The Ecological Footprint of cities and regions: comparing resource availability with resource demand

MATHIS WACKERNAGEL, JUSTIN KITZES, DAN MORAN, STEVEN GOLDFINGER and MARY THOMAS

Mathis Wackernagel is the Executive Director of Global Footprint Network. He is also an Adjunct Professor at SAGE at the University of Wisconsin–Madison, and Scientific Advisor of the Centre for Sustainability Studies in Veracruz, Mexico.

Justin Kitzes directs the National Accounts Programme at Global Footprint Network. He holds an MS degree in Earth Systems from Stanford University, and directs the National Accounts Programme at Global Footprint Network. His research tasks include maintaining the National Footprint Accounts calculation systems and collaborating on academic papers and reports. His previous areas of work have included ocean science, sustainable agriculture and monetary valuation of the environment.

Dan Moran is a former director of the National Accounts Programme and Global Footprint Network. He holds a BA in Philosophy from Whitman College and is a graduate student at Lund University, Sweden. He is a former director of the National Accounts Programme at

ABSTRACT Cities and regions depend on resources and ecological services from distant ecosystems. The well-being of city and region residents is affected by both the health and availability of these ecosystems, especially in today's ecologically strained world. The management of a city or region's resource metabolism, including the natural capital that supports these flows, is becoming increasingly a central concern to cities and regions that want to succeed. Urban infrastructure is long-lasting and influences resource needs for decades to come: which cities are building future resource traps, and which are opportunities for resource-efficient and more competitive lifestyles? Reliable measures comparing the supply of natural capital to human demand are indispensable for managing resource metabolism, as they help identify challenges, set targets, track progress and drive policies for sustainability. This paper describes one such measurement tool: the Ecological Footprint. After explaining the assumptions behind the Footprint and describing some representative findings, it provides examples of how this resource accounting tool can assist local governments in managing their ecological assets, and support their sustainability efforts.

KEYWORDS Ecological Footprint / regional governance / resource accounts / sustainability

I. WHY TRACK RESOURCE CONSUMPTION AND NATURAL CAPITAL?

Local governments succeed by helping all their residents live fulfilling lives, both today and in the future. The availability of natural capital, nature's ability to renew and provide resources and services, is not the only ingredient in this vision. However, without natural capital – without healthy food, energy for mobility and heat, fibre for paper, clothing and shelter, fresh air and clean water – such a vision is impossible. Thus, providing current and future human well-being depends on protecting natural capital from systematic overuse; otherwise, nature will no longer be able to secure society with these basic services.

How well do we use Earth's natural capital? Without measurements, we cannot effectively manage these essential natural resources. To take care of our natural capital, we must know how much we have and how much we use. This is no different from financially responsible households, businesses or governments using accounts to keep track of their income and spending. To protect our natural assets, we need similar

Vol 18(1): 103–112. DOI: 10.1177/0956247806063978 www.sagepublications.com

accounts that keep track of the supply of natural resources available to us, and our demand on this resource supply.

II. ECOLOGICAL FOOTPRINT ACCOUNTS: CAPTURING HUMAN DEMAND ON NATURE

Ecological Footprint accounts act as balance sheets by documenting for a given population – a household, a district, a city, a region or humanity as a whole – the area of biologically productive land and sea required to produce the renewable resources this population consumes and assimilate the waste it generates, using prevailing technology. In other words, Ecological Footprints document the extent to which human economies stay within the regenerative capacity of the biosphere.(1)

Such biophysical resource accounting is possible because resources and waste flows can be tracked, and because most of these flows can be associated with the biologically productive area required to maintain them. Since people use resources from all over the world and pollute far away places with their wastes, the Ecological Footprint accounts for these areas, wherever they happen to be located on the planet.

Footprints can be analyzed from a consumption perspective,(2) or at any stage of the production process. They can also be applied at all scales, from global down to any activity of organizations and populations, or for urban development projects, services and products.

The Ecological Footprint uses a common, standardized measurement unit to make results comparable, similar to financial assessments that use one currency such as dollars or Euros to compare economics. The measurement units for Footprint accounts are global hectares. They are adjusted hectares that represent the average yield of all bioproductive areas on Earth.(3) More precisely, a global hectare is one hectare of biologically productive space with world average productivity for the given year. When weighting each area in proportion to its usable resource productivity (that is, its annual production of usable resources and services), the different areas can be converted from hectares and expressed in a (different) number of global hectares of average productivity. "Usable" refers to the portion of biomass used by humans, reflecting the anthropocentric assumptions of the Ecological Footprint measurement.

