

ECOFOOTPRINT ANALYSIS

My initial comparison focused on ecofootprint calculators from the Global Footprint Network (GFN) and the Center for Sustainable Economy (CSE), two of the more complex calculators available free on the Internet. However, noticing a significant discrepancy — 4.7 earths necessary to sustain my lifestyle according to the GFN but only 1.5 earths according to the CSE — I began to investigate additional calculators, some more simplistic than others. My conclusion: Free available calculators display wide variance, which makes me question the validity of any free calculator; from my analysis, I fault inappropriate underlying assumptions, simplicity and lack of dynamic survey questions. Too, all calculators suffer from a substantial lack of transparency in methodology.

COMPLEX (SOMEWHAT) CALCULATORS:

GFN — www.footprintnetwork.org
Necessary earths: 4.7
Global acres: 20.8
Carbon: 23.5 tons of CO ₂
Services: 42%
Mobility: 31%
Goods: 14%
Food: 7%
Shelter: 6%

CSE — www.myfootprint.org
Necessary earths: 1.5
Global acres: 58.36
Carbon: 42%
Food: 11%
Housing: 22%
Goods and Services: 25%

Though the calculators aren't completely clear, a substantial portion of my footprint owes to direct carbon output, which as detailed below, is a result of considerable airplane travel.

MORE SIMPLISTIC CALCULATORS (FOR COMPARISON):

WWF — http://footprint.wwf.org.uk/
Necessary earths: 5.2
Carbon: 32 tons of CO ₂
Travel: 66%
Stuff: 14%
Food: 6%
Home: 14%

www.ecologyfund.com/ecology/res_bestfoot.html
Necessary earths: 2.5
Global acres: 9.8

CI— http://www.conservation.org/act/live_green/pages/default.aspx
Carbon: 16.0 tons of CO ₂
Household: 5.4
Driving: 0.0
Travel: 10.7
Eco-footprint: 63 (eco-ally rating)

Some calculators obviously provided more data than others. See screenshots of the limited calculator output for graphic representations of provided charts without numbers.

The calculators offered by the GFN (www.footprintnetwork.org) and the CSE (myfootprint.org) asked the widest array of questions; I consider them the most comprehensive. However, both displayed wide discrepancy in total footprint as well as what that amounted to in terms of “necessary earths.” After digging as much as possible into the methodology of the two calculators, I learned they use fundamentally different calculations to measure overall sustainability. The GFN bases its calculations on the annual National Footprint Accounts publication. According to that publication, as of 2007, the global biocapacity (amount of land available to sustain human activity) of the earth was 4.4 acres (1.8 hectares) per capita. The CSE appears to use a somewhat more expansive conception of global carrying capacity, developed by Jason Venetoulis and John Talberth of the now-defunct, Oakland, CA-based organization Redefining Progress. CSE estimates the earth’s biocapacity to be 43 global acres (15.71 hectares) per person.

Unfortunately, neither calculator clearly defines for the laymen — i.e. the non-eco-footprint scientist — the exact methodology behind and argument for each level. Their respective Web literature is inexact but a review highlights a possible explanation: GFN includes “services” which it defines as the carbon footprint of an individual based on his or her society’s overall consumption pattern, factoring in the national carbon output of sectors such as health care, entertainment, government, the military, etc. This additional cost is non-variable within nations; each person carries his or her per capita share. From CSE’s description of its methodology, it appears that the survey is only considering individual consumption/carbon output. Under the second scenario, more global landscape would be available as biocapacity because the cost of social “services” are not counted. I am not satisfied with this explanation. Ultimately, the calculations are far from transparently explained.

Both calculators suffer from other weaknesses, namely in their design. Obviously, in creating a user-friendly web interface there must be tradeoffs between simplicity and complexity, between asking questions that capture enough data and asking questions in ways that users can answer them. It must be noted that incorporation of more variables and data calculations complicates the task of making a Web app that is intended to be free. Nonetheless, both the GFN and CSE calculators have multiple design problems.

- **National baseline assumptions:** Both calculators use baselines of national per capita consumption and add or subtract based upon a respondent’s answers. This has limitations for accuracy. For example, the GFN calculator starts with average figures for meat consumption, modifying by an undisclosed factor depending on the respondent. While this might accurately capture the meat consumption of a vegan, it’s unclear how the GFN calculator accurately assigns a value for someone who says they eat beef “very often” without any quantitative answer. This also doesn’t take into account the idea that not all beef is created equal and portion sizes vary. Respondents ostensibly get the same meat consuming credits regardless of whether their meat may be deemed sustainable or whether they eat a 4 oz. burger or a 16 oz.

steak. A more accurate, though considerably more tedious, method would involve asking for specific consumptive amounts: How many ounces of non-grass feed beef per week? How many ounces of free-range chicken? Etc.

