

# SEATOSOURCE: EMPOWERING THE COMMUNITY TO PROTECT WATERWAYS FLOWING INTO THE GREAT BARRIER REEF AND GREAT SOUTHERN REEF

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## KEYWORDS

Conservation, community engagement, ocean health, plastic pollution, waterways

## INTRODUCTION

Mismanaged waste moving from land to sea consists of an estimated 60-95% plastic (Hardesty et al., 2015, Law et al., 2020). The repercussions of this environmental waste are increasingly evident, causing adverse effects on individuals, communities, and ecosystems. Some of these impacts include physical harm to aquatic life due to entanglement and ingestion (Derraik, 2002; Gall and Thompson, 2015; Wilcox et al., 2016), smothering and damage of sensitive ecosystems (Gregory, 2009; Valderrama Ballesteros et al., 2018), potential threats to human health and food safety (Barboza et al., 2018), contribution to climate change (Shen et al., 2020), and disruption of the nutrient cycle (Green et al., 2016; Salam et al., 2023). The extended lifespan of plastics further exacerbates these issues, transforming plastic pollution into a persistent environmental problem with significant economic, social, and cultural implications.

In Australia, a comprehensive coastal survey conducted at the continental scale revealed that approximately 68% of recorded items across 575 transects were plastic (Hardesty et al., 2015). The presence of mismanaged waste was found to be influenced by site characteristics, substrate type, and location, with terrestrial sources predominantly contributing to debris in more densely populated areas. Socioeconomic status and environmental context (land use, site type, state, etc.) were also related to waste patterns in Australia and beyond (Schuyler et al., 2021; Schuyler et al., 2022). Intentional dumping may also play a role in environmental waste in Australia, similar to findings in other countries such as Curaçao, (Debrot et al., 1999) and Scotland (Storrer et al., 2007). It is worth noting that incentive programs such as container deposit legislation were correlated with fewer beverage containers found in the environment in both Australia and the United States (Schuyler et al., 2018). More recently, it has been shown that local waste management efforts can substantially reduce coastal pollution, with Australia experiencing a national decline in coastal debris of nearly 30% over six years (Willis et al. 2022).

The current plastic crisis is drawing increased attention globally. The recognition of plastic pollution as a wicked and cross-border problem, underscores its complexity and the imperative for collective action (Wagner 2022). Worldwide collaboration is underway to negotiate a global treaty to eliminate plastic pollution, spearheaded by the United Nations Environmental Programme, with the goal of establishing a legally binding agreement by 2024 (United Nations, 2023). This aligns with the focus on plastic pollution within the United Nations' sustainable development goals (United Nations, 2015). The acknowledgment of plastic pollution as a challenging problem requiring collective action emphasizes the need for comprehensive strategies involving the active participation of all stakeholders - individuals, communities, governmental bodies, industries, and more. An inclusive, collaborative approach is essential for crafting effective and lasting solutions to address the intricate challenges of plastic pollution, ensuring a sustainable future that uses plastic in a considered, thoughtful manner.

To help tackle the problem of plastic pollution in Australia, Conservation Volunteers Australia (CVA) developed the nationwide community activation program SeaToSource. By directing attention upstream, at the source, and collaborating with communities along waterways, the program aimed to identify and mitigate pollution in urban areas. The overarching objective was to prevent mismanaged waste from reaching our rivers and ocean, emphasizing the pivotal role all Australians play in preserving the health of these vital ecosystems.

