

# Tracking the Ecological Trends Shaping the Future of the Mediterranean Region



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## 1. Introduction

### **The significance of tracking human demand on biocapacity**

Human societies and economies depend on the biosphere's natural capital and many life-supporting ecological services. As demand on these ecological resources increases, economic success can no longer be secured without carefully managing and tracking the demand on and availability of natural capital.

Considering the rapid increase in human demand, the 21<sup>st</sup> century is likely to be shaped by ecological constraints. These constraints might be felt in the form of climate change, water scarcity, urban crowding, declining fisheries, food crises, and soaring energy costs. Even though ecological capital is becoming visibly scarce, most governments still lack robust tools to measure their natural capital, and leaders remain reluctant to take rapid action to reduce their resource risks.

Preparing for and navigating the future will require understanding and utilizing tools that can help visualize the scale of change we are witnessing, provide a platform for weighing policy options and thus secure national well-being. Since the late 1940s, governments have used Gross Domestic Product (GDP) to measure the health and vitality of their nations. With growing resource scarcity, leaders will need to look beyond GDP and measure not only the value-added of their economic activities, but also human quality of life and environmental sustainability in order to understand potential trade-offs. In this context, accounting systems such as the Ecological Footprint, partnered with in-country analysis and scenario planning, will be critical for nations to adopt to weigh their options.

### **The purpose of the Mediterranean initiative**

Global Footprint Network launched a Mediterranean Initiative to bring the reality of resource constraints to the center of the Mediterranean policy debate, and to support decision-makers with specific tools that help them weigh policy trade-offs. These tools will enable policy analysts and decision-makers to more fully identify the risks that resource limitations pose to their countries' economic stability. It should also help them pinpoint the opportunities that lie in aggressive, timely efforts to reduce their overall resource dependence. With these benefits in mind, Global Footprint Network engages with nations to offer them tools to help them make more effective and informed decisions.

Leaders in the region are becoming more aware of the potentially debilitating consequences of current trends; yet, these trends continue, and reversing them will take time. In the last four decades, for example, humanity has continuously increased its demand for ecological services and resources – by about 80 percent as measured by Ecological Footprint Analysis (Ewing et al., 2009). As a consequence, human use of nature's ecological flows and services now significantly exceeds what nature can renew (Ewing et al., 2009). This overshoot means that humanity is drawing down the planet's ecological assets. Even if we continue on a moderate trajectory as projected by the UN, it will take twice the renewable capacity of the biosphere to meet our demands by the early 2030s (Ewing et al., 2009).

To achieve lasting development success, governments, institutions, businesses, and individuals must work with the reality that human well-being - prosperity - is the ultimate goal, and that our well-being depends on our natural capital. While ecological assets are an often underestimated component of a country's economy, the goods and services that sustain a healthy human society – including access to food, safe water, sanitation, culture, manufactured goods, and economic opportunity – are all supported by a foundation of functioning and healthy ecosystems. If human demand on nature continues to exceed what nature can regenerate, this will lead to an erosion of the resource base, and consequently undermine human welfare (Galli et al., *forthcoming*).

With navigational tools such as the Ecological Footprint, it becomes possible to manage human pressure on the planet and take steps to move humanity away from liquidating its ecological resource base.

## 2. What is the Ecological Footprint?

The Ecological Footprint answers one particular research question: How much of the planet's regenerative capacity is demanded by human activities, such as eating, moving, the provision of shelter, and use of goods and services (Wackernagel et al., 1999a, b)? It measures the biologically productive land and water required to produce all the resources a population consumes, and to sequester its CO<sub>2</sub> emissions, using prevailing technology (Wackernagel et al., 2002). Footprint results are expressed in the unit of global hectares (gha) - hectares of land or sea area with world average bioproductivity in a given year<sup>1</sup> (Galli et al., 2007).

While the Ecological Footprint quantifies human demand, biocapacity acts as an ecological benchmark and quantifies nature's supply: resource production and waste disposal services. A population's Footprint can thus be compared to the biocapacity that is available to support that population, as expenditure is compared against income in financial terms (Monfreda et al., 2004).

How much biocapacity is available to populations? For humanity as a whole, the availability is one planet: In 2006 this was equivalent to approximately 1.8 biologically productive hectares per person. Biocapacity per person varies considerably by country. For instance, in 2006 the U.S. was endowed with 4.4 gha of biocapacity per resident, while in Kuwait there was 0.5 gha of biocapacity per resident.

The amount of biocapacity that a person has access to also depends on that population's purchasing power. If a population has high purchasing power, it can access biocapacity from other regions through trade. For instance, they can import biocapacity in the form of food or goods. Alternatively, in the absence of international carbon emissions trading schemes, they can use the biocapacity of other nations freely by emitting carbon dioxide into the global commons.

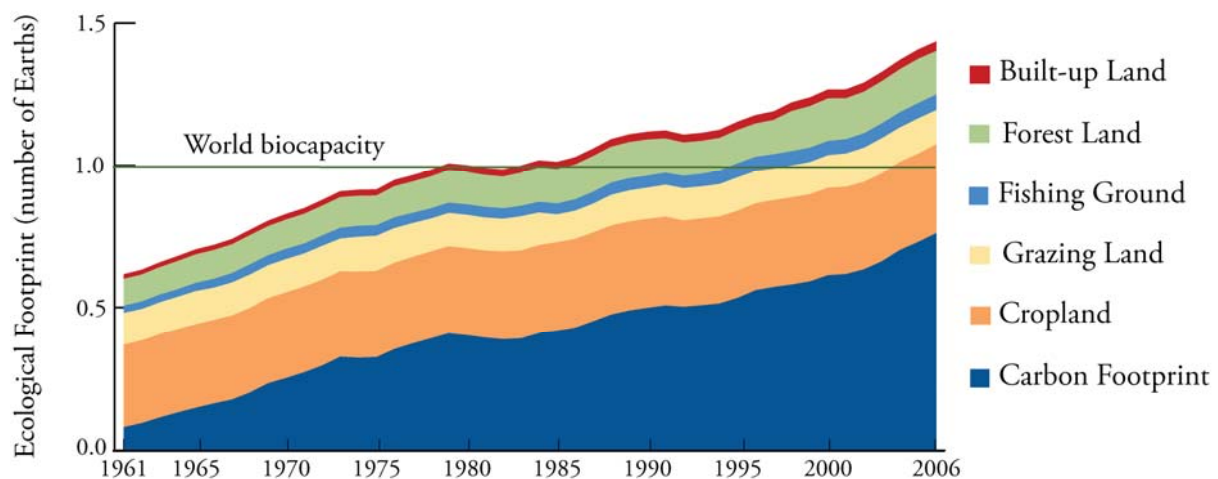
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<sup>1</sup> Such areas are cropland, grazing land, forests, fishing grounds, carbon Footprint, and built-up lands.

If the residents of a country use more biocapacity in net terms than is available within the country, they run an ecological deficit (conversely, if their residents use less, then they run an ecological remainder). An ecological deficit indicates that a country must rely on biocapacity from outside its own borders (through imports or emissions of CO<sub>2</sub> to the global atmosphere), or must be drawing down its own stock of natural capital.

The Ecological Footprint monitors the combined demand of anthropogenic pressures that are usually evaluated independently (climate change, fisheries collapse, land degradation / land-use change, etc.) and compresses this large amount of information into a single number. However, it does not assign arbitrary weights to individual components, but weights them proportional to their demand on biocapacity (Monfreda et al., 2004).

In 1961, humanity's Ecological Footprint was approximately half of what the biosphere could renew and sequester (biocapacity). According to the most updated National Footprint Accounts (GFN, 2009; Ewing et al., 2009), in the early 1980s human demand for the first time exceeded the planet's biocapacity. This overshoot<sup>2</sup> has continued to increase, reaching 44 percent in 2006 (see Figure 1). In other words, the Earth needed approximately 17 months to renew all the resources used and absorb the CO<sub>2</sub> emissions created, in 2006. As these annual deficits accrue into an ever larger ecological debt, ecological reserves are depleting, and greenhouse gases such as CO<sub>2</sub> are accumulating in the biosphere and atmosphere (Ewing et al., *forthcoming*).



**Figure 1:** The ratio of humanity's Ecological Footprint to the biocapacity of the Earth (1961-2006). Source: National Footprint Accounts 2009, Global Footprint Network.

The current state of environmental degradation means that natural ecosystems may lose their long-term ability to provide a consistent level of life-support services for mankind. Collapsing fisheries, loss of forest cover, depletion of freshwater systems,

<sup>2</sup> Global overshoot occurs when humanity's demand on nature exceeds the biosphere's supply, or regenerative capacity. Such overshoot leads to a depletion of Earth's life supporting natural capital and a build up of waste. At the global level, ecological deficit and overshoot are the same, since there is no net-import of resources to the planet. Local overshoot occurs when a local ecosystem is exploited more rapidly than it can renew itself.

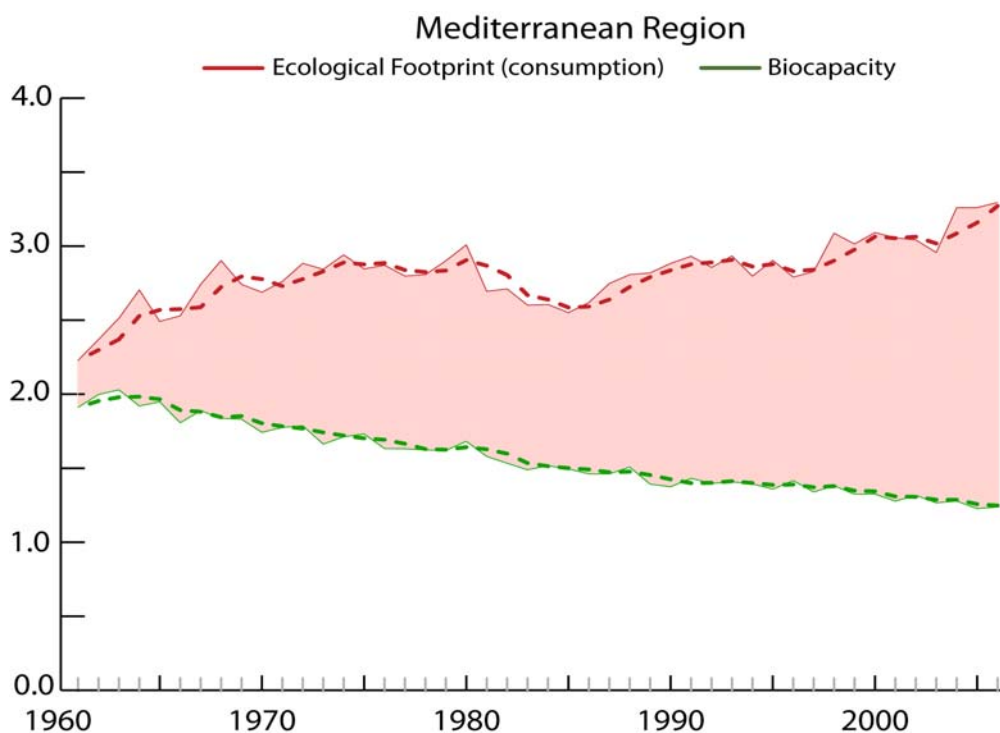
build-up of carbon dioxide in the atmosphere and the accumulation of wastes and pollutants are just a few noticeable examples (UNDP, 2007). If continued, overshoot will permanently reduce the Earth's ecological capacity, leading to a collapse in ecological and human well-being.

### 3. The Mediterranean Region's dependence on ecological services

The Mediterranean region cradles many of the world's most influential civilizations. This region, rich in history, art, and architecture, is home to many diverse cultures and continues to be an attractive destination for tourists (with more than 25 percent of global tourism visiting this region). However, it is becoming more and more ecologically fragile as demand for resources continues to increase the pressure on its ecological assets.

As a result, all Mediterranean nations (with the exception of Montenegro) are running ecological deficits. Each nation's residents, compounded by its visitors, use more ecological assets than are available within the nations' own borders, a situation which is likely to cause local ecological deterioration.

Starting even before 1961, the Mediterranean region as a whole was running a slight ecological deficit (see Figure 2): the per capita Ecological Footprint of an average resident of the Mediterranean region was equal to 2.2 gha - in line with the demand of a world average resident (2.3 gha) – while the average available biocapacity (1.9 gha per capita), was lower than the world average per capita ecological budget (3.7 gha).



**Figure 2:** The Ecological Footprint and biocapacity of the Mediterranean region since 1961 in global hectares per person. Dotted lines represent a three year moving average, while the solid lines represent raw yearly data.

During the period from 1961 to 2006, the Mediterranean region experienced an increase in average per capita Ecological Footprint (+ 48 percent), reaching 3.3 gha in 2006 and a decrease (- 35 percent) in the region's average biocapacity, which reached 1.2 gha per capita in 2006. By 2006, the Mediterranean region's per capita Ecological Footprint was larger than both the global average per capita Footprint and available biocapacity (Figure 2). This indicates that Mediterranean populations are consuming more resources than those available in the region and that their consumption patterns are not globally replicable in a sustainable manner.

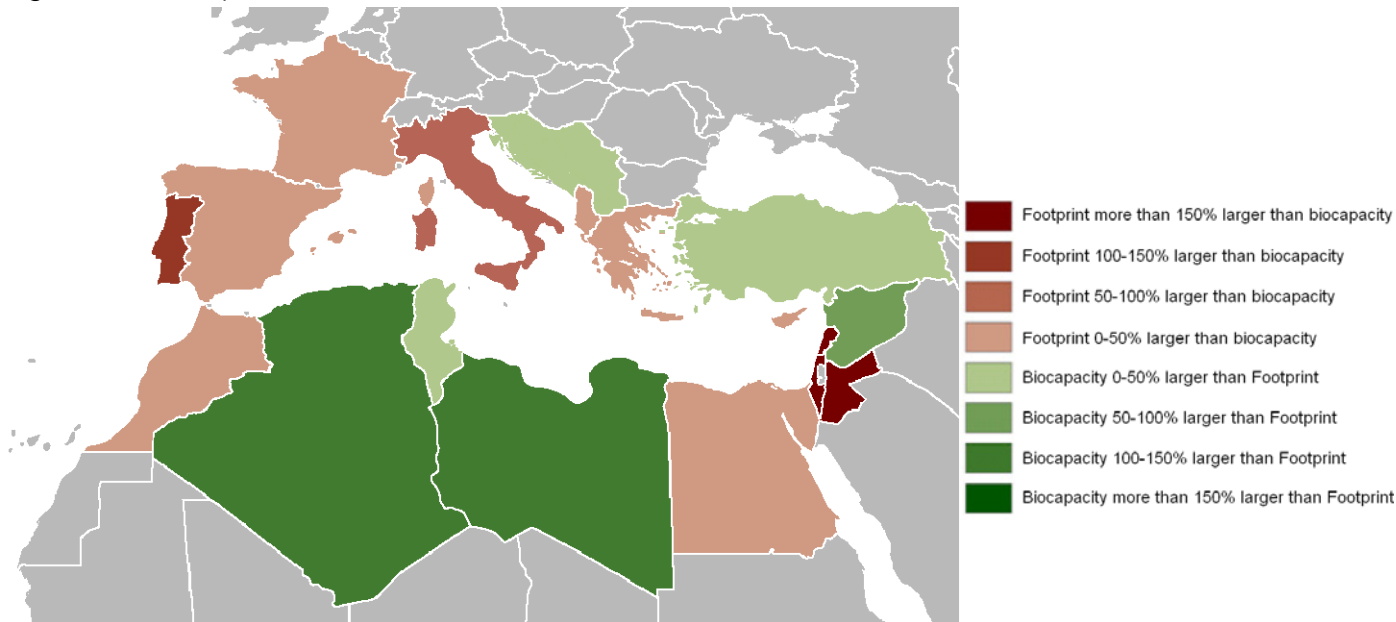
In 2006, the countries comprising the Mediterranean region occupied 401 million hectares of productive land. Of this, 65 million hectares were forest, 108 million hectares were cropland, 135 million hectares were grazing land, and 13 million hectares were covered by built infrastructure. The combined continental shelf area was 80 million hectares. The overall biocapacity of the region was 574 million global hectares, leading to an implied biocapacity per physical bioproductive hectare of 1.43 (the world average is defined as 1). This number reflects the high yields found on the productive land on the North shore of the Mediterranean. However, the total physical area of the countries in the Mediterranean region was 860 million hectares, giving a biocapacity density (biocapacity per physical hectare) of 0.67 (the world average is 0.93), a result of the large expanses of unproductive desert on the South shore.

The state of biocapacity density in each Mediterranean nation is reported in Figure 3; it shows a clear distinction between European and African countries, the latter being characterized by a lower biocapacity density. A high correlation between water availability and biocapacity per hectare can also be detected.

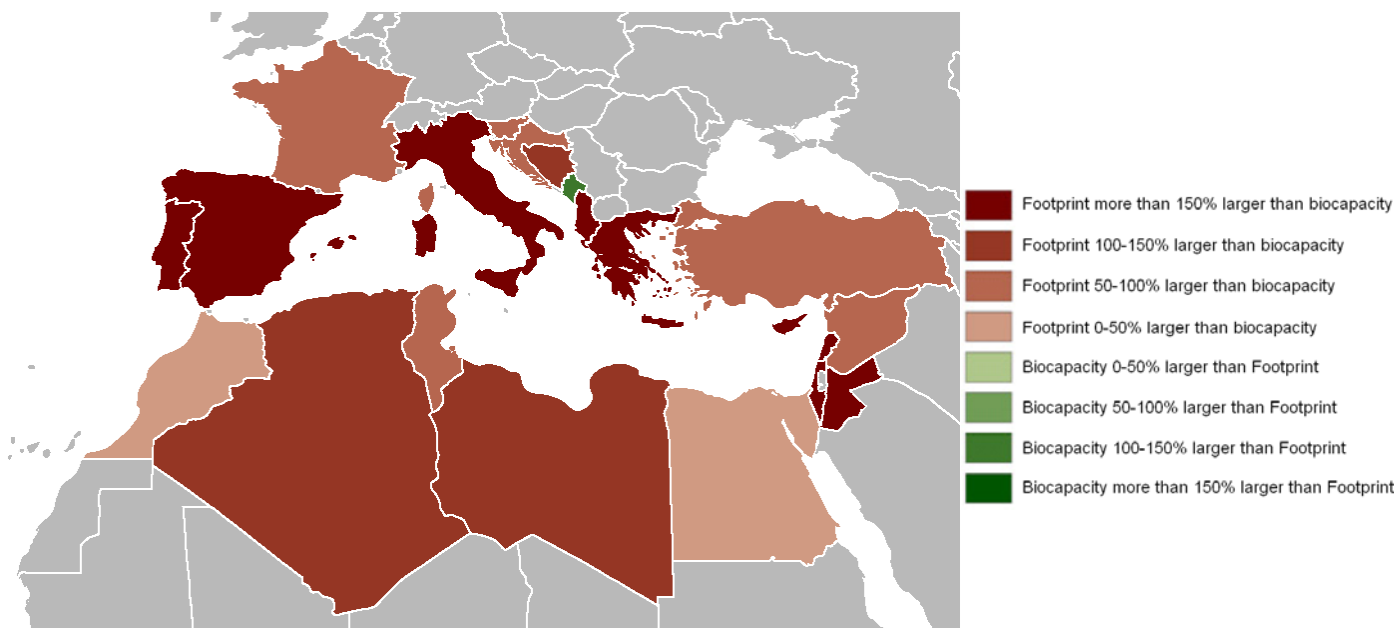


**Figure 3:** Map of the Mediterranean region showing the distribution of biocapacity per physical hectare throughout nations.

