Beyond CO2 - Competitiveness redefined in a resource constraint world

Introduction

Two significant misperceptions have for too long shackled our approach to environmental protection and climate change. First, the error is simply that most country governments still perceive that taking action is a burden they will need to shoulder for the good of the world – rather than the understanding that their lack of action in environmental protection and climate change will have an increasingly important impact on their competitiveness and economic well being. Second, that we need only to look at CO2 emissions and hence oversee the other increasing ecological deficits with the more immediate and country relevant risks arising from the lack of action.

The question by governments of "What's in it for me?" and the lack of an answer perceived relevant for their country's short to medium term well being has up to now been a major stumbling block to progress and international agreement.

But if leaders and their administrations truly understood the full extend of the issue and its underlying resource dynamics and hence possible challenges to their economies, they would have the exact opposite approach. In fact environmental issues will very quickly start to burden each nations economy by increasing food dependencies, energy dependencies and as a result a rapidly increasing national debt.

This dynamic is particularly true for the nations of the developing region, characterized by high human pressure on their ecosystems, leading to ever more fragile economies and endangering social cohesion.

Why Beyond CO2 and Why Competitiveness

When we look at the main drivers of environmental protection and climate change, we have a tendency to concentrate on the CO2 emissions. But we need to have a much more holistic view of the matter. Only by using such a holistic view can we address immediate risks emerging from bio capacity deficits like food scarcity. Furthermore, the fact that in the last years, the efforts have very much been around reduction of CO2 has even increased the feeling to deal with a huge global issue with little clear links to the immediate economic well being of states. This has strongly increased a lack of enthusiasm for a challenge with a size much too big for any government and hence very much perceived as doing "good" for all other states. But this view limited to the CO2 challenge is standing in the way of dealing with all aspects of environmental protection and climate change and hence we are not realizing that action is needed today to avoid short-term degradation of the competitive position of any country by the impact of continued biocapacity deficits beyond CO2.

But how can we develop such a holistic view and use it to understand the short and medium term risks and the possible actions for each country? The best holistic representation today available is the ecological footprint, developed by the Global Footprint Network under the leadership of Mathis Wackernagel (see also [1]). In this ecological footprint, which is subdivided in different land types, we can determine, on one hand, the current use of biocapacity (expressed in global hectares, gha, a measurement of biocapacity, see also http://en.wikipedia.org/wiki/Global_hectare) of the country under analysis and we can determine, on the other hand, the available biocapacity for the country under analysis. Based on this analysis and the possible deficit of available bio capacity compared to the used bio capacity (biocapacity deficit) we will be able to determine the risks due to biocapacity deficits to the country's competitiveness in the short and medium term future. The risks to the competitivity are related to issues like:

- Food scarcity and an increasing dependence on food imports and exposure to food price changes. This will contribute to the impoverishment of the population and will also impact negatively the debt situation of the country. In the extreme case this will lead to social unrest and trouble.
- Increasing dependency on energy imports and exposure to energy price changes. This will make the production costs for the companies of the country higher, will contribute to the impoverishment of the population and will also impact negatively the debt situation of the country.
- Water scarcity, which will directly impact the capacity to feed the population and hence generate a continued food scarcity. Furthermore this will also impact the business either in raising production costs.
- Climate change that induces a further loss of biodiversity and impacts weather conditions in a way that endangers food production.

We will need to translate an overall biocapacity deficit into a more detailed analysis to look at the different land types, which are used to subdivide the footprint. The following land types are used to describe the use or availability of biocapacity of a country:

- **Cropland**: Cropland is the most bioproductive of all the land use types and consists of areas used to produce food and fiber for human consumption, feed for livestock, oil crops, and rubber.
- **Grazing Land**: Grazing land is used to raise livestock for meat, dairy, hide, and wool products.
- **Fishing Ground**: Fishing ground footprint represents the estimated primary production required to support the fish caught.
- **Forest**: The forest footprint represents the yearly amount of lumber, pulp, timber products, and fuelwood consumed.
- **Built-up Land**: The built-up land Footprint is calculated based on the area of land covered by human infrastructure — transportation, housing, industrial structures, and reservoirs for hydropower.
- **Carbon Footprint (only used to express biocapacity use):** The Carbon footprint with the carbon dioxide emissions, primarily from burning fossil fuels, is the only waste product included in the footprint accountings. The carbon Footprint is calculated as the amount of forestland required to absorb given carbon emissions. It is the largest portion of humanity's current Footprint – in some countries though, it is a minor contribution to their overall Footprint.

When looking at the balance between biocapacity use and availability, we can for each country, based on its development stage, its average household spending on food and energy, its existing energy resources, its current export balance and its domestic debt situation, determine the most important risks in relation with biocapacity deficits it is exposed to.

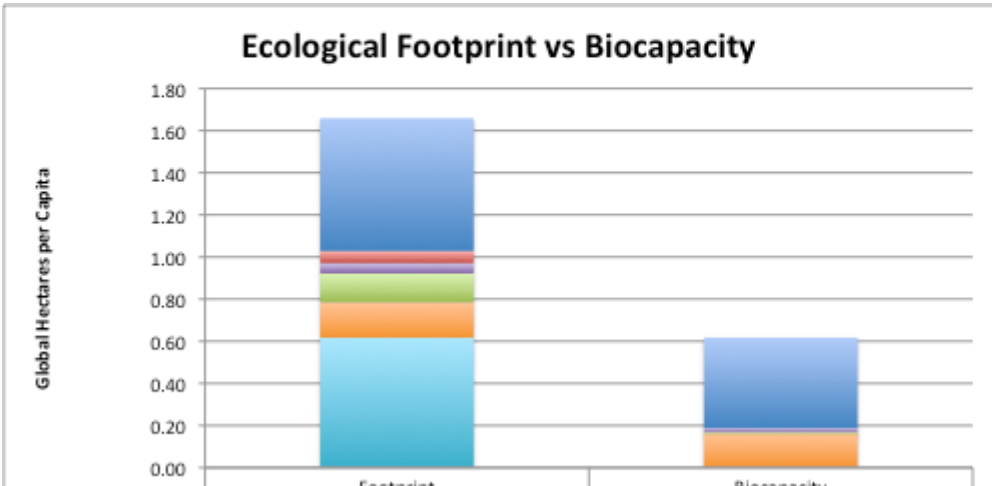
These are all risks that are or will be impediments to growth and when identified and understood will help to stimulate the development of relevant strategies to achieve sustained economic progress to drive continued social progress in this country. Failing to address these risks in a timely fashion will make the state vulnerable through an increasingly important bio capacity deficit which will generate a slowing down or even reversing of social development and will easily become a starting point for social unrest.

Hence it today's world where fossil energy will be more limited and we are potentially facing water and food scarcity, countries need to take into account the impact of their use of their bio capacity and the cost of maintaining biocapacity deficits. In conclusion, no country will be able to maintain a competitive environment supporting necessary growth to support and further advance, where necessary, the social development whilst maintaining a continued biocapacity deficit, as the risks as pointed out above will quickly become reality and undermine the countries stability.

But let us illustrate these concepts on the case of Egypt.

Egypt's Case

First let us look at the biocapacity use and availability of Egypt currently. We will then add to this analysis the evolution of the biocapacity use and availability of the last 50 years, this to complete the current year analysis by adding the clearly visible long-term trends. The first chart below (based on the 2010 Data Tables of the Global Footprint Network, see also [2]) shows the current biocapacity use of Egypt and compares it with its biocapacity available. We can easily see that there are important deficits in cropland, grazing land and fishery grounds of over 60%. This implies an important under capacity to provide for food in the country. Furthermore we can see that the CO_2 footprint represents an important over 35% of the overall footprint, which clearly points an important fossil energy dependency.



