

Ecological Footprint : Overview

The Ecological Footprint is a resource management tool that measures how much land and water area a human population requires to produce the resources it consumes and to absorb its wastes under prevailing technology.

In order to live, we consume what nature offers. Every action impacts the planet's ecosystems. This is of little concern as long as human use of resources does not exceed what the Earth can renew. But are we taking more?

Today, humanity's Ecological Footprint is over 23% larger than what the planet can regenerate. In other words, it now takes more than one year and two months for the Earth to regenerate what we use in a single year. We maintain this overshoot by liquidating the planet's ecological resources. This is a vastly underestimated threat and one that is not adequately addressed.

By measuring the Ecological Footprint of a population (an individual, a city, a nation, or all of humanity) we can assess our overshoot, which helps us manage our ecological assets more carefully. Ecological Footprints enable people to take personal and collective actions in support of a world where humanity lives within the means of one planet.

The Challenge and the Goal: *Sustainability*

Sustainability is a simple idea. It is based on the recognition that when resources are consumed faster than they are produced or renewed, the resource is depleted and eventually used up. In a sustainable world, society's demand on nature is in balance with nature's capacity to meet that demand.

When humanity's ecological resource demands exceed what nature can continually supply, we move into what is termed [ecological overshoot](#). According to a report by the World Resources Institute, the United Nations Environment Programme, the United Nations Development Programme, and the World Bank, [World Resources 2000-2001, People and Ecosystems: The Fraying Web of Life](#), in addition to the growing depletion of non-renewable resources such as minerals, ores and petroleum, it is increasingly evident that renewable resources, and the ecological services they provide, are at even greater risk. Examples include collapsing fisheries, carbon-induced climate change, species extinction, deforestation, and the loss of groundwater in much of the world.

We depend on these ecological assets to survive. Their depletion systematically undermines the well being of people. Livelihoods disappear, resource conflicts emerge, land becomes barren, and resources become increasingly costly or unavailable. This depletion is exacerbated by the growth in human population as well as by changing lifestyles that are placing more demand on natural resources.

Our Approach to Sustainability: *Resource Accounting*

Keeping track of the compound effect of humanity's consumption of natural resources and generation of waste is one key to achieving sustainability.

As long as our governments and business leaders do not know how much of nature's capacity

we use or how resource use compares to existing stocks, overshoot may go undetected - increasing the ecological deficit and reducing nature's capacity to meet society's needs.

The Ecological Footprint is a resource accounting tool used to address underlying sustainability questions. It measures the extent to which humanity is using nature's resources faster than they can regenerate. It illustrates who uses how much of which ecological resources, with populations defined either geographically or socially. And, it shows to what extent humans dominate the biosphere at the expense of wild species.

The Ecological Footprint clarifies the relationship of resource use to equity by explicitly tying individuals' and groups' activities to ecological demands. These connections help decision makers more accurately and equitably shape policy in support of social and environmental justice.

Continued overshoot is not inevitable. The Ecological Footprint provides a systematic resource accounting tool that can help us plan for a world in which we all live well, within the means of our one planet.

Humanity's Footprint 1961-2002

Ecological Footprint accounts estimate how many Earths were needed to meet the resource requirements of humanity for each year since 1961, when complete UN statistics became available. Resource demand (Ecological Footprint) for the world as a whole is the product of population times per capita consumption, and reflects both the level of consumption and the efficiency with which resources are turned into consumption products. Resource supply (biocapacity) varies each year with ecosystem management, agricultural practices (such as fertilizer use and irrigation), ecosystem degradation, and weather.

This global assessment shows how the size of the human enterprise compared to the biosphere, and to what extent humanity is in ecological overshoot. Overshoot is possible in the short-term because humanity can liquidate its ecological capital rather than living off annual yields.

