

Carbon and Ecological Footprints

After the issue of sustainability rose to prominence during the 1990s, the concepts of “carbon footprint” and “ecological footprint” became important measures for examining the impacts of individuals and countries. Of the two, the carbon footprint is perhaps better known and understood among the general public; it helps us to understand how many tons of the greenhouse gas carbon dioxide (including equivalent gases) are emitted each year from a household or country.

Perhaps less known to the general public and media, the “ecological footprint” has been widely researched and adopted among agricultural and natural resource experts (notwithstanding some limitations which are beyond the scope of the present discussion). A search of the term reveals an extensive literature. The ecological footprint describes the number of hectares of land (and water) of biological productivity which an individual country needs to fulfill its lifestyle requirements for food, biomass fuel, fiber, timber building materials and the forest sequestration of carbon dioxide emissions *not* absorbed by the oceans. (Thus the ecological footprint includes a large portion of our carbon footprint). In contrast to the “ecological footprint” which assess the demand for biological productivity, The term “biocapacity” represents the actual amount of annual biological productivity which nature makes available.

If the annual ecological footprint exceeds the biocapacity, then the situation is unsustainable in the long run. In the short term, a larger ecological footprint means that a nation will have to either (1) import resources from other nations (thus reducing the available biocapacity in the latter) or (2) begin to deplete its stock of biological productivity, which would eventually result in the collapse of ecosystems. Due to human activities, a 2019 scientific study, the UN Environment Programme Intergovernmental Science-Policy Report, indicated that about one million plant and animal species are at risk of extinction.

Research has also shown that the global ecological footprint has tended to increase over time (for all the same reasons discussed elsewhere with the IPAT formula). According to the Global Footprint Network (GFN) in 2018, humanity uses the annual equivalent of 1.7 earths to provide the biological resources we use and to sequester human carbon dioxide emissions. This means that it takes the earth one year and six months to regenerate biological productivity which we consume in a year. It might be noted that the present demand for ecological resources is in close proximity to what we use, except for our ever-increasing carbon footprint. (Consequently, the excess carbon dioxide which cannot be absorbed results in increasing atmospheric concentrations of the greenhouse gas).

Ultimately, the sustainability of earth’s ecological resources is even more compromised and complicated by the unequal distribution of global consumption. The average American, according to the GFN, consumes about seven hectares of ecological productivity, or about four times the global average of 1.7. Hence, if everyone consumed at the rate of the U.S., it would require four earths. Clearly, the present globally unsustainable situation will get progressively worse as other countries seek to improve their lifestyles AND as global population grows beyond the present 7.7 billion.

Carbon and Ecological Footprints: Up Close and Personal

For the U.S. and countries of the developed world, reducing the ecological footprint to live sustainably will be a major challenge. The question becomes, how do we adjust consumption patterns and

production methods to reduce the biological, land and water resources required to meet our needs for food, biomass fuel, fiber , building materials and forest sequestration.

Here are some ideas to get started:

- (1) Above all, reduce fossil-fuel energy consumption for transportation and housing and reduce, re-use and recycle consumer products which have high manufactured energy inputs (such as metal, plastic and glass containers). These practices will reduce our carbon footprint of greenhouse gases which, as noted above, will also substantially reduce our ecological footprint
- (2) Examine food and beverage consumption habits to eat *less* and eat “lower on the food chain” to reduce the amount of land, water and biological resources used to provide food sustenance. This would include eating more vegetarian meals and reducing the consumption of corn-fed beef in favor of chicken (the lowest impact) and pork. Likewise, reducing the consumption of alcoholic beverages also reduces the demand for these resources. In fact, per dollar of expenditure, the Global Footprint Network has found that food and alcohol expenditures per dollar have two to three times the ecological impact of the next highest categories, housing and clothing! At the same time that the ecological footprint is being reduced, it should be obvious that it will be possible to develop a healthier lifestyle and perhaps a less expensive one as well!

When practical, it might also be noted that a reduction in the consumption of imported food and beverage products will also allow more biocapacity to remain to meet needs in other countries. (Again, I’ll also probably be healthier if I reduce somewhat my consumption of coffee, chocolate and rum!)

- (3) Find ways to reduce paper use and recycle used papers (including junk mail).
- (4) For home purchase and construction, as practical, consider the purchase of a smaller home and try to utilize local and domestic timber which is sustainably produced.
- (5) If using a wood stove, make use of local wood wastes and wood pellets made from them.