

1. Record Nr.	UNINA9910502668803321
Autore	Bank Michael S
Titolo	Microplastic in the Environment
Pubbl/distr/stampa	Cham, : Springer International Publishing AG, 2021
ISBN	3-030-78627-7
Descrizione fisica	1 online resource (364 p.)
Collana	Environmental Contamination Remediation and Management
Soggetti	Environmental management Environmental science, engineering & technology Environmental medicine Climate change
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di contenuto	Intro -- Foreword -- Preface -- Microplastics on the Rise -- Acknowledgments -- Contents -- Contributors -- Chapter 1: The Microplastic Cycle: An Introduction to a Complex Issue -- 1.1 Introduction -- 1.2 Fluxes of Microplastics Across Ecosystem Compartments -- 1.3 Microplastic and Terrestrial Ecosystems -- 1.4 Microplastic and Freshwater Ecosystems -- 1.5 Microplastic and Marine Ecosystems -- 1.6 Microplastic and the Atmosphere -- 1.7 Microplastic in Biota -- 1.8 Microplastics and Public Policy -- 1.9 Conclusions -- References Chapter 2: Analytical Chemistry of Plastic Debris: Sampling, Methods, and Instrumentation -- 2.1 Introduction -- 2.2 About the Analytes -- 2.3 Sampling -- 2.3.1 Aqueous Matrices -- 2.3.2 Air Samples -- 2.3.3 Sediments, Soils, and Dust -- 2.3.4 Biological Samples -- 2.3.5 Sample Preservation -- 2.4 Laboratory Processing -- 2.4.1 Sample Preparation -- 2.4.2 Chemical and Enzymatic Digestion -- 2.4.3 Physical Separation of Plastics from the Matrix: Filtration and Sieving -- 2.4.4 Density and Other Physical Separation -- 2.4.5 Solvent Extraction -- 2.5 Microplastic Detection and Instrumentation 2.5.1 Visual Identification -- 2.5.2 Dyes and Fluorescence Microscopy -- 2.5.3 Electron Microscopy (EM) -- 2.5.4 Chromatography -- 2.5.5 Infrared (IR) Spectroscopy -- 2.5.6 Raman Spectroscopy -- 2.5.7

Scanning Probe Microscopy (SPM) -- 2.5.8 Mass Spectrometry (MS) --
2.5.9 Thermal Analysis Techniques -- 2.5.10 X-ray Photoelectron
Spectroscopy (XPS) -- 2.6 Microparticle Classes of Emerging Concern
-- 2.6.1 Surface Coatings/Paints -- 2.6.2 Tire Particles -- 2.7 Quality
Assurance and Quality Control -- 2.8 Conclusion -- References
Chapter 3: Evaluating Microplastic Experimental Design and Exposure
Studies in Aquatic Organisms -- 3.1 Introduction -- 3.2 MP Parameters
-- 3.2.1 Chemical and Physical Character of MP -- 3.2.2 Primary vs.
Weathered MP -- 3.2.3 Microplastic Co-contaminants -- 3.2.4
Application of Labelled Microplastics in Experimental Exposure Studies
-- 3.3 How to Design a Meaningful Experimental Exposure Study? --
3.3.1 Mode of Exposure -- 3.3.2 Concentration of MP for Exposure
Studies -- 3.3.3 Surfactants -- 3.3.4 Duration of Exposure -- 3.4
Recommendations -- References
Chapter 4: Microplastics in Terrestrial and Freshwater Environments --
4.1 Introduction -- 4.2 Microplastics in Terrestrial Environments --
4.2.1 Agriculture -- 4.2.2 Urban Environments -- 4.2.2.1 Roads --
4.2.3 Occurrence of Microplastics in Terrestrial Organisms -- 4.3
Pathways to Freshwater Environments -- 4.3.1 Transfers
from Agricultural Environments -- 4.3.2 Transfers from Urban
Environments -- 4.3.2.1 Littering and Leaching of Plastic Waste --
4.3.2.2 Urban Drainage -- 4.3.2.3 Road Runoff -- 4.3.2.4 Wastewater
Treatment Plant (WWTP) Effluents -- 4.4 Microplastics in Freshwater
Systems
4.4.1 Microplastics in Rivers

Sommario/riassunto

This open access book examines global plastic pollution, an issue that has become a critical societal challenge with implications for environmental and public health. This volume provides a comprehensive, holistic analysis on the plastic cycle and its subsequent effects on biota, food security, and human exposure. Importantly, global environmental change and its associated, systems-level processes, including atmospheric deposition, ecosystem complexity, UV exposure, wind patterns, water stratification, ocean circulation, etc., are all important direct and indirect factors governing the fate, transport and biotic and abiotic processing of plastic particles across ecosystem types. Furthermore, the distribution of plastic in the ocean is not independent of terrestrial ecosystem dynamics, since much of the plastic in marine ecosystems originates from land and should therefore be evaluated in the context of the larger plastic cycle. Changes in species size, distribution, habitat, and food web complexity, due to global environmental change, will likely alter trophic transfer dynamics and the ecological effects of nano- and microplastics. The fate and transport dynamics of plastic particles are influenced by their size, form, shape, polymer type, additives, and overall ecosystem conditions. In addition to the risks that plastics pose to the total environment, the potential impacts on human health and exposure routes, including seafood consumption, and air and drinking water need to be assessed in a comprehensive and quantitative manner. Here I present a holistic and interdisciplinary book volume designed to advance the understanding of plastic cycling in the environment with an emphasis on sources, fate and transport, ecotoxicology, climate change effects, food security, microbiology, sustainability, human exposure and public policy.