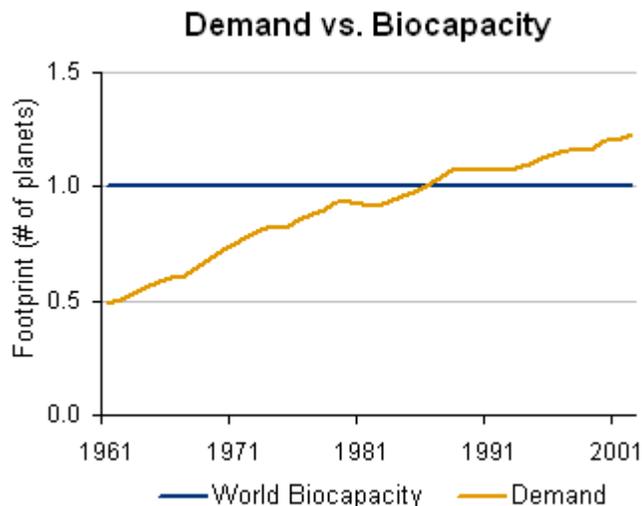


Figure 1 shows the ratio between the world's demand and the world's biocapacity in each year, and how this ratio has changed over time. Expressed in terms of "number of planets," the biocapacity of the Earth is always 1 (represented by the horizontal blue line). This graph

shows how humanity has moved from using, in net terms, about half the planet's biocapacity in 1961 to over 1.2 times the biocapacity of the Earth in 2002. The global ecological deficit of 0.2 Earths is equal to the globe's ecological overshoot.

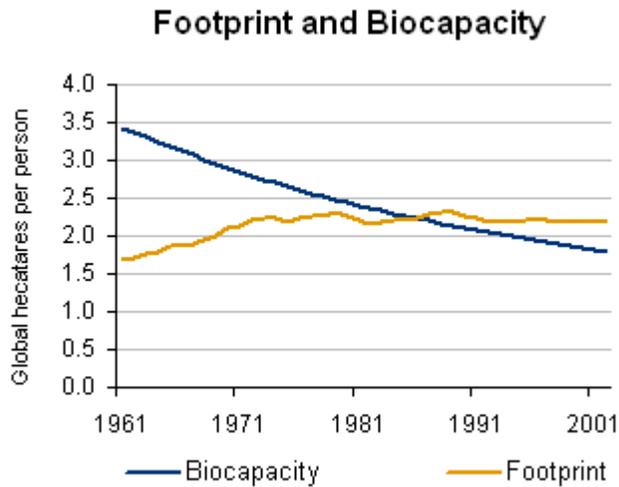


Figure 2 tracks, in absolute terms, the world's average per person Ecological Footprint and per person biocapacity over a 40-year period.

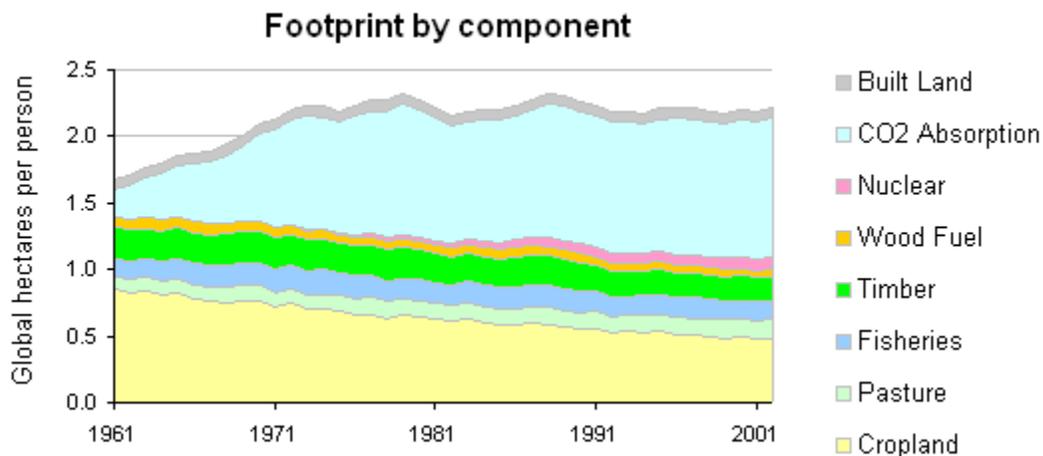


Figure 3 shows the components of the world's average per person Ecological Footprint.

National Footprints

The 2005 National Footprint Accounts use over 4,000 data points per year to calculate each country's demand on nature and to assess its biological capacity. National Footprint Accounts currently exist for over 150 countries in [hectares](#) and [acres](#), for each year from 1961 to 2002. Totalling the national Footprints of each country provides us with the [global analysis](#).

