FOOTPRINT AND BIOCAPACITY ATLAS OF FRANCOPHONIE MEMBER NATIONS

PREPARING ECONOMIES FOR THE “GLOBAL AUCTION”
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**Global Footprint Network**
promotes a sustainable economy by advancing the use of the Ecological Footprint, a resource management tool that measures how much nature we have, how much we use and who uses what. All Footprint and biocapacity data in this report are based on the National Footprint Accounts, Edition 2011.

[www.footprintnetwork.org](http://www.footprintnetwork.org)

**Organisation Internationale de La Francophonie**
The International Organisation of the Francophonie (OIF) represents the countries that share the French language. Today, it includes 75 member states and governments (36 members and 19 observers) on five continents. It represents a unique group for whom the sharing of a common language is a starting point for political, economic and cultural cooperation between its members.

[www.francophonie.org](http://www.francophonie.org)

**Institute de l’énergie et de l’environnement de la Francophonie (IEFP)**
OIF is also involved in sustainable development cooperation through (IEEP). IEFP’s mission is to contribute to strengthening national capabilities on both institutional and individual levels and to promote partnerships in the field of energy and the environment. IEFP has been created in 1988 to reflect the commitment of heads of States and governments of Francophone countries for a concerted action on developing the energy sector in member countries. In 1996, this mission was expanded to include the environment.

[www.iefp.org](http://www.iefp.org)

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**PUBLICATIONS DIRECTOR**
Fatimata Dia Touré, Directrice de l’IEPF

**SCIENTIFIC TEAM**
Mathis Wackernagel *
David Moore *
Alessandro Galli *
Katsunori Iha *
Gemma Cranston *

**COORDINATION**
Rajae Chafil, IEPF

**AUTHORS**
Mathis Wackernagel *
David Moore *
Scott Mattoon *
Melissa Mazzarella *
Rajae Chafil, IEPF
Alessandro Galli *

**MEMBERS OF FRANCOPHONIE’S IEPF**
Fatimata Dia Touré, Director
Prosper Biabo, Program Director
Rajae Chafil, Program Specialist
Louis-Noël Jail, Communication
Jacinthe Potvin, Information Services

**DESIGN**
MaddoxDesign.net

*Global Footprint Network

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We are in a new era of resource constraints, with countries becoming increasingly dependent on resources they do not have.

As a result, more countries are competing in an accelerated race for limited global resources. We call this new dynamic “The global auction.”

To remain economically competitive, countries with ecological deficits need new tools for successful policy and investment decisions. Economic planners and private investors who ignore this new reality put their assets in peril.
Even the strongest economies will not operate without fuel, water, food and fibers. Input of primary resources keeps economies on the move. During the 20th century, such inputs were easily available. Prices were falling. As a result, most countries became dependent on large amounts of natural resources they did not have—both non-renewables (such as fossil fuels) and biological resources and services (such as food, water, fibers and carbon sequestration). While resources are still relatively cheap today, growing global demand has led to a supply crunch. This new situation is reshaping the rules of competitiveness for all economies.

The Ecological Footprint represents humanity’s demand on the planet for natural resources and ecosystem services. Biocapacity tracks Earth’s supply of these same resources and services. Both Ecological Footprint and biocapacity results are expressed in a globally comparable, standardized unit called a “global hectare” (gha)—a hectare of biologically productive land or sea area with world average bioproductivity in a given year.

These two indicators show a clear trend over the past 50 years: More and more countries are becoming ecological debtors—that is, their Footprint exceeds the biocapacity available within their borders. As the maps show, in 1961 most people lived in countries that had more biocapacity than their residents demanded. By 2008, 83 percent of the world population lived in countries that demanded more than what their local ecosystems could renew.

Member nations of the Organisation Internationale de la Francophonie represent a diversity of geographies, cultures, and economic possibilities. Through La Francophonie, they are united in the goal of advancing peace and sustainable development. Global Footprint Network’s initiative with La Francophonie has this same goal at heart. Its purpose is to summarize the resource situation of those nations using the Ecological Footprint and biocapacity indicators, and to identify how resource constraints carry implications for their economic performance. The full Footprint Atlas will be published in 2013.
Countries with **ecological deficits** (when the Footprint exceeds local biocapacity) depend on net imports of resources, on depletion of their ecological assets, and/or on the use of global commons (such as the sequestration of anthropogenic CO₂ pollution). Dependence on imported resources exposes a country to supply disruption and price volatility. Overharvesting causes a loss of capital assets. Emitting CO₂ from fossil fuel burning is largely free of direct costs for now, but fossil fuels are far from free. For instance, oil costs dwarf even the most aggressive proposed CO₂ taxes.

