

Our Ocean Backyard — *Santa Cruz Sentinel* columns by Gary Griggs, Distinguished Professor of Earth and Planetary Sciences, UC Santa Cruz.

#257 March 4, 2018
The Limits of the Earth

History tells us that a drought is never very far away from us here in California. After a total of 0.06 inches of rain in December, February was nearly as dry with just 0.30 inches by the end of February.

Water covers about 71% of our planet's surface, and we only have to look offshore to see it. But freshwater, the stuff we drink, wash in, and irrigate our crops with, is often in short supply. Only 3% of the world's water is fresh, and about two-thirds of that is tucked away in Antarctica, Greenland and in continental glaciers in places like Alaska, the Himalayas and the Andes. This leaves 1% of all the planet's water for the 7.6 billion people on Earth as well as all of the plants and animals.

Many people around the planet, and California is no exception, live in places where there isn't enough water to provide for their basic needs. In California we have built a massive system of dams, reservoirs, pipes and pumps to just move it around. But much of the world population doesn't have this luxury. As a result, just over one billion people worldwide lack access to clean water, and about 66% - or 4 billion people - experience water scarcity for at least one month every year.

Many of the watersheds and river systems that provide the water to feed an expanding human population and keep ecosystems alive are overstressed. Around the world lakes are drying up, groundwater tables are dropping, and river flows are

declining and often polluted. A changing climate is altering patterns of weather and water around the world, causing shortages and droughts in some areas and floods in others.

We are very fortunate in Santa Cruz to have a reliable water supply and we can count on safe clean water coming out of the tap when we turn it on. And most places in the United States have a similar luxury, although I don't think many of us always appreciate this privilege or the luxuries we take for granted here in the United States.

We have about 4.3% of the global population, but we use 20% of global energy. On average, one American consumes as much energy as 2 Japanese, 6 Mexicans, 13 Chinese, 31 Indians, 128 Bangladeshis, or 370 Ethiopians. Americans also eat 15% of the world's meat and consume 815 billion calories of food every day—roughly 200 billion more than we need – enough to feed 80 million people. And we throw out 200,000 tons of edible food daily.

Americans also produce 40% of the world's trash, and by age 75 the average American has generated 52 tons of garbage.

While there are many around the world that would like to enjoy our lifestyle, it has become clear that it is physically impossible for the 7.6 billion people on the Earth to live as the average American does. There simply aren't enough natural resources to go around. And I wouldn't begin to assume that anyone living in Santa Cruz is average and lives like all the other people in the United States.

It is generally believed that humanity uses the equivalent of about 1.7 planet Earths to provide the renewable resources and absorb the wastes we create today. In other words, we are seriously overdrafting our bank account. Using similar methods to determine our ecological footprints, if the entire population of the Earth lived and consumed as Americans do, it would take about four Earths to provide for their needs.

One of the very few things that we can all agree on, regardless of our political affiliation, is that we don't have three more Earths. Whether its energy, water or food, we are deficit spending, and its going to take a very serious effort to bring the human population back into balance with the planet before we are bankrupt. We all have a role to play.

Our planet is finite, but human potential is not. Living within the means of one planet is technologically possible, environmentally beneficial, and our only chance for a sustainable future.