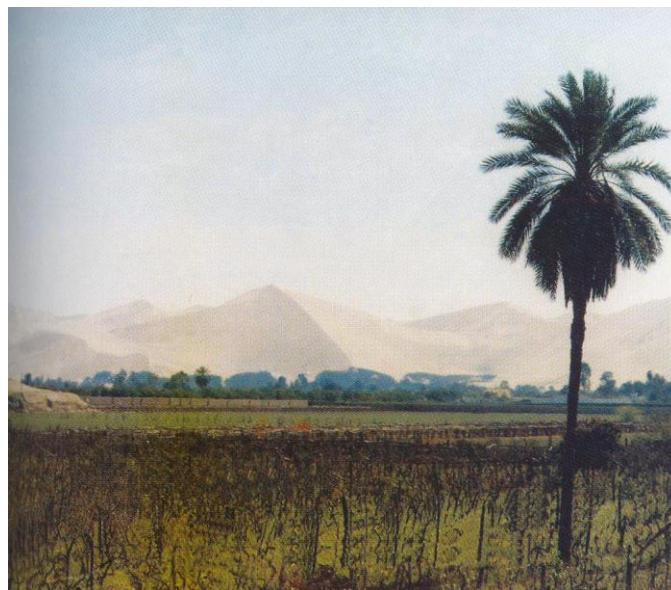




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## **Impacts of APEC-agreement in the agriculture sector in the Ica Valley in Peru: water use asymmetries and food security vulnerabilities**



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# INDEX

**I. The agrarian activity in the Ica Valley**

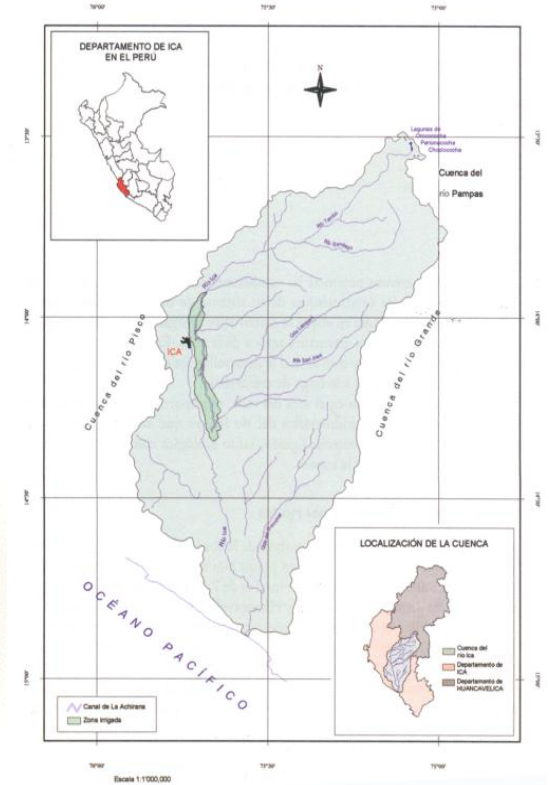
**II. Groundwater use by the great landowners and the new high value crops**

**III. Relevant water use indicators in the Ica Valley and vulnerabilities for the food security in small farmers**

**IV. Final Remarks**

# I.The agrarian activity in the Ica Valley

# The Ica Valley: Geographical location



The Ica valley is located 300 km to the south of Lima, the capital of Peru, and is in the Pacific basin.

**Cuadro 1**  
**Principales zonas agroexportadoras no-tradicionales en Perú (2014)**

| Región             | En millones (US\$) | % del Total |
|--------------------|--------------------|-------------|
| Región Ica         | 1480               | 35%         |
| Provincia de Ica   | 864                | 20%         |
| Región La Libertad | 750                | 18%         |
| Región Piura       | 660                | 16%         |
| Región Lima        | 480                | 11%         |
| Región Lambayeque  | 300                | 7%          |
| Región Arequipa    | 220                | 5%          |
| Otras Regiones     | 341                | 8%          |
| Total              | 4231               | 100%        |

Fuente: MINAGRI. Elaboración propia



Today the Ica valley represents around 20% of total agri-food exports of Perú, and 27% of fruits and legumes exported by Peru (non-traditional crops)

