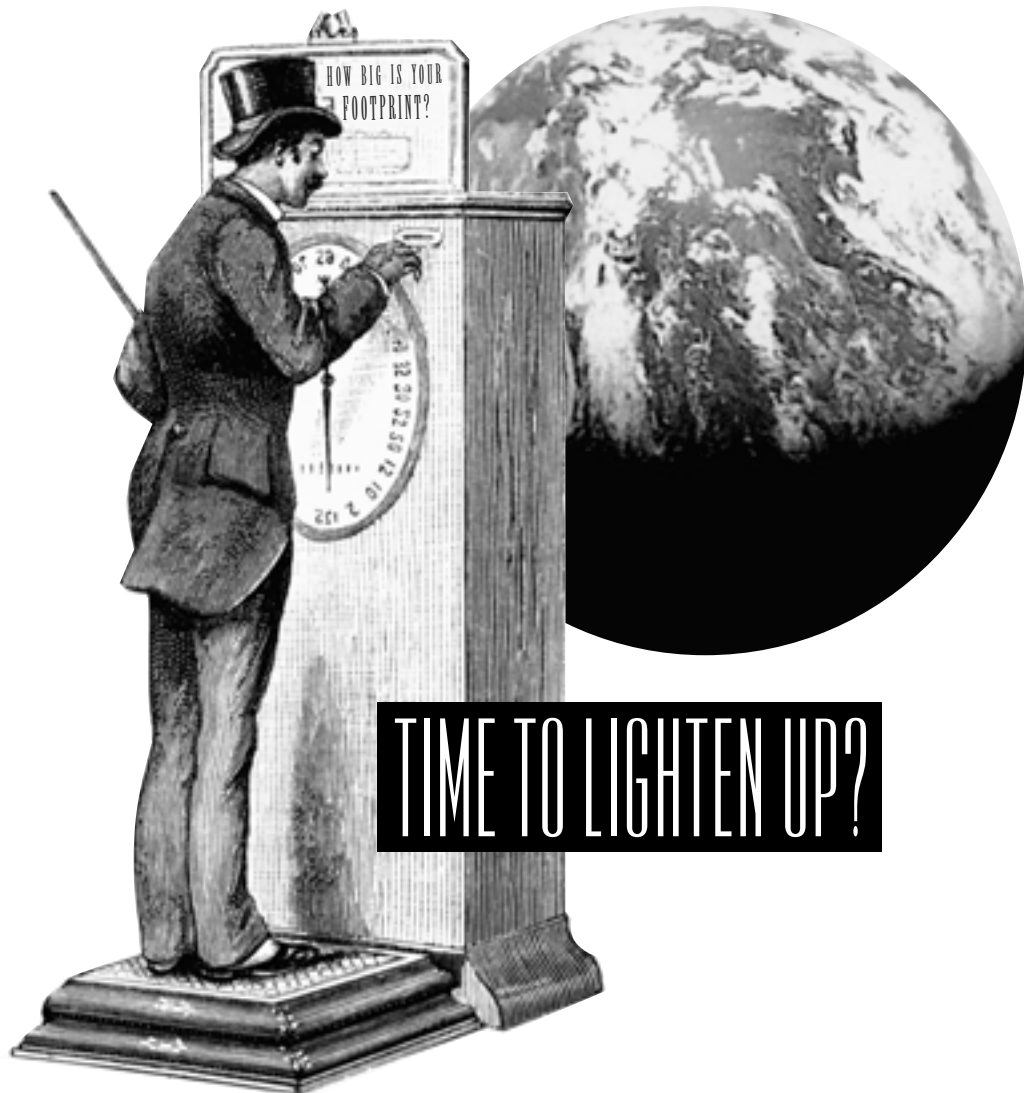


REPORT ON THE

**SONOMA COUNTY**

**ECOLOGICAL FOOTPRINT PROJECT**

—MAY 2002—



**Sustainable Sonoma County**  
*with* **Redefining Progress**

## ACKNOWLEDGMENTS

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*Sustainable Sonoma County is a learning and action community that connects, inspires, and empowers people to align their thinking and action with their deep need for a life-affirming and sustainable world.*

This report is posted at [www.sustainablesonoma.org](http://www.sustainablesonoma.org)

Supporting documentation is posted at  
[www.rprogress.org/programs/sustainability/ef/projects/](http://www.rprogress.org/programs/sustainability/ef/projects/)

Extensive information about the Ecological Footprint is available at  
[www.redefiningprogress.org](http://www.redefiningprogress.org)



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100% NON-DEINKED POST When selecting paper for this report, we had to choose between saving money and saving the Earth—the same dilemma shoppers face all the time. We chose 100% non-deinked post consumer waste paper even though it cost more than paper made from virgin wood pulp. When the economy and ecology align, budget-friendly choices are also Earth-friendly choices.



# ECOLOGICAL FOOTPRINT PROJECT

—MAY 2002—

## SUMMARY

**R**edefining Progress, an Oakland-based think tank, calculated Sonoma County’s Ecological Footprint, a measurement of people’s demand on nature, and determined that it is 22 acres per person. This means it takes 22 acres of land and sea throughout the world to support each resident of Sonoma County. If everyone in the world consumed like the average person in Sonoma County, we would need about four more Earths.

Protecting Earth’s ecosystems depends on individuals reducing their personal consumption. But it is even more critical that we enact system-wide changes so that living in an Earth-friendly way is common and easy instead of noble and tedious. The good news is that to promote long-term health and viability, communities are starting to recognize and respond to local and global ecological limits. The Ecological Footprint is a powerful guide for individuals, businesses, and governments as we steer toward a sustainable future.

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*\* Why lighten up? By living lightly we respect nature’s limits. And a lighthearted approach makes this pursuit more satisfying —even seriously fun—and improves our chance for success.*

## INTRODUCTION

Imagine for a moment that throughout the world there is no system for keeping track of money, and that the amount of it is finite. People spend unaware of how much they have. As population and expenditures increase, the amount of money must stretch farther and farther. Soon people start feeling pinched. They realize they need a way to account for money exchanges, and to track what they spend and save.

This far-fetched fantasy is actually similar to our relationship with environmental resources, except that accounting for Earth's wealth is far more important and more complicated than accounting for money.



The Ecological Footprint, an innovation that is barely ten years old, enables us to quantify our relationship with nature by computing the acres needed to support our consumption. This effort is part of a worldwide movement to study Earth's total ecological capacity and humanity's long-term prospects and quality of life.

Many prominent scientists have praised the Ecological Footprint. One of the twentieth century's greatest biologists, E.O. Wilson, considers the Footprint a premier ecological invention because of its ability to communicate complex scientific information in relatively simple terms.

### **The Ecological Footprint is used worldwide for a variety of tasks, including**

- The City of Petaluma and Carollo Engineers used the Ecological Footprint as one of their main criteria in selecting a sewage treatment option for Petaluma's new facility.
- World Wildlife Fund, the world's largest conservation organization, uses the Ecological Footprint as an over-arching measure for explaining the need for conservation, and features it as their sustainability measure in the Living Planet Report.
- The National Assembly for Wales, a newly-formed government, chose the Ecological Footprint as its headline indicator for measuring progress.
- Earth Day Network, an international organization with 5000 member organizations in 185 countries, selected the Ecological Footprint as its primary campaign theme for the next years.
- Several Swiss banks use the Ecological Footprint as part of their analysis of countries' credit worthiness.

Although the Ecological Footprint has been computed for most countries in the world, it's been done for only a handful of individual communities. The U.S. Environmental Protection Agency awarded Sustainable Sonoma County a grant to undertake such a project in Fall of 2001.

Sonoma County's Ecological Footprint Project included four phases: calculate the County's per capita footprint, have results reviewed by local scientists and community leaders, write and distribute a report, and hold a conference to discuss the results and their applications. Seventy-five people attended a project launch in November. The calculation was completed in February, focus groups of scientists and community leaders met in March, and the conference was held in May.

As a community, Sonoma County can benefit from the Ecological Footprint by applying it to planning and policy decisions regarding critical issues such as zoning, development, transportation, environmental regulations, and open space preservation. Using the Footprint and other sustainability tools, we can define sustainability goals in specific terms, measure our progress, create strategies for accelerating progress, and educate and inspire community action toward building a sustainable future.



*What are the questions we want to answer using the Footprint? After we know this, then we can focus on the actionable items.—Ai-Chu Wu\**

*\*Most of the quotations used throughout this report are from the members of the Project's two focus groups. For information about the members, please see pages 20 and 21.*

## WHY ACCOUNT FOR NATURAL RESOURCES?



**I**n the past, natural resources were plentiful and people were scarce. But the situation is reversing and, increasingly, people are plentiful and natural resources are scarce. According to the Living Planet Report 2002, during the last thirty years, the consumption of natural resources has increased forty percent, while Earth's natural wealth in biodiversity has decreased thirty percent. Humanity's current demand on Earth's ecosystems outstrips its biological capacity by about twenty percent. This means that for every year of human consumption, it takes the Earth about one year and two months to renew. We are overspending our natural capital budget and the debt is mounting.

**...for every year of human consumption, it takes the Earth about one year and two months to renew.**

Most people find it very difficult to understand how this could be true, especially in a place like bountiful Sonoma County.

