

# How can Mediterranean societies thrive in an era of decreasing resources?

Global Footprint Network  
Mediterranean Ecological Footprint Initiative



# Innovation and tradition: realizing a sustainable vision

**The unique geography** and rich history of the Mediterranean region set it apart from the rest of the world. Unsustainable consumption and development trends, however, threaten the unique ecological assets that are the Mediterranean region's most valuable sources of strength.

The Mediterranean Strategy for Sustainable Development aims to guarantee the health of these threatened assets by integrating environmental concerns into key development decisions. The strategy's objectives also include ensuring a high quality of life for Mediterranean people without further degrading the environment and within the carrying capacity of regional ecosystems.

According to Global Footprint Network's analysis, outlined in the following pages, the Mediterranean region now uses approximately two and a half times more natural resources and ecological services than what its ecosystems can provide. But our analysis also reveals opportunities for the region.

Global Footprint Network's Mediterranean Program seeks to provide a framework and tools to guide the management of natural resources, economic development and sustainable consumption patterns to realize the vision of the Mediterranean Strategy for Sustainable Development.

# Is the Mediterranean region on track?

**Ensuring a high quality of life** for all people within the region's carrying capacity is the core vision of the Mediterranean Strategy for Sustainable Development.

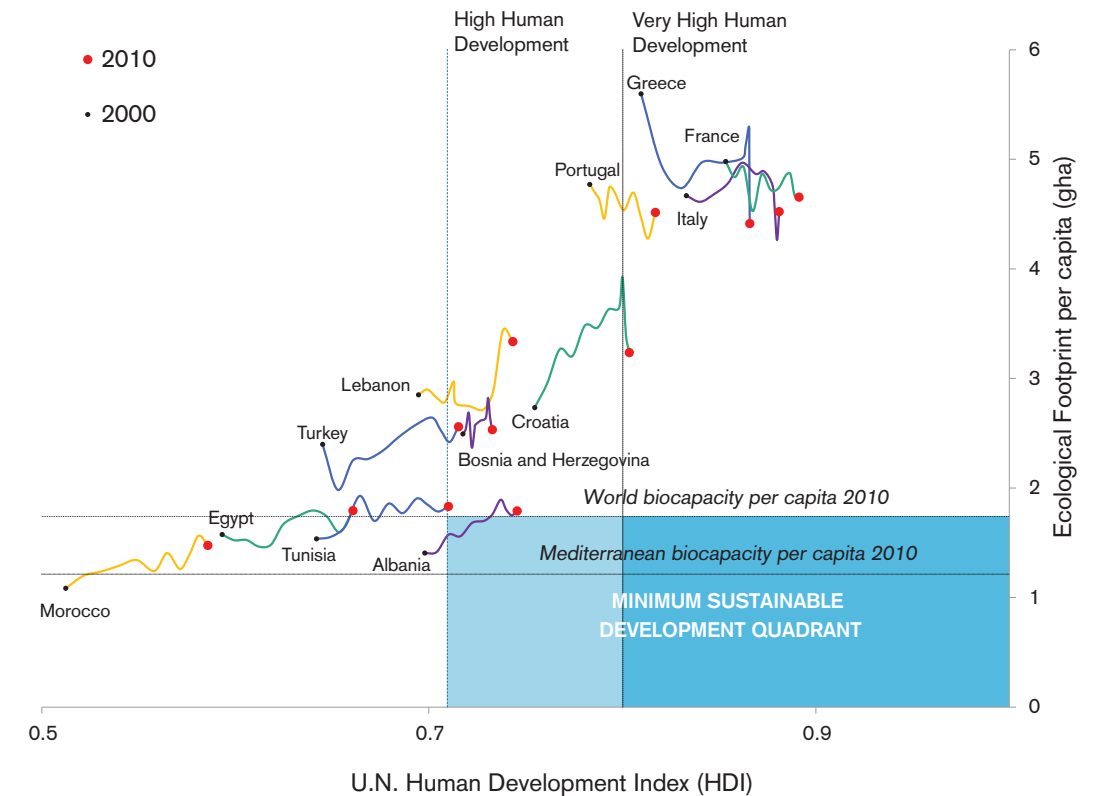
Consistent with this vision, a framework that combines the United Nations Human Development Index (HDI) with the Ecological Footprint provides a macro-level, comparative assessment of nations' progress towards this vision. This framework (at right) shows that no country in the Mediterranean region meets the two minimum criteria for globally replicable sustainable development (depicted in the shaded blue area): a per person Ecological Footprint lower than world biocapacity of 1.8 gha and an HDI of at least 0.71.

From the 1980s to 2000, almost all high-income western countries experienced a large increase in their Ecological Footprints and HDI values. But from 2000 to 2010, their per person Ecological Footprints have declined, along with the rate of HDI growth, as shown at right. (See Greece for instance.)

Conversely, all middle-income countries from the south and east rim of the region have experienced constant increases in their HDI from 1980s to 2010, coupled by continuous increases in their per person Ecological Footprints, including in the 2000-2010 period. (For example, see Albania and Tunisia.) As a result, human development in the entire Mediterranean region climbed from medium (HDI=0.70) to high levels (HDI=0.76), but resource demand came to noticeably exceed the region's supply of ecological assets.

Securing economic prosperity and well-being for the region's population thus requires taking full account of resource constraints and physical limits in decision-making processes.

Mediterranean Countries, Ecological Footprint and HDI, 2000–2010



**HUMAN DEVELOPMENT INDEX AND ECOLOGICAL FOOTPRINT** / Human Development Index and Ecological Footprint positions in 2000 (black dots) and 2010 (red dots) as well as trajectories over this time period, for selected Mediterranean countries. An Ecological Footprint lower than world average biocapacity and a high HDI score (blue quadrant) are the necessary minimum conditions for globally replicable sustainable human development.

