

Wool in Aquatic Environments

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Microplastic pollution has emerged as one of the most critical global challenges of our times. It is estimated that 12.2 million tonnes of plastic enter the global marine environment each year. Of this, 3.2 million tonnes are estimated to be primary microplastics, i.e. particles less than 5mm in size released directly into the environment.

One major source of microplastics is the shedding of fibres during machine washing of synthetic textiles. Through the laundry wastewater streams these microfibrils enter marine systems where they are ingested by aquatic organisms and enter the food chain or accumulate on the ocean floor.

One strategy against the problem is to increase the use of natural fibres such as wool in apparel as well as interior textiles. Initial research suggests that wool readily biodegrades in water.

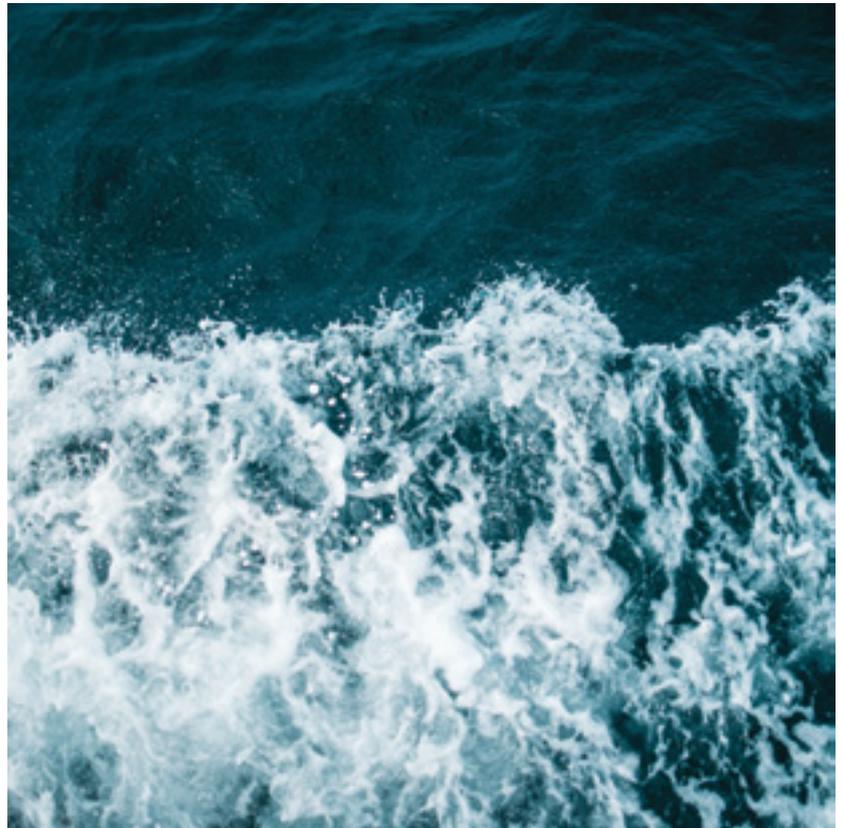
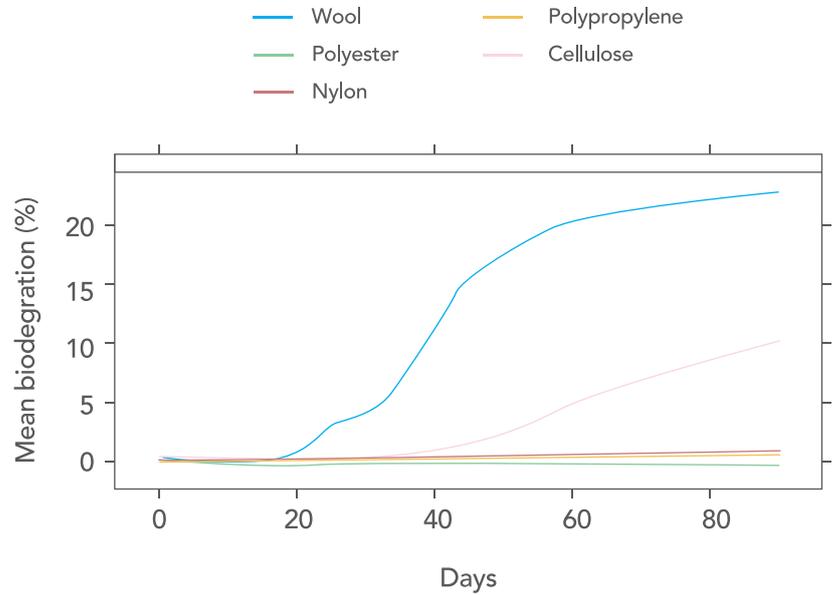
- Wool has been shown to be biodegradable in marine environments, in laboratory and on-site testing.
- In vitro experiments in New Zealand showed surface damage to wool fibres after 21 days incubation in sea water.²
- Bacteria were observed to play an important role in marine degradation. In soil, fungi first weaken the wool fibre after which bacteria then break down the remaining elements.²
- After 7 to 8 months the deterioration of wool fibres is quite advanced.²
- Preliminary data showing that, if ingested, the proportion of natural microfibrils in the digestive tract of birds declined from throat indicating that they are likely being digested.³

Further research is underway to understand how wool interacts with the natural environment, building a strong evidence base around wool properties.

Rates of Decomposition in Marine Environments ^{4, 5}

| Item | Time to Biodegrade |
|---|--------------------------|
|  Cotton shirt | 2-5 months ² |
|  Wool sock | 1-5 years ² |
|  Nylon fabric | 30-40 years ³ |
|  Leather | 50 years ³ |
|  Rubber boot sole | 50-80 years ³ |
|  Disposable diaper | 450 years ³ |

Biodegradation of Textile Fibres



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¹ Eunomia (2016). *Plastics in the Marine Environment*. Eunomia Research & Consulting Ltd, Bristol UK, June 2016. <https://www.eunomia.co.uk/reports-tools/plastics-in-the-marine-environment/>

² Brown R.M. (1994). *The Microbial Degradation of Wool in the Marine Environment*. Thesis for the degree of Master of Science in Microbiology, University of Canterbury, New Zealand.

³ Zhao, S., Zhu, L., Li, D., 2016. Microscopic anthropogenic litter in terrestrial birds from Shanghai, China: not only plastic but also natural fibers. *Sci. Total Environ.* 550, 1110–1115. <https://doi.org/10.1016/j.scitotenv.2016.01.112>

⁴ NOAA (2007). *NOAA 101 Clean Guide*. National Oceanic and Atmospheric Administration Marine Debris Program, US Department of Commerce

⁵ Ocean Conservancy & NOAA (2013). *Talking Trash & Taking Action*. Publication of the Talking Trash & Taking Action Educational Program of the Ocean Conservancy and National Oceanic and Atmospheric Administration Marine Debris Program <https://marinedebris.noaa.gov/talking-trash-and-taking-action>