

# The Decarbonaras

Alexandra Davis  
Janessa Rowland  
Karen Sauler  
Nishanthi Jegganathan

# Carbon Reduction Challenge



## Overview:

In order to reduce the required amount of carbon dioxide emissions, we took a three-angle approach to the problem by recycling, practicing a vegetarian diet, and planting trees. Over an eight week implementation period and with the participation of many friends and family, we were able to demonstrate a small way every day people could make a positive impact on the environment.



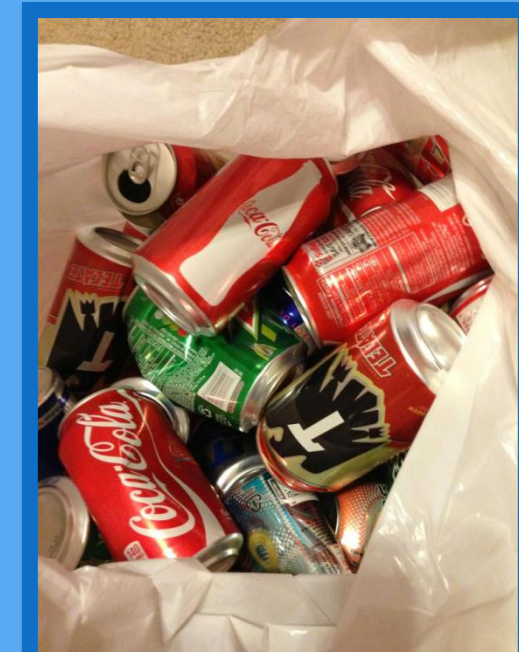
## Recycling

- A plastic and aluminum recycling program was implemented at the New Piney Grove Missionary Baptist Church (NPG)



- Meals or beverages were provided through church programs that greatly contributed to recyclable materials
- March and April 2013 church calendar

- Small-scale recycling done by individual group members as well.



- Calculations:
- The EPA waste reduction model (WARM) was used for the following calculations<sup>1</sup>:
    - Total Plastic Recycled: 357.3 pound = 393.9 lbs. of CO<sub>2</sub>
    - Total Aluminum Recycled: 131.5 pounds = 1304.8 lbs. of CO<sub>2</sub>
  - (Total CO<sub>2</sub> reductions) 1698.7 lbs. - (transportation emissions) 81.7 lbs. = 1617 pounds of CO<sub>2</sub>

**CO<sub>2</sub> Saved: 1617 pounds**

- Scalability:
- If the recycling program continued for a year, we would save 9702 lbs. of CO<sub>2</sub>



## Vegetarianism

- In order to understand the current diet of our 55 vegetarian participants, we gave each person an entry survey which asked the amount of each type of meat (chicken, beef, and fish) they currently ate, and asked them to state if they would be willing to give that up during the week for the implementation period.
- We also gave an exit survey upon completion to determine if all participants completed the vegetarian process as pledged, and to share and lifestyle changes that may have come about from the project.

Weekly Diet

#2. How many times a week (Monday-Friday) do you eat beef?

#3. How many times a week (Monday-Friday) do you eat chicken?

#4. How many times a week (Monday-Friday) do you eat fish?

Weekly Diet

#1. What is your name?

#2. Do you plan on eating meat through Friday (before beginning lunch)?

#3. Do you agree to eat a vegetarian diet Monday through Friday for the months of March and April?