A nation's consumption is calculated by adding imports to and subtracting exports from national production. Results from this analysis shed light on a country's ecological performance. For example, the National Footprint Accounts identify whether or not a country's Ecological Footprint exceeds its [biological capacity](#). A country has an [ecological reserve](#) if its Footprint is smaller than its biological capacity. Otherwise it runs an [ecological deficit](#).

Today, most countries, and the world as a whole, are running ecological deficits. The world's ecological deficit is equal to its ecological [overshoot](#).

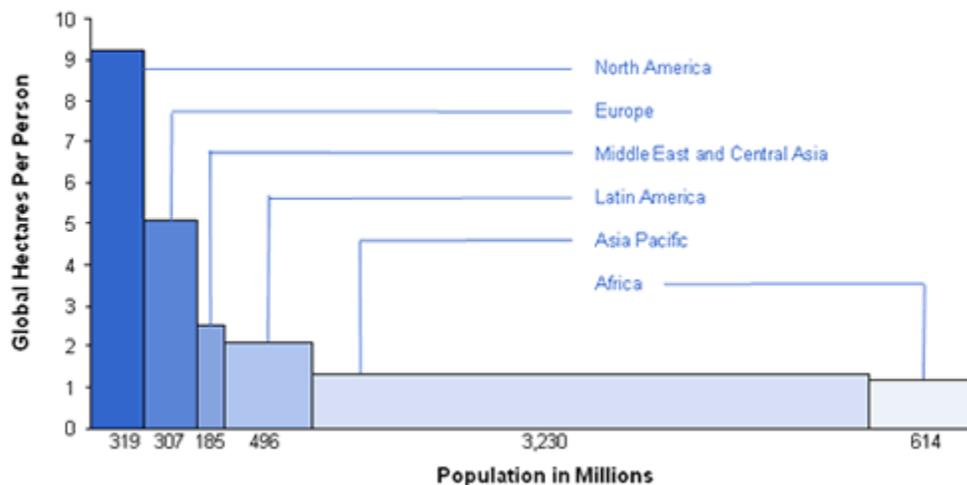
While countries can offset ecological deficits through trade or liquidation of national resources, the global ecological deficit cannot be offset through trade. In 2002, humanity's Footprint exceeded the Earth's biological capacity by over [20 percent](#).

National Footprint analyses are the most accurate of all Ecological Footprint assessments because complete trade statistics are available at the national level and because national analysis does not require data on consumer behaviour or final use of resources within the country; all that is required is data on aggregate final demand.

The footprints of nations and their biological capacity can be directly compared because resource flows are translated into a common unit of biologically productive area, "[global hectares](#)" (or "global acres"). A global hectare is the average per hectare regenerative capacity of all the planet's biologically productive surfaces. Currently, the planet has approximately 11.3 billion hectares (27.9 billion acres) of biologically productive land and sea surfaces.

REGIONAL FOOTPRINT ANALYSIS

Footprints vary widely by region. Global Footprint Network, with its partner WWF International have published reports for [Europe](#) and [Asia](#), with a report for Africa planned for 2006.



SCIENTIFIC DEVELOPMENT

[Global Footprint Network](#) serves as the steward of the National Footprint Accounts and continuously reviews them to ensure that the accounts are based on current data and reflect the broadest scientific consensus. This allows the Footprint community and all Footprint users to build comparable applications, based on the most robust national data available.

Assessments at the "subnational level" (for cities, etc.) build on conversion factors derived from the National Footprint Accounts. Currently, Global Footprint Network is working with the Footprint community to develop [standards](#) for all sub-national Ecological Footprint assessments.

ACCESSING NATIONAL ACCOUNTS

The most recent summary data for 150 countries is available here as expressed in [acres](#) or [hectares](#) and can be [downloaded](#) as a spreadsheet. National Footprint accounts are updated annually based on the latest complete data sets available, which usually entails a time lag of about three years. Summary results are also published in a number of other places, including WWF's [Living Planet Reports](#) and on the website of the [European Environment Agency](#). More detailed results for any individual country or year, as well as time trend data, are available from [Global Footprint Network](#)

Results Page (acres version)

National calculations assess a country's demand on nature (Footprint) and the country's access to biological capacity (biocapacity). A country has an ecological reserve if its domestic biocapacity exceeds its Ecological Footprint. If Footprint exceeds biocapacity, the country has an ecological deficit.

Select results from the 2005 National Footprint Accounts are reported below (or [Download](#) these tables as an Excel file).

