Zero Waste Zero Carbon Pilot at Northcross Intermediate School June 2021 Evaluation Report

Report Prepared by Recreation Solutions, Ltd and Hibiscus Coast Zero Waste

Contents

Acknowledgements

The Zero Waste Zero Carbon Pilot was made possible with the enthusiasm and encouragement from teacher Kel Hartell who organised many internal workings within Northcross Intermediate School, and Programme Developer Monique Russell who turned many zero waste and climate change ideas into an organised, inspiring whole. Thank you, Chris Judd for co-facilitating the programme. Much appreciation goes to Julia Parfitt, Christina Bettany and the Hibiscus Bays Local Board for advice and direction, Thanks also to Tori Christie, Rebecca Harrington, and Sarah Sheeran from Auckland Council also advised and directed the project. We are respectful of Ben Sheeran from Recreation Solutions for preparing the professional, impartial evaluation of the Zero Waste Zero Carbon Pilot which validates the success of the programme. Hibiscus Coast Zero Waste is very grateful to Foundation North for the initial funding to develop the pilot and to Auckland Council's Waste Solutions for providing funding for extending the trialing, providing food caddies, and funding this evaluation report. Grants from the Lion Foundation and Glass Packaging Forum provided resources materials as well in the form of Henkel Bins and recycling crates, respectfully.

Overview of the Zero Waste Zero Carbon Programme

Who developed the programme?

The Programme was initiated by Betsy Kettle of Hibiscus Coast Zero Waste with a grant from Foundation North with the goal of creating a programme that linked the carbon footprint of our current food system, organic waste to landfill and climate change mitigation. How could students "do the right thing" with food choices and food scraps to mitigate climate change? Professional curriculum developer, Monique Russell, took the concept and developed it into a programme that fit year 7 students' levels of understanding of atmospheric carbon, photosynthesis and soil carbon with the goal to encourage new behaviors around separating out and building soil carbon with food scraps. Building soil carbon using food scraps has been identified as a way to mitigate climate change, support organic, regenerative agriculture and lessen methane emissions from landfill. The evaluation of the programme was supported by Auckland Council Waste Solutions through the Community Waste Minimisation

Initiative fund.

Who evaluated the Programme?

Ben Sheeran of ReCreation Solutions prepared the survey, put it up on Survey Monkey for the students to fill in and then evaluated the before and after results.

How long is it / how many sessions / length?

Each year 7 class engages in two 55-minute sessions with a trained facilitator who comes to their classroom. The facilitator involves the students in as many hands-on activities as possible. During the school year it is proposed to have "touchpoints" at the beginning of each term to remind students of the importance of food scrap separation, averaging about a half hour in length.

A part time, parent helper is recommended to help with these reminders for one to two hours a week throughout the school year and who would check on the compost collections and food caddies.

What topics are covered in each session?

Session 1 focuses on establishing a basic understanding of soil, through a scientific investigation to answer the key question, "Is soil alive?". The hands-on investigation is followed by activities to distinguish between unhealthy and healthy soils, to introduce the carbon cycle and the pivotal role of healthy soil in sequestering carbon.

Session 2 highlights the significance of the issue of food waste going to landfill in relation to climate change and resource use, and introduces the idea that composting can play a significant part of "fixing" our broken food system. Students are familiarised with various methods of composting, and finally, they are introduced to the City to Farm project and how they can be a part of positive change to help reduce waste and fight climate change.

How is the Programme facilitated?

The specially trained teacher visits each class with a teaching kit complete with the resources required for delivery of the programme, including fresh soil samples. The facilitators use their own laptop to connect to a screen/TV provided by the school, where they use a presentation to help guide the session. Students generally work in small groups for the hands-on tasks and all materials are provided through the teaching kit. The only consumables are 1 worksheet per group and soil samples that need to be refreshed regularly.

How is the Food Scrap collection facilitated?

The food scrap collection system is expected to work differently in different schools. At Northcross Intermediate each class was given a food scrap caddy. Caddies are emptied daily into a central collection bucket and rinsed out. A "lead" classroom is responsible for emptying the central collection bucket into the special wheelie bin and layering it with Bokashi Zing inoculant daily. The special sealed wheelie bins are collected fortnightly if the City to Farm System is used. The wheelie bins need to be stored in shady place, ideally locked.

What resources does it use?

Facilitators come with magnifying lenses and a complete set of resources.

The school will need to supply food caddies for each classroom. Food scraps collected need to be composted at the school, or collected by the City to Farm Composting Programme which takes the food scraps to a local farm to grow topsoil and bananas. The City to Farm Project supplies all zing inoculant, biochar and wheelie bins.

Schools who wish to compost on-site are encouraged to apply for a WMIF grant to cover the cost of composting equipment, materials and a composting coordinator. The cost for the on-site composting facilitator to help the students with the on-site composting programme is $50 to $100 per week, assuming the parents are paid the living wage at $25 per hour

and they pay their own taxes. This is assuming the school is using a hot composting system like the NZ Carbon Cycle Box. On-site composting involves training of the parent helper who is then responsible for on-going layering and turning of the compost materials in the bins. There may be additional costs to purchase woody mulch if this is not supplied on site by the school.
It is suggested schools start out by using the City to Farm collection and work up to composting at the school, especially if the plan is to have school food gardens.

What teaching / school support did it require

It requires the school administration to arrange for each year 7 class to be inducted in the programme at the start of term, the earlier the better.

Schools are encouraged to give participating students badges and engage with the City to Farm Programme in some way—a field trip, creating a video, creating a terra preta trench, learning about different types of composting etc.

It is also suggested that the students be reminded about the programme after each holiday through a survey, a waste audit or learning to do classroom waste audit. These are called "touchpoints" and would be facilitated by a parent touchpoint helper who would also check on the food scrap collection programme making sure caddies were clean and were being used.

What is the cost per student?

The cost is roughly $10 per student for the facilitated programme which includes some transport costs for facilitators.

The cost per City to Farm Collection is between $25 and $50 per week depending on the number of wheelie bins collected.

The cost to the school for the parent touchpoint helper for one to two hours per week would cost between $25 to $50 per week, assuming the

parents are paid the living wage at $25 per hour and the parent helpers pay their own taxes.

The food caddies, aka "enclosed kitchen tidys" are estimated to cost $25 each.

