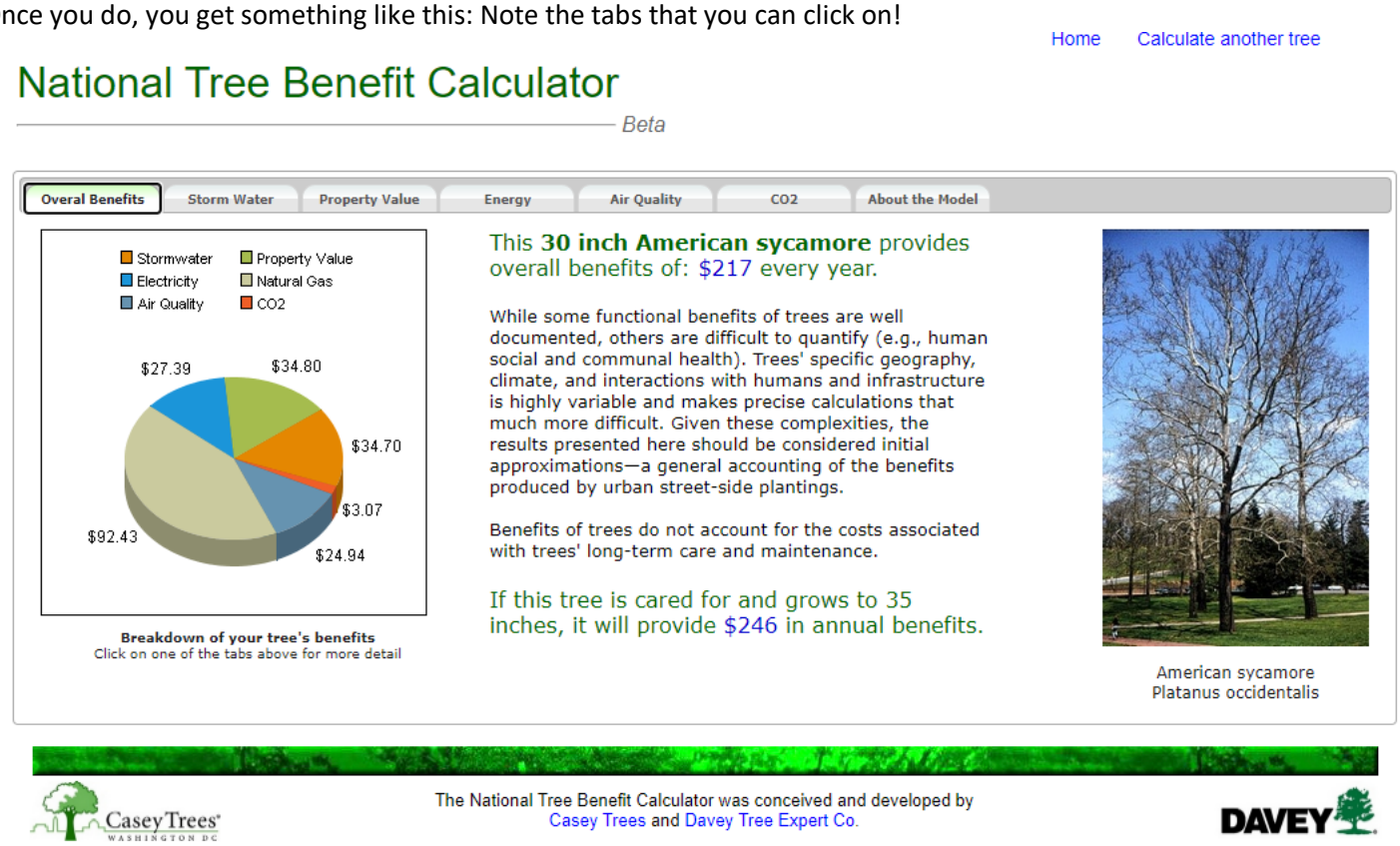
Data Integration Rachel Taylor

Last week, I did a virtual workshop through Indiana State University called "*Educating for Environmental Change*," and I learned about a really cool resource called the "National Tree Benefit Calculator." The link to the calculator is below, but to actually see how it works, you have to input a zip code, a tree species, and a tree circumference.