Sustainable Consumption & The Ecological Footprint

Apr 22, 2004

by Jason Venetoulis

In order to live, people consume natural resources. This isn't bad if our use of resources stays within the earth's capacity to renew and regenerate indefinitely. Are we taking more than we should? In the *Living Planet Reports 2000* and *2002*, WWF International and Redefining Progress documented that humanity's **Ecological Footprint** has breached the limits of environmental sustainability by 15%.

The updated 2004 Footprint of Nations released in March concludes the situation remains unchanged except that the United States has become the country with the largest per capita Ecological Footprint.

What is an Ecological Footprint?

The Ecological Footprint is a tool that measures the land area required to support an individual, business, community or nation, providing for its needs and absorbing its wastes. Six factors are measured to produce a footprint: energy use, grazing land, pastureland, fisheries, built land and forests.

Sustainability requires living within the regenerative and absorptive capacity of the planet. As a corollary, a sustainable business operates from income - it doesn't liquidate capital. In this situation, we are drawing down the Earth's natural capital and flooding nature's absorptive sinks. This leaves less nature for future generations of all life, and is unsustainable.

How big is our Ecological Footprint?

Humanity's collective Ecological Footprint breached the sustainability mark in the late 1970s. By 2000, the ecological deficit reached nearly 1 acre per person or 9 million square miles.

In 2000, humanity's total Ecological Footprint increased to 13.2 billion global hectares (33 billion acres), growing by 147 million global hectares (367 million acres) between 1999 and 2000.

A sustainable Footprint for an individual would be 1.88 hectares (4.6 acres). Individuals in the U.S. have the world's largest Footprint at 9.57 hectares (23.7 acres). This is nearly four times larger than the global average Footprint and is larger than the average in Africa, Latin America, and Asia combined. Individuals in developing countries like Bangladesh and Mozambique have Footprints of 0.53 hectares (1.3 acres) per capita - just over 1/20th of the US Footprint.

The main culprit in the US's oversized Ecological Footprint is energy consumption. Fossil fuels used for electricity and transportation make up the largest segment of America's Ecological Footprint while use of crop and pasture land are the largest contributors to the footprints of Africa, Asia, and Latin America.

Over the past decade, some countries in Western Europe increased their Ecological Footprint while others declined. Norway and Italy, the European countries with the largest and smallest per capita Ecological Footprints respectively, both had larger Footprints in 2000.

In contrast, the Netherlands per capita Ecological Footprint, already smaller than the Western European average, decreased by 2.5% in 2000. This may be due, in part, to the Netherlands' efforts to secure commitments to social and environmental responsibility from the financial sector; measures to control the growth of consumption and a commitment to protect open space and biological diversity.

Redefining Progress works with businesses and governments to help identify cost effective ways to reduce their Ecological Footprints. RP has worked closely with municipalities from Santa Monica to Almada, Portugal.

Case: City of Santa Monica

The City of Santa Monica has a well-deserved reputation as a leader in the sustainable communities movement. For decades, the city's progressive population has elected representatives to local and state government that are willing to be leaders on sustainability issues. In 1994, the city adopted its Sustainable City Program.

"The long-term impacts of policy choices will be considered to ensure a sustainable legacy" (City of Santa Monica, 1994). Setting itself apart from the pack, Santa Monica has established a sustainability program, indicators to track progress toward specific targets, and has taken substantive actions. The City has adopted practices and policies that have decreased fossil fuel use, water use and pollution, increased green space, and engaged community members. One of the City's indicators of sustainability is the Ecological Footprint.

Between 1990-2000, the city reduced its footprint by 5% (167 square miles). On a per person basis, Santa Monica's Footprint dropped from 21.4 acres in 1990 to 20.9 acres in 2000. Santa Monica's per capita Footprint is about the same as the average in San Francisco Bay Area, despite the Bay Area's less carbon intensive energy mix. It is lower than the average Footprint in the Ojai Valley (23 acres) and Sarasota County (23 acres).

As you can see in Illustration 3, the largest segment of the City's Footprint is associated with energy. To reduce this, the City's procurement policy specifies the purchase of renewables and the reduction of natural gas and diesel fuel use.