Exit Survey

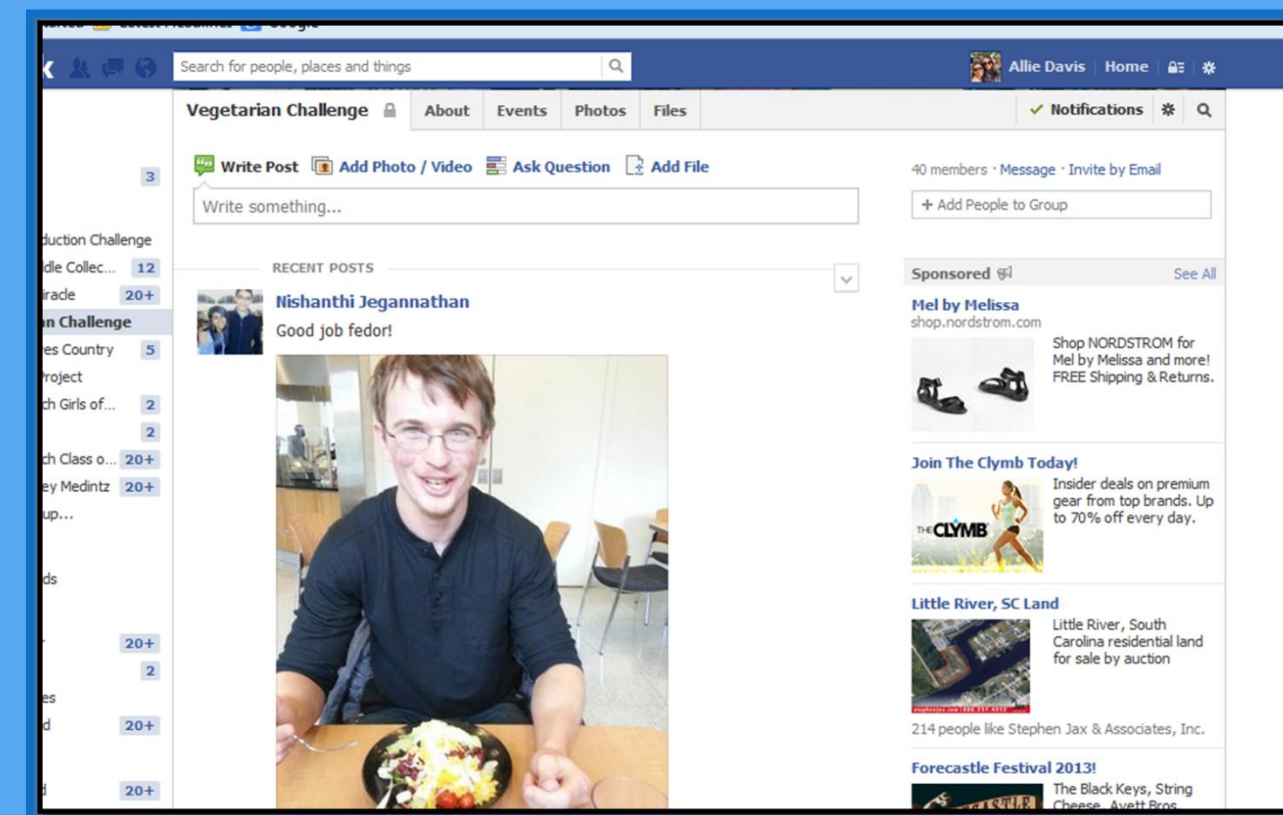
#1. What is your name?

#2. Did you plan on eating any particular things (other than meat) as a vegetarian?

#3. Are you planning on making any permanent lifestyle changes after completing the two month period as a vegetarian?