	Footprint	Biocapacity
Cropland	0.63	0.43
Grazing Land	0.06	0.00
Fishing Ground	0.05	0.02
Forest	0.14	0.00
Built-up Land	0.17	0.17
Carbon Footprint	0.62	

When we then further look at the evolution of the footprint (from the Global Footprint Network Mediterranean Initiative, see also [3]), we can see that the cropland footprint has been slightly decreasing over the years, which does speak for a certain level of increased cropland productivity or lower food consumption. The CO2 footprint has been increasing from almost 0 in 1960 to the level of today. Finally all other footprints have been stable over the years.

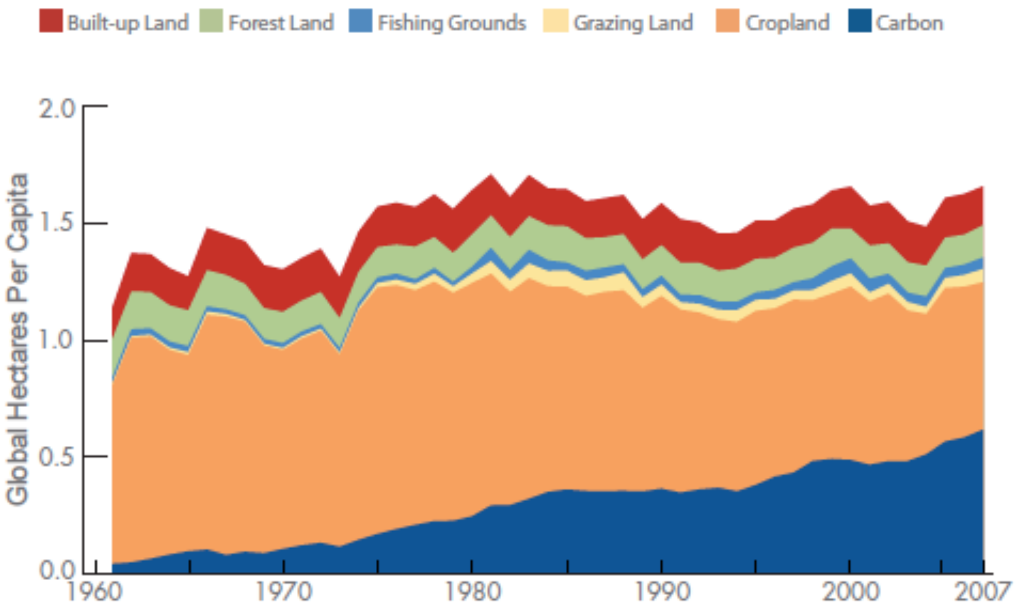


Figure EGY-1: Ecological Footprint of Egypt by component, 1961-2007

When we look at the development of available biocapacity over the years, we can easily see a decline of cropland until the mid 80s and then a stabilization, which again speaks for an improvement of the production from cropland (as at the same time the population continued to grow).