Summary of the Evaluation Survey of the Zero Waste Zero Carbon Pilot

The Zero Waste Zero Carbon Pilot (ZWZC) refers to an initiative from The Sustainable North Trust for developing and trialing a new programme for intermediate schools linking zero waste to climate change mitigation. It is recommended all year 7 students be engaged in the programme to provide the basis for on-going uptake of separating out food scraps for composting.

The ZWZC Programme has the goal of:

- Providing ***knowledge:*** linking food scrap diversion with topsoil building as this has the potential for atmospheric carbon sequestration
- Shifting ***attitudes/intentions:*** from the mindset of food scraps as rubbish to food scraps as resources.
- Changing ***actions/behaviours:*** to encourage students to put their food scraps into food caddies for composting rather than into the rubbish bin or garbage disposal. Instead, to consider alternatives such as feeding pets, chickens, home composting, worm farming, bokashi trenching and for larger quantities, the City to Farm system.

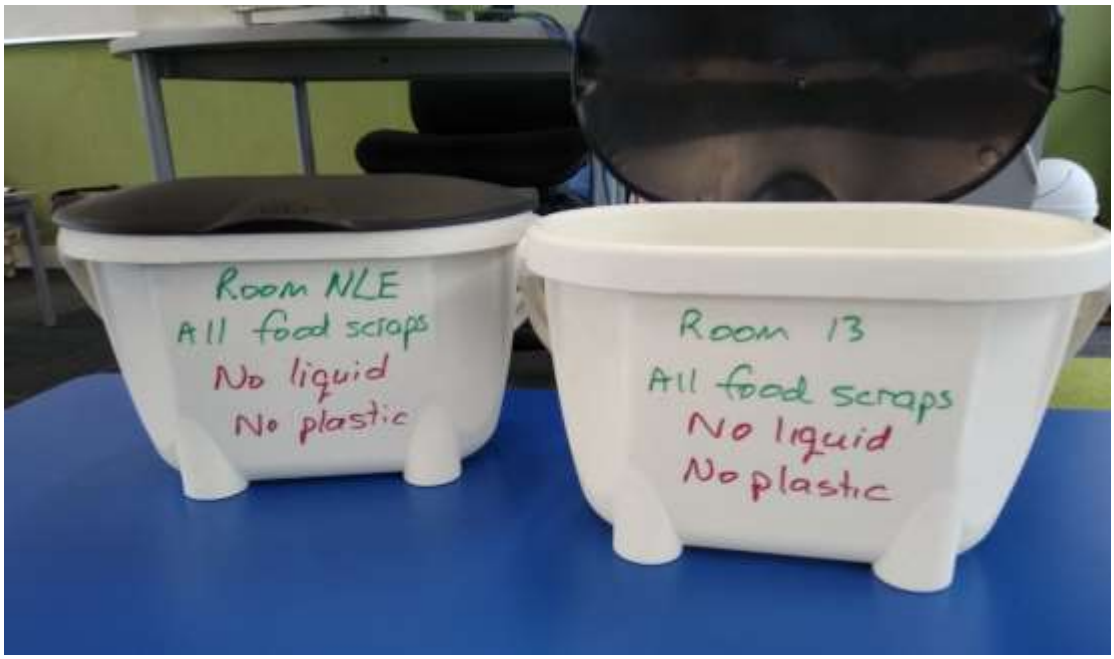
This evaluation covers results from over 400 Year 7 students in Term One 2021 at Northcross Intermediate School, North Shore, Auckland, New Zealand. New, incoming students were engaged for two, 55 minute sessions with a professional facilitator that visited each year 7 classroom. The students participated in a Survey Monkey questionnaire to assess their levels of knowledge, attitude and behaviour. A before and after waste audit was also done.

The following improvements were found between the Before and After Survey results:

- The proportion of student respondents who viewed food scraps as "rubbish" decreased from **35% to 8%.**
- The proportion of student respondents who viewed soil as "rubbish"

decreased from **24% to 3%.**

- The proportion of student respondents who couldn't identify differences between healthy and unhealthy soils decreased from **16% to 2%.**
- The proportion of student respondents who recognised the potential value of soil as a means to reduce carbon increased from **0% to 35%.**
- The proportion of student respondents who could identify the environmental services soils provide as a function of soil characteristics increased from **7% to 15%.**
- The proportion of student respondents who identified soil processes relating to composting increased from **32% to 41%.**
- The proportion of student respondents who correctly identified the form of carbon in the atmosphere increased from **40% to 47%.**
- The proportion of student respondents who correctly identified the form of carbon in plants increased from **18% to 26%.**
- The proportion of student respondents who indicated they use the classroom food caddy increased from **50% to 67%.**
- The proportion of student respondents who disposed of food waste by feeding pets increased from **52% to 54%.**
- The proportion of student respondents who disposed of food waste by bokashi composting increased from **12% to 22%.**
- The proportion of student respondents who "often" disposed of food waste by rubbish bin decreased from **37% to 33%.**



Each classroom at Northcross Intermediate School has a food scrap caddy. Common scraps are citrus peels, banana peels and apple cores.

Background

The ZWZC Pilot started and ended with a waste audit identifying the types, volumes and weights of different waste streams. Of particular

interest was the compostable component. Compostables were divided into 4 categories—home compostable along with food contaminated paper and commercially compostable materials.

NX Waste Audit Results	before ZWZC	after ZWZC
Landfill	21%	41%
Recycling	39%	32%
Home Compostable	33%	19%
Compostable Commercial	3%	1%
Hazardous	0%	0%
Re-usable	3%	5%
total	100%	100%

Before the ZWZC started compostable products were 36% of the waste stream. After the programme it dropped to 20%. The waste audit team accidently weighed 3 outdoor bags which do not reflect what is happening in the classroom. For greater accuracy, next time outdoor and indoor bags will be differentiated and a representative proportion of indoor and outdoor bags will be weighed.

Home compostable food and packaging can theoretically be composted at the school in either hot compost bins or worm farms. PLA-lined coffee cups or PLA bottles containing bioplastics need special hot composting facilities. Research is still being done to see if schools can successfully hot compost bioplastics. Generally, bioplastic materials are taken to Envirofert, a company in Tuakau specializing in composting at over 70^{o} C for at least 5 days

Non-compostable, non-recyclable paper serveware is made of paper but lined with plastic. Standard paper cups are made like this, as well as paper ice cream cones, waxed paper, muffin cups, baking paper and many other papers that need to be waterproof. Since these are not recyclable or compostable, they can only be landfilled. The ZWZC pilot focuses only on food scraps rather than composting paper but this is something students could learn about in future programmes.