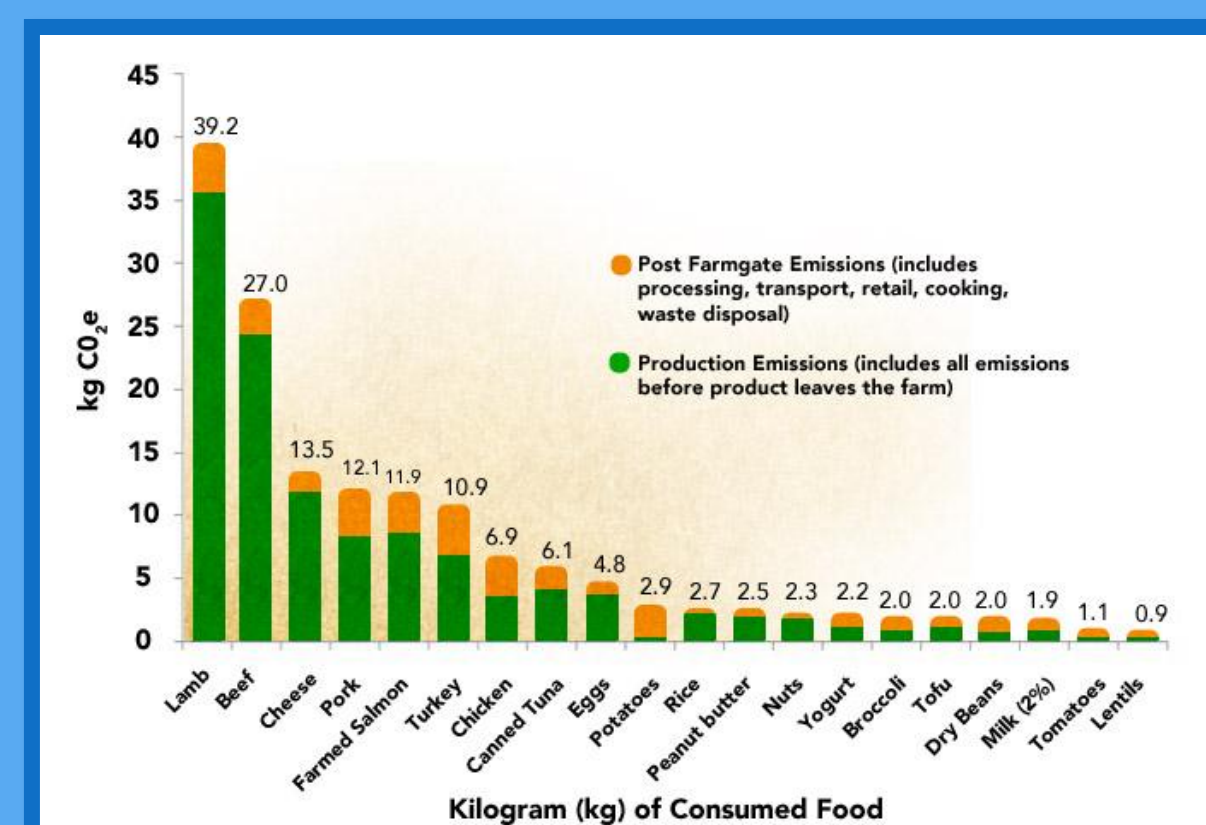
#4. What was the most difficult part of keeping up with a vegetarian diet?

- We used these baseline numbers in an Excel chart to determine the difference in consumption of each category of meat before and during the implementation period and to determine additionality.
- After agreeing to participate, each member was added to a Facebook group where they could upload pictures and recipes of vegetarian meals, and we could post important announcements and survey links



- Calculations:
- The environmental working group's model is used to quantify the amount of carbon reduced for the vegetarianism portion of the project. This model takes into account the carbon dioxide emitted for the transportation, processing, cooking, disposal, retailing, and growth of the meat products.
  - Assumption: each serving is 3-4 ounces<sup>2</sup>

Type of Meat	Kg of CO <sub>2</sub>
1 kg of beef	27 kg
1 kg of chicken	6.9 kg
1 kg of fish	11.9 kg

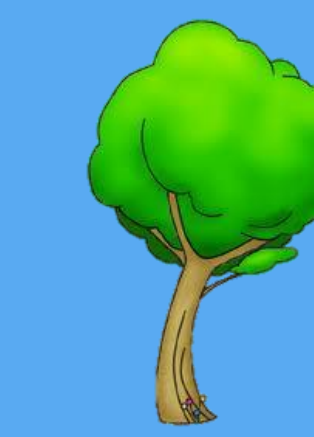


	Beef	Poultry	Fish
Number of Times Eaten per Week (Mon.-Fri.)	460	537	159
Ounces per Week (Mon.-Fri.)	1380	1011	477
Total CO <sub>2</sub> reduction (lbs.)	3160.2	289.591	443.95