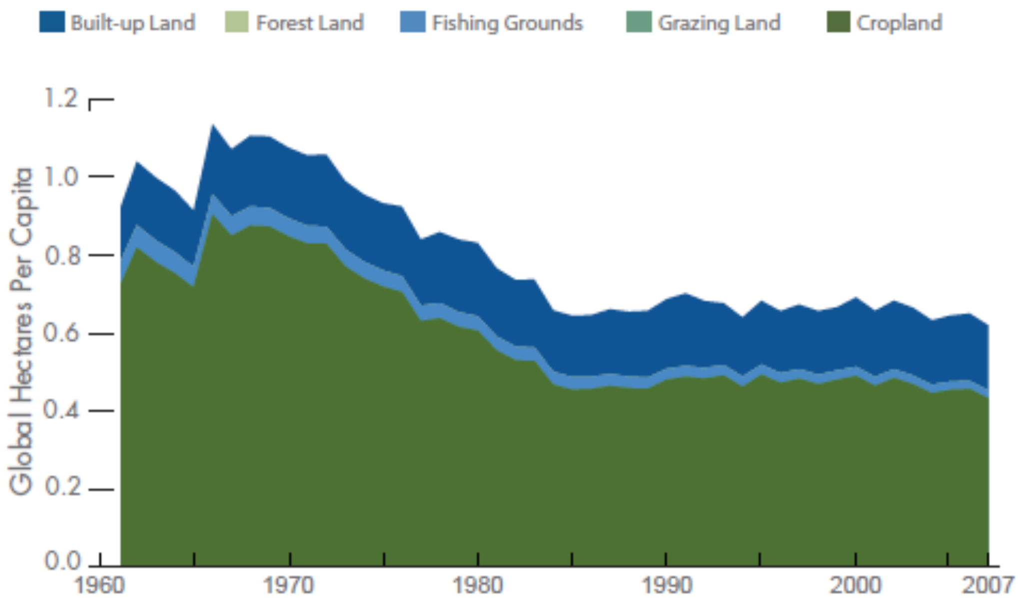
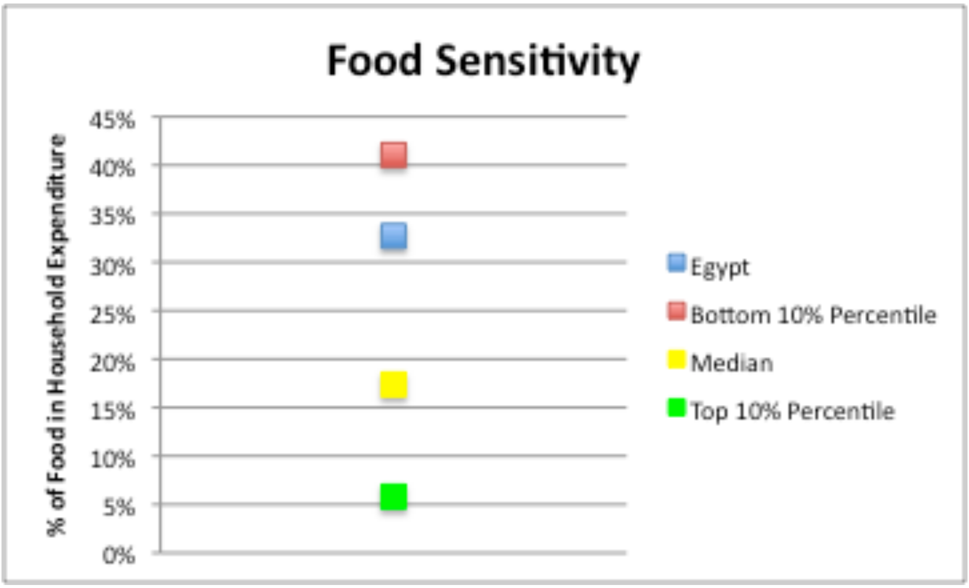
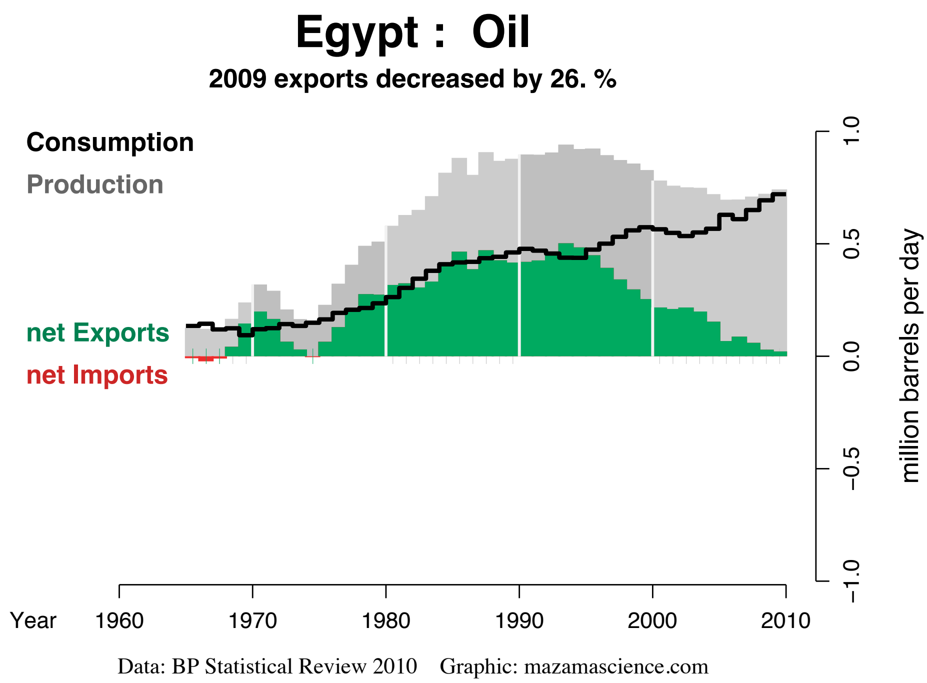