# Measuring ecological assets

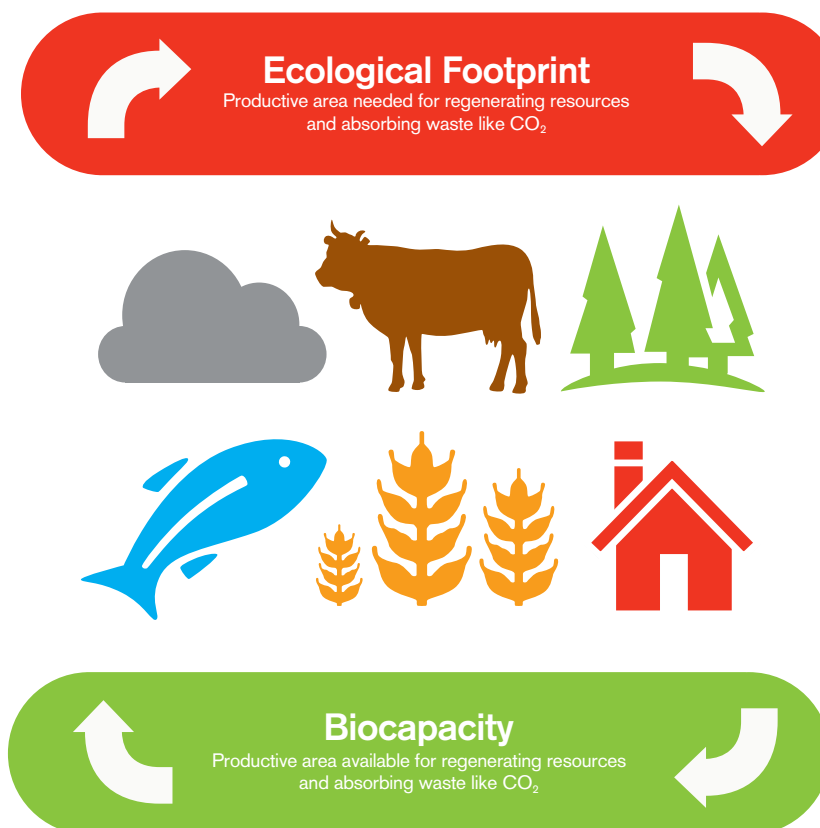
**Just as a bank statement** tracks expenditures against income, Ecological Footprint Accounting measures a population's demand for and ecosystems' supply of ecological assets.

On the supply side, a city, state or nation's biocapacity represents the productivity of its ecological assets (including forest lands, grazing lands, cropland, fishing grounds and built-up land).

On the demand side, the Ecological Footprint measures the ecological assets that a given population requires to produce the natural resources and services it consumes (including plant-based food and fiber products, livestock and fish products, timber and other forest products, space for urban infrastructure, and forest to absorb its carbon dioxide emissions from fossil fuels).

Both measures are expressed in global hectares—globally comparable, standardized hectares with world average productivity.

Each city, state or nation's Ecological Footprint can be compared to its biocapacity. If a population's Ecological Footprint exceeds the region's biocapacity, that region runs an ecological deficit. A region in ecological deficit meets demand by importing, liquidating its own ecological assets (such as overfishing), and/or emitting carbon dioxide into the atmosphere.



**HUMAN CONSUMPTION IS COMPARED TO NATURE'S PRODUCTION /**  
The Ecological Footprint measures people's use of cropland, forests, grazing land and fishing grounds for providing resources and absorbing waste (carbon dioxide from fossil fuel burning). Biocapacity measures how much biologically productive area is available to regenerate these resources and services.

## CARBON

CO<sub>2</sub> emissions associated with use of fossil fuels, electricity and energy intensive commodities, converted into biologically productive areas (such as forest land) necessary for their sequestration.

## GRAZING LAND

The area of grasslands used to raise livestock for meat, dairy, hide and wool products. It includes all grasslands used to provide feed for animals, including cultivated pastures, wild grasslands and prairies.

## FOREST PRODUCTS

The area of forests required to support the annual harvest of fuel wood, pulp and timber products.

## FISHING GROUNDS

The area of marine and inland waters required to support annual catches of aquatic species (fish and seafood).

## CROPLAND

The area required to grow all crop products required for human consumption (food and fiber) and for livestock feeds, fish meals, oil crops and rubber.

## BUILT-UP LAND

The area of land covered by human infrastructure such as roads, housing, industrial structures and reservoirs for hydroelectric power generation.

# Can the region's ecological assets meet the demand of its residents?

From 1961 to 2010, the Mediterranean's per person Ecological Footprint increased by 54 percent, while per person biocapacity in the region decreased 21 percent.

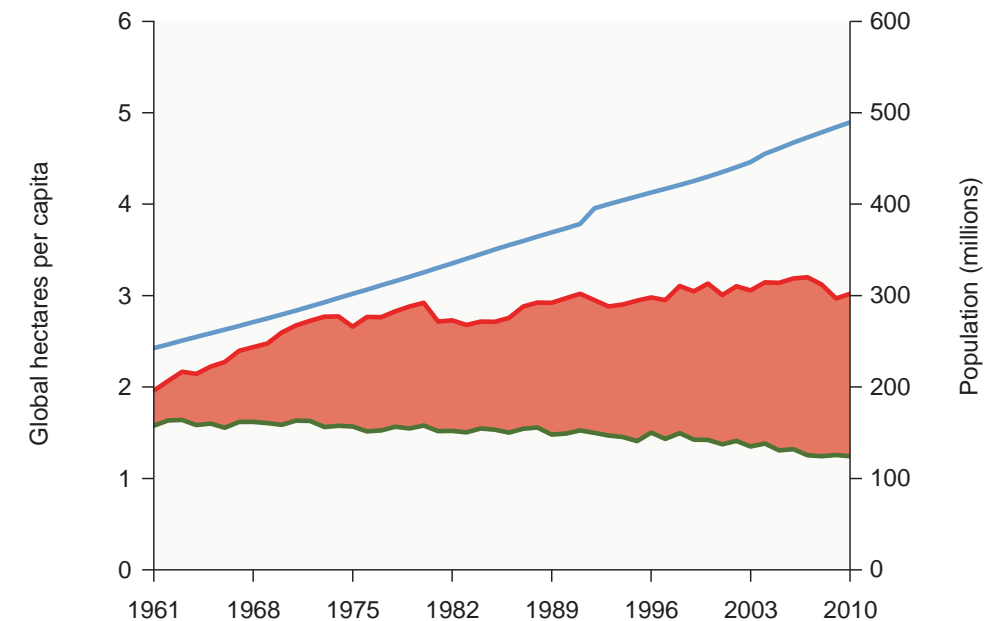
The average Mediterranean resident now has an Ecological Footprint of 3.0 global hectares (gha), slightly higher than the world-average Footprint (2.7 gha) and more than double the 1.2 gha of biocapacity available per person in the region. In nearly 50 years, the growing gap in supply and demand created a more than three-fold increase in the region's ecological deficit (represented by the shaded area in the right graph).

In 1961, the needs of the Mediterranean region as a whole already exceeded its ecosystems' capacity to produce resources and services. By 2010, only 41 percent of the region's Ecological Footprint was met by local ecological assets. The deficit has been met by depleting local stocks and overloading global carbon sinks (29 percent of the Footprint) and by importing resources such as food and energy from outside the region (30 percent of the Footprint).

The widening gap between demand and supply makes the stability of the region highly dependent on the availability of resources from international markets, as well as the region's ability to pay for accessing them.