**CO<sub>2</sub> Saved: 4593.741 pounds**

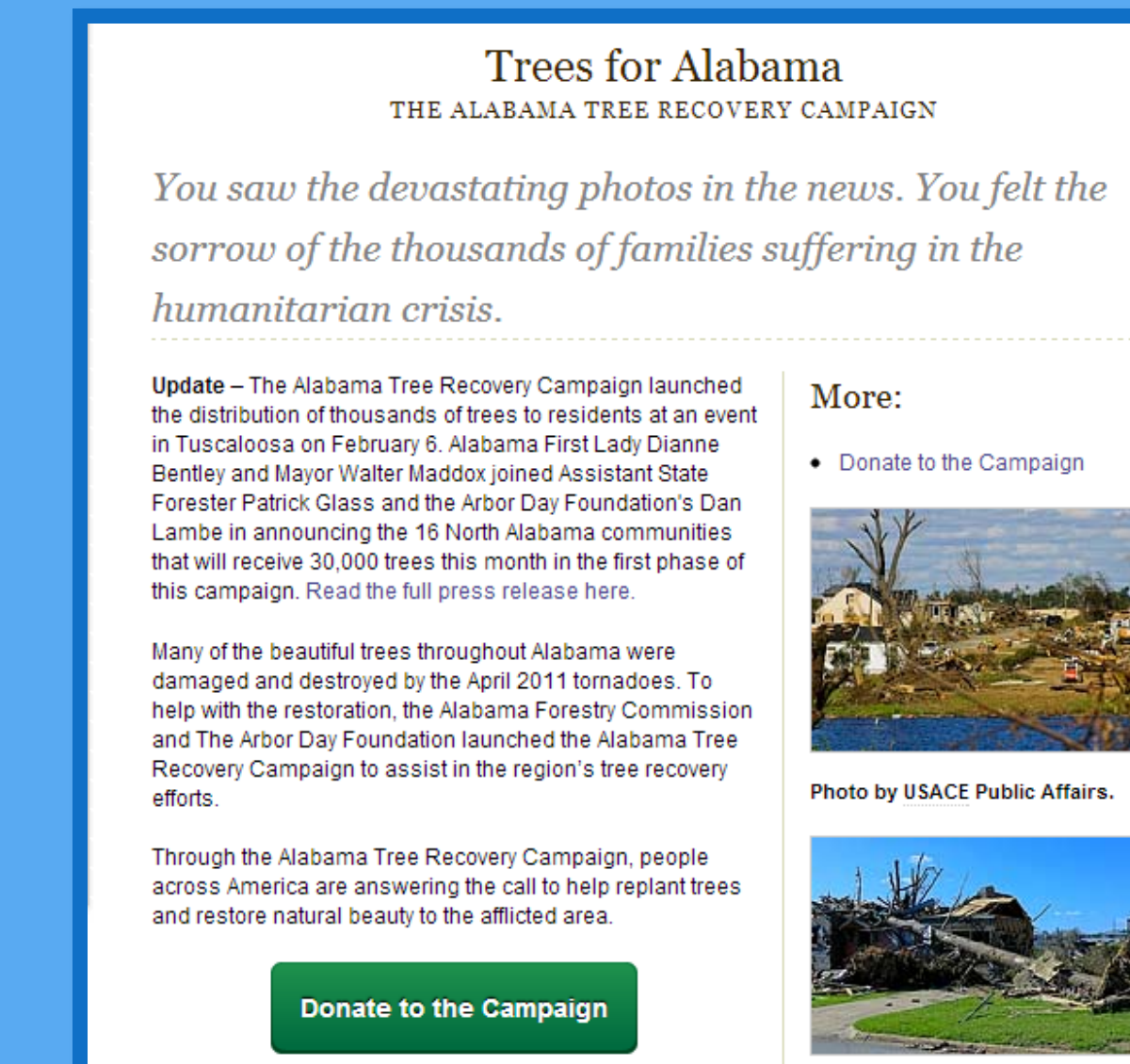
- Scalability:
- If each of the 55 participants remained vegetarian for a year, we could save a total of 27,562.446 lbs. of CO<sub>2</sub>

**What does this mean?**



## Tree Planting

- We collected and donated \$60 to Arbor Day Foundation's Alabama Tree Recovery Program to plant 60 trees in Northern Alabama.
- The purpose of this program is to replace trees that were destroyed by the April 2011 tornadoes.



