaces</p>	<p><b>Maintain &amp; establish vegetated corridors without artificial light</b> interconnecting green spaces and water bodies</p>

These measures will likely benefit other urban wildlife as well. Inferences from this study are highly relevant for conservationists, city planners, municipalities, and the general public.

## RESULTS SUMMARY

- Light:** Bats of all foraging guilds were less likely to occur in areas with high levels of artificial light at night. Orange lights affected most species less than white lights.
- Vegetation:** Increasing levels of canopy cover in the immediate surrounding or large forest patches within reach had positive effects on the occurrence of most species.
- Water:** Most species occurred particularly in areas with a large (aggregate) water surface in the surrounding and/or at close distance to water bodies.

## METHODS

- Passive acoustic monitoring of bats at 600 sites within and around Berlin, up to 6 times per site over 2 years
- Modelling the effects of various relevant landscape variables on the occurrence of five species of bats