**Ecological Creditors** countries use fewer resources and ecological services than are available within their borders, and therefore are endowed with a biocapacity reserve. Biocapacity reserves, in an increasingly resource-constrained world, are becoming rare and more sought after. The growing value of biocapacity gives those countries an economic advantage.

**Ecological Debtors**

Footprint is

- 0-50% larger than biocapacity
- 50-100% larger than biocapacity
- 100-150% larger than biocapacity
- >150% larger than biocapacity
- Data not available

**Ecological Creditors and Ecological Debtors 2008**

One key trend is clear: more and more countries are becoming ecological debtors. As the maps show, there has been a significant shift since 1961. Back then, most people lived in countries that had more biocapacity than their residents demanded. In other words, they were like true farms, where the farm family is consuming less than what their farm can produce. By now 83 percent of the world population lives in countries where residents demand more than what their ecosystems can renew. Humanity’s demand is now 50 percent larger than the planet’s biocapacity, up from a 30 percent reserve in 1961. This global overshoot translates inevitably into liquidation of ecological assets.
WHY BIOCAPACITY MATTERS

Humanity is entering a new era of constraints, when demand exceeds the planet’s limited supplies of natural resources and other ecosystem services. While many resource and consumption trends are global, each country is in a unique situation (as demonstrated by countries’ biocapacity and Footprint trends shown for 11 countries in the appendix).

Human and non-human life compete for area on this planet, and is ultimately limited by the biosphere’s regenerative capacity. In addition to the scarcity of crop land, fishing grounds, forests, and the like, use of non-renewable resources from the lithosphere also faces limitations.

The primary lithosphere resource, fossil fuel, is most restricted by the biosphere’s finite capacity to absorb CO$_2$ waste. Biocapacity is far more limited than oil, gas and coal availability. In fact, if humanity burned more than one fifth of the fossil fuels already found, global average temperatures would increase more than 2 degrees Celsius, a commonly recognized upper threshold for dangerous climate change (carbontracker.org).

THE ECOLOGICAL FOOTPRINT measures people’s demand on nature. It is expressed as the biologically productive land and sea area required to provide all the ecosystem services people use through the consumption of their goods and services. In 2008, humanity’s Ecological Footprint was 18 billion global hectares (gha), or 2.7 gha per person. On the supply side, the planet’s productive area, or biocapacity, was 12 billion gha, or 1.8 gha per person. This means global demand exceeded the planet’s supply by the aforementioned 50 percent (2.7 gha/1.8 gha = 1.5).

A country’s Footprint is the sum of all the cropland, grazing land, forest and fishing grounds required to produce the food, fiber, timber, and fuel wood it consumes, to provide space for its settlements and infrastructure, and to absorb the wastes it emits (current Footprint calculations only include one waste: CO$_2$ from fossil fuels). A country’s Footprint calculation includes its net imports—that is, when residents demand resources and ecological services from foreign ecosystems, it adds to their total and per capita Footprint. In 2008, the single largest demand humanity put on the biosphere was its carbon Footprint.
In an era of global overshoot, the uneven distribution of biocapacity raises political and economic questions. Ecological debtor countries face increasing risk from a growing dependence on the biological capacity of others. Conversely, countries with biocapacity reserves can view their biological wealth as an asset that provides an important competitive advantage in an uncertain world.

Figure 1: Ecological Footprint and biocapacity ranked by countries’ per capita biocapacity. This comparison includes all Francophonie member countries for which sufficient data are available (typically those with populations greater than 1 million). While the average per person Footprint among members is slightly smaller than the world average, their biocapacity per person exceeds that of the world by one third.
Global Footprint Network’s data highlights the fundamental conflict between two major trends: Human demand for biocapacity is continuously increasing, while relative income for many countries is in decline. For many Francophonie member countries, their residents’ absolute income may have increased on average, but their share in global income has fallen. For instance, the French resident today earns on average 35 percent less of the total global income than 30 years ago (measured in GNI according to World Bank statistics). The resident of Senegal receives on average 50 percent less of the global income than three decades earlier. This is creating a new challenge for these and other countries: Since all countries participate in increasingly interconnected economies, dropping relative incomes make it more difficult for ecological debtors to compete in the global market for the world’s limited resources.