Data source: *The National Tree Benefit Calculator*
http://www.treebenefits.com/calculator/

Once you do, you get something like this: Note the tabs that you can click on!



Lesson Enhancement and Rationale:
I would love to use this tool during the human impact portion of my ecology unit. We cover human population, deforestation, greenhouse gases, global warming, pollution, sources of energy, etc. I can actually see a great opportunity for project-based learning, where the final project is to redesign/landscape our school block with a budget of ___$!

Being in NYC, my students are probably less engaged with nature than most other students in the country, so I love this resource for a couple of reasons:

1) I can actually do "outdoor teaching." Every city block has trees! But, I think that my student fail to see the value of them other than aesthetics. To use the Calculator, students would need to 1) identify the type of tree and 2) measure the circumference of the tree. I would love to make "Tree Identification Cards" for the local trees on our city block (There are many!), and have students identify the type of tree by analyzing the bark, leaves, etc. and then take the data on circumference to input into the Calculator.
2) The Tree Benefit Calculator produces amazing figures with really succinct text that is meaningful, relevant, and appropriate for student use. I can see this tool being really engaging. It covers almost all of the topics that we approach in our human impact unit, and even goes a little beyond the scope of my course (opportunity for research!).

This could completely change the way that I teach the unit. Right now, it's my last unit, and it always feels rushed and I have very few activities to go along with it. The reason that I applied for the Indiana professional development (and another teacher ecology workshop this summer) is because I know that I want to enhance my ecology unit. After all, environmental science is one of the most important things that I, as a science teacher, am responsible for teaching students! The benefits of trees and the landscape of our city block could be an ongoing project that I actually use to drive the entire unit. It also makes environmental science so much more meaningful in an urban environment.

Interdisciplinary STEM:
In terms of interdisciplinary STEM, I could be totally wrong, but I see an opportunity for modeling plant growth over time. For example, if students were to choose young trees to plant on our city block, they could develop some sort of mathematical model to determine the growth of the tree over the next 10 years, etc. Since the Tree Benefit Calculator determines benefits by tree circumference, they could use their model to explain the benefits of this investment over time (this is something that I will have to look into, but I see a possibility).

The whole idea of the Tree Benefit Calculator fits perfectly with engineering and design. I could have students analyze aerial views from Googlemaps to make observations about tree placement throughout the city to aid their potential landscape proposals. Perhaps this could tie into social justice? Are trees more concentrated in certain areas and neighborhoods?... Where are our parks located?... Finally, my school is making a big push for mental health in our advisory classes, so I can definitely see the importance of greenery in urban environments as a point of discussion. When we consider the tradeoffs of our human impacts, I constantly remind my students that aesthetics is legitimately important to us by our human nature! Whether that be the beauty of nature and preserving it vs. arguments against wind turbines.

Using Data:

I love using data in the classroom! Data leads to observations and questioning, and it increases student buy-in to the content that 'needs' to be covered. If designed properly, students can use data to draw conclusion *before* you teach anything. In turn, my job is no longer to deliver the content, but to clarify their understanding. With the Tree Benefit Calculator, it's very easy to draw conclusions. We know that we are looking for positive benefits. But, when the data is more open for 'interpretation,' I see a huge struggle with students! Here is an example that had me shocked. In our introduction to science unit, we learn about the significance of data and the validity of scientific experiments. I presented students with a hypothetical experiment where I made the claim that eating peppermint while taking an exam will increase test scores as it enhances metal focus. I gave my students the data from the experiment. Essentially, they needed to calculate average test scores for each group. The group that ate the peppermint had an average score of something like 93.1% and the group that did not had an average score of 92.9%. Students needed to argue whether or not the data supported the claim, and at least half of my students argued that it did!! I was really quite shocked that my students didn't have an intrinsic understanding of significance. I did have plenty of student say, "the scores were pretty much the same, or the difference isn't great enough to draw a conclusion," but the amount of students arguing that the peppermint helped them to "score better" really surprised me. So, this evolved into yet another lesson and a future test question. But still, even after explicitly teaching this in the beginning of the year, I saw students struggle to interpret data from their own experiments over and over again. This is definitely a skill that as a ninth-grade teacher I need to address intensively!