

Report

# Natural resources and the banana market

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## 1. Introduction

Bananas are a very important commodity and rank fourth after rice, maize and wheat in food production. About one fifth of the global production is exported from developing countries to developed countries and therefore it is an example of an unidirectional South-North trade.

Bananas are a very sensitive commodity at the international level, not only because of economic reasons but also due to environmental aspects. During the last decades of the 20<sup>th</sup> century, the banana export sector underwent very important structural changes, facing challenges such as the successive reforms of the European Union (EU) Banana Regime and the following controversial World Trade Organization (WTO) dispute or the evolving pattern of consumer preferences and food distribution channels.

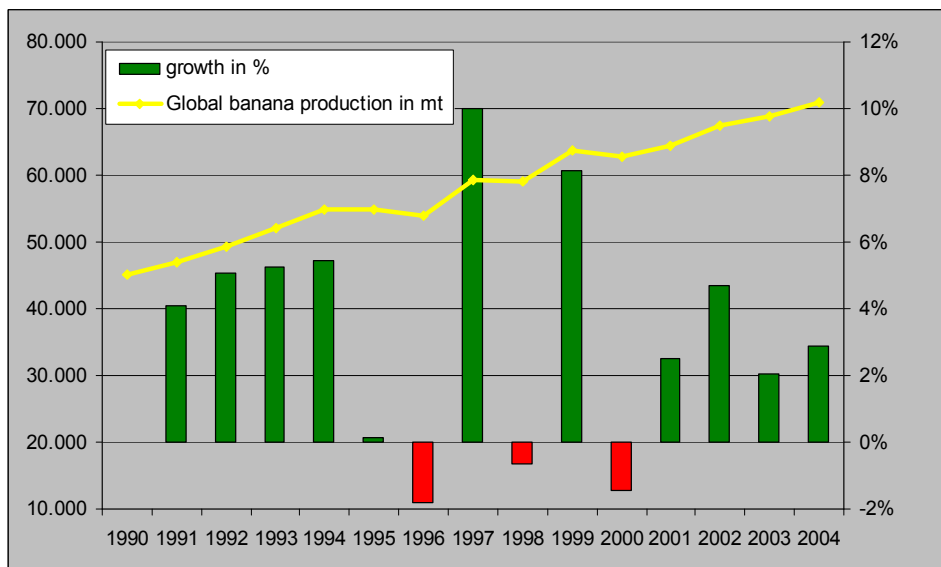
This report analyses the interaction of natural resources (land and water) and the banana markets.

## 2. The banana market

### 2.1. Global production

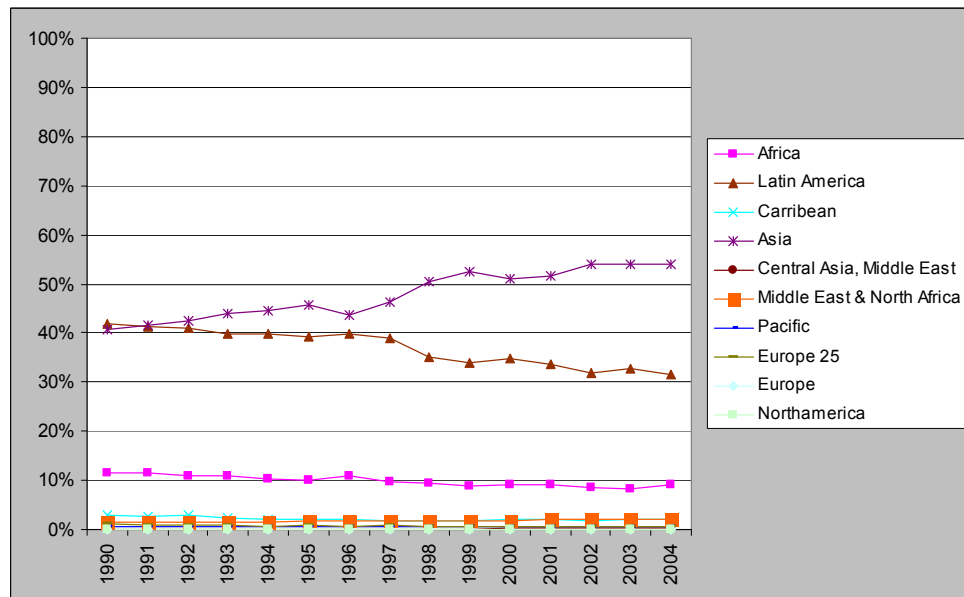
During the last decade the global banana production increased from 54900 tons in 1995 to 70800 tons in 2004, which corresponds to an increase of 29%. Since 1990 the market grew by a strong 57%. While the region Central and South America (even excluding the Caribbean countries) was the world biggest banana producer in 1990, the Asian countries produced more than 50% of the world production since 1998 and expanded their share to 54% in 2004. The Asian production doubled between 1990 and 2004, while the Central and South America production grew by a mere 18%. The Caribbean banana production was very volatile during this period. It decreased by 18% until 1998 and from then on it grew again even surpassing the 1990 level (5%). The SSA countries expanded their production by almost a quarter. Most of the increases happened from 2003 to 2004, when the market grew by almost 15%. However all regions except Asia lost shares of the global banana production.

Figure 1: Global banana production



Sources: FAO

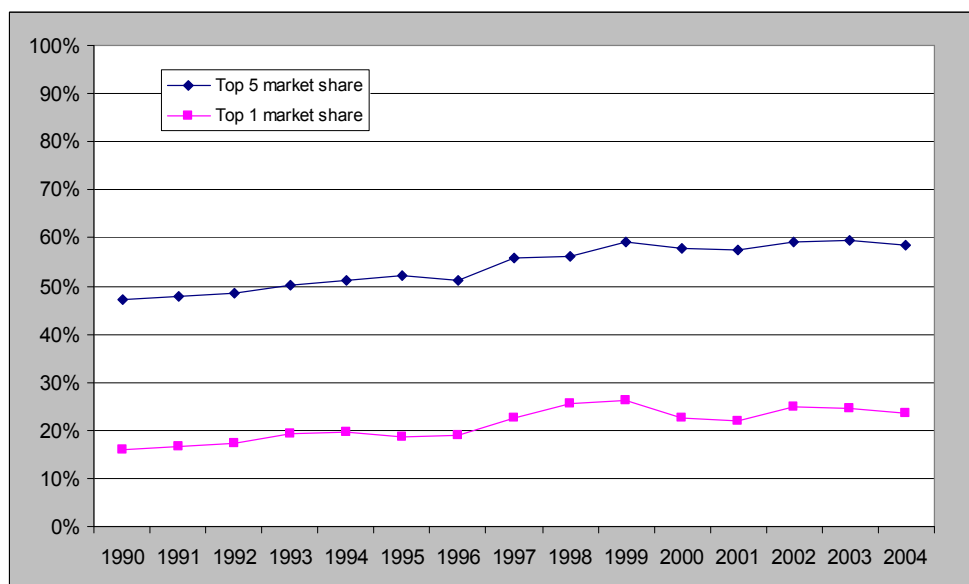
Figure 2: Banana production – regional share in % of global production