While only a few countries in the world ran an ecological deficit in 1961, most of the countries in the Mediterranean region were already characterized by a deficit situation. Only four decades later, in 2006, three quarters of the world population and all of the Mediterranean population (except that living in Montenegro), lived in countries that ran ecological deficits. This means those populations demanded more biocapacity for their final consumption than they had within their borders (see Figures 4 and 5).

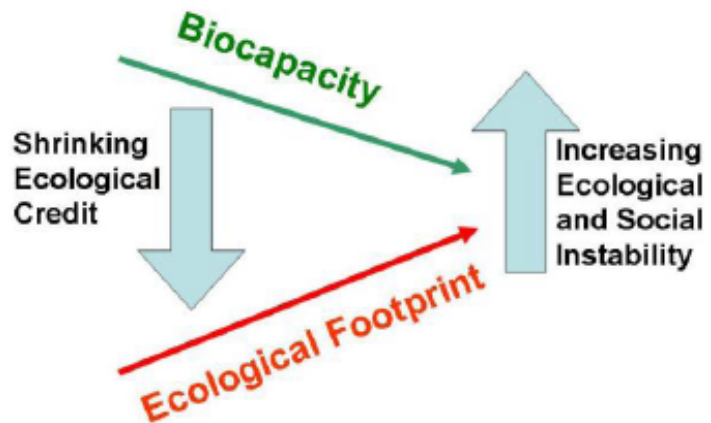


**Figure 4:** Creditor/Debtor status for countries in the Mediterranean region in 1961. Green nations represent countries where the local biocapacity is greater than their residents' Footprint (creditor countries); red represents countries where the Footprint is greater than local biocapacity (debtor countries).



**Figure 5:** Creditor/Debtor status for countries in the Mediterranean region in 2006. All countries ran ecological deficits in 2006, except Montenegro.

For successful governance of their nations and populations, policy and decision makers should pay attention to local resource availability, economic purchasing power to access other regions' biocapacity, and overall demand for resources and ecological services. As ecological budgets shrink per person, competition for global natural resources (e.g., biocapacity) tightens. One consequence is the increased risk of political, economic and social instability. The faster an entity (government, agency, corporation, etc.) loses ecological margin – shrinking their ecological surplus or moving into an ecological deficit situation – the sooner that nation will be forced to manage resource demand, energy efficiency and threats to quality of life. Historical Footprint trends, as well as future Footprint scenario assessments, can enable key decision and policy makers to make informed decisions that avoid internal, regional or international instability due to political, economic and social pressures (Abdullatif et al., 2009).



#### 4. How Countries Compare

Humanity as a whole is not living within the means of the planet, and countries vary widely in their relative resource demand as natural resource wealth and material consumption are not evenly distributed worldwide. Some countries and regions have a net demand on the planet greater than their respective biocapacity, while others use less than their available capacity.

There is no physical law or principle requiring all countries to live within their own biocapacity. In the globalized world we live in, countries can access biocapacity from elsewhere. In the short-run, it is possible for all countries to run an ecological deficit – but this leads to overshoot and the gradual liquidation of ecological assets, including the saturation of waste sinks. The physical constraint is that not all countries can be ecological debtors over the long-run.

In a world that is already in global overshoot, running an ecological deficit, therefore, becomes an increasing risk for that country's economy. It takes financial resources to import natural resources from elsewhere. While CO<sub>2</sub> emissions are still largely unpaid for, this may change in a future that has a climate agreement in place. If no climate agreement is in place, then international cooperation may suffer due to the asymmetric impacts of climate change, and international trade may thus become more expensive.

In a state of global overshoot, it therefore becomes important for countries to understand their ecological risk exposure. The size of an ecological deficit is an approximation of that risk.

## Albania

In 2006, Albania occupied 3.6 million hectares of land and sea, including 2.8 million hectares of productive area. Of this, 799,000 hectares were forest, 705,000 hectares were cropland, 415,000 hectares were grazing land, and 104,000 hectares were covered by built infrastructure. Albania has 743,000 hectares of continental shelf in the Mediterranean Sea.

Albania's cropland, fishery, and forest yields were all lower than the global average, while grazing yields were higher, leading to a total biocapacity of 3.2 million global hectares (gha). This was significantly less than Albania's Ecological Footprint of consumption of 8.1 million gha. **Albania has been running an ecological deficit since before 1961.** Albania's Ecological Footprint of production, minus the carbon Footprint, of 2.5 million gha was less than local biocapacity in 2006. This indicates that in 2006, in aggregate, Albania may not have extracted more from its ecosystems than the ecosystems themselves could renew, since some of their demand was covered by ecosystem services from outside of Albania.

In 2006, Albania's average Ecological Footprint per capita was 2.6 gha, equal to the global average Footprint per capita, but larger than the global average available biocapacity per capita.

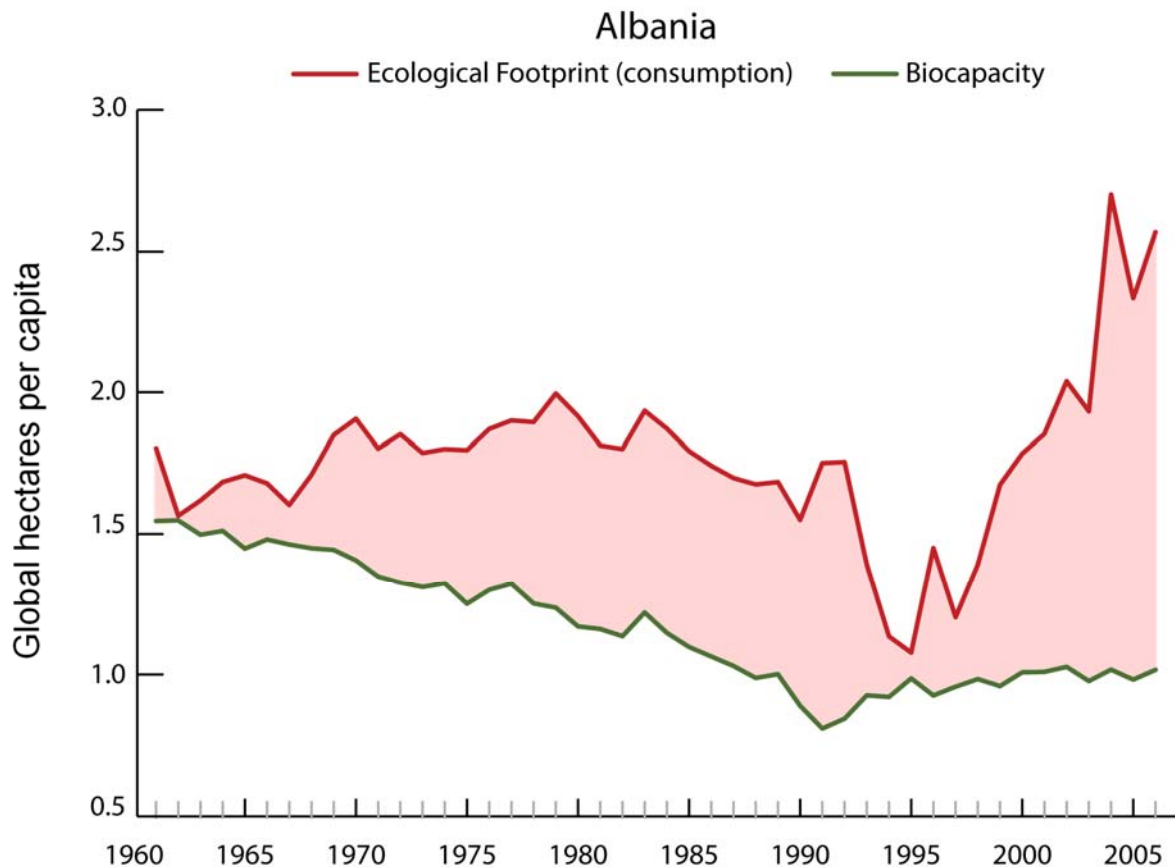


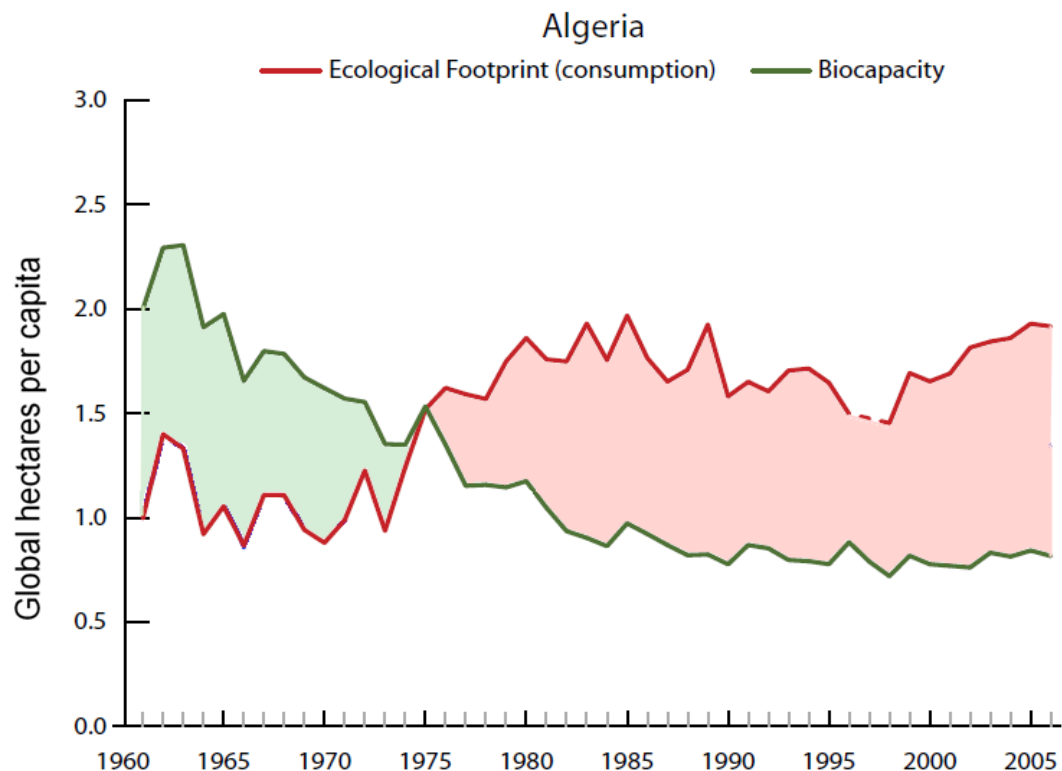
Figure 6: Albania's Ecological Footprint and biocapacity per capita over time.

## Algeria

In 2006, Algeria occupied 239.2 million hectares of land and sea, including 45.5 million hectares of productive area. Of this productive area, 2.3 million hectares were forest, 8.4 million hectares were cropland, 32.8 million hectares were grazing land and 1.0 million hectares were covered by built infrastructure. Algeria had 0.97 million hectares of continental shelf in the Mediterranean Sea, and due to Algeria's dry climate there is no significant inland water area.

Algeria's cropland, grazing land, fishery, and forest yields were all lower than the global average, leading to a total biocapacity of 27.2 million global hectares (gha). This was significantly less than Algeria's Ecological Footprint of consumption of 63.9 million gha. **Algeria has been running an ecological deficit since 1976**, made possible, in part, because of its ability to use oil revenue to import resources. Algeria's Ecological Footprint of production, minus the carbon Footprint, of 21.1 million gha was less than local biocapacity in 2006. This indicates that in 2006, in aggregate, Algeria may not have extracted more from its ecosystems than the ecosystems themselves could renew, since some of their demand was covered by ecosystem services from outside of Algeria.

In 2006, Algeria's average Ecological Footprint per capita was 1.9 gha, smaller than the global average Footprint per capita, but larger than the global average available biocapacity per capita.



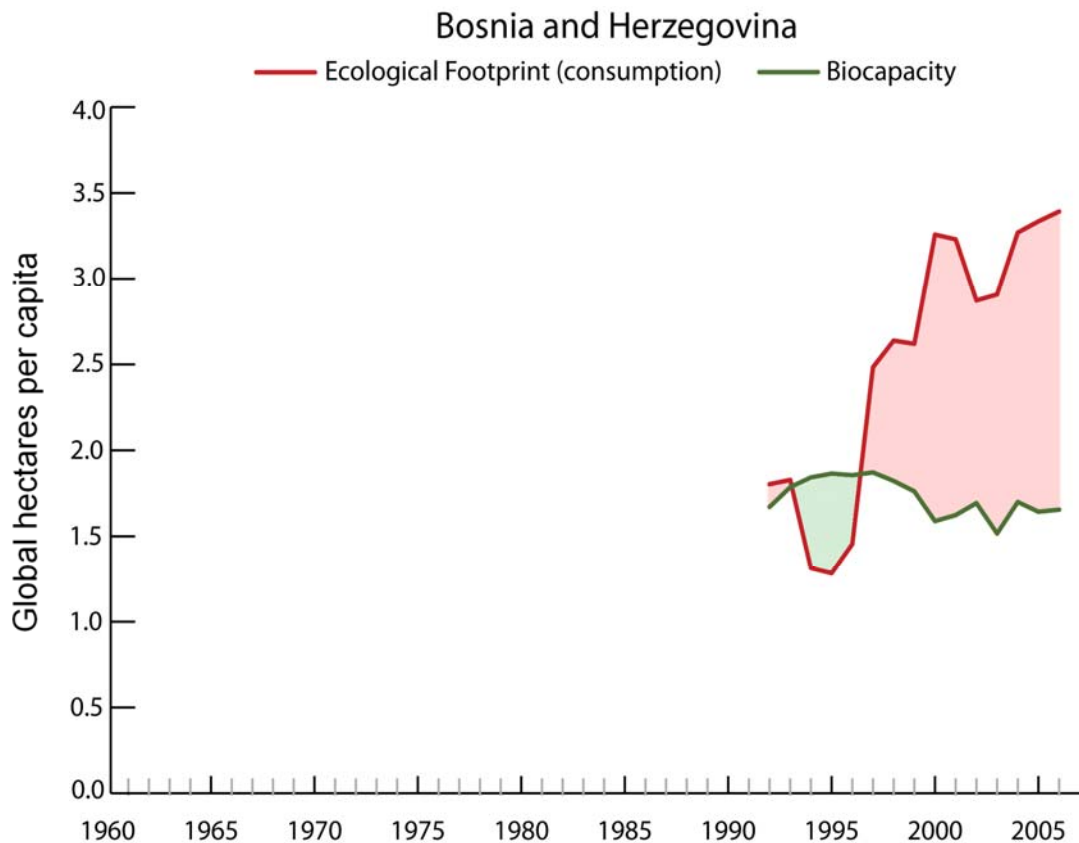
**Figure 7:** Algeria's Ecological Footprint and biocapacity per capita over time. Dotted lines indicate interpolation due to inconsistencies in the source data.

## Bosnia and Herzegovina

In 2006, Bosnia and Herzegovina occupied 5.4 million hectares of land and sea, including 4.5 million hectares of productive area. Of this, 2.2 million hectares were forest, 1.1 million hectares were cropland, 1.0 million hectares were grazing land and 148,000 hectares were covered by built infrastructure. Bosnia and Herzegovina has 240 hectares of continental shelf in the Mediterranean Sea.

Bosnia and Herzegovina's cropland yields were lower than the global average, while grazing and fishing yields were at the world average and forest yields were higher, leading to a total biocapacity of 6.5 million global hectares (gha). This was significantly less than Bosnia and Herzegovina's Ecological Footprint of consumption of 13.3 million gha. **Bosnia and Herzegovina has been running an ecological deficit since 1997.** Bosnia and Herzegovina's Ecological Footprint of production, minus the carbon Footprint, of 5.5 million gha was less than local biocapacity in 2006. This indicates that in 2006, in aggregate, Bosnia and Herzegovina may not have extracted more from its ecosystems than the ecosystems themselves could renew, since some of their demand was covered by ecosystem services from outside of Bosnia and Herzegovina.

In 2006, Bosnia and Herzegovina's average Ecological Footprint per capita was 3.4 gha, greater than the global average Footprint per capita and larger than the global average available biocapacity per capita.



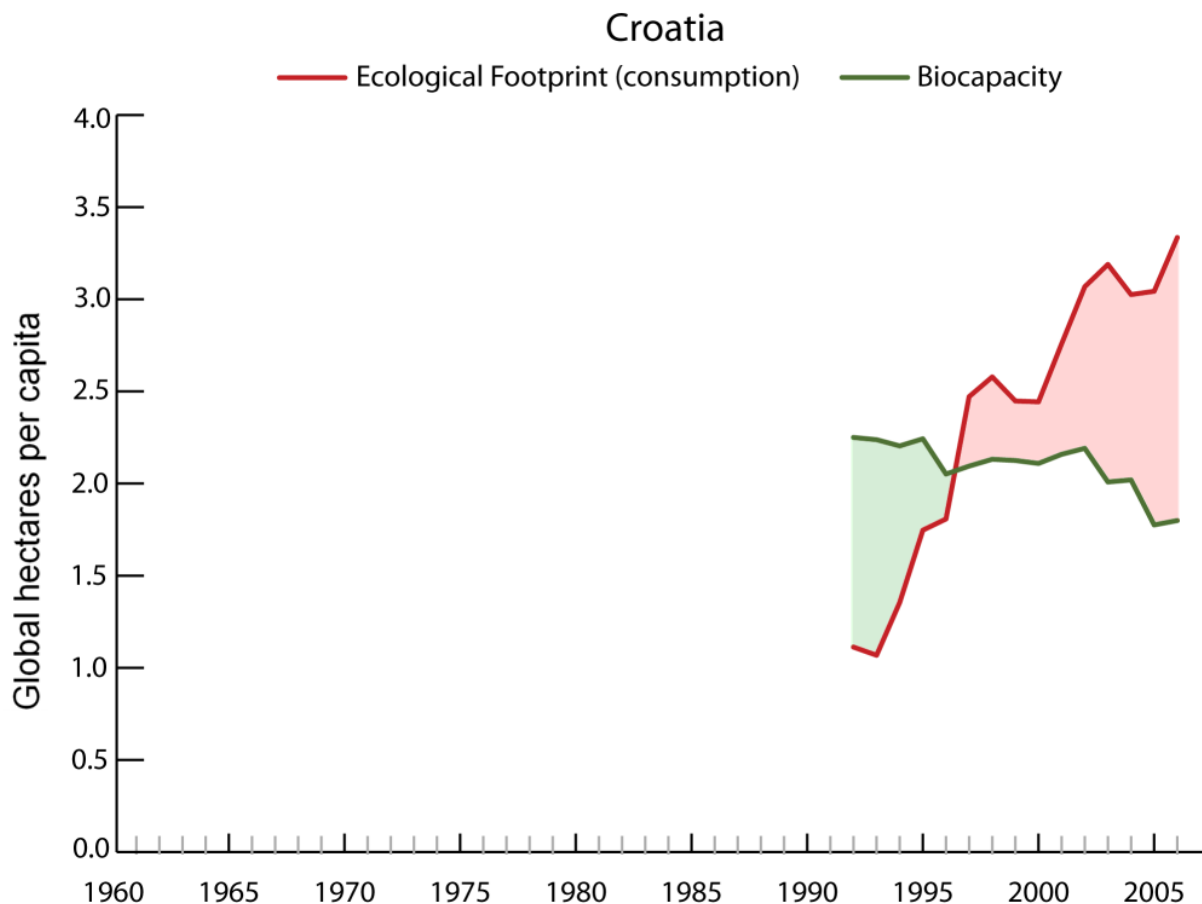
**Figure 8:** Bosnia and Herzegovina's Ecological Footprint and biocapacity per capita over time.