### **The following two stories help to illustrate**

- A man started a trip with a full tank of gas and no gas gauge. Happily, he sped along for hours under the illusion that he would never run out of gas—right up to the time that his car stopped, leaving him stranded.
- A woman inherited a very handsome endowment. Every month she received a sizable amount of interest. But her appetite for spending expanded beyond the amount she received. She dipped deeper and deeper into her endowment because her

expenses exceeded her monthly earnings. She never kept track of her money, and never imagined that the interest she received depended on protecting her capital. Before long, she spent nearly all of the wealth she had inherited.

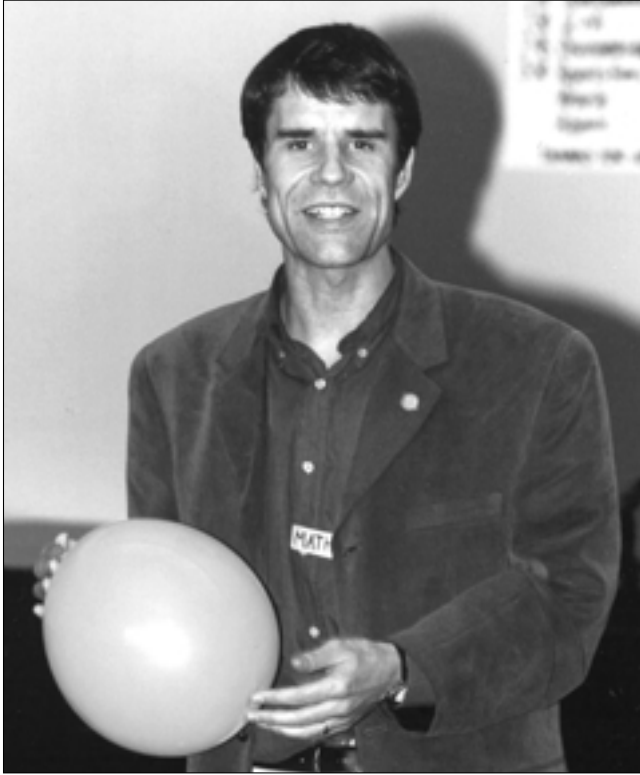
**H**ow different are we as the human community from the characters in these stories? We have been exceeding Earth's ability to renew natural resources such as fisheries, forests, and groundwater. Part of the reason may be that up until recently, it's been difficult to decipher the signals that tell us we are overshooting the limits—that we are dipping into our natural capital.

Complicating matters, the human impulse to disregard limits is strong. One reaction to the threat of bankruptcy, whether financial or ecological, is to insist that the accountants are wrong, and to pretend that there's not a problem. Another response is resignation, to just give up.

But individuals and communities are beginning to realize that they must pay attention to local and global ecological limits for their long-term health and viability. This translates into environmental accounting, planning, and budgets, and here is where the Ecological Footprint comes in.

*The future belongs to those who give the next generation reasons to hope.—Teilhard de Chardin*

## WHAT IS THE ECOLOGICAL FOOTPRINT?



Bigger is not always better, demonstrates Mathis Wackernagel, co-creator of the Ecological Footprint, at the Sonoma County Ecological Footprint Project Launch, November 2001.)

**T**he Ecological Footprint is a measurement of people's demand on nature. All human activity has an impact. This is not a problem as long as nature's limits are respected.

The Footprint takes stock of all land anywhere in the world used for crops, roads, grazing, building, growing trees for wood products, as well as waters for fishing. The Footprint also includes forestland for absorbing carbon dioxide.

A Footprint measurement can be made for a single activity or for a group of activities. For example, the Footprint of a car trip can be calculated, as can the impact for all Bay Area commuters in one day or for many years. A business can calculate the Footprint for its entire operation or for a single product. An individual or a family can calculate their Footprint.

Footprints are based on national consumption. The starting point for calculating a nation's consumption is to measure its domestic production. Then its imports are added in and its exports are subtracted out. Over 250 categories of production, imports, and exports—items such as oil, coal, corn, timber, fishmeal, and cotton—are tabulated for each nation to calculate its consumption.

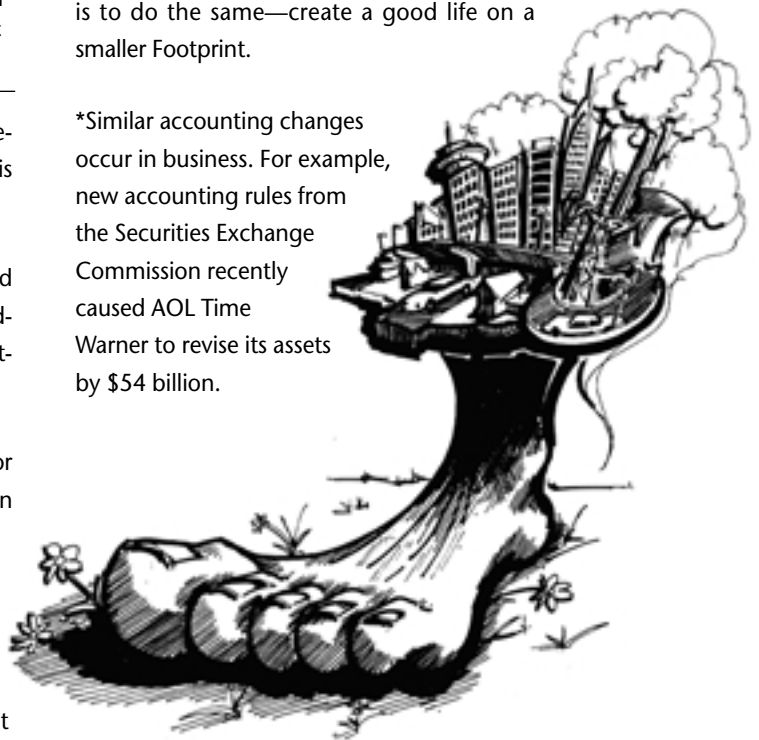
*As a non-scientist, you feel very vulnerable and dependent on scientific data. You hope that the data that has gone into the Footprint is really reliable.—George Freund*

Footprint accounts have been continually subjected to peer review, analysis, and refinement. Recent improvements in the methodology for calculating Footprints have resulted in reducing the size of the U.S. Ecological Footprint from 30 acres to 24. More conservative assumptions for energy, and better data on pasture productivity and cattle feed are now employed. Also, the method for counting acres has been refined.\*

If everyone consumed at the U.S. level, we would need about four more planets to sustain us all. One reason our high consumption is possible is that people in other countries, on average, live on less. Another is that much of our waste, for example, greenhouse gas, is accumulating—exceeding Earth's ability to recycle it.

Many countries, like France, have a much smaller Footprint than ours, and yet live just as well if not better. Our challenge is to do the same—create a good life on a smaller Footprint.

\*Similar accounting changes occur in business. For example, new accounting rules from the Securities Exchange Commission recently caused AOL Time Warner to revise its assets by \$54 billion.



*Trend is not destiny.*  
—René Dubos, author and ecologist

# HOW WAS SONOMA COUNTY'S ECOLOGICAL FOOTPRINT MEASURED?

A community's Footprint is calculated differently from a nation's Footprint because the necessary local data is mostly unavailable. As an example, to determine how much cotton Sonoma County residents consume would require an elaborate survey. Because the Footprint is composed of over 250 such measures, it would be impractical to calculate a community's footprint gathering data locally.

Therefore, to measure a community's Footprint, researchers start with the national footprint and then adjust it using relevant and available local indicators. The Sonoma County data used to adjust the national Footprint and determine its Footprint were: population, vehicle miles traveled; average house size; electricity usage; sales of general merchandise, clothing, electronics, appliances, and building material and supplies; paper consumption; and income.

The Sonoma County data was then applied to five major categories of consumption—food, household, transportation, goods, and services—that were adjusted to create the calculation. The data were converted to acres according to six categories: energy land, crop land, pasture, forest, built area, and sea. Please see the chart on the next page.



Tim Smith, Sonoma County Supervisor, and Mathis Wackernagel, Redefining Progress, at the Sonoma County Ecological Footprint Project launch.



*As somebody who's used to dealing with this kind of stuff, I know what cropland is, I know pasture and forest, but what the hell is energy land? Is it like Disneyland?—Rich Walker*

*(See FAQs, page 9, for the answer.)*

## DATA USED TO ADJUST FOOTPRINT—1999

	Sonoma County	Sonoma County as % of U.S.	U.S.
Population . . . . .	458,614 . . . . .	0.16% . . . . .	281,421,906
Vehicle miles traveled (VMT)/ capita . . . . .	7,646 . . . . .	95% . . . . .	8,021
Average square feet of housing/capita* . . . . .	615 . . . . .	94% . . . . .	657
kWh electricity/ capita . . . . .	2,743 . . . . .	71% . . . . .	3,873
General merchandise sales, \$/capita . . . . .	1,112 . . . . .	95% . . . . .	1,174
Clothing sales, \$/capita . . . . .	366 . . . . .	75% . . . . .	485
Electronics and appliance sales, \$/capita . . . . .	304 . . . . .	125% . . . . .	244
Home furnishings sales, \$/capita . . . . .	257 . . . . .	101% . . . . .	255
Building material and supplies sales, \$/capita . . . . .	1,017 . . . . .	126% . . . . .	809
Paper consumption, lbs/capita/year . . . . .	383 . . . . .	107% . . . . .	359
Per capita income . . . . .	\$30,485 . . . . .	112% . . . . .	\$27,321

To see the spreadsheets that show all data used to calculate Sonoma County's Ecological Footprint, and to see sources from which the data were derived, please visit: [www.rprogress.org/programs/sustainability/ef/projects/](http://www.rprogress.org/programs/sustainability/ef/projects/)

\*The average Sonoma County house is 1600 sq. ft.; in the U.S. it's 1702 sq. ft. Both have an average of 2.6 sq. ft. people per household.