Source: FAO, own calculation

India is the world's biggest producer of bananas and covers almost 25% of the world production. In 1990 India's share of the world market was about 16%, but became more and more dominant. The top 5 producers increased their market share from 47% in 1990 to more than 58% in 2004. India, Brazil, Ecuador and Philippines have been in the top 5 for the whole period. Indonesia was overtaken by China in 1997. China became number three in 2004 with a production of 6,245,000 tons. China increased its production by 276% between 1990 and 2004.

Figure 3: Banana production – share of top and top five producers



Source: FAO, own calculations

## 2.2. Export and import of bananas

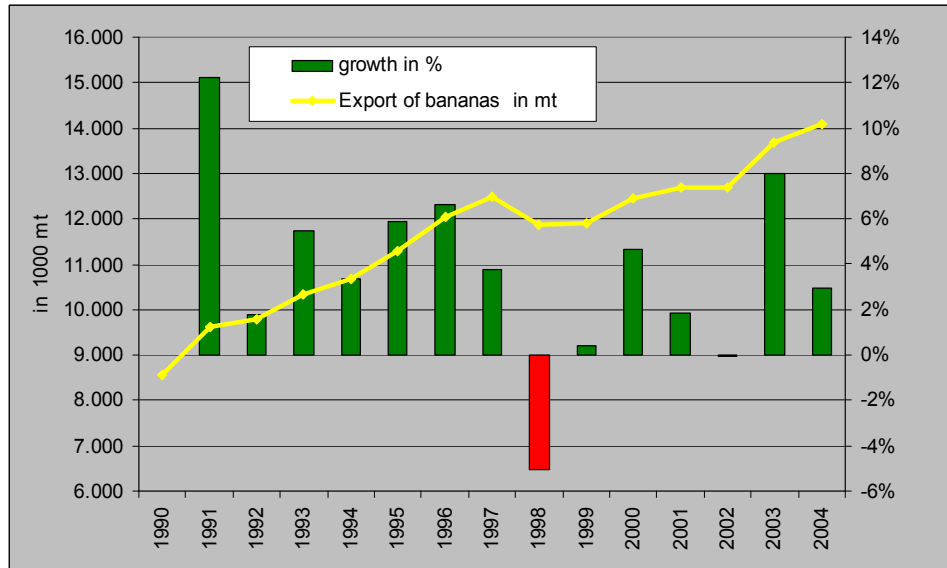
### 2.2.1. Exports

The increase of the banana market is export driven. Net exports<sup>1</sup> grew by 65% from 1990 to 2004. The export was and is still dominated by the Central and South American countries. However, their export share decreased from over 83% in 1992 to 75% in 2004. During the same period the Asian banana producers expanded their share from 10 to 18%. The export share of the African countries that are producing about a tenth of the world production does not even reach 4%.

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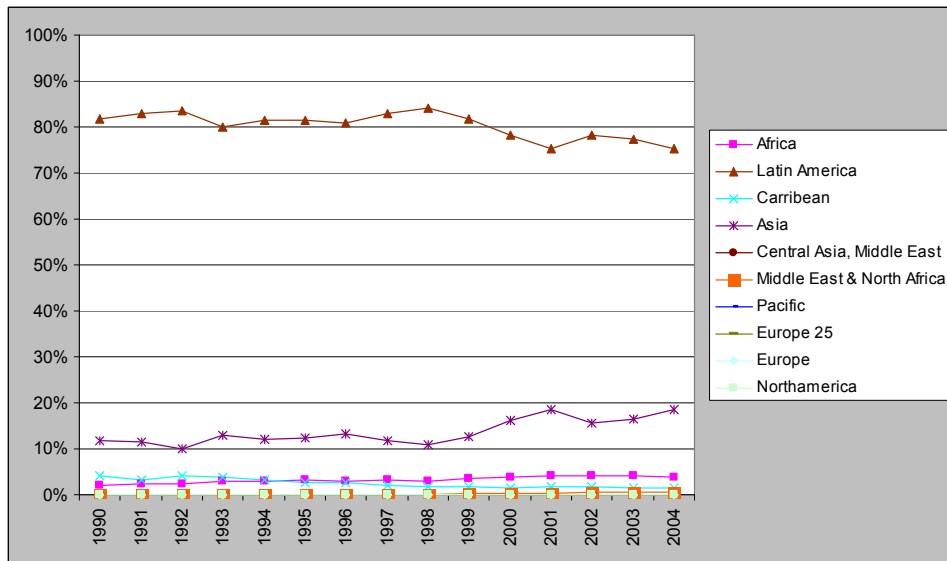
<sup>1</sup> Net export is defined as the volume of bananas that is exported by producing countries. "Trading exports" are excluded.