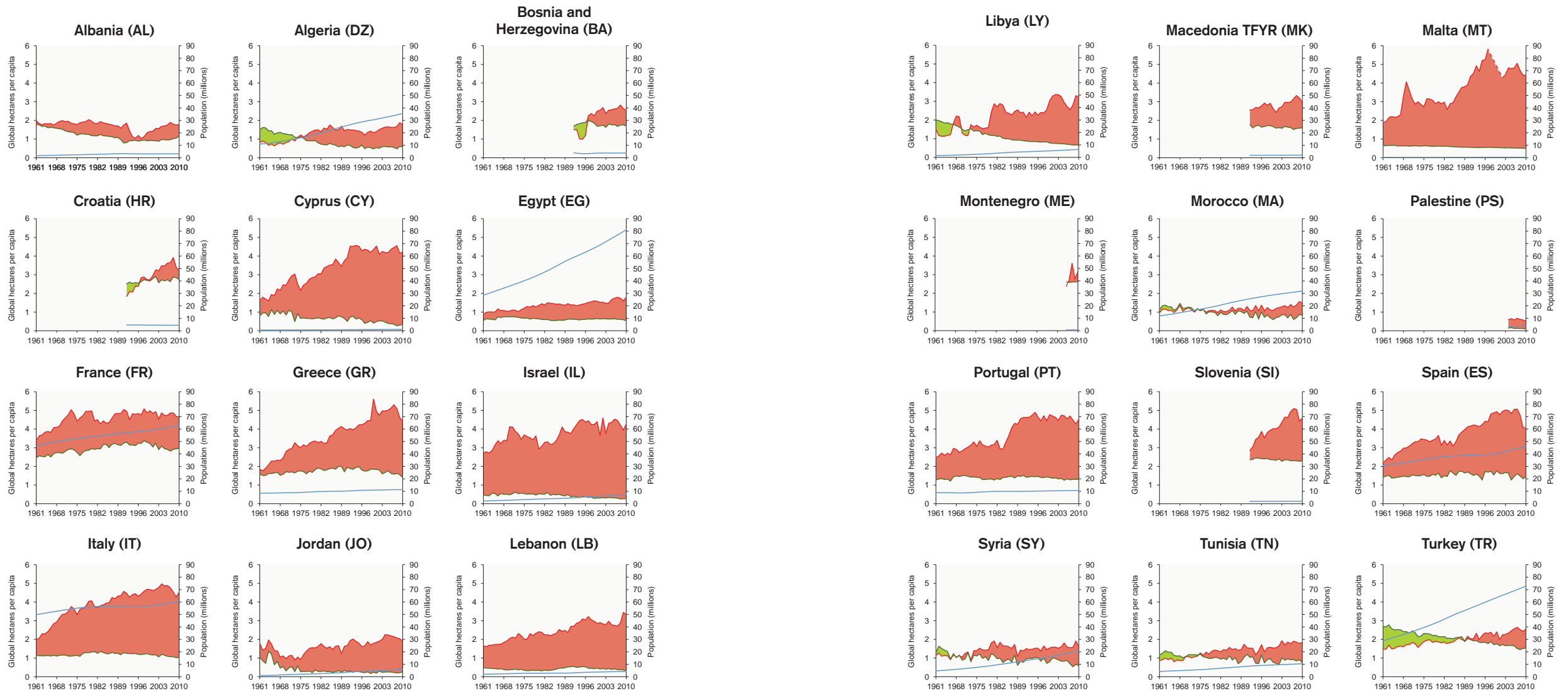
— Ecological Footprint  
— Biocapacity  
— Population

## Mediterranean Region



**A WIDENING GAP BETWEEN SUPPLY AND DEMAND** / The Mediterranean region's per person Ecological Footprint (red line) has increased, while the biocapacity (green line) per resident has decreased. Population (blue line) has more than doubled, from about 240 million in 1961 to nearly 490 million in 2010. Note: The 1992 population jump is a statistical anomaly and coincides with the first year the former Yugoslavian republics were included in the region's Ecological Footprint calculation.

█ Ecological Footprint  
█ Biocapacity  
█ Population



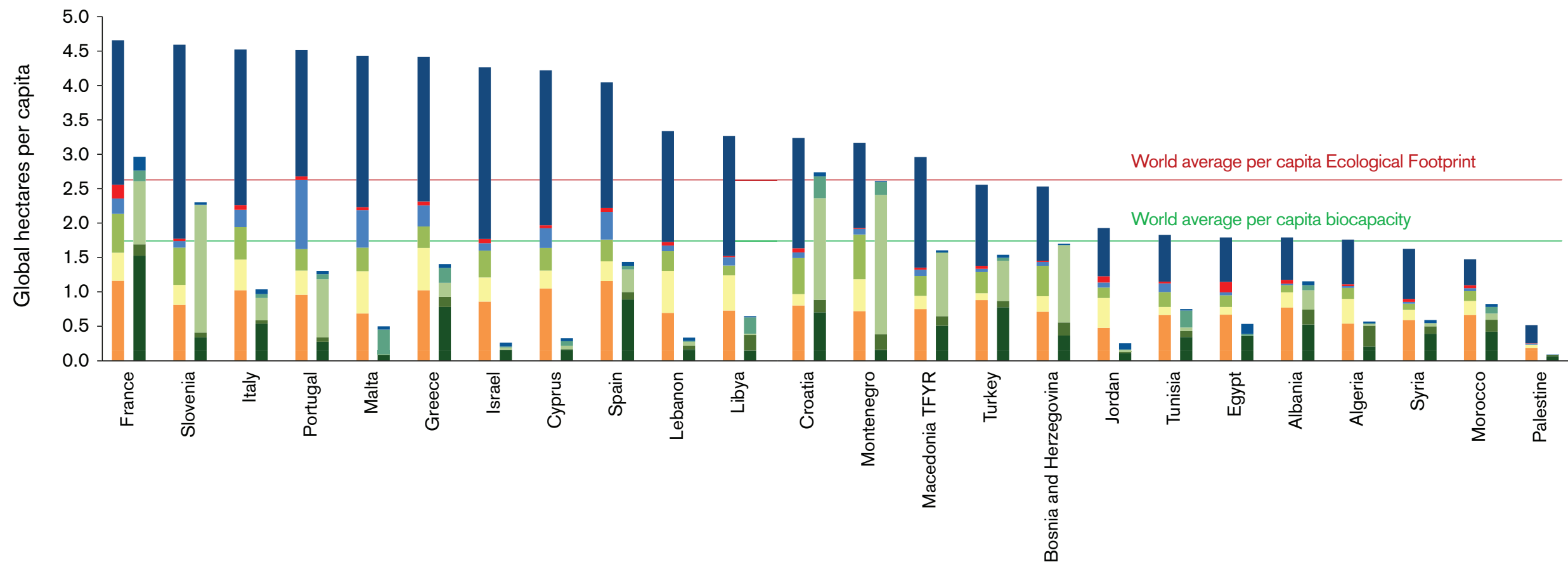
**TRENDS FOR MEDITERRANEAN COUNTRIES** / Ecological Footprint (red line) and biocapacity (green line) are expressed in global hectares per person. Ecological deficits are shaded red, reserves are shaded green. Population trends (blue line) are reported in millions. Additional information on the Ecological Footprints of the 24 countries can be found in Galli et al., (2015). *Environmental Science & Policy*, vol. 51, pp 125-136, and at [www.footprintnetwork.org](http://www.footprintnetwork.org).

