

# Environmental Impacts of Onshore Wind Energy

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## Introduction

- Substantial onshore wind energy expansion required
- Land scarcity
- High installation demands also in forested areas
- Broad public acceptance essential
- Green-green dilemma

## Methods

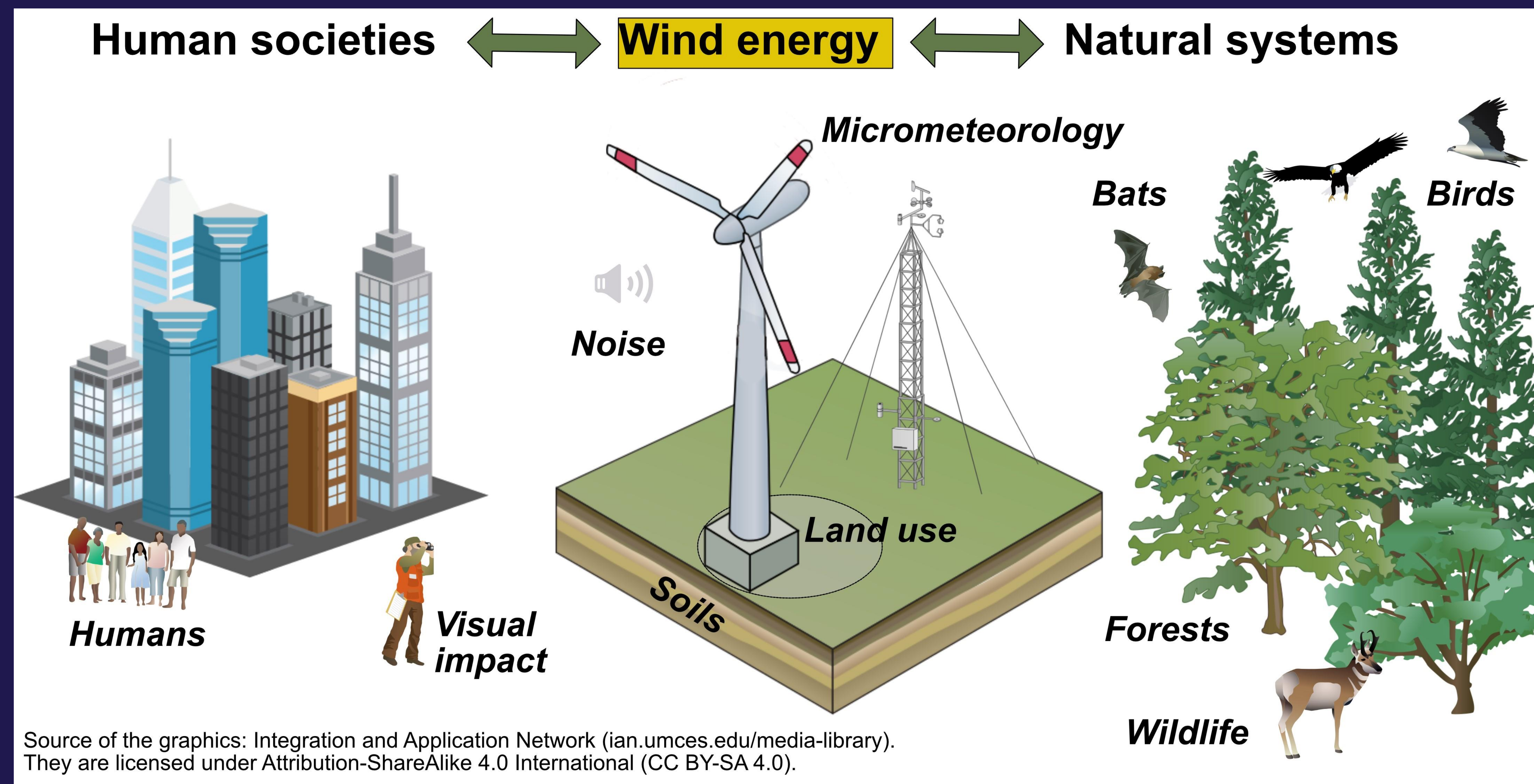
Literature review

1. Search queries in six scientific databases
  2. Peer-reviewed literature published from 2010 to 2023
- 152 studies from 31 countries in 81 journals

## Results

- Two-thirds of the studies refer to Europe and North America, only 5 % to Asia
- Half of the studies focus on impacts on birds and bats, while evidence on noise impacts is scarce
- Social acceptance-related studies only in Europe and North America

# Negative environmental impacts of wind energy cannot be generalized and are context-specific due to research bias and the lack of standardized, systematic research.