Figure EGY-3: Biocapacity of Egypt by component 1961-2007

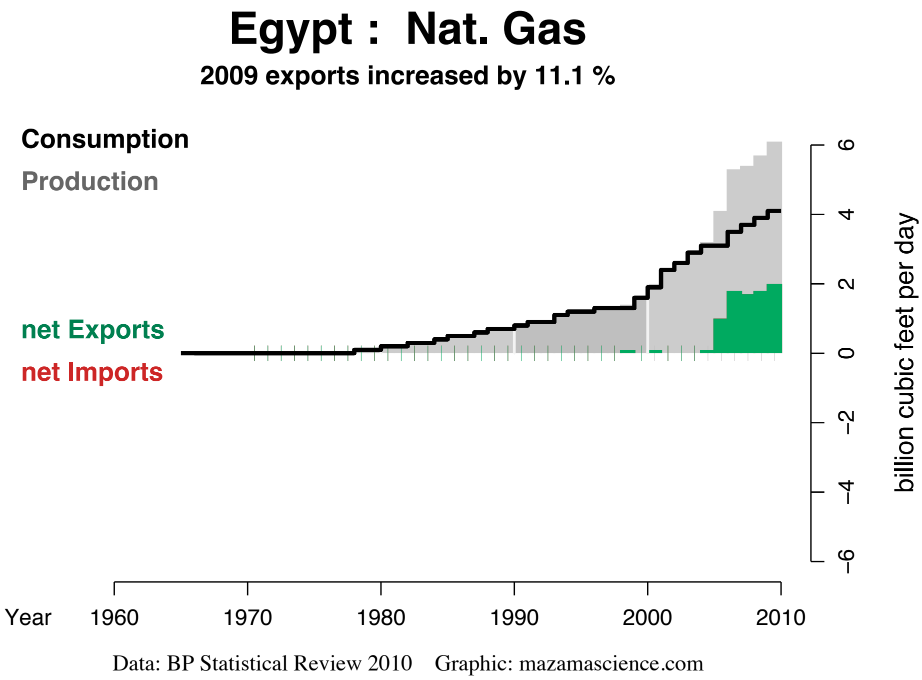
In conclusion to this we can see that Egypt is exposed to a deficit of cropland, grazing land and fishery grounds,, which will make it more and more dependent on food imports and hence become more and more impeded in its capacity to grow due to the increasing costs generated by the food import and its dependences on food prices. This is even more exemplified when we see the high level of household spending (based on World Bank Data from the International Comparison Program, Expenditure shares of GDP (percentage share, GDP=100, XR term), see also [4]) that goes into food, and this even in view of the fact that the government of Egypt is currently subsidizing food products, which will continue to increase government spending (see also the evolution of government debt in the conclusion chapter) as this will have to increase with the evolution of food prizes and the population increase of on average of 2% per year.