**The 24 countries studied** in this report include all countries with populations greater than 500,000 directly bordering the Mediterranean Sea plus Jordan, Macedonia and Portugal, which are ecologically characterized by Mediterranean biomes.

# Ecological Footprint and biocapacity of Mediterranean nations

Every country in the Mediterranean region is running an ecological deficit, with its Ecological Footprint exceeding its biocapacity (according to 2010 data). Moreover, approximately 90 percent of people in the Mediterranean region live in countries whose Ecological Footprint is higher than the world-average biocapacity available per person. The graph below shows the Ecological Footprint and biocapacity by different land types for each country in the Mediterranean in 2010. The countries with the highest incomes currently have the highest resource demands in terms of Ecological Footprint. The carbon Footprint varies the most among countries and rises with higher per capita income levels.

- BIOCAPACITY**
- Built-up land
  - Fishing ground
  - Forest land
  - Grazing land
  - Cropland
- ECOLOGICAL FOOTPRINT**
- Built-up Footprint
  - Fish Footprint
  - Forest Product Footprint
  - Grazing Footprint
  - Crop Footprint
  - Carbon Footprint



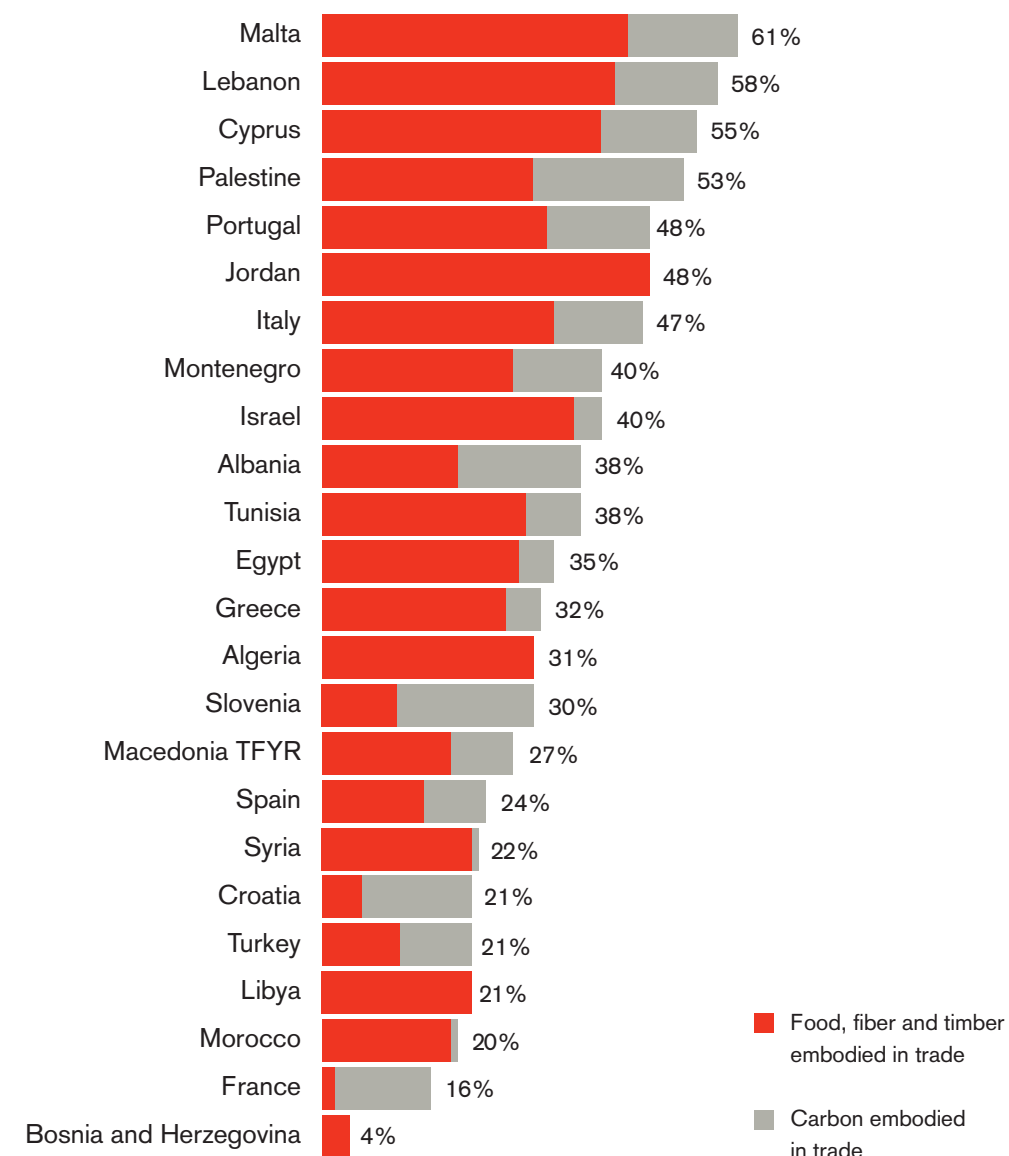
# What do resource limits mean for long-term economic performance?

**No country in the Mediterranean region** is capable of providing all the natural resources and services that its population demands by solely relying on its own biocapacity (see pages 8-9). To some extent they all depend on net biocapacity imports. This dependence varies considerably between countries in the region, from under 5 percent in Bosnia and Herzegovina to over 60 percent in Malta.

The composition of external biocapacity dependence varies by country. Indeed, countries can depend on the bioproductive ecosystems of other countries to provide renewable natural resources such as food, fiber and timber products. In the case of Bosnia and Herzegovina, Morocco, and Syria, the imports of such products account for all or nearly all of their external biocapacity dependence. Countries also can and do produce more waste than their ecosystems are capable of absorbing. In Croatia, Slovenia and France, the implicit reliance on outside ecosystems to absorb the carbon dioxide that is emitted into the atmosphere as a result of consumption activities accounts for the largest share of their external biocapacity dependence.

To understand the economic implications of ecological deficits, we can start by looking at both the scale of the deficit and its composition.

