All life on Earth, in one staggering chart

Scientists estimated the mass of all life. It's mind boggling.

Brian Resnick May 29, 2018, 12:00pm EDT

By weight, human beings are insignificant.

If everyone on the planet were to step on one side of a giant balance scale, and all the bacteria on Earth were to be placed on the other side, we'd shoot violently upward. That's because all the bacteria on Earth combined are about 1,166 times more massive than all the humans.

Comparisons to other categories of life similarly demonstrate how very, very small we are. As a sweeping new study in the *Proceedings of the National Academy of Sciences* finds, in a census sorting all the life on Earth by weight (measured in gigatons of carbon, the signature element of life on Earth), we make up less than 1 percent of life.

There are an estimated 550 gigatons of carbon of life in the world. A gigaton is equal to a billion metric tons. A metric ton is 1,000 kilograms, or about 2,200 pounds.

We're talking in huge, huge, mind-boggling terms here.

So, using the new data in *PNAS*, we tried to visualize the weight of all life on Earth to get a sense of the scale of it all.

All life on Earth, in one chart

What you'll see below is a kind of tower of life. Each large block of this tower represents a gigaton of life, and the blocks are grouped into broad kingdoms.

There are the protists (think microscopic life like amoebae), archaea (single-celled organisms somewhat similar to bacteria), fungi (mushrooms and other types of fungus), bacteria (you're familiar with these, right?), plants, and animals.

As you can see, plants dominate our world. If the tower of life were an office building, plants would be the main tenants, taking up dozens of floors. Comparatively, all the animals in the world — seen in gray in the tower — are like a single retail shop (a trendy one, to be sure) on the ground floor.

And if we zoom in on all animal life, we again see how insignificant humans are compared to everyone else in the kingdom. Arthropods (insects) outweigh us by a factor of 17. Even the mollusks (think clams) weigh more.

What's missing from this chart is just as important

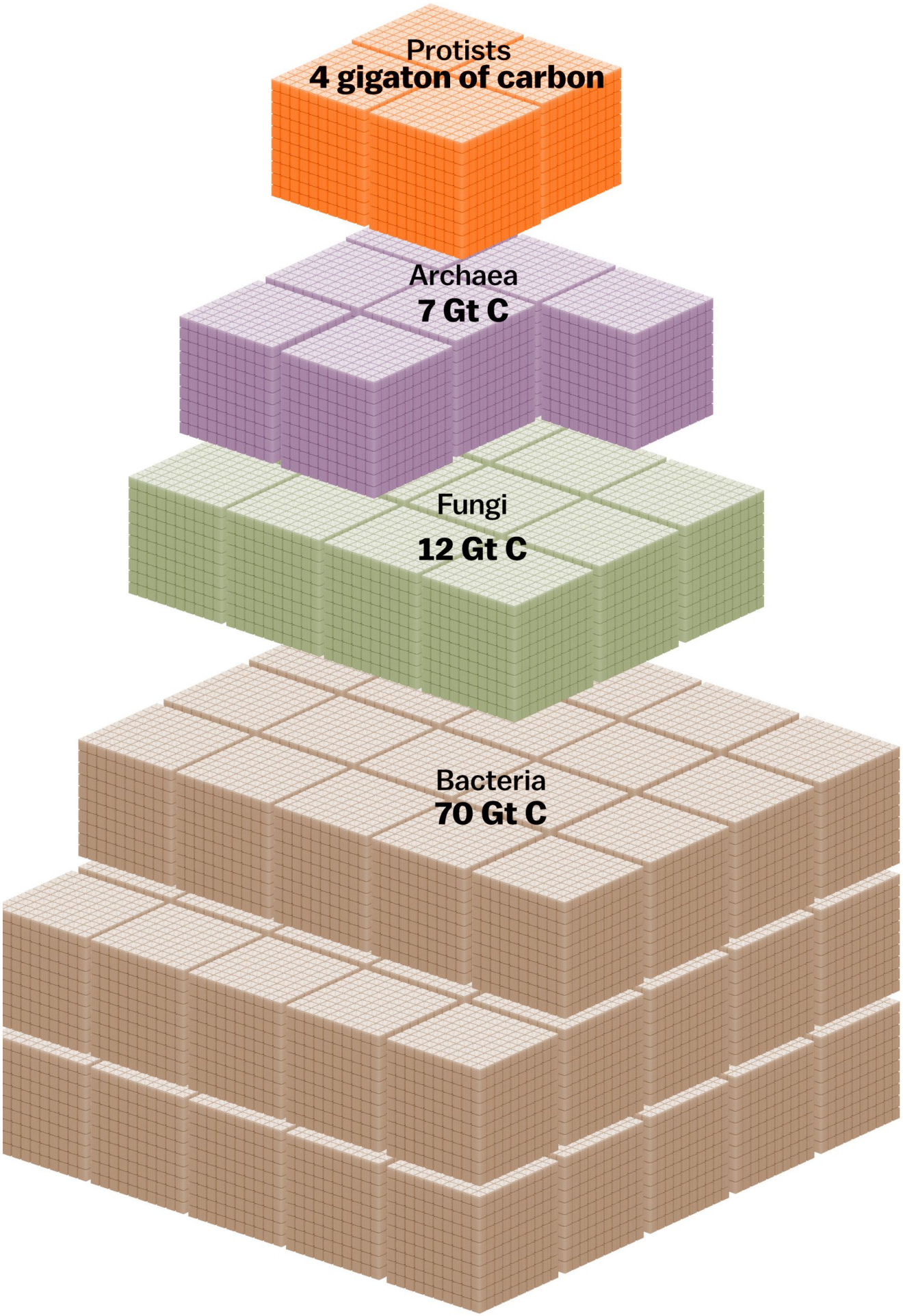
Yet despite our small biomass among animals, we've had an overwhelmingly huge impact on the planet. The chart above represents a massive amount of life. But it doesn't show what's gone missing since the human population took off.

