POLICY ANALYSIS TO REDUCE MICROPLASTICS FROM RESERACH FACILITIES IN ANTARCTICA

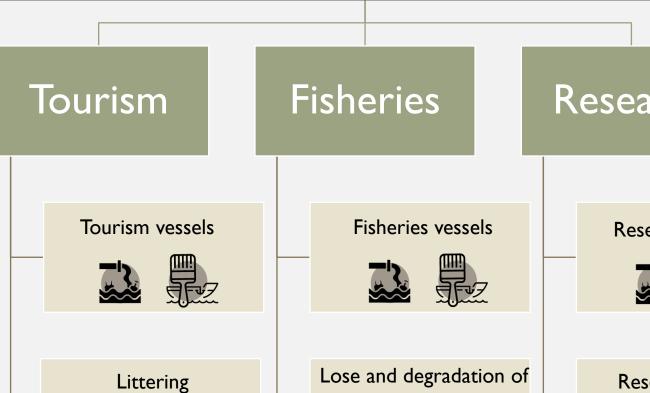
By Aanchal Jain, Clara Manno & Kevin Hughes





POTENTIAL MICRO PLASTICS FLOWS IN ANTARCTICA ENVIRONMENT

fishing material



Research

Research vessels





Research facilities

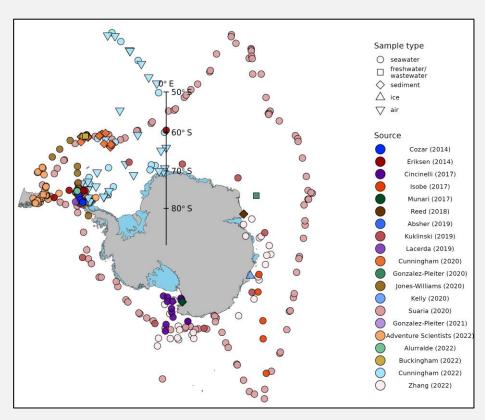




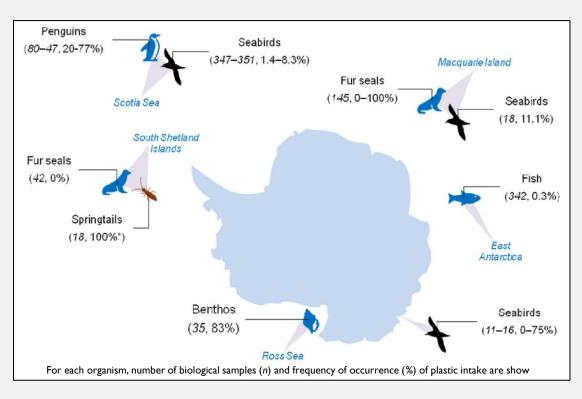


MICROPLASTICS ABUNDANCE AND IMPACTS ON ANTARCTIC ECOSYSTEM

Numerous sampling and field observations have confirmed the presence of plastic particles in the Antarctic environment and their ingestion by Antarctic biota.



Plastic samples collected between 2010 and 2022; Source: Hunter et al., 2024 (in prep)



