Impact of Marine Debris on Wildlife and Fisheries

Current Knowledge and Data Gaps

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Litter and macroplastics

- **Ingestion** – animals mistakenly eat plastic or other debris

- **Entanglement** – animals get caught up or and killed in marine debris or other derelict fishing gear

- **Habitat Damage** – marine debris can crush sensitive habitats like coral reefs and sea grass

- **Transport for non-indigenous species** – from one region to another

- **Vector for pathogens** – debris and plastics can carry bacteria

- **Harmful toxic effects** – chemical additives associated with plastic production or sorbed from the environment

- **Smothering** – prevent oxygen and nutrient flow, blocking light, compromising ecosystem services

Image: Plastic Oceans

Rochman 2015
Microlitter and microplastics

- **Ingestion** – animals mistakenly eat plastic or other debris

**Physical characteristics**
(e.g., shape, size, surface area etc.)

Prey size
Life history

Marine debris impact on wildlife
Current state of knowledge: Fish

- Global data showing fish interact with plastics and marine debris
- Fewer studies have explored the consequences of interactions
- Sampling has primarily focused on digestive tract
- Even less have considered trophic transfer and bioaccumulation

*Savoca et al., 2021*
Marine Debris Impact on Wildlife

Microlitter and microplastics
- **Ingestion** – animals mistakenly eat plastic or other debris
- **Ecosystem disruption** – microplastics can disrupt biological processes within wildlife – including feeding, nutrition, growth, reproduction and survival
- **Trophic transfer** – microplastics move within food webs from prey to predator
Marine Debris Impact on Wildlife
What does the data show?

Growing field of research with a large number of new or improved analytical methods provided on a monthly basis

Various types of extraction and analytical methods applied to assessment of biota limits comparability

Example of exponential growth in «microplastic» research – literature search specifically for methods (excludes reviews)
Preliminary data – analysis on going

Groups of biota investigated for plastics

- Invertebrates
- Fish
- Bivalves
- Amphibian
- birds
- mammals
- plants
- reptiles

Size of plastics studied in fish

- nano
- micro
- meso
- macro

Location

- Sub compartment
  - birds
  - bivalves
  - fish
  - invertebrates (excl bivalves)
  - mammals
  - other
  - plants
  - reptiles

Which tissue?

- Whole organism
- GIT
- Muscle
- Other

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Reporting is fundamental

- Size or mass of organism
- Abundance or mass of debris
- Size of debris: <5mm or >1mm?
- More standardised for macrolitter / debris

Cowger et al., 2020

Dioses-Salinas et al., 2020

Microplastic Reporting Guidelines

- Components to Report in All Procedures
- Field Sampling
- Sample Preparation
- Microplastic Identification
- Microplastic Categorization
- Microplastic Quantification
- Toxicology Considerations

units (e.g. kg, count, mm, %)
size dimensions (e.g. from minimum or maximum)
quantification techniques

Cowger et al., 2020
Why do we need harmonisation?

• There are growing requirements for countries to monitor plastic pollution

• Many different suggested approaches are emerging

  • e.g., Europe: EU Member States and Regional Sea Conventions must ratify monitoring frameworks and instruments
Why do we need harmonisation?

Different approaches for analysis can hamper the setup and design of large scale databases and therefore the assessment of marine debris

• Between different labs and different countries
• Application for monitoring, risk assessment and legislation.

To reach substantial improvements in environmental sustainability and socio-economic development, it is essential to undertake major actions for the evaluation and optimization data generated during assessments of marine debris.
Summary

- Marine debris can impact wildlife and fisheries in several ways.

- We have a lot of work to do as an international community to reach harmonization in our data.

- We need data platforms which can account for variations in data and methods to generate comparable datasets.
Thank you for listening

Questions?

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