In 2002 (the most recent year for which consistent data are available),(4) the biosphere had 11.3 billion hectares of biologically productive area corresponding to roughly one-quarter of the planet's surface. These 11.3 billion hectares include 2.3 billion hectares of water (ocean shelves and inland water) and 9 billion hectares of land. The land area is composed of 1.5 billion hectares of cropland, 3.5 billion hectares of grazing land, 3.9 billion hectares of forest land and 0.2 billion hectares of built-up land.

Since these areas stand for mutually exclusive uses, and each global hectare represents the same amount of biomass production potential for a given year, they can be added up. This is the case for both the aggregate human demand (the Ecological Footprint) and the aggregate supply of biocapacity.

The Ecological Footprint calculated for each country includes the resources contained within the goods and services that are consumed by people living in that country, as well as the associated waste. Resources

Global Footprint Network. Previously, he has worked as an economics research associate and book editor, and is President of MyTwoFrontTeeth.org, a web-based service provider for charities.

Steven Goldfinger is Senior Scientist at Global Footprint Network. He is a research psychologist and has worked as an environmental educator with corporate, municipal and academic clients. He helped establish The Natural Step US, an environmental NGO that promotes a scientific framework for understanding sustainability, and has worked with Second Nature, an NGO that promotes environmental literacy and the greening of operations in higher education.

Mary Thomas is Communications Coordinator at Global Footprint Network. She holds a BA in Social Studies from Wesleyan University, with a focus on community research, and is Communications Coordinator at Global Footprint Network. She has a background in environmental health planning and education, and previously undertook outreach with the San Francisco Community Clinic Consortium.

Address: All authors can be contacted at Global Footprint Network, 3270 Lakeshore Avenue, Oakland, CA 94610–2720, USA; tel: +1 510 839 8879; e-mail: info@footprintnetwork.org

Global Footprint Network seeks to make the planet's ecological limits central to decision making for governments, businesses

and households. It does this by increasing the effectiveness and reach of the Ecological Footprint by strengthening the Footprint community, standardizing the tool, and building wide support for bringing human demands in line with Earth's limited resources. More on the science behind the Ecological Footprint and examples of how it has been used to advance sustainability can be found on the website www.footprintnetwork.org.

consumed for the production of goods and services that are exported to another country are added to the Footprint of the country where the goods and services are actually consumed, rather than of the country where they are produced.

The global Ecological Footprint is the area of productive biosphere required to maintain the material throughput of the human economy, under current management and production practices. Typically expressed in global hectares, the Ecological Footprint can also be measured in number of planets, whereby one planet represents the biological capacity of the Earth in a given year. Results could also be expressed, for example, in Austrian or Danish hectares – hectares with Austrian or Danish average productivity – just as financial accounts can use different currencies. The national analysis is based primarily on data published by the Food and Agriculture Organization of the United Nations (FAO), the International Energy Agency (IEA), the UN Statistics Division (UN Commodity Trade Statistics Database – UN Comtrade) and the Intergovernmental Panel on Climate Change (IPCC). Other data sources include studies in peer-reviewed science journals or thematic collections.

III. ECOLOGICAL FOOTPRINT RESULTS

For each given year, Ecological Footprint accounts track the Footprints and the natural capacity of roughly 150 nations (or the number of nations with populations greater than 1 million with available data). This data can then be scaled down to specific regions. Footprints for cities do exist. However, data for cities are not as consistently calculated as for nations and are therefore less comparable among cities. For this reason, Global Footprint Network, along with its 50 partner organizations, is developing sub-national calculation standards (Box 1).

The most recent edition of national Footprint accounts[5] shows that in 2002, the average Canadian required more than 7.5 average hectares to provide for his or her consumption. If everyone on Earth consumed at this level, we would need four additional planets. The average Italian lived on a Footprint almost half that size (4.0 global hectares), the average Mexican occupied 2.4 global hectares, and the average Indian lived on about one-quarter of that (0.7 global hectares). The global average demand is 2.2 global hectares per person (for more countries see Table 1).