# WHAT IS SONOMA COUNTY'S ECOLOGICAL FOOTPRINT?

## How does it compare with Marin, the U.S., and France?

Sonoma's Footprint is 22 acres, Marin's is 27 acres, the U.S.'s is 24, and France's is 13. These Footprints and their component parts are shown in the charts below.

NOTE: Numbers below represent global acres per person, and may not add due to rounding. Figures are for 1999.

<b>SONOMA COUNTY— 22 acres</b>							
	<b>Energy land</b>	<b>Crop land</b>	<b>Pasture</b>	<b>Forest</b>	<b>Built area</b>	<b>Sea</b>	<b>Total</b>
<b>Food</b>	1.7	2.2	0.8	0.0	0.0	0.7	5.4
<b>Housing</b>	2.7	0.0	0.0	1.5	0.2	0.0	4.4
<b>Transportation</b>	3.7	0.0	0.0	0.0	0.3	0.0	4.0
<b>Goods</b>	3.8	0.4	0.1	1.2	0.1	0.0	5.5
<b>Services</b>	2.1	0.0	0.0	0.9	0.1	0.0	3.0
<b>TOTAL</b>	13.9	2.6	0.8	3.6	0.6	0.7	22.4

<b>MARIN COUNTY—27 acres</b>							
	<b>Energy land</b>	<b>Crop land</b>	<b>Pasture</b>	<b>Forest</b>	<b>Built area</b>	<b>Sea</b>	<b>Total</b>
<b>Food</b>	1.7	2.2	0.8	0.0	0.0	0.7	5.4
<b>Housing</b>	3.0	0.0	0.0	1.7	0.1	0.0	4.8
<b>Transportation</b>	4.7	0.0	0.0	0.0	0.2	0.0	4.9
<b>Goods</b>	5.0	0.5	0.1	1.4	0.0	0.0	6.9
<b>Services</b>	3.7	0.0	0.0	1.6	0.0	0.0	5.4
<b>TOTAL</b>	18.1	2.7	0.8	4.7	0.4	0.7	27.4

<b>U.S.—24 acres</b>							
	<b>Energy land</b>	<b>Crop land</b>	<b>Pasture</b>	<b>Forest</b>	<b>Built area</b>	<b>Sea</b>	<b>Total</b>
<b>Food</b>	1.7	2.2	0.8	0.0	0.0	0.7	5.4
<b>Household</b>	3.5	0.0	0.0	1.4	0.3	0.0	5.2
<b>Transportation</b>	3.9	0.0	0.0	0.0	0.5	0.0	4.3
<b>Goods</b>	4.0	0.4	0.1	1.2	0.1	0.0	5.8
<b>Services</b>	1.9	0.0	0.0	0.8	0.1	0.0	2.8
<b>TOTAL</b>	15.0	2.6	0.8	3.4	1.0	0.7	23.5

<b>FRANCE—13 acres</b>							
	<b>Energy land</b>	<b>Crop land</b>	<b>Pasture</b>	<b>Forest</b>	<b>Built Area</b>	<b>Sea</b>	<b>Total</b>
<b>Food</b>	0.7	2.0	0.4	0.0	0.0	0.9	4.0
<b>Housing</b>	2.1	0.0	0.0	0.1	0.3	0.0	2.5
<b>Transportation</b>	1.8	0.0	0.0	0.0	0.1	0.0	1.9
<b>Goods &amp; Services</b>	3.1	0.3	0.0	1.0	0.3	0.0	4.7
<b>TOTAL</b>	7.7	2.3	0.5	1.1	0.6	0.9	13.1

The Food, Goods, and Services categories have little available local data. Sonoma and Marin have the same figures in the food categories as the U.S. because, absent good local data, U.S. averages were used for local assessments.

## FOOTPRINT SECRETS



**Footprints are pretty straightforward. Essentially, this is how I calculate mine:**

1. How much pasture does it take to feed the cows for the dairy and meat I consume?
2. How large is the field needed to produce all my beans, cotton, rubber, sugar, cereals—not only for my bread and spaghetti, but also for feeding my share of chicken and pigs?
3. How much ocean area is necessary to produce the fish that I eat?
4. How much land does my house, my garden, and my share of the roads, city squares and parks occupy?
5. To stabilize the CO<sub>2</sub> concentration in the atmosphere and slow down climate change, how much forest area is necessary to absorb the CO<sub>2</sub> from my fossil fuel use? Or alternatively, how much forest area would it take to produce the same amount of energy from fuel wood?
6. I translate all of these various areas into standardized acres with equal productivity. Because they represent world averages, we call them global acres.
7. Then I add up these areas to get my Footprint.

There is no other secret to the Footprint calculation. Just remember that a complete footprint assessment also includes the energy and resources used for our share of social expenditures: hospitals, policing, government, education, military operations etc. —*Mathis Wackernagel*

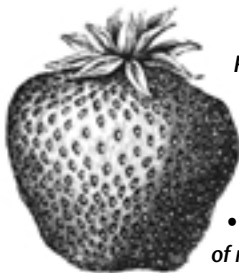


Spot drawing, Nicolae Ascu, NYT

## HOW CAN THE ACCURACY OF SONOMA COUNTY'S FOOTPRINT BE IMPROVED?

**L**ocal Footprints, as with all calculations, are only as good as the data used. The accuracy of Sonoma's Footprint would increase by using the following local data, if available.

- **Food** Percent of food consumed by Sonoma County residents that is locally grown, organically grown, and unprocessed or unpackaged; consumption of meat and dairy products
- **Household** Residential natural gas consumption and other residential fuel consumption, built up area occupied by housing and other structures
- **Transportation** Average car fuel efficiency, average car occupancy, passenger miles on public transportation, airplane miles and/or hours flown by Sonoma residents, built up area occupied by transportation
- **Goods and Services** Consumption in physical quantities of various goods and services



*Regarding the food portion, I believe some adjustment is needed to make the findings more palatable (excuse the pun) because a significant amount of food consumed in the county is locally grown, is organically grown, and has minimal processing and packaging.*

- *Organic, or chemical-free, agricultural production uses less energy than most conventional farming.*
- *Consuming food that is locally-produced avoids the major transportation costs that are characteristic of much of the U.S. food system.*
- *Reduced processing and packaging reduces use of both energy and water in the food system.*

*The combined effects of these local production and consumption patterns are almost certainly greater here than in most of the rest of the U.S. In the absence of more precise data I would suggest a 10% reduction in this Footprint calculation for Sonoma County, pending improved methodology to refine this category to incorporate such local practices.*

—*Jim Stewart, Professor, Department of Environmental Studies and Planning, Sonoma State University*

# HOW DOES SONOMA'S CAPACITY COMPARE WITH ITS CONSUMPTION?

Part of calculating Sonoma County's Ecological Footprint was to measure its supply of natural resources and compare this with its consumption. To determine Sonoma's supply or biological capacity, researchers assembled data regarding the County's ecosystems and land use.