The Pilot's need was determined by several factors:

- There is a growing awareness that carbon sequestration occurs,

along with many other environmental benefits, when developing topsoil organically (without NPK fertilizers, fungicides, herbicides or pesticides) using compost, and in this case--composted food scraps
- After primary school, classroom food scrap collection at intermediate schools does not continue often due to the sheer quantity of food scraps generated at intermediate schools
- With the Community mandate of Zero Waste by 2040 there is a need to engage students with what they can do to minimize waste, especially with the coming roll-out of kerbside food scrap collection
- Involving students in climate-friendly solutions helps raise awareness of the impact of landfilling organic matter and offers hands-on actions for relief from climate anxiety
- Students entering a new school for the first time tend to be more open to adopting new ideas which can set the stage for on-going behaviour change throughout life.

Development of the programme was initially funded by Foundation North in 2019 and then in 2020 by Auckland Council. Council funding provided evaluation of the programme's impacts. The Pilot was professionally developed by teacher and curriculum developer, Monique Russell.

Interest in this programme can be directed to Betsy Kettle at The Sustainable North Trust, aka Hibiscus Coast Zero Waste hibiscuscoastzerowaste@gmail.com

Food scraps from Northcross Intermediate School are currently taken to a local farm to build topsoil and grow bananas. The programme is called City to Farm and provides an easy first step for schools endeavoring to divert large amounts of food scraps

A student monitor demonstrates how to empty a classroom food caddy into the collection bucket for bokashi composting

Project Purpose

This report will focus on the environmental, educational and community benefits / outcomes of ZWZC Pilot programme, looking at the profile, scale, scope and impact of what has been achieved. It will include both quantitative and qualitative data.

The evaluation report will include:

- Summary of key findings
- Recommendations

Survey Methodology

The research data was gathered via two questionnaires from ZWZC 2021 programme participants (Year 7 students) – prior to and post their participation in the programme.

ZWZC event participant data was gathered from participants in the form of written responses relating to descriptions of soil and food waste,

questions about soils and their benefits, different forms of carbon, learning outcomes, and current and future actions participants intend to take in terms of waste.

It should be noted that the evaluation presented only represents an evaluation of the data collected from specific participants as a sample of the ZWZC programme as a whole.

Evaluation results from ZWZC 2021 were received from a total of 406 of student programme participants.

Students put together carbon cycle puzzles explaining how plants take carbon dioxide out of the atmosphere through photosynthesis and turn it into starches and sugars that are used throughout the plant –including the roots-- to feed soil micro-organisms which build topsoil.

Methodology for Evaluation

Quantitative and qualitative methods have been used to evaluate the success of ZWZC 2021, delivered via various classroom sessions. Specific goals identified for the project in relation to evaluation include identifying if the ZWZC pilot programme (or parts of it) are inspiring schools and communities to:

- Increase ***Knowledge*** of the relationship between food waste and environmental impact
- Change ***Intention/Attitudes*** of food scraps from rubbish to resource

- Encourage ***Actions/Behaviours*** towards thoughtfully putting food scraps in a container for composting rather than mindlessly putting them in the rubbish

Quantitative

Evaluation has involved analysing student participants' answers to evaluation forms following their participation in ZWZC 2021 workshops.

Answers to each of the questions have been grouped into a number of categories and the frequency that each answer has been given has been summarised and compared. For example, in question 4 participant survey respondents were asked to discuss how healthy soil can benefit us and the planet. Answers have been categorised according to whether the answer fits within four categories (1. "Grows plants that produce oxygen", 2. "grows plants that feed animals", 3. "holds water preventing droughts and flooding", 4. "stores carbon"). The degree to which these answers were mentioned prior to and after participating in the ZWZC programme is then compared and evaluated.

The proportion of total responses that each response receives is illustrated with graphs that have percentages (%) identified.

Qualitative

Qualitative methods involved taking the quantitative results and assessing whether these numeric answers suggest that the ZWZC programme has been effective in meeting the key evaluation goals relating to:

- Knowledge
- Attitude/Intention
- Action/Behavior.

Specific answers provided by participants in their surveys are included in this assessment. Direct quotes are included in *"italics"* in the report.

Monique engages the students in a Q&A session about what they know about soil

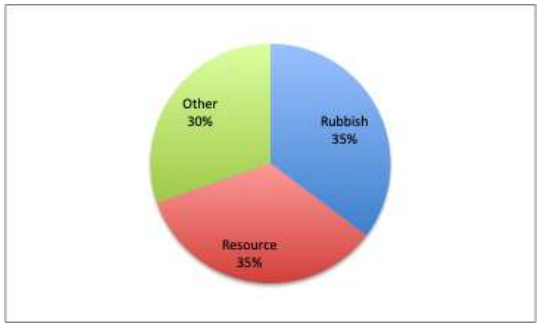
Results of Participant Evaluation Survey

A summary of results of the participant evaluation survey for students prior to attending the ZWZC programme compared with after attending are outlined below, and are referenced in terms of how they meet ZWZC Goals.

Question 1 Attitude to food scraps

Participants were asked to choose words they would use to describe a photo of food scraps. This question sought to evaluate students' attitudes around the potential for food scraps as a "resource" to be composted through a process of decomposition, as a means to add carbon to the soil e.g., *"food scraps that can be recycled and turned into compost and healthy soil".* This is in contrast to students either simply describing what they see in the photo, or viewing food scraps as "rubbish" with no potential value or use, e.g., *"rubbish...trash…garbage…litter".*

As shown in figure 1, in the pre-programme survey 35% of student respondents viewed food scraps as "rubbish" whereas in figure 2 only 8% of students viewed food scraps as "rubbish" after participating in the ZWZC programme. The proportion of student respondents who either described the photo or recognised the potential value of food scraps as a means to reduce carbon increased from 65% to 92%.