## Croatia

In 2006, Croatia occupied 10.2 million hectares of land and sea, including 7.8 million hectares of productive area. Of this, 2.1 million hectares were forest, 338,000 hectares were cropland, 661,000 hectares were grazing land and 169,000 hectares were covered by built infrastructure. Croatia has 4.5 million hectares of continental shelf in the Mediterranean Sea.

Croatia's cropland, grazing, and forest yields were higher than the global average, while fishing yields were lower, leading to a total biocapacity of 8.2 million global hectares (gha). This was significantly less than Croatia's Ecological Footprint of consumption of 15.2 million gha. **Croatia has been running an ecological deficit since 1997.** Croatia's Ecological Footprint of production, minus the carbon Footprint, of 4.6 million gha was less than local biocapacity in 2006. This indicates that in 2006, in aggregate, Croatia may not have extracted more from its ecosystems than the ecosystems themselves could renew, since some of their demand was covered by ecosystem services from outside of Croatia.

In 2006, Croatia's average Ecological Footprint per capita was 3.3 gha, greater than the global average Footprint per capita, and larger than the global average available biocapacity per capita.



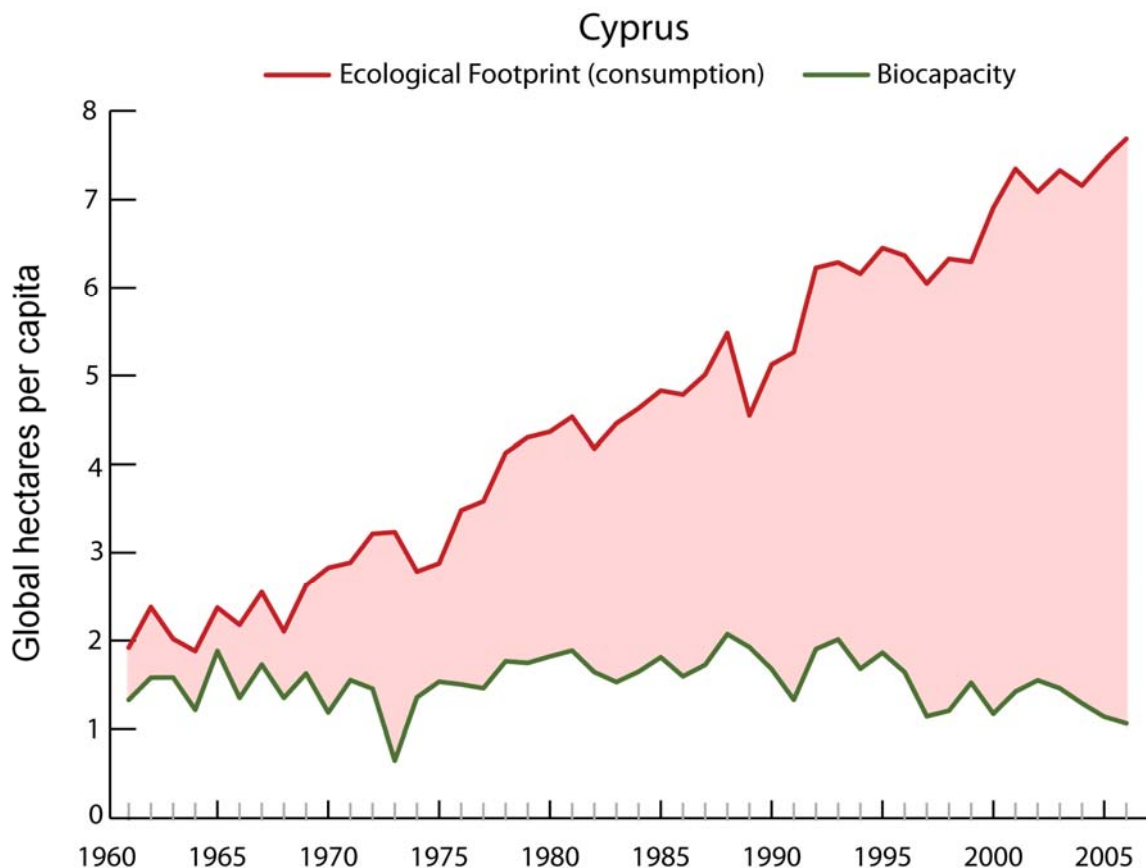
**Figure 9:** Croatia's Ecological Footprint and biocapacity per capita over time.

## Cyprus

In 2006, Cyprus occupied 1.2 million hectares of land and sea, including 948,000 hectares of productive area. Of this, 175,000 hectares were forest, 156,000 hectares were cropland, 1,000 hectares were grazing land and 319,000 hectares were covered by built infrastructure. Cyprus has 296,000 hectares of continental shelf in the Mediterranean Sea.

Cyprus' cropland, forest, and fishing yields were lower than the global average, while grazing yields were equal, leading to a total biocapacity of 901,000 global hectares (gha). This was significantly less than Cyprus' Ecological Footprint of consumption of 6.5 million gha. **Cyprus has been running an ecological deficit since before 1961.** Cyprus' Ecological Footprint of production, minus the carbon Footprint, of 801,000 gha was less than local biocapacity in 2006. This indicates that in 2006, in aggregate, Cyprus may not have extracted more from its ecosystems than the ecosystems themselves could renew, since some of their demand was covered by ecosystem services from outside of Cyprus.

In 2006, Cyprus' average Ecological Footprint per capita was 7.7 gha, greater than the global average Footprint per capita, and larger than the global average available biocapacity per capita.



**Figure 10:** Cyprus' Ecological Footprint and biocapacity per capita over time. Dotted lines indicate interpolation due to inconsistencies in the source data.

## Egypt

In 2006, Egypt occupied 105.1 million hectares of land and sea, including 11.9 million hectares of productive area. Of this, 69,000 hectares were forest, 3.5 million hectares were cropland, 1.3 million hectares grazing land and 1.3 million hectares were covered by built infrastructure. Bordering the Mediterranean and the Red Sea, Egypt had 5 million hectares of continental shelf, and the Nile and its tributaries provided 0.6 million hectares of inland water.

Egypt's cropland yields were greater than the global average, while grazing land, fishery, and forest yields are lower, leading to a total biocapacity of 23.8 million global hectares (gha). This is significantly less than Egypt's Ecological Footprint of consumption of 103.8 million gha. **Egypt has been running an ecological deficit since before 1961**, made possible, in part, because of its ability to use oil revenue to import resources. Egypt's Ecological Footprint of production, less the carbon Footprint, of 29.5 million gha was greater than the local biocapacity in 2006. This indicates that Egypt may have been drawing down its stock of natural capital.

In 2006, Egypt's average Ecological Footprint per capita was 1.4 gha, smaller than the global average Footprint per capita and the global average available biocapacity per capita.

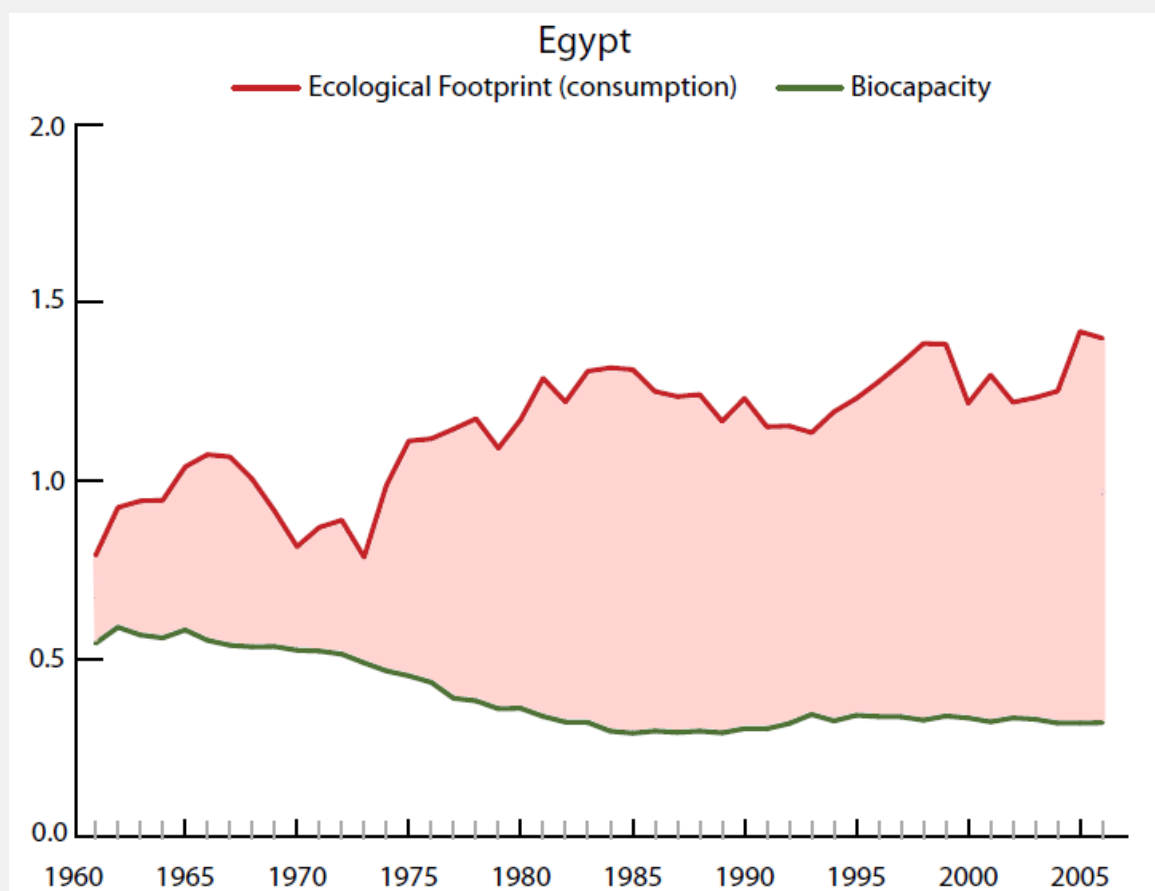


Figure 11-A: Egypt's Ecological Footprint and biocapacity per capita over time.

### Egypt (continued)

A country's production overshoot (defined when Footprint of production exceeds available biocapacity) may be observable in two of the six land types: forest land and fishing grounds. Carbon uptake land is always in overshoot, as there is no biocapacity set aside explicitly for carbon storage. Egypt's production overshoot came entirely from forest land; fishing grounds were in surplus. Continued overshoot in forestry will result in further deforestation of Egypt's remaining forests, with severe impacts on soil stability, water storage, and biodiversity.

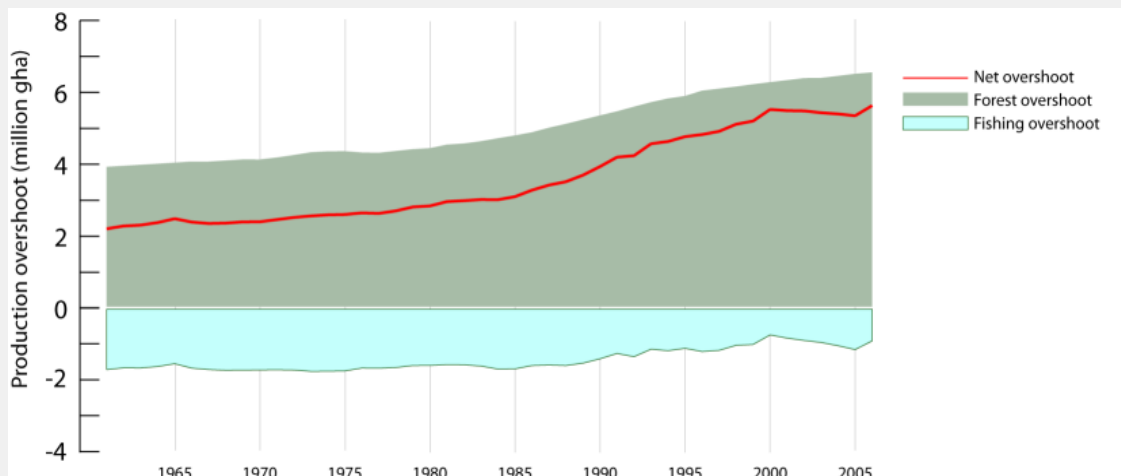


Figure 11-B: Egypt's production overshoot (excluding carbon).

Evaluating production overshoot with the inclusion of carbon shows the large demand that Egypt's production is placing on global biocapacity.

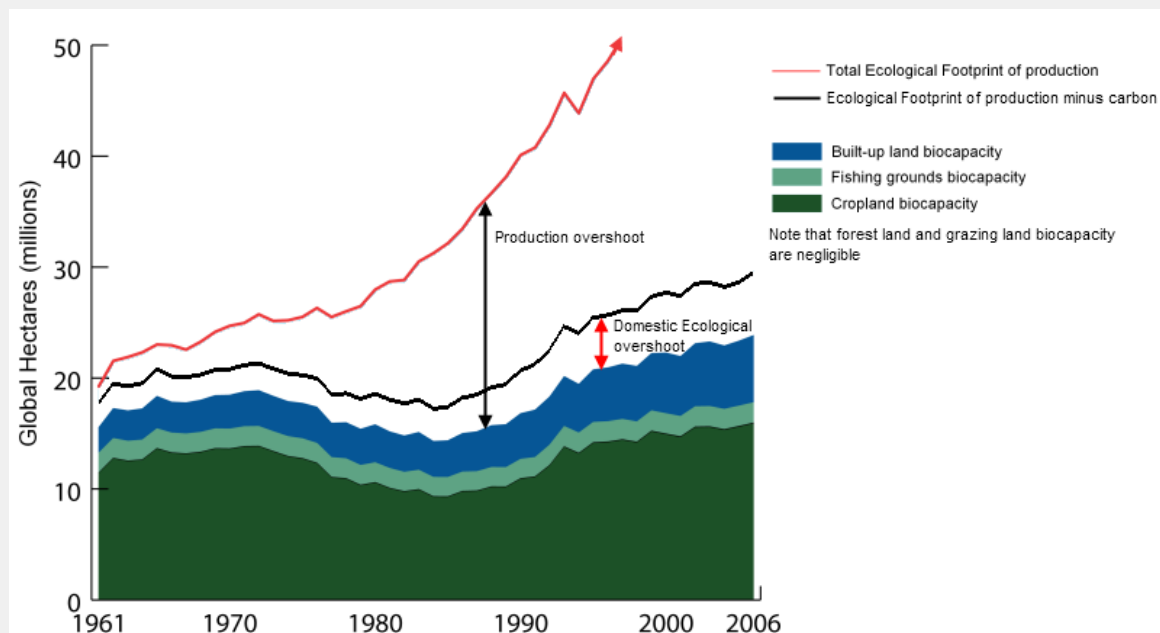


Figure 11-C: Egypt's production and domestic ecological overshoot (including carbon).

### ***Egypt (continued)***

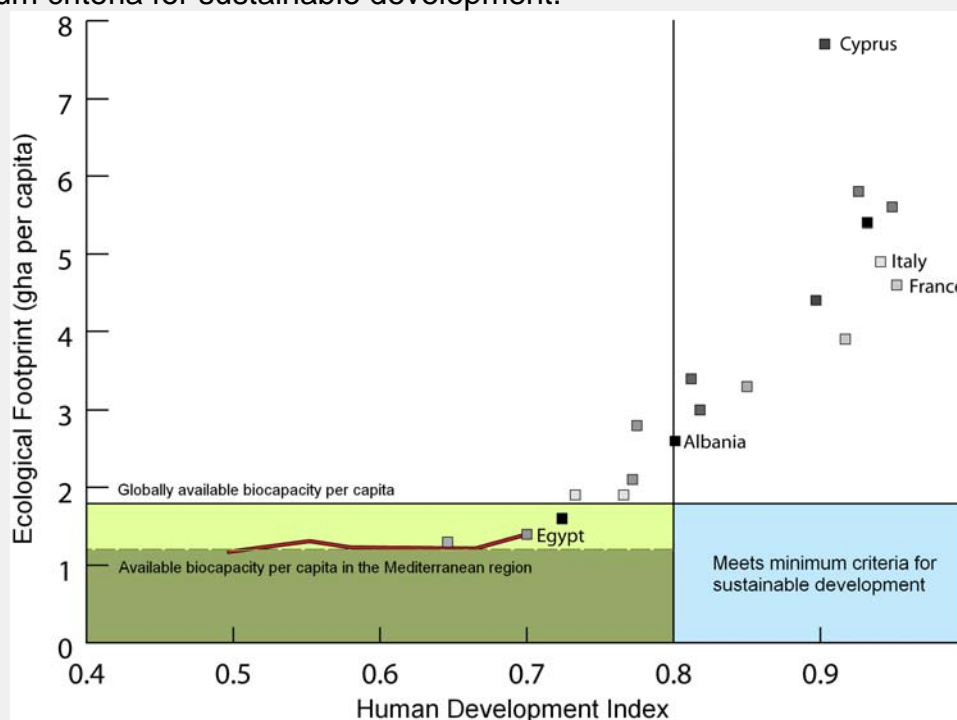
If the concept of ecological constraints is accepted, then every population, region, or country has to determine its own optimal level of resource consumption. A consumption rate that is too low can lead to inadequate food, shelter and overall human health. Conversely, a consumption rate that is too high can put a population at risk, since domestic ecological deficits in a world with significant ecological overshoot will become an increasing liability to economies.

Optimal resource consumption for a region or country depends on three factors:

1. the amount of biocapacity in their country,
2. the amount of biocapacity in the world as a whole, and
3. the country's purchasing power compared to world average.