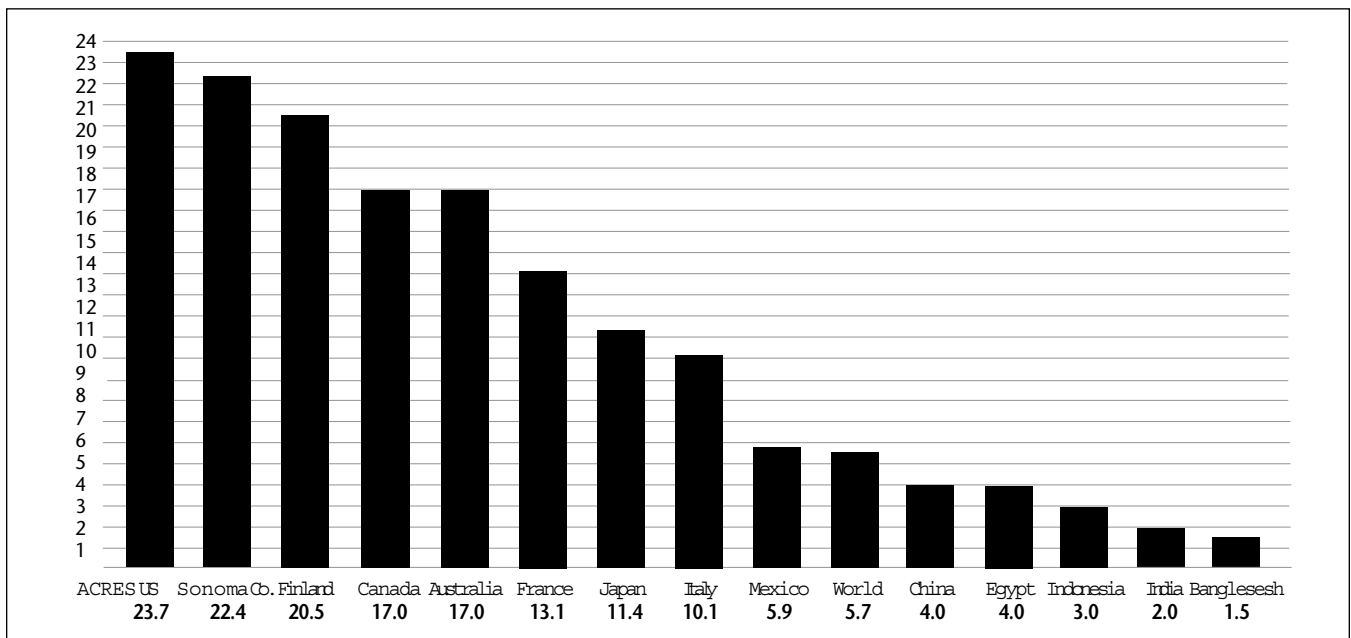
<b>SONOMA COUNTY LAND USE</b>	<b>ACRES</b>
Arable and permanent crop land . . . . .	140,797
Pasture, grassland, rangeland . . . . .	204,414
Forest land . . . . .	558,800
Built-up area . . . . .	97,540
<b>TOTAL LAND AREA . . . . .</b>	<b>1,012,473</b>
Fishing grounds . . . . .	520,044
<b>TOTAL GLOBAL ACRES . . . . .</b>	<b>2,384,000</b>

These measures were then converted to global acres so that they would be comparable to land throughout the world. Sonoma County's biological capacity was computed to be 2,384,000 global acres. This exceeds the actual physical area in the county because Sonoma's land is highly productive.

To determine the collective size of Sonoma County's Ecological Footprint, researchers multiplied the number of Sonoma County residents by their average Footprint size. This equals 10,268,000 global acres, or 4.3 times more than Sonoma County's biocapacity. Another way to view this is if Sonoma County residents were to live only on what Sonoma County could supply, each person would have a Footprint of about 5 acres instead of 22. Clearly, we import a lot of resources and export a lot of waste. As an example, all our fossil fuel is imported, and much of our carbon dioxide emissions are not absorbed.



*When I first came from Taiwan to the U.S. in 1973, the impression I had was how wasteful people are here. They just throw things away that would be precious in Taiwan or China. For example, those nice and sturdy paper plates and plastic dining ware were thrown away after one or no use on my first flight here. —Ai-Chu Wu*



SIZE OF FOOTPRINT IN ACRES— MAY 2002

# FAQS: FREQUENTLY ASKED QUESTIONS ABOUT THE ECOLOGICAL FOOTPRINT

## What data are used to calculate the Footprint?

Official government data are mostly used. Where government data are unavailable or spotty, peer-reviewed data from science literature are used.

## How accurate is the Footprint?

Conservative estimates are consistently used in Footprint calculations. Also, various aspects for which data is scarce are not yet included in Footprints, making them appear smaller than they really are. As a result Footprints tend to underestimate human demand on nature. When thinking about the Footprint, it is helpful to remember what renowned statistician George Box said, "All models are wrong. Some are useful." Just as the map is not the territory, the Footprint or any model will never perfectly represent our impact on natural systems.

## How can we use the Footprint until we know it's accurate?

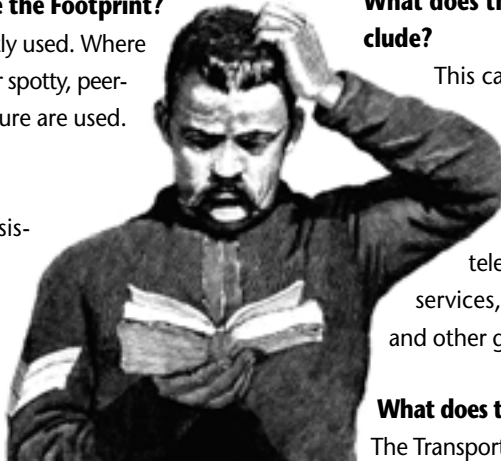
Footprint accounts constantly are scrutinized and improved. There will never be a point at which the Footprint or any model is perfectly accurate, but they can still be very useful. (See answer above.) A national environmentalist, anonymously, takes the point even farther: "I know absolutely nothing about the in-nards of the Ecological Footprint. Nevertheless, I have an opinion, and that is, who cares? We know Americans consume too much. Is it 3 times what we should be consuming, or 5, or 8.64? I really don't care. I know what the problem is. What I want to see now are SOLUTIONS."

## What are global acres?

Global acres (global hectares in metric measurement) are the measures used for the Ecological Footprint. Each acre corresponds to one acre of biologically productive space adjusted to equal world-average productivity. Today, the biosphere has 26.7 billion acres of biologically productive land and water, equal to a little less than one-quarter of the Earth's surface.

## What is energy land?

Energy land is the forest area needed to absorb carbon dioxide put into the atmosphere from burning fossil fuel. Alternatively, it measures the amount of forest it would take to produce the same amount of energy from fuel wood.



## What does the Goods and Services part of the Footprint include?

This category includes consumer goods like appliances, clothing, electronics, sports equipment, toys, computers, communication equipment, household furnishings, and cleaning products. It also includes services like water, sewage, garbage, telecommunications, education, health care, financial services, entertainment, recreation and tourism, military, and other government services.

## What does the Transportation part of the Footprint include?

The Transportation Footprint includes all aspects of personal mobility, from walking to riding bicycles, taking trains, driving cars and flying planes. These activities occupy space for road infrastructure, energy and resources for building the infrastructure and manufacturing the vehicles, and energy for operating them.

## What does the Housing part of the Footprint include?

The Housing Footprint covers the spaces for built-up land, the energy and resources for constructing the building, and the energy for operating it. This category does not include the furniture, appliances, or cleaning equipment, which are accounted for in the Goods and Services category.

## Why does the amount of meat and other animal products I eat make a difference?

Animal-based food requires about three times more land, energy, and other resources than crop-based food. Overall, plant-based diets have a smaller impact on the Earth.



*People might respond, "Yes we consume, but we're also the most productive."—Rev. Marvin Bowers*



*About 9-11 somebody said, "How could they do that to us?" I believe the world is saying many things to us now, and one is certainly about the world's resources and our consumption.*

—Sister Michaela Rock

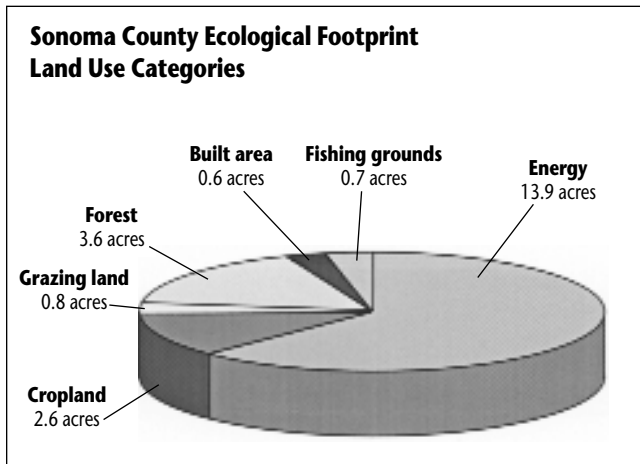


*I find the entire subject to be profoundly confounding and saturated with irony.*

—Eric Koenigshofer

### **I live as lightly as possible, why is my Footprint so big?**

Certain indirect costs such as for governmental operations, interstate highways, and military expenses, are shared by all U.S. residents. Also, infrastructure and other established systems in this country encourage high consumption. For these reasons it is important that we change our over-arching systems so that they support living lightly.



### **Do we have to become poor to have small Footprints?**

Everyone can't consume the way we do without harming the planet and ultimately ourselves. As others around the globe strive to move beyond subsistence living, and as human population increases, more stress is placed on natural systems. Those of us with high consumption can respond by discovering ways to live lightly. Rather than becoming poorer, we may become richer in what matters most. As we know, the best things in life aren't things.

### **What about population?**

Every person has a Footprint. The greater the population and the greater their consumption, the larger the collective Footprint. Because we share only one Earth with finite natural resources, the greater our world family, the fewer resources there are per person.

### **Won't shrinking our Footprints hurt the economy?**

Shrinking our Footprints will shift spending patterns toward Earth-friendly consumption. For example, transitioning from single occupancy vehicles to mass transit systems moves substantial public funds from road building to other types of development. Money saved riding bikes in the park instead of shopping at the mall may be invested in energy efficient lights and appliances, solar panels, and services like music lessons. It is unclear what the overall effects of this will be on the economy.

### **What can I do? My Footprint is big because I drive to work, and my job is far away.**

Many are in this situation. That's one of the reasons the average Footprint in this country is large. However, personal and collective choices do make a difference. Individuals can combine trips, and when their current cars wear out, they can be replaced with more fuel-efficient models. When choosing housing and work, priority can be placed on having the two be close together—best when they're within walking or biking distance from each other. We can encourage changes such as carpool and vanpool support from employers, better public transportation, and incentives for more energy efficient transportation.