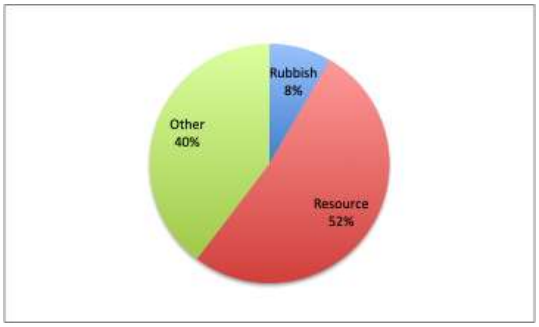


Figure 1: *Before ZWZC Programme*

Figure 2: *After ZWZC Programme*

Word clouds summarizing words used by students pre and post programme are outlined in figures 3 and 4 below:

Figure 3: *Description of food scraps pre-programme*

Figure 4: *Description of food scraps post-programme*

A classroom monitors smiles as he empties the daily food scraps into the collection bucket for bokashi composting

Question 2 Attitude to soil

Students are intrigued when looking through a hand lens at freshly dug, organically managed, living soil with all its diverse life forms

Participants were asked to choose words they would use to describe a photo of different types of soils. This question sought to evaluate students' attitudes around the potential for soil as a "resource" to sequester carbon and that there are healthy soils with good attributes e.g., *"healthy and unhealthy soils"* and *"there is good healthy soil that should be a rich black colour, and the not healthy soil which is a brownish colour which is dry".* This is in contrast to students either simply describing what they see in the photo, or viewing soil as "rubbish" with no potential value or use, e.g., *"dirty, ugly".*

As shown in figures 5 and 6, the proportion of student respondents who viewed soil as "rubbish" decreased from 24% before to 3% after participating in the ZWZC programme. The majority of student respondents continued to simply describe what they saw in the photo (decreased from 68% to 67%). However, a significant number of students progressed from viewing soil as having no value or use to recognising that there are unhealthy soils as well as healthy soils that can benefit humans and the planet.

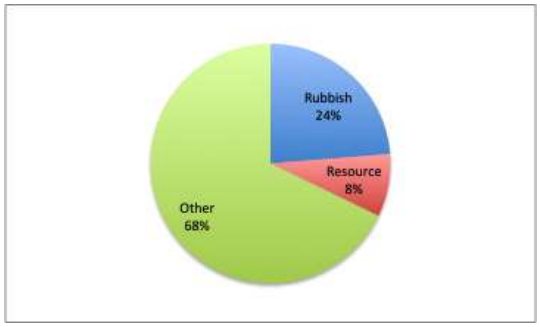


Figure 5: *Description of soil pre-programme*

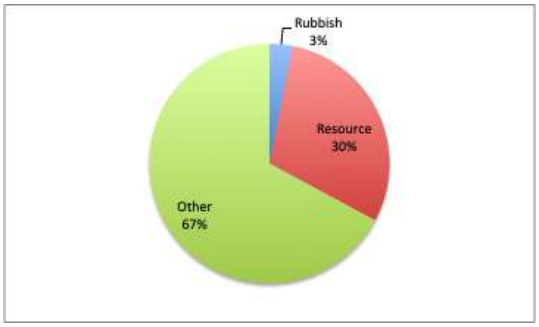


Figure 6: *Description of soil post-programme*

Question 3 Knowledge of differences in soil

A student compares healthy and unhealthy soil by looking at a chart that relates soil colour to soil organic matter. Generally, the darker the soil, the more organic matter and greater soil health.

Participants were asked to outline the difference between healthy soil and unhealthy soil. This question sought to evaluate students' knowledge of soil as a living thing, that is suited to its particular habitat and responds to environmental changes, both natural and human-induced. Answers were categorized according to whether student respondents could identify "environmental variables" that make soils different, e.g., categories including 1. "colour", 2." texture (clumpy, small/large grains)", 3. "moisture (wet/dry)", 4. "pH", 5. "organic content", and 6. "compaction". Answers were also categorised according to whether student respondents could identify the "environmental services" that healthy soils can provide,

such as how the storage of air or water or the degree of decomposition of plant matter is a function of these soil's characteristics such as the level of compaction. This is in contrast to students who couldn't identify any differences between healthy and unhealthy soils.

As shown in figure 7, in the pre-programme survey 16% of student respondents couldn't identify differences between healthy and unhealthy soils whereas in figure 8 this number dropped to 2% of students after participating in the ZWZC programme. There is a high proportion of student respondents that could recognise at least one characteristic that contrasts healthy and unhealthy soils (e.g., most commonly "moisture", "texture" and "colour") even prior to participating in the ZWZC programme. However, the proportion of student respondents who could identify the environmental services these soils provide as a function of these characteristics increased from 7% to 15%.

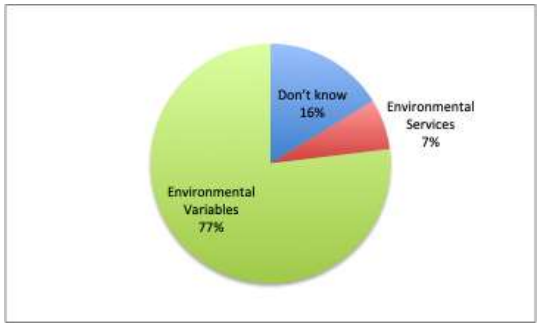


Figure 7: *Description of soil differences pre-programme*

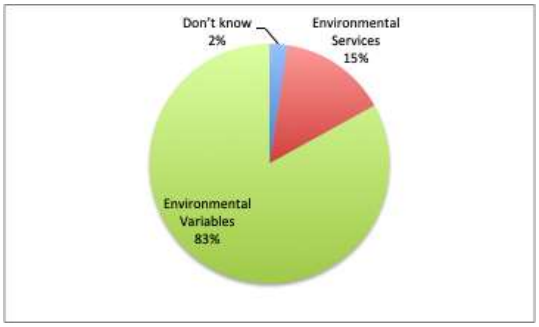


Figure 8: *Description of soil differences post-programme*

For example, one student respondent outlined that *"in healthy soil carbon -based organic matter helps create pockets in the soil that store air and water. These pockets allow resident plants and animals to breathe and move easily. Unhealthy compacted soil, on the other hand, will feel hard and solid, and limit the movement of animals and growth of plants roots".*

"Healthy Soil has a rich colour, is moist, has lots of nutrients and healthy bacteria and you can see composted items. Unhealthy soil is dry, is nutrient poor and can't support plant growth"

"Healthy soil is rich and moist, the perfect ratio of everything. It carries many nutrients and bacteria, and is the perfect home for a seed that wants to grow. Whereas, the unhealthy soil (barely soil) is too dry and crumbly, and rock hard. It needs to be dark and moist, because when a seed is germinating it likes to be hidden and cosy".