Figure 4: Banana net exports



Sources: FAO

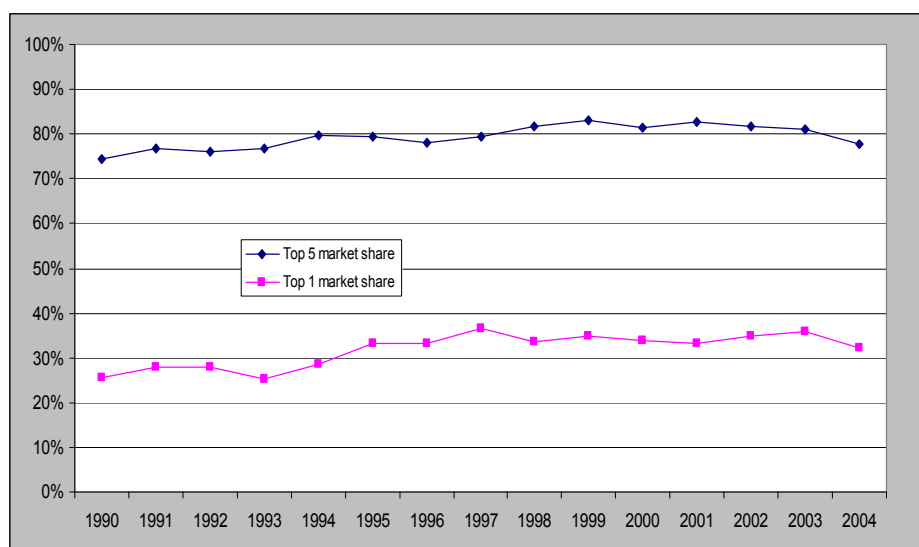
Figure 5: Banana net exports - regional share in % of global exports



Sources: FAO, own calculation

Ecuador is the biggest sole exporter and covered almost one third of the net exports in 2004. It reached its peak in 1997, when Ecuador exported 36,5% of the total net exports. Costa Rica and Colombia are other big exporting countries, while the Philippines are the only Asian country among the top five net exporters. India, for instance, is the worlds biggest banana producer and exported just slightly more than 11,000 tons until 2003. The export increased to 71,000 tons in 2004, but reachds only 1,56% of Ecuador's export (over 4,500,000 tons). The top five exporters cover about 80% of the total market. The highest dependences on banana export can be found in the Caribbean: Saint Lucia, St. Vincent and Grenadines, Dominica and Grenada<sup>2</sup>.

Figure 6: Banana export –share of top one and top five producers



Source: FAO, own calculations

### 2.2.2. Imports

The net imports<sup>3</sup> grew by 54% from 1990 to 2004. In 2000 the imports reached its peak with 13,000,000 tons. The EU 25 are the biggest regional importers, while The United States is the biggest single importing country. France, Germany, Italy and the UK are the biggest European importers, while Japan is the only Asian country among the top 5 importers. The importing countries are more diversified than the exporting countries. The top 5 importing

<sup>2</sup> St. Lucia generates almost 90% of its total agricultural exports through bananas.

<sup>3</sup> Net import is defined as total imports minus exports. "Trading imports" are therefore excluded.

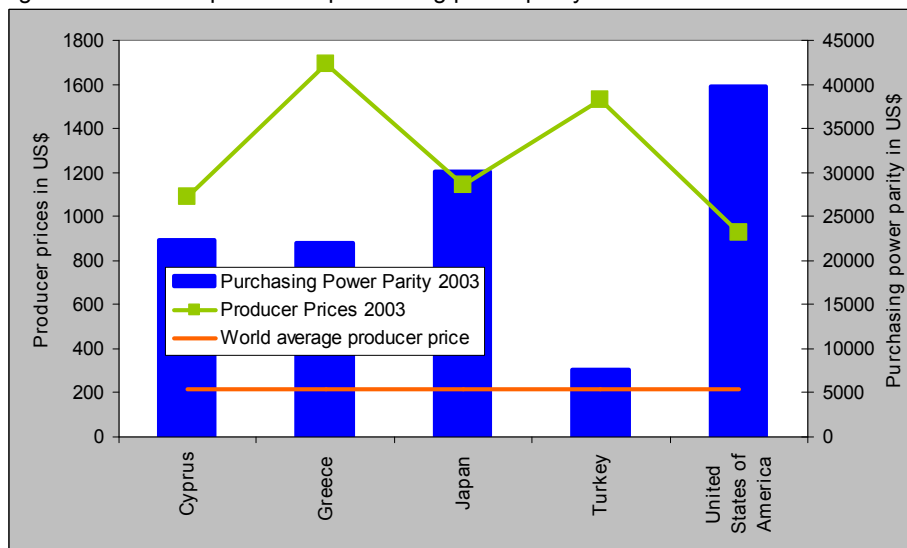
countries cover only slightly above 50% of the total imports, which is far below the export share of 80%.

### 2.3. Banana Prices

#### 2.3.1. Producer prices

There are big differences in the producer prices. The farmers in Turkey and Greece produce one ton of banana at about US\$ 1,600. These prices are even higher than the producer prices in Japan, where one ton costs about US\$ 1,100. These differences become even larger considering the Purchasing Power Parity (see World Bank 2005), where Turkey has a purchasing power of US\$ 7,680, Greece US\$ 22,000 and Japan US\$ 30,000!

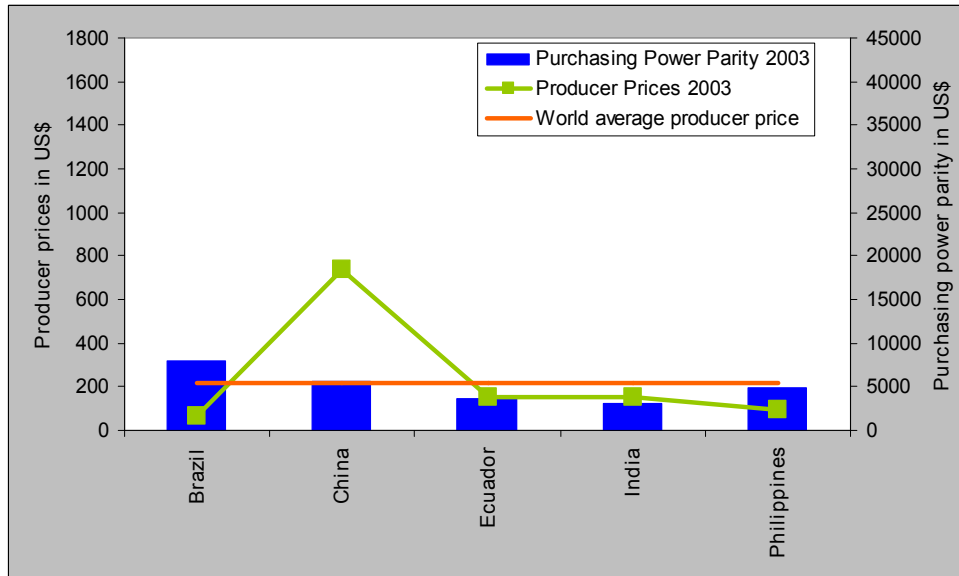
Figure 7: Producer prices and purchasing power parity in selected countries



Sources: FAO, World Bank

Looking at the biggest producers, China produces bananas at prices far above average, while Brazil produces its bananas at very low prices – in absolute and relative (related to the purchasing power parity) terms. China produces bananas at about US\$ 730 per ton. This level stabilized since 1997. From 1991 to 1997 the Chinese producer prices rose by 155% (1991: US\$ 275; 1997: US\$ 700). The price increase was only higher in Honduras (+358%; 1991: US\$ 65; 2003: US\$ 299) and Ghana (+357%; 1991: US\$ 40; 2003: US\$ 183). However, the overall producer prices grew by a mere 27% within the time period (1991: US\$ 172; 2003: US\$ 219).