If the country's purchasing power is below the worldwide average, then it is unlikely the region will be able to maintain a positive biocapacity trade balance. Countries with low purchasing power will not be able to access biocapacity from elsewhere. Rather, they may in fact end up sacrificing biocapacity to countries with high purchasing power.

One way of determining the optimal resource consumption rate is to explore the level needed to attain a high level of social welfare. The Human Development Index (HDI) is one measure of this; an HDI of 0.8 or greater is considered high human development. When comparing the HDI to the Ecological Footprint, no nation had yet achieved both a high level of development and a globally replicable sustainable rate of consumption in 2006. In the Mediterranean region, Jordan came closest, while Egypt was currently on a pathway to meeting these minimum criteria for sustainable development.



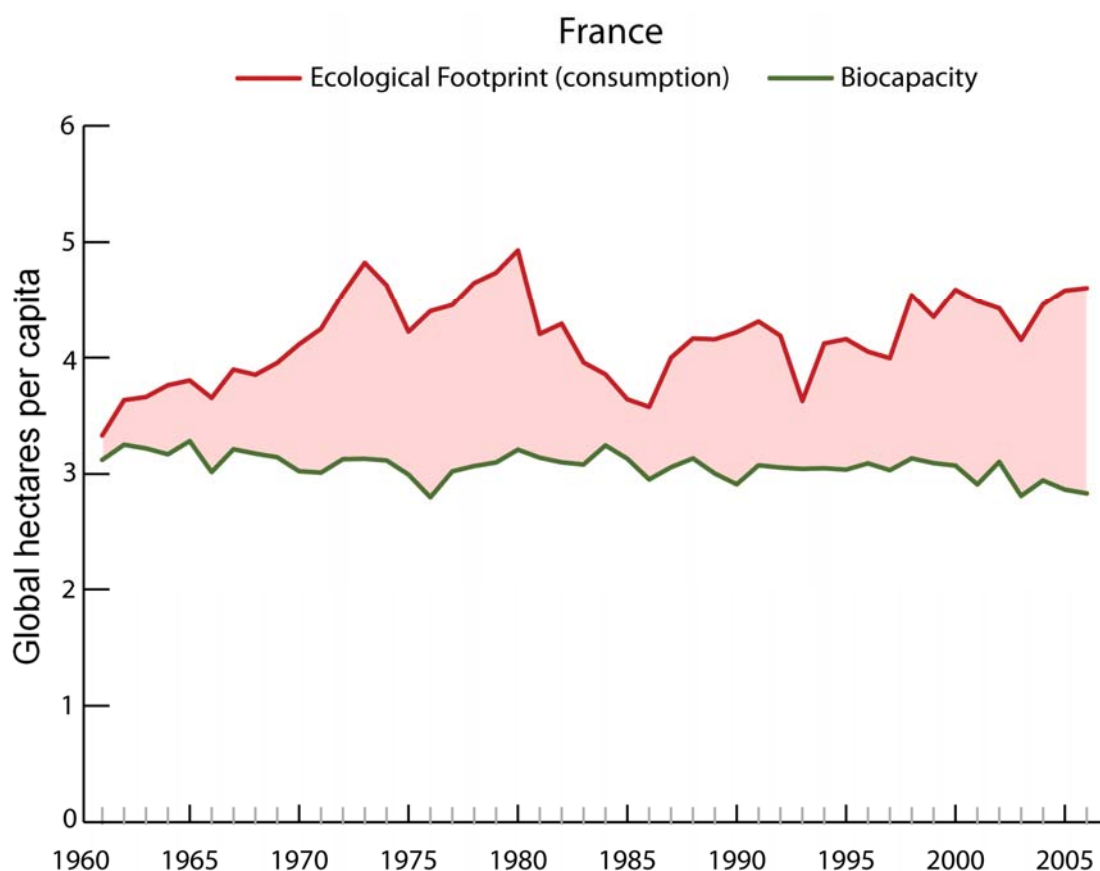
**Figure 11-D:** Ecological Footprint and Human Development Index for Egypt and the Mediterranean Region, 2006.

## France

In 2006, France occupied 71.0 million hectares of land and sea, including 66.5 million hectares of productive area. Of this, 14.8 million hectares were forest, 16.8 million hectares were cropland, 15.7 million hectares were grazing land, and 2.8 million hectares were covered by built infrastructure. France has 16.1 million hectares of continental shelf in the Mediterranean Sea, Atlantic Ocean, North Sea, and English Channel.

France's cropland, grazing, forest, and fishing yields were all higher than the global average, leading to a total biocapacity of 173.7 million global hectares (gha). This was significantly less than France's Ecological Footprint of consumption of 282 million gha. **France has been running an ecological deficit since before 1961.** France's Ecological Footprint of production, minus the carbon Footprint, of 140.3 million gha was less than local biocapacity in 2006. This indicates that in 2006, in aggregate, France may not have extracted more from its ecosystems than the ecosystems themselves could renew, since some of their demand was covered by ecosystem services from outside of France.

In 2006, France's average Ecological Footprint per capita was 4.6 gha, greater than the global average Footprint per capita, and larger than the global average available biocapacity per capita.



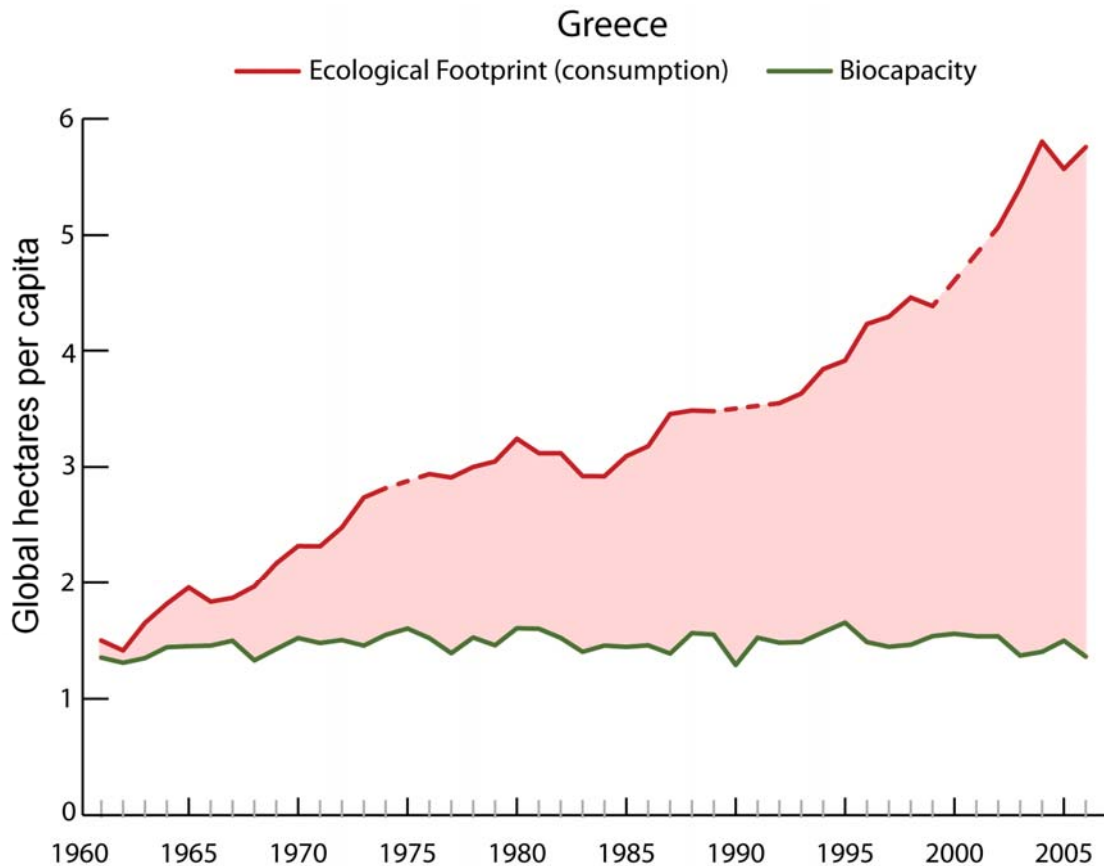
**Figure 12:** France's Ecological Footprint and biocapacity per capita over time.

## Greece

In 2006, Greece occupied 22.6 million hectares of land and sea, including 17.5 million hectares of productive area. Of this, 2.5 million hectares were forest, 2.9 million hectares were cropland, 2.2 million hectares were grazing land, and 294,000 hectares were covered by built infrastructure. Greece has 9.4 million hectares of continental shelf in the Mediterranean Sea.

Greece's cropland yields were higher than the global average, while fishing and forest yields were lower and grazing yields were equal, leading to a total biocapacity of 15.2 million global hectares (gha). This was significantly less than Greece's Ecological Footprint of consumption of 64.0 million gha. **Greece has been running an ecological deficit since before 1961.** Greece's Ecological Footprint of production, less the carbon Footprint, of 12.2 million gha was less than local biocapacity in 2006. This indicates that in 2006, in aggregate, Greece may not have extracted more from its ecosystems than the ecosystems themselves could renew, since some of their demand was covered by ecosystem services from outside of Greece.

In 2006, Greece's average Ecological Footprint per capita was 5.8 gha, greater than the global average Footprint per capita, and larger than the global average available biocapacity per capita.



**Figure 13:** Greece's Ecological Footprint and biocapacity per capita over time. Dotted lines indicate interpolation due to inconsistencies in the source data.

## Israel

In 2006, Israel occupied 2.5 million hectares of land and sea, including 1.2 million hectares of productive area. Of this, 172,000 hectares were forest, 375,000 hectares were cropland, 125,000 hectares were grazing land, and 129,000 hectares were covered by built infrastructure. Israel had 321,000 hectares of continental shelf in the Mediterranean Sea.

Israel's cropland and forest yields were higher than the global average, while the grazing and fishery yields were lower, leading to a total biocapacity of 2.2 million global hectares (gha). This was vastly lower than Israel's Ecological Footprint of consumption of 36.6 million gha. **Israel has been running an ecological deficit since before 1961**, made possible in part due to wealth transfers from overseas. Israel's Ecological Footprint of production, less the carbon Footprint, of 2.0 million gha was less than local biocapacity in 2006. This indicates that in 2006, in aggregate, Israel may not have extracted more from its ecosystems than the ecosystems themselves could renew, since some of their demand was covered by ecosystem services from outside of Israel.

In 2006, Israel's average Ecological Footprint per capita was 5.4 gha, much larger than the global average Footprint per capita and the global average available biocapacity per capita, indicating that the consumption of Israel was not globally replicable in a sustainable manner.

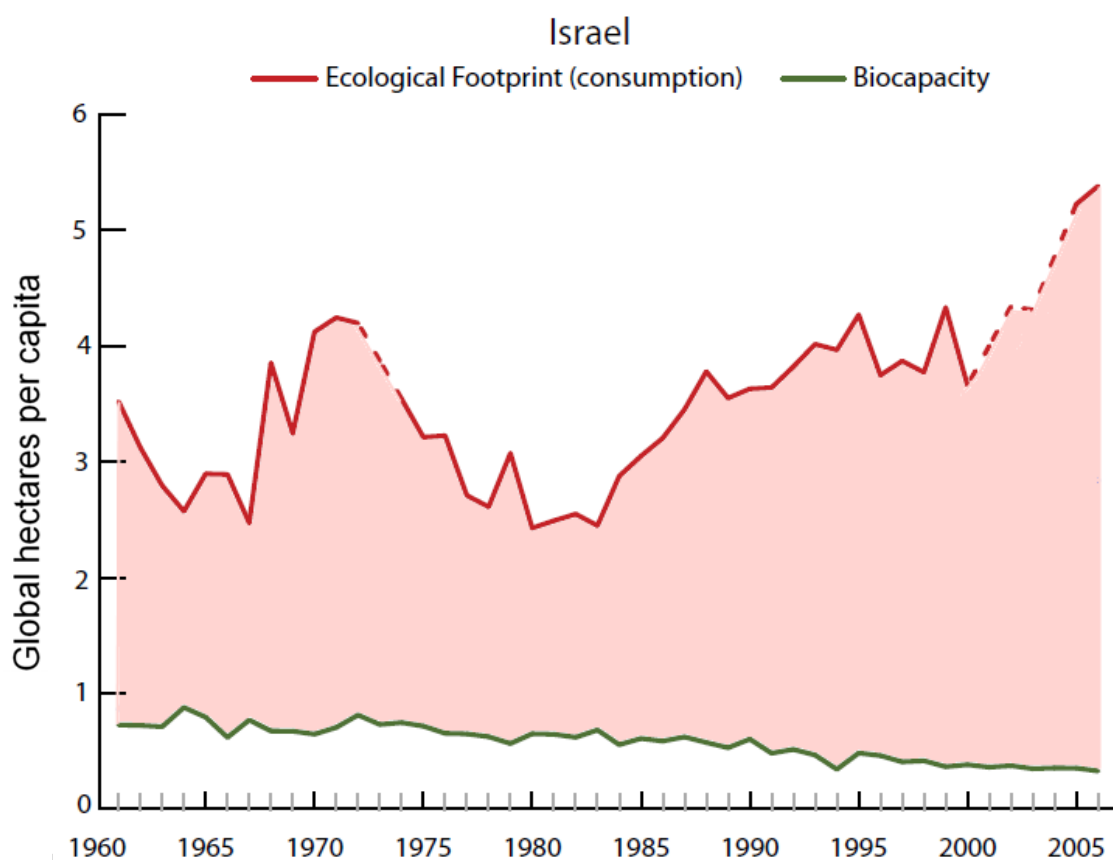


Figure 14. Israel's Ecological Footprint and biocapacity per capita over time. Dotted lines indicate interpolation due to inconsistencies in the source data.

## Italy

In 2006, Italy occupied 41.2 million hectares of land and sea, including 35.5 million hectares of productive area. Of this, 8.4 million hectares were forest, 9.2 million hectares were cropland, 5.1 million hectares were grazing land, and 1.5 million hectares were covered by built infrastructure. Italy has 11.1 million hectares of continental shelf in the Mediterranean Sea.

Italy's cropland, grazing, and forest yields were higher than the global average, while fishing yields were lower, leading to a total biocapacity of 60.8 million global hectares (gha). This was significantly less than Italy's Ecological Footprint of consumption of 290.1 million gha. **Italy has been running an ecological deficit since before 1961.** Italy's Ecological Footprint of production, less the carbon Footprint, of 45.1 million gha was less than local biocapacity in 2006. This indicates that in 2006, in aggregate, Italy may not have extracted more from its ecosystems than the ecosystems themselves could renew, since some of their demand was covered by ecosystem services from outside of Italy.

In 2006, Italy's average Ecological Footprint per capita was 4.9 gha, greater than the global average Footprint per capita, and larger than the global average available biocapacity per capita.

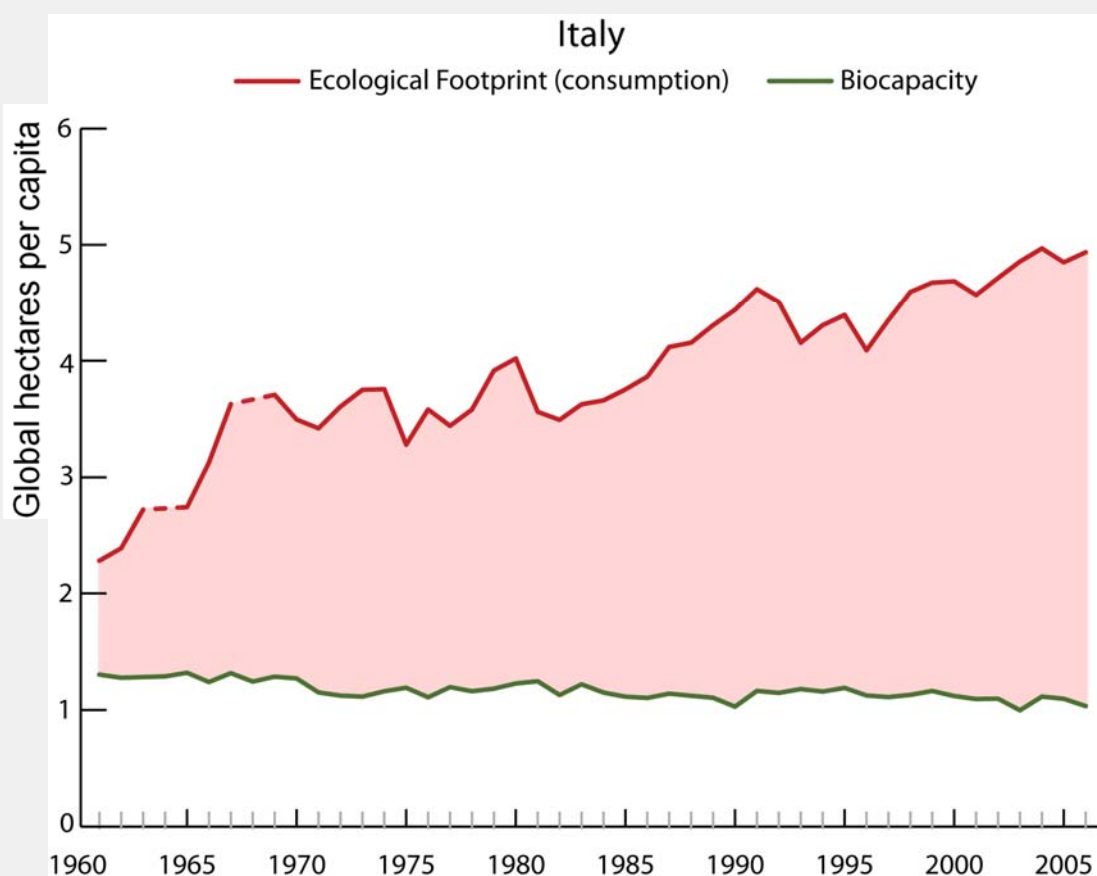


Figure 15-A: Italy's Ecological Footprint and biocapacity per capita over time.

### Italy (continued)

The story of Italy during the last four decades is a story of growth and increasing ecological deficit. From 1961 to 2006, the per capita Ecological Footprint increased by about 116 percent, passing from 2.3 to 4.9 gha and increasing the gap between national ecological demand and supply.

In the last few decades, Italy has experienced a big change, especially following World War II until the 1960s. During this time Italy saw an economic boom, as testified, for example, by the growth of Fiat, the Italian automobile manufacturing company. Increased economic activity required an increase in energy and fuel consumptions and, as a consequence, an increase in the carbon Footprint. In 1961, Italy's carbon Footprint was 0.2 gha per capita (8 percent of the overall demand), while in 2006 it was 2.9 gha per capita (58 percent of the national Footprint). In the same period, Italy's demand for cropland decreased by 18 percent, from 1.3 to 1.0 gha per capita.