- **Ignoring geography:** The CSE calculator does ask a question about regional climate and a question about home location, ostensibly to establish energy consumption baselines. Beyond that, both surveys lack considerations of geography. The same activities — spending, consumption of goods, recycling and services — produce different amounts of carbon in different settings (urban vs. suburban vs. rural). Working from a national estimate is certainly more practical but not more accurate.
- **Question detail:** Many questions were too broad or vague. For example, the GNF calculator asks respondents how much plastic they recycle with a sliding scale between “infrequently” and “often.” This may be a proxy for other recycling habits but it’s not clear whether the graphical slider has only these two values or an intricate multi-point value scale. Either way, questions could be designed better to ask for percentage estimates. The CSE calculator does a better job in this regard when obtaining values for transport, asking for specific number of miles per year spread across cars, as well as buses, trains and planes. The CSE even probes the primary type of vehicle. The downside of CSE’s attention to detail in this regard is its complex requirements of annual calculations. Respondents will likely have a considerably more difficult time estimating their yearly mileage across all categories, which may lead to inaccurate valuation.
- **Offsetting activity:** The GNF calculator is not very creative in capturing footprint-reducing activity. It considers recycling, basic purchasing habits and renewable electricity purchase, but it fails to gather information on other potentially offsetting activities. For one, it makes no recognition of different vehicle types or basic fuel efficiency ratings. The CSE calculator asks for substantially more information about efficient habits; for example, there are several questions related to water consumption (from shower habits to low-flow toilets to rainwater harvesting). Unfortunately, the survey does so via yes-or-no check boxes, which again fail to gather more detailed values. Interestingly, the GNF calculator makes almost no consideration of water use at all.
- **Housing type:** Neither survey completely captures a satisfactory range of housing situations. For example, I live in an independent apartment in the basement of a traditional home. For the GNF calculator, I was either given the option of selecting a freestanding home as my housing model (then including my landlords as part of my household) or a duplex. The CSE calculator does better, allowing me to select a building with 2-4 units, but neither truly captures my living arrangements. The survey also asks for details of monthly heating and electric bills; this specificity is good, yet not all consumers pay their bills directly (mine, for example, is included in my rent).
- **Other activity:** The GNF footprint includes services as a per capita share of consumption, but this doesn’t allow for variation in jobs, hobbies, etc. A person who routinely drinks beer, attends fancy parties or movie theaters doesn’t deserve the same share of services as someone whose idea of an afternoon is a bike ride and book in the park. The CSE does little better at adding in some extra categories of spending and consumption.

Ultimately, all surveys — particularly those that are meant to be easily accessible and cheap to develop — will have flaws. Based on individual question design and depth, I'm inclined to give put more faith in the CSE survey; however, I balk at its final verdict on my consumptive lifestyle and the calculation it renders: I have great difficulty believing that my consumption only requires 1.5 earths.

PERSONAL AREAS FOR REDUCTION

I already attempt various amounts of sustainable activity: I eat vegan, I eat primarily organic, I recycle strenuously (likely more than what D.C. actually will sort), I compost, I don't own a car (I've used Zipcar once and taken four cab rides in three months), I use green chemicals/cleaners, I catch bugs in glue traps, I like blankets, I keep my basement cold, I'm public transit averse (and bike most days when there's not rain), my apartment is wind-powered, my appliances are Energy Star-rated and I use a low-flow toilet and shower head.

Where I can improve most: Airplane travel.

Living in abroad (primarily in India) for two years, I found myself using convenient, cheap and quick short-hop flights, averaging three hours of flight time per month, as well as multiple long-haul flights several times a year. Given the incredible amount of carbon emitted by jet travel, this is clearly unsustainable. The GFN calculator attributes 31% of my footprint to mobility, of which most is air travel (determined by erasing air from an edited footprint). The CSE calculator attributes 42% of my footprint to direct carbon output, which is again primarily air transport. The most obvious alternative is to use India's more carbon-friendly rail network; this decreases convenience substantially as train tickets must be booked weeks in advance; too, traveling by train converts a journey from a five-hours door-to-door to roughly 24 hours. Still, this is not an insurmountable challenge and such actions are certainly necessary to reduce consumption.

A complication arises in that my fiancé lives in India; I will fly there in December for three weeks and return in January. I will go back again in May 2012 and return in August. This means approximately 80 hours of international flight time on top of my domestic flying habits. A reduction in this travel is personally much more difficult as alternative, lower-carbon forms of travel are incredibly inconvenient (either a ship or a combination of shorter flights with intercontinental rail and bus) and cost prohibitive. The price differential, of course, stems from a lack of carbon accounting. Still, giving up such trips would entail personal sacrifice (not seeing my fiancé, not conducting research in India) that I'm unwilling to make at this point. The longer-term solution will be to simply live in India, which is indeed a goal. But in the short-term, I resign myself to traveling long distances unsustainably.