Figure 8: Producer prices and purchasing power parity in top 5 banana producing countries



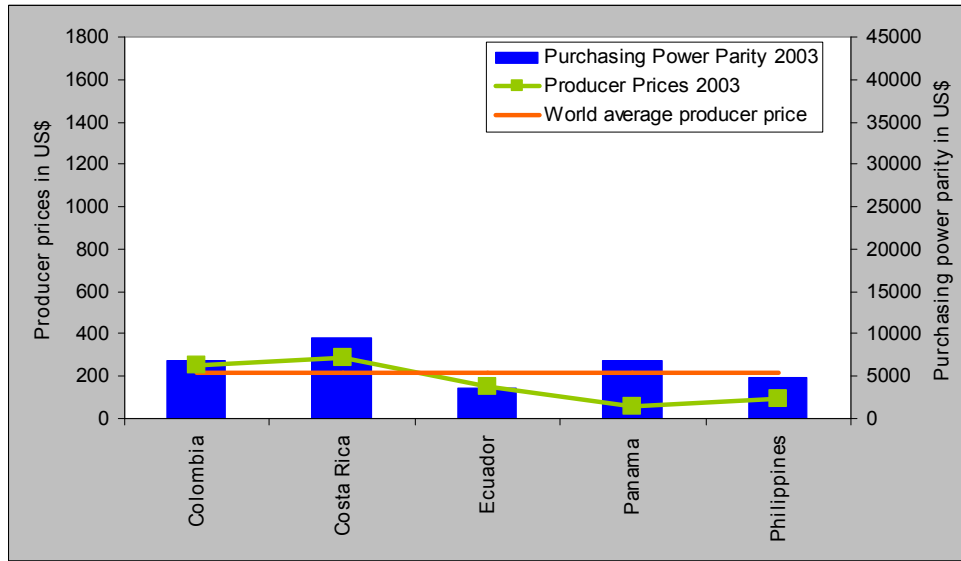
Sources: FAO, World bank

The producer prices of the net exporting countries are 24% below the world average. The exporting countries produce one ton at US\$ 166, while the world average production price is US\$ 219. However, the increase of the producer prices have been above the world rate between 1991 and 2003 and grew from a level of US\$ 123 by 35%. The producing prices of the five biggest exporters<sup>4</sup> are very competitive and at or below the world average level.

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<sup>4</sup> Guatemala was replaced by Panama, because producer price data was not available for Guatemala.

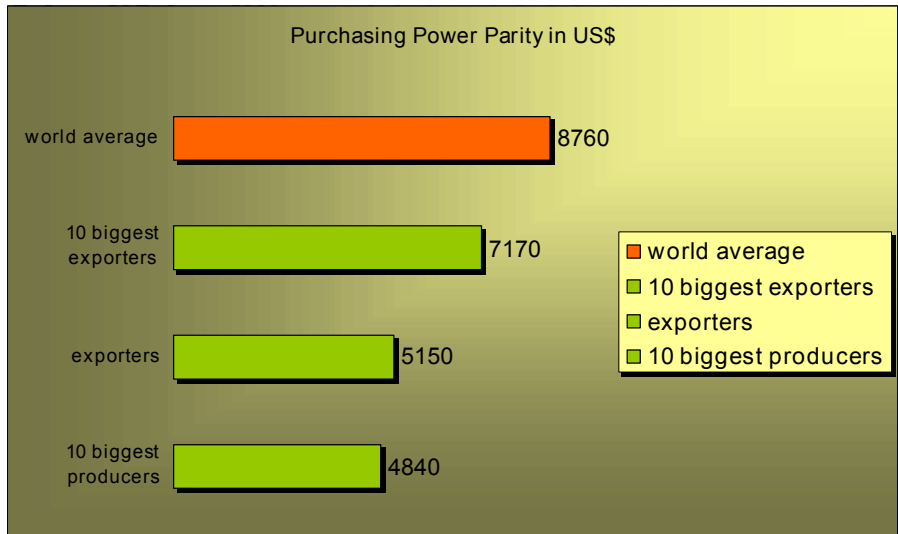
Figure 9: Producer prices and purchasing power parity in top 5 banana exporting countries



Sources: FAO, World Bank

However, it is obvious that the main banana producers and exporters are relatively poor countries. The average purchasing power parity of the 10 biggest banana producer is US\$ 4,840 and that corresponds to 55% of the world average (US\$ 8,760). All net exporters achieve an average purchasing power parity of US\$ 5,150 on average, while the purchasing power parity of the 10 biggest exporters is equal to US\$ 7,170.