In contrast, the current supply of biologically productive land and sea on this planet adds up to 1.8 hectares per person. Even less would be available per person if we allocated some of this area to the other species that also depend on it. Earth's ability to maintain the biodiversity that may be essential for the health and stability of the biosphere is directly dependant on the ability of humans to provide space for other species.

Comparing supply and demand, we see that in 2002, humanity's Ecological Footprint exceeded the Earth's biocapacity by more than 20 per cent (2.2 global hectares/person /1.8 global hectares/person = 1.2). In other words, in 2002 it took more than one year and two months to regenerate the resources humanity consumed in that one year. Footprint practitioners have named this phenomenon "ecological overshoot". Global demand began outpacing supply only recently, beginning in the 1980s. In 1961, for example, it took only 0.5 years worth of planetary production to regenerate what was used in that year, as shown in Figure 1 below.

1. William E Rees and Mathis Wackernagel started their collaboration and the development of the Ecological Footprint in 1990. Early publications include Rees, W E (1992), "Ecological footprints and appropriated carrying capacity: what urban economics leaves out", *Environment and Urbanization* Vol 4, No 2, October, pages 121–130; also Wackernagel, M and W E Rees (1996), *Our Ecological Footprint: Reducing Human Impact on the Earth*, New Society Publishers, Gabriola Island, Canada. The methodology has evolved since, and a summary can be found at www.footprintnetwork.org.

2. Globally, the consumption Footprint equals the production Footprint. At the national scale, trade must be accounted for, so the consumption Footprint = production Footprint + imports – exports (assuming no significant change in stocks).

3. One hectare (10,000 square metres) is equal to 2.47 acres.

4. National accounts methodology build on Monfreda, C, M Wackernagel and D Deumling (2004), "Establishing national natural capital accounts based on detailed Ecological Footprint and biological capacity assessments", *Land Use Policy* No 21, pages 231–246. An

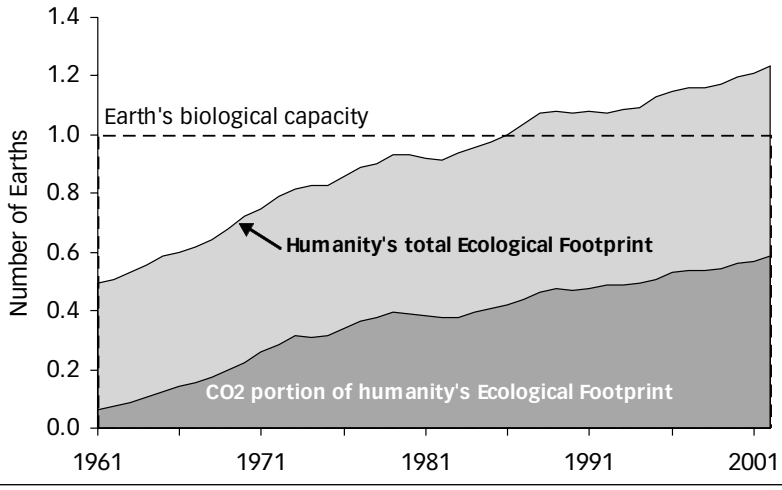

FIGURE 1
Ecological overshoot, 1961–2002

BOX 1
Global Footprint Network: its goals and strategies

Global Footprint Network, a sustainability think tank established in 2003, seeks to make the planet's ecological limits central to decision-making by governments, businesses and households. It does this with its more than 50 partner organizations by increasing the effectiveness and reach of the Ecological Footprint, strengthening the Footprint community, standardizing the tool, and building wide support for bringing human demands in line with Earth's limited resources.

Standardization will improve the quality and comparability of Footprint applications across the world. It will establish further credibility with the scientific community and government agencies, and, ultimately, spread Footprint technology more widely and quickly. Draft standards have been available since December 2005, and first official standards are to be released in June 2006 (see www.footprintstandards.org).

Another major Global Footprint Network initiative is entitled Ten-in-Ten. Its goal is to institutionalize the Ecological Footprint in at least ten key nations by 2015, with the hope of bringing the use of the Footprint on par with the Gross Domestic Product (GDP). This effort will help countries manage their ecological wealth in the same way they manage their finances. Footprint accounting will be used to develop economic policies that also protect ecological assets and invest in ecosystem conservation. The Network has identified 23 potential countries where it has active contacts.