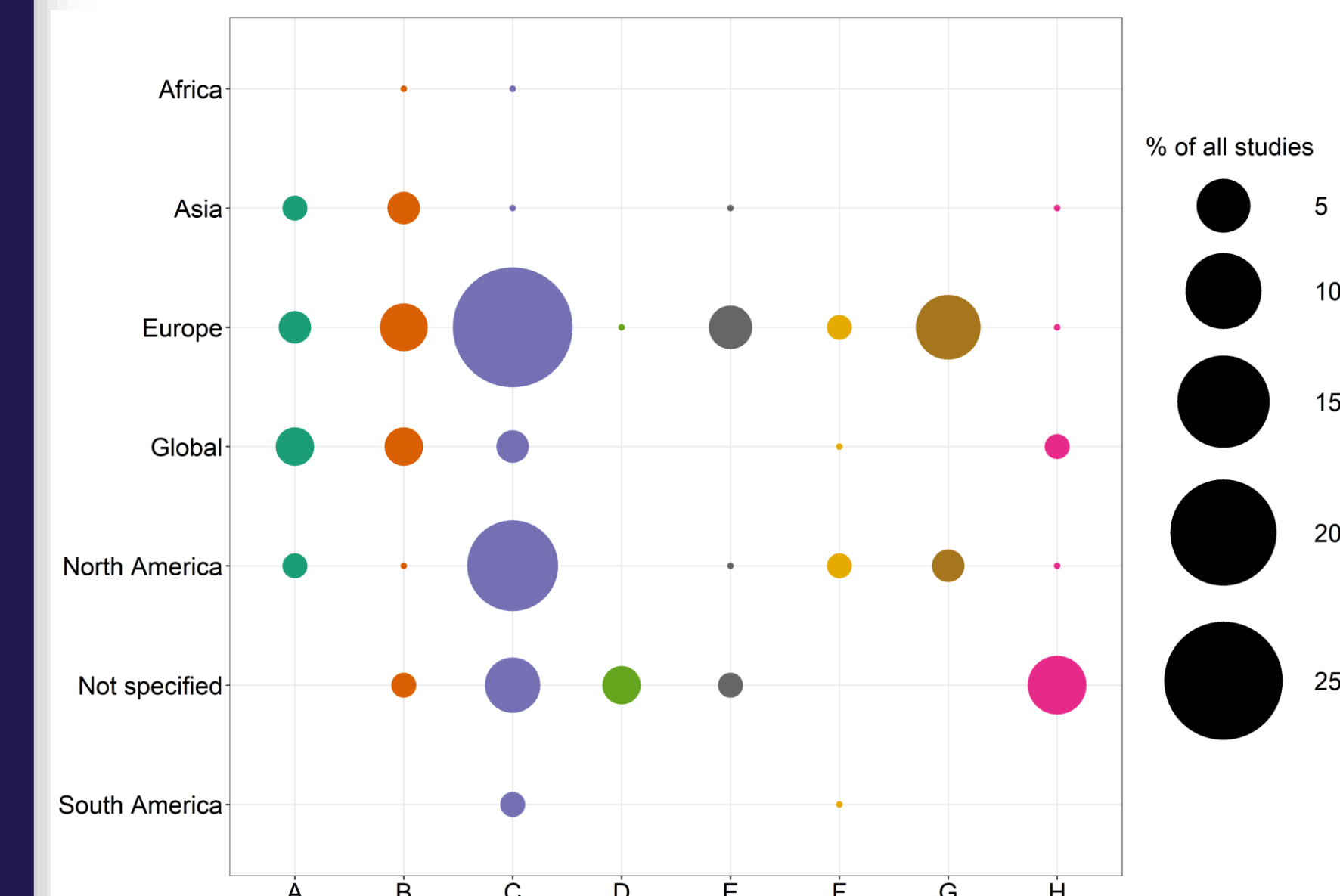


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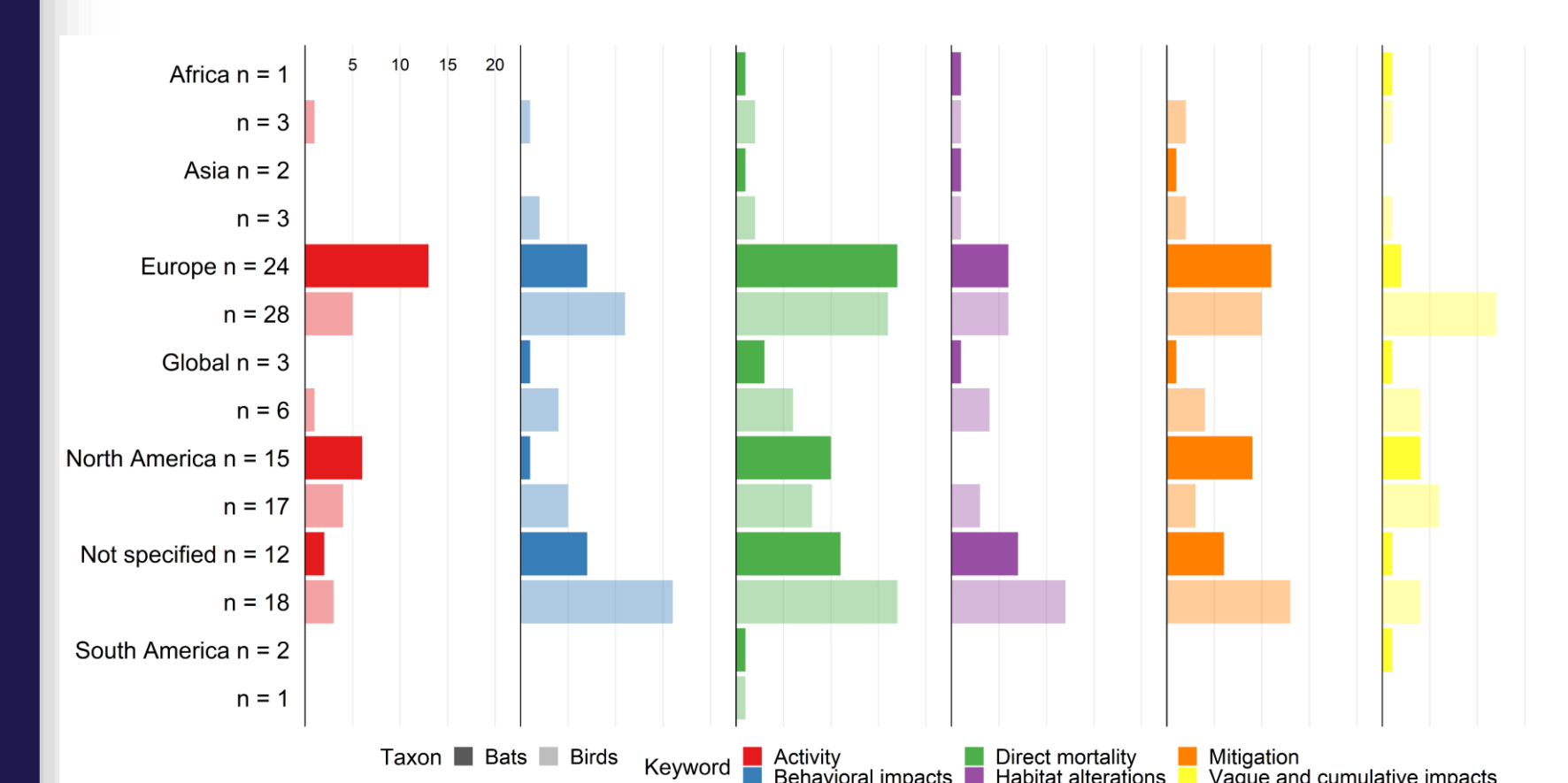
## Discussion

- Data scarcity for some impact categories
- Geographical and content-related research bias
- Inadequate research design
- Local and context-specific effects
- Broader context of other anthropogenic influences
- Efficacy of mitigation strategies
- Reinforcing before-after control-impact (BACI) design for all impact pathways

## Additional info



Spatial distribution of the reviewed studies addressing the impacts on the abiotic environment (A), impacts on the biotic environment (B), impacts on birds and bats (C), noise impacts (D), visual impacts (E), other impacts (F), social acceptance of onshore wind energy (G), and multiple impacts (H).



Impacts on birds and bats in studies from different regions. N denotes the number of studies.



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