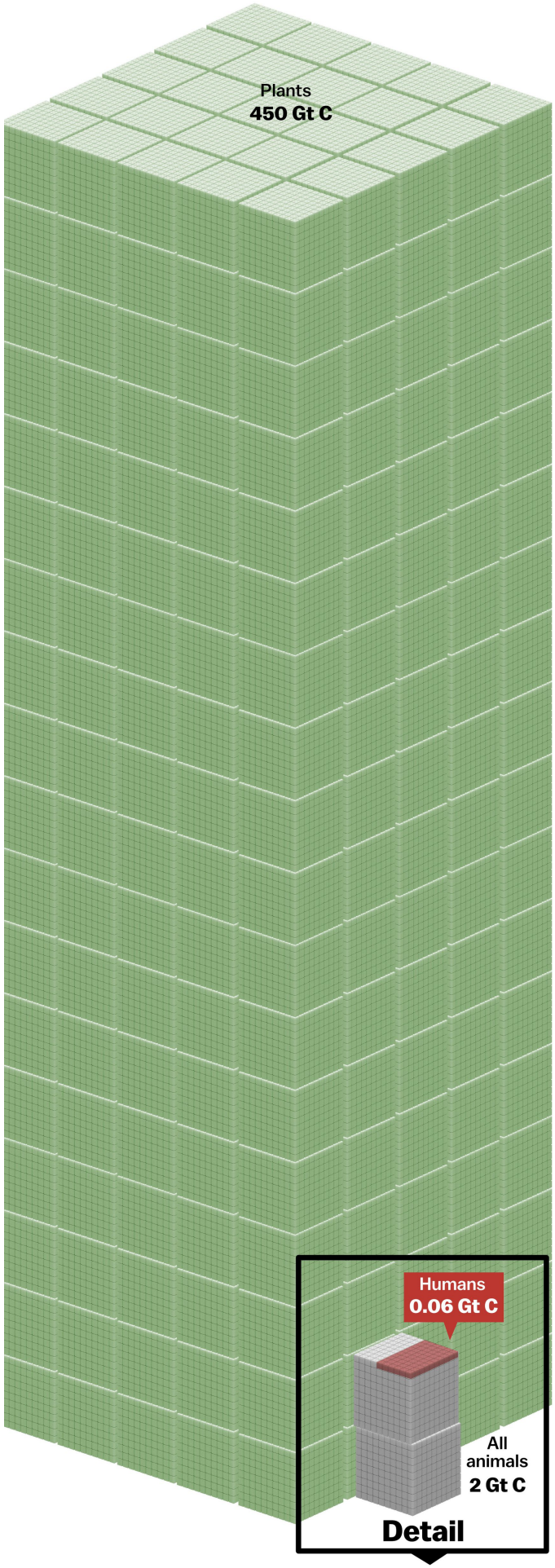
The authors of the *PNAS* article estimate that the mass of wild land mammals is seven times lower than it was before humans arrived (keep in mind it's difficult to estimate the exact history of the number of animals on Earth). Similarly, marine mammals, including whales, are a fifth of the weight they used to be because we've hunted so many to near extinction.