The transition from an agricultural society (mostly relying on cropland) to an industrial society (mostly relying on carbon uptake land) led to an increase in per capita GDP, which almost quadrupled in the period 1961-2006. This large increase in the national economy (represented by the increase in GDP) was financed, at least partially, through a continuously increasing demand on natural capital (represented by the increase in Footprint).

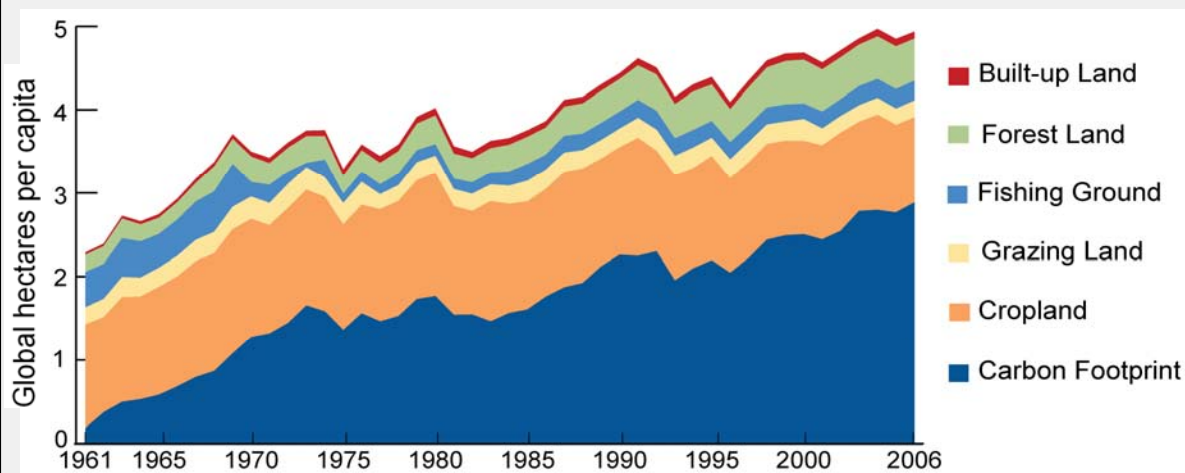


Figure 15-B: Italy's per capita Ecological Footprint by component and over time.

Local ecological deficits probably occurred before 1960 in Italy. However, because of the increased purchasing power, Italy was able to access resources that were unavailable locally, thus meeting the growing needs of its population.

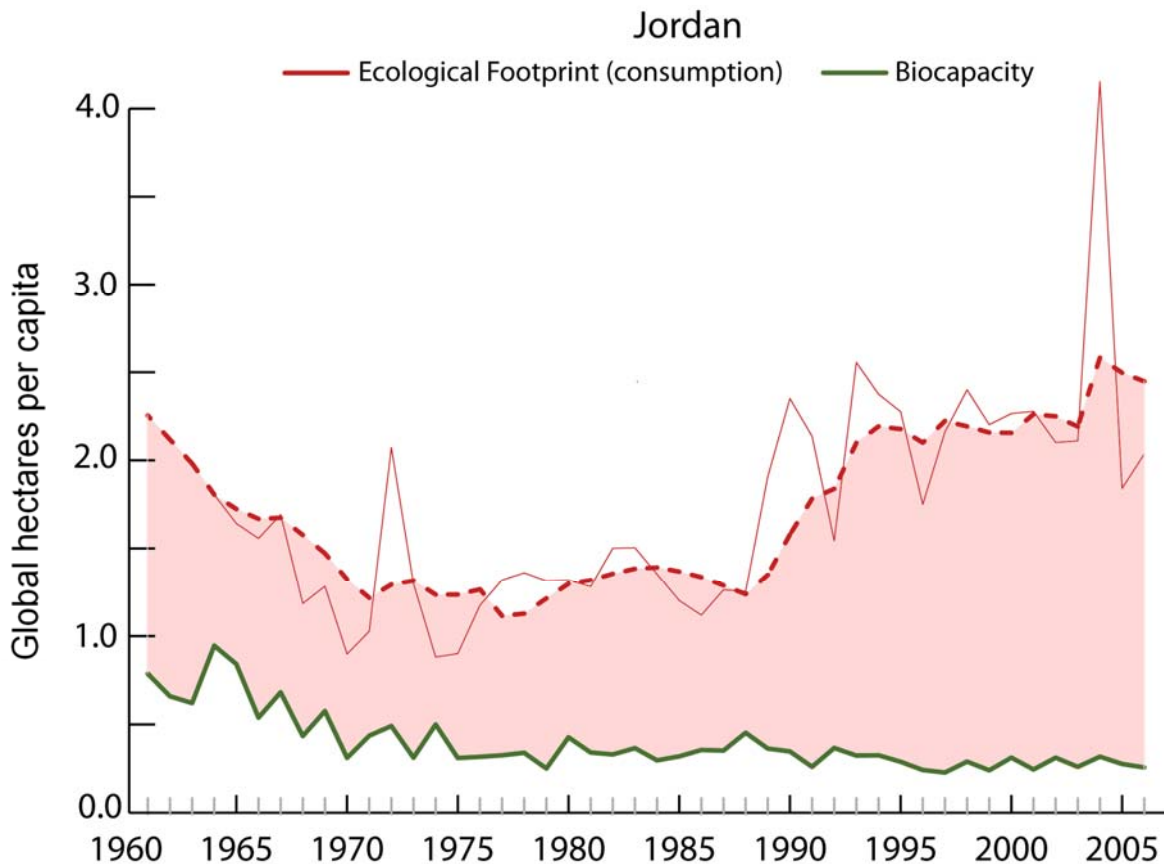
Italian society's well-being was maintained by accumulating environmental debt through net imports of biocapacity. This situation was even more accentuated in 2006, and put Italy's future development at risk because of the intrinsic fragility of both the Mediterranean and global ecosystems upon which Italians depend.

## Jordan

In 2006, Jordan occupied 8.9 million hectares, including 1.4 million hectares of productive area. Of this, 83,000 hectares were forest, 276,000 hectares were cropland, 742,000 hectares were grazing land, and 199,000 hectares were covered by built infrastructure. Jordan has 62,000 hectares of inland water and continental shelf.

Jordan's cropland and forest yields were higher than the global average, while the grazing and fishery yields were lower, leading to a total biocapacity of 1.5 million global hectares (gha). This was much lower than Jordan's Ecological Footprint of consumption of 11.7 million gha. **Jordan has been running an ecological deficit since before 1961.** Jordan's Ecological Footprint of production, less the carbon Footprint, of 1.4 million gha was less than local biocapacity in 2006. This indicates that in 2006, in aggregate, Jordan may not have extracted more from its ecosystems than the ecosystems themselves could renew, since some of their demand was covered by ecosystem services from outside of Jordan.

In 2006, Jordan's average Ecological Footprint per capita was 2.0 gha, lower than the global average Footprint per capita but higher than the global average available biocapacity per capita, indicating that the consumption of Jordan was not globally replicable in a sustainable manner.



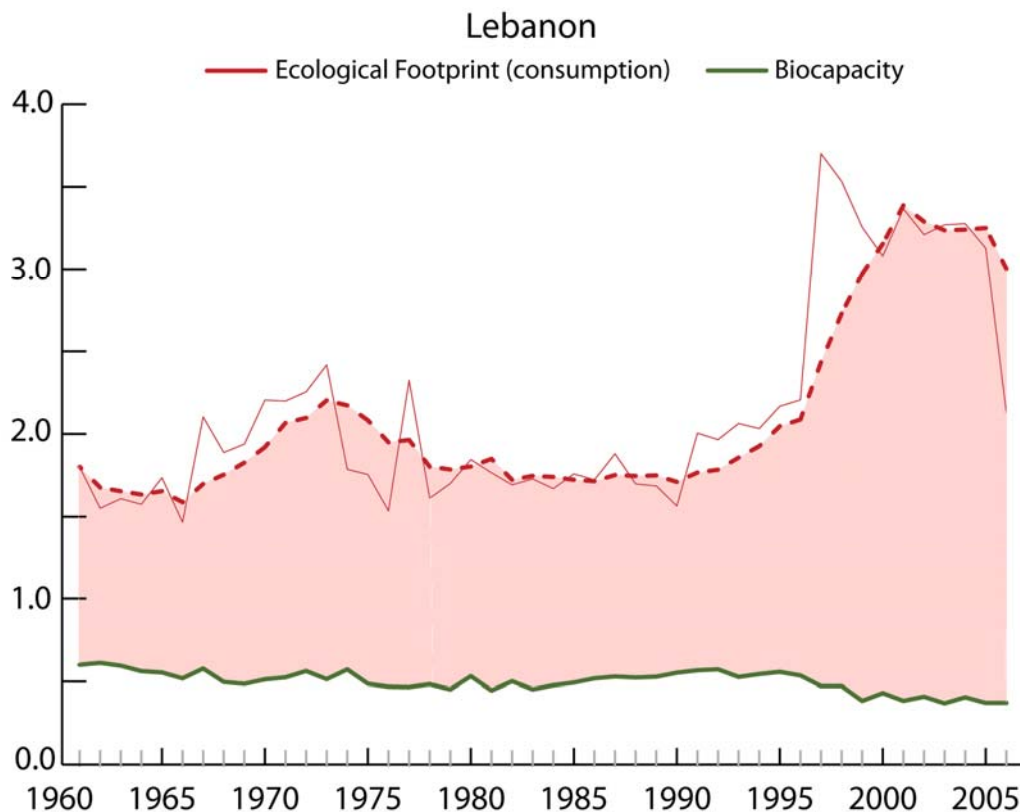
**Figure 16:** Jordan's Ecological Footprint and biocapacity per capita over time. Dotted lines indicate that a three-year moving average of the Ecological Footprint was used due to inconsistencies in the source data.

## Lebanon

In 2006, Lebanon occupied 1.2 million hectares of land and sea, including 1.0 million hectares of productive area. Of this, 138,000 hectares were forest, 289,000 hectares were cropland, 400,000 hectares were grazing land, and 67,000 hectares were covered by built infrastructure. Bordering the Mediterranean Sea, Lebanon had 117,000 hectares of continental shelf.

Lebanon's cropland, grazing, and forest yields were higher than the global average, while the fishery yields were lower, leading to a total biocapacity of 1.5 million global hectares (gha). This was much lower than Lebanon's Ecological Footprint of consumption of 8.6 million gha. **Lebanon has been running an ecological deficit since before 1961.** Lebanon's Ecological Footprint of production, less the carbon Footprint, of 1.2 million gha was greater than local biocapacity in 2006. This indicates that in 2006, in aggregate, Lebanon may not have extracted more from its ecosystems than the ecosystems themselves could renew, since some of their demand was covered by ecosystem services from outside of Lebanon.

In 2006, Lebanon's average Ecological Footprint per capita was 2.1 gha, smaller than the global average Footprint per capita, but larger than the global average available biocapacity per capita, indicating that the consumption of Lebanon was not globally replicable in a sustainable manner.



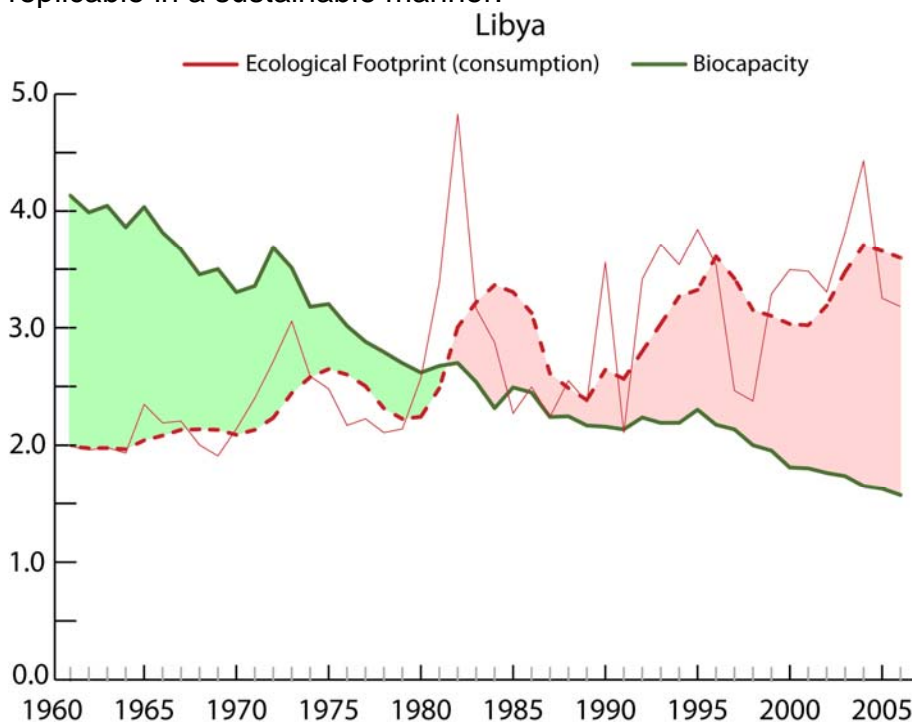
**Figure 17:** Lebanon's Ecological Footprint and biocapacity per capita over time. Dotted lines indicate that a five-year moving average of the carbon component of the Ecological Footprint was used due to source data inconsistencies.

## Libyan Arab Jamahiriya

In 2006, Libya occupied 182.4 million hectares of land and sea, including 16.0 million hectares of productive area. Of this, 217,000 hectares were forest, 2.1 million hectares were cropland, 13.5 million hectares were grazing land, and 234,000 hectares were covered by built infrastructure. Bordering the Mediterranean Sea, Libya has 6.4 million hectares of continental shelf<sup>3</sup>.

Libya's cropland, grazing, forest, and fishery yields were all lower than the global average, leading to a total biocapacity of 9.5 million global hectares (gha). This was lower than Libya's Ecological Footprint of consumption of 19.2 million gha. **Libya has been running an ecological deficit since the end of the 1980s**, made possible, in part, because of its ability to use oil revenue to import resources. Libya's Ecological Footprint of production, less the carbon Footprint, of 3.9 million gha was less than local biocapacity in 2006. This indicates that in 2006, in aggregate, Libya may not have extracted more from its ecosystems than the ecosystems themselves could renew, since some of their demand was covered by ecosystem services from outside of Libya.

In 2006, Libya's average Ecological Footprint per capita was 3.2 gha, larger than the global average Footprint per capita and the global average available biocapacity per capita, indicating that the consumption of Libya was not globally replicable in a sustainable manner.



**Figure 18:** Libya's Ecological Footprint and biocapacity per capita over time. Dotted lines indicate that a five-year moving average of the carbon component of the Ecological Footprint was used due to source data inconsistencies.

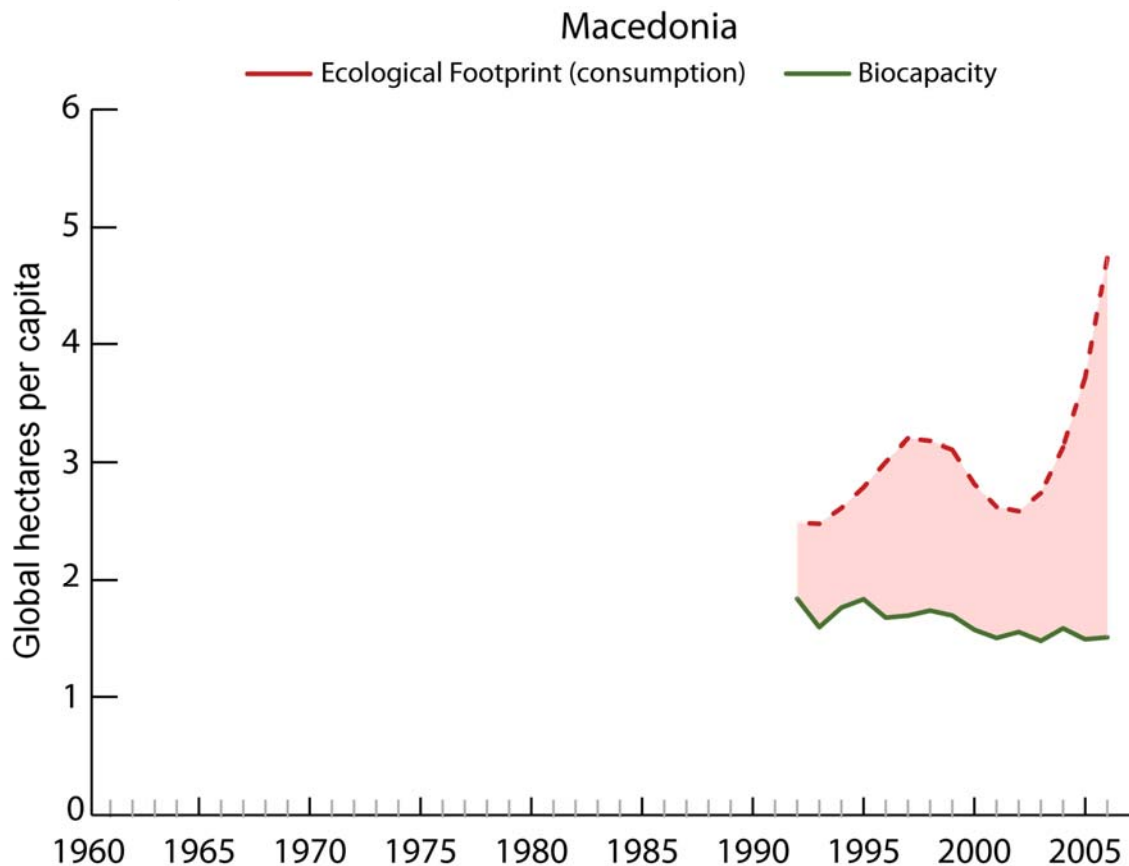
<sup>3</sup> The source data for continental shelf area for Libya are missing in the standard datasets utilized by Global Footprint Network. For this study, the area has been taken from the World Resource Institute's country profiles and included in the biocapacity calculations. The biocapacity given here thus differs from NFA 2009.

## Macedonia

In 2006, Macedonia occupied 2.6 million hectares of land and water, including 2.3 million hectares of productive area. Of this, 906,000 hectares were forest, 491,000 hectares were cropland, 747,000 hectares were grazing land, and 79,000 hectares were covered by built infrastructure. Macedonia has 28,000 hectares of inland water.

Macedonia's cropland, grazing, and fishery yields were equal to the global average, while the forest yields were higher, leading to a total biocapacity of 3.1 million global hectares (gha). This was much lower than Macedonia's Ecological Footprint of consumption of 12.5 million gha. **Macedonia has been running an ecological deficit since before 1992.** Macedonia's Ecological Footprint of production, less the carbon Footprint, of 2.1 million gha was less than local biocapacity in 2006. This indicates that in 2006, in aggregate, Macedonia may not have extracted more from its ecosystems than the ecosystems themselves could renew, since some of their demand was covered by ecosystem services from outside of Macedonia.

In 2006, Macedonia's average Ecological Footprint per capita was 6.12 gha, higher than the global average Footprint per capita and the global average available biocapacity per capita, indicating that the consumption of Macedonia was not globally replicable in a sustainable manner.