Between 1990 and 2000 the transportation component of Santa Monica's Footprint increased by about 2,000 acres. Reduced dependence on fossil fuel powered vehicles would shrink this part of the city's Footprint. The City is moving ahead of the curve on this front with solar powered electric vehicle charging stations, aggressive public transportation promotions, and a city employee trip reduction program, yet there remains lots of room for progress.

Increases in recycling rates during the 1990s in Santa Monica also helped reduce its Footprint. According to the Natural Resources Defense Council, every ton of glass, paper, plastic, and metal diverted from landfills and recycled cuts potential energy use by half. With a recycling rate of 54% and growing, reducing the size of the total waste stream reduces its Footprint.

Finally, it is worth noting that Ecological Footprinting does not capture all the impacts humanity has on nature. An exact accounting is probably not possible. Moreover, there is much more to life than nature's utility to one species. Redefining Progress's Ecological Footprint analysis does, however, offer one of the most comprehensive assessment tools and can help inform, educate, and point the way toward a more sustainable path.

To calculate your household's Footprint visit www.myfootprint.org

2002 Data	Population (millions)	Total Ecological Footprint (global acres/pers)	Biocapacity (global acres/pers)	Ecological Reserve / Deficit (global acres/pers)
World	6,225.0	5.4	4.4	-1.0
Afghanistan	22.9	0.2	0.7	0.5
Albania	3.1	3.5	2.2	-1.2
Algeria	31.3	3.7	1.5	-2.2
Angola	13.2	2.2	8.4	6.2
Argentina	38.0	5.4	16.5	11.1
Armenia	3.1	2.5	1.5	-1.0
Australia	19.5	17.3	27.9	10.9
Austria	8.1	11.6	8.6	-2.7
Azerbaijan	8.3	3.7	3.0	-0.7
Bangladesh	143.8	1.2	0.7	-0.5
Belarus	9.9	7.7	8.2	0.5
Belgium & Luxembourg	10.7	12.8	3.0	-9.6
Belize	0.3	6.9	16.8	9.9
Benin	6.6	2.5	2.0	-0.7
Bolivia	8.6	4.9	38.0	33.1
Bosnia Herzegovina	4.1	5.4	4.9	-0.5
Botswana	1.8	3.7	11.4	7.7
Brazil	176.3	5.2	24.9	19.8
Bulgaria	8.0	7.4	5.7	-1.7
Burkina Faso	12.6	2.7	2.5	-0.5
Burundi	6.6	1.7	1.5	-0.2
Cambodia	13.8	1.2	1.7	0.5
Cameroon	15.7	2.0	3.5	1.5
