



BACKGROUND

'Persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment' (UNEP, 2021).

Plastics are the largest, most harmful and persistent proportion of global marine litter, accounting for approximately 85% of marine waste. Without intervention, plastic waste entering aquatic ecosystems is projected to triple from 9-14 million tonnes per year in 2016, to 23-37 million tonnes per year by 2040 (UNEP, 2021).

Marine litter has been acknowledged as a threat multiplier that acts with other stressors such as climate change to cause greater damage than if they were to occur in isolation. Climate change can lead to increased input of litter to the environment, but litter can also inhibit climate resilience of aquatic ecosystems. Understanding these connections is vital toward managing the combined risks, particularly as the impacts on species, habitats and ecosystems vary widely across oceanic regions.

This study explores these interactions and highlights five case studies on the combined threats from climate change and marine litter

CASE STUDIES

Caribbean Sea

Commercially important queen conch and spiny lobster are under threat from ocean acidification, increased storminess, rising sea temperature, and microplastics. Many Caribbean countries are not meeting their potential as international beach destinations due to scenic degradation from litter and seaweed blooms.



Deep Sea

Deep sea species and habitats are vital in maintaining oceanic productivity. Although generally free of human influence, some of the highest concentrations of marine plastic ever found are reported from deep-sea sediments: 1.9 million particles per m².



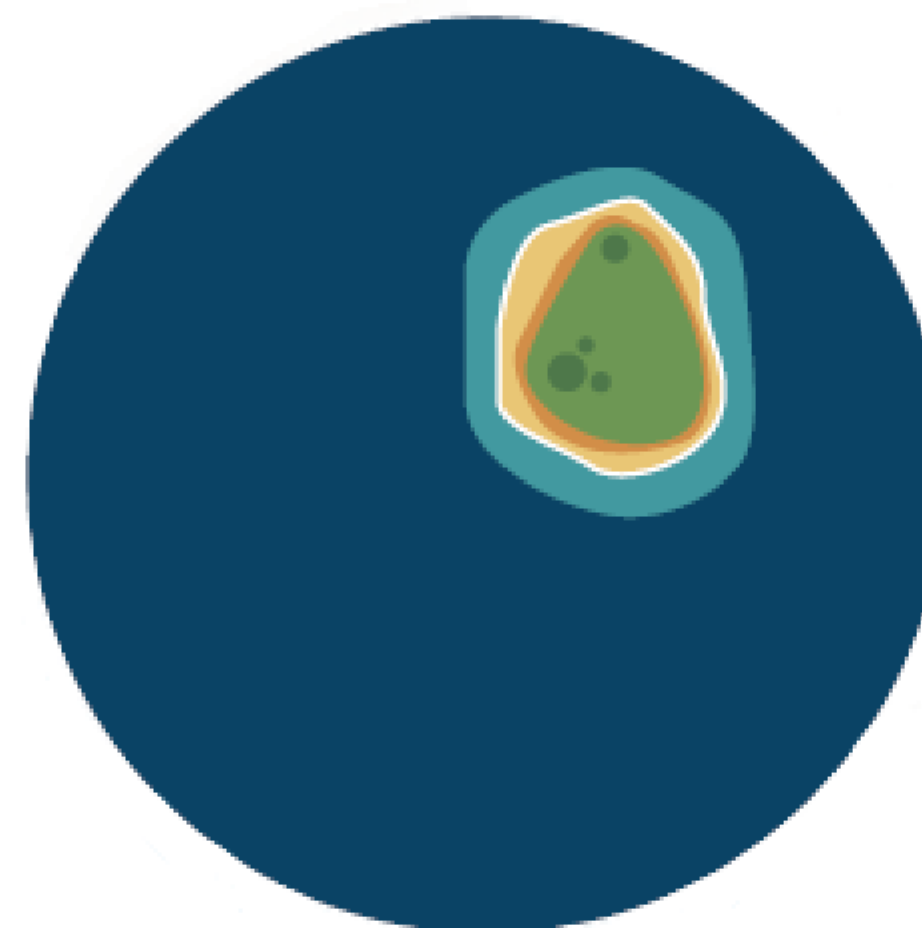
Mediterranean Sea

The world's largest and deepest semi-enclosed sea is also one of the most polluted, with the highest concentration of floating microplastics ever recorded: over 40,000 items per m³. Marine mammals are of particular concern as injuries and mortality from entanglement and ingestion of litter, combined with overfishing, noise and climate change are driving population declines.