**External Biocapacity Dependence through Trade**  
The share of a country's Ecological Footprint met through net biocapacity imports.





# What if prices increase just 10%?

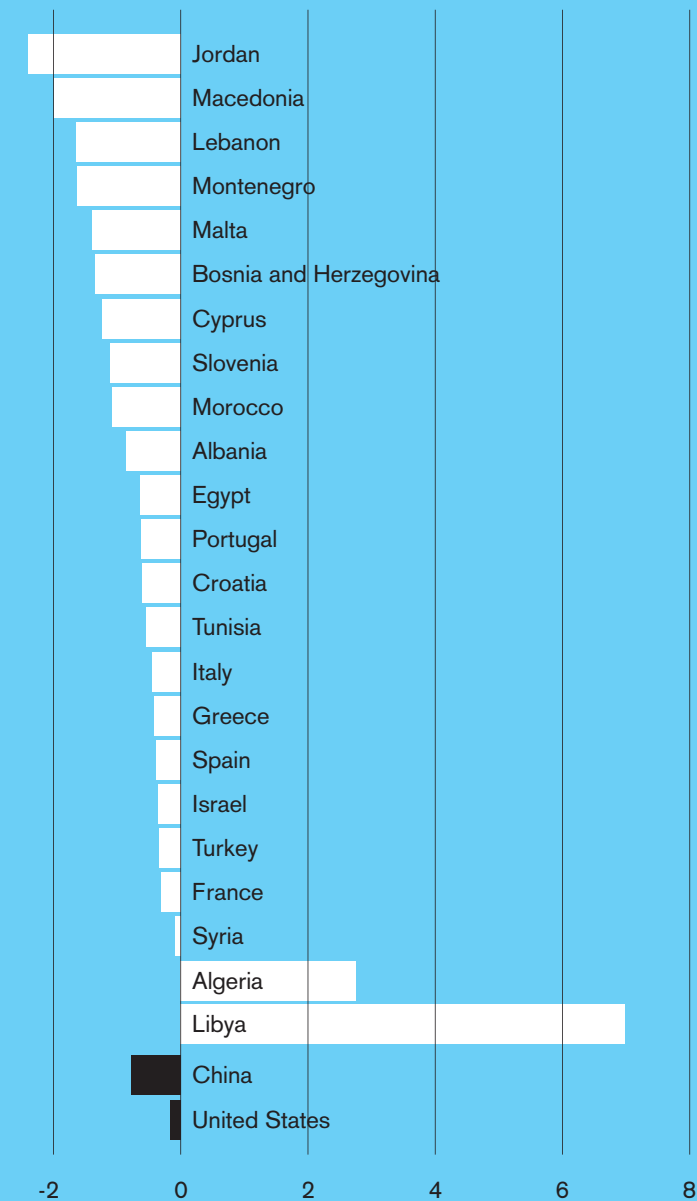
**With humanity** now consuming the equivalent of 1.5 planets, the continually increasing demand for natural resources and services is running up against natural boundaries. In addition to the many environmental implications of this ecological overshoot, countries may face growing economic risks as well.

All countries in the Mediterranean region are dependent to some extent on imports to meet the consumption needs of their populations (see pages 12-13). As prices for commodities increase over the long term and become more volatile in the short term, the overall trade balance of a country faces additional risk.

While the impact of price changes is difficult to predict, a simple scenario helps to visualize the differentiation among countries in the region. Increasing prices of natural resources by 10 percent (a likely possibility given the abrupt ups and downs of commodity prices in the past decade) while keeping consumption constant leads to very different outcomes for countries in the Mediterranean region. It appears that most countries in the region are likely to experience difficulties in the face of commodity price changes (see right graph) in the form of worsening trade balances. Conversely, oil exporting countries are likely to experience improving trade balances.

Additional information can be found in Galli et al., (2015). *Environmental Science & Policy*, vol. 51, pp 125-136.

**Exposure to Price Volatility**  
Effect on the trade balance of a 10% increase in commodity prices, as percent of GDP.



Note: China and United States data is provided for comparison purposes.

# Problem and solution: two sides of the coin

**Achieving a sustainable Mediterranean region** necessitates implementing new actions and policies related to both production and consumption activities.

Shifting towards Sustainable Consumption and Production (SCP) patterns, in turn, entails increasing resource efficiency along the entire life cycle of products and services, and promoting sustainable lifestyles and consumption patterns. Ultimately, this requires measuring and managing how sustainably products are consumed.