This is the essence: for most countries, the relative income of residents’ has decreased. At the same time, biocapacity deficits have increased (or biocapacity reserves have shrunk). As countries depend more on biocapacity from outside the country, their ability to bid for these resources is diminishing. These conflicting trends point to a structural weakening of countries’ economies. Before the global auction for biocapacity (when resources were abundant), declining relative income barely affected countries’ economies. In the era of plentiful resources, supply of goods and resources was limited only by market demands. In a world where resource costs are becoming a significant factor to economic production, biocapacity and relative income trends will become key determinants of economic success or failure.

WHY AN AUCTION — AND WHY THE FOCUS ON RELATIVE INCOME?

We are in a world of resource limitations, with more countries wanting—and competing for—more of the planet’s limited biocapacity. In this global auction of finite goods, what matters most is not absolute ability to pay, but the relative ability compared to all the other bidding powers. If people’s relative income is decreasing in a world where all want more, their ability to compete in the auction is weakening.

To remain competitive, policy makers need to pay closer attention to relative income, not just absolute income. For instance, what percentage share does an Egyptian, a Belgian, a Nigerian or a Cambodian, get from the total global income pie? And how is this share changing over time?

To find out more, or to participate in this initiative, contact La Francophonie at: raja.chafii@francophonie.org or Global Footprint Network at info@footprintnetwork.org.

WHAT’S NEXT?

La Francophonie and Global Footprint Network will launch the complete report on francophone member nations’ biocapacity and Footprints in mid-2013.

The appendix contains eleven country trends to spotlight the particular situation of those countries.

The initiative’s goal is to help policy analysts identify more specific risks and opportunities for each nation, including options for diversifying trade.

The full report will highlight tools for measuring risks, and include strategies for action. It will discuss how to mitigate the risks of a global auction, including countries’ need to revisit their competitiveness strategies and adapt them to this new era of resource constraints. It will also outline why focusing on wealth generation, rather than income maximization, allows countries to build a foundation for a stable economy.
Figure 2: Ecological deficits go up, relative incomes come down (1985 – 2007).
While the biocapacity deficits have been growing fast, per capita income of most countries compared to global income has been shrinking, weakening their position to access limited resources from around the globe.

This means as countries increasingly require resources and ecological services beyond what their domestic ecosystems can provide (in net terms), their relative purchasing power is declining.

Note: The y-axis shows the fraction of the world’s GDP a resident of a given country on average generates. Therefore the world’s average per person share, per definition, is at (1/world population) or currently at about 0.14 of a billionths of total world GDP.

**GLOBAL AUCTION**
Countries that grow a biocapacity deficit while losing relative income amplify their exposure to the global auction.
BELGIUM

FOOTPRINT AND BIOCAPACITY ATLAS OF FRANCOPHONIE MEMBER NATIONS

Figure BE-1: Ecological Footprint per capita in Belgium by component, 1961-2008

Figure BE-2: Contributing drivers of Belgium’s Ecological Footprint, 1961-2008

Figure BE-3: Biocapacity per capita in Belgium by component 1961-2008

Figure BE-4: Contributing drivers of Belgium’s biocapacity, 1961-2008

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<tbody>
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<td>EF per capita [gha]</td>
<td>7.11</td>
<td>6.69</td>
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<tr>
<td>- EF Carbon</td>
<td>3.26</td>
<td>2.50</td>
<td>30%</td>
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<tr>
<td>BC per capita [gha]</td>
<td>1.33</td>
<td>1.32</td>
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<tr>
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<td>- deficit Forest</td>
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<tr>
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<td>&gt;64</td>
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<tr>
<td>HDI</td>
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<td>0.76</td>
<td>16%</td>
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* GNI fraction of world from 1970, not 1961
** HDI value from 1980, not 1961
Figure BE-5: Belgium’s per capita biocapacity deficit, 1961-2008

Figure BE-7: Belgium’s GDP by component, GNI, and ratio of national GNI per capita to world total GNI, 1961-2008

Figure BE-9: Belgium’s population by age group, 1961-2010

Figure BE-6: Belgium’s per capita biocapacity deficit by contributing land-use type, 1961-2008

Figure BE-8: Ecological Footprint and HDI for all countries in 2008, with Belgium’s trend for 1980-2008
indicator|
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<td>15-64</td>
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<td>&gt;64</td>
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<td>HDI</td>
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* GNI fraction of world from 1970, not 1961
** HDI value from 1980, not 1961
**EGYPT**

**FOOTPRINT AND BIOCAPACITY ATLAS OF FRANCOPHONIE MEMBER NATIONS**

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**Figure EG-1: Ecological Footprint per capita in Egypt by component, 1961-2008**