Canada	31.3	18.5	37.3	18.8
Central African Rep	3.8	2.2	9.1	6.9
Chad	8.3	2.7	6.2	3.7
Chile	15.6	5.4	13.3	7.9
China	1,302.3	4.0	2.0	-2.0
Colombia	43.5	3.0	8.9	5.9
Congo	3.6	1.5	19.3	18.0
Congo Dem Rep	51.2	1.5	3.7	2.2
Costa Rica	4.1	4.9	3.7	-1.2
Cote Divoire	16.4	1.7	4.9	3.0
Croatia	4.4	7.4	7.2	-0.2
Cuba	11.3	4.2	2.0	-2.2
Czech Republic	10.2	12.1	6.7	-5.4
Denmark	5.4	13.1	8.4	-4.7
Dominican Republic	8.6	4.0	2.0	-1.7
Ecuador	12.8	3.5	5.7	2.2
Egypt	70.5	3.5	1.0	-2.2
El Salvador	6.4	3.0	1.5	-1.7
Eritrea	4.0	1.7	1.5	0.0
Estonia	1.3	14.6	14.1	-0.2
Ethiopia	69.0	2.0	1.2	-0.7
Finland	5.2	16.8	30.4	13.3
France	59.9	13.8	7.9	-5.9
Gabon	1.3	2.7	48.4	45.7
Gambia	1.4	3.0	2.0	-1.0
Georgia	5.2	1.7	3.0	1.2
Germany	82.4	10.9	4.4	-6.4
Ghana	20.5	2.5	3.2	0.7
Greece	11.0	11.6	4.0	-7.9
Guatemala	12.0	3.0	3.2	0.0
Guinea	8.4	2.2	6.9	4.4
Guinea-Bissau	1.4	1.7	7.7	6.2
Haiti	8.2	1.5	0.7	-0.7
Honduras	6.8	3.2	4.4	1.2
Hungary	9.9	9.1	5.2	-3.7
India	1,049.5	1.7	1.0	-1.0
Indonesia	217.1	2.5	2.5	-0.2
Iran	68.1	5.7	2.0	-3.7
Iraq	24.5	2.5	0.0	-2.2
Ireland	3.9	10.4	11.4	1.0
Israel	6.3	11.9	1.0	-10.9
Italy	57.5	9.9	2.7	-6.9
Jamaica	2.6	4.2	1.2	-3.0
Japan	127.5	10.6	2.0	-8.6
Jordan	5.3	4.0	0.7	-3.5
Kazakhstan	15.5	8.6	9.9	1.5
Kenya	31.5	2.0	1.5	-0.5
Korea DPRP	22.5	3.7	1.7	-2.0
Korea Republic	47.4	10.6	1.5	-9.4
Kuwait	2.4	18.0	0.7	-17.3
Kyrgyzstan	5.1	3.2	3.5	0.2
Laos	5.5	2.0	3.5	1.2
Latvia	2.3	8.4	16.8	8.2
Lebanon	3.6	6.9	0.7	-6.2
Lesotho	1.8	2.2	2.5	0.2
Liberia	3.2	1.5	7.9	6.4
Libya	5.4	7.9	2.5	-5.4
Lithuania	3.5	10.4	10.1	-0.2
Macedonia	2.0	5.4	2.2	-3.2
Madagascar	16.9	1.5	7.4	5.7
Malawi	11.9	1.5	1.0	-0.5
Malaysia	24.0	5.9	8.2	2.2
Mali	12.6	2.0	3.2	1.0
Mauritania	2.8	4.0	14.3	10.4
Mauritius	1.2	4.4	3.0	-1.7
Mexico	102.0	5.9	4.2	-1.7
Moldova Republic	4.3	3.2	2.5	-0.7
Mongolia	2.6	6.7	28.7	22.0
Morocco	30.1	2.2	1.7	-0.5
Mozambique	18.5	1.5	5.2	3.7
Myanmar	48.9	2.2	3.2	1.0
Namibia	2.0	3.7	10.9	7.4
Nepal	24.6	1.5	1.2	-0.5
Netherlands	16.1	10.9	2.0	-9.1
New Zealand	3.8	14.8	37.5	22.7
Nicaragua	5.3	3.0	8.9	5.9
Niger	11.5	3.2	3.0	-0.2
Nigeria	120.9	3.0	2.5	-0.5
Norway	4.5	14.6	17.3	2.7
Pakistan	149.9	1.5	0.7	-0.7
Panama	3.1	4.2	6.4	2.2