More on the science behind the Ecological Footprint, and examples of how it has been used to advance sustainability, can be found on the website www.footprintnetwork.org.

updated version of this can be downloaded from http:\\www.footprintnetwork.org/gfn_sub.php?content=download. Free academic licenses containing all the calculations are also available at this site. The Footprint is computed for all countries that are represented in UN statistical data, back to 1961, with approximately 5,000 data points and 10,000 calculations per year and country. More than 200 resource categories are included, among them cereals, timber, fishmeal and fibres. These resource uses are translated into global hectares by dividing the total amount consumed in each category by its global average productivity, or yield. Biomass yields, measured in dry weight, are taken from statistics (see FAO (2005), FAOSTAT (FAO statistical databases), FAO, Rome, Italy, accessed October 2005 at http://faostat.fao.org.) Earlier methods were discussed in a special issue of *Ecological Economics*. See Wackernagel, M and Judith Silverstein, (2000), "Big things first: focusing on the scale imperative with the Ecological Footprint", *Ecological Economics* Vol 32, No 3, pages 391–394. This was a contribution to Robert Costanza's Forum: "The dynamics of the Ecological Footprint concept", in Costanza, R et al. (2000), "Commentary forum: the Ecological Footprint", *Ecological Economics* Vol 32, No 3, Special Issue, pages 341–394.

5. The 2005 edition of national Footprint and biocapacity accounts was sponsored by the European Environment Agency and published on their website at www.eea.eu.int. Another application comparing national results is published in World-Wide Fund for Nature International (WWF), Global Footprint Network, UNEP World Conservation Monitoring Centre (2004), *Living Planet Report 2004*, WWF, Gland, Switzerland, www.panda.org/livingplanet.

IV. OVERSHOOT AND ECOLOGICAL DEFICIT

It is possible to exceed global biocapacity, entering overshoot, because trees can be harvested faster than they re-grow, fisheries can be depleted more rapidly than they restock and CO_2 can be emitted into the atmosphere more quickly than ecosystems can sequester it. With humanity's current demand on nature, overshoot is no longer merely a local but, rather, a global phenomenon. Now we are not only consuming nature's interest but also invading its capital.

Overshoot causes the liquidation of natural capital: carbon accumulates in the atmosphere, fisheries collapse, deforestation spreads, biodiversity is lost and freshwater becomes scarce. Efficiency gains have helped to some extent: humanity's Ecological Footprint has grown more slowly than its economic activities. Still, human demand on nature has risen steadily to a level where the human economy is now in global ecological overshoot.

V. APPLICATIONS OF ECOLOGICAL FOOTPRINT ACCOUNTS

The Ecological Footprint can be applied at all scales, ranging from single products to humanity as a whole. It is a useful tool to help budget limited natural capital. Footprint calculations also demonstrate four complementary ways in which ecological deficits can be reduced or eliminated:

- use resource-efficient technology to reduce the demand on natural capital;
- reduce human consumption while preserving quality of life. For example, reduce the need for fossil fuels by making cities pedestrian friendly;
- lower the size of the human family in equitable and humane ways, so that total consumption decreases even if per capita demand remains unchanged; and
- invest in natural capital. For example, implement resource extraction methods that increase rather than compromise the land's biological productivity, thereby increasing supply.

There have been Footprint applications on every continent. Global and national accounts have been reported in headlines worldwide, and over 100 cities or regions have assessed their Ecological Footprint (see some examples in Box 2). In California, Sonoma County's Footprint project "Time to Lighten Up" has inspired every city in the county to sign up for the Climate Saver Initiative of the International Council for Local Environmental Initiatives (ICLEI) – also known as Local Governments for Sustainability. Wales has adopted the Ecological Footprint as its headline indicator for sustainability. WWF International, one of the world's most influential conservation organizations, uses the Ecological Footprint in its communication and policy work for advancing conservation and sustainability.

