

Dr. Alexander Kunz (孔燕翔)

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Lab website link: <https://microplasticresearch.wordpress.com/>

YouTube channel: <https://www.youtube.com/@microplasticresearchtaiwan>

EDUCATION

2010	Dr. rer. nat. (PhD equivalent)	Institute of Ecology, Leuphana University of Lüneburg, Germany
2005	Dipl.-Geol. (MSc equivalent)	Department of Geosciences, University of Cologne, Germany

EMPLOYMENT

2022 – present	Principal Investigator	Research Center for Environmental Changes, Academia Sinica, Taiwan
2019 – 2022	Principal Investigator	Department of Geosciences, National Taiwan University, Taiwan
2011 – 2019	Research Scientist	Department of Geosciences, National Taiwan University, Taiwan
2006 – 2010	PhD Research Associate	Leuphana University, Faculty for Environmental Sciences and Engineering, Lüneburg, Germany
2007 – 2008	Lab Manager, Gamma-ray Spectrometry	Leibniz Institute for Applied Geophysics, Section S3: Geochronology and Isotope Hydrology, Hannover, Germany
2005/10 – 2005/12	Project-Based Geospatial Analyst	Lithosphere - Applied 3D Geological Surveying Ltd. & Co KG, Cologne, Germany

Detailed information about past employments can be found on my LinkedIn profile here:

[LinkedIN Dr. Alexander Kunz](#)

RESEARCH INTEREST

Dr. Alexander Kunz brings a rich background in Quaternary geology and geochronology to his current pioneering research on plastic pollution. Initially focusing on microplastics in the environment, Dr. Kunz's work began with studying beach pollution and its interaction with the ocean. He then expanded his research to freshwater systems, investigating pollution levels, sources, and pathways of microplastics in Taiwanese rivers. Through collaborative efforts with his team, Dr. Kunz provides vital advice to policymakers and stakeholders on preventing microplastic pollution. Now, his focus has broadened to encompass plastic pollution in general, working closely with NGOs to develop sustainable environmental solutions. Dr. Kunz's ability to secure significant research funding and lead interdisciplinary teams underscores his commitment to advancing our understanding and mitigation of environmental pollutants.

RESEARCH HIGHLIGHTS

Tackling Marine Plastic Waste: Recycling Challenges and Innovations in Taiwan. Marine litter, mainly synthetic polymers or plastics, poses significant economic, social, and environmental challenges. This waste harms marine wildlife through entanglement and ingestion, spreads invasive species, releases toxic additives, contaminates the food chain, and jeopardizes human health. Current estimates indicate up to 130 million tons of plastic waste in our oceans, with about 2.7 million tons entering marine environments annually. If current practices continue, mismanaged plastic waste could reach 265 million tons per year by 2060.

Efforts to reduce plastic waste include banning single-use plastics and conducting cleanups. However, the challenge remains in managing collected marine litter, often contaminated and degraded, making recycling difficult without advanced treatments. Landfilling and incineration, common strategies, result in lost raw materials and environmental pollution. Recent advancements show potential for converting marine litter into industrial raw materials or consumer products, such as plastic pellets from fishing gear or generating pyrolysis oil and syngas. However, viable solutions for other marine litter components, like hard plastic floats and buoys, are still limited.

Taiwan serves as a prime example due to extensive efforts and research on marine litter pollution. Evaluating the recyclability of hard plastic buoys and floaters commonly found along the coastline reveals significant opportunities. Engaging recycling operators, plastic resin producers, consultants, and brand owners helps in understanding their interest and capabilities in recycling these items. Developing practical strategies can enhance recycling's effectiveness and sustainability, including decision models outlining recycling steps and factors.

There is a general willingness to recycle marine debris among business sectors and stakeholders. However, high recycling costs make recycled products expensive and uncompetitive. Solutions like government subsidies, tax benefits, and financial incentives are crucial to encourage recycling efforts. Recycling companies face challenges with marine debris due to its mixed nature and often unfavorable material composition. Developing cost-effective methods for handling marine debris is essential. Standardizing material identification and promoting recyclable materials in fishing gear and other marine equipment can improve recycling processes. Tailored approaches are needed for different types of marine debris. Marking plastic items with material codes, designing products for

recyclability, and implementing stricter controls on hazardous chemicals can enhance recycling feasibility.

In summary, while there is clear interest in recycling marine debris, significant economic and material-related challenges remain. Addressing these issues through financial incentives, improved recycling technologies, and regulatory measures is crucial for developing a sustainable marine debris recycling industry. These efforts provide a solid foundation for future strategies aimed at mitigating marine pollution and promoting environmental sustainability.

Plastic Pollution in Freshwater Environments: A Growing Crisis. Plastics have revolutionized human life with their versatility, but improper disposal has caused significant environmental damage, especially in our rivers and freshwater systems. Microplastics, tiny particles from the breakdown of larger plastic items, migrate from land to water bodies, posing severe threats to water resources and human health.

Microplastics are found in sediments, surface waters, and organisms, affecting the health of humans, animals, and entire ecosystems. Despite growing awareness, freshwater plastic pollution, especially in Asia, remains under-researched compared to marine environments. Most studies have focused on European and North American rivers, but understanding microplastic pollution in rivers worldwide is crucial as these pollutants often end up in the oceans.

Rivers are major conduits for plastic waste, with Asian rivers identified as the most polluting, contributing 86% of the total global plastic waste entering the oceans annually. Although research on microplastic pollution in rivers has increased, the transport mechanisms, sources, and ecological impacts are still not fully understood. Additionally, other freshwater environments such as lakes, reservoirs, and aquaculture ponds have received even less attention.

Asia, particularly China, India, and Japan, is a significant contributor to global plastic pollution due to rapid industrialization and inadequate waste management. This has burdened their rivers with plastic, making them major sources of marine pollution. Comprehensive research on freshwater systems in Asia is urgently needed to inform risk assessments and policy development.

Microplastics threaten water quality and freshwater ecosystems by containing harmful chemicals and releasing persistent organic pollutants. Plastics degrade slowly and can remain in the environment for centuries, exacerbating pollution problems.

Understanding the extent and impact of microplastic pollution in freshwater systems is essential for developing effective strategies to combat this issue. Comprehensive research and targeted policies are needed to address the environmental challenges posed by plastic waste in rivers, ultimately contributing to global efforts to reduce marine plastic pollution.

REPRESENTATIVE PUBLICATIONS

A full list of all publications is available on Google Scholar. Please follow this link:

[Google Scholar Dr. Alexander Kunz](#)

MEDIA PRESENCE

The work of Dr. Alexander Kunz was featured in several news articles, news reports, radio interviews, as well as documentaries. Following links provide access to several videos and online newspaper articles:

Summary of videos and radio interviews	<u>https://microplasticresearch.wordpress.com/media/</u>
List of videos and news articles about microplastics in Taiwanese rivers	<u>https://microplasticresearch.wordpress.com/list-of-videos-and-news-articles-about-microplastics-in-rivers/</u>
List of news articles related to the 2022 Greenpeace project about microplastics in wild animal feces	<u>https://microplasticresearch.wordpress.com/list-of-news-articles-related-to-the-2022-greenpeace-project/</u>
YouTube playlist of documentaries and reports where our team was involved (all in Chinese)	<u>Microplastic Research Taiwan Playlist 1</u>
YouTube playlist of media coverage showing our research about microplastics in Taiwanese rivers (all in Chinese)	<u>Microplastic Research Taiwan Playlist 2</u>