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	Population (millions)	Footprint (global acres/pers)	Biocapacity (global acres/pers)	Reserve / Deficit (global acres/pers)
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Albania	3.1	3.5	2.2	-1.2
Algeria	31.3	3.7	1.5	-2.2
Angola	13.2	2.2	8.4	6.2
Argentina	38.0	5.4	16.5	11.1
Armenia	3.1	2.5	1.5	-1.0
Australia	19.5	17.3	27.9	10.9
Austria	8.1	11.6	8.6	-2.7
Azerbaijan	8.3	3.7	3.0	-0.7
Bangladesh	143.8	1.2	0.7	-0.5
Belarus	9.9	7.7	8.2	0.5
Belgium & Luxembourg	10.7	12.8	3.0	-9.6
Belize	0.3	6.9	16.8	9.9
Benin	6.6	2.5	2.0	-0.7
Bolivia	8.6	4.9	38.0	33.1
Bosnia Herzegovina	4.1	5.4	4.9	-0.5
Botswana	1.8	3.7	11.4	7.7
Brazil	176.3	5.2	24.9	19.8
Bulgaria	8.0	7.4	5.7	-1.7
Burkina Faso	12.6	2.7	2.5	-0.5
Burundi	6.6	1.7	1.5	-0.2
Cambodia	13.8	1.2	1.7	0.5
Cameroon	15.7	2.0	3.5	1.5
Canada	31.3	18.5	37.3	18.8
Central African Rep	3.8	2.2	9.1	6.9
Chad	8.3	2.7	6.2	3.7
Chile	15.6	5.4	13.3	7.9
China	1,302.3	4.0	2.0	-2.0
Colombia	43.5	3.0	8.9	5.9
Congo	3.6	1.5	19.3	18.0
Congo Dem Rep	51.2	1.5	3.7	2.2
Costa Rica	4.1	4.9	3.7	-1.2
Cote Divoire	16.4	1.7	4.9	3.0
Croatia	4.4	7.4	7.2	-0.2
Cuba	11.3	4.2	2.0	-2.2
Czech Republic	10.2	12.1	6.7	-5.4
Denmark	5.4	13.1	8.4	-4.7
Dominican Republic	8.6	4.0	2.0	-1.7
Ecuador	12.8	3.5	5.7	2.2
Egypt	70.5	3.5	1.0	-2.2
El Salvador	6.4	3.0	1.5	-1.7
Eritrea	4.0	1.7	1.5	0.0
Estonia	1.3	14.6	14.1	-0.2
Ethiopia	69.0	2.0	1.2	-0.7
Finland	5.2	16.8	30.4	13.3
France	59.9	13.8	7.9	-5.9
Gabon	1.3	2.7	48.4	45.7
Gambia	1.4	3.0	2.0	-1.0
Georgia	5.2	1.7	3.0	1.2
Germany	82.4	10.9	4.4	-6.4
Ghana	20.5	2.5	3.2	0.7
Greece	11.0	11.6	4.0	-7.9
Guatemala	12.0	3.0	3.2	0.0
Guinea	8.4	2.2	6.9	4.4
Guinea-Bissau	1.4	1.7	7.7	6.2
Haiti	8.2	1.5	0.7	-0.7
Honduras	6.8	3.2	4.4	1.2
Hungary	9.9	9.1	5.2	-3.7
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Iran	68.1	5.7	2.0	-3.7
Iraq	24.5	2.5	0.0	-2.2
Ireland	3.9	10.4	11.4	1.0
Israel	6.3	11.9	1.0	-10.9
Italy	57.5	9.9	2.7	-6.9
Jamaica	2.6	4.2	1.2	-3.0
Japan	127.5	10.6	2.0	-8.6
Jordan	5.3	4.0	0.7	-3.5
Kazakhstan	15.5	8.6	9.9	1.5
Kenya	31.5	2.0	1.5	-0.5
Korea DPRP	22.5	3.7	1.7	-2.0
Korea Republic	47.4	10.6	1.5	-9.4
Kuwait	2.4	18.0	0.7	-17.3
Kyrgyzstan	5.1	3.2	3.5	0.2
Laos	5.5	2.0	3.5	1.2
Latvia	2.3	8.4	16.8	8.2
Lebanon	3.6	6.9	0.7	-6.2
Lesotho	1.8	2.2	2.5	0.2
Liberia	3.2	1.5	7.9	6.4
Libya	5.4	7.9	2.5	-5.4
Lithuania	3.5	10.4	10.1	-0.2
Macedonia	2.0	5.4	2.2	-3.2
Madagascar	16.9	1.5	7.4	5.7
Malawi	11.9	1.5	1.0	-0.5
Malaysia	24.0	5.9	8.2	2.2
Mali	12.6	2.0	3.2	1.0
Mauritania	2.8	4.0	14.3	10.4
Mauritius	1.2	4.4	3.0	-1.7
Mexico	102.0	5.9	4.2	-1.7
Moldova Republic	4.3	3.2	2.5	-0.7
Mongolia	2.6	6.7	28.7	22.0
Morocco	30.1	2.2	1.7	-0.5
Mozambique	18.5	1.5	5.2	3.7
Myanmar	48.9	2.2	3.2	1.0
Namibia	2.0	3.7	10.9	7.4
Nepal	24.6	1.5	1.2	-0.5
Netherlands	16.1	10.9	2.0	-9.1
New Zealand	3.8	14.8	37.5	22.7
Nicaragua	5.3	3.0	8.9	5.9
Niger	11.5	3.2	3.0	-0.2
Nigeria	120.9	3.0	2.5	-0.5
Norway	4.5	14.6	17.3	2.7
Pakistan	149.9	1.5	0.7	-0.7
Panama	3.1	4.2	6.4	2.2
Papua New Guinea	5.6	3.7	5.2	1.5
Paraguay	5.7	4.7	13.3	8.6
Peru	26.8	2.2	10.4	8.2
Philippines	78.6	2.5	1.5	-1.0