**Figure EG-2: Contributing drivers of Egypt’s Ecological Footprint, 1961-2008**

**Figure EG-3: Biocapacity per capita in Egypt by component, 1961-2008**

**Figure EG-4: Contributing drivers of Egypt’s biocapacity, 1961-2008**

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**Indicator** | **Value (2008)** | **Value (1961)** | **Change (%)**
---|---|---|---
EF per capita [gha] | 1.70 | 0.87 | 94%
- EF Crop | 0.66 | 0.38 | 74%
BC per capita [gha] | 0.65 | 0.54 | 21%
BC deficit per capita [gha] | 1.04 | 0.34 | 211%
- deficit Forest | 0.75 | 0.29 | 162%
GNI per capita [constant 2000 $US] | 1,874 | 438 | 328%
- fraction of world [billionths] | 0.05 | 0.05 | 1%
GDP per capita [constant 2000 $US] | 1,859 | 438 | 325%
Exports per capita [constant 2000 $US] | 745 | 89 | 737%
Population [’000] | 78,323 | 28,649 | 173%
0-14 | 25,581 | 12,295 | 108%
15-64 | 51,460 | 14,707 | 250%
>64 | 4,634 | 900 | 415%
HDI | 0.63 | 0.41 | 55%

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* GNI fraction of world from 1970, not 1961
** HDI value from 1980, not 1961
**FRANCE**

**FOOTPRINT AND BIOCAPACITY ATLAS OF FRANCOPHONIE MEMBER NATIONS**

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**Figure FR-1: Ecological Footprint per capita in France by component, 1961-2008**

**Figure FR-2: Contributing drivers of France’s Ecological Footprint, 1961-2008**

**Figure FR-3: Biocapacity per capita in France by component 1961-2008**

**Figure FR-4: Contributing drivers of France’s biocapacity, 1961-2008**

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--- | --- | --- | --- |
EF per capita [gha] | 4.91 | 3.48 | 41% |
  - EF Carbon | 2.24 | 1.30 | 73% |
BC per capita [gha] | 2.99 | 2.54 | 18% |
BC deficit per capita [gha] | 1.92 | 0.95 | 103% |
  - deficit Forest | 1.96 | 0.87 | 127% |
GNI per capita [constant 2000 $US] | 23,776 | 7,871 | 202% |
  - fraction of world [billionths] | 0.59 | 0.96 | -39% |
GDP per capita [constant 2000 $US] | 23,366 | 7,809 | 199% |
Exports per capita [constant 2000 $US] | 7,059 | 626 | 1028% |
Population ['000] | 64,371 | 47,255 | 36% |
  0-14 | 11,531 | 12,047 | -4% |
  15-64 | 40,713 | 28,320 | 44% |
  >64 | 13,916 | 5,322 | 161% |
HDI | 0.88 | 0.72 | 22% |

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* GNI fraction of world from 1970, not 1961
** HDI value from 1980, not 1961
**Greece**

### Ecological Footprint per capita in Greece by component, 1961-2008

- **EF per capita [gha]**: 4.92, 1.92, 156%
  - EF Carbon: 2.53, 0.31, 709%
- **BC per capita [gha]**: 1.59, 1.58, 0%
- **BC deficit per capita [gha]**: 3.34, 0.34, 883%
  - deficit Forest: 2.76, 0.37, 644%
- **GNI per capita [constant 2000 $US]**: 14,172, 3,782, 275%
  - fraction of world [billionths]: 0.35, 0.56, -37%
- **GDP per capita [constant 2000 $US]**: 14,648, 3,733, 292%
- **Exports per capita [constant 2000 $US]**: 3,667, 168, 2081%
- **Population ['000]**: 11,237, 8,398, 34%
  - 0-14: 1,655, 2,208, -25%
  - 15-64: 7,597, 5,438, 40%
  - >64: 2,658, 688, 287%
- **HDI**: 0.86, 0.72, 20%

* GNI fraction of world from 1970, not 1961
** HDI value from 1980, not 1961
**GUINEA-BISSAU**

**FOOTPRINT AND BIOCAPACITY ATLAS OF FRANCOPHONIE MEMBER NATIONS**

**Figure GW-1**: Ecological Footprint per capita in Guinea-Bissau by component, 1961-2008

**Figure GW-2**: Contributing drivers of Guinea-Bissau’s Ecological Footprint, 1961-2008

**Figure GW-3**: Biocapacity per capita in Guinea-Bissau by component, 1961-2008

**Figure GW-4**: Contributing drivers of Guinea-Bissau’s biocapacity, 1961-2008

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<tr>
<td>HDI</td>
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* GNI fraction of world from 1970, not 1961
** HDI value from 1980, not 1961
Table: Indicator Value