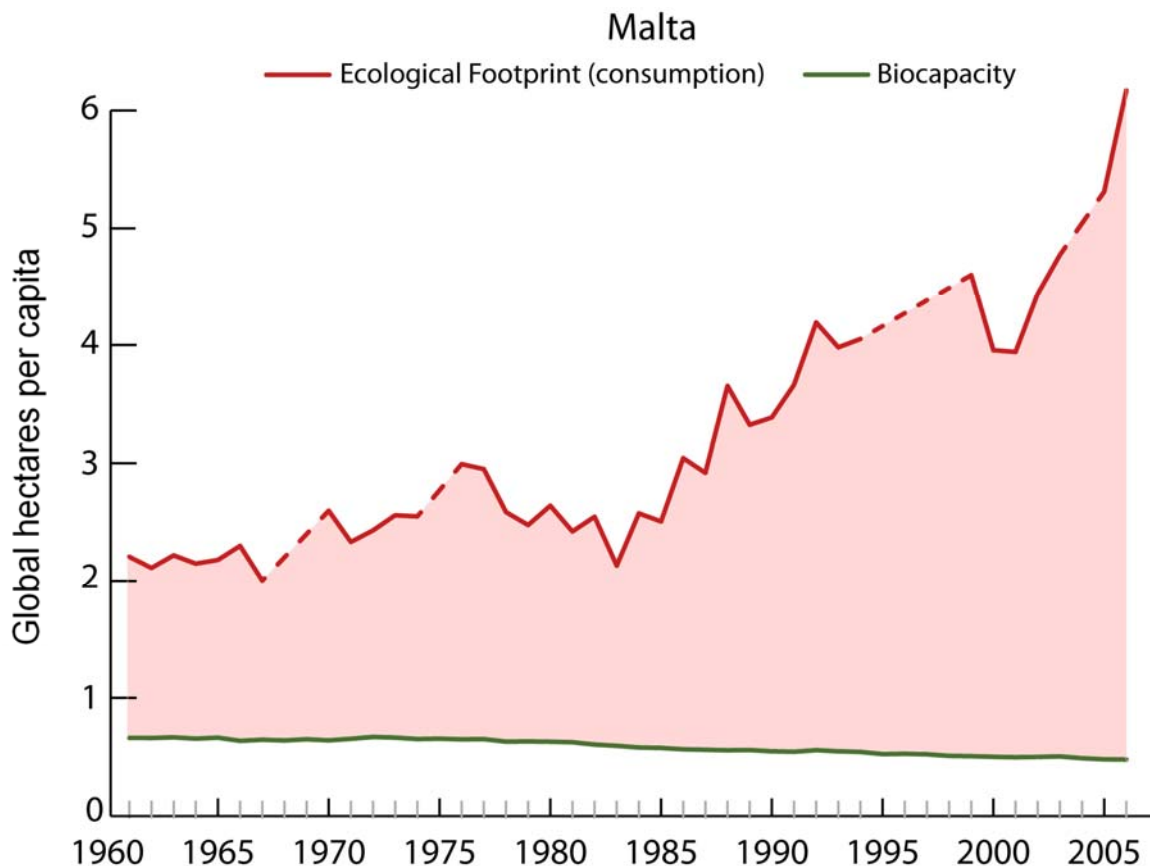
**Figure 19:** Macedonia's Ecological Footprint and biocapacity per capita over time. Dotted lines indicate the use of a 3-year moving average due to source data inconsistencies.

## Malta

In 2006, Malta occupied 618,000 hectares of land and sea, including 595,000 hectares of productive area. Of this, 9,000 hectares were cropland and 586,000 hectares were continental shelf.

Malta's cropland yields were higher than the global average, while the fishing yields were lower, leading to a total biocapacity of 194,000 global hectares (gha). This is much lower than Malta's Ecological Footprint of consumption of 2.5 million gha. **Malta has been running an ecological deficit since before 1961.** Malta's Ecological Footprint of production, less the carbon Footprint, of 71,000 gha was less than local biocapacity in 2006. This indicates that in 2006, in aggregate, Malta may not have extracted more from its ecosystems than the ecosystems themselves could renew, since some of their demand was covered by ecosystem services from outside of Malta.

In 2006, Malta's average Ecological Footprint per capita was 6.2 gha, higher than the global average Footprint per capita and the global average available biocapacity per capita, indicating that the consumption of Macedonia was not globally replicable in a sustainable manner.



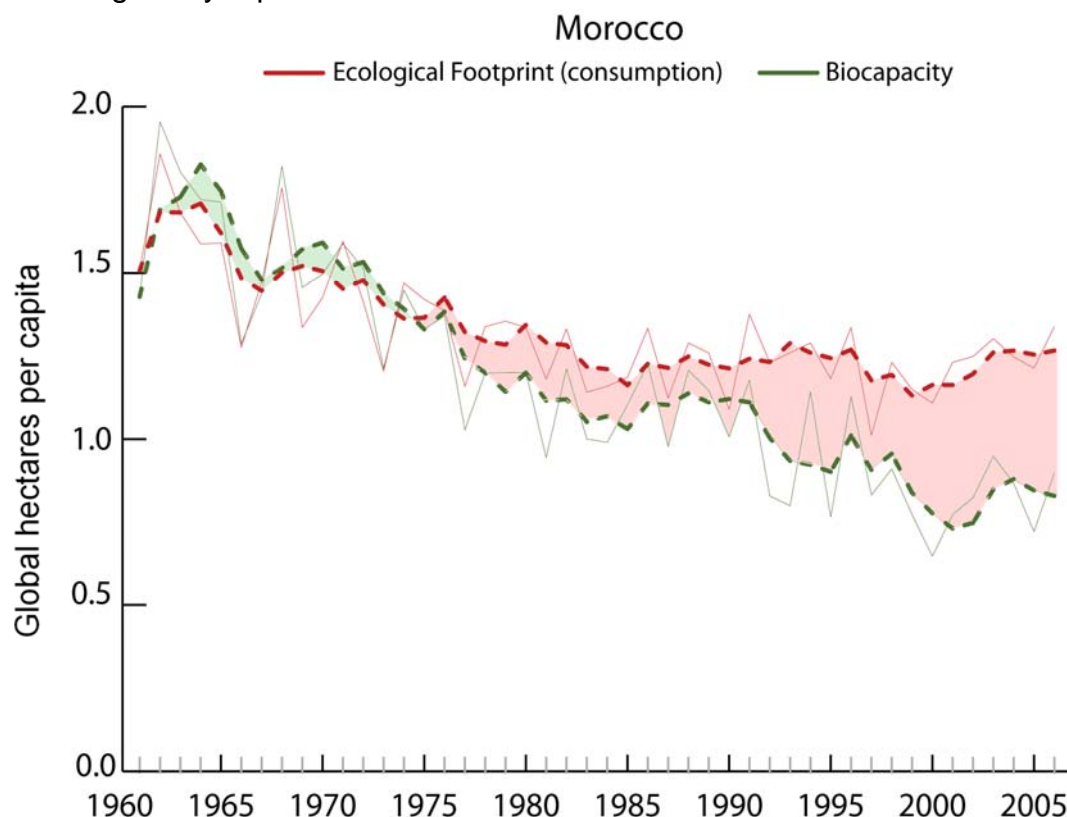
**Figure 20:** Malta's Ecological Footprint and biocapacity per capita over time. Dotted lines indicate interpolation due to source data inconsistencies.

## Morocco

In 2006, Morocco occupied 51.7 million hectares of land and sea, including 42.3 million hectares of productive area. Of this, 4.4 million hectares were forest, 8.9 million hectares were cropland, 21.0 million hectares were grazing land, and 889,000 hectares were covered by built infrastructure. Bordering the Atlantic Ocean and the Mediterranean Sea, Morocco has 7.0 million hectares of continental shelf.

Morocco's cropland, grazing, and forest yields were lower than the global average, while the fishery yields were higher, leading to a total biocapacity of 27.7 million global hectares (gha). This was lower than Morocco's Ecological Footprint of consumption of 41.3 million gha. **Morocco has been running an ecological deficit since 1974.** Morocco's Ecological Footprint of production, less the carbon Footprint, of 23.2 million gha was less than local biocapacity in 2006. This indicates that in 2006, in aggregate, Morocco may not have extracted more from its ecosystems than the ecosystems themselves could renew, since some of their demand was covered by ecosystem services from outside of Morocco.

In 2006, Morocco's average Ecological Footprint per capita was 1.3 gha, lower than the global average Footprint per capita and the global average available biocapacity per capita, indicating that the consumption of Morocco could be globally replicable in a sustainable manner.



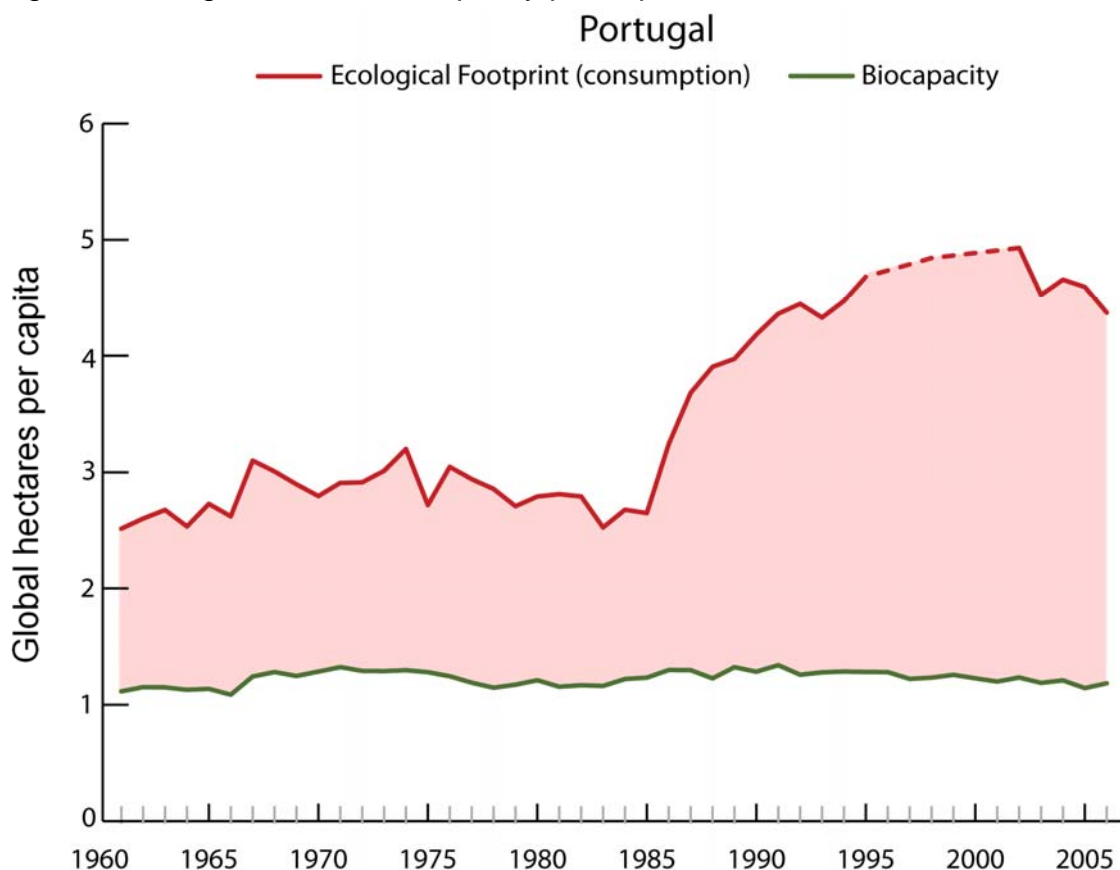
**Figure 21:** Morocco's Ecological Footprint and biocapacity per capita over time. Dotted lines indicate interpolation due to source data inconsistencies. Morocco's lack of major export resources mean that its biocapacity, and production and consumption Footprints are closely linked.

## Portugal

In 2006, Portugal occupied 11.2 million hectares of land and sea, including 9.2 million hectares of productive area. Of this, 2.6 million hectares were forest, 1.5 million hectares were cropland, 2.8 million hectares were grazing land, and 248,000 hectares were covered by built infrastructure. Portugal has 2.0 million hectares of continental shelf in the Atlantic Ocean.

Portugal's grazing, fishing, and forest yields were higher than the global average, while cropland yields were lower, leading to a total biocapacity of 12.5 million global hectares (gha). This was significantly less than Portugal's Ecological Footprint of consumption of 46.2 million gha. **Portugal has been running an ecological deficit since before 1961.** Portugal's Ecological Footprint of production, less the carbon Footprint, of 13.8 million gha was greater than local biocapacity in 2006. This indicates that Portugal may have been drawing down its stock of natural capital.

In 2006, Portugal's average Ecological Footprint per capita was 4.4 gha, greater than the global average Footprint per capita, and larger than the global average available biocapacity per capita.



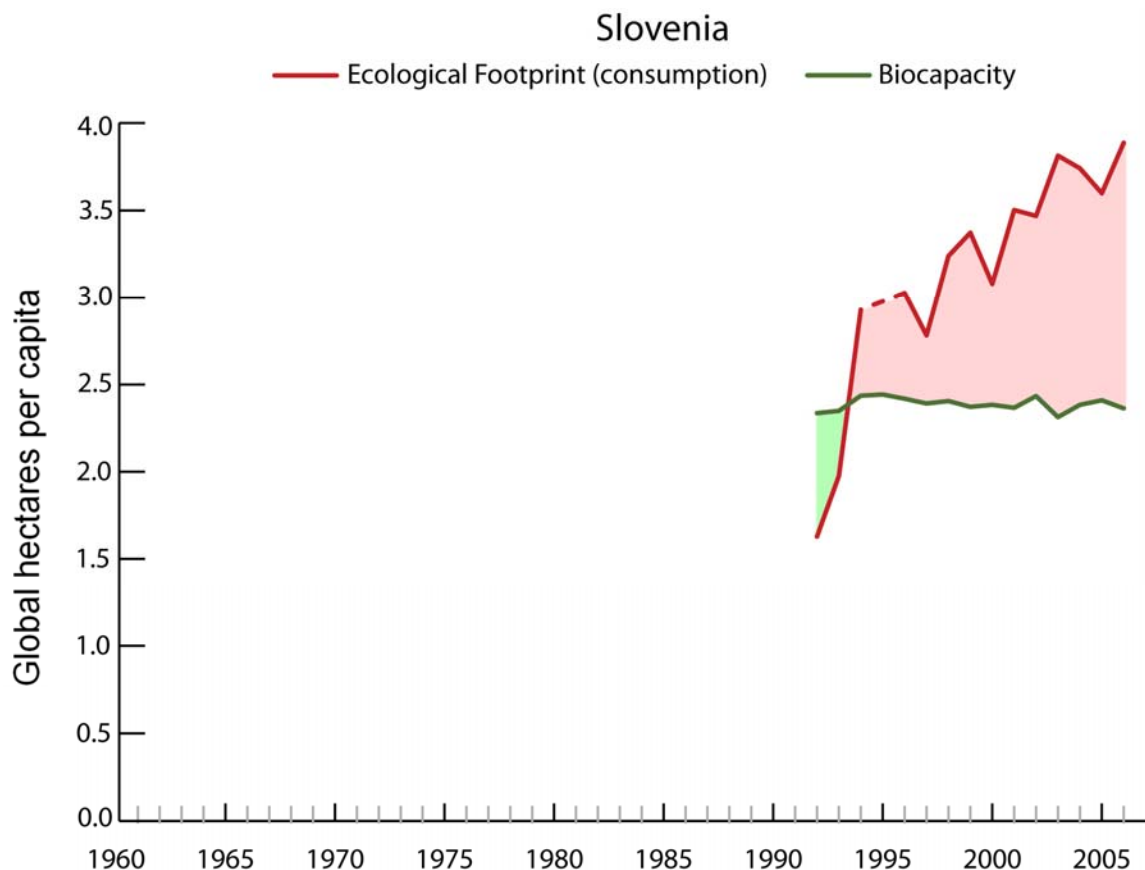
**Figure 22:** Portugal's Ecological Footprint and biocapacity per capita over time. Dotted lines indicate interpolation due to source data inconsistencies.

## Slovenia

In 2006, Slovenia occupied 2.0 million hectares of land and sea, including 1.9 million hectares of productive area. Of this, 1.2 million hectares were forest, 134,000 hectares were cropland, 523,000 hectares were grazing land, and 55,000 hectares were covered by built infrastructure. Slovenia has 17,000 hectares of continental shelf in the Mediterranean Sea.

Slovenia's cropland, grazing, and forest yields were higher than the global average, while fishing yields were lower, leading to a total biocapacity of 4.7 million global hectares (gha). This was significantly less than Slovenia's Ecological Footprint of consumption of 7.8 million gha. **Slovenia has been running an ecological deficit since 1994.** Slovenia's Ecological Footprint of production, less the carbon Footprint, of 2.5 million gha was less than local biocapacity in 2006. This indicates that in 2006, in aggregate, Slovenia may not have extracted more from its ecosystems than the ecosystems themselves could renew, since some of their demand was covered by ecosystem services from outside of Slovenia.

In 2006, Slovenia's average Ecological Footprint per capita was 3.9 gha, greater than the global average Footprint per capita, and larger than the global average available biocapacity per capita.



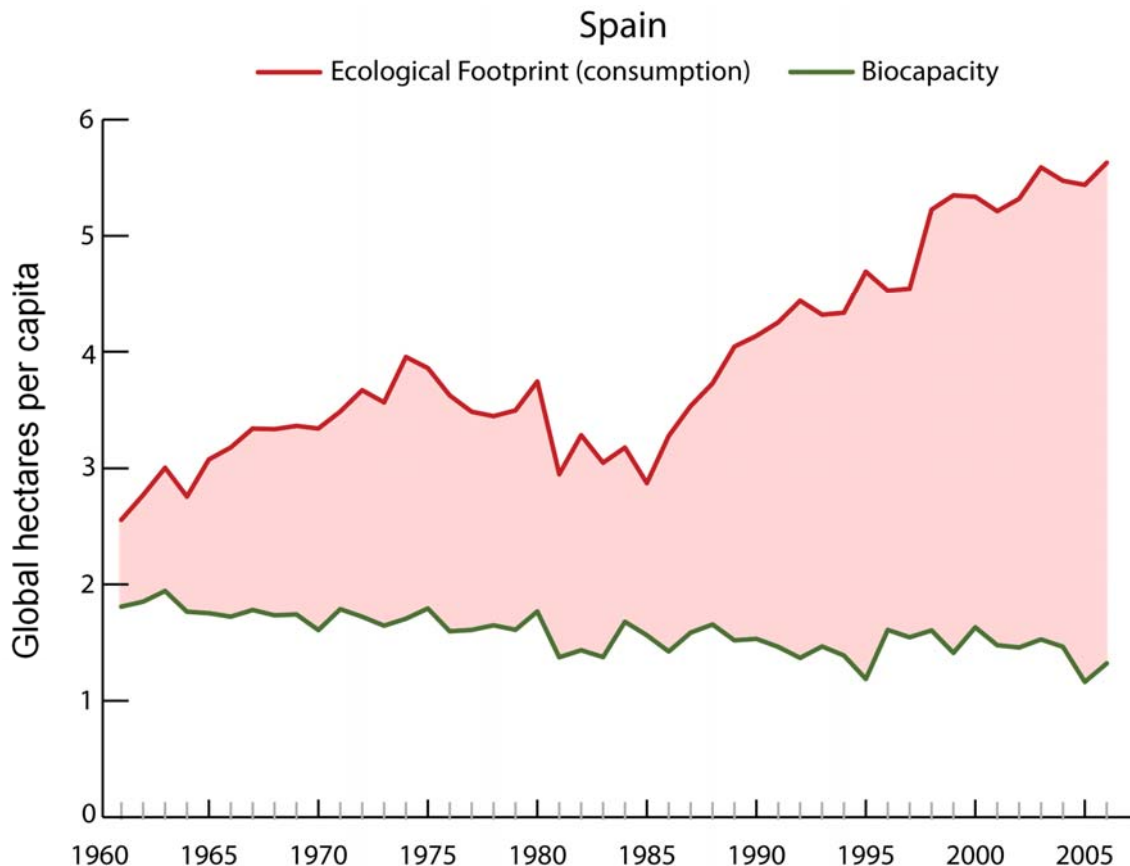
**Figure 23:** Slovenia's Ecological Footprint and biocapacity per capita over time.