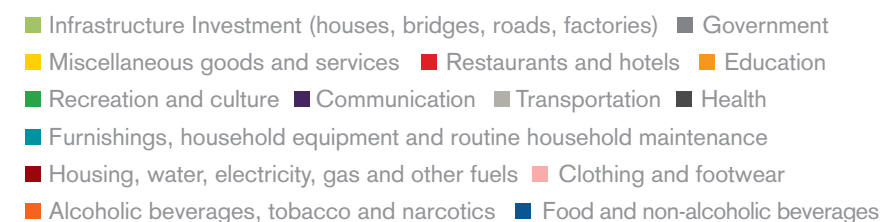
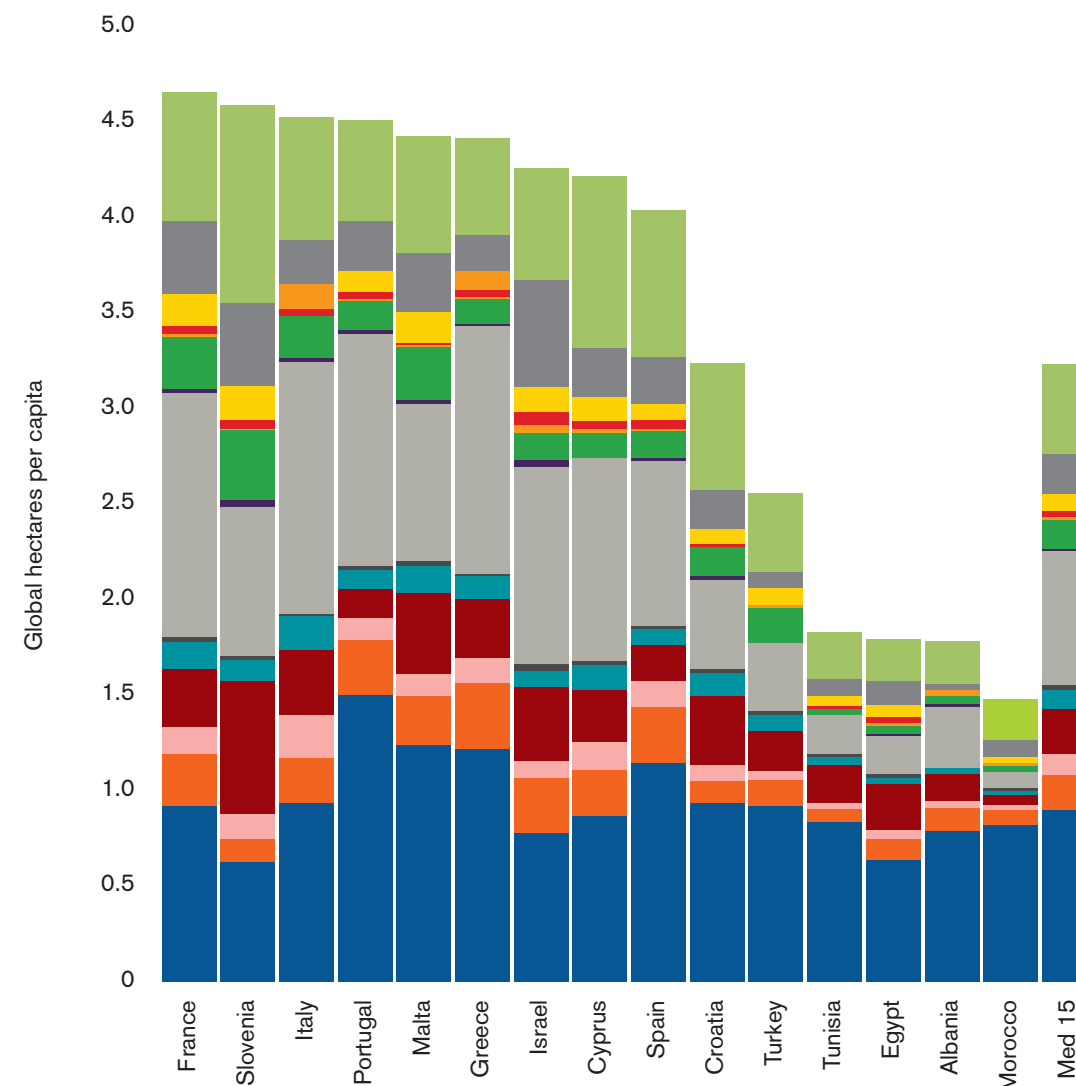
The Mediterranean region is at the forefront of the SCP approach. The Ecological Footprint can further support this approach by providing decision-makers with additional data to prioritize policies and measure progress.

Ecological Footprint analysis broken down by consumption components highlights both the biggest challenges facing a region and the areas in which policy changes can have the largest impact.

In almost all countries, the three largest components of the Ecological Footprint are food, transportation and housing (as demonstrated in the right graph). Targeting these areas through sustainable policies thus offers the opportunity to have the greatest impact on the Ecological Footprint of the region. For instance, Portugal has the highest food Footprint of any Mediterranean country, while France, Italy and Greece have the highest transportation Footprints, suggesting different priorities for Footprint reduction in each country.

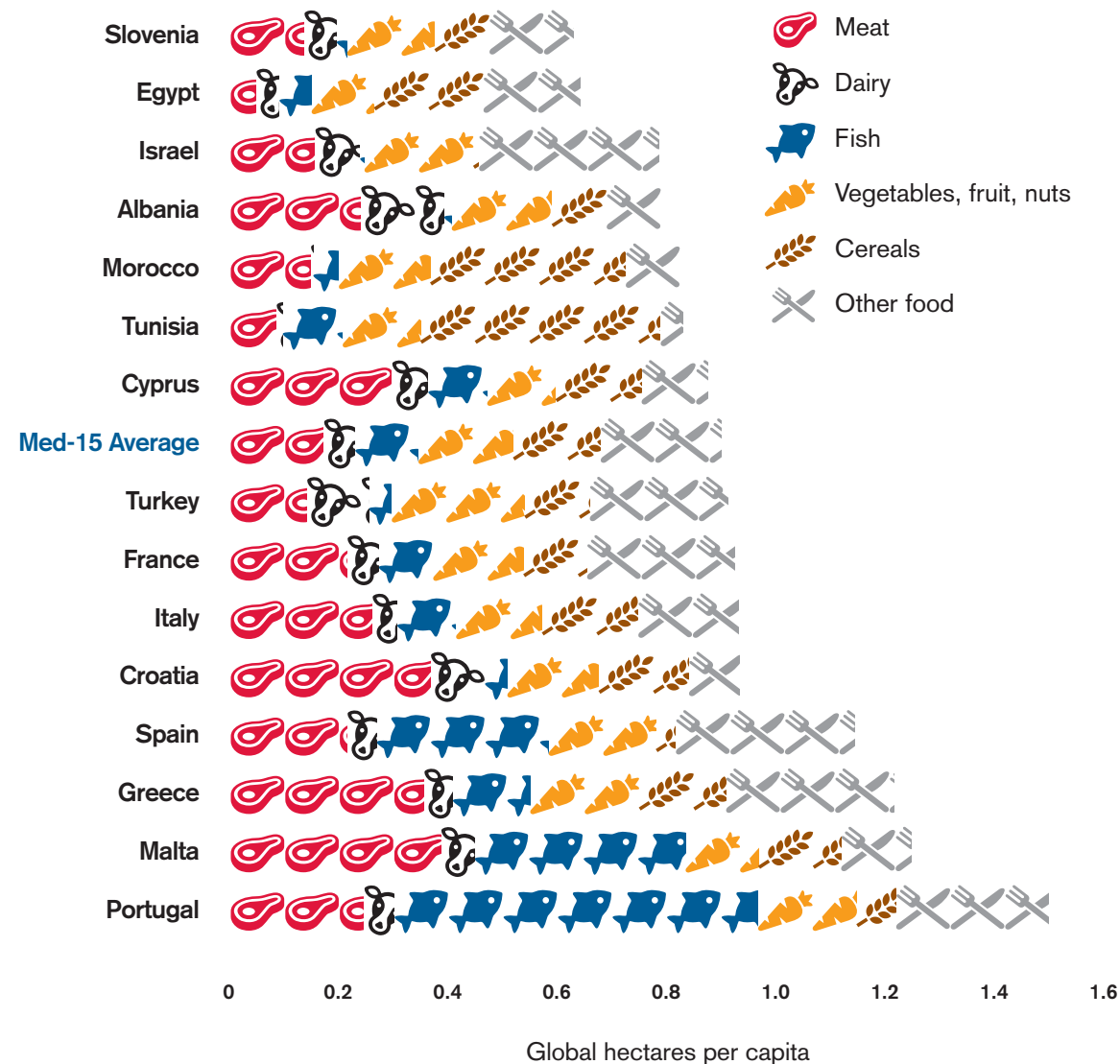
**Ecological Footprint by Key Consumption Activities (2010)**

Analysis provided for 15 countries only, due to data limitations.