| Agrarian surface in the Ica Valley between 2004 and 2014 |           |        |           |        |               |                   |
|--|-----------|--------|-----------|--------|---------------|-------------------|
| Cultivos/Años  | 2004      |        | 2014      |        | % crecimiento | Mercado destino   |
|  | Hectáreas | %      | Hectáreas | %      | 2004-2014     |                   |
| Asparagus  | 6,012     | 21.7%  | 10,500    | 28.1%  | 75%           | Exportación       |
| Grapes for human consumption                             | 500       | 1.8%   | 4,200     | 11.2%  | 740%          | Exportación       |
| Grapes for wine and                                      | 3,357     | 12.1%  | 4,100     | 11.0%  | 22%           | Interno:95%       |
| Cotton   | 9,360     | 33.8%  | 3,650     | 9.8%   | -61%          | Interno           |
| Corn   | 804       | 2.9%   | 2,800     | 7.5%   | 248%          | Interno           |
| Pallar   | 737       | 2.7%   | 1,900     | 5.1%   | 158%          | Interno           |
| Potato   | 543       | 2.0%   | 1,264     | 3.4%   | 133%          | Interno           |
| Advocat  | 405       | 1.5%   | 1,230     | 3.3%   | 204%          | Exportación : 80% |
| Páprika pepper   | 927       | 3.3%   | 1,063     | 2.8%   | 15%           | Exportación       |
| Olives   | 354       | 1.3%   | 982       | 2.6%   | 177%          | Interno           |
| Onion  | 840       | 3.0%   | 938       | 2.5%   | 12%           | Exportación       |
| Tomato   | 575       | 2.1%   | 731       | 2.0%   | 27%           | Exportación: 80%  |
| Pecan  | 499       | 1.8%   | 564       | 1.5%   | 13%           | Interno           |
| Otros cultivos   | 2,804     | 10.1%  | 3,445     | 9.2%   | 23%           | Exportación:40%   |
| Total  | 27,717    | 100.0% | 37,367    | 100.0% | 35%           |                   |

Source: Agriculture Ministry of Peru. Own elaboration

Grapes for human consumption is the crop with the highest growth rate: 740% between 2004 and 2014

### Destiny of the agrarian production in the Ica Valley

| Crops /Years     | 2004   |      | 2014   |      |
|------------------|--------|------|--------|------|
|                  | Has    | %    | Has    | %    |
| Exports          | 10,316 | 37%  | 19,205 | 51%  |
| Internal markets | 17,492 | 63%  | 18,162 | 49%  |
| Total            | 27,808 | 100% | 37,367 | 100% |

Source: Agriculture Ministry of Peru

The destiny of the agrarian production in the Ica Valley has changed in the last years: the surface for internal market remains the same (around 18, 000 has) , and surface for exports grew from 10,000 has to around 20,000 has

**Agri-food exports in the Ica Valley by crop (US \$): comparisson between 2005 and 2015**

| <b>Crops/Years</b> | <b>2005</b> | <b>2007</b> | <b>2010</b> | <b>2012</b> | <b>2015</b> | <b>Growth rate<br/>2005-2015<br/>(%)</b> | <b>Share in 2015<br/>(%)</b> |
|--------------------|-------------|-------------|-------------|-------------|-------------|--|------------------------------|
| Green Asparagus    | 142,006     | 250,493     | 268,431     | 359,815     | 418,957     | 195%                                     | 48%                          |
| Grapes             | 21,453      | 77,832      | 135,718     | 169,815     | 254,550     | 1087%                                    | 29%                          |
| Onions             | 11,814      | 19,001      | 24,248      | 39,485      | 43,701      | 270%                                     | 5%                           |
| Tomato             | 62,458      | 161,043     | 97,012      | 44,480      | 26,927      | -57%                                     | 3%                           |
| Subtotal           | 237,731     | 508,368     | 525,409     | 613,595     | 744,134     | 213%                                     | 86%                          |
| Other crops        | 35,660      | 75,579      | 79,671      | 93,879      | 120,569     | 238%                                     | 14%                          |
| Total Ica          | 273,391     | 584,623     | 604,220     | 705,634     | 864,703     | 216%                                     | 100%                         |

Source: Agroica. [www.agroica.gob.pe](http://www.agroica.gob.pe). Own elaboration

*Between 2005 and 2015 the green asparagus exports grew 195% and the grapes 1087%. In 2015 both crops represented 80% of the agri-food export supply of the ica Valley.*



### Green Asparagus and Grapes exports by destiny of the Ica Valley (US \$)

| Crops           | Destiny by country            | 2005        | % by country in 2005 | 2015        | % by country in 2015 | Growth rate between 2005 and 2015 |
|-----------------|-------------------------------|-------------|----------------------|-------------|----------------------|-----------------------------------|
| Green Asparagus | United States of America      | 96,300,000  | 68%                  | 267,521,866 | 65%                  | 178%                              |
|                 | Other APEC countries          | 2,750,314   | 2%                   | 18,034,905  | 4%                   | 556%                              |
|                 | Total APEC countries          | 99,050,314  | 70%                  | 285,556,771 | 69%                  | 188%                              |
|                 | Other non-APEC countries      | 42,955,615  | 30%                  | 129,202,237 | 31%                  | 201%                              |
|                 | Total Green Asparagus Exports | 142,005,929 | 100%                 | 414,759,007 | 100%                 | 192%                              |
| Grapes          | United States of America      | 6,638,166   | 31%                  | 74,006,652  | 29%                  | 1015%                             |
|                 | Hong - Kong                   | 5,454,357   | 26%                  | 27,987,846  | 11%