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<td>0.39</td>
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<td>2.45</td>
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<td>GNI per capita [constant 2000 $US]</td>
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* GNI fraction of world from 1970, not 1961
** HDI value from 1980, not 1961
Morocco

Figure MA-1: Ecological Footprint per capita in Morocco by component, 1961-2008

Figure MA-2: Contributing drivers of Morocco’s Ecological Footprint, 1961-2008

Figure MA-3: Biocapacity per capita in Morocco by component, 1961-2008

Figure MA-4: Contributing drivers of Morocco’s biocapacity, 1961-2008

--- | --- | --- | ---
EF per capita [gha] | 1.32 | 0.94 | 41%
- EF Crop | 0.60 | 0.32 | 89%
BC per capita [gha] | 0.70 | 1.14 | -39%
BC deficit per capita [gha] | 0.63 | -0.20 | -
- deficit Forest | 0.34 | 0.00 | -
GNI per capita [constant 2000 $US] | 1,706 | 618 | 176%
- fraction of world [billionths] | 0.04 | 0.06 | -35%
GDP per capita [constant 2000 $US] | 1,734 | 613 | 183%
Exports per capita [constant 2000 $US] | 603 | 118 | 411%
Population [’000] | 31,321 | 11,948 | 162%
0-14 | 8,949 | 5,211 | 72%
15-64 | 21,247 | 6,114 | 247%
>64 | 2,010 | 301 | 569%
HDI | 0.57 | 0.36 | 56%

* GNI fraction of world from 1970, not 1961
** HDI value from 1980, not 1961
Figure MA-5: Morocco's per capita biocapacity deficit, 1961-2008

Figure MA-7: Morocco's GDP by component, GNI, and ratio of national GNI per capita to world total GNI, 1961-2008

Figure MA-9: Morocco’s population by age group, 1961-2010

Figure MA-6: Morocco’s per capita biocapacity deficit by contributing land-use type, 1961-2008

Figure MA-8: Ecological Footprint and HDI for all countries in 2008, with Morocco’s trend for 1980-2008
**SENEGAL**

Indicators and Data:

|----------------------------|--------------|--------------|-------------
| EF per capita [gha]        | 1.53         | 2.32         | -34%        
|   - EF Crop               | 0.69         | 1.00         | -31%        
| BC per capita [gha]        | 1.40         | 4.90         | -71%        
| BC deficit per capita [gha]| 0.13         | -2.58        | -           
|   - deficit Crop          | 0.26         | -0.08        | -           
| GNI per capita [constant 2000 $US]| 555 | - | -       
|   - fraction of world [billionths]| 0.01 | 0.04 | -69% 
| GDP per capita [constant 2000 $US]| 557 | 617 | -10%    
| Exports per capita [constant 2000 $US]| 161 | 219 | -26%    
| Population ['000]         | 11,787       | 3,131        | 276%        
|   0-14                    | 5,432        | 1,278        | 325%        
|   15-64                   | 6,703        | 1,691        | 296%        
|   >64                     | 316          | 78           | 304%        
| HDI                       | 0.45         | 0.32         | 41%         

