

LOVE  
YOUR FOOD  
@SCHOOLS  
LET'S NOT BE WASTEFUL



Food Waste  
Reduction and Recycling  
Resource Kit

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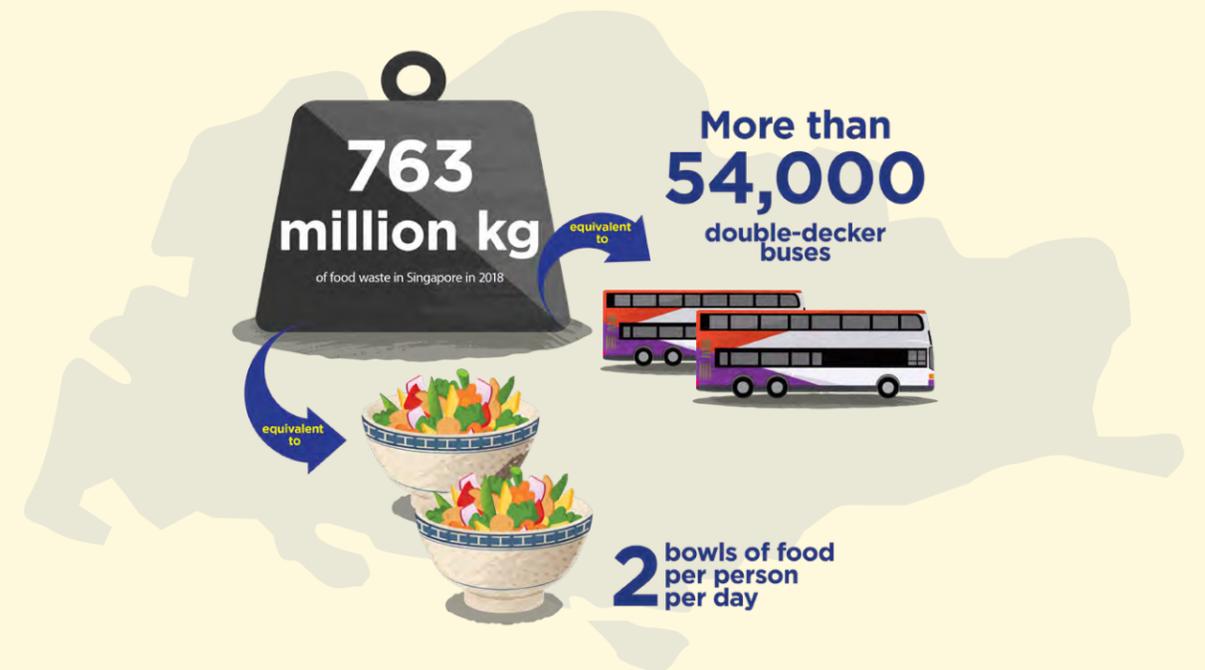
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# INTRODUCTION

## HOW MUCH FOOD WASTE DO WE GENERATE?

In 2018, Singapore generated 763 million kg of food waste. Food wastage happens when we buy, order or cook more than we can eat.



### What's the big deal?

Singapore is a small country with limited space. At the current rate we are producing waste, **Semakau Landfill will be filled up by 2035 if we do not take steps to reduce waste.**<sup>1</sup> The resources and labour used to produce the food also go to waste, along with hard-earned money we use to buy food.



<sup>1</sup> National Environment Agency  
– <http://www.nea.gov.sg/energy-waste/waste-management/waste-statistics-and-overall-recycling>

# LET'S NOT BE WASTEFUL

Together we can cultivate strong environmental ownership in schools and work towards a Zero Waste Nation.

This kit aims to help schools get started. You will find resources, including instructions on how to make game sets, to encourage students to reduce food waste.

## FOOD MANAGEMENT CYCLE



## MODULE 1: GROW FOOD

### ★ BACKGROUND

**Growing food takes time, hard work and resources.** Wasting food means we are wasting these resources!

### ✎ THINGS YOU CAN DO

#### Activity 1: Growing food takes time, hard work and resources

**Objective:** To help students appreciate the time, resources and hard work required to grow food.

**Duration:** 20 minutes

**What you need:**

- Activity sheet (found on page 6).
- 1 “paddy field” and 8 “rice stalks” with answers on the bottom of each stalk. When stalks are inserted into the field, answers should not be visible.