Question 4 Knowledge of benefits of soil

Students monitors prepare food scraps with bokashi-composting which starts the breakdown process so food scraps will be incorporated into topsoil quickly.

Participants were asked to outline how healthy soil benefits us, and the planet. This question again sought to evaluate students' knowledge of soil as a living thing, that is suited to its particular habitat and responds to environmental changes, both natural and human-induced. Answers were categorized according to whether student respondents could identify "benefits" of healthy soils, e.g., categories including 1. "Growing plants that produce oxygen", 2." growing plants for food", 3. "holds water preventing droughts and flooding", 4. "stores carbon". This is in contrast to students who couldn't identify any benefits that arise from having healthy soils.

As shown in figure 9, in the pre-programme survey 10% of student respondents couldn't identify how healthy soils benefit us and the planet whereas in figure 10 this number dropped to 7% of students after participating in the ZWZC programme. In the pre-programme survey, students' respondents predominantly recognised that soil grows plants and provides nutrients for food (78%). The proportion of student respondents who identified the benefits from healthy soils in storing carbon increased from 0% to 35%. Only 4% of student respondents in the pre- and post-programme surveys identified benefits relating to holding

water in the soil, and this could be an area to provide more focus in future workshops.

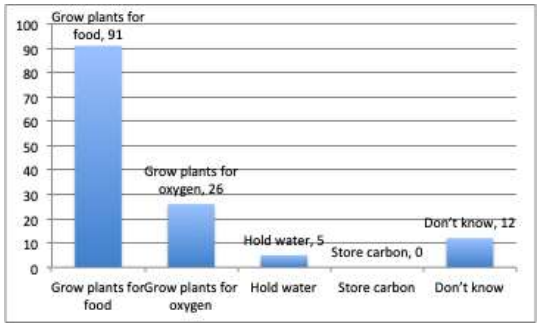


Figure 9: *Description of soil benefits pre-programme*

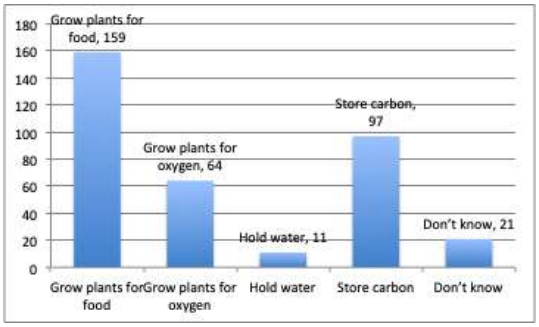


Figure 10: *Description of soil benefits post-programme*

Word clouds summarizing words used by students pre and post programme are outlined in figures 11 and 12 below:

Figure 11: *Description of soil benefits pre-programme*

Figure 12: *Description of soil benefits post-programme*

For example, one student outlined that *"since we have to [sic] much carbon in the air we need to lessen it and Plants take in carbon and turn it into fresh air but plants need healthy soil to grow another benefit of healthy soil is that soil too can take in oxygen. But also, with healthy soil we can grow healthy plants to replenish the air but also to grow healthy food".*

"Ninety-five percent of our food comes from soil, and healthy, fertile soils produce more food, are rich in organic matter built of carbon, are less susceptible to erosion and floods and promote biodiversity".

Monique explains the qualities of healthy soil and compares it to a damp sponge with good soil structure to allow air movement, water storage and organic matter to feed soil microorganisms.

Question 5 Knowledge of soil processes

Participants were asked to outline how unhealthy soil can become healthy soil. This question sought to evaluate students' knowledge of composting, understanding the process of carbohydrates being eaten by soil organisms, creating more soil. Also, the process of decomposition of plant

and leaf litter adding carbon to the soil. Answers were categorized according to whether student respondents could identify soil processes increasing soil health including composting, e.g., categories including 1. "Decomposition of plant matter", 2." soil organisms eating carbohydrates", 3. "absorbing water". This is in contrast to students who couldn't identify any means by which unhealthy soils become healthy soils.

As shown in figure 13, in the pre-programme survey 29% of student respondents couldn't identify processes that enhance soil health whereas in figure 14 this number dropped to 15% of students after participating in the ZWZC programme. The proportion of student respondents who identified soil processes relating to composting increased from 32% to 41%, and those who identified soil processes relating to carbohydrates being eaten by soil organisms, creating more soil increased from 0% to 10%.

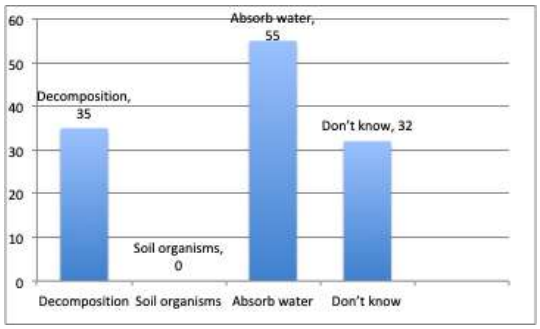


Figure 13: *Description of soil processes pre-programme*

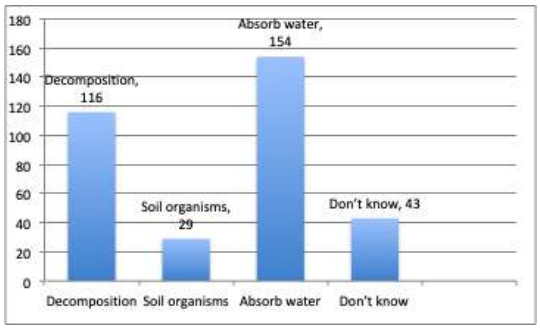


Figure 14: *Description of soil processes post-programme*

Word clouds summarizing words used by students pre and post programme are outlined in figures 15 and 16 below:

Figure 15: *Description of soil benefits pre-programme*

Figure 16: *Description of soil benefits post-programme*

For example, one student outlined that *"Organic matter is the single most important ingredient to improving any soil. It can make heavy clay soil drain better, easier to dig and not so hard or sticky. It can also help sandy soil hold together better and retain more moisture and nutrients".*

There is an intensity in the room as students are absorbed in looking at soil carbon (living and once-living organisms) in healthy soil

Question 6 Knowledge of carbon cycle

These boys are chuffed they could assemble the diagram about the carbon cycle

Participants were asked to outline the various forms that carbon can take. This question sought to evaluate students' knowledge of the carbon cycle, how carbon is constantly recycled on earth through the carbon cycle – photosynthesis, decomposition, respiration, and burning fossil fuels are the processes that change states of carbon in the carbon cycle. The rate of carbon sequestration and carbon release determines the carbon cycle balance (carbon neutral, carbon negative, carbon positive), which affects the earth's temperature. Answers were categorized according to what form carbon takes in the atmosphere (e.g., gas, carbon dioxide) and in plants (e.g., solid, carbohydrates, sugars). This is in contrast to students who couldn't identify the correct forms that carbon takes.

