



## Backyard Bites

Arushi Agarwal, Class of 2025

Pine Lake Middle School, Issaquah School District, Sammamish

### State the problem, phenomenon, or driving question

How can I optimize my carbon and water footprint by reducing my yard space and starting a vegetable garden in my backyard?

### Impact Statement

If I design and plan a vegetable garden, then my family and I can start growing fresh and local food - right in our backyard. If we succeed in starting and maintaining a vegetable garden, then we can lower our carbon and water footprint and reduce our negative impact on many systems. [See Understanding Your FoodPrint.](#)

**Provide brief background knowledge:** How growing food in my backyard reduces the negative impact I have on several systems:

**Transportation-** According to the [Worldwatch Institute](#), the average American meal travels somewhere between 1,500 and 2,500 miles from farm to table – a colossal use of precious resources. For the product to stay seemingly fresh across this long trip, it is often picked while unripe and then highly processed in factories after transport. In an [article by the EPA](#), the conversion from miles to amount of CO2 emissions is listed. For every mile driven, the typical car releases 411 grams of CO2. With a backyard garden, my transportation to the grocery store is also lessened. Under normal circumstances, my family would take roughly one trip to the grocery store per week. This is about 60 trips per year, which is estimated to about 500 miles. When converted to metric tons, 500 miles worth of travel to the grocery store is 2 tons of CO2 emitted into the atmosphere. With a garden, trips to the grocery store can be reduced, as can the direct carbon number from my family's carbon footprint.

**Water Quality** - Our food will be grown organically, without any chemicals or fertilizers meaning that chemical run-off into water bodies will not occur. [Protecting Water Quality from Agricultural Runoff](#) by the [EPA](#), states, "Insecticides, herbicides, and fungicides are used to kill agricultural pests. These chemicals can enter and contaminate water through direct application, runoff, and atmospheric deposition. They can poison fish and wildlife, contaminate food sources, and destroy the habitat that animals use for protective cover. Furthermore, [Sustainable Agriculture Research](#) published a study, [Water Quality in Organic Systems](#), which compares the nitrate pollution from plots with organic and conventional crop rotations as well as organic pastureland. This study was conducted by the USDA in the year of 2011 and lasted for three years, taking samples from each plot.

Researchers found that the amount of nitrate lost in conventional cropping systems was twice as high as the amount of nitrate lost in organic cropping systems. The least amount of nitrate lost was found in organic pasture systems. “Results of this study suggest that organic farming practices...can improve water quality,” they concluded.

**Energy** - It takes energy and resources to harvest, ship, package, and distribute the food. In a study by the Leopold Center for Sustainable Agriculture - [Food, Fuel, and Freeways](#) - it states that food systems account for 16% of the United States’ total energy consumption. In 1999, a British study was conducted to measure the energy and CO2 difference between local and internationally sourced produce. As opposed to the apples imported from New Zealand, the fresh apples from a localized farm showed a 3,000 percent reduction in energy usage and only emitted 13% of the carbon dioxide. With a backyard garden, the steps to ship, package, and distribute the produce are not required, resulting in a more efficient, economically friendly, and sustainable method.

**Water** - Most steps in the farm to table sequence require water. If we can take out most steps in this sequence, our water footprint will decrease. An [article by FoodPrint](#), says, “In the United States, agriculture is responsible for 80 percent of all water consumed. It takes a surprising amount of water to grow and process food because crops cannot grow without water, especially not without irrigation water. In fact, one’s diet accounts for more than two-thirds of one’s own total water footprint, mostly because of all the “virtual water” needed to produce one’s food.” Virtual water is the hidden flow of water when something travels from one place to another. With a backyard garden, vegetables won’t have to travel by plane, car, train, or any other sort of transportation. It will be directly from [Farm to Fork](#), taking out all the unnecessary steps in between. Additionally, having a lawn increases your water footprint and is not sustainable. The [Environmental Protection Agency](#) estimates that a third of all public water is used to water grass. In the US, lawns consume nearly 9 billion gallons of water a day, and our mowers consume 200 million gallons of gas. Although my family doesn’t water our lawn often, watering isn’t the only concern for us. Grass provides no habitat for pollinators or other animals and plants that make up a healthy ecosystem. By reducing my lawn area for this garden, I will be removing grass and using that space for growing vegetables - a much more sustainable use of backyard space.