Government agencies, particularly in Europe, have studied the implications of Ecological Footprint results, and have re-examined the significance of carrying-capacity. A number of national ministers have repeatedly used the concept, including French President Jacques Chirac in his speech to the World Summit on Sustainable Development in Johannesburg. Larger media outlets are picking up the ideas: The Economist titled its July 2002 insert on the global environment "How

TABLE 1
Comparison of the Ecological Footprint and the biological capacity of selected countries. (The difference between the biological capacity and the Ecological Footprint is the ecological deficit/reserve)

Results for 2002	Population (millions)	Ecological Footprint (global ha/cap)	Biological capacity (global ha/cap)	Ecological deficit (–) or reserve (+) (global ha/cap)[a][b]
WORLD	6,225.0	2.2	1.8	–0.4
Argentina	38.0	2.2	6.7	+4.5
Australia	19.5	7.0	11.3	+4.3
Brazil	176.3	2.1	10.1	+8.0
Canada	31.3	7.5	14.3	+6.5
China	1,302.3	1.6	0.8	–0.8
Egypt	70.5	1.4	0.5	–0.9
France	59.8	5.6	3.2	–2.4
Germany	82.4	4.4	1.8	–2.6
India	1,049.5	0.7	0.4	–0.4
Indonesia	217.1	1.0	1.0	–0.2
Italy	57.5	4.0	1.1	–2.9
Japan	127.5	4.3	0.8	–3.6
Korea Republic	47.4	4.3	0.6	–3.8
Mexico	102.0	2.4	1.7	–0.7
Netherlands	16.1	4.4	0.8	–3.6
Pakistan	149.9	0.6	0.4	–0.2
Philippines	78.6	1.0	0.6	–0.5
Russia	144.1	4.4	7.0	+2.6
Sweden	8.9	5.5	9.8	+4.3
Thailand	62.2	1.4	1.0	–0.5
United Kingdom	59.1	5.4	1.5	–3.9
USA	291.0	9.7	4.7	–5.1

[a] Negative numbers indicate an ecological *deficit*, positive numbers an ecological *reserve*. Results are reported per person and are expressed in global hectares, hectares of biologically productive land and sea area with world average productivity.
[b] N.B. Numbers may not always add up due to rounding. These Ecological Footprint results are based on 2002 data from the European Environment Agency and Global Footprint Network (2005) or org.eea.eu.int/news/Ann1132753060.

many planets?" based on a Footprint assessment that showed it would take three planet Earths if all people lived OECD lifestyles.

VI. AN INDICATOR FOR "STRONG" AND "WEAK" SUSTAINABILITY

By monitoring human use of renewable natural capital, Ecological Footprint accounts provide guidance for sustainability: a Footprint smaller than the available biocapacity is a necessary condition for "strong sustainability", a stance which asserts that securing people's well-being necessitates maintaining natural capital.

BOX 2
Footprint applications in public policy

MUNICIPAL APPLICATIONS

There may well be over 100 Ecological Footprint studies for cities, ranging from student projects to comprehensive analyses of a metropolitan area's demand on nature. London, for instance, has already undergone three rounds. In 1995, urban sustainability specialist Herbert Girardet estimated that the UK capital's Footprint was 125 times the size of the city itself. In other words, in order to function, London required an area the size of the entire productive land surface in the UK to provide the resources the city used and to dispose of its pollutants and waste.

In 2000, under the leadership of Mayor Ken Livingstone, London commissioned a more detailed Ecological Footprint study called "City Limits". The report, sponsored by organizations including the Chartered Institution of Wastes Management, the Institution of Civil Engineers (ICE) and the Biffaward Programme on Sustainable Resource Use, was produced by Best Foot Forward and was launched in September 2002. Results for the city and its 7 million inhabitants are available at www.citylimitslondon.com.

To respond to the challenges identified by the "City Limits" report, London Remade, a business membership organization supported by over 300 of the capital's major businesses and higher education institutions, wanted to analyze possible steps for reducing London's Footprint. In collaboration with London First, a waste management partnership, it commissioned consulting companies WSP Environmental and Natural Strategies to identify the reduction potential in a project called "Toward Sustainable London: Reducing the Capital's Ecological Footprint". The first two of four reports, "Determining London's Ecological Footprint" and "Priority Impact Areas for Action", are available at www.londonremade.com or www.londonfootprint.com.

In 2005, the city of Cardiff completed a comprehensive Footprint study and made their results available at www.cardiff.gov.uk/sustainabledevelopment.