## YEAR CASE STUDY WAS IMPLEMENTED

2020 to 2023

## CASE STUDY SUMMARY

Plastic pollution in the ocean stands as an urgent environmental concern demanding immediate attention. Harnessing the power of community action, Conservation Volunteers Australia (CVA), developed SeaToSource — a nationwide community activation program strategically designed to address the challenge of plastic pollution at its source. This involved pinpointing the origins of mismanaged waste and exploring intervention opportunities before it infiltrates the environment. Running from March 2020 to March 2023, the program delivered a series of community events in nine iconic urban catchments feeding into the Great Barrier Reef and Great Southern Reef. Guided by a rigorous methodology developed and deployed by CSIRO in Australia and multiple other countries around the world, CVA established 34 national survey sites, diligently monitored every three months by CVA officers and volunteers to track waste debris and quantify mismanaged waste in the environment. Beyond surveys, the program ran several activities to educate and empower people to take simple and impactful actions against plastic pollution. These activities included beach clean-ups, youth art competitions, source reduction workshops, corporate challenges, and a Nature Ambassador initiative. Throughout the project's duration, more than 10,600 volunteers successfully removed nearly 19 tons of debris, 80% of which was plastic. The program highlights the power of collective action in confronting environmental challenges and protecting our ocean and waterways.

## CASE STUDY DETAIL

### **The specific issue**

Effectively addressing ocean plastic pollution in Australia necessitates a comprehensive understanding of the types, locations, and causes of mismanaged waste, coupled with collaborative efforts from all stakeholders to instigate transformative change. The sheer vastness of Australia's coastline renders it impractical for any singular organization to conduct thorough surveys and implement waste reduction measures across such expansive areas. Therefore, Conservation Volunteers Australia (CVA) strategically forged partnerships with various organizations and communities, to implement the nationwide community activation program SeaToSource.

### **Approach**

SeaToSource's approach was to leverage the power of community action, collaboration, and citizen science to collect large amount of data at a low cost and reduce plastic pollution at the source.

The SeaToSource program pursued two objectives:

1. Collecting data to contribute to a National Plastic Pollution Baseline Survey and enhance our comprehension of the extent, magnitude, and diverse types of mismanaged waste infiltrating our environment.
2. Educating and empowering the community to take simple and impactful actions to mitigate plastic pollution.



Figure 1: Map showing the nine river locations chosen for the SeaToSource surveys.

SeaToSource concentrated its efforts in nine iconic urban centres, focusing on major catchment areas around the country (Figure 1). These included Mackay that feeds into the Great Barrier Reef and the Brisbane River, Georges River, Parramatta River, Werribee River and Port Phillip Bay, River Torrens, River Derwent, Tamar

River, and the Swan River and surrounding coastline feeding into the Great Southern Reef. The Great Barrier Reef and Great Southern Reef are home to a wide variety of plants and animals found nowhere else on the planet. These locations were chosen after consultation with local communities and stakeholders and based on environmental, cultural, social and economic values.

### **Summaries of activities and their implementation**

The SeaToSource program delivered eight key community activities at each location. The eight activities are summarised below.

#### **1. Debris monitoring surveys**

Ongoing quarterly debris monitoring surveys were run at each location by CVA officers and local volunteers. For each location (except Mackay River), four survey sites were established in the upper river, middle river, lower river, and beach. For Mackay, two survey sites were established on the coastline. In total, 34 national survey sites were routinely monitored every three months for the duration of the program. Surveys were conducted following the methodology developed by CSIRO (Hardesty et al., 2016; CSIRO et al. 2022). This approach ensured sufficient baseline data was available to understand regional variability in the type and volume of debris and track the impacts of local, state, regional and national source reduction programs such as the plastic bag ban & the container refund scheme. The data collected from these surveys directly contributed to expanding CSIRO's National Plastic Pollution Baseline Survey.

#### **2. Community clean-ups**

Several community clean-up activities were run to reduce debris loads in key catchments, identify debris sources, and raise community awareness. All clean-up sites were selected based on their high conservation, social, or economic significance. They were either known debris hotspots or valuable locations for collecting long-term datasets on debris in our waterways.

#### **3. National Day of Action**

Every year, a flagship SeaToSource National Day of Action was organised to empower local communities to step-up and take tangible measures to minimise debris at sites of importance to them, and actively contribute to the protection and conservation of their local waterways. The event acted as a platform for organisations and communities to connect while educating and inspiring attendees to act on ocean litter. In addition to the community clean-up organised by CVA, stallholders were invited to participate and facilitate a range of activities to showcase local waterways and instil appreciation for local coastal and aquatic spaces.