## Spain

In 2006, Spain occupied 56.7 million hectares of land and sea, including 42.1 million hectares of productive area. Of this, 10.3 million hectares were forest, 15.2 million hectares were cropland, 9.2 million hectares were grazing land, and 915,000 hectares were covered by built infrastructure. Spain has 6.2 million hectares of continental shelf in the Mediterranean Sea and Atlantic Ocean.

Spain's cropland, grazing, and fishing yields were higher than the global average, while forest yields were lower, leading to a total biocapacity of 58.0 million global hectares (gha). This was significantly less than Spain's Ecological Footprint of consumption of 247 million gha. **Spain has been running an ecological deficit since before 1961.** Spain's Ecological Footprint of production, less the carbon Footprint, of 73.0 million gha was greater than local biocapacity in 2006. This indicates that Spain may have been drawing down its stock of natural capital.

In 2006, Spain's average Ecological Footprint per capita was 5.6 gha, greater than the global average Footprint per capita, and larger than the global average available biocapacity per capita.



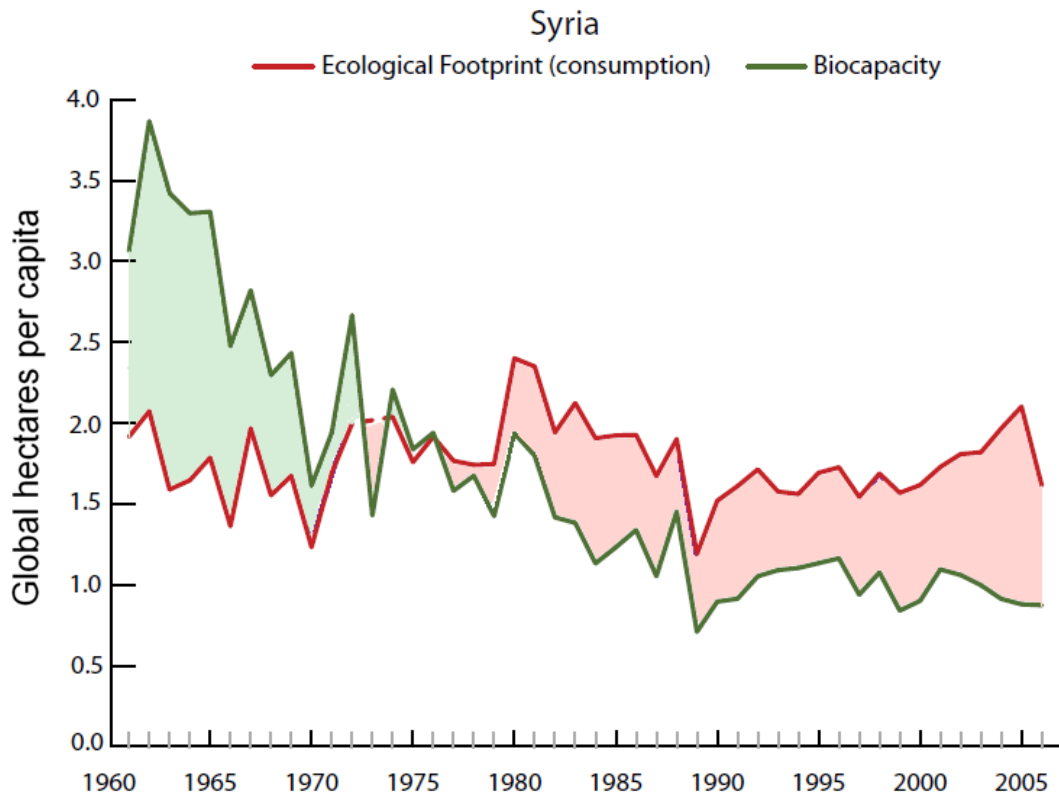
**Figure 24:** Spain's Ecological Footprint and biocapacity per capita over time.

## Syrian Arab Republic

In 2006, Syria occupied 18.6 million hectares of land and sea, including 15.1 million hectares of productive area. Of this, 467,000 hectares were forest, 5.6 million hectares were cropland, 8.3 million hectares were grazing land, and 560,000 hectares were covered by built infrastructure. Bordering the Mediterranean Sea, Syria has 85,000 hectares of continental shelf.<sup>4</sup>

Syria's cropland, grazing, and fishery yields were all lower than the global average, while the forest yields were higher, leading to a total biocapacity of 17.0 million global hectares (gha). This is lower than Syria's Ecological Footprint of consumption of 31.3 million gha. **Syria has been running an ecological deficit since the early 1970s.** Syria's Ecological Footprint of production, less the carbon Footprint, of 15.0 million gha was less than local biocapacity in 2006. This indicates that in 2006, in aggregate, Syria may not have extracted more from its ecosystems than the ecosystems themselves could renew, since some of their demand was covered by ecosystem services from outside of Syria.

In 2006, Syria's average Ecological Footprint per capita was 1.6 gha, smaller than the global average Footprint per capita and the global average available biocapacity per capita, indicating that the consumption of Syria could be globally replicable in a sustainable manner.



**Figure 25:** Syria's Ecological Footprint and biocapacity per capita over time. Dotted lines indicate interpolation due to source data inconsistencies.

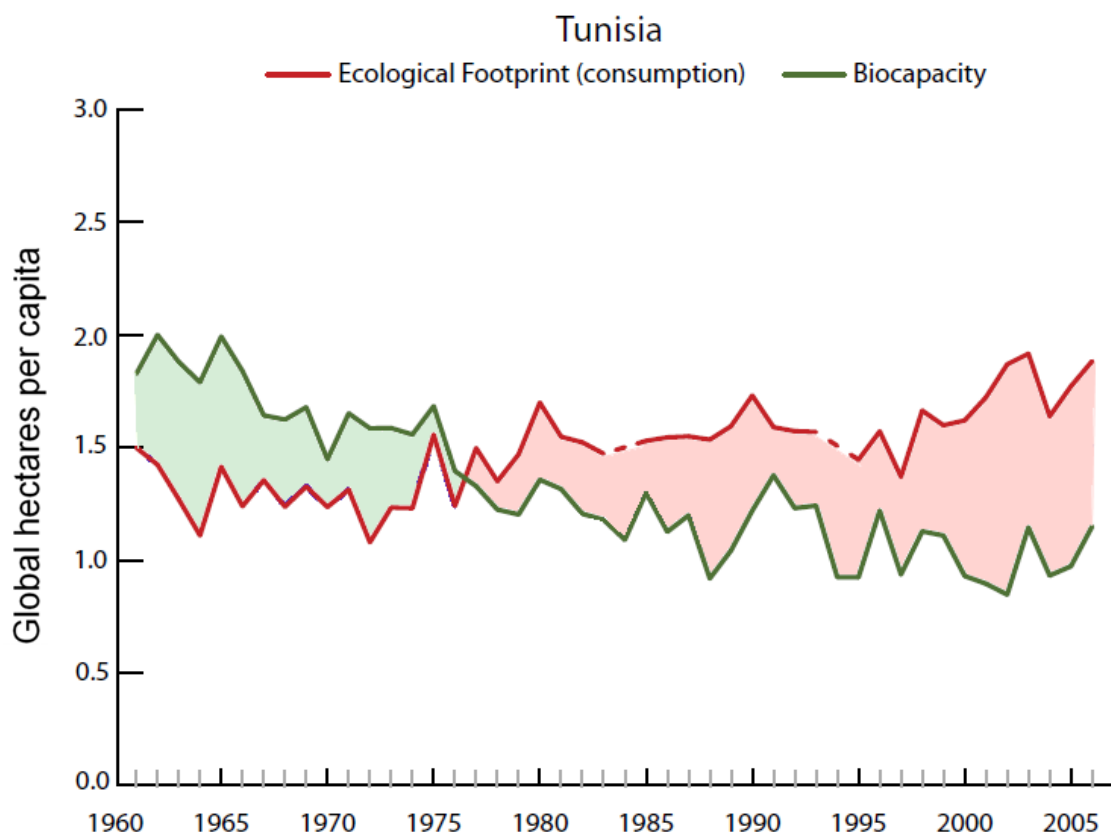
<sup>4</sup> The source data for continental shelf area for Syria are missing in the standard datasets utilized by Global Footprint Network. This area has instead been taken from the World Resource Institute's country profiles and included in the biocapacity calculations reported in this study. Therefore, the biocapacity given here differs from NFA 2009.

## Tunisia

In 2006, Tunisia occupied 22.9 million hectares of land and sea, including 18.6 million hectares of productive area. Of this, 1.1 million hectares were forest, 5.0 million hectares were cropland, 4.9 million hectares were grazing land, and 328,000 hectares were covered by built infrastructure. Bordering the Mediterranean Sea, Tunisia has 6.5 million hectares of continental shelf.

Tunisia's cropland, grazing, forest, and fishery yields were all lower than the global average, leading to a total biocapacity of 11.7 million global hectares (gha). This was lower than Tunisia's Ecological Footprint of consumption of 19.2 million gha. **Tunisia has been running an ecological deficit since 1977.** Tunisia's Ecological Footprint of production, less the carbon Footprint, of 9.9 million gha was less than local biocapacity in 2006. This indicates that in 2006, in aggregate, Tunisia may not have extracted more from its ecosystems than the ecosystems themselves could renew, since some of their demand was covered by ecosystem services from outside of Tunisia.

In 2006, Tunisia's average Ecological Footprint per capita was 1.9 gha, smaller than the global average Footprint per capita, but slightly higher than the global average available biocapacity per capita, indicating that the consumption of Tunisia was not globally replicable in a sustainable manner.



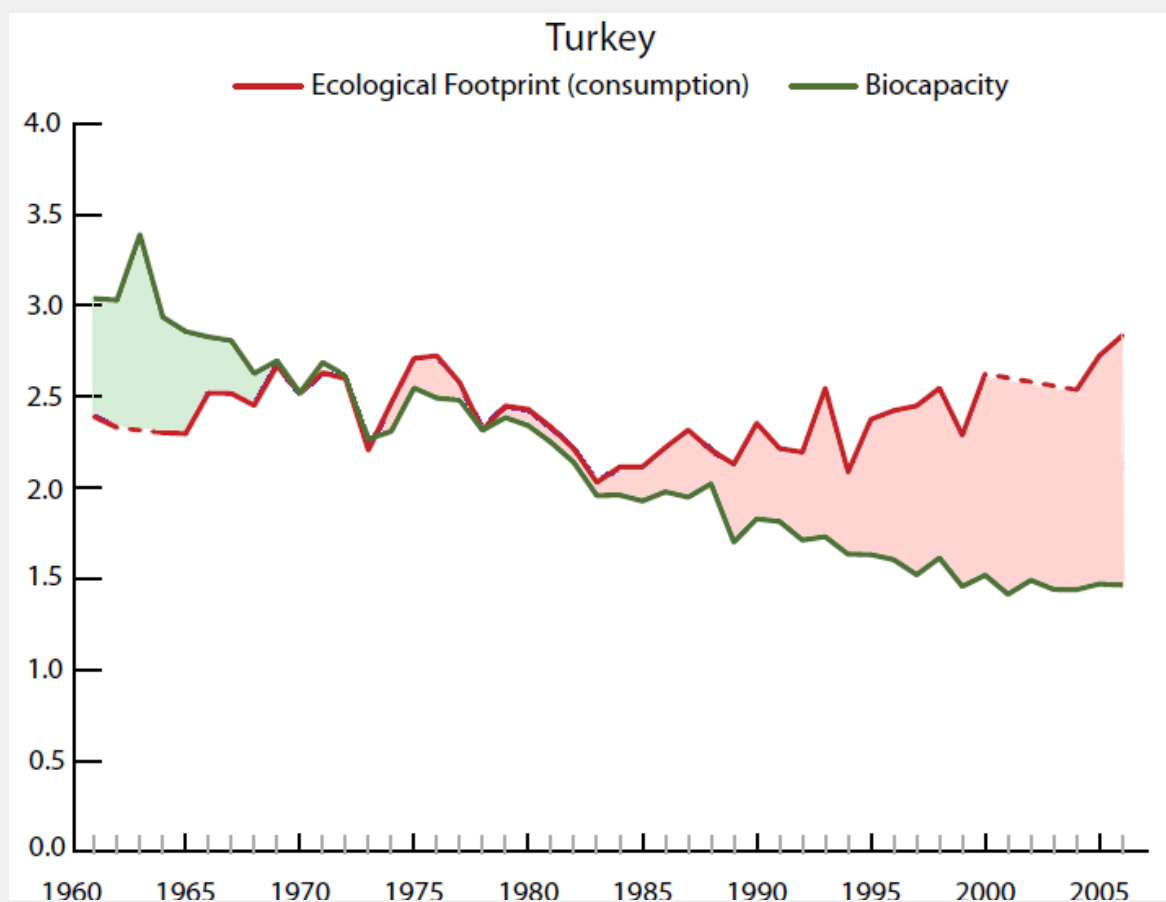
**Figure 26:** Tunisia's Ecological Footprint and biocapacity per capita over time. Dotted lines indicate interpolation due to source data inconsistencies.

## Turkey

In 2006, Turkey occupied 83.7 million hectares of land and sea, including 59.7 million hectares of productive area. Of this, 10.2 million hectares were forest, 25.9 million hectares were cropland, 14.6 million hectares were grazing land, and 2.3 million hectares were covered by built infrastructure. Bordering the Mediterranean and the Black Sea, Turkey has 5.3 million hectares of continental shelf.

Turkey's cropland, grazing, forest, and fishery yields were all higher than the global average, leading to a total biocapacity of 108.4 million global hectares (gha). This was much lower than Turkey's Ecological Footprint of consumption of 209.6 million gha. **Turkey has been running an ecological deficit since 1974.** Turkey's Ecological Footprint of production, less the carbon Footprint, of 90.5 million gha was less than local biocapacity in 2006. This indicates that in 2006, in aggregate, Turkey may not have extracted more from its ecosystems than the ecosystems themselves could renew, since some of their demand was covered by ecosystem services from outside of Turkey.

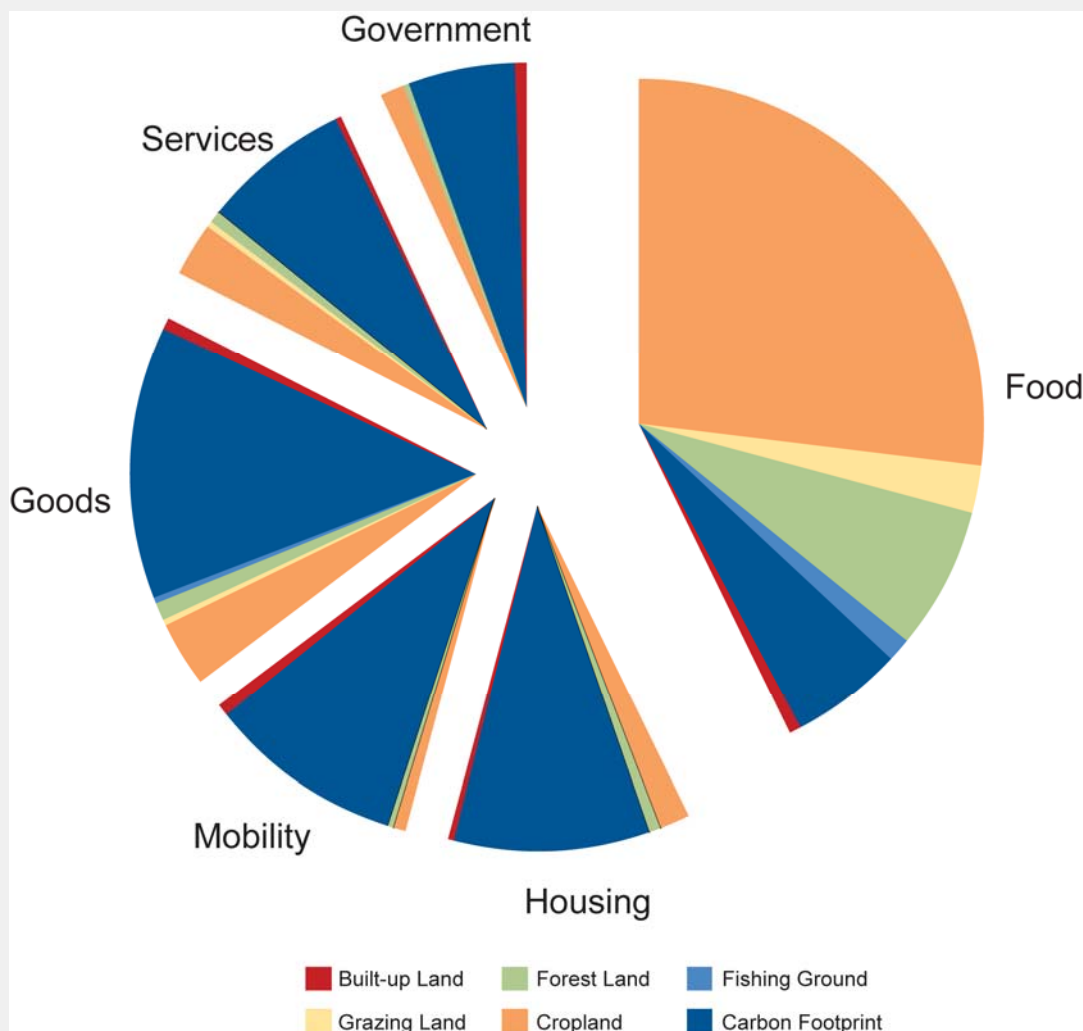
In 2006, Turkey's average Ecological Footprint per capita was 2.8 gha, larger than the global average Footprint per capita, and the global average available biocapacity per capita, indicating that the consumption of Turkey was not globally replicable in a lasting manner.