As shown in figure 17, in the pre-programme survey 40% of student respondents correctly identified that carbon takes the form of carbon dioxide in the atmosphere whereas in figure 18 this number increased to 47% of students after participating in the ZWZC programme. The proportion of student respondents who incorrectly identified the form of carbon in the atmosphere decreased from 60% to 52%.

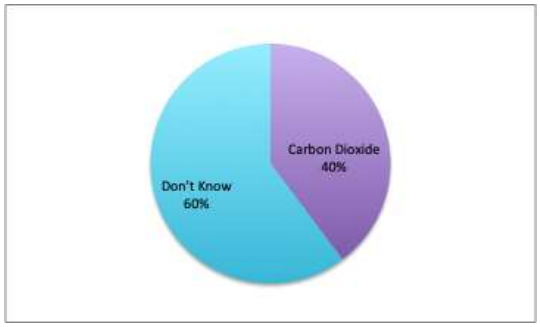


Figure 17: *Form of carbon in atmosphere pre-programme*

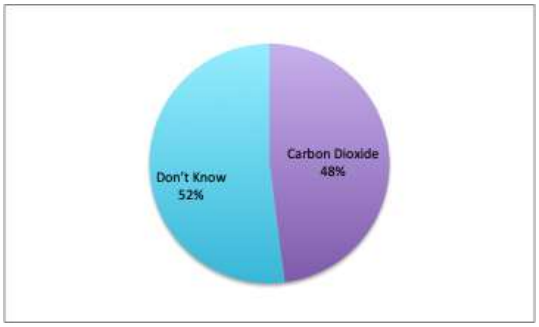


Figure 18: *Form of carbon in atmosphere post-programme*

As shown in figure 19, in the pre-programme survey 18% of student respondents correctly identified that carbon takes the form of carbohydrates in the plants whereas in figure 20 this number increased to 26% of students after participating in the ZWZC programme. The proportion of student respondents who incorrectly identified the form of carbon in plants decreased from 82% to 74%.

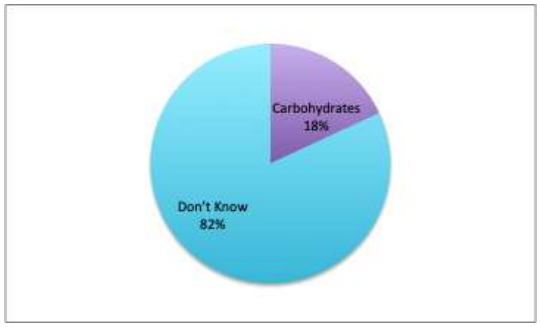


Figure 19: *Form of carbon in plants pre-programme*

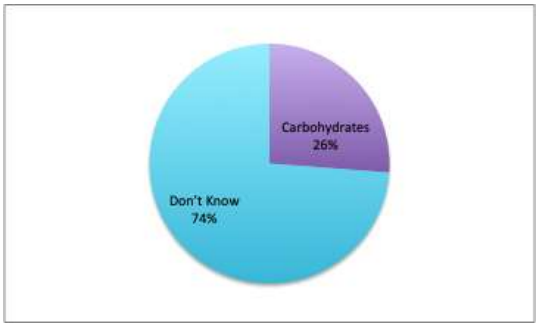


Figure 20: *Form of carbon in plants post-programme*

For example, one student outlined that *"Plants use C02 and sunlight to make food (photosynthesis) leaving oxygen".*

Question 7 Action: use of classroom food caddy

Participants were asked to indicate whether they use the food caddy in the classroom to dispose of their food scraps. This question sought to evaluate whether students are taking any actions to participate in some sort of food scrap diversion from landfill and garbage disposals following their participation in the ZCZW programme.

As shown in figure 21, in the pre-programme survey 50% of student respondents indicated they used the food caddy whereas in figure 22 this number increased to 67% of students after participating in the ZWZC

programme.

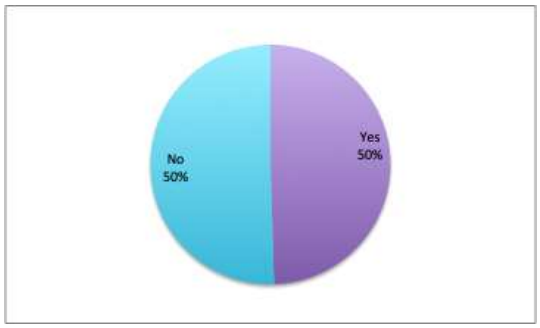


Figure 21: *Use of food caddy pre-programme*

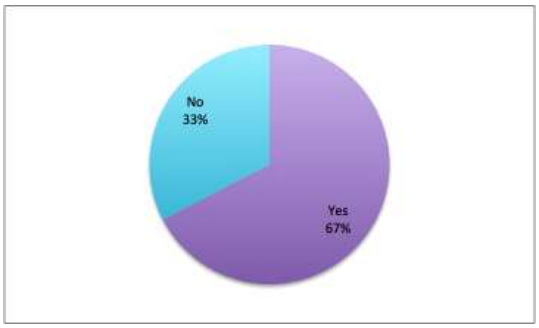


Figure 22: *Use of food caddy post-programme*

For example, one student outlined that *"I use it because I know that I am part of a bigger thing that will repair our planet".*

"Because it helps grow bananas at that place where they give the schools compost to".

"It's good for the planet!"

"We use the compost bin so when they get put in the farms the carbon goes into the ground".

"We don't usually because it will attract flies and other insects into the classroom".