Remote Oceanic Islands

Litter accumulates on remote islands, carried by oceanic currents and gyres. Litter pollution on the islands exacerbates the effects of climate change damaging corals, suffocating mangroves and exposing many vulnerable species to plastic ingestion and entrapment.



Polar Regions

Litter combined with other pressures such as fishing and pollution undermine the resilience of polar regions to climate change and their fragile ecological balance, threatening the important ecosystem services they provide.

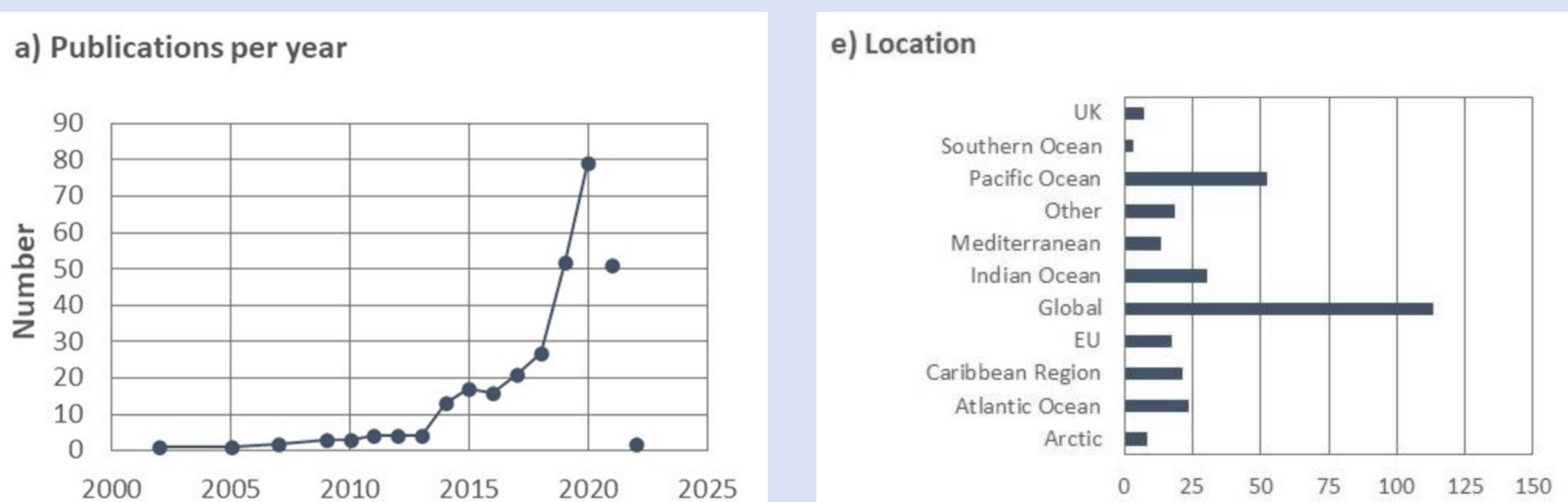


APPROACH: SYSTEMATIC REVIEW

A systematic online search was conducted using the rapid evidence assessment methodology (Smithers, 2015), using online bibliographic databases and search engines. Searches involved combinations of pre-selected keywords linked with climate change and marine litter. The literature was screened by individuals with good knowledge of the topic to confirm they were relevant and accessible.