#### **4. Corporate Beach Clean-Up Challenges**

Each year CVA set a challenge to its Corporate Partners to come together to collect and sort as much mismanaged waste as possible within a few short hours in the lead up to Christmas. This event was used to encourage people to make changes to their purchasing habits over the Christmas period, particularly in regard to single use items and plastic gifts.

#### **5. Litter Stopper app**

During the program, CVA also partnered with Beach Patrol and Love our Street (LOS); a network of volunteer groups in Victoria using the power of community spirit to clean local beaches and streets. Using the Litter Stopper app, created by Beach Patrol, SeaToSource volunteers were able to record information about their individual and group clean-ups. Because the SeaToSource program started in early 2020, at the beginning of the global Covid 19 pandemic, the Litter Stopper app was instrumental in helping people to get out and contribute to the program, in their own time and space whilst abiding by safety measures to ensure the reduction of virus transmission.

#### **6. Sea The Change Youth Art Competition**

To engage the younger community in the program, CVA ran an annual youth art competition. Students were encouraged to explore a plastic item used at home, school, or in the wider community and design either a poster or video showing how they would re-purpose or replace that object with a more ocean-friendly option, or, how they would inspire others to change their use of the plastic object. CVA provided research topics, teacher resources and champion species from the Great Southern Reef as inspiration.

#### **7. Source reduction workshops**

During the life of the program, CVA organised and facilitated a series of source reduction workshop in each river catchment. These workshops were delivered both online and in-person and allowed community members to delve deeper into their local plastic pollution issue and develop targeted action plans for their catchment or community. Participants were guided by CVA Project Officers and used waste debris data collected throughout the program to identify the commonly found plastic items in their area and the key barriers and opportunities

for reducing plastic pollution. To further their skills and knowledge, participants were supported with online resources such as the CVA Plastic Waste Challenge Home Audit and the CVA Beating Plastic Pollution online course. Guest speakers and facilitators added to the workshops with their expertise in sustainability, landfill diversion and provided attendees with more contacts, networks and ideas they could take back into their own communities.

#### 8. Nature Ambassadors

A cohort of volunteers took part in a pilot project, enabling them to become CVA Nature Ambassadors - everyday people who wanted to do more for their local communities and waterways. Nature Ambassadors participated in training other volunteers in the CSIRO data collection methodology and clean-ups. This has enabled Nature Ambassadors to gain leadership experience, resulting in them often leading the way for ideas around how to get their communities involved in both data collection and behaviour change in their own lives and communities. They also completed training in safety and volunteer management, and were an integral part of delivering the National Day of Action each year, as well as inspiring action on reducing plastic pollution within their own networks.

#### Summary of outcomes and measurable impacts

Overall, the SeaToSource program involved over 10,600 Australian volunteers and 50 of the nation's largest businesses at 690 events. More than 380,000 waste debris – 80% of it plastic – were prevented from flowing into the nation's Great Barrier Reef and Great Southern Reef since September 2020, despite COVID and flooding impacting in person events for considerable time. Over 1,237 hectares of waterways and coastlines were surveyed and close to 19 tonnes of mismanaged waste were collected (Table 1).

*Table 1. Summary of the number of volunteers involved at each location and the amount of debris collected and analysed.*

Location	Number of volunteers	Number of debris	Number of plastic debris	% plastic	Total weight (kg)
Mackay	783	9,234	7,901	86	345
Brisbane River	1,245	68,828	54,432	79	1,748
Georges River	2,644	49,632	45,989	93	5,243
Parramatta River		26,112	22,914	88	
Tamar River	1,797	26,548	18,700	70	5,896
River Derwent		31,088	23,314	75	
Werribee River	989	40,993	29,028	71	2,948
River Torrens	1,850	66,986	57,350	86	1,456
Swan River	1,294	61,326	39,468	64	1,344
<b>Total</b>	<b>10,602</b>	<b>380,747</b>	<b>299,096</b>	<b>79</b>	<b>18,980</b>