Figure 10: Purchasing power parity comparison

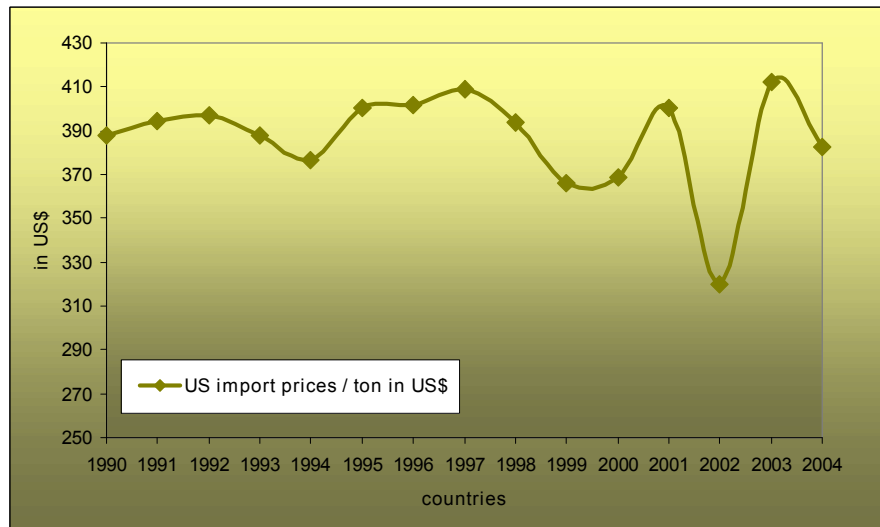


Sources: FAO, World Bank

### 2.3.2. Banana prices

When analysing banana prices, it is important to note, that as the world banana market is geographically fragmented, mainly due to transport costs and diverging import policies in the consuming countries, such as the EU banana regime, an international market price for bananas does not exist. However, taking into account that the US banana market is free from tariffs and import quantity restrictions, we could consider the evolution of banana prices in the USA as a useful benchmark in order to gain insight on the historical trends.

Figure 11: US import prices in US\$



Sources: FAO, World Bank

In general, banana market prices at the international level are determined by demand and supply. Demand depends on income, population growth, consumer preferences and import regimes etc. in the different countries. Supply factors include weather conditions, yields, supply sources etc. In 1998 Mitch Hurricane destroyed many crops in Central America. In some areas the export volume was shortened drastically and the export prices increased in consequence. However, the global production decreased by only 0,65%. The losses in Central America were compensated by a strong production increase in Asia.

### 3. Natural resources and bananas

Bananas are native to tropical south-eastern Asia (hundreds of different banana types grow in Malaysia) but are widely cultivated in tropical regions. The banana is not a tree but a high herb that can reach up to 15 metres of height. It is a perennial plant that replaces itself. The time between planting and harvesting takes between 9 and 12 months. Bananas will grow in most soils, but to thrive, they should be planted in a rich, well-drained soil. The large leaves of bananas use a great deal of water. Regular deep watering is an absolute necessity during warm weather. The best possible location would be above an abandoned compost heap. Bananas are the most popular fruit and ranked fourth in human food production<sup>5</sup>.

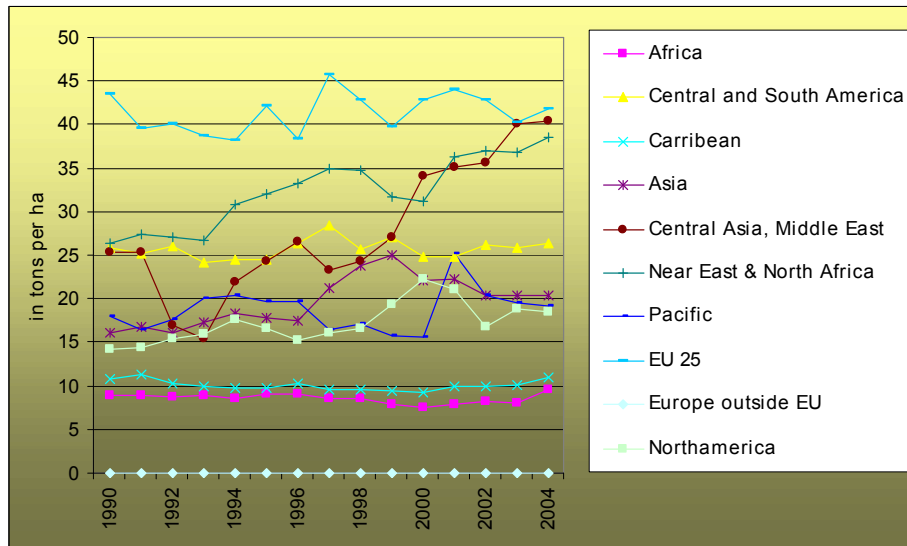
#### 3.1. Land

The most important natural resources for banana production are land and water. The world production of bananas is produced on 4.3 mln. ha of land (about the size of Switzerland), yielding 16.35 tons per ha in 2004. The global yield increased by 18% since 1990, when 13.41 tons/ha were produced. There are big differences in the yield between regions and countries. The contribution of the EU 25 to global production is very low (only 0.65%), but the yield is the highest around the world, followed by Central Asia & the Middle East (representing only 0.06% of world production). The yield in Central & South America (26.36 tons/ha) is almost 30% higher than in the Asian countries (20.37 tons/ha). While the yield in the region Central & South America was relatively stable throughout the period from 1990 to 2004, the Asian yield improved by almost 27% from 16.06 tons /ha. The lowest yields occur in Africa and in the Caribbean (about 10 tons/ha).

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<sup>5</sup> Bananas are ranked after rice, wheat and maize in the food production.

Figure 12: Yield in tons per ha

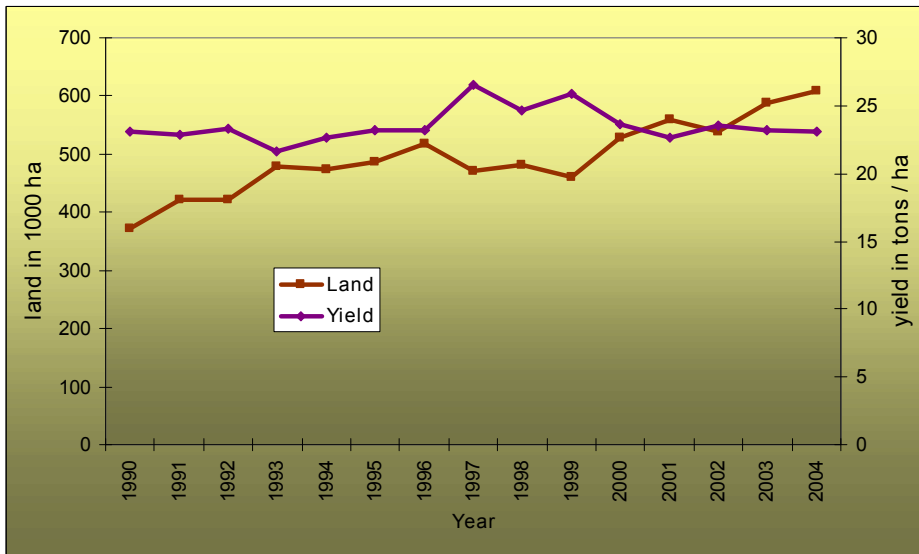


Sources: FAO, own calculations

However, the highest yields in single countries are attained in the region Central & South America. Costa Rica (responsible for more than 3.1% of the global banana production), Guatemala (1.4%), Panama (0.7%) and Nicaragua (even though it had the highest yield, it was only responsible for 0.07% of the global production in 2004) are the top yielding countries. The top 5 yielding country is Israel (responsible for 0.2% of the global production). Ecuador, the world's biggest exporting country, yields 50% average of the highest yielding country Nicaragua (27.89 tons/ha in Ecuador versus 55.98 tons/ha in Nicaragua).

