



Marine Debris Research at CSIRO

“Conducting research to further our understanding, management and protection of coastal and marine ecosystems, whilst using scientific knowledge to empower community and governments to reduce litter entering our oceans.”



Overview

- The CSIRO [Marine Debris Team](#) are national and international leaders in scientific research whose objectives are to **understand, manage and protect marine ecosystems** from the effects of mismanaged waste, including marine plastic pollution.
- We conduct research into **the sources, distribution, and fate of plastic pollution** in our environment. This research involves engaging with governmental and non-government organisations, research institutions and industry bodies around the world.
- To date, we have partnered with more than 40 organisations, governments, universities, and community groups in over 20 countries to build capacity and quantify waste leakage to the environment. See our [handbook of survey methods](#) available from the United Nations, and let us know if you are interested to learn more.
- The Team, led by Dr Britta Denise Hardesty, has been involved with numerous marine debris projects across more than a decade have resulted in **the global recognition of Australia's high-value work surrounding plastics pollution** ([For more click here](#)).



Figure 1: Dr Denise Hardesty collecting data toward a National Monitoring Project.

- The team partners with a diversity of stakeholders to work across a multitude of projects across a variety of aspects of plastic pollution. Many of these projects involve deep engagement with CSIRO's [Ending Plastic Waste](#) mission, where Denise leads the Information for Decision Making work package.
- For a full list of current, past, and emerging projects [click here](#).
- For a full list of publications, factsheet, reports, and popular articles [click here](#).

Australian Plastic Pollution Monitoring Project (CSIRO/DCCEEW)

CSIRO and the Department of Climate Change, Energy, the Environment and Water (DCCEEW) are working together with Australian stakeholders to provide a deeper understanding of the **effect of current policy and community action on reducing plastic pollution** and identify trends and hotspot of litter in the Australian environment. This project focuses on 4 main areas:

- Designing a **National Monitoring program** to monitor plastic losses to the environment and conduct a **National Baseline** of litter in Australian environment.
- Developing a **National Plastic Pollution Web-Portal** to hold data about litter in the environment to gain a national picture. This portal will be an open access portal for all stakeholders to contribute and access plastic pollution data from across Australia.
- **Establishing a risk framework for estimating impacts** of plastic ingestion and entanglement on marine species in Australian waters.
- Evaluating the current **role and effectiveness of stormwater drains and gross pollutant traps** for reducing plastic leakage and develop a pilot program that will see CSIRO sensor technology deployed nationally.



Figure 2: Volunteers assisting in data collection (beach transects) for the national baseline project(s).

This project aligns with other ongoing monitoring projects in Australia undertaken in collaboration with a number of partners including [CVA](#) and [CSIRO interchange](#), our upcoming book [Community Approaches to Ending Plastic Waste](#), and [National Park Ghost Nets](#).

Artificial Intelligence (AI) and Sensors to Monitor Plastic Pollution.

This work stream encompasses two main bodies of work [Monitoring Plastic Pollution with Artificial Intelligence \(AI\)](#) and [Gross Pollutant Trap \(GTP\) Sensors](#). The two projects aim to **enhance the understanding, monitoring, and management of litter** in the environment. This will allow for a better understanding of the sources, sinks and transport dynamic of litter from land to the ocean via stormwater and waterways in urban areas.

The AI project uses an object recognition model to detect and categorise litter items in images of waterways. Cameras are currently deployed in multiple locations across Australia and globally. In each case, we can use the data collected to provide an estimation of litter quantities and types in waterways or stormwater outlets.



Figure 3: Example of litter detection and classification by our system in waterways.

CSIRO has been developing new sensor technology that enables near real-time monitoring of litter loads in gross pollutant traps (GPTs). With a reporting tool, the technology will help improve stormwater management of GPTs by local governments, save money and increase efficiency.



Figure 4: Example of a gross pollutant trap (GTP).

Global Plastic Losses – Phase II

Our Global Plastic Losses project aims to collect valuable empirical data from around the world to quantify the flow of litter (plastic and other items) from land to the ocean. Through this project, we are working with local partners around the world to develop capacity for conducting scientifically robust, harmonised methods to survey litter in the environment. The data obtained are used to extrapolate the sources of and flow of litter into the surrounding environment. This research allows our partner countries to obtain a current baseline of litter in their terrestrial and marine environments and encourage their decision makers to pursue ongoing monitoring and invest in effective waste management at local, sub-national, national, and regional levels. It also provides a critical baseline that can be used to measure change as new policies and practices are put into action.



Figure 5: Training, Thailand, July 2022.

UNEP COBSEA

This project is a partnership between CSIRO and the United Nations Environment Programme's (UNEP) Coordinating Body on the Seas of East Asia (COBSEA) that **delivers technical assistance and capacity building towards a harmonised litter monitoring programme for participating countries**. So far CSIRO has worked as technical partner with Cambodia, Malaysia, Philippines, Thailand, and Viet Nam to help deliver the following:

- **Regional training of trainers** – This stream builds in country capacity for regional experts in marine litter monitoring, providing technical assistance for leading monitoring and assessment of marine litter in their country.
- **Regional Guidance on Harmonised National Marine Litter Monitoring Programmes** – as an expert technical partner, CSIRO has been working with partner countries to develop guidelines for best-practice of marine litter monitoring in East Asia.

Other recent and ongoing international research projects include the [UN River Risks Project](#) and the [Indonesia Innovation Hub](#). The [Indonesia Innovation Hub](#) is part of the Indo-Pacific Plastics Innovation Network taking place at CSIRO, [click here](#) for more information.



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