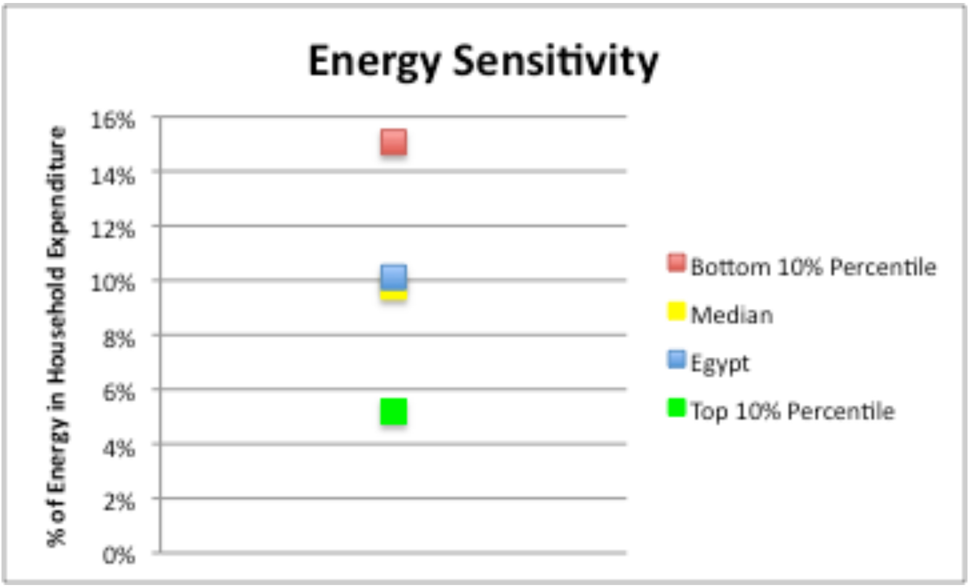
Finally, when we look at the CO2 footprint and its constant increase, we can see that Egypt, that used to be an energy exporter, now has reached a level where it does use all the oil production domestically, and will hence be very soon be in need to import oil or extend its domestic use of its gas production (the oil and gas export charts are from Mazama Science Databrowsers, see also [5]).



And here is the corresponding graph for gas, which is still available to be exported (also due to an important production increase over the last 5 years).



Currently, we can also see that the exposure to energy prizes, due to the percentage of household spending (based on World Bank Data from the International Comparison Program, Expenditure shares of GDP (percentage share, GDP=100, XR term), see also [4]), is close to the median value, which would imply a limited sensitivity to this issue, but this is actually very much the result of the government of Egypt heavily subsidizing the energy prizes.