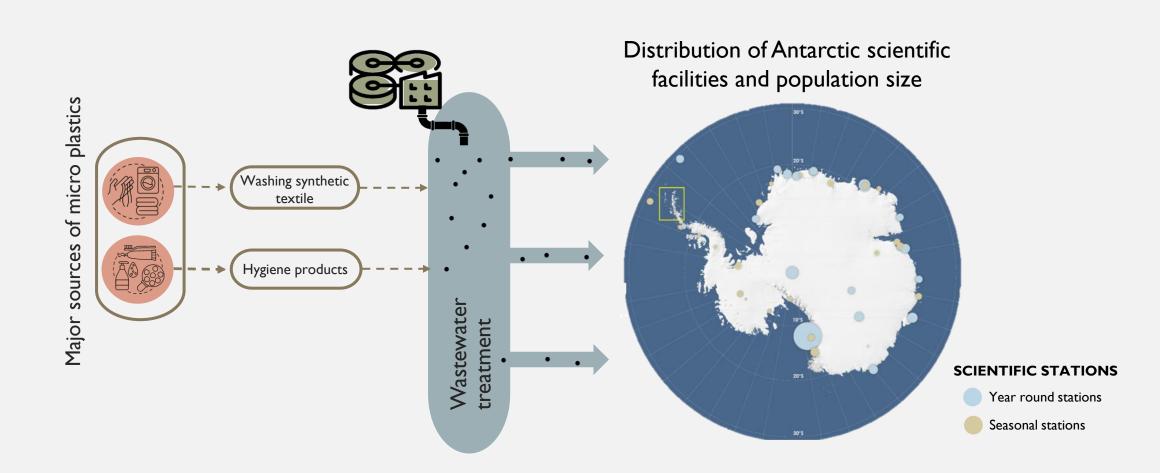
Distribution of field observations of plastic litter intake by Antarctic biota; Source: Caruso et al., 2022

RESEARCH QUESTION

How to effectively mitigate microplastics release from wastewater from scientific research facilities in Antarctica.

- Quantify the potential release of microplastics from wastewater generated by scientific research stations in Antarctica ecosystem.
- Evaluate and compare various policy options to reduce microplastic pollution in the Antarctic environment.

MICROPLASTICS RELEASE FROM RESEARCH STATIONS IN ANTARCTICA



METHOD

Total amount of microplastic produced from scientific stations

Step 1: Estimation of microplastics produced through washing machines

Literature review



Step 2: Estimation of microplastics produced through the use of hygiene and personal care products

Literature review



Step 3: Estimation of microplastics release in the environment

COMNAP survey



Cost efficiency analysis

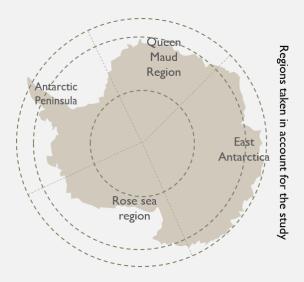
Literature review



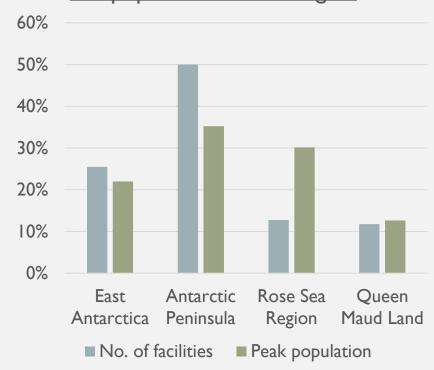
dentification of potential treatment options

Literature review

RESULTS: MICROPLASTIC LEAKAGE



Proportion of scientific facilities and population in each region



Potential amount of microplastics production from each region

■ Microplastic effectively removed though WWTS (in kg)

■ Microplastic release in environment (in kg)







	Option I	Option 2	Option 3	Option 4	Option 5
Wastewater treatment management (1°: primary; 2°: secondary; 3°: tertiary)	I° & 2°	I°, 2° & 3°	I°& 2°	I° & 2°	-
Prevention measures	-	-	Washing machine filters	Ban on hygiene products with microbeads	Washing machine filters & Ban on hygiene products with microbeads
Annual cost per person per year (US\$)	378	527	446	378	68
Removal efficiency (for 1 person per year - in grams)	55.40	59.10	59.10	55.67	48.92
Removal efficiency per US \$	15%	11%	13%	15%	72%

CONCLUSION

Low-cost
preventive
solutions: washing
machine filters and
eco-friendly
products

Long term
solution:WWTS
to remove all
pollutants from
wastewater

Development
of methodology
to support
further analysis

FURTHER RESEARCH AND SCOPE

- I. Conduct comprehensive analyses of microplastic releases from all activities and develop targeted solutions specific to each activity (Postdoctoral Research project)
- 2. Comparative legal analysis and understanding the challenges of implementation environmental policies in Antarctic system (SCAR Fellowship)

THANK YOU!