A secondary area for improvement: Electronics and gear.

I admit to liking gadgets and toys — computers, phones, cameras, bikes, fly fishing/scuba/camping/tennis gear, my hiking GPS unit, etc. I do buy from the used market on occasion

but I don't completely wear out such gear before making additional purchases. I own four cameras that function (including two high-end DSLRs). I bought two laptops this year, one new for video editing, one used for travel; I have a third from 2003 that still works albeit sadly; I recently sold a fourth that was purchased in 2007. I never discard and often collect. I possess back-ups for my back-ups. In the world of higher-end durable electronic goods, I am an over-consumer.

A strategy to make a distinct impact in this area is elusive. Obviously I need to consume less. I can make personal pledges — no new laptops until 2020. I can promise to take good care of my gear so that it lasts longer. Yet neither seems like tangible a strategy for reduction, nor does either address the underlying reality that consumption is a lifestyle.

POLICY RESPONSE

There is a wide array of policy responses to encourage reductions in our consumptive footprints. From an economic theory standpoint, pollution (carbon or other) and degradation can be viewed as externalities; in other words, they are costs of an activity that are not directly born by the agent. For example, in the case of driving, some pollution costs are internalized through mitigation technology and fuel taxes, but the cost of carbon dioxide in terms of climate change is not born by the driver, but rather by society. The most efficient and elegant solution is to provide an incentive to internalize costs through a carbon tax. A far more complex response — which was proposed in the 2009 American Clean Energy and Security Act — would resemble a carbon emissions quota system for point-source pollution with transferrable permits (often referred to as “cap and trade”). Neither is feasible in our current U.S. political climate. Other options, such as feed-in tariffs show great promise but require substantial consumer/producer investment and as such are less likely to be supported widely.

However, complex schemes requiring collective action are frequently more feasible on a smaller scale and limited in scope, where the number of actors and interests is reduced; this is a core principle political scientist Elinor Ostrom's research on commons management. In this spirit, I propose a municipal policy scheme to reduce carbon output from vehicular traffic in the District of Columbia, by providing incentives to use alternate transport, namely bicycles and buses. This will take the form of a patchwork of policies that are implementable in increments as revisions to municipal code and the D.C. Department of Transportation Master Plan 2005, which at present only calls for five percent bike mode share by 2015. Some of these are policies advocated by the Washington Area Bicyclist Association; others are more adventurous.

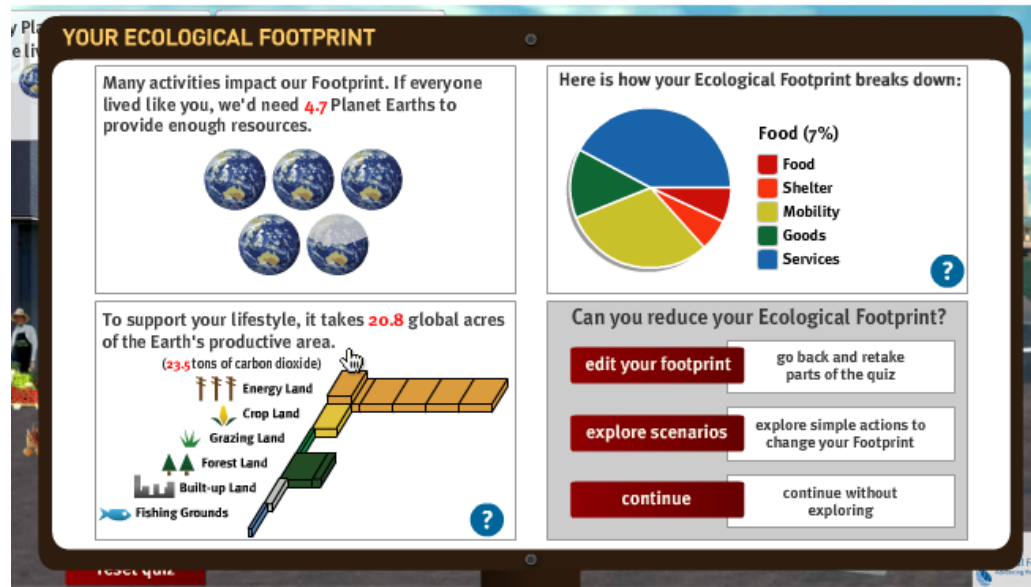
- **Build more bike lanes**, condensing car lanes, in higher traffic areas. 14th and 15th Streets NW are North-South examples; continue with major thoroughfares, possibly Nebraska, Massachusetts, Connecticut, Georgia, New York, Florida, Pennsylvania and Wisconsin Avenues, as well as Military Road. Reduce from two car lanes each way to one car lane and one bike lane, with additional support of stop signs and lights in residential neighborhoods to deter bypasses. Construct of durable bike lanes (cement barricades in some segments, permanent orange pylons

in others) to help secure bike lanes. Ultimate goal: increase congestion to the point of discouraging drivers.