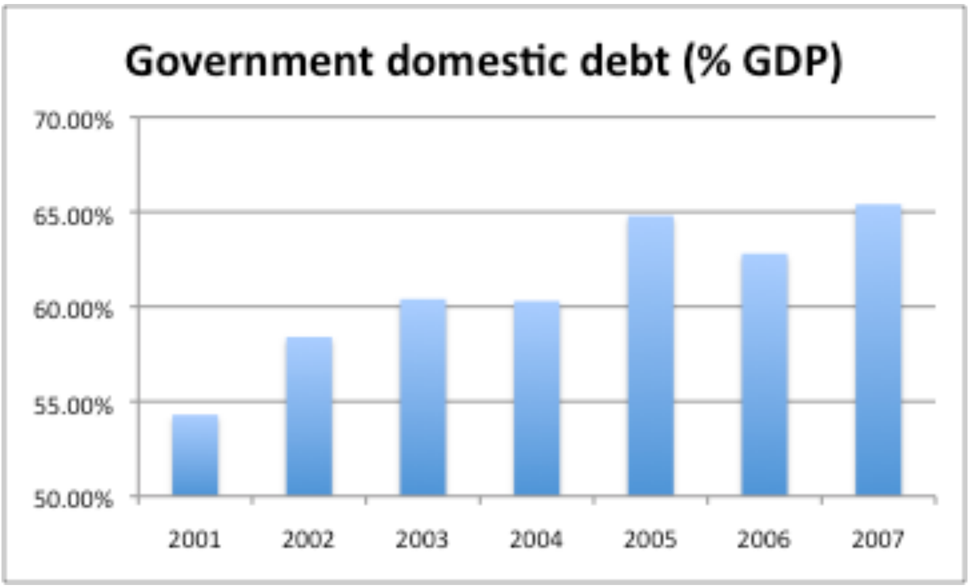


Conclusion

In conclusion, we have been able to show with the case of Egypt, that a holistic approach of the environmental protection and climate change issues by using the ecological footprint, allows to determine immediately several important short and mid term risks for a continued economic development of Egypt. Such risks will reduce the competitivity of Egypt and hence reduce the attractiveness of Egypt for foreign direct investments. We have been able to demonstrate

1. The risk of a continued biocapacity deficit for food resources, and this being even more accelerated by a high-level of sensitivity given the high percentage of food in the household spending and the fact that food is already subsidized. This risk will express itself by a continued impoverishment of the population due to the increasing food prices, increased national debt due to the import of food and the continued subsidizing of it. Both impacts will have a direct negative impact on the competitive standing of Egypt.
2. The risk of having to import fossil energy, which will lead to energy price increases, increased need to subsidize and finally an increase emission of CO2 with its overall impact on climate change. Again this will have a direct negative impact on the competitive standing of Egypt.

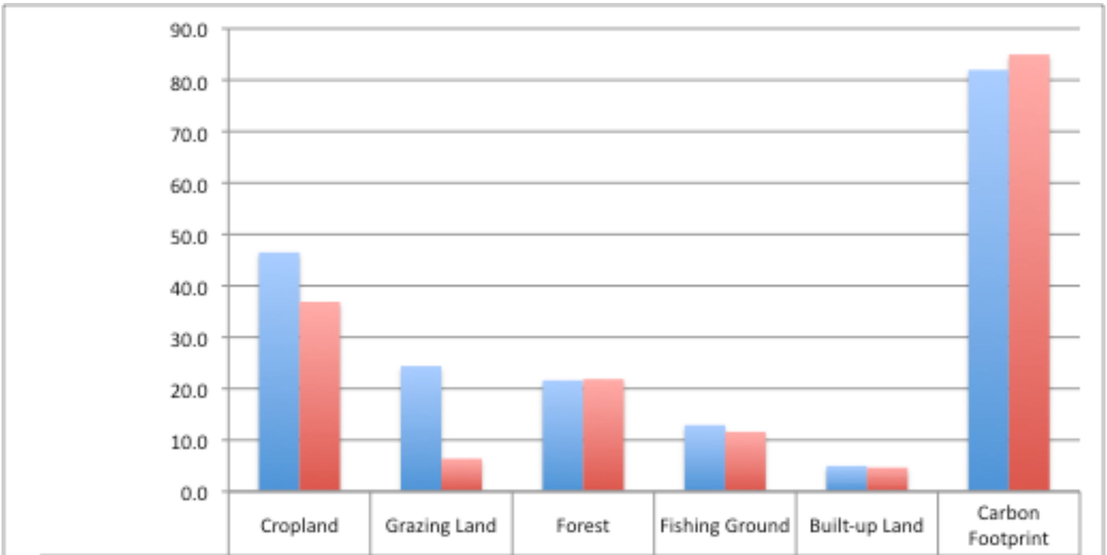
We can already see over the last decade how the government debt has increased:



Finally both these risks will continue to grow as they are directly linked to the size of population, which is currently growing with at least 2% annually.

