



Call for PhD Candidates

Pollution Solutions

Project Description

Project 1: The Plastisphere Mobilome: Unravelling the Role of Horizontal Gene Transfer in Microbial Adaptation and Biogeochemical Perturbation

The widespread accumulation of plastic waste in soil, water and marine environments has led to the formation of unique microbial ecosystems, collectively termed the "plastisphere". These communities colonise plastic surfaces and are known to include diverse microbial species, including bacteria, archaea, and fungi. One of the key features of microbial life is their ability to adapt rapidly to environmental changes, often facilitated by a powerful evolutionary mechanism known as horizontal gene transfer (HGT). This research aims to investigate the "mobilome"—the collective of all mobile genetic elements (MGEs)—within the plastisphere, and its implications for microbial evolution and significant alterations to ecological processes or functions, i.e., water purification, carbon metabolism and nutrient cycling.

Plastisphere samples will be collected from environmental matrix (i.e., wastewater streams, biosolids, and coastal wetlands), and subsequently will be assessed to: a) characterise the genetic composition of MGEs within plastisphere communities; b) determine the modes of HGT predominant in plastisphere communities, such as transformation, transduction, and conjugation; c) evaluate how HGT influences microbial metabolic pathways and interactions; and d) quantify the contribution of HGT to carbon and nutrient cycling in water/wastewater. The core methodology integrates genome-resolved metagenomics, HGT network analysis using the MetaCHIP pipeline, genome-scale metabolic modelling, and bioinformatics, validated by empirical measurements of dissolved organic matter and oxygen dynamics.

Project 2: Plastic pollution: A socioeconomic-technological perspective

Plastic pollution presents challenges intertwined with socioeconomic and technological factors. The convenience and affordability of plastic lead to environmental degradation, disproportionately impacting low-income communities. Discussions around solutions, such as innovative recycling, alternative financing, biodegradable alternatives and plastic treaty, are ongoing but require accompanying policy changes and public awareness to shift consumer behaviour. Also, plastic generation and disposal emit huge amounts of greenhouse gases. However, countries have yet to recognise it in their climate mitigation policies. An integrated approach combining socioeconomic insights with technological advancements is crucial for effective plastic management and environmental sustainability. This project invites candidates to engage in interdisciplinary studies to analyse policies, market dynamics, and emerging technologies.

Potential PhD topics include (students can revise and propose their own):

- *Plastic in Nationally Determined Contributions (NDC)*
- *Alternative financial approach/accounting on plastic pollution management*
- *Plastic treaty on the horizon: measure policy effectiveness*

Project 3: Plastic pollution and environmental justice

This PhD project investigates plastic pollution through the lens of environmental justice, focusing on how the production, circulation and disposal of plastics create uneven social and ecological burdens. While plastic is often framed as a universal environmental problem, its impacts are disproportionately

experienced by low-income communities, Indigenous peoples and countries in the Global South, who are frequently positioned as sites of waste disposal and informal recycling. At the same time, decision-making around plastic governance, from local planning to global treaties, often excludes those most affected.

The candidate will critically examine plastic pollution across scales—from everyday consumption and waste practices to global commodity chains and policy frameworks—asking who benefits, who is harmed, and who has a voice in governing plastics. Using an interdisciplinary approach that may combine qualitative methods (e.g. interviews, ethnography, participatory research), spatial or material analysis, and policy review, the project will explore themes such as toxic exposure, labour precarity in recycling economies, colonial and neo-colonial waste flows, and community-led resistance or alternatives.

This PhD will contribute to emerging debates on just transitions away from plastic dependence, informing more equitable policies and practices in waste management, circular economy initiatives, and international agreements. The project is suited to candidates with a background in environmental studies, human geography, sociology, law, public policy or related fields, and a strong interest in social justice, collaboration with affected communities, and translating research into practical change.

RMIT's Centre for Nature Positive Solutions

RMIT's Centre for Nature Positive Solutions (CNPS) is multi-disciplinary team with a proven track record of conducting impactful research that addresses the world's most pressing environmental challenges, including climate change, pollution, and biodiversity loss. Grounded in cutting-edge science, CNPS focuses on innovative research that transforms the conservation, restoration, and management of ecosystems, ensuring a sustainable future where both people and nature can thrive. CNPS develops solutions that mitigate climate change, protect aquatic biodiversity, foster economic growth, and promote capacity building and community wellbeing.

With a dynamic team of ~25 researchers at RMIT University, we collaborate globally to provide actionable guidance and solutions that empower communities, industries, and governments. Our core team has over 50 years of collective research experience, with expertise in ecology, biogeochemistry, microbiology, environmental economics, remote sensing, social science, mapping, and modelling. CNPS includes internationally recognised researchers with more than 300 peer-reviewed publications.

Supervisor

Dr Tanveer Adyel is a Senior Lecturer and ARC DECRA Fellow at RMIT, with an academic background in Environmental Science and Environmental Engineering, and works on plastic pollution and urban stormwater engineering areas. Tanveer's multidisciplinary research on plastic pollution covers diverse spatial areas, including coastal wetlands, constructed wetlands, freshwater ecosystems and soil. His works apply advanced analytical tools, microbial ecology and modelling to assess the fate and transport of plastic pollution within the environmental matrix.

Location

RMIT University is based in Melbourne, Australia, with campuses located both in the City or Bundoora.

Competitive RMIT Scholarship

Scholarship Information

Scholarships are required to complete a PhD in Australia. **Competitive RMIT Scholarship** rounds open annually in June and are available for domestic and international applicants. Successful

candidates may receive a stipend (approx. AUD **\$36,245** per year-tax free), tuition fee waiver for up to 3.5 years, Overseas Student Health Cover (subject to eligibility), laptop, small research funds, etc.

Candidate Skillset

Project 1, we welcome motivated applicants from diverse backgrounds, including but not limited to environmental science/engineering, ecology, microbiology, genetics, soil science, etc. PhD students will apply the knowledge of multi-omics to plastics and wetland biogeochemistry. PhD students will work within collaborative settings using different facilities, including FT-ICR-MS, LC-MS, GC-MS, NMR, microscopy, bioinformatics, Ramon spectroscopy, microensors, 2D Planar optode, etc.

Project 2, we welcome motivated applicants from diverse backgrounds, including but not limited to environmental science/policy/engineering, social science, economics, climate science, development study, etc.

Project 3, we welcome motivated applicants from diverse backgrounds, including but not limited to environmental science/policy, social science, cultural geography, etc.

A strong CV for this competitive scholarship scheme may include:

- A Master's or Honours degree in a similar field
- First-authored Q1 publication
- Good communication skills
- Demonstrated ability to work independently

How to apply?

Interested applicants are invited to put expression of interest (EOI) to tanveer.adyel@rmit.edu.au, if they meet the following [PhD eligibility criteria](#). For your EOI please include:

1. A short **cover letter** (max 1-page) outlining your research interests and experience
2. A detailed **CV** with contact details for two academic referees
3. A **self-recorded short video** (without any slides) describing motivation for a PhD and relevant research and/or academic experience on the proposed topic
4. **IELTS/TOEFL/PTE** score ([where applicable](#))
5. Academic transcript(s)

Please contact Dr Tanveer Adyel (tanveer.adyel@rmit.edu.au) for any enquiries.

Application Deadline

Applications will be reviewed on a rolling basis until **31 July 2026 for International Students** and **31 August 2026 for Domestic Students**.

International Students	Domestic Students
EOI Deadline: August 30, 2026 Full Application: September 30, 2026	EOI Deadline: September 30, 2026 Full Application: October 30, 2026