- **Increase bus routes** to compensate for increased ridership, coupled with a more progressive pricing scheme: Fare increases for the general public; discounts — via SmartTrip registration — for children, students, seniors, bikers and the poor.
- **Increase parking permit restrictions** (including high density parking permit fees) for specific zones of town, to discourage driving.
- **Increase traffic/driving law enforcement** through a variety of means: additional traffic and parking fines; augmented funding for bicycle police, with electronic ticketing capability, to enforce traffic laws routinely by flouted drivers and protect and encourage cyclists; additional license plate cameras and automated ticketing systems; support for the Assault of Bicyclists Prevention Act of 2011 presently before the D.C. council.
- **Create car-free corridors and bike trails**, to herd cyclist traffic and allow more people to ride safely thereby incentivizing the switch to bike.
- **License and charge bicycles** for riding in certain areas at certain times as a way to maintain funding.
- **Add biking infrastructure**: lighting on racks, fee-for-use showers, bike shares (making public transit easier), smarter curb cuts, etc.
- **Pass additional legal supports for bike parking** requirements (both in housing and public buildings).
- **Prohibit riding on the sidewalk** in areas where there are bike lanes (helps build support among the public).
- **Enforce of headlight laws for biker safety**; additional helmet requirements.
- **Tax credits** for deregistering cars in D.C., bike commuter credits, etc.

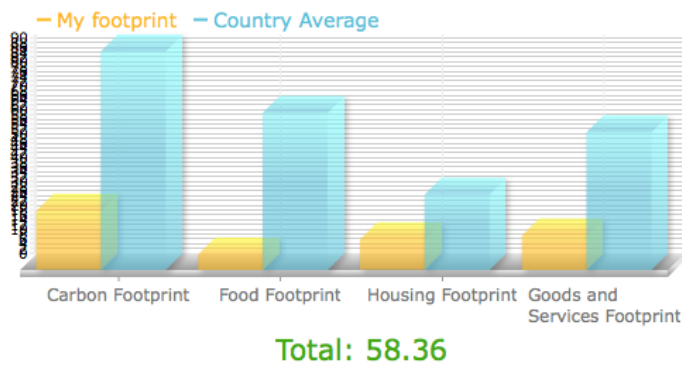
Some of these policy changes would require additional funding (construction of additional bike lanes), some would simply be rule changes with little budgetary impact, some would generate new revenue (increased fines and written-tickets).

Global Footprint Network:

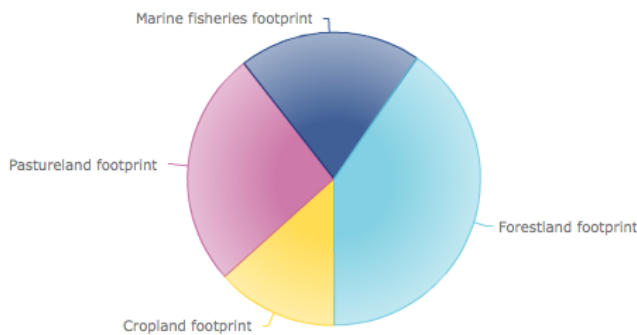


Center for Sustainable Economy:

MY FOOTPRINT IN GLOBAL ACRES BY CONSUMPTION




MY FOOTPRINT SHARE BY BIOME



WWF

You're living as if we had **5.20 planets** to support us but we only have one.



Your footprint is 5.20 planets

We've also calculated your **carbon footprint**, which is **32.00 tonnes per annum**

6%	66%	14%	14%
food	travel	home	stuff

Reduce your footprint...

Join 46,768 other people sharing tips, scores and successes

Sign up
(it's quick & free!)

ecologyfund.com

Ecological Footprint Calculator

This ecological footprint calculator was developed by [Best Foot Forward](#).

To estimate your footprint, select those options that most closely reflect your lifestyle.

I live in

I travel mostly by and usually holiday .

I live in a which I share with .


My heating/cooling bills are relatively for the size of home.

I buy my electricity from sources and energy.

I am a and tend to eat food.

I produce an amount of household waste most of which is .

I think that of the productive area of the planet should be left for other species.



CI

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CALCULATOR

QUICK DETAILED

HOUSEHOLD 5.4*	Number of short flights I make in a year...* <input type="text" value="10"/>
DRIVING 0.0*	Number of long flights I make in a year... <input type="text" value="6"/>

* (under 500 miles one way)

TRAVEL
10.7*

YOUR CARBON FOOTPRINT **16.0*** SUGGESTED DONATION **\$192**

* Tons of CO₂

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