### **Is living in the city or the country more Earth-friendly?**

People living in cities such as San Francisco generally have smaller footprints than people living in rural areas. Because cities are more compact, people can live more efficiently, especially relative to transportation. "You can't be an environmentalist without being an urbanist," claim a growing number of thinkers.

*I had a revelation in New York—that it was the most efficient place on Earth. The person heating a downstairs apartment also heats everyone above him.—Fred Euphrat*



DETAIL FROM A DRAWING BY SAUL STEINBERG

### **Isn't it all hopeless?**

Sometimes it seems that way. The scientific and technological solutions exist for us to transition quickly to an Earth-friendly and sustainable way of life. However, major psychological, social, and political hurdles exist. To the extent that we believe and act like it's hopeless, or that Earth's resources are unlimited, it is indeed hopeless. As Henry Ford observed, "Whether you believe you can do a thing or not, you are right." (Please see page 15 for more about emotional responses)

## SONOMA COUNTY'S ECOLOGICAL FOOTPRINT

# SCIENTISTS' & COMMUNITY LEADERS' VIEWS

VARIOUS SKETCHES BY CHARLES GIBSON



**F**or this project, two focus groups—scientists and community leaders—were convened to review and discuss the strengths, weaknesses, and applications of the Ecological Footprint concept and of Sonoma County's Footprint calculation. Prior to meeting, participants reviewed the calculation of Sonoma County's Ecological Footprint and computed their personal Footprints. Each group met for a half day and answered a series of questions. Due to the similarity of the two groups' comments, they have been consolidated for the following overview.

### Major themes from the focus groups

- The Ecological Footprint is a unique and powerful conceptual and educational tool.
- The Footprint's language and analysis are problematic—complex, technical, and difficult to understand.
- The validity of the science and assumptions on which calculations are based are difficult to verify and therefore questionable.
- The Footprint's message is harsh and therefore must be communicated sensitively so that people do not become discouraged. Concrete suggestions for lightening the Footprint and examples of people living well on smaller footprints must be offered.
- There should be better and more plentiful public information and education about the Ecological Footprint, especially through schools, churches, and business.

Many group members were both surprised and chagrined about the size of their personal Ecological Footprints. They noted the incongruities between their values and their lives. For example, one scientist described flying to conferences to discuss saving endangered habitats while burning fossil fuel that emits greenhouse gases. Another frequently drives a long distance to restore a redwood grove.

### Comments



*You can get a real 'ah-ha!' when you do your own calculation.—David Stokes*

*I don't understand exactly what it means that if everyone would live like I do, it would take four planets. By when? Even though I'm consuming four planets, nothing's really changing. —Davin Cardenas*



*As an academic, I want to get an A+ on everything. So how do I get an A+ on my footprint? I would score best if I were dead. The fact of the matter is you can't be human and be alive and not take up any acres.—Sascha von Meier*



*I live a block from my church, and days go by that I never get in a car. I ride a bicycle around town. It's just happenstance. Here is something that makes my Footprint look better as a result of absolutely no moral or intellectual or social responsibility on my part.—Rev. Marvin Bowers*



## STRENGTHS OF THE ECOLOGICAL FOOTPRINT

To varying degrees, participants considered the Ecological Footprint concept a good one—ranging from “the best” and “fantastic” to “good first step” and “confirming.”

### Highlights

- Unique and powerful conceptual and educational tool
- Incorporates a lot of information into a simple, comprehensible measure that metaphorically is very potent, compelling, and intuitively simple and obvious
- Works at all levels, from the personal to the global, and allows comparisons within and between levels
- Useful as an analytical tool—prompts questions about how best to live lightly, for example, urban vs. rural, homegrown vs. mass produced food
- Encourages thinking for new possibilities, approaches, analyses, especially for business—encourages quality over quantity

### Comments



*The value here is not so much as a quantitative tool, but as a qualitative statement: It takes a finite amount of land to support you and—guess what—the number of acres on the planet is finite. That’s a concept that many of our leading economists, for example, haven’t grasped.*

—Sascha von Meier

*Its value lies not in its ability to be used as an analytical tool but as a metaphor that allows people to visualize. For all its shortcomings, it is a really valuable way for people to see what it is they are doing, and that’s hard to come by.*

—David Stokes



## WEAKNESSES OF THE ECOLOGICAL FOOTPRINT

*(Some contradict the above strengths)*

### Highlights

- Difficult language, complex calculation, difficult to follow how numbers are derived
- Reliance on too many assumptions—generalizations upon generalizations
- Hard to grasp the notion of using more planets than we have—where are the resources coming from?
- Using acres is scientifically problematic. Scientists seemed to agree that energy would be superior to land as a common denominator for consumption. However, metaphorically, energy is inferior because it is more abstract.
- Incomplete and humancentric—leaves out other species and issue of overall size of human population
- Overall message pessimistic—it may do more harm than good
- Measures are insensitive to small changes at the individual level, e.g., not buying a new car, not having children, riding a bike to work, and also at larger level, e.g., Sonoma County’s level of recycling
- Not usable for analysis or policy
- Lacks reference to context and society’s overall goals—misses effect over time of consumption and growth
- Too much reliance on the web—many people don’t use or have access

### Comments

*One weakness is not knowing if we’re dealing with accurate data.*—Patricia Robles-Mitten



*When you come out with this Footprint and how many Earths it will take if everybody lives like I do, people will ignore that last little phrase and say, ‘It takes five Earths to do what we’re doing? Wait a minute! We’re doing what we’re doing on one Earth, so obviously it’s all working. What’s wrong with this model?’ That relates to the Third World issue, and that’s a hard leap for people to make.*—Sascha von Meier

*It’s supposed to be an impact on the planet, but it really is our impact on ourselves. That is, it indicates sustainability for humans. If you think about sustainability for nature and natural systems, it leaves a lot out. It does not include the effects of our actions on natural ecosystems or the other species with whom we share the planet.*—Dave Stoke

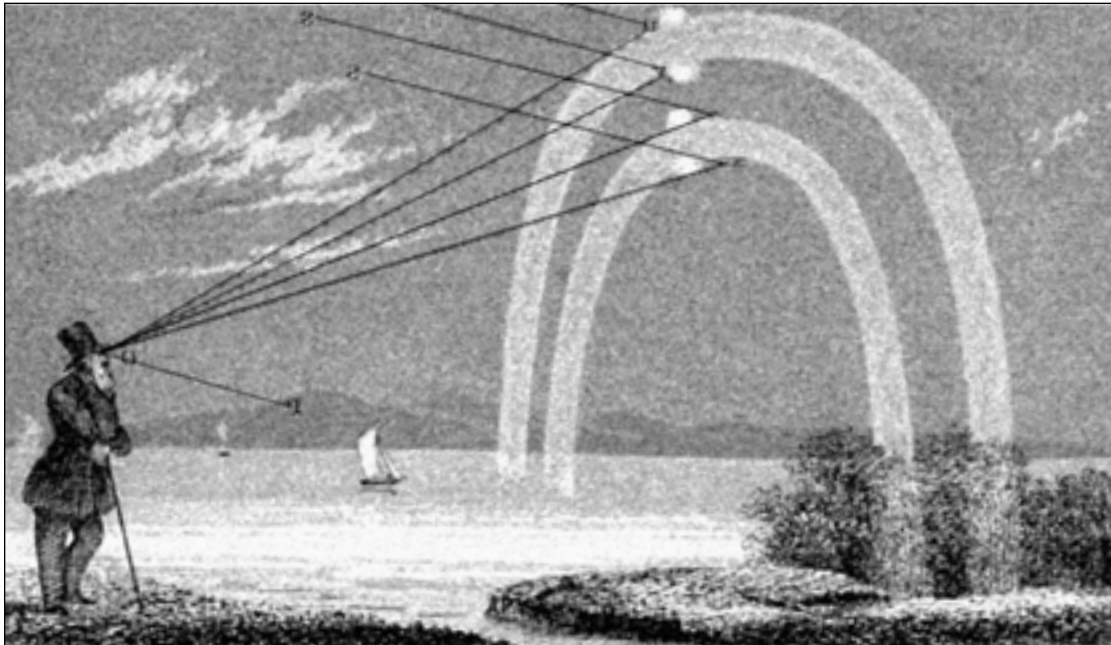


*Consumption is just one piece of other issues going on in the world.*—Jennifer Yankovich

*Looking at it at a point in time takes it out of context, and that context is growth.*—Fred Euphrat



## RECOMMENDATIONS AND APPLICATIONS



ENVISION *the* POSSIBILITIES

### Comments

*To get this idea accepted, the Ecological Footprint needs to become more of a household term. On the bottom of water and energy bills could be a little footprint with a message about how big the person's footprint is.*—Jennifer Yankovich



*I foresee that we'll look at business plans, and at the bottom line along with profits we'll see an entry that says, 'What is the Ecological Footprint?'*  
—Patricia Robles-Mitten

*The public needs to know that the Third World is supporting us. People talk about foreign aid and charity. In fact, the flow is from there to here. The next thing they need to know is that six billion people is not sustainable.*—Gary Anderson



*To counteract the feeling of 'Oh my God, this is undoable!' we need to offer very specific models of places that are getting it right.*—George Freund

### Highlights

- Keep improving it—better language, more rigorous and clear science
- Determine what questions we are trying to answer, and what are the actionable items
- Offer positive, tangible examples and suggestions at all levels—individual, community, country
- Incorporate effects on other species
- Utilize marketing tools and more than the web to disseminate information
- Don't water down the message to make it more palatable
- Put in context—growth, population, society's overall goals
- Outreach through schools, churches, business, large assemblies of people

## INSPIRING EXAMPLES



**Here are some inspiring examples that can help bolster our vision of what is possible.**

- Europeans and the Japanese on average live on about half the resources that we do, yet their health and education levels are at least as high as ours. Large resource use does not appear to correlate with a high quality of life.