#### ACTIVITY ANSWERS:

**Bananas** - 10 months, **Watermelon** - 70-90 days, **Wheat** - 1-2 months, **Maize (Corn)** - 11 months, **Rice** - 110-130 days, **Bok Choy** - 60-95 days, **Asparagus** - 3 years, **Soy beans** - 100-150 days

### 📖 Activity instructions:

**Step 1:** Distribute the activity sheet.

**Step 2:** Assign the students the role of “farmers” and ask them to search for the answers by picking the “rice stalks”. Set a time limit (e.g. 3-5 minutes) to provide sufficient challenge for students.

**Step 3:** Discuss the questions with students.

- What resources do you need to grow food?
- Do you feel that growing food requires a lot of hard work?

### Activity 2: Farming in Singapore

🎯 **Objective:** To give students first-hand experiences that help them understand the importance of cherishing food so they will appreciate and not waste it.

Organise a learning journey to a local farm or community garden ([www.kranjicountryside.com](http://www.kranjicountryside.com) and [www.nparks.gov.sg](http://www.nparks.gov.sg)).

## 🔍 CASE STUDY

### Urban Farming at Spectra Secondary School

- ‘Urban farmers’ of Spectra Secondary School worked hard to grow vegetables during its 10-week Garden Based Service Learning (GBSL) curriculum.
- The harvested vegetables were sold to the public at Farmers’ Markets, with proceeds benefitting needy students. This project helped students understand and appreciate the hard work required to produce food.



*Both growing and selling food requires so much patience and hard work! Experiencing the whole process taught me how hard the farmers have to work so that there is food for us to eat.*

*– Ashwina D/O Mani Sangar, student*



### Challenges to the project:

- **Weather.** In the event of bad weather, outdoor activities were affected.
- **Students’ involvement.** Students were reluctant to get their hands dirty.
- **Insect infestation.** Insects would feed on and cause damage to the crops.



### Tips:

- **Be flexible.** Outdoor activities can be swapped with indoor activities, such as making compost or crafting a self-watering pot.
- **Install good infrastructure.** Infrastructure such as auto-irrigation systems, good drainage, trellises and netting frames can reduce the impact of downpours and deter pests.



Parent volunteer harvesting Chinese Cabbage with his daughter.



Happy customer with her purchase.



Student harvesting baby bok choy after 35 days.

- **Cultivate ownership.** Encourage students to propose ideas such as the types of vegetables to plant.
- **Involve parents/families.** This will help spread the message of cherishing food at home and tap on their expertise.
- **Plan ahead.** Time harvesting periods to coincide with school activities.



## ACTIVITY SHEET: GROWING FOOD IS HARD



# GROW FOOD

**Growing food takes time, hard work and resources**

Do you know how long it takes to grow these crops before they can be harvested?

Find out and fill in the blanks with the correct answers.



**Watermelon**



**Rice**



**Wheat**



**Bok Choy**



**Soybeans**



**Asparagus**



**Bananas**



**Maize (Corn)**

Other resources such as fuel and manpower are used to transport food to Singapore from countries as far as Brazil.

It takes weeks, months or even years to grow food and get it to your table, but it takes just seconds to waste it. Wasting food causes unnecessary strain on our environment.



## MODULE 2: BUY AND STORE FOOD PROPERLY



### BACKGROUND

**Buy what you need and store it properly.** Avoid buying items that you do not have plans for so they do not end up in the trash. Good storage practices protect food from contamination and extend its shelf life after purchase.



### THINGS YOU CAN DO

#### Activity 1: Store it right

**Objective:** To teach students how to store food items properly after buying them, so that food items do not spoil easily.

**Duration:** 20 minutes

**What you need:**

- Game sets comprising a “refrigerator”, “freezer”, “cupboard”, and “food props” per set (printables found on pages 9-11).

#### Activity instructions:

- Step 1:**
- Group students in teams of 5
  - Distribute 1 game set to each group
  - Get students to decide where to store the food items (10 minutes)

**Step 2:** Discuss the questions with students.

- Why should we only buy just enough food while grocery shopping?
- Why do we end up overbuying while grocery shopping? What are some ways to prevent this from happening?