Foam plastic was among the top three plastic categories collected nationally during the SeaToSource program with over 50,000 pieces (14%) collected, 86% of which was polystyrene debris (Figure 2). Australia started phasing out of single use expanded polystyrene in 2022 and future ongoing monitoring will inform on the success of this action. In terms of specific plastic items, food wrappers were identified as a major problem with more than 36,000 pieces (10%) collected over the life of the program, followed closely by cigarette butts with nearly 35,000 butts (9%) collected. With no bans currently planned or proposed, these plastic items remain major threats. Noticing the impact of cigarette butts, the SeaToSource program was able to negotiate the installation of cigarette butt bins in some key hotspots. Other plastic items of concerns nationally found during the program were bottle caps and lids (5%), plastic bags (3%), eating utensils (2%) and fishing gears (1%).

A total of 359 debris monitoring surveys (Figure 3A) were conducted with over 3,500 volunteers removing more than 9,000 kg of waste, and analysing of over 181,200 debris items, the majority of which were plastic. The data collected during these surveys also contributed to an ongoing national initiative supported by the Department of Climate Change, Energy, the Environment and Water (DCCEEW). This initiative aims to develop a nationwide baseline of mismanaged waste in the environment, against which change can be measured. The benefits of this national project include the collective capacity to attain a comprehensive understanding of waste distribution. Additionally, it facilitates the identification of areas exhibiting high accumulation, the pinpointing of problematic regions, and the isolation of specific items of concern. This data will be made available on a publicly accessible data portal in 2025. Such efforts not only assist Australia in

meeting its commitments as part of the National Plastics Plan 2021 (DAWE, 2021), but can also support the International Plastics Treaty that is in development (United Nations, 2023).

### SeaToSource National Debris Composition 2020-2023

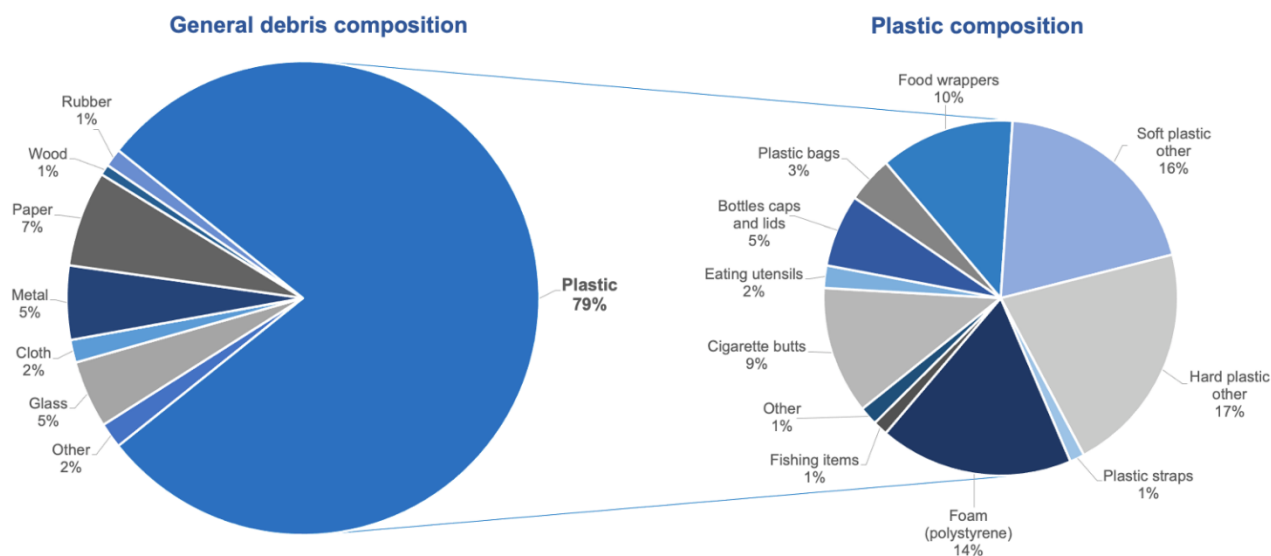


Figure 2: National debris composition results from all the clean-ups and monitoring surveys done during the program from March 2020 to March 2023.