### Size of Footprint vs Quality of Life— U.S. & France Compared

	Footprint—acres	Years of life expectancy—male	Years of life expectancy—female	Child mortality - deaths per 1000	Average number of years of formal schooling
<b>France</b>	13	75.2	82.8	5	15.5
<b>U.S.</b>	24	74.6	80.4	7	15.5

- Participants in the Global Living Project in British Columbia reduced their Footprint to 4 acres per person on average.
- Fertility rates are dropping worldwide. Women in 1990 had 3.7 children on average, and 2.7 in 2001.
- The rate of population increase is slowing. In 1989, 87 million people were added to the Earth's population. In 2000, 77 million people were added.
- 535 cities and counties around the world—130 of them in the U.S., 5 of them in Sonoma County—are committed to protecting climate by reducing their greenhouse gas emissions.
- Students in Yugoslavia led a resistance movement that, after many years, toppled President Milosevic. Satire was one of their winning strategies.
- The Berlin wall came down in 1989, marking the end of the long and terrifying cold war.
- Sundsvall, Sweden, has pledged to become a completely sustainable society by 2020.
- Calgary built North America's first wind-powered mass transit system since sail boats, called "Ride the Wind." The system eliminates 26,000 tons of carbon dioxide emissions annually.
- Slavery was abolished in the U.S. in 1865.

***When we want to, we can make significant changes in all kinds of areas.***

*For example, with smoking, people in education, advertising, and a lot of other areas decided we were going to reduce. There was certainly well-financed opposition, and yet a dramatic change took place in a relatively short period of time. In other areas we have made progress, too. The Napa River now is far cleaner than when I was a kid. It wasn't long ago that no town in the Bay Area had any sort of recycling.*  
—Rev. Marvin Bowers

***Many believe that it takes a crisis to bring about change. This is only a belief, and it prevails only when there is an atrophy of vision. (paraphrase) —Peter Senge***

- Women won the right to vote in the U.S. in 1920.
- Where environmental and economic needs conflict, 57% of Americans side with environmentalism, according to a Gallop poll.
- In Alachua County, Florida, bus ridership increased from 1.3 to 2.3 million trips in one year when the County, to improve air quality and decrease traffic congestion, offered free passes.
- Smoking declined 52 percent in California in 11 years, from an average of 126.6 packs per person per year in 1988 to 61.3 packs in 1999.
- Californians reduced their energy consumption by about 10 percent in 2001.
- In 1990 Sonoma voters overwhelmingly passed a tax measure to preserve agriculture and open space.
- Sonomans prevented PG&E from building a nuclear power plant on the San Andreas fault line, and led a successful movement to protect the California coastline from development.
- Eight of Sonoma's nine cities have urban growth boundaries.

***Obstacles are those frightful things you see when you take your eyes off your goal.—Henry Ford***

## FEAR OF FOOTPRINT & OTHER FEELINGS

*Attitude affects everything in life. It does not have to become overwhelming. We can just do our piece of it.*

—Patricia Robles-Mitten

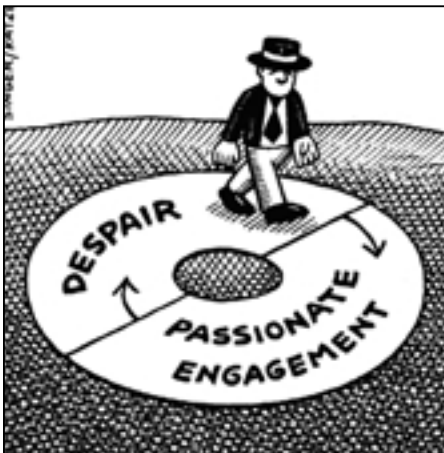
**M**any people experience a “fear of footprint” when they think about their impact on the Earth. Other common responses are sadness, powerlessness, apathy, avoidance, anxiety, shock, anger, and guilt.

Emotions are not just an interesting sideshow on the road to a sustainable world. They may be the key for accessing solutions. The science and technology needed to create a sustainable world exist, and have for a long time. Missing are answers to questions, such as:

- Where do we find the courage and endurance to work for change?
- How do we generate the political will to implement what we know is needed?
- How do we communicate about the issues on which the long term survival of humankind depends?

The painful feelings that often arise when considering our relationship with the Earth are appropriate and actually serve a vital function. Just as we reflexively yank our finger from a burning flame, or cry over the death of a loved one, we may also experience pain for the Earth, our home, when we witness its destruction.

*Pain is not an evolutionary error.* —Mathis Wackernagel



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THE SCREAM—DETAIL, BY EDVARD MUNCH, 1893

**P**ain for the world is evidence of our interconnectedness in the web of life. In our culture, feelings for the larger web of life are often trivialized and ignored. They often don't suit the prevailing mindset that says, “The bottom line matters above all else. Environmentalists are idealistic dreamers. More is better!” Pain can be suppressed through drugs and other distractions, or it can become fuel for courage and action.

For more about this topic, please see “Coming Back to Life,” noted in the Resources section of this report. Also, Sustainable Sonoma County offers education sessions where participants learn about and explore their relationship with the Earth, including their emotional responses.

*I wanted you to see what real courage is...It's when you know you're licked before you begin, but you begin anyway and you see it through no matter what.*

—Atticus Finch to his son in *To Kill a Mockingbird*

# MEASURING YOUR PERSONAL ECOLOGICAL FOOTPRINT

**R**edefining Progress & Earth Day Network's Ecological Footprint Quiz below helps approximate how much land and water area supports an individual's consumption and lifestyle. Answers in italics represent responses for the average U.S. resident. By taking this quiz on the web, [www.myfootprint.org](http://www.myfootprint.org), an online version will compute the size of your Ecological Footprint so that it can be compared with others.

## FOOD

### 1. How often do you eat animal based products? (beef, pork, chicken, fish, eggs, dairy products)

- Never (vegan)
- Infrequently (no meat, and eggs/dairy a few times a week) (strict vegetarian)
- Occasionally (no meat or occasional meat, but eggs/dairy almost daily)
- Often (meat once or twice a week)
- Very often (meat daily)*
- Almost always (meat and eggs/dairy in almost every meal)

### 2. How much of the food that you eat is processed, packaged and not locally grown (from more than 200 miles away)?

- Most of the food I eat is processed, packaged, and from far away
- Three quarters*
- Half
- One quarter
- Very little. Most of the food I eat is unprocessed, unpackaged and locally grown.

## GOODS & SHELTER

### 3. Compared to people in your neighborhood, how much waste do you generate?

- Much less
- About the same*
- Much more

### 4. How many people live in your household?

- 1 person
- 2 people
- 3 people*
- 4 people
- 5 people
- 6 people
- 7 or more people

### 5. What is the size of your home?

- 2500 square feet or larger
- 1900-2500 square feet
- 1500-1900 square feet
- 1000-1500 square feet*
- 500 -1000 square feet
- 500 square feet or smaller

### 6. Which housing type best describes your home?

- Free standing without running water
- Free standing with running water*
- Multi-story apartment building (*continued above*)

- Row house or building with 2-4 housing units
- Green-design residence

### 7. Do you have electricity in your home?

- No
- Yes
- Yes, with energy conservation and efficiency

## MOBILITY

### 8. On average, how far do you travel on public transportation each week (bus, train, subway or ferry) ?

- 200 miles or more
- 75-200 miles
- 25-75 miles
- 1-25 miles*
- 0 miles

### 9. On average, how far do you go by motorbike each week (as a driver or passenger)?

- 200 miles or more
- 75-200 miles
- 25-75 miles
- 1-25 miles
- 0 miles*

### 10. On average, how far do you go by car each week (as a driver or passenger)?

- 400 miles or more
- 300-400 miles
- 200-300 miles*
- 100-200 miles
- 10-100 miles
- 0-10 miles