#### ACTIVITY ANSWERS:

**Freezer:** Chicken, Fresh Fish, Frozen Nuggets, Prawns

**Refrigerator:** Apple, Bananas, Cabbage, Carrot, Cheese, Chocolate, Leafy Vegetables

**Cupboard:** Can of Beans, Noodles, Potato, Potato Chips



Here are some additional storage tips to share with the class after the discussion:



- **Store it correctly.** Follow the instructions on the product's packaging. Some items must be kept in the fridge after opening.



- **Check your refrigerator.** The main compartment operates best between 0°C and 4°C, and the freezer at -18°C and below.



- **Store better.** Chips, crackers and cereals last the longest when kept in airtight containers. Airtight bag clips can also be a convenient option.



- **Practise "first to expire, first out".** Place products that are nearing expiry at the front of the fridge, freezer or cupboard. This reminds you to use them as soon as possible.



- **Use the freezer.** Box up leftovers in serving portions and freeze them so that they last longer and can be reheated easily for the next meal.

### Activity 2: Store it right

**Objective:** Check the refrigerator at home and share how the food are stored. Students can do this with parents using the materials provided on pages 9 - 11.



### PRINTABLES: STORE IT RIGHT

#### Food Props

Print on **A4 paper**, paste on recycled cardboard and cut along the lines.

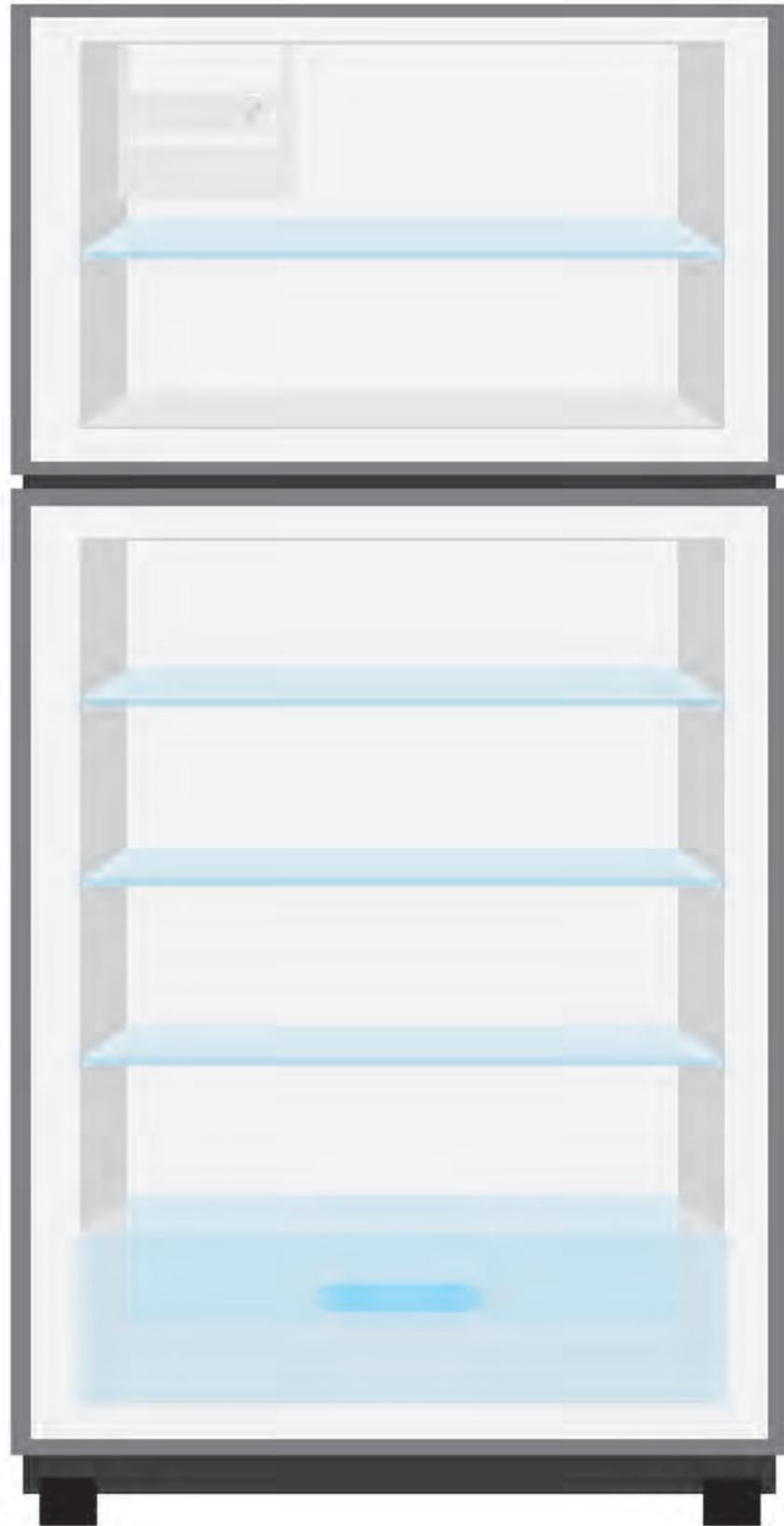
 FRESH FISH	 CHEESE	 POTATO
 BANANAS	 NOODLES	 CARROT
 APPLE	 POTATO CHIPS	 FROZEN NUGGETS
 PRAWN	 CABBAGE	 CAN OF BEANS
 CHICKEN	 CHOCOLATE	 LEAFY VEGETABLES



