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Plastic at the top: occurrence, characteristics and research challenges of microplastics in birds of prey

Plastika na vrhu - učestalost, obilježja te izazovi istraživanja mikroplastike u grabljivicama

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INTRODUCTION & AIM

Microplastics (MPs) are widespread contaminants of terrestrial ecosystems, yet their occurrence in birds of prey remains relatively understudied. Due to their high trophic position and diverse feeding strategies, raptors can be useful sentinels of plastic transfer through terrestrial food webs.

This review synthesized published evidence on occurrence, dominant particle shape and polymer composition of MPs and other anthropogenic plastic particles in birds of prey.

MATERIALS & METHODS

- Literature review based on Scopus, ResearchGate and Google Scholar
- 20 studies included after screening
- Sample types: pellets, digestive tract, faeces and related matrices
- Main variables: occurrence/prevalence, dominant particle shape, polymer composition
- Abundance interpreted descriptively because units and matrices differed among studies

KEY NUMBERS

20 included studies

18 studies reporting a dominant shape

Reported mean abundance ranged from 0.85 to 15.0 MPs per pellet. Differences in sampling and analytical methods prevented a pooled estimate.

RESULTS

Across studies that reported a dominant shape, fibres prevailed most often (61.1%), followed by fragments (22.2%), sheet-like plastics (11.1%) and films (5.6%) (Fig. 1).

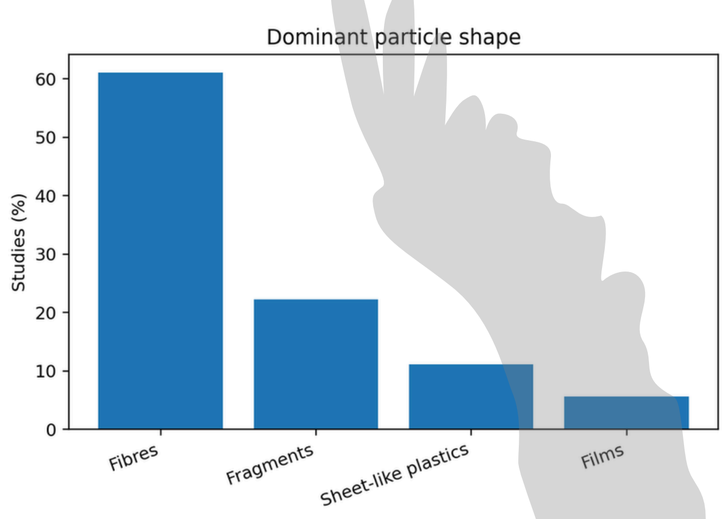


Figure 1. Dominant particle shape

Descriptive grouping of 18 studies reporting particle-shape information; studies used different particle-size definitions.

Polymer composition was diverse (Fig. 2). PE was the most recurrent polymer across extracted studies, followed by PP, PET and PVC; PAN, PS and PA/nylon were also reported.

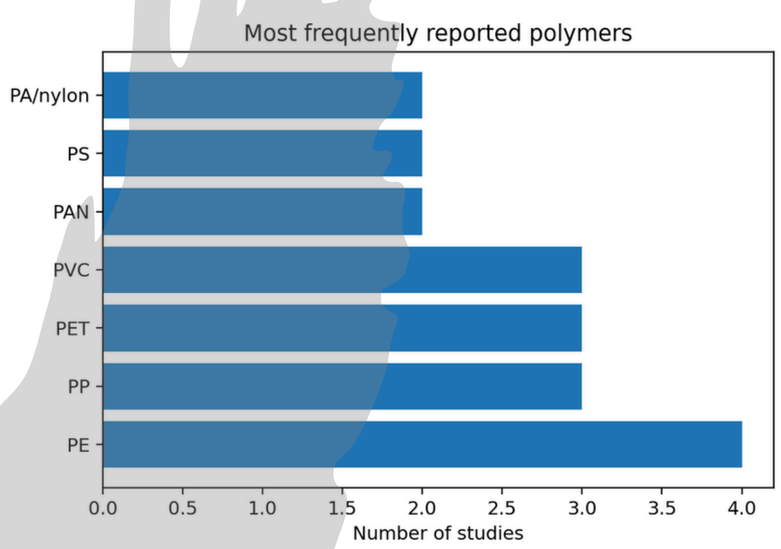


Figure 2. Most frequently reported polymers

Includes studies of different plastic size classes; values indicate the number of studies reporting each polymer group.

Selected occurrence patterns

- Plastic particles were reported from pellets, digestive tracts and faeces.
- Zero-detection examples included Great horned owl, Barn owl and Red-tailed hawk in upper gastrointestinal tract samples from British Columbia, and *Bubo bubo*, *Asio otus* and *Tyto alba* in whole-GIT rehabilitation samples.
- Complete occurrence (all analysed individuals positive) was reported in several whole-GIT studies, including Red-shouldered hawk, Osprey, Barred owl, Eastern screech owl, Black vulture and Turkey vulture, and in all four species examined in one Madrid study.
- Reported occurrence varied strongly among species, localities and matrices.

Methodological challenges

- Different sample matrices and study designs
- Unequal reporting units (per pellet, per individual, per gram)
- Variable use of chemical confirmation
- Some studies measured broader anthropogenic plastic debris, not only confirmed MPs

CONCLUSION

Birds of prey are clearly exposed to plastic pollution across terrestrial environments. Fibres dominate most often, while reported polymer composition remains heterogeneous. Future studies should use standardised sampling, chemical confirmation and comparable reporting metrics.



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