### 11. Do you bicycle, walk, or use animal power to get around?

- Most of the time
- Sometimes*
- Seldom

### 12. Approximately how many hours do you spend flying each year?

- 100 hours
- 25 hours
- 10 hours
- 3 hours*
- Never fly

### 13. How many miles per gallon does your car get?

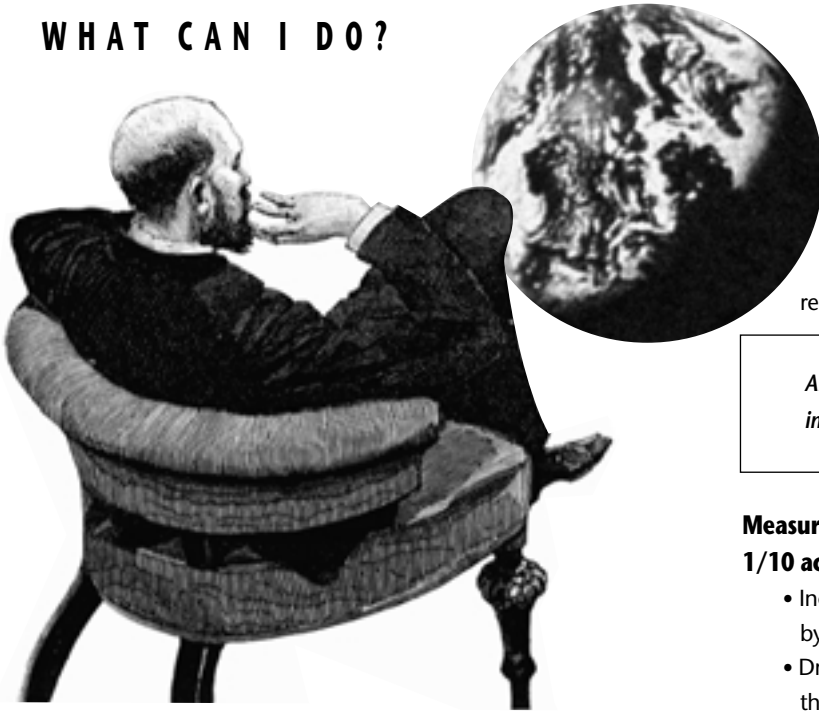
- More than 50 miles per gallon
- 35-50 miles per gallon
- 25-35 miles per gallon
- 15-25 miles per gallon*
- Fewer than 15 miles per gallon

### 14. How often do you drive in a car with someone else, rather than alone?

- Almost never
- Occasionally (about 25%)*
- Often (about 50%)
- Very often (about 75%)
- Almost always

NOTE: Online questionnaire includes 2 more questions for motorbike users.

## WHAT CAN I DO?



*What are alternatives to our consumption, especially after 9-11 when the President is telling us it's our patriotic duty to spend more, consume more?—Davin Cardenas*

**H**ere, in order, are the individual consumer actions that most lighten one's impact on the environment, ranked by researchers at the Union of Concerned Scientists.

### TRANSPORTATION

1. Choose a place to live that reduces the need to drive.
2. Think twice before purchasing another car.
3. Choose a fuel-efficient, low polluting car.
4. Set a concrete goal for reducing your travel. Go on a gaso-line diet.
5. Walk, bicycle, carpool or take public transit whenever you can.

*Never mind PAPER OR PLASTIC bags. How did you get to the store?—Donella Meadows, author and scientist*

### FOOD

6. Eat less meat. Meat production is harder on the environment than any other food.
7. Buy certified organic and locally-grown food when possible.

### HOUSEHOLD OPERATIONS

8. Don't rent or buy more house than you need.
9. Upgrade your heating and hot-water efficiency.
10. Install energy efficient lighting and appliances.
11. If possible, choose an electricity supplier offering renewable energy.

*Anything you do will seem insignificant, but it is very important that you do it. —Gandhi*

### Measures to Lighten Up

#### 1/10 acre

- Increase the amount of organically grown food that you eat by 50%
- Dry 12 loads of laundry per month on the clothesline rather than an electric or gas dryer
- Shower 3 minutes less per day

#### 1/5 acre

- Increase the amount of locally grown food that you eat by 50%
- Keep the thermostat set 5 degrees lower during the heating season

#### 1/3 acre

- Increase the amount of unprocessed and unpackaged food you eat by 50%
- Fly 5 hours less per year
- Drive 20 miles less per week

#### 1/2 acre

- Substitute one meat dinner a week with a vegetarian alternative

#### 1 acre for 1 year

- Postpone having a child for one month

*I find myself thinking more about my Ecological Footprint and realize how much more I can control. Now when I run water, I hear it and turn it off much more quickly. I read my own water and electricity meters. I know exactly what my mileage is. —Patricia Robles-Mitten*

More strategies for reducing your Footprint are offered in "Take Action," a section following the Ecological Footprint quiz at [www.myfootprint.org](http://www.myfootprint.org)

## WHAT CAN I DO? — continued from page 17

### Three additional actions deserve emphasis.

The first is **CONVERSATION**. Talk is not cheap. Social transformation happens through conversation—the power of our words. Through speaking we break down social taboos that inhibit us from talking about things that matter. Through speaking we spread new ideas and inspire others.



*In social settings I found myself starting to engage in conversations asking, "Do you know what your Ecological Footprint is?"*

—Patricia Robles-Mitten

Second are **REPRODUCTIVE CHOICES**. Delaying and reducing the numbers of children we have helps slow and shrink our population. Collectively this can have an immense, positive impact. Similarly, support for family planning programs empowers others to have children by choice.

### WORLD POPULATION

Year	Population (in billions)
1800	1.0
1900	1.7
2000	6.1
<b>2100: Possible scenarios</b>	
• with one-child families	1.4
• with two-child families	8.7
• at year 2001 growth rate	22.2

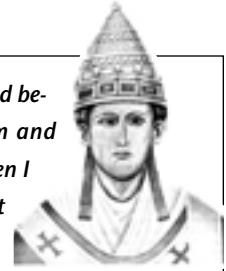
NOTE: 1 billion = 1,000 million = 1,000,000,000

Third, it is critical to help enact **SYSTEM-WIDE CHANGE** so that living in an Earth-friendly way is common and easy instead of noble and tedious. Many ways to influence the larger system exist, for example, voting for those who hold public office, voting with our dollars when we shop, writing letters to the editor, and lobbying for legislation.

*It is individuals who change societies, give birth to ideas; who, standing out against tides of opinion, change them.*

—Doris Lessing

*It often happens that I wake at night and begin to think about a serious problem and decide I must tell the Pope about it. Then I wake up completely and remember that I am the Pope.* —Pope John XXIII



### System-wide actions a community can take to reduce its Ecological Footprint and enhance its livability include

- Encourage walkable, mixed use development with nearby public transportation, stores, schools, offices, and entertainment—to minimize sprawl and the need to drive.
- Reduce the need for car transportation through infrastructure changes like better public transit and bike lanes.
- Offer incentives for green building.
- Mandate that renewable energy sources comprise a certain proportion of the community's power.
- Establish a farmer's market to improve access to local, organic produce and reduce the transportation footprint of food.
- Support urban gardens, plant trees, and protect agriculture and open space.
- Integrate natural waste-treatment systems such as wetlands into sewage treatment methods.
- Encourage businesses and regional, state, and national governments to do the same as the above

*One thread running through the focus groups was the need to give people hope by suggesting actions within their individual control. But another thread was that even when one's life habits are severely adjusted, there is little change in footprint. This is because one's individual power is severely constrained by the built environment.*



*As an example, only when lots of people work together can a better system of public transportation come about. And it still takes quite awhile.*

*The best example of successful collective action that I know of comes from Zurich. Within about 20 years, they built a system that has one of the highest utilization rates in the world. They did it in a way quite unlike anything yet tried in the U.S.*

—Joel Woodhull

## RESOURCES



### ORGANIZATIONS

**SUSTAINABLE SONOMA COUNTY** [www.sustainablesonoma.org](http://www.sustainablesonoma.org)  
A learning and action community that connects, inspires, and empowers people to align their thinking and action with their deep need for a life-affirming and sustainable world.

**REDEFINING PROGRESS** [www.redefiningprogress.org](http://www.redefiningprogress.org)  
A nonprofit, nonpartisan public policy organization that seeks to ensure a more sustainable and socially equitable world for our children and our children's children.

**SUSTAINABLE NORTH BAY** [www.sustainablenorthbay.org](http://www.sustainablenorthbay.org)  
A partnership of individuals, local governments, colleges, business leaders, community groups and nonprofit organizations in the San Francisco North Bay counties of Napa, Marin and Sonoma.

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
[www.epa.gov](http://www.epa.gov)  
The U.S. agency whose purpose is to protect human health and safeguard the natural environment.

**WORLD-WIDE FUND FOR NATURE (WILDLIFE FUND IN THE U.S.)**  
[www.panda.org](http://www.panda.org)  
This organization produces the Living Planet Report that describes human impact on Earth's natural ecosystems.

### BOOKS

*Our Ecological Footprint; Reducing Human Impact on the Earth*, Mathis Wackernagel and William Rees, New Society Publishers, 1996. Describes and discusses this innovative tool. [www.newsociety.com](http://www.newsociety.com)

*Sharing Nature's Interest: Ecological Footprints As An Indicator Of Sustainability*, Nicky Chambers, Craig Simmons and Mathis Wackernagel, Stylus Publishing, 2001. Provides more Footprint examples. <http://styluspub.com/books/>

*The Consumer's Guide to Effective Environmental Choices*, Michael Brower and Warren Leon for The Union of Concerned Scientists, Three Rivers Press, 1999. Prioritizes and describes the actions consumers can take to reduce their impact on the environment. [www.ucsusa.org](http://www.ucsusa.org)

*Better Not Bigger: How to Take Control of Urban Growth and Improve Your Community*, Eben Fodor, New Society Publishers, 1999. Explodes common myths about growth and recommends citizen action. [www.newsociety.com](http://www.newsociety.com)

*Coming Back To Life: Practices to Reconnect Our Lives, Our Worlds*, Joanna Macy and Molly Young Brown, New Society, 1998. Describes the need and methods for moving one from apathy to compassion, from alienation to connection. [www.newsociety.com](http://www.newsociety.com)

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Many more resources are available at the websites shown above.