## PRINTABLES: STORE IT RIGHT

### Refrigerator and Freezer

Print on **A3 paper**, paste on recycled cardboard and cut along the lines.



## PRINTABLES: STORE IT RIGHT

### Cupboard

Print on **A3 paper**, paste on recycled cardboard and cut along the lines.





## MODULE 3: ORDER FOOD

### ★ BACKGROUND

**Order/take only what you can finish.** Ask for a smaller portion and think twice before ordering a jumbo-sized meal.

### ✎ THINGS YOU CAN DO

#### Activity 1: At a buffet

**Objective:** Simulate a buffet and remind students to order/take only what they can finish.

**Duration:** 20 minutes

#### ? What you need:

- Food props in the ratio of 6 food props to 1 student (printables found on page 13).
- Food trays/containers to hold different food props.
- 1 plate and 1 resealable bag approximately 18 cm by 20 cm for each student.



#### 📖 Activity instructions:

**Step 1:** Place food items in food trays/containers to simulate a buffet set-up.

**Step 2:** Give each student one resealable bag and instruct them to put their “food” into the bag, which represents their stomach.

**Step 3:** Discuss the questions with the students.

- What are some ways to avoid ending up with excess food items that we don’t want?
- How can event organisers prevent food waste?

### 🔍 CASE STUDY

#### Beating Food Waste at Fernvale Primary School

- Fernvale Primary School initiated various schemes to reduce food waste, such as food portioning by canteen stalls and organising environmental outreach events.
- Environmental topics were incorporated into the teaching of different subjects.
- P3 students designed food waste reduction posters as part of project work.
- Through these efforts, food waste generated was reduced and students gradually ordered only what they could finish.



A Scout encouraging a fellow student to finish his food.



Decals designed by students remind their peers to reduce food waste.



### Challenges to the project:

- **Students' involvement.** The students were not responsive to the school's food waste reduction messages.
- **Cooperation from canteen vendors.** Vendors were sceptical about the effectiveness of offering two portion sizes on their menu.



### Tips:

- **Develop consistent publicity materials.** Use posters, table decals, cut-outs and tokens to foster the behaviour of ordering just enough and reducing food waste.
- **Make it interesting through gamification.** Introduce a leaderboard of food waste generated by the school and have the students update it daily. Reward students who have made the effort to reduce food waste.
- **Provide support to canteen vendors.** Provide logistics for designing and printing of new menus with different portion sizes.



Posters displayed in the canteen reminding students to love their food and not waste a bite.



Food Waste Monitors recording the food waste generated.

*We found the portioning useful as we see the kids waste less. This means we also save money!*

*– Mdm Zainab Gani,  
Malay Cuisine vendor*



### PRINTABLES: BUFFET TIME

#### Food Props



Print on **A3 paper**, paste on recycled cardboard and cut along the lines. Try using other materials to give props a "3D" effect.



# MODULE 4: REDISTRIBUTE FOOD

## ★ BACKGROUND

**Donate excess food to share it with others and reduce food waste.** Non-perishables can be donated instead of being disposed of.