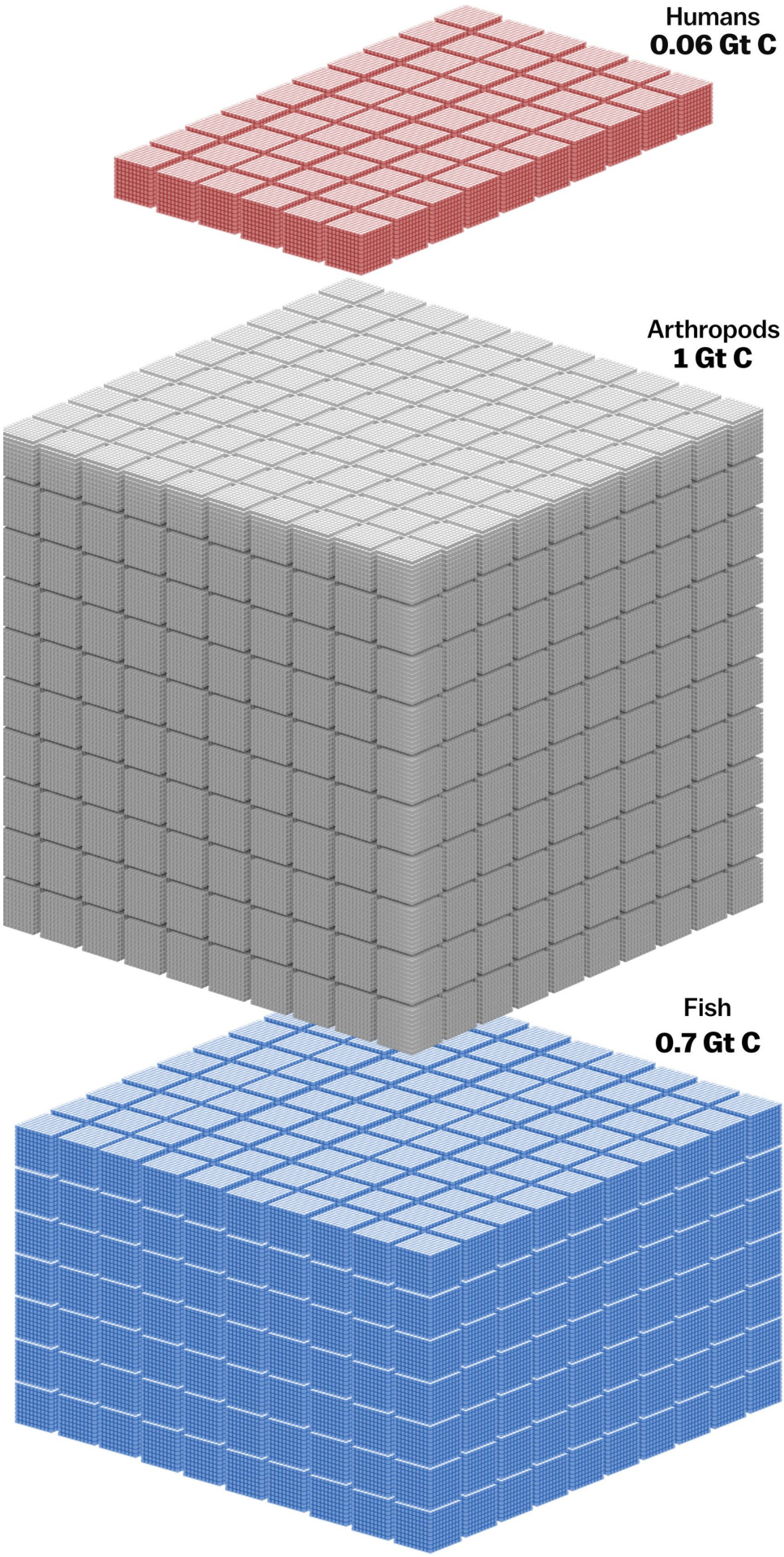
And though plants are still the dominant form of life on Earth, the scientists suspect there used to be approximately twice as many of them — before humanity started clearing forests to make way for agriculture and our civilization.