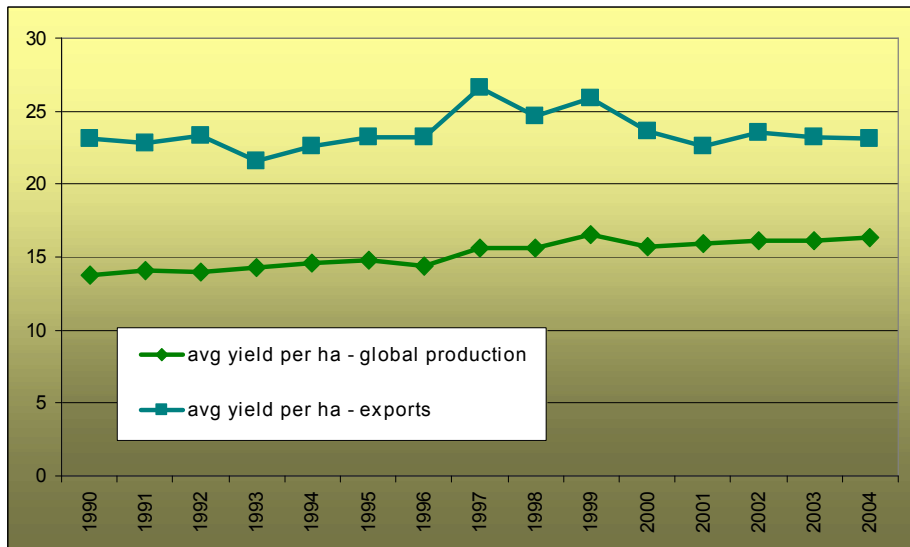
The land needed for exports increased by 64% between 1990 and 2004, while the yield remained stable at slightly above 23 tons/ha. Therefore the "exporting yield" is 40% higher than the "producing yield".

Figure 13: Needed land and yield for export bananas



Sources: FAO, own calculations

Figure 14: Yield of export bananas vs. yield of global production

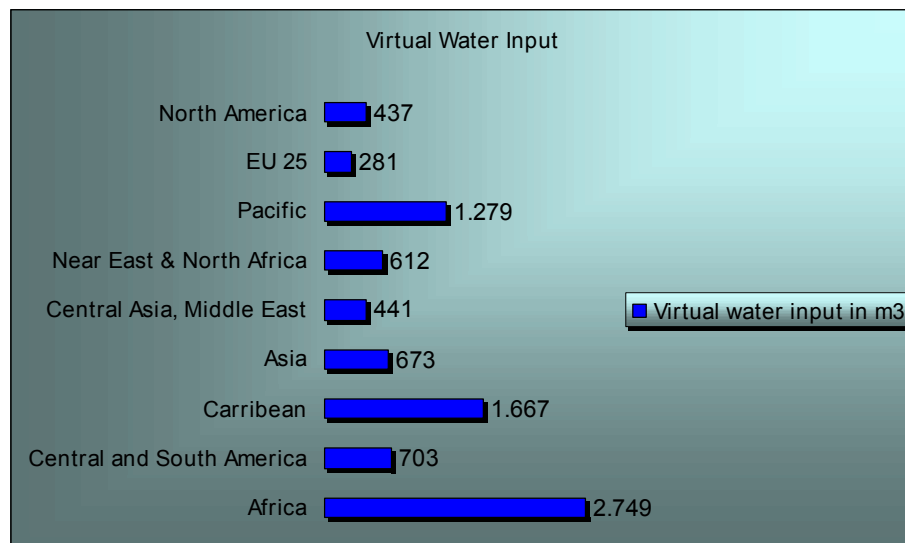


Sources: FAO, own calculations

### 3.2. Virtual water

The virtual water input is also very volatile. The average ton of bananas “contained” 890 m<sup>3</sup> of water in 2004, which is far lower than the 1,000 m<sup>3</sup> in 1990<sup>6</sup>. Again the EU 25 seem to be the most efficient region. The virtual water input of 266 m<sup>3</sup> per ton of banana is the lowest in the world. However, the European banana market only represents 0,65% of the global production. The Asian bananas contain 4% less virtual water than the bananas from Central & South America. In Africa and the Caribbean the highest virtual water input observable.

Figure 15: Virtual water input per ton of bananas



Sources: FAO, UNESCO-IHE, own calculation

Again most of the top 5 countries with respect to the (lowest) virtual water input are located in the region Central & South America. Colombia, Costa Rica and Panama are the most efficient countries of the region with respect to virtual water. Surprisingly, two EU countries are also among the top 5: Spain (with 266 m<sup>3</sup>, the country with the lowest virtual water input) and Italy. However, their contribution to the global banana production is negligible.

The earnings per drop of water are highest in the European Union. On average the European countries earn US\$ 1.38 per m<sup>3</sup>, while the African countries only earn 0.14 US\$