* GNI fraction of world from 1970, not 1961
** HDI value from 1980, not 1961

Figure SN-1: Ecological Footprint per capita in Senegal by component, 1961-2008

Figure SN-2: Contributing drivers of Senegal’s Ecological Footprint, 1961-2008

Figure SN-3: Biocapacity per capita in Senegal by component, 1961-2008

Figure SN-4: Contributing drivers of Senegal’s biocapacity, 1961-2008
**Togo**

**Footprint and Biocapacity Atlas of Francophone Member Nations**

**Indicator Value**

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>EF per capita [gha]</td>
<td>1.03</td>
<td>1.54</td>
<td>-33%</td>
</tr>
<tr>
<td>- EF Crop</td>
<td>0.41</td>
<td>0.39</td>
<td>5%</td>
</tr>
<tr>
<td>BC per capita [gha]</td>
<td>0.67</td>
<td>1.52</td>
<td>-56%</td>
</tr>
<tr>
<td>BC deficit per capita [gha]</td>
<td>0.36</td>
<td>0.02</td>
<td>2065%</td>
</tr>
<tr>
<td>- deficit Forest</td>
<td>0.40</td>
<td>0.60</td>
<td>-34%</td>
</tr>
<tr>
<td>GNI per capita [constant 2000 $US]</td>
<td>257</td>
<td>194</td>
<td>33%</td>
</tr>
<tr>
<td>- fraction of world [billionths]</td>
<td>0.01</td>
<td>0.02</td>
<td>-73%</td>
</tr>
<tr>
<td>GDP per capita [constant 2000 $US]</td>
<td>258</td>
<td>196</td>
<td>32%</td>
</tr>
<tr>
<td>Exports per capita [constant 2000 $US]</td>
<td>82</td>
<td>57</td>
<td>44%</td>
</tr>
<tr>
<td>Population ['000]</td>
<td>5,777</td>
<td>1,594</td>
<td>262%</td>
</tr>
<tr>
<td>0-14</td>
<td>2,390</td>
<td>672</td>
<td>256%</td>
</tr>
<tr>
<td>15-64</td>
<td>3,433</td>
<td>850</td>
<td>304%</td>
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<tr>
<td>&gt;64</td>
<td>231</td>
<td>56</td>
<td>310%</td>
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<tr>
<td>HDI</td>
<td>0.43</td>
<td>0.35</td>
<td>23%</td>
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</tbody>
</table>

* GNI fraction of world from 1970, not 1961
** HDI value from 1980, not 1961

**Figure TG-1**: Ecological Footprint per capita in Togo by component, 1961-2008

**Figure TG-2**: Contributing drivers of Togo’s Ecological Footprint, 1961-2008

**Figure TG-3**: Biocapacity per capita in Togo by component 1961-2008

**Figure TG-4**: Contributing drivers of Togo’s biocapacity, 1961-2008
Figure TG-5: Togo’s per capita biocapacity deficit, 1961-2008

Figure TG-6: Togo’s per capita biocapacity deficit by contributing land-use type, 1961-2008

Figure TG-7: Togo’s GDP by component, GNI, and ratio of national GNI per capita to world total GNI, 1961-2008

Figure TG-8: Ecological Footprint and HDI for all countries in 2008, with Togo’s trend for 1980-2008

Figure TG-9: Togo’s population by age group, 1961-2010
Tunisia

Footprint and Biocapacity Atlas of Francophone Member Nations

<table>
<thead>
<tr>
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<tr>
<td>EF per capita [gha]</td>
<td>1.76</td>
<td>0.93</td>
<td>90%</td>
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<tr>
<td>- EF Carbon</td>
<td>0.66</td>
<td>0.05</td>
<td>1143%</td>
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<tr>
<td>BC per capita [gha]</td>
<td>0.96</td>
<td>1.18</td>
<td>-19%</td>
</tr>
<tr>
<td>BC deficit per capita [gha]</td>
<td>0.81</td>
<td>-0.25</td>
<td></td>
</tr>
<tr>
<td>- deficit Forest</td>
<td>0.81</td>
<td>0.15</td>
<td>441%</td>
</tr>
<tr>
<td>GNI per capita [constant 2000 $US]</td>
<td>2,857</td>
<td>689</td>
<td>314%</td>
</tr>
<tr>
<td>- fraction of world [billionths]</td>
<td>0.07</td>
<td>0.07</td>
<td>-2%</td>
</tr>
<tr>
<td>GDP per capita [constant 2000 $US]</td>
<td>3,023</td>
<td>691</td>
<td>337%</td>
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<tr>
<td>Exports per capita [constant 2000 $US]</td>
<td>1,176</td>
<td>162</td>
<td>625%</td>
</tr>
<tr>
<td>Population ['000]</td>
<td>10,329</td>
<td>4,277</td>
<td>141%</td>
</tr>
<tr>
<td>0-14</td>
<td>2,459</td>
<td>1,830</td>
<td>34%</td>
</tr>
<tr>
<td>15-64</td>
<td>7,294</td>
<td>2,215</td>
<td>229%</td>
</tr>
<tr>
<td>&gt;64</td>
<td>850</td>
<td>176</td>
<td>383%</td>
</tr>
<tr>
<td>HDI</td>
<td>0.69</td>
<td>0.45</td>
<td>32%</td>
</tr>
</tbody>
</table>

* GNI fraction of world from 1970, not 1961
** HDI value from 1980, not 1961

Figure TN-1: Ecological Footprint per capita in Tunisia by component, 1961-2008

Figure TN-2: Contributing drivers of Tunisia’s Ecological Footprint, 1961-2008

Figure TN-3: Biocapacity per capita in Tunisia by component, 1961-2008

Figure TN-4: Contributing drivers of Tunisia’s biocapacity, 1961-2008
The National Footprint Accounts track countries’ use of ecological services and resources as well as the biocapacity available in each country. As with any resource accounts, they are static, quantitative descriptions of outcomes for any given year in the past for which data exist. The detailed calculation methodology of the most updated Accounts are described in Calculation Methodology for the National Footprint Accounts, 2011 Edition (www.footprintnetwork.org, 2011). The implementation of the National Footprint Accounts through database-supported templates is described in the Guidebook to the National Footprint Accounts (Kitzes et al. 2008) and the method paper by Borucke et al. (2013). Kitzes et al. (2009) outline the research agenda for improvements.