# Food Footprint: How fit is your diet?

Ecological Footprint of Food Consumption (2010)



Food is a substantial share of Mediterranean countries' overall resource requirements, but it ranges widely as a proportion of the overall Ecological Footprint, from as low as 20 percent (Slovenia) to as high as 70 percent (Morocco) (see pages 16–17).

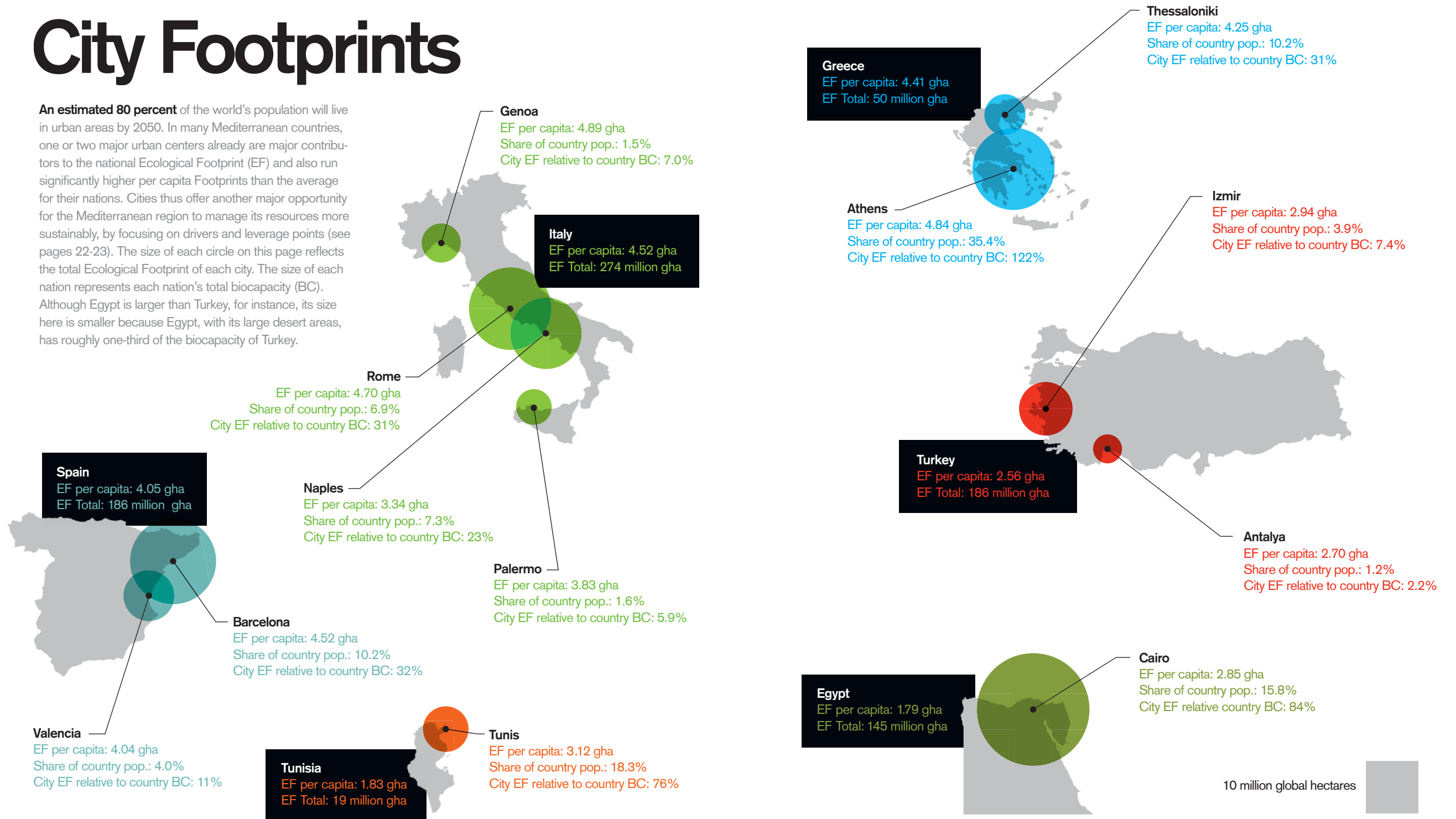
Food, of course, is a basic human requirement. Consequently, resource needs for food consumption can be shifted by only small amounts. In addition, food consumption heavily relates to dietary habits and production efficiency. Protein-intensive food such as meat and dairy requires more bioproductive land to produce the same amount of calories as plant-based food products. Protein-based foods thus have higher Footprints than plant-based foods.

Portugal and Malta have the most protein-intensive diets in the Mediterranean (see graph on the right), which are based largely on fish and account for about 0.67 gha and 0.39 gha of the Ecological Footprint respectively. In Morocco and Tunisia, on the other hand, the biggest share of the food Footprint comes from cereal consumption, at 0.36 gha and 0.44 gha respectively, and a small share from the fishing industry.

Reducing human dependency on ecological assets for food consumption therefore depends on agriculture productivity improvements, food waste reduction, and the promotion of healthier and less resource-intensive diets.

# City Footprints

An estimated 80 percent of the world's population will live in urban areas by 2050. In many Mediterranean countries, one or two major urban centers already are major contributors to the national Ecological Footprint (EF) and also run significantly higher per capita Footprints than the average for their nations. Cities thus offer another major opportunity for the Mediterranean region to manage its resources more sustainably, by focusing on drivers and leverage points (see pages 22-23). The size of each circle on this page reflects the total Ecological Footprint of each city. The size of each nation represents each nation's total biocapacity (BC). Although Egypt is larger than Turkey, for instance, its size here is smaller because Egypt, with its large desert areas, has roughly one-third of the biocapacity of Turkey.