Three different events were delivered every year over the life of the program. The annual Sea The Change Youth Art Competition (Figure 3B) involved over 36 schools, with 241 students contributing 79 wonderful entries. The SeaToSource National Day of Action (Figure 3C) was very popular with a total of 1,150 volunteers participating and collectively removing 990 kg of debris from local waterways. In addition, 136 stallholders facilitated a wide range of activities – from smoking ceremonies to trash puppet workshops, plastic upcycling demonstrations, virtual deep-sea diving, and live animal displays. The annual Corporate Beach Clean-up Challenges (Figure 3D) were also successful with 209 staff from 11 Corporate CVA Partners and supporters from five capital cities participating and recording 28,920 pieces of mismanaged waste. These annual events delivered cleaner waterways, but most importantly, fostered more informed and connected communities, taking action for nature together.

Participation in the SeaToSource program through the Litter Stopper app was a popular choice, particularly during COVID lockdowns. Over the 3 years, 2,337 individuals picked up more than 7,200 kgs of mismanaged waste in the environment from their local beaches and waterways covering 765km of waterway and coastlines.

In addition to removing mismanaged waste from the environment, the SeaToSource program was also successful in plastic pollution mitigation through source reductions workshops and the CVA Nature Ambassador initiative. Over the 3-year program, 20 source reduction workshops were held across Australia, attracting 183 participants. These workshops focused on single-use plastic items commonly found during the monitoring surveys and clean-ups such as, coffee cups, bags, plastic food wrapping, cigarette butts, and fishing line. Hands-on beeswax wrap making workshops was a popular choice during which participants used recycled fabric to make their own plastic-free alternatives to conventional plastic packaging. Another direct outcome of these reduction workshops was the opportunity to collaborate with local landholders and councils to install waste diversion infrastructures such as TAngler bins (for recreational fishing waste) and cigarette butt bins. TAngler bins were installed with council support at four river catchment locations (Mackay, Brisbane River, George River, and Werribee River) and cigarette butt bins at two locations (Swan River and River Derwent). These were monitored by volunteers, with data being reported to the relevant council for decision-making purposes.



Figure 3. Photos showcasing four different activities delivered during the SeaToSource program: A) 2022 Debris Monitoring Survey in Brisbane River, B) Sea The Change Youth Art Competition entry 2022, C) National Day of Action 2021 in Georges River, D) 2022 Christmas Corporate Challenge in Sydney.

In total, 79 individuals enthusiastically embraced the role of Nature Ambassador. Among them, 33 dedicated Nature Ambassadors actively participated, collectively contributing 260 volunteer hours to advance the SeaToSource program. A significant outcome of the initiative was the inception of the Coffee Cup Project within three river catchments. After doing extensive research on reusable coffee cup networks, such as Green Caffeem and RENOME, several Nature Ambassadors ardently advocated for these programs to local cafes and restaurants, serving as local points of contact, and offering support and tailored plans. Several businesses proactively adopted these reusable alternatives, positioning themselves ahead of impending state-wide bans on single-use plastics. Additional notable achievements from this initiative include a Nature Ambassador who shared insights on minimizing medical waste within her workplace and another Nature Ambassador who successfully mobilized businesses on his university campus, leading to a reduction in the use of single-use plastics. Overall, the initiative's effort in equipping and inspiring individuals to emerge as nature leaders was very successful with most Nature Ambassadors feeling empowered to lead action in their communities (94%) and feeling they had built skills to so do (88%) at the end of the initiative.

