

Using community science to fight against marine plastic

Environmental education is key to increasing public awareness of the sources of marine plastic pollution. President **Michael Hannah** of EnviroPod® Canada Limited explains how a simple, affordable catch basin insert can help businesses control their plastic footprint and help educate the public about non-point source pollutants.

New Zealand's war against marine plastic starts at stormwater drains. Education professionals are teaching the next generation of Kiwis by showing them what goes down the stormwater drains and where it ends up.

Environmental education is a process that allows individuals to explore environmental issues, engage in problem-solving, and act to improve the environment. As a result, individuals develop a deeper understanding of environmental issues and have skills to make informed and responsible decisions.

New Zealand's environmental educators are engaging with students and communities to monitor an at-source treatment device in several community-based programs. In doing so, these groups are learning about the problem and helping to find solutions. By collecting data on what's going down the stormwater drains, they are helping identify the sources of marine plastic and the character of this non-point source pollutant.

One of the biggest challenges with stormwater pollution is that the public still does not know that most stormwater drains flow to the ocean, creeks, rivers, and lakes untreated. A recent study by Christchurch City Council in New Zealand showed that 55 percent of people did not know that stormwater drains discharge directly into waterways. Because marine plastic is the most visual form of stormwater pollution, it is an effective tool for public understanding of wider stormwater issues.

Environmental educators are working with one of New Zealand's companies, EnviroPod to achieve greater public awareness of sources of stormwater pollution. This for-profit social enterprise company was founded by two stormwater engineers – Michael Hannah and Greg Yeoman – who have looked at the pollution caught in stormwater devices for 25 years as part of their work. Realizing that people need to see and understand the problem, they developed a simple solution to eliminate plastic in stormwater runoff that also has educational value. The LittaTrap™ is a lightweight catch basin insert that can easily be emptied and replaced by hand, catching plastic pollutants while also creating the opportunity for community education into the street-level sources of marine plastic.

Kaitiakitanga for the local water environment

The first organization to use the technology was Mountains to Sea, Wellington (MTSW). MTSW delivers freshwater and marine education programs for schools and communities across the greater Wellington region. One of their programs, Healthy Harbours, explores the link between land and sea through the waterways in the Porirua or Wellington catchments. The program engages students by initially connecting them with the ocean through a snorkeling experience and then leads exploration through discovery walks back up into the catchment to consider the issues associated with urban runoff.

As an extension to the program, groups of students actively monitor an at-source LittaTrap, a device that captures litter in stormwater catch basins. By monitoring the device in different locations and considering the findings, the students gain greater awareness of marine pollution and a better understanding of both issues and solutions – thereby fostering *kaitiakitanga* (the Maori word for guardianship and stewardship of natural resources) and action for the environment.



Another educating group, Tread Lightly of Auckland, uses LittaTraps in the mobile environmental class room called the Drain Game. The Tread Lightly Drain Game visits elementary and middle schools – exploring the difference between stormwater and wastewater systems; where the different drains lead; and the effects of pollutants, contaminants, and rubbish that enters both systems has on freshwater and marine environments. As part of the program, using aerial images of their school and local area, students are challenged to identify and map the locations of any stormwater drains. Students also observe what is in each drain, making the connection with litter and other materials that can get washed into the stormwater system.

In the South Island of New Zealand, Environment Canterbury educators adopted the LittaTrap monitoring program with 10 schools and community groups. The participating groups are undertaking a 10-month monitoring and evaluation program to measure content and volume of waste captured in stormwater drains as well as behavior change. The data collected will be of use for several purposes. One of these is to support groups to present to the local council and Zone Committees. In turn, it is hoped that this will influence policy and action to improve plastic management in the community.

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From neighborhood to nation

The data collected in these community science projects is extremely valuable to engineers and scientists. One Crown Research Institute, part of the National Institute of Water and Atmospheric Research in New Zealand (NIWA), has engaged with the community and an education group to undertake a LittaTrap monitoring project across an entire watershed. The NIWA study is not only looking at what is washing down the drains, but its character as it travels to the ocean in order to also understand the volume of marine plastic that is land-based and pollution hotspots. Exploring a hypothesis that plastics are being broken into tiny pieces in rivers creating microplastics, which is potentially more harmful to aquatic life. The long-term study is incorporating other upstream educational activities to see if change can influence the amount of plastic being discharged through the stormwater system. This work includes an analysis of how recycled plastics that are being lost down stormwater drains can support science in the circular economy approach of plastic use and management.

As an island nation, New Zealand is greatly concerned with the build-up of plastic in the ocean. For this reason, the country's Ministry of Education includes information on the program in its science-learning hub. The hub provides teacher support, materials, and connections to the New Zealand school curriculum. To support this, EnviroPod produced an education fieldguide, and provides safety support through an outreach program as well as offering discounted LittaTraps to educators.

The ultimate hope from these programs is that through the use of simple technology such as the LittaTrap coupled with community science and engagement, long-lasting policy and behavior change will create action and turn the tide on plastic pollution.

Author's Note

EnviroPod Canada Limited President Mike Hannah is committed to preserving oceans and waterways for future generations. Through the Toronto-based company in Canada, Hannah uses technology (such as the LittaTraps) and public engagement to raise awareness of the sources of plastic pollution in marine water.

Hannah is also the co-founder and managing/technical director of the specialist stormwater



Top: Students sort through waste captured in LittaTraps.

Above middle: Students lift a LittaTrap from a stormwater drain

Above: Cigarette butts found as part of a community science project.

Photos by Mountains to Sea, Wellington

management company, Stormwater360 New Zealand. With 27 years of experience as a stormwater management and green infrastructure practitioner, Hannah has designed, developed, and implemented numerous stormwater solutions across the Asia Pacific region. He works regularly with local and central government in New Zealand to consult on planning and legislation of stormwater policy and practices.

Web Resources

1. Mountains to Sea Wellington website: <http://mountainstosea.wellington.org/>
2. Tread Lightly Website: <https://tread-lightly.org/>
3. Ministry of Education of New Zealand Science Learning HUB Website: <https://www.sciencelearn.org.nz/resources/2747-down-the-drain>.