ECOLOGICAL FOOTPRINT

The National Footprint Accounts, 2011 edition, track human demand for ecological services in terms of six major land use types (cropland, grazing land, forest land, carbon Footprint, fishing grounds, and built-up land). The Ecological Footprint of each major land use type is calculated by summing the contributions of products and activities competing for bioproductive space. Built-up land reflects the bioproductivity compromised by infrastructure and hydropower. Forest land for carbon dioxide uptake represents the carbon absorptive capacity of a world average hectare of forest needed to absorb human induced carbon dioxide emissions, after having considered the ocean sequestration capacity (also called the carbon Footprint).

The Ecological Footprint calculates the combined demand for ecological resources wherever they are located and presents them as the global average area needed to support a specific human activity. This quantity is expressed in units of global hectares. A global hectare is defined as a biologically productive hectare with world average bioproductivity.

By expressing all results in a common unit, biocapacity and Footprints can be directly compared across land use types and countries.

Demand for resource production and waste assimilation are translated into global hectares by dividing the total amount of a resource consumed by the yield per hectare, or dividing the waste emitted by the absorptive capacity per hectare. Yields are calculated based on various international statistics, primarily those from the United Nations Food and Agriculture Organization (FAO ResourceSTAT Statistical Databases).

Yields are mutually exclusive: If two crops are grown at the same time on the same hectare, one portion of the hectare is assigned to one crop, and the remainder to the other. This avoids double counting. This follows the same logic as measuring the size of a farm: Each hectare is only counted once, even though it might provide multiple services.

The Ecological Footprint, in its most basic form, is calculated by the following equation:

\[ EF = \frac{D_{\text{ANNUAL}}}{Y_{\text{ANNUAL}}} \]

where \( D \) is the annual demand of a product and \( Y \) is the annual yield of the same product (Borucke et al, 2013). Yield is expressed in global hectares. In practice, global hectares are estimated with the help of two factors: The yield factors (that compare national average yield per hectare to world average yield in the same land category) and the equivalence factors (which capture the relative productivity among the various land and sea area types).

Therefore, the formula of the Ecological Footprint becomes:

\[ EF = \frac{P}{Y_N} \cdot YF \cdot EQF \]

where \( P \) is the amount of a product harvested or waste emitted (equal to \( D_{\text{ANNUAL}} \) above), \( Y \) is the national average yield for \( P \), and \( YF \) and \( EQF \) are the yield factor and equivalence factor, respectively, for the country and land use type in question. The yield factor is the ratio of national-to-world-average yields. It is calculated as the annual availability of usable products and varies by country and year. Equivalence factors translate the area supplied or demanded of a specific land use type (e.g. world average cropland, grazing land, etc.) into units of world average biologically productive area expressed in global hectares. These factors vary by land use type and year.

Annual demand for manufactured or derivative products (e.g. flour or wood pulp) is converted into primary product equivalents (e.g., wheat or roundwood) through the use of extraction rates. These quantities of primary product equivalents are then translated into an Ecological Footprint. The Ecological Footprint also embodies the energy required for the manufacturing process.

CONSUMPTION, PRODUCTION, AND TRADE

The National Footprint Accounts calculate the Footprint of a population from a number of perspectives. Most commonly reported is the Ecological Footprint of consumption of a population, typically just called Ecological Footprint. The Ecological Footprint of consumption...
for a given country measures the biocapacity demanded by the final consumption of all the residents of the country. This includes their household consumption as well as their collective consumption, such as schools, roads, fire brigades, etc., which serve the household, but may not be directly paid for by the households.

In contrast, a country’s primary production Ecological Footprint is the sum of the Footprints for all resources harvested and all waste generated within the country’s geographical borders. This includes all the area within a country necessary for supporting the actual harvest of primary products (cropland, grazing land, forest land, and fishing grounds), the country’s infrastructure and hydropower (built-up land), and the area needed to absorb fossil fuel carbon dioxide emissions generated within the country (carbon Footprint).