Students learn about the tools needed to divert food scraps: Zing, a food scrap caddy, stomper, and a bokashi bucket

Question 8 Action: home food scrap diversion

Participants were asked how often they dispose of their food waste at home through various methods. Categories included feeding pets, rubbish bins, garbage disposals, home composting, worm farming, bokashi, or the city to farm system. Students were asked whether they used these methods *"never", "sometimes", "often",* or *"always"*. This question sought to evaluate whether students are taking any actions to participate in some sort of food scrap diversion from landfill and garbage disposals following their participation in the ZCZW programme.

As shown in figure 23, in the pre-programme survey 52% of student respondents indicated they disposed of food waste by feeding pets whereas in figure 24 this number increased to 54% of students after participating in the ZWZC programme. In the pre-programme survey 12% of student respondents indicated they disposed of food waste by bokashi composting whereas in figure 24 this number increased to 22% of students after participating in the ZWZC programme. In the pre-programme survey 37% of student respondents indicated they "often" disposed of food waste by rubbish bin whereas in figure 24 this number decreased to 33% of students after participating in the ZWZC programme.

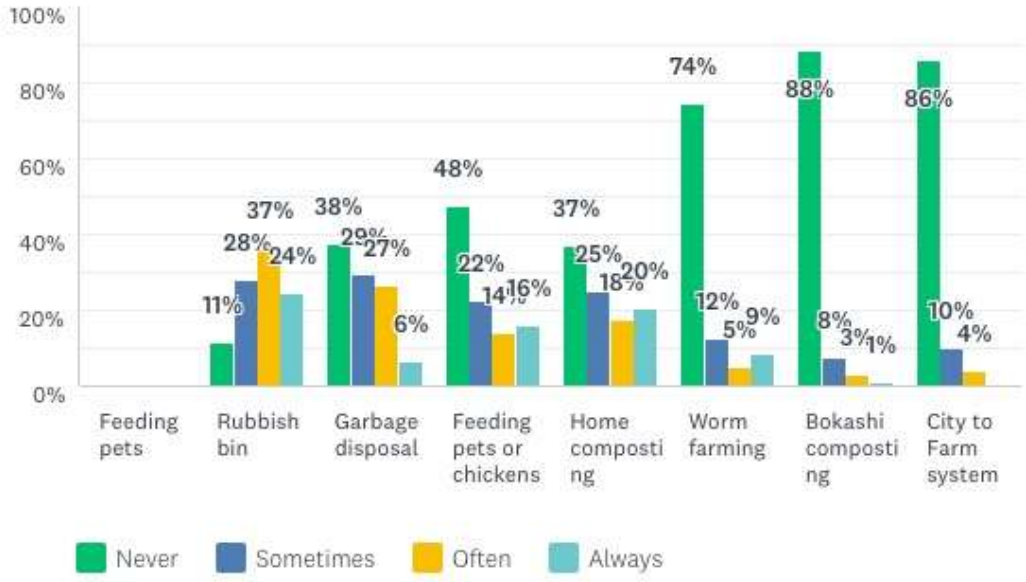


Figure 23: *Use of food scrap diversion pre-programme*

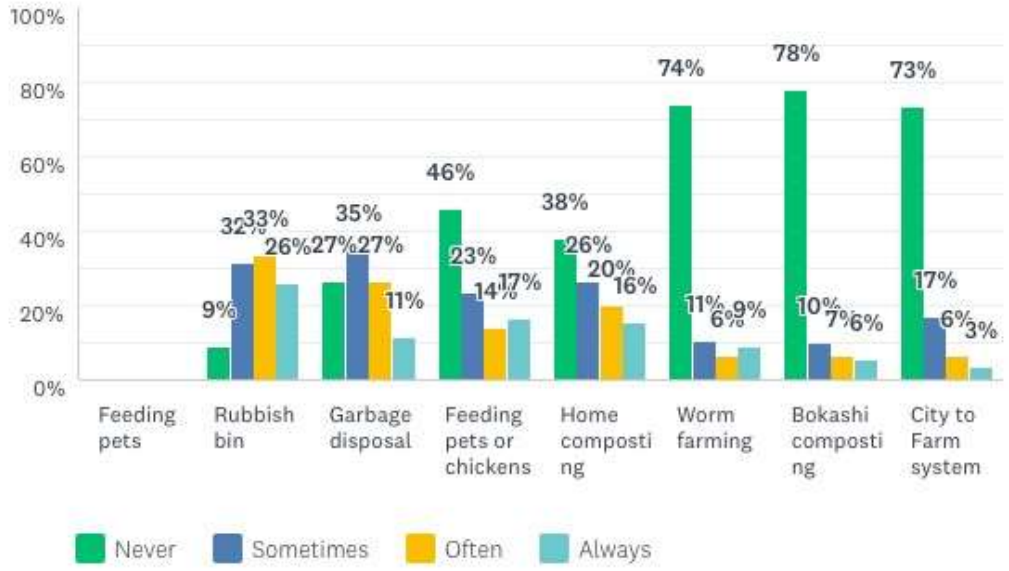


Figure 24: *Use of food scrap diversion post-programme*

Question 9 Attitude: satisfaction with ZWZC programme

Participants were asked to rate how much they valued the ZWZC programme. Students were asked rate the programme on a scale of 1 – 6 (with 1 being "very low value" and 6 being "very high value"). This question sought to evaluate whether students' attitudes are likely to change as a result of their satisfaction with their participation in the ZCZW programme.

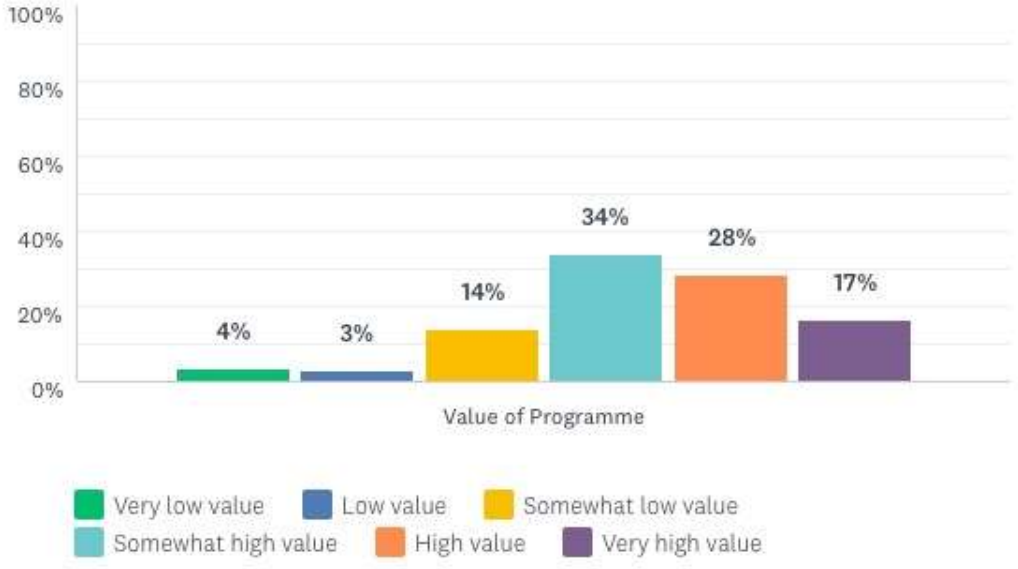


Figure 25: *Value of programme*

As shown in figure 25, 79% of student respondents indicated they valued the ZWZC programme at a 4 or above (somewhat to very high value).