Others have studied aspects of city living using the Ecological Footprint. For instance, the Sustainable Consumption Group of the Stockholm Environment Institute at York has led a number of studies of cities and regions (www.regionalsustainability.org; www.oneplanetliving.org). They also contributed, with BioRegional, to a WWF–UK report called "One Planet Living in the Thames Gateway", which identifies Footprint-saving potential for greener urban developments. The report is available at www.wwf.org.uk/filelibrary/pdf/thamesgateway.pdf.

ICLEI–Local Governments for Sustainability and Global Footprint Network have joined forces to help cities around the world (including ICLEI's 600 member cities) with the Ecological Footprint, in order to help them advance sustainability. See www.iclei.org.

Bill Dunster is one of the UK's leading ecological architects, whose architectural practice designed BedZED in collaboration with the NGO BioRegional (www.bioregional.com). BedZED (or Beddington Zero fossil Energy Development) is a mixed development urban village with high standards for minimizing energy and water needs, reducing sprawl and drawing on renewable energy resources. The development also mixes housing types and integrates homes, workplaces and leisure facilities. BedZED is an attempt at "One Planet Living", i.e., making lifestyles possible that would be replicable worldwide, within the means of one planet. Dunster and BioRegional used the Footprint as a management tool: to set targets, and later to check to what extent the objectives were realized. More on his work and on the BedZED development can be found at www.zedfactory.com.

NATIONAL AND REGIONAL APPLICATIONS

A number of national and regional Footprint studies have contributed to policy discussions, some in close cooperation with government agencies. For example:

Wales (population 2,900,000). In March 2001, the National Assembly for Wales adopted the Ecological Footprint as their headline indicator for sustainability, making Wales the first nation to do so. The first report was commissioned through WWF–Cymru (the Welsh section of World-Wide Fund for Nature) and executed by Best Foot Forward. This report details Welsh energy, transportation and materials management, and can be found at www.wwf-uk.org/filelibrary/pdf/walesfootprint.pdf. An update of the report was produced by Stockholm Environment Institute and is available at www.walesfootprint.org.*

continued

BOX 2
Continued

The State of Victoria, Australia (population 4,650,000). EPA Victoria, the lead state agency responsible for protecting the environment, established a series of pilot projects in 2002 in partnership with a wide range of organizations and businesses, to further investigate the practical applications of the Ecological Footprint to promote sustainability. The campaign is now expanding its reach. See www.epa.vic.gov.au/eco-footprint.

The European Environment Agency (EEA) is under a constitutional requirement of the European Union to produce a state of the environment report every five years. The 2005 report, released in November 2005, prominently features Europe's Ecological Footprint. See www.eea.eu.int. 2005 edition results for national Footprints are available at org.eea.eu.int/news/Ann1132753060

Preparatory discussions on the UN Convention on Biodiversity have identified the Ecological Footprint as a key indicator for the 2010 targets. Increasingly, governments are recognizing the importance of ecological assets for securing their country's future well-being. See www.biodiv.org.

NRG4SD (Network of Regional Development for Sustainable Development) has proposed the use of ten integrated environmental indicators, with the Ecological Footprint as an overarching environmental concept (10 indicators +1). See www.nrg4sd.net.

Sonoma County, California (30 miles north of San Francisco, population 495,000). Under a grant from the US Environmental Protection Agency, Sustainable Sonoma County, a local NGO, used the Ecological Footprint as the foundation of a 2002 campaign. By inviting wide public participation and comment on the study before it was released, it was able to generate strong local buy-in. As a result, the launch of the study received countywide media coverage and built the groundwork for a subsequent campaign. The latter resulted in all municipalities in Sonoma committing simultaneously to reduce their CO_2 emissions by 20 per cent, making it the first US county to do so. To meet this commitment, they established programmes that track progress towards meeting their reduction goal. The Sonoma Footprint study is available at www.sustainablesonoma.org/projects/scefootprint.html.

Six southern regions of Italy. Commissioned by WWF–Italy, the policy think-tank CRAS produced a study comparing the six southern regions of Italy. The study is available at www.cras-srl.it/pubblicazioni/32.pdf.

INTERNATIONAL APPLICATIONS

The European Parliament commissioned a comparative study on the application of Ecological Footprinting to sustainability, which included case studies exploring potential uses of the Footprint in international legislation. The study was completed in 2001 and was supervised by the Directorate General for Research, Division Industry, Research, Energy, Environment, and Scientific and Technological Options Assessment (STOA). It is available at www.europarl.eu.int/stoa/publi/pdf/00–09–03_en.pdf or as 10-page summaries in 11 European languages at www.europarl.eu.int/stoa/publi/default_en.htm.