The difference between the production and consumption Footprint is trade, shown by the following equation:

\[ EF_C = EF_P + EF_I - EF_E \]

where \( EF_C \) is the Ecological Footprint of consumption, \( EF_P \) is the Ecological Footprint of production, and \( EF_I \) and \( EF_E \) are the Footprints of imported and exported commodity flows, respectively.

BIOCAPACITY

A national biocapacity calculation starts with the total amount of bioproductive land and sea available. “Bioproductive” refers to land and water areas that supports significant photosynthetic activity and accumulation of biomass, ignoring barren areas of low, dispersed productivity. This is not to say that areas such as the Sahara Desert, Antarctica, or Alpine mountaintops do not support life; their production is simply too widespread to be directly harvestable and negligible in quantity. Biocapacity is an aggregated measure of the amount of area available, weighted by the productivity of that area. It represents the ability of the biosphere to produce crops, livestock (pasture), timber products (forest), and fish, as well as to uptake carbon dioxide in forests. It also includes how much of this regenerative capacity is occupied by infrastructure (built-up land). In short, it measures the ability of available terrestrial and aquatic areas to provide ecological services. A country’s biocapacity for any land use type is calculated as:

\[ BC = A \cdot YF \cdot EQF \]

where \( BC \) is the biocapacity, \( A \) is the area available for a given land use type, and \( YF \) and \( EQF \) are the yield factor and equivalence factor, respectively, for the country land use type in question.

SELECTED SOURCE DATA

<table>
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<th>Dataset</th>
<th>Source</th>
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<tr>
<td>Ecological Footprint</td>
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<tr>
<td>Production of primary agricultural products</td>
<td>FAO ProdSTAT section of the FAOSTAT web-site: <a href="http://faostat.fao.org/site/567/default.aspx#ancor">http://faostat.fao.org/site/567/default.aspx#ancor</a></td>
</tr>
<tr>
<td>Production of crop-based feeds used to feed animals</td>
<td>Feed from general marketed crops data is directly drawn from the SUA/FBS section of FAOSTAT: <a href="http://faostat.fao.org/site/354/default.aspx">http://faostat.fao.org/site/354/default.aspx</a></td>
</tr>
<tr>
<td>Import and Export of primary agricultural and livestock products</td>
<td>FAO TradeSTAT section of the FAOSTAT web-site: <a href="http://faostat.fao.org/site/535/default.aspx#ancor">http://faostat.fao.org/site/535/default.aspx#ancor</a></td>
</tr>
</tbody>
</table>
| Livestock crop consumption | Calculated by Global Footprint Network based upon the following datasets:  
  - FAO Production for Livestock primary.  
  - Haberl, et al. 2007. Quantifying and mapping the human appropriation of net primary production in earth’s terrestrial ecosystems. PNAS 104: 12 |
| Production, import and export of primary forestry products | FAO ForeSTAT section of the FAOSTAT website: [http://faostat.fao.org/site/630/default.aspx](http://faostat.fao.org/site/630/default.aspx) |
| Import and Export of commodities | Data available directly from the UN Commodity Trade StatisticsDatabase. [http://comtrade.un.org](http://comtrade.un.org) |

Economic Trends

| Debt | World Bank data portal |

Demographic Trends

APPENDIX B

REFERENCES


<table>
<thead>
<tr>
<th>Abbreviations</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC</td>
<td>Biocapacity, regenerative capacity of nature, measured in global hectares</td>
</tr>
<tr>
<td>EF</td>
<td>Ecological Footprint, human demand on nature, measured in global hectares</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>gha</td>
<td>global hectare</td>
</tr>
<tr>
<td>GNI</td>
<td>Gross National Income</td>
</tr>
<tr>
<td>HDI</td>
<td>UNDP’s Human Development Index</td>
</tr>
<tr>
<td>Country with *</td>
<td>slightly updated results based on 2011 edition</td>
</tr>
<tr>
<td>Country with ***</td>
<td>results from 2010 edition, modified in country collaboration</td>
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</table>
"We have entered a global auction, with more people bidding for fewer resources. Such an auction changes the rules of competitiveness, and poses a systemic risk to many countries’ economic stability. In a time of global ecological overshoot, managing our use of natural capital is crucial for economic success."
In the past, seemingly unlimited resources fueled our economies. As demand for these resources and other ecological services expand, ecological deficits are skyrocketing. As a consequence, it requires ever more effort to secure resources. This tightening situation increasingly affects whether business, communities, and nations succeed.

Global Footprint Network and La Francophonie’s initiative documents these resource and consumption trends among member nations and outlines options for action, so all can prosper in a world of resource constraints.