**Food** - Where you get your food, how it was grown, what type of food you eat - all of these factors affect global sustainability. [See Understanding Your FoodPrint](#). By creating a backyard space for growing vegetables, you are optimizing many of the negative sides of the food system. The food you are getting from it is local, organic, fresh, and policy-free.

### **Show how the project supports community goals (local policies, plans, or performance measures)**

This project aligns with the [Issaquah Climate Action Plan](#) and its criteria for **urban agriculture**. The plan affirms to eat local saying, “The benefits of local food are significant and include: Lower carbon footprint and less air pollution, economic diversity through the support of local farms, local preservation of open space, greater variety, and fresher, tastier and healthier food.” By creating a space for growing localized food, I am helping my city meet its carbon reduction goals.

This project also supports the [Joint Letter of Commitment: Climate Change Actions in King County](#) as one of their goals is to, “Expand our local food economy, for example by supporting urban and community farming, buying locally produced food and participating in the Local Food Initiative.” The Local Food Initiative can be found in the [K4C Tool Kit](#) and the new [K4C](#) pledge. This initiative works to, “Create a sustainable farm-to-plate pipeline more resilient to the effects of climate change.”

My impact project, “**Backyard Bites**,” serves to meet these purposes, supporting the benefits of local food as well as the farm-to-plate concept.

### **Document current conditions**

1. My family grows a few herbs such as mint, but not more than that
2. We have tried starting a garden before, but have never succeeded
3. Few people I know grow their food, and there is only one home in my neighborhood that grows enough variety and amount to use often

### **Identify your stakeholders:**

This impact project affects me and my family. Since almost everyone buys food, it can also impact the businesses that grow, package, transport, distribute, and sell the vegetables. Other stakeholders include:

1. [The City of Issaquah Urban Agriculture](#)
2. [King County Local Food Initiative](#)
3. [Tilth Alliance](#)
4. [King Conservation District](#)

### **Describe the project and the steps taken to implement it.**

1. Benchmark current conditions - survey family, peers, and other community members of where they get their fresh produce and ask them to calculate their water and carbon footprints
2. Research ways to reduce these numbers through gardening and suggest reducing yard space to create a vegetable garden
3. Research which vegetables can be grown in this climate and at what time
4. Survey an area in my backyard which would be most suitable
5. Plan and design the garden
6. Start by planting indoor seedlings and then moving them outdoors

7. Track efficiency and effectiveness of the vegetable garden
8. Ask those who participated in this project to calculate their footprints again and measure the progress

**Describe the audience you will present your work to. Identify the content and media you will use to communicate your project and its impact.**

I will be presenting my work to peers, teachers, family, and Sustainability Ambassadors. I will present the basics of how creating a backyard vegetable garden reduces your negative impact on many of the systems, as well as providing my before/after water and carbon footprints.

**This is it! Document the impact your project had with evidence and data.**

1. Measure before/after carbon and water footprints
2. Measure other factors - efficiency and effectiveness

**Develop a series of 5 short videos of your plan, process, and results. (1-3 minutes)**

1. My plan and intended impact, relationship to community goals, stakeholders who need to know.
2. Here are the steps I plan to take, the resources I will need, experts I will consult.
3. The story of how I'm implementing my plan, the steps, insights, obstacles.
4. Here is the result, my impact data, I did it! I learned a lot.
5. Here is the math story of projected, collective impact if others did what I did.

**Reflect on your experience**

- a. Post a series of short blogs chronicling my project
- b. Post a series of short videos documenting my project
- c. Describe new insights, new stakeholder connections
- d. What new skills did I learn?
- e. How do I feel about the impact I achieved?
- f. What is the mathematical amplification if lots more people did what I did?