### Turkey (continued)

Utilizing national macroeconomic data, such as input-output tables, it is possible to deconstruct a nation's Ecological Footprint into categories of final consumption. This allows policymakers to determine the direct and indirect impacts of a given change in final demand. For example, the impact of the purchase of food by a consumer can be traced through all the inputs into the agricultural sector. These data allow the construction of personal consumption calculators, which help individuals determine and modify their demands on resources.

The majority of Turkey's 2006 Ecological Footprint is associated with the consumption of food, of which only a relatively small portion results from the carbon Footprint. The housing and mobility Footprints are predominantly carbon, while the goods (the second greatest contributor) and services sectors have significant cropland Footprints associated with them.



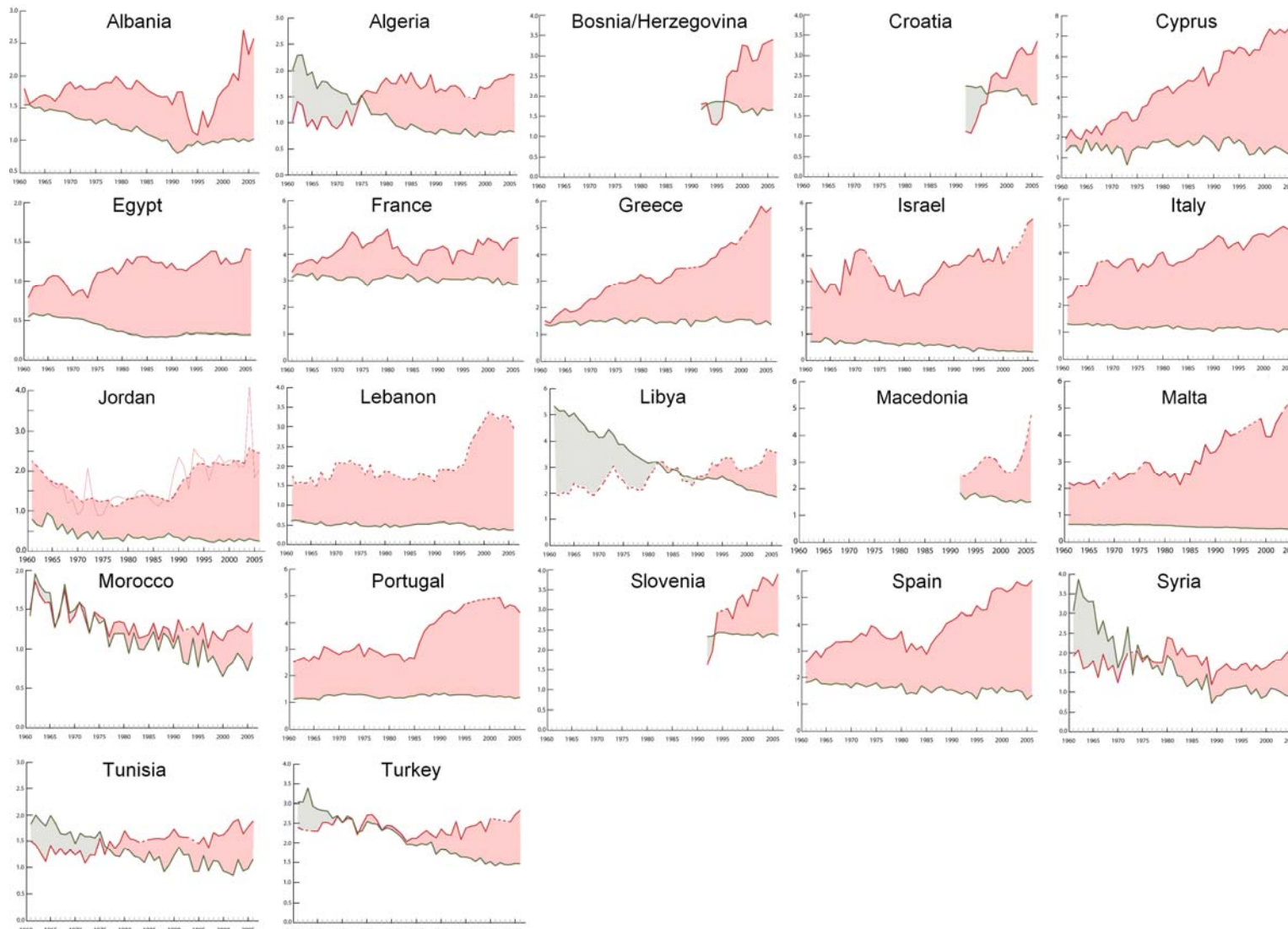
**Figure 27-B:** Turkey's Ecological Footprint by final consumption category. Gross Fixed Capital formation has been internalized into household consumption and government expenditure.

**Table 1:** Changes in population, Ecological Footprint and biocapacity for the Mediterranean countries, 1961-2006.

Country	Population		EF (consumption) per capita		Biocapacity per capita		EF (production) per capita	
	2006	Change from 1961	2006	Change from 1961	2006	Change from 1961	2006	Change from 1961
	[millions]	[%]	[gha]	[%]	[gha]	[%]	[gha]	[%]
Albania	3.2	91%	2.6	43%	1.0	-34%	1.2	-20%
Algeria	33.4	203%	1.9	92%	0.8	-59%	1.3	29%
Bosnia-Herzegovina*	3.9	-1%	3.4	88%	1.7	-1%	2.6	46%
Croatia*	4.6	-0.7%	3.3	200%	1.8	-20%	2.3	55%
Cyprus	0.8	47%	7.7	300%	1.1	-20%	3.3	158%
Egypt	74.2	160%	1.4	77%	0.3	-41%	1.0	44%
France	61.3	33%	4.6	38%	2.8	-9%	4.0	28%
Greece	11.1	33%	5.8	284%	1.4	1%	3.4	163%
Israel	6.8	210%	5.4	53%	0.3	-55%	2.8	227%
Italy	58.8	16%	4.9	116%	1.0	-21%	2.9	121%
Jordan	5.7	515%	2.0	-51%	0.3	-67%	1.1	55%
Lebanon	4.1	108%	2.1	18%	0.4	-38%	1.2	123%
Libya	6.0	331%	3.2	60%	1.6	-62%	2.6	52%
Macedonia*	2.0	5%	6.1	146%	1.5	-18%	2.1	-7%
Malta	0.4	30%	6.2	180%	0.5	-28%	1.9	570%
Montenegro**	0.6	-	1.1	-	2.3	-	1.2	-
Morocco	30.9	158%	1.3	-11%	0.9	-37%	1.1	-11%
Portugal	10.6	19%	4.4	74%	1.2	6%	2.8	40%
Slovenia*	2.0	3%	3.9	139%	2.4	1%	3.4	56%
Spain	43.9	43%	5.6	120%	1.3	-27%	3.7	58%
Syria	19.4	307%	1.6	-16%	0.9	-71%	1.5	-34%
Tunisia	10.2	138%	1.9	26%	1.1	-37%	1.5	13.6%
Turkey	73.9	155%	2.8	19%	1.5	-52%	2.1	-12%
Mediterranean	459.6	90%	3.3	48%	1.2	-35%	2.3	25%
World	6592.9	114%	2.6	13%	1.8	-51%	2.6	13%

\* Change from 1992 to 2006 used.

\*\* Only 2006 values are available for Montenegro as it was a single country with Serbia (Serbia and Montenegro) till June 2, 2006.



**Figure 28:** Summary of the per capita Ecological Footprint and biocapacity trends of countries in the Mediterranean region, 1961-2006. All curves are shown over the same time period. However the y-axis is scaled differently for each country in order to show the dynamics of the trends more prominently. For more detail, visit the country curve. Time trend data for Montenegro is unavailable.

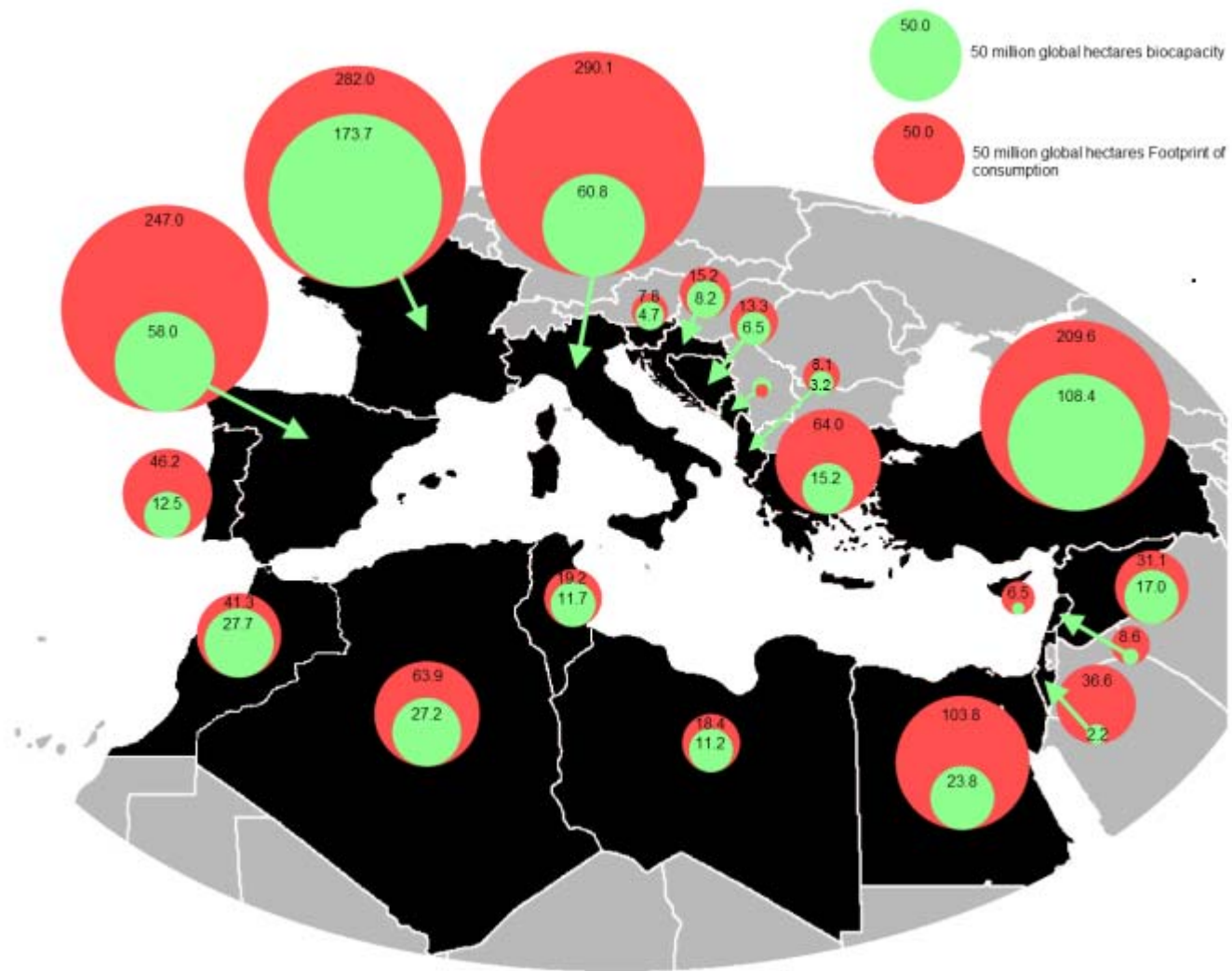


Figure 29: Total Ecological Footprint and biocapacity of countries in the Mediterranean region, 2006.

## 5. Conclusion

Addressing sustainability requires understanding the trade-offs between guaranteeing human well-being and safeguarding the biosphere's regenerative capacity. A number of international agencies and countries have tested the Ecological Footprint, and several -- including Switzerland, Finland, Japan, United Arab Emirates, Ecuador and Luxembourg -- are now using the tool in varying capacities. For instance, the Ecological Footprint is used in the United Arab Emirates to facilitate sustainable planning through a robust and science-based decision making process (Abdullatif et al., 2009).

In order to manage and govern the Mediterranean region, as well as each of its countries, policymakers must have the ability to monitor ecological limits at both levels. This is a core requirement of the measurement of sustainability, and will help ensure that development efforts succeed by working with, rather than against, nature's budget.

In determining whether the Ecological Footprint is a suitable indicator for the Mediterranean region, a number of questions may need to be considered:

- To what extent are biocapacity constraints relevant for Mediterranean countries and their economic success?
- What potential risks do Mediterranean countries' ecological deficits entail, if any?
- How accurate are the trend lines depicted here, and what is needed to make these assessments more accurate?
  - Are they accurate enough to inform policy makers?
- What kind of blind spots do these assessments have when describing the resource dependence of countries or cities?
- If indeed it is correct that the Mediterranean region is in a deficit situation, what actions would be in the countries' self-interest?
- What will 2030 look like if we fail to address ecological overshoot now?
- What immediate actions can you take to ensure a viable future for your city or country?
- How is it in your city or country's self-interest to make ecological resources a priority?

Knowing the answers to these questions can mean the difference between a country's long-term success and its vulnerability in an increasingly resource-constrained world.

Ecological Footprint accounts are not sufficient to manage a country's success, but they are a necessary ingredient. These accounts provide context for more specific assessments that only highlight one aspect of resource use (such as water accounts, or carbon assessments). Since basic Footprint assessments already exist, countries do not need to start from scratch – they only need to verify and improve what is already available.

## APPENDIX 1: Structure of the National Footprint Accounts (NFA) and accounting procedure

Created in 2003 by Global Footprint Network, the National Footprint Accounts (NFA) quantify the Earth's supply of, and human demand on, renewable natural capital. The NFA quantify this supply and demand by means of two different accounting sets: the Ecological Footprint and biocapacity. NFA cover more than 200 countries, and extend from 1961 through 2006. NFA facilitate the understanding of our collective Ecological Footprint on a global, national or sub-national scale and enable international comparisons of countries' demand. NFA can be considered an integrated economic and environmental accounting system in that they translate the structure and functioning of a country's economy into environmental terms.

The commonly reported Ecological Footprint of a nation refers to the Footprint of consumption, or the Ecological Footprint of resources consumed and carbon dioxide emissions generated due to the activities of the residents of a given nation. For each nation, the Footprint of consumption,  $EF_C$ , is calculated as in equation 1:

$$EF_C = EF_P + EF_I - EF_E \quad (\text{Eq. 1})$$

where  $EF_P$  is the Footprint of all resources produced and emissions generated within a nation (Footprint of production), and  $EF_I$  and  $EF_E$  are the Footprints embodied in goods imported and exported, respectively. Each type of Ecological Footprint,  $EF$ , is given by equation 2:

$$EF = \frac{P}{Y_w} * EQF \quad (\text{Eq. 2})$$

where  $P$  is the amount of resource consumed or carbon dioxide emitted,  $Y_w$  is the world-average yield for  $P$  (or the world-average forest sequestration potential for carbon dioxide), and  $EQF$  is the equivalence factor for the land use type in question, which normalizes all types of activities into the common unit of global hectares (Monfreda et al., 2004; Galli et al., 2007; Ewing et al., *forthcoming*).

As clearly reported in Kitzes et al (2008) and Ewing et al (2009), the National Footprint Accounts utilize approximately 50 million data points, primarily based on international datasets published by the United Nations Food and Agriculture Organization (FAOSTAT), United Nations Commodity Trade Statistics Database (UN Comtrade), and International Energy Agency (IEA), complemented by data from peer reviewed publications.

These data are used in the NFA framework to then calculate the demand on each of the six land types (cropland, grazing land, fishing ground, forest land, built-up land, and carbon uptake land to accommodate the carbon Footprint). This allows for the observation and measurement of human demand placed on the biosphere and its composing ecosystems. Further details on the NFA' framework can also be found in Kitzes et al. (2008).

For each nation, the aggregate total Ecological Footprint is then calculated by adding the demand on each land type, and used to communicate and inform policy makers. The availability of a single calculated figure gives the NFA the status of an objective tool for measurement of phenomena that are otherwise difficult to quantify (Eurostat, 2006).

## **APPENDIX 2: The ‘carbon plus’ approach**

Trends in Figure 1 illustrate the rapid growth of human demand for ecological assets. As the figure shows, human demand is primarily made of, though not limited to, demand for the biosphere’s capacity to sequester carbon. The Earth’s natural carbon cycle is thus out of balance. CO<sub>2</sub> molecules are being released into the atmosphere faster than they can be sequestered, and a larger surface of photosynthetic lands is now required to eventually sequester the extra CO<sub>2</sub> responsible for this imbalance (Kitzes et al., 2009). Demand for carbon sequestration is growing unabated - as global population grows, standards of living improve and demand for energy and energy-intensive products increases (Krausmann et al, 2009).

Climate change is currently seen as the most impending environmental issue, preventing human societies from achieving sustainability. Unfortunately in the search for sustainability, decision makers have approached sustainable development through the climate change lens (Robinson et al., 2006), ignoring the fact that the impact on the atmosphere is just one of multiple human-induced environmental impacts. Looking at carbon in isolation – as opposed to considering it a symptom of humanity’s overall metabolism of resources – has made us blind to other dangers. While significant, carbon sequestration accounted for just over half of total world-average demand on the planet’s ecological assets in 2006 (Ewing et al., 2009). The world’s increasing appetite for water, food, timber, marine and many other resources is also continuing to put pressure on the biosphere.

Solving the sustainability challenge, therefore, requires a new holistic approach to tackling multiple issues concurrently. This approach must help us avoid additional costs while also preventing a halt in progress on other environmental issues (Robinson et al., 2006; Turner, 2008). Without a way of measuring the status (and human rate of use) of our ecological assets, it is easy for policy makers to ignore the impossibility of infinite growth and remain entangled in ideological debates over the “affordability of sustainability”. Clear metrics are needed to change these ideological debates into discussions based on empirical facts, and the Ecological Footprint could be one of them. Understanding what the real risks are will then facilitate building consensus over the actions needed to address them (Ewing et al., 2009; Kitzes et al., 2009).

President Sarkozy’s “Commission on the Measurement of Economic Performance and Social Progress” (also known as the “Stiglitz Commission”) has emphasized the importance of complementing GDP with physical indicators for monitoring environmental sustainability. Their report highlighted the Ecological Footprint and one of its most significant components, the carbon Footprint.

While the Stiglitz Commission favored a focus on the carbon Footprint only -- due to current carbon interest and the already established carbon accounting practices -- for the reasons above Global Footprint Network argues that a “carbon plus” view is necessary to understand the significance of current environmental trends and to take a comprehensive, more effective approach that tackles the full palette of human demands on the biosphere’s regenerative capacity.

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