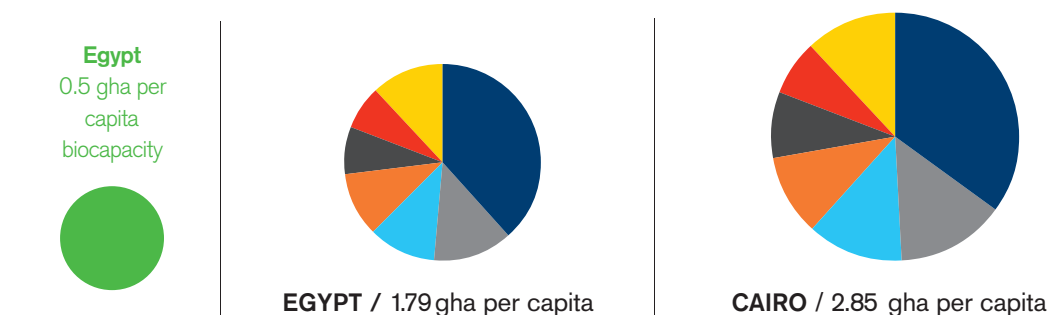
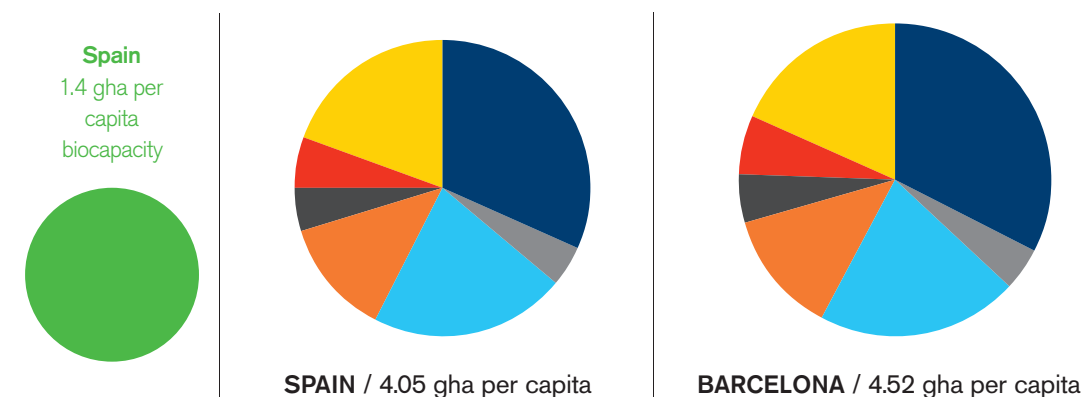
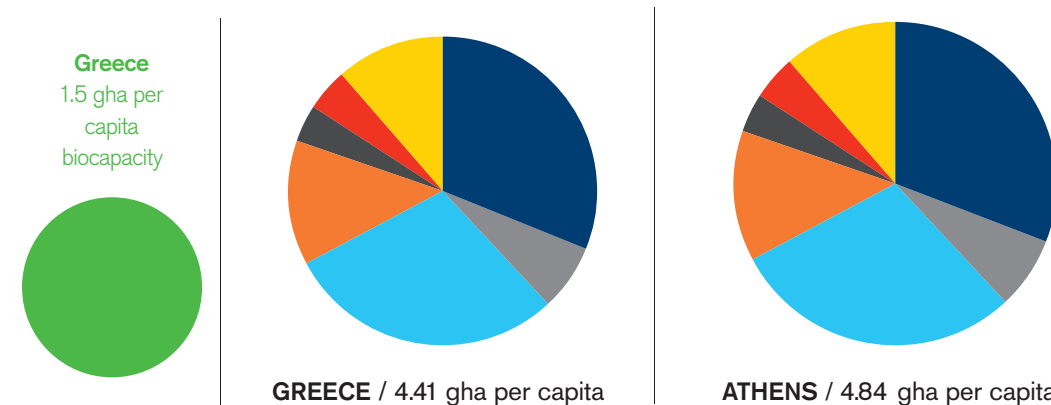
# Focusing on Athens, Barcelona and Cairo

**Cities that make investments** to improve the well-being of their citizens while reducing their resource dependence will be more resilient amid growing resource constraints.

City Footprinting (see graph on the right) can inform a broad set of policies, ranging from transportation to building codes to residential development. It can provide guidance to city councils in choosing the most sustainable policies that also serve the needs of their residents.

For instance, the Ecological Footprints of Athens, Barcelona and Cairo paint very different pictures for these three cities. They all run Ecological Footprints higher than their nation's average, suggesting that urban residents' higher consumption lifestyle outpaces efficiency gains offered by the sharing of infrastructures in cities. Transportation comprises a larger portion of the Footprint for both Athens and Barcelona compared with Cairo, suggesting an opportunity to reduce the transportation Footprint. Housing, meanwhile, comprises a larger portion of the Footprint in Cairo compared with Athens and Barcelona.

Moreover, Athens' Footprint constitutes nearly 40 percent of Greece's Footprint; this city thus represents both a Footprint driver and a policy opportunity for the country. The carbon Footprint in personal transportation represents nearly 25 percent of the overall city's Footprint. Consequently, municipal transportation policies could lead to a noticeable reduction in resource consumption.



**Per capita Ecological Footprint (2010)**

- Food
- Housing
- Personal transportation
- Goods
- Services
- Government
- Infrastructure Investment (houses, bridges, roads, factories)

# With an ecological bank statement, policy decisions become more informed.

**Leaders today require strategies** that address the dual challenges of shrinking resource supply and growing demands on the planet. Global Footprint Network and its partners have the tools and programs necessary to help countries thrive in a resource-constrained world. Our frameworks help economic decision-makers react to resource limits and demonstrate it is possible and within their power to reverse these resource trends.

Ecological Footprint accounting can help cities, states and nations more accurately measure their ecological reserve or deficit, identify key challenges and opportunities, and forecast and monitor the impact of different policies. Using Ecological Footprint accounting and our Net Present Value Plus (NPV+) tool can help government agencies at all levels manage their capital investments in a fiscally responsible and environmentally sustainable way.

## Ecological Footprint

Are we using more resources than we have?

### Early warning:

The Ecological Footprint can help identify which issues need to be addressed most urgently to generate political will and guide policy action.

### Headline and issue framing:

The Ecological Footprint can improve understanding of the problems, enable comparisons across regions and raise stakeholder awareness.

### Policy development:

With the identification of Footprint “hot-spots,” policy makers can prioritize policies and actions, often in the context of a broader sustainability policy.

### Monitoring:

Footprint time trends and projections can be used to monitor the short- and long-term effectiveness of policies.

## Net Present Value Plus (NPV+)

Will our investment reduce our exposure to limited resources?

### Investment analysis:

NPV+ helps governments and public agencies more accurately measure the long-term value of their investments in infrastructure and natural capital.

### Future scenarios:

NPV+ uses multiple scenarios to create a more realistic view for capital decisions and more fully assess risks and opportunities.

### Policy orientation:

By understanding where the best long-term value is, policies can be reoriented toward better outcomes.

### Building resilience:

Sound investments build wealth, avoid stranded assets and leave a better legacy for future generations.

Analysis:



Global Footprint Network®  
Advancing the Science of Sustainability

Global Footprint Network is an international think tank that coordinates research, develops methodological standards and provides decision-makers with a menu of tools to help the human economy operate within Earth's ecological limits.

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Funding:



The MAVA Foundation was established in 1994 and is a family-led, Swiss-based philanthropic foundation whose mission is to engage in strong partnerships to conserve biodiversity for future generations.

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