Summary of Results of Participant Evaluation Survey

We have seen improvements in evaluation results for student participants of the ZWZC programme which include:

- The proportion of student respondents who viewed food scraps as "rubbish" decreased from **35% to 8%.**
- The proportion of student respondents who viewed soil as "rubbish" decreased from **24% to 3%.**
- The proportion of student respondents who couldn't identify differences between healthy and unhealthy soils decreased from **16% to 2%.**
- The proportion of student respondents who recognised the potential value of soil as a means to reduce carbon increased from **0% to 35%.**
- The proportion of student respondents who could identify the environmental services soils provide as a function of soil characteristics increased from **7% to 15%.**
- The proportion of student respondents who identified soil processes relating to composting increased from **32% to 41%.**
- The proportion of student respondents who correctly identified the form of carbon in the atmosphere increased from **40% to 47%.**
- The proportion of student respondents who correctly identified the form of carbon in plants increased from **18% to 26%.**
- The proportion of student respondents who indicated they use the classroom food caddy increased from **50% to 67%.**
- The proportion of student respondents who disposed of food waste by feeding pets increased from **52% to 54%.**
- The proportion of student respondents who disposed of food waste by bokashi composting increased from **12% to 22%.**
- The proportion of student respondents who "often" disposed of food waste by rubbish bin decreased from **37% to 33%.**

These improvements need to be viewed in the context of a number of factors.

Some year 7 students would have had some level of exposure to the concepts or actions associated with the ZWZC programme due to the

environmental programmes being offered at primary school. For example, as figure 26 shows, 28% of student respondents said they used composting bins and 19% said they had used worm farms at primary school.

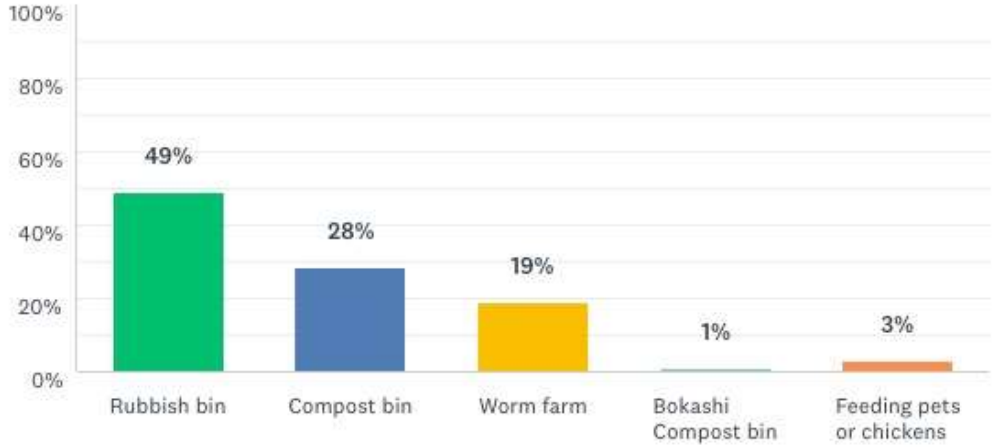


Figure 26: *Waste options used at primary school*

As a result, the changes in this evaluation report viewed for student respondents pre and post their participation in the ZWZC workshops in term 1 2021 are likely to have been influenced by their prior level of knowledge or actions from earlier exposure to zero waste concepts at primary school (e.g., from the use of worm farms and compost bins at primary school). They may therefore have attained a certain benchmark in terms of knowledge, attitude and actions with respect to waste. For example, students appeared to have a benchmark knowledge of soil processes relating to composting (32% of student respondents), as well as some understanding of the form carbon takes in the atmosphere (40% of student respondents).

What is clear is that the ZWZC programme built on this prior knowledge and actions including in terms of the value of soil in sequestering carbon, of which students appeared to have no knowledge of prior to participating in the ZWZC programme (going from 0% to 35%). This new knowledge may have influenced greater action, as demonstrated by the use of classroom food caddies increasing from 50% to 67% pre and post ZWZC programme. There is evidence that the ZWZC programme is building on the knowledge base developed at primary school in a meaningful way as students move through their learning pathway and have the capacity to understand more complex processes and concepts.

The response rate to the surveys was 406. As a proportion of the school population, these evaluation findings into the outcomes of the ZWZC programme are accurate to a 4% error level at 95% confidence.

Future Expansion of the Zero Waste Zero Carbon Programme into more Schools

While getting people out of cars, on their feet, riding bicycles and into mass transit must be done to reduce emissions a secondary emphasis could be placed on growing food at schools. The third greatest contributor to greenhouse gasses has been identified by the Drawdown Team as that created by the world's largest industry—producing food for humanity. On each step of the life cycle of conventional food production GHGs are produced. Drawing-down carbon dioxide and other GHGs can be addressed by local, organic food production which brings to mind growing food at schools, composting, the use of organic methods and growing topsoil. So, raising awareness and inspiring action on one of the biggest zero waste zero carbon relationships could be further developed in courses on food production and regenerative soil creation for older students.

Even though the programme has not been publicized, three schools have expressed interest in the ZWZC programme for 2022—Murrays Bay Intermediate in the Mairangi Bay catchment, Wainui School in South Rodney and Orewa College in the Hibiscus Coast.

We look forward to continue working with Auckland Council's Sustainable Schools team who we hope will continue to provide oversight, host promotions, offer relationship building between schools, and promote the programme throughout Auckland Region over time.