## ✎ THINGS YOU CAN DO

### Activity 1: Sort your food

**Objective:** To teach students to differentiate between food items that can and cannot be donated.

**Duration:** 20 minutes

**What you need:**

- 1 food item/prop from each of the 10 categories below.

 <b>ITEMS THAT CAN BE DONATED</b>		 <b>ITEMS THAT CANNOT BE DONATED</b>	
 <b>STAPLES</b> Rice, Noodles, Pasta	 <b>BEVERAGES</b> Hot Beverages, UHT Milk, Ready to Drink	 <b>UNLABELLED</b>	 <b>EXPIRED</b>
 <b>CONDIMENTS</b> Oil, Seasoning, Spices, Spreads, Sugar, Syrup	 <b>SNACKS</b> Biscuits, Cereals, Chips, Chocolates	 <b>OPENED</b>	 <b>USED</b>
 <b>CANNED FOOD</b> Beans, Seafood, Fruits, Soup, Meat	 <b>DRIED/PRESERVED FOOD</b> Beans, Fruits, Vegetables, Meat		

## 📖 Activity instructions:

**Step 1:** Group students into teams of 5 and distribute the 10 food items to each team. Set a time limit (e.g. 10 minutes) for the students to sort which food items can or cannot be donated.

**Step 2:** Discuss the questions with students.

- Why is it that some foods cannot be donated?
- Why should we donate excess food?

### Activity 2: Donate food

**Objective:** Organise a food donation drive.

Below are some partners you can approach for assistance.



**The Food Bank Singapore:**  
[www.foodbank.sg](http://www.foodbank.sg)



**Food from the Heart:**  
[www.foodfromtheheart.sg](http://www.foodfromtheheart.sg)



**Fei Yue Community Services:**  
[www.fyccs.org](http://www.fyccs.org)



**Willing Hearts:**  
[www.willinghearts.org.sg](http://www.willinghearts.org.sg)



**Lions Home for the Elders:**  
[www.lionshome.org.sg](http://www.lionshome.org.sg)

## CASE STUDY

### Donating Excess Food at Zhonghua Secondary School



The team behind “Donut Waste Food, Lettuce Donate”.



ZHSS students and staff from The Food Bank Singapore.

- Students from Zhonghua Secondary School initiated a food waste reduction project called “Donut Waste Food, Lettuce Donate”, in collaboration with The Food Bank Singapore.
- They designed publicity materials, held talks, and conducted food donation drives in their school and at Braddell Heights Community Club.
- Students learnt that by donating instead of discarding excess food, they were contributing to both the environment and society.



*Don't give up so soon and strive on to the last day to get as many donations!*

*– Goh Tze Mian,  
teacher-in-charge of the food donation drive*

### Challenges to the project:



Students distributing flyers as part of outreach efforts.

- **Shortage of donations.** Response was lukewarm in the beginning. Students’ requests of placing food bins at prominent areas were also denied because of security risk.
- **Selection of outreach activities.** A limited number of activities could be run due to time and capacity constraints. Thus, only impactful activities were selected.
- **Transportation.** Food donations had to be consolidated outside of school. Hence, thorough assessment of logistics and accessibility of the venue was needed.

### Tips:



Publicity poster designed by students.

- **Carry out consistent publicity on multiple platforms.** Conduct the following actions prior to the food donation drive to help boost donations:
  - Make assembly announcements.
  - Send email blasts.
  - Utilise social media.
  - Display posters around the school.
- **Time the donation drive.** Organise the donation drive before or after festive seasons to garner more donations, and hold it over an extended period of time.
- **Plan logistics early.** Prepare cardboard boxes and a room to store collected food items beforehand.



# MODULE 5: RECYCLE FOOD WASTE

## ★ BACKGROUND

**Segregate and recycle food waste.** Composting and food waste recycling turn food waste, such as fruit peels and eggshells, into compost for plants. This closes the loop in the food management cycle.

## ✎ THINGS YOU CAN DO

### Activity 1: Traditional composting

- 🎯 **Objective:** To teach students how to make compost.
- 🕒 **Duration:** More than 3 months
- 📖 **Activity instructions:**
  - a. Prepare a black, plastic dustbin with a lid.
  - b. Drill small holes on the lid, bottom and sides of the bin for ventilation.
  - c. Place bin in a well-ventilated area without direct sunlight and elevated from the ground (using bricks or stones).
  - d. Line sides of bin with cardboard to prevent material from coming out through drilled holes.
  - e. Follow the 5 steps below.

1 Collect vegetable scraps and fruit peels (nitrogen-rich 'greens') in the plastic bin.	2 Add some dried leaves (carbon-rich 'browns').	3 Add water to the mixture and stir.	4 Leave it to decompose naturally. Add water, turn and stir daily for 3-6 months.	5 Use compost as fertiliser on plants.

### Activity 2: Vermicomposting

- 🎯 **Objective:** To teach students how to make compost using earthworms.
- 🕒 **Duration:** 1-3 months
- 📖 **What you need and activity instructions:**

1 Put in dampened bedding materials eg. newspaper strips in a bin.	2 Add in eggshells and vegetable scraps (nitrogen-rich 'greens').	3 Alternate the layers but ensure that the topmost layer is made up of dampened bedding materials.	4 Add the earthworms' (e.g. Red Wiggler worms, Malaysian blue worms and European night crawlers) and close the lid.	5 The earthworms will feed on mixture and pass out worm castings. Collect worm castings in 1-3 months for use on plants.

Find out more on composting methods online or in gardening books.

### Activity 3: Recycling food waste with machines

- 🎯 **Objective:** To teach students how compost can be made using a food waste recycling machine.

#### Food waste recycling using a machine:

1 Segregate your food waste from non-food items.	2 Put food waste into the food waste recycling machine. Different machines will have different conversion times.

Micro-organisms, enzymes and emulsifiers digest food waste in the food waste recycling machine and convert it into compost.

You may plan a visit to premises that use food waste digesters, e.g. Our Tampines Hub (our\_tampines\_hub@pa.gov.sg).

1 Earthworms can be purchased at [www.ogreenliving.com](http://www.ogreenliving.com), [www.organicorigins.com.sg/compostworms.php](http://www.organicorigins.com.sg/compostworms.php), [www.facebook.com/lm-vertical-culture-pte-ltd-714846801992455](https://www.facebook.com/lm-vertical-culture-pte-ltd-714846801992455)

**Disclaimer**  
This list of companies is non-exhaustive and is for reference. Inclusion in this list does not constitute license, endorsement or recommendation by NEA. For more information, please contact the companies.

## 1. Vermicomposting project at ITE College East

- In 2016, the Green Club members and landscaping students at ITE College East teamed up to recycle food waste from the fruit stall by feeding them to earthworms.
- Students generated 3.5kg of castings fortnightly to fertilise plants.
- They learnt that food waste can be converted to a useful product.



Harvesting worm castings.



Harvesting worm castings.



Fertilising a papaya plant with the worm castings.

*I never knew we could recycle food waste, but now I know earthworms can eat them and we can use the castings to grow even more delicious fruits and vegetables!*

– Nah Yi Xian, Landscaping student



## Challenges to the project:

- **Storage.** The earthworms propagated rapidly and storage soon became an issue.
- **Commitment.** A high level of care and dedication was put in to make the vermicomposting project successful.

## Tips:

- **Limit earthworm population growth.** Reduce food waste fed to earthworms so they reproduce less rapidly.
- **Motivate the students.** Guide students proactively and patiently on caring for the earthworms.
- **Structure a care schedule.** Create a roster to detail the duties of students and canteen vendors for seamless operation of the wormery.
- **Form partnerships.** Approach and partner existing practitioners of vermicomposting, such as Siloso Beach Resort, to provide basic wormery ingredients and training.



Malaysian blue earthworms.

## 2. Recycling Food Waste at Chongzheng Primary School

- Chongzheng Primary School was a participant in the 'Love Your Food @ Schools' project that promoted a closed-loop food management system.
- Everyone in school segregated their food waste, which was then deposited into a food waste recycling machine and converted into compost for school's use or distribution to visitors and community gardens.
- Students became more conscious of the need to reduce food waste and the school's food waste was reduced by approximately 40%.



Students segregating food waste.



# ROLES & RESPONSIBILITIES

Working towards zero waste in schools requires collaboration and communication between the different stakeholders.

Each stakeholder should be aware of the food waste recycling process in place and work together when problems arise. Knowing his/her roles and responsibilities will help prepare the school for different scenarios.

This table can be used as a guide of the activities required. To ensure sufficient support, you may wish to assign the relevant officers/stakeholders to the different roles.

Roles and Responsibilities	
<b>School Leader/s</b>	<p><input type="checkbox"/> <b>Planning</b></p> <ul style="list-style-type: none"> <li>Form a Food Waste Reduction (FWR) Committee to drive FWR programmes.</li> <li>Appoint suitable school personnel to oversee the food waste recycling system (if any).</li> <li>Meet with the FWR Committee to establish goals for the term and review the programme regularly (e.g. once a term).</li> </ul> <p><input type="checkbox"/> <b>Communication</b></p> <ul style="list-style-type: none"> <li>At the beginning of a school term, explain FWR messages and the programme to teachers and students.</li> <li>Throughout the year, make announcements to remind the school to reduce, segregate and recycle food waste.</li> <li>At school-wide events, communicate FWR plans and profile the FWR Committee and supporting staff and students..</li> </ul> <p><input type="checkbox"/> <b>Education</b></p> <ul style="list-style-type: none"> <li>Encourage teachers to integrate NEA's FWR resources into their lessons.</li> </ul>

Assign the relevant officers/ stakeholders to the different roles to ensure sufficient support of the activities required.



Roles and Responsibilities	
<b>WR Committee Members and/or supporting school personnel</b>	<p><input type="checkbox"/> <b>Planning</b></p> <ul style="list-style-type: none"> <li>Plan and propose the school's FWR plan to the school leaders.</li> <li>Oversee and train the appointed personnel to manage the food waste recycling system (if any).</li> <li>Train and work with environment champions/student leaders to advocate FWR to their peers.</li> <li>Meet up with stakeholders (e.g. Principal, Vice Principal, teachers, vendors, canteen manager, OM) once every term to gather feedback.</li> </ul> <p><input type="checkbox"/> <b>Segregation (for food waste recycling)</b></p> <ul style="list-style-type: none"> <li>Plan and monitor the setup of the waste segregation bins/stations</li> <li>Ensure the school has necessary resources (posters, decals, bins) and deploy them around the school.</li> <li>Schedule environment champions/student leaders to ensure that food waste is segregated properly during recess and lunch times.</li> <li>Involve cleaners to maintain the cleanliness of the segregation areas.</li> </ul> <p><input type="checkbox"/> <b>Communication</b></p> <ul style="list-style-type: none"> <li>At the beginning of the school term, explain FWR and segregation procedures to all students and staff through posters, assembly programmes, and announcements.</li> <li>Throughout the school term, make announcements and conduct FWR educational campaigns.</li> </ul> <p><input type="checkbox"/> <b>Education</b></p> <ul style="list-style-type: none"> <li>Integrate NEA's FWR resources into lessons.</li> </ul>
<b>Vendors</b>	<p><input type="checkbox"/> <b>Planning</b></p> <ul style="list-style-type: none"> <li>Attend FWR committee meetings.</li> <li>Provide options of             <ul style="list-style-type: none"> <li>Serving different food portion sizes so that diners can choose to order only what they can finish.</li> <li>Swapping sides so that diners can request a replacement for a side that they do not eat</li> </ul> </li> </ul> <p><input type="checkbox"/> <b>Segregation (for food waste recycling)</b></p> <ul style="list-style-type: none"> <li>Segregate food waste into a separate bin during food preparation and at the end of the day.</li> </ul>
<b>Students</b>	<p><input type="checkbox"/> <b>Segregation (for food waste recycling)</b></p> <ul style="list-style-type: none"> <li>During recess and lunch times, ensure only food waste is deposited into the food waste bin, and demonstrate how to segregate properly, if needed.</li> <li>Help appointed school personnel with the daily weighing and tracking of the weight of food waste.</li> <li>Help appointed school personnel in managing the food waste recycling machine/system.</li> <li>Weigh and pack compost for distribution.</li> </ul> <p><input type="checkbox"/> <b>Communicate</b></p> <ul style="list-style-type: none"> <li>Share FWR and segregation message with friends.</li> <li>Design FWR communication materials such as posters or decals and place them in the canteen.</li> </ul> <p><input type="checkbox"/> <b>Education</b></p> <ul style="list-style-type: none"> <li>Share your FWR experiences at an assembly talk with the school.</li> <li>Help school personnel in FWR outreach activities.</li> </ul>



An initiative by