**Striving towards sustainable outcomes.**

From an environmental standpoint, the SeaToSource program has effectively cleared a substantial amount of mismanaged waste from the physical landscape. Given the significant threat that plastic poses to various aquatic and bird species, the removal of nearly 19 tonnes of mismanaged waste by the program holds considerable importance, extending beyond immediate benefits to ensure a lasting positive impact. The educational outreach, reaching over 10,600 individuals and training a community to take proactive measures, guarantees a sustained effect well into the future.

SeaToSource not only delivers social benefits by fostering connections within communities and providing individuals a platform to address the overwhelming issue of plastic pollution, but it also establishes a lasting legacy through the Nature Ambassadors initiative. This initiative empowers individuals to actively lead their communities in addressing the challenges of plastics pollution, contributing to a nationwide outcome.

Economically, SeaToSource has generated tangible benefits. Trained citizen scientists, contributing data to achieve a more holistic understanding of mismanaged waste in the environment on a national scale, is beneficial on a multitude of levels. It presents a cost-effective approach to gathering high-quality data, extending geographical coverage within a condensed timeframe, and concurrently promoting awareness, stewardship, and behavioural change. Furthermore, local councils have experienced cost savings in waste management at known hotspots, beaches, and parklands due to reduced staffing requirements.

The impact on volunteers is diverse, ranging from providing a practical outlet to address climate anxiety to offering social connections for those experiencing isolation or new to Australia. School incursions and excursions have facilitated teachers in connecting classroom learning with real-world projects, providing accessible experiences for schools and students.

For community groups, the program has not only assisted them with large-scale clean-ups but has also injected much-needed peoplepower and morale. Collaborations with Natural Resource Management (NRM) Groups and local councils have contributed to priority actions in NRM and Local Government Areas (LGA), addressing major concerns in targeted areas.

The program contributed to a National Plastic Pollution Baseline survey by providing valuable data efficiently. The proficiency of CVA staff means that they are able to train others in survey methods, contributing to an improved national picture of mismanaged waste in the environment.

For CVA as an organization, the program's major benefits stem from adapting to the challenges presented during the pandemic. Innovations in volunteer engagement developed during this period have been applied to other projects, enhancing organizational capacity. Last year, CVA launched its own digital application, the CVA Community Hub, providing a personalized journey that allows users to browse and register for on-ground volunteering events or take actions from their own home with app-led activities. A dedicated SeaToSource app-led activity will be launched in the app this year to continue heading upstream and working with people and communities to identify and reduce pollution originating from households.

#### **Important lessons and critical success factors.**

Amidst the challenges brought about by the pandemic, CVA embraced adaptability, transitioning to online engagement for the first time. As an entity focused on connecting people to the environment through practical conservation activities, this shift demanded significant time and effort. Nevertheless, it allowed CVA to not only sustain but also expand their online engagement initiatives, leading to organizational growth.

One noteworthy project during this period was the pilot of Nature Ambassadors. This initiative targeted the most active CVA volunteers, taking them on an educational journey to deepen their understanding of plastic pollution. Through this initiative, volunteers developed community action plans to mobilize their localities on the issue. The success of this pilot has positioned it as a broader engagement method for future projects.

Early on, CVA recognized the importance of purposeful data collection to ensure meaningful impact from their events. Contributing data to a national picture of plastic pollution in the environment was pivotal and helped to engage participants. This connection not only enriched research but also aligned the program with real-world applications, aiding in decision-making, planning, and policy development. The collaboration between CVA and CSIRO involved training volunteers in survey methods and creating a network of individuals committed to contributing data in their free time. This showcased that well-managed citizen science can uphold methodological rigor and integrity, contributing to credible research.

The SeaToSource program's effectiveness stemmed from meaningful partnerships and collaborations and from offering a diverse range of engagement options, catering to various interests and skills within the community. The program successfully involved a broad cross-section of society, from primary school students to university students, families, corporate entities, domestic and international travellers, local governments, individuals, and community groups. While the impacts of ocean plastic pollution are extensive, they are solvable. This initiative underscores the potential of collective action in addressing environmental challenges and safeguarding our precious ocean.

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