The United Nations Population Fund (UNFPA) report *State of World Population 2001 – Footprints and Milestones: Population and Environmental Change* builds on Ecological Footprint concepts. See www.unfpa.org/swp/2001/english/ch03.html#5.

* Barrett, J, R Birch, N Cherrett and T Wiedmann (2005), "Reducing Wales' Ecological Footprint – main report", Stockholm Environment Institute, University of York, published by WWF–Cymru, Cardiff, UK. See http://www.walesfootprint.org. See also National Assembly for Wales (2004), "Sustainable development indicators for Wales 2004", National Assembly for Wales *Statistical Bulletin* No 18. See http://www.wales.gov.uk/keypubstatisticsforwalesheadline/content/sustainable/2004/hdw20040323-e.htm.

Some argue that "strong sustainability" is too stringent, since technology and knowledge can compensate for lost ecological assets. While this can be debated, even managing for "weak sustainability" requires reliable accounting of assets. Hence, by measuring the overall supply of, and human demand on, regenerative capacity, the Ecological Footprint serves as an ideal tool for tracking progress, setting targets and driving policies for sustainability.

VII. WHAT'S IN IT FOR LOCAL GOVERNMENTS?

Ecological Footprint accounts allow governments to track a city or region's demand on natural capital, and to compare this demand with the amount of natural capital actually available. The accounts also give governments the ability to answer more specific questions about the distribution of these demands within their economy. In other words, it gives them information about their resource metabolism.

For example, Footprint accounts reveal the ecological demand associated with residential consumption, the production of value-added products, and the generation of exports. They also help assess the ecological capacity embodied in the imports upon which a region depends. This can shed light on the region's constraints or future liabilities in comparison with other regions of the world, and identify opportunities to defend or improve the local quality of life. Footprint accounts help governments become more specific about sustainability in a number of ways. The accounts provide a common language and a clearly defined methodology that can be used to support staff training and to communicate about sustainability issues with other levels of government or with the public. Footprint accounts add value to existing data sets on production, trade and environmental performance by providing a comprehensive way to interpret them. For instance, the accounts can help guide "environmental management systems" by offering a framework for gathering and organizing data, setting targets and tracking progress. The accounts can also serve as environmental reporting requirements, and inform strategic decision-making for regional economic development.

In addition, monitoring demand and supply of natural capital allows governments to:

- build a region's competitiveness by monitoring ecological deficits, since over time these deficits could become an increasing economic liability;
- stay aligned with the business community's increasing focus on sustainability as a way of decreasing future vulnerability;
- manage common assets more effectively. Without an effective metric, these assets are typically undervalued and their contribution to society is not systematically assessed nor included in strategic planning;
- have access to an early warning device for long-term security that recognizes emerging scarcities and identifies global trends;
- monitor the combined impact of ecological pressures that are more typically evaluated independently, such as climate change, fisheries collapse, loss of cropland, forestry overharvesting and urban sprawl;
- identify local and global possibilities for climate change mitigation,

and examine the tradeoffs between different approaches to atmospheric CO_2 reduction; and
- test policy options for future viability and possible unintended consequences. For instance, it supports urban design processes, opens dialogue with stakeholders, helps manage expectations, provides a platform for sustainability management systems, supports training for sustainability, allows for ecological risk assessments, and helps explain past successes more effectively.

The global effort for sustainability will be won, or lost, in the world's cities, where urban design may influence over 70 per cent of people's Ecological Footprint. High-Footprint cities can reduce this demand on nature greatly with existing technology. Many of these savings also cut costs and make cities more liveable. Since urban infrastructure is long-lasting and influences resource needs for decades to come, infrastructure decisions make or break a city's future. Which cities are building future resource traps, which ones are building opportunities for resource efficient and more competitive lifestyles?

Without regional resource accounting, governments can easily overlook or fail to realize the extent of these kinds of opportunities and threats. The Ecological Footprint, a comprehensive, science-based resource accounting system that compares people's use of nature with nature's ability to regenerate, helps eliminate this blind spot.