GROWING RECOGNITION OF THE ISSUE

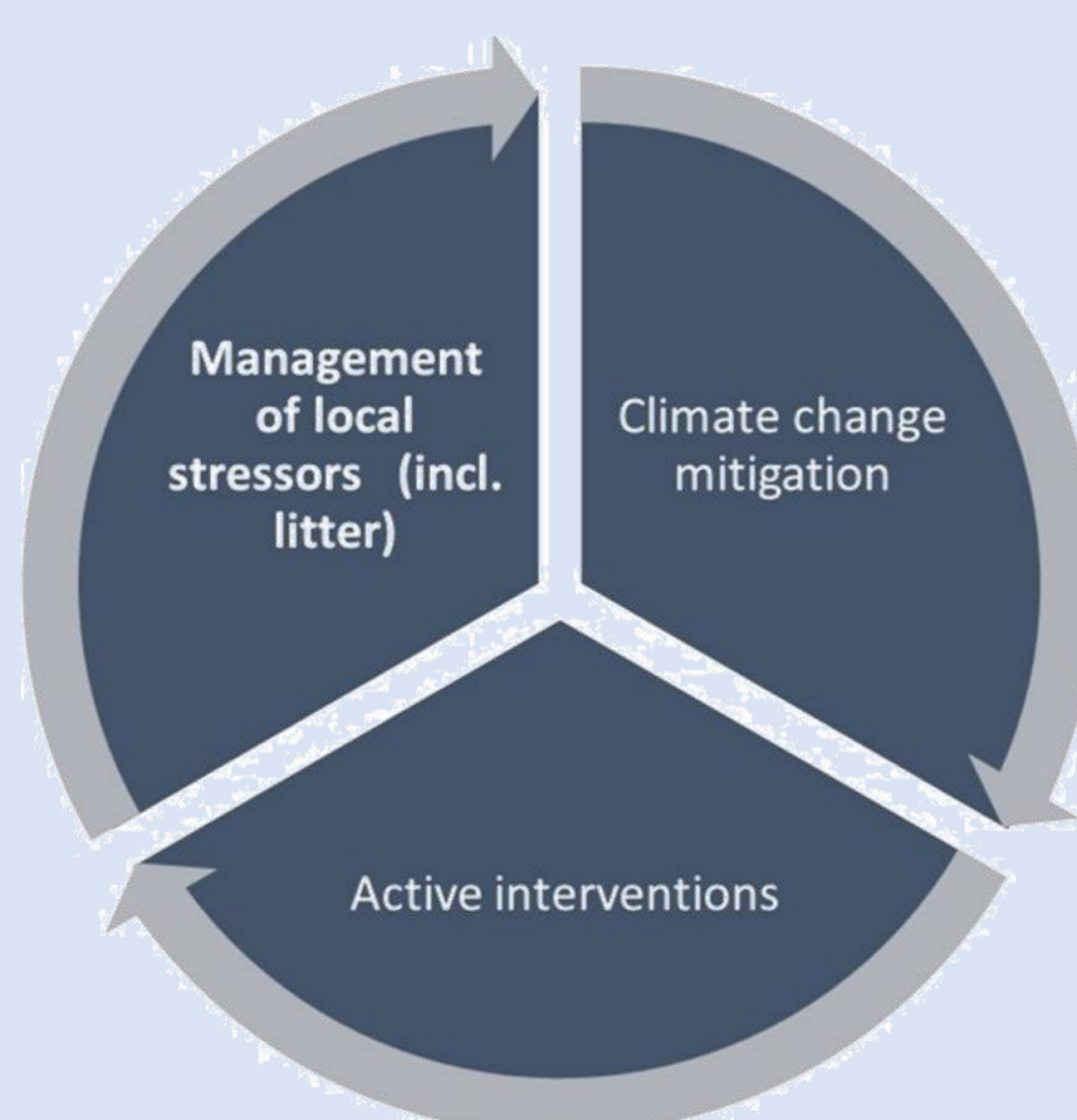
A total of 305 bibliographic references were included in the final list. The review showed that since 2003 to 2015, there has been a steady yearly increase in the number of studies looking into climate change and marine litter combined. Almost half (143) of all entries were desk-based reviews, followed by observational studies (102). 115 studies were found to approach the topic on the global scale, followed by regional, local and country scale studies. Geographically, the Pacific region had the greatest number of studies on these two challenges combined.



CHALLENGES

- In coastal areas, the combined effects of litter and climate change can degrade the marine environment and cause lower fish catches.
- This can affect livelihoods and potentially cause human health risks.
- The links between marine litter and climate change vary depending on the type of environment, levels of human activity, and human behaviours, as demonstrated in the case studies.

CONCLUSIONS



BUILDING RESILIENCE

- Climate resilient ecosystem approaches can help direct and prioritise research and monitoring, as well as management, policy, planning and action.
- This study provides a framework for managing the risks and mitigating the impacts from the combined threats of climate change and marine litter.

REFERENCES

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For more information, see our paper in *Science of the Total Environment*:

