CARBON FOOTPRINT OF FOOD (with a little water sense thrown in)
Lesson by: R.Ricky Bennett
Grade Level: Fifth

Focus: The main focus is on how much carbon dioxide is put into the atmosphere by getting the food we eat to us. The secondary focus is sensible water use in food choices.

Objectives:
1. Students will be able to make better water use choices.
2. Students will have a basic understanding of what a carbon footprint is.
3. Students will be able to think more about the processes that it takes to get food to the table.
4. Students will be able to make better choices for the environment through both water and food choices and understand stewardship to the earth.

Standards:
SC 5.1.5 2000
Explain that technology extends the ability of people to make positive and/or negative changes in the world.

Background:
More background information can be found in the Teacher's Script provided below.

Materials:
1. Open Area
2. Carbon Footprint Overview sheets
3. Water Footprint Overview sheets

Procedure: (40 Minutes Total)

1. A good way to start this activity is to eat lunch first which will tie in with the lesson later on.
2. Pass out the carbon footprint overview sheets one per person. Students should read the sheets to themselves.
3. Next discuss what the children think of the carbon footprint and what they can do based on the sheets they have just read.
4. Pass out the water footprint overview sheets to each student. Students should read the sheets to themselves.
5. Lastly have a discussion about the water footprint and how it affects food choices.

Evaluation:

1. The next class day, have the students write a paper about what they learned and what they personally plan to do to be good stewards and make wiser food choices. (This will allow the teacher to see if the information stuck in their minds and made an impact.)

Carbon Footprint Overview Sheet:

[Adapted From: http://www.ehow.com/info_8122401_ways-reduce-carbon-footprint-kids.html]

Shop Locally

When products are produced or food is grown in a different part of the country, these products must be transported in order to be sold and consumed in your area. Even more fuel is used and carbon emissions released by transportation systems that bring in goods from other countries. Buying local goods can help reduce fuel usage and carbon emissions by eliminating the need to transport anything. Talk to your parents about the benefits of buying local products. Local farmers markets are good sources of produce grown in the area. Gifts for special occasions can be found at local craft fairs. Because local goods don't have to be transported very far, they are sometimes cheaper than imported products, which will also help your family save money.

Eating Habits

By changing your eating habits, you can reduce carbon emissions. Cooking at home helps eliminate trips to fast food joints and restaurants. This reduces pollution emissions from driving. You can grow some of your own food at home by creating a garden. Eating home-grown food also eliminates the need for transportation to get your food to you. For a more drastic approach, you can reduce your consumption of meat and dairy products. Methane is released by cows in mass quantities on meat and dairy farms. Their waste, when decomposing, also releases greenhouse gases. If fewer people consume meat and dairy products, this means fewer cows, goats and sheep will be needed to supply food. This reduces greenhouse gases from raising the animals and transporting meat.

A bulk solution. The waste associated with school lunches can amount to as much as 67 pounds per child per year. Try buying drinks and snacks in bulk and sending them to school in reusable containers. Replace paper bags with a lunch box-better yet, have your kids make their own lunchbox!

BYOB. Bring your own bags! Have your kids make or decorate reusable shopping bags. Personalized, reusable shopping bags are more likely to be used than generic alternatives. Encourage your kids to bring an empty backpack to the store so they can carry purchases home.

Water Footprint Overview Sheet:

[Adapted From: http://www.teachablemoment.org/elementary/waterfootprint.html and http://ezinearticles.com/?10-Facts-About-Water-Footprint&id=652616]

It takes 1,914 gallons of water to produce 1 pound of beef

It takes 574 gallons of water to produce 1 pound of pork

It takes 588 gallons of water to produce 1 pound of chicken meat

It takes 634 gallons of water to produce 1 hamburger

It takes 359 gallons of water to produce 1 pound of rice

It takes 162 gallons of water to produce 1 pound of wheat

It takes 108 gallons of water to produce 1 pound of corn

It takes 3 gallons of water to produce 1 slice of wheat bread

It takes 8 gallons of water to produce 1 cup of tea

It takes 13 gallons of water to produce 1 orange

It takes 19 gallons of water to produce 1 orange

It takes 179 gallons of water to produce 1 pound of cane sugar

It takes 158 gallons of water to produce 1 pound of cheese

It takes 1,015 gallons of water to produce 1 gallon of milk

It takes 53 gallons of water to produce 1 egg

2. The virtual water content of a food is the volume of water it has taken to grow, process and prepare the food rather than the actual nutritional content and it is the virtual water content we consider when we talk about the water footprint of a food for example an apple has a virtual water content of 70 Liters of water, a 100g orange 50L; 100g of chicken meat 390L and 100g of beef 1600L;

3. The water footprint of a food or product can increase significantly if the production process gives rise to waste water that has to be treated or waste products that have to be diluted before they are disposed of;

5. A food can have a different footprint depending on where it is produced. For example if cotton product is produced in China it has a virtual water content of 5404 m3/ton, but if it is produced in India it will have a virtual water content of 21563 m3/ton. The variation will depend on the amount of rainfall, the water available in the soil and the amount of water needed for irrigation and the water required to dilute processing by-products before disposal.

6. Virtual water consumption varies between countries dependent on the level of personal consumption in terms of food, goods and services. In the UK it is 1245 m3/person/yr, in the US 2483 m3/person/yr which is three times the level in China.

7. The per capita consumption of virtual water contained in our diets varies according to the type of diet, from 1 m3/day for a survival diet, to 2.6 m3/day for a vegetarian diet and over 5 m3 for a US style meat based diet.

8. The water footprint of a food is often not in the country where the food is being consumed;

9. A nation's water footprint can be described by location either as internal, where the nation's footprint is within its national boundaries or external when goods are imported and the water used to produce those goods is external to the country;

Teacher Script for Carbon Footprint:

[Adapted From: http://prairieecothrifter.com/2012/01/how-eat-sustainably.html and http://www.cleanmetrics.com/html/food_carbon_footprints.htm]

One of the easiest ways we have found to live more sustainably is to reduce our carbon footprint. Because the production of food has such a large carbon footprint, learning to eat sustainably is a great way to limit your impact on the earth. Here are some things we have learned that you too can put into practice in your household.

Reduce Waste

Millions of tons of food are thrown away in western countries every year. In the UK, it has been calculated that 330 kg of food is thrown out by every household each year. This rotting food accounts for 20 million tons of carbon dioxide gas each year. It is a similar story in other large, wealthy nations worldwide.

To reduce food waste, there are several simple strategies that you can employ:

•Learn creative ways to use left-overs to make delicious and nutritious meals.

•Store food correctly to reduce the amount of spoilage.

•Shop wisely; only buy what you know can be consumed by your family within its use-by date.

•Plan your menu and only buy what you need.

•Learn new ways of preserving food for later use.

Shop Locally

The best and freshest produce is purchased locally, from farmers' markets, farm gates, CSA's, roadside stalls or a friendly neighbor. Locally grown food has greatly reduced food miles and doesn't need to be specially treated to have a long shelf life. A lot of locally produced food is also grown organically, so the food is better for you and the environment.

Choose packaged products that are produced as close to where you live as possible to limit the miles it has to travel. Support local industries wherever possible.

Eat Organic Food

Organic farming is a sustainable method of growing crops and grazing meat animals without the use of toxic chemicals. Traditional farming methods have developed that use large

quantities of fertilizers, pesticides and herbicides, which have been shown to be present in the food we eat. These toxic chemicals kill off the good bacteria and insects along with the pests. The soils become so degraded that large quantities of artificial fertilizers, many based on petroleum, need to be added to make crops grow. Often growth hormones are added to force the plants and animals to achieve marketable size more quickly. Food grown organically is sustainable, non-toxic and produces better quality food.

Eat What is in Season

We have come to expect to buy any type of fresh produce at any time of the year. This means that the food has to travel long distances to get to you, often from overseas. Varieties have to be selected that have a long shelf life to allow for the length of time between picking and purchase. Often quality and taste are sacrificed to obtain this long shelf life. By eating food that is in season, you are saving on storage and freight costs while eating the way nature intended.

Grow your Own

Plant a vegetable garden to grow those foods that you can in your area. If you don't have a garden, use pots on a balcony or sunny windowsill.

Remember, anything you grow is going to taste better and be more nutritious than anything you can buy in a store. Trade any surplus with neighbors or take it to a farmers' market. You can't grow everything you eat but every bit helps.

These tips have really helped us eat more sustainably and I hope they help you too. Start small and make a few changes at a time. You don't want to overwhelm yourself. Remember, every small step is helping you move towards a more sustainable lifestyle.

What are Food Carbon Footprints?

The carbon footprint of a food/beverage product or service (sometimes called the carbon foodprint) is the total amount of carbon dioxide (CO2) and other greenhouse gases emitted over the life cycle of that product or service, expressed as kilograms of CO2 equivalents. This includes all greenhouse gases generated in the agricultural phase -- including emissions from the production and transport of all inputs, as well as emissions due to on-farm energy use and non-energy-related emissions (such as methane and nitrous oxide) from soils and livestock. The carbon footprint also includes the greenhouse gas emissions generated in the processing and packaging of food/beverage products, and delivery to a point of sale or use location. For the food service industry -- including restaurants and institutional cafeterias -- the carbon footprint generally includes the emissions from meal preparation on site. Finally, waste disposal all along the supply and consumption chain -- from the farm through

processing, transport and consumption -- can add significantly to the life-cycle carbon footprint of many food/beverage products.

Teacher Script for Water Footprint:

[Adapted From: http://www.unesco.org/water/news/newsletter/252.shtml#know]

•The water footprint of an individual, business or nation is defined as the total volume of freshwater that is used to produce the foods and services consumed by the individual, business or nation. A water footprint is generally expressed in terms of the volume of water use per year.

•Since not all goods consumed in one particular country are produced in that country, the water footprint consists of two parts: use of domestic water resources and use of water outside the borders of the country. The water footprint includes both the water withdrawn from surface and groundwater and the use of soil water (in agricultural production).

•Virtual water is the water 'embedded' in commodities. Producing goods and services requires water; the water used to produce agricultural or industrial products is called the virtual water of the product.

•The global volume of virtual water flows related to the international trade in commodities is 1,600 Km^3/yr. About 80% of these virtual water flows relate to the trade in agricultural products, while the remainder is related to industrial product trade.

•The production of 1 kilogram of:

•rice requires 3,000 litres of water

•maize requires 900 litres of water

•wheat requires 1,350 litres of water

•beef requires 16,000 litres of water.

•140 litres of water are needed to produce 1 cup of coffee while the production of 1 litre of milk requires 1,000 litres of water.

•Globally, water is saved if agricultural products are traded from regions with high water productivity to those with low water productivity. At present, if importing countries produced all imported agricultural products domestically, they would require 1,600 Km^3 of water per year; however, the products are being produced with only 1.200 Km^3/yr in the exporting countries, saving global water resources by roughly 400 billion m^3/yr.

•The per capita consumption of virtual water contained in our diets varies according to the type of diet, from 1 m^3/day for a survival diet, to 2.6 m^3/day for a vegetarian diet and over 5 m^3 for a United States style meat based diet.

Just as in the idea behind the carbon footprint involved in food the same principles can be used to describe the water footprint of food. Certain plants and animals require more water. Also, the climate in which foods are grown has a big impact on the water needed for the growth of plants.