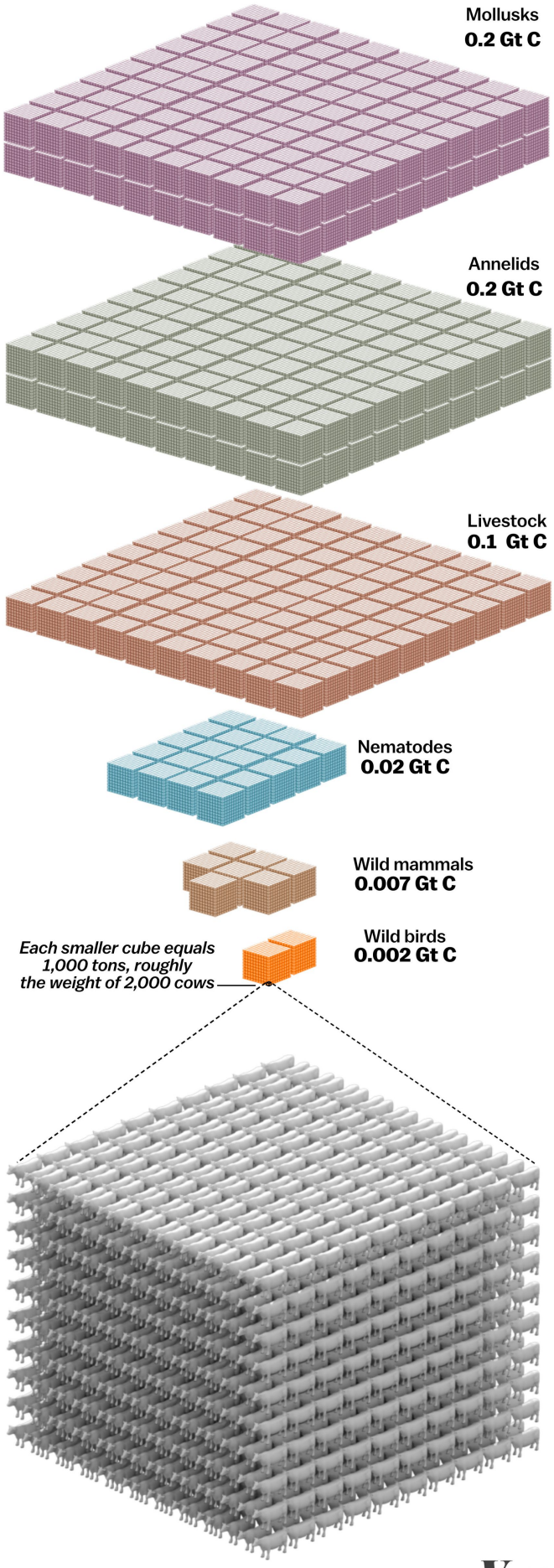
The census in the *PNAS* paper isn't perfect. Though remote sensing, satellites, and huge efforts to study the distribution of life in the ocean make it easier than ever to come up with estimates, the authors admit there's still a lot of uncertainty. But we do need a baseline understanding of the distribution of life on Earth. Millions of acres of forests are still lost every year. Animals are going extinct 1,000 to 10,000 faster than you'd expect if no humans lived on Earth. Sixty percent of primate species, our closest relatives on the tree of life, are threatened with extinction.

We have to know how much more we stand to lose.


Protists
4 gigaton of carbon
Archaea
7 Gt C
Fungi
12 Gt C
Bacteria
70 Gt C


Plants
450 Gt C
Humans
0.06 Gt C
All
animals
2 Gt C
Detail


Humans
0.06 Gt C
Arthropods
1 Gt C
Fish
0.7 Gt C



SOURCE: PNAS "The biomass distribution on Earth"
Yinon M. Bar-On, Rob Phillips, and Ron Milo

Vox