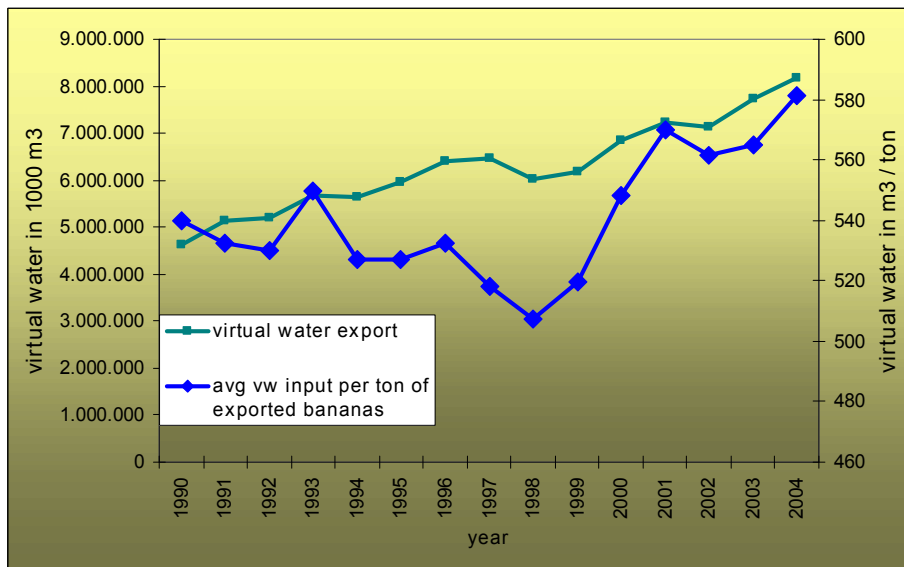
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<sup>6</sup> The calculation of the virtual water volume is based on UNESCO-IHE (A.J. Hoekstra: using data from 1997-2001). The decline of the virtual water input results from a larger share of countries with lower virtual water input.

per m<sup>3</sup><sup>7</sup>. Asian countries earn 0.58 US\$ and banana producers from Central & South America 0.55 US\$ per m<sup>3</sup>. The earnings per m<sup>3</sup> in the Caribbean only amount to 0.23 US\$.

The virtual water input for exports increased by 77% between 1990 and 2004, while the virtual water input per ton grew only slightly by 7% from 540 m<sup>3</sup> / ton to 580 m<sup>3</sup> / ton. The virtual water input for exported bananas is more than one third below the world average of 888 m<sup>3</sup> per ton.

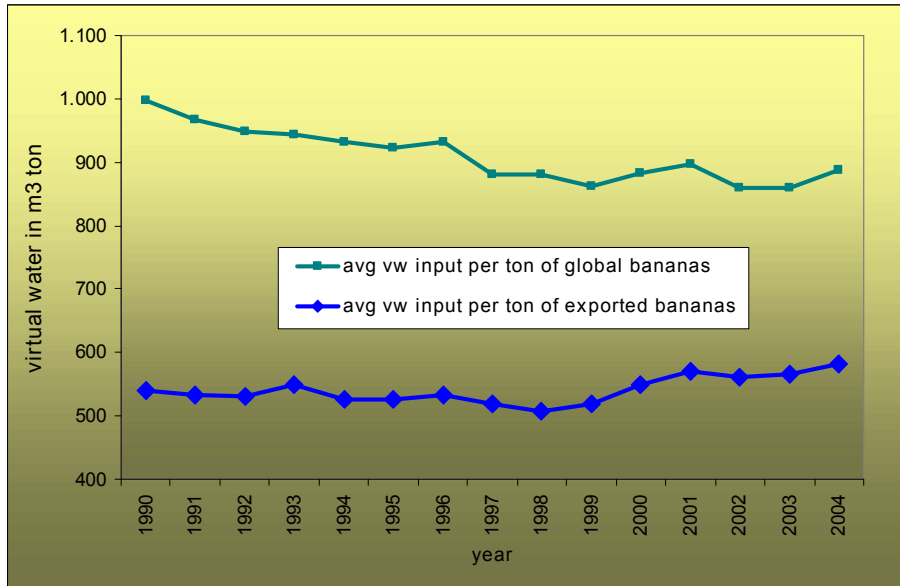
Figure 16: Virtual water input for exported bananas and virtual water per ton of exported bananas



Sources: FAO, UNESCO-IHE, own calculation

<sup>7</sup> The import price of the United States is used as a world reference price and is therefore the basis of these calculations.

Figure 17: Virtual water per ton of exported and global bananas



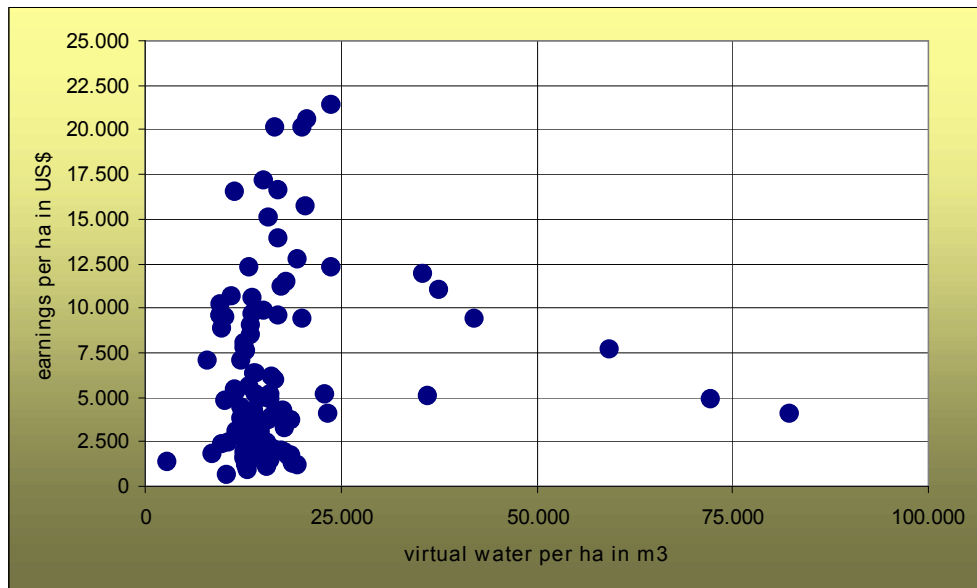
Sources: FAO, UNESCO-IHE, own calculation

### 3.3. Yields and virtual water

Analysing the natural resource input, the earnings per ha and the virtual water input per ha can be used as an indication whether the cultivation of a crop is efficient in economic and environmental terms. It is important to stress that absolute benchmarks are not available, but benchmark levels are instead flexible and dependent on the regional and global conditions. Referring to

Figure 18, it is clear that the countries on the bottom right-hand side are confronted with relatively low earnings per ha and a high virtual water input. On the other hand, the countries at the top left side of the picture are very efficient. They produce high earnings with a low virtual water input.