- Calculations:
- 5 species of native hardwood trees have been selected to be planted: crapemyrtle, black willow, flowering dogwood, American hophornbeam, and Sycamore<sup>1</sup>
  - We determined that a moderate growth hardwood tree planted in a suburban/urban setting allowed to grow for 15 years sequesters 176 pounds of CO<sub>2</sub>. This value takes into account "survival factors" developed by the U.S. Department of Energy. For each year, the CO<sub>2</sub> sequestration rate (in lbs. per tree) is multiplied by the survival factor to yield a probability-weighted sequestration rate. These values, that can be seen in the table below, are summed for the 15-year period, beginning from the time of planting, to derive the estimate of 176 lbs. of CO<sub>2</sub> per tree.

Tree Age (yrs)	Survival Factors by Growth Rate			Annual Sequestration Rates by Tree Type and Growth Rate (lbs. carbon/tree/year)					
				Hardwood		Conifer			
	Slow	Moderate	Fast	Slow	Moderate	Fast	Slow	Moderate	Fast
0	0.873	0.873	0.873	1.3	1.9	2.7	0.7	1.0	1.4
1	0.798	0.798	0.798	1.6	2.7	4.0	0.9	1.5	2.2
2	0.736	0.736	0.736	2.0	3.5	5.4	1.1	2.0	3.1
3	0.706	0.706	0.706	2.4	4.3	6.9	1.4	2.5	4.1
4	0.678	0.678	0.678	2.8	5.2	8.5	1.6	3.1	5.2
5	0.658	0.658	0.658	3.2	6.1	10.1	1.9	3.7	6.4
6	0.639	0.639	0.644	3.7	7.1	11.8	2.2	4.4	7.6
7	0.621	0.621	0.630	4.1	8.1	13.6	2.5	5.1	8.9
8	0.603	0.603	0.616	4.6	9.1	15.5	2.8	5.8	10.2
9	0.585	0.589	0.602	5.0	10.2	17.4	3.1	6.6	11.7
10	0.568	0.576	0.589	5.5	11.2	19.3	3.5	7.4	13.2
11	0.552	0.564	0.576	6.0	12.3	21.3	3.8	8.2	14.7
12	0.536	0.551	0.563	6.5	13.5	23.3	4.2	9.1	16.3
13	0.524	0.539	0.551	7.0	14.6	25.4	4.6	9.9	17.9
14	0.512	0.527	0.539	7.5	15.8	27.5	4.9	10.8	19.6

<http://ftp.eia.doe.gov/pub/oiat/1605/cdrom/pdf/sequester.pdf>

**60 trees x 176 lbs. CO<sub>2</sub> /tree = 10,560 pounds CO<sub>2</sub> saved**

- Scalability:
- If 1 person donated \$1 everyday, 64,240 lbs. of CO<sub>2</sub> would be saved in 1 year



**Equal to \$2,612.2 of gasoline at current national average \$3.53<sup>3</sup>**



OR



**Annual greenhouse gas emissions from 1.4 passenger vehicles<sup>4</sup>**

**Grand Total of CO<sub>2</sub> Reductions = 14,550.7 pounds**

References:  
1. [http://epa.gov/epawaste/conserve/tools/warm/Warm\\_Form.html](http://epa.gov/epawaste/conserve/tools/warm/Warm_Form.html)  
2. [http://www.fns.usda.gov/fds/facts/hpffacts/Meats\\_HHPFFacts/Meats\\_HHPFFacts\\_GROUND\\_A609\\_Final.pdf](http://www.fns.usda.gov/fds/facts/hpffacts/Meats_HHPFFacts/Meats_HHPFFacts_GROUND_A609_Final.pdf)  
3. <http://www.eia.gov/petroleum/gasdiesel/>  
4. <http://www.epa.gov/cleanenergy/energy-resources/calculator.html#results>