To join an Ecological Footprint online discussion group, Send a blank email to: [footprints-subscribe@yahoogroups.com](mailto:footprints-subscribe@yahoogroups.com)

For more about Zurich's transportation success, visit: <http://transweb.sjsu.edu/pubs.htm>

*Is the footprint a bad thing? A sustainable thing? A renewable thing? I don't know if it's like a building footprint that is taken out forever, or if it's like a Sierra Club footprint where the grass springs back the moment we walk past. I hope that the grass springs back.—Fred Euphrat*



## SCIENCE FOCUS GROUP



(l to r) David Stokes, George Freund, Richard Walker, Alexandra "Sascha" von Meier, Gary Anderson, Ai-Chu Wu, Fred Euphrat

### **Gary Anderson**

Instructor in Geography and Environmental Science, Santa Rosa Junior College. B.S. in Physics. M.A. in Science Education and Public Policy. M.A. in Geography. Experience with geography and environmental science textbook development, demography education materials, redwood conservation projects.

### **Fred Euphrat**

Owner, Forest, Soil, and Water, consultants in forestry, hydrology, and environmental restoration. Ph.D. in Forestry and Hydrology. Author, *Sonoma Mandala*. Radio Commentator, *Native Sonoma*, a weekly program on KRCB. Recently ran for Supervisor of Sonoma County's Fourth District.

### **George Freund**

Instructor, Philosophy Department, Santa Rosa Junior College, since 1982, with a specialty in environmental philosophy. B.A. in Sociology. M.A. in Philosophy. Coordinator of Environmental Forum, SRJC.

### **David Stokes**

Assistant Professor in the Department of Environmental Studies and Planning, and Adjunct professor, Biology Department, Sonoma State University. B.A. in Geology. Ph.D. in Zoology. Maintains active research in the fields of conservation biology, behavioral ecology, and avian ecology.

### **Alexandra "Sascha" von Meier**

Assistant Professor in the Department of Environmental Studies and Planning, and Director of the Environmental Technology Center, Sonoma State University. B.A. in Physics, Ph.D. in Energy & Resources. Has researched energy technology and policy, mainly electric power: photovoltaic systems, power distribution, operational culture of nuclear power plants, and the electric utility industry.

### **Richard Walker**

Environmental Scientist with the California Department of Forestry and Fire Protection working on the North Coast Watershed Assessment Program. Ph.D. in Geography. Dr. Walker has worked on spatial systems for ecological monitoring. He has also worked as an assistant professor in Wisconsin, conservation program director in Montana, researcher for NASA, and served in the Peace Corps in Morocco.

### **Ai-Chu Wu**

Instructor, Math Department, Sonoma State University. M.P.H. in Biostatistics. Ph.D. in Population Ecology. Founder, Ai-Chu Wu, Ph.D., Statistical Consulting. Dr. Wu has worked as a Quality Program Manager and Senior Quality and Statistical Consultant for Hewlett-Packard, and as Senior Programmer Analyst for the San Francisco Health Department.

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## COMMUNITY LEADER FOCUS GROUP

### **Reverend Marvin Bowers**

Minister of Saint Paul's Episcopal Church, Healdsburg. B.A. in English. Masters in Divinity. Episcopal Parish Priest in Napa and Sonoma County for over 30 years. Participated in various community service and advocacy ministries in shelter, housing, food, drug, and alcohol recovery.

### **Davin Cardenas**

Sonoma State University student in Hutchins Program. Chair of MECHA, Movimiento Estudiantil Chicano de Aztlan.

### **Eric Koenigsfhofer**

Attorney specializing in land use with the firm Perry, Johnson, Anderson & Miller. Former member of the Sonoma County Board of Supervisors and the California Coastal Commission.

### **Patricia Robles-Mitten**

Serves on the Southwest Community Health Center Board. B.A. & M.A. in Psychology. Retired after 31 years as District Manager for Pacific Bell and AT&T. Community boards include the National Women's History Project, the Santa Rosa Junior College Foundation, and the United Way. Recipient of many awards including SSU Distinguished Alumni (1995), and the Cesar Chavez UFW Award (1994).

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**Sister Michaela Rock**

President and Founder of St. Joseph’s Centers for Social Change. Founder of the Southwest Health Center in Santa Rosa. A member of the Catholic order of Sisters of St. Joseph of Orange. Sr. Michaela is a former schoolteacher and principal, and also worked 30 years in hospital administration.

**Jennifer Yankovich**

Executive Director, Sonoma Valley Area Chamber of Commerce. B.S. in Agricultural Economics. Ms. Yankovich has worked for about 8 years in the public sector, including 3 years as Community Development Manager for the County of Sonoma.



(l to r) Davin Cardenas, Reverend Marvin Bowers, Sister Michaela Rock, Jennifer Yankovich, Patricia Robles-Mitten, Eric Koenigsfhofer

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## ECOLOGICAL FOOTPRINT PROJECT TEAM



(l to r) Ann Hancock, Joel Woodhull, Margaret Pennington, Diana Deumling, Amy Wingfield.  
*See photo of Mathis Wackernagel on page 4.*

**Margaret Pennington**

Chair, Sierra Club Redwood Chapter. B.A. in Social Science. B.S. in Mathematics with Economics minor. Former research analyst and statistician at Agilent.

**Mathis Wackernagel**

Director, Sustainability Program, Redefining Progress. Coordinator, Center for Sustainability Studies at Anahuac University, Mexico. Co-creator of the Ecological Footprint. Author and contributor to academic articles and books, including *Our Ecological Footprint*. Ph.D. in Planning.

**Diana Deumling**

Research Associate, Redefining Progress. B.S. in Environmental Science, M.S. in Conservation Ecology and Sustainable Development specializing in agricultural ecology. Previously worked at the Institute for Food and Development Policy and the Center for Urban Education about Sustainable Agriculture.

**Ann Hancock**

Project Coordinator, Sustainable Sonoma County. Journalist. B.S. in Applied Behavioral Sciences. M.P.H. in Administration and Planning. 20 years in community organizing, planning, and project development.

**Amy Wingfield**

Student in Environmental Studies and Political Science, Sonoma State University. Serves as Associated Students Representative for the School of Social Sciences.

**Joel Woodhull**

Chairman, Sonoma County Transportation/Land-use Coalition. B.S. & M.S. in Engineering. Ph.D. in Transportation Engineering. Over thirty years of professional and managerial experience.

***What readers are saying about the...***

REPORT ON THE  
  
**ECOLOGICAL FOOTPRINT PROJECT**

**I** recommend reading this report. It introduces Sonoma County to the Ecological Footprint, a tool that helps raise awareness about our impact on nature's resources.—Tim Smith, Sonoma County Supervisor

**C**alifornia's population is currently at 35 million and increasing by more than 5 million a decade. The impact of increased growth on our communities and our environment has not yet been fully addressed. What can we do to preserve our natural surroundings and prepare for growth of this magnitude? This should be the basic question underlying our public policy making.

For the first time, we have a tool—the Ecological Footprint—that measures the relationship among population, environmental resources, and consumption. This powerful tool should be used by all policy makers in addressing the multiple and complex issues we face as a state, a nation, a world.

This report is a must read.—Patty Berg, Democratic Candidate for the 1st Assembly District

**T**he Ecological Footprint calculation opens up the whole can of worms that is our culture's struggle with the concepts of growth, economic productivity, value, and equity in a world whose physical and biological resources we are beginning to recognize as fundamentally limited.

We should think of it not as a judgment, but as an inspiration. The Footprint concept gives us occasion to contemplate growth and progress in terms of quality rather than quantity—an absolutely necessary transition for economic thinking in the 21st century.

This report does an excellent job of exposing key ideas and engaging the reader in what is bound to become the vital debate of our time.—Alexandra von Meier, Professor in Energy and Resources, Sonoma State University

**T**he Ecological Footprint offers us a mirror with which to view ourselves in light of the carrying capacity of the Earth. As a metric, it helps us gage our activities in relation to others and to the ability of the Earth to support us. Perhaps most importantly it can serve as a point of departure to stimulate dialogue among us about how to begin to address our most pressing local environmental concerns.—Richard Walker, Environmental Scientist, Calif. Department of Forestry & Fire Protection

**I** foresee that we'll look at business plans, and at the bottom line along with profits we'll see an entry that says, "What is the Ecological Footprint?"—Patricia Robles-Mitten, District Manager for Pacific Bell and AT&T (retired)

**You** can get a real "ah-ha" when you do your own calculation.—David Stokes, Professor in the Department of Environmental Studies and Planning, Sonoma State University