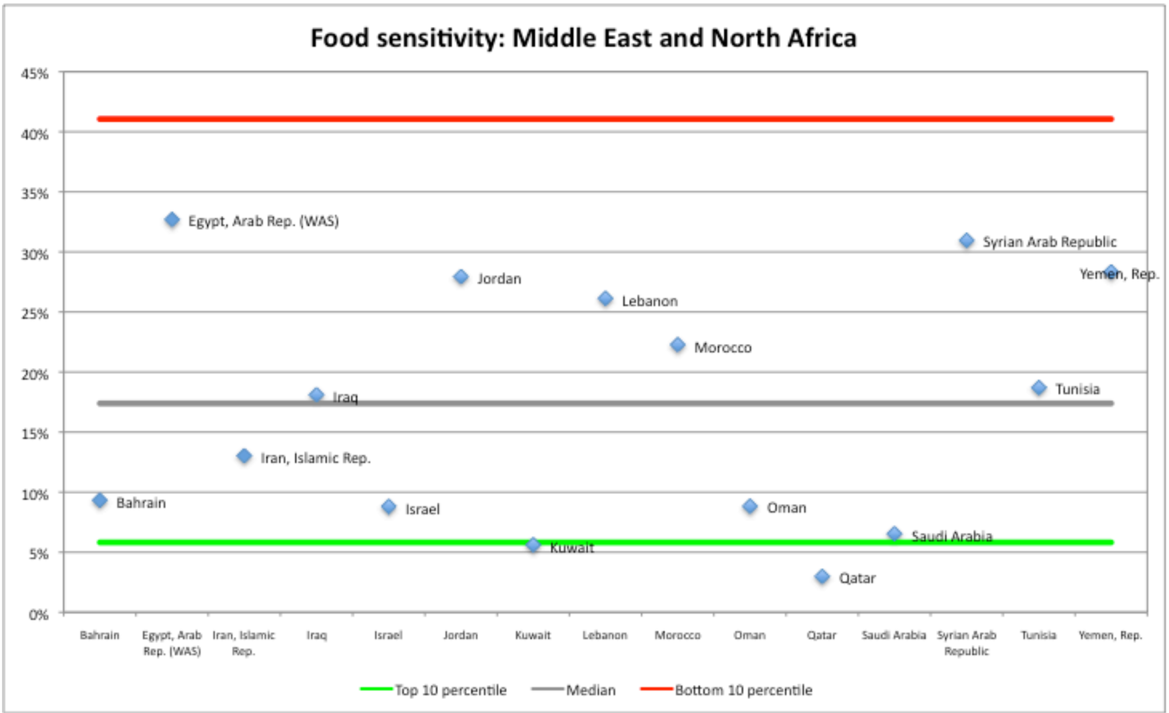
Annex - The View on Food Security in the MENA Region

When we look at the overall situation of biocapacity related to food production we can see that the MENA region has currently a deficit of 35% and this deficit will continue to raise with the increasing population, as the history has shown as that in this region (see also the Egypt example) it is very difficult to increase food productivity at the same rate as the population increase:



	Cropland	Grazing Land	Forest	Fishing Ground	Built-up Land	Carbon Footprint
MENA Footprint	46.5	24.4	21.6	12.9	5.0	82.0
MENA Biocapacity	36.9	6.4	21.9	11.6	4.7	85.0

Finally, when we look at the overall food sensitivity (as defined by the percentage of food related expenditure in a household budget) in the region, we can see that only two countries are quite safe (Kuwait and Qatar), but 8 are highly exposed (Egypt, Iraq, Jordan, Lebanon, Morocco, Syria, Tunisia, and Yemen).



This shows the high degree of exposure to any food crisis of the region, as all countries are dependent on food import and many of them have a high exposure to any food price change given the high percentage of food in their household budgets.

[1] http://www.footprintnetwork.org
[2] http://www.footprintnetwork.org/en/index.php/GFN/page/ecological_footprint_atlas_2008
[3] http://www.footprintnetwork.org/en/index.php/GFN/page/mediterranean_initiative
[4] http://www.worldbank.org/data/icp
[5] http://www.mazamascience.com/databrowsers.html