Figure 18: Virtual water per ha in m3 and earnings per ha in US\$



Sources: FAO, UNSECO-IHE, own calculation

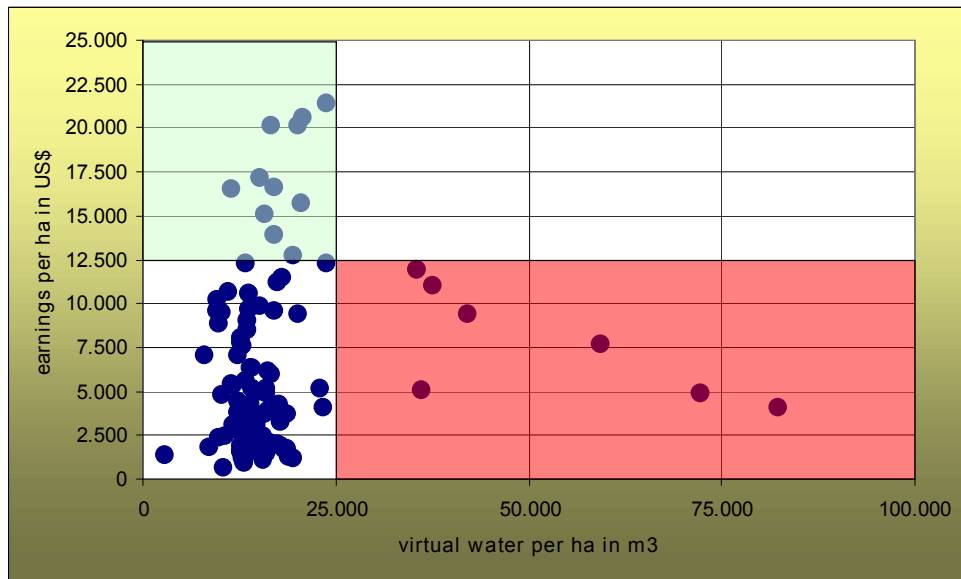
### 3.4. Optimising the natural resources input

An optimisation of the natural input usage can be drawn upon for devising development aid strategies and for benchmarking the implementation of these strategies. This will be demonstrated subsequently.

Example: The countries that are on the bottom right in

Figure 18 are (in the red square; in alphabetical order): Jordan, Kenya, Malawi, Senegal, South Africa, Togo and the United Arab Emirates. The more successful countries that are at the top left of the picture are (in the green square; in alphabetical order): Costa Rica, Cyprus, Egypt, Israel, Morocco, Nicaragua, Spain, Timor Leste and Turkey. With respect to an efficient natural resource input and a high economic output, the banana production of countries with low efficiency levels should be substituted by the production in higher yielding countries.

Figure 19: Correlation of virtual water per ha in m3 and earnings per ha in US\$



Sources: FAO, UNESCO-IHE, own calculation

The countries in the red square produced 1.2 millions of bananas in 2004. This volume amounts to about 22% of the production of the countries in the green box (5.5 millions) or 1.7% of the global production. If the 1.2 millions of bananas would be allocated to the efficient countries according to their current share, natural resources could be saved. The virtual water input could be reduced from 4.5 millions m<sup>3</sup> to 0.45 millions m<sup>3</sup>. The land demand would only amount to 25,600 ha instead of 71,000 ha. The virtual water input could be reduced by 90% and only about one third of the current land would be needed to produce the same amount of bananas.

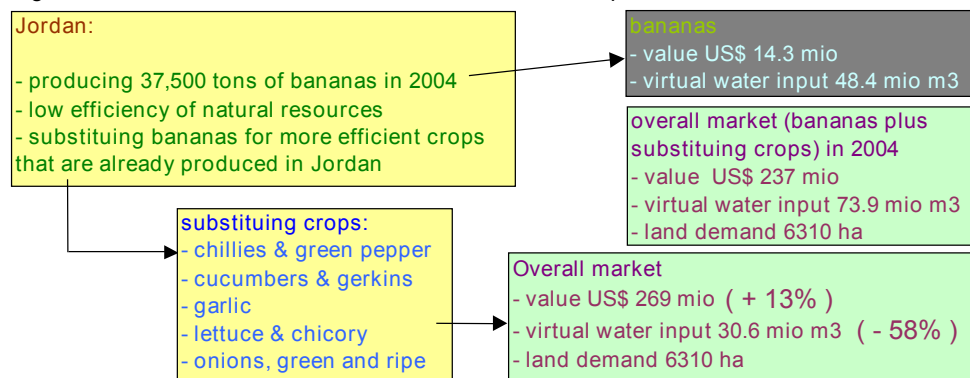
Terminating the cultivation of bananas (or any other crop) in (inefficient) producer countries has diverse effects: arable land becomes available, banana farmers receive lower incomes, poverty of these farmers could rise and related negative social effects for the respective families could occur. Thus it is necessary to offer alternative possibilities to the affected people in inefficient producer countries. This could be part of development aid projects.

For instance, in Jordan the banana production could be substituted by increasing the share of more efficient crops like garlic, onions, chillies, cucumbers, lettuce, spinach etc. Such projects could achieve a high effect but still be relatively inexpensive. The global use of natural resources would be expected to become more efficient, potential negative regional effects would occur but be limited. The changes could even lead to improvements for the

people involved. It is also conceivable to use the available natural resources in other sectors like services (tourism) or industry, instead of exporting them directly.

Using the available natural resources differently for agricultural purposes could be managed easily, especially when it is useful to increase the share of crops that are already being cultivated. The increasing amount of more efficient crops could lead to a higher economic output and a more sustainable use of natural resources. A higher economic output could therefore be achieved with a low environmental impact. In Jordan, for instance, substituting bananas by already cultivated crops like garlic, onions, chillies, cucumbers, lettuce, spinach could reduce the virtual water input by almost 60%, while increasing the monetary output by 13%.

Figure 20: Substitution of bananas for more efficient crops in Jordan



Sources: FAO, UNESCO-IHE, own calculations

The amount of Jordan's 37,500 tons only reflects 0.05% of the global production and therefore does not influence the market at all. An ODA project could support the substitution of the bananas cultivation. Trainings for producing and marketing alternative crops and financial subsidies for seeds could be offered to motivate farmers to substitute bananas for alternative crops. The costs of the project will be far below the higher output of about US\$ 30 mln. The sustainability will be assured, because farmers will be able to increase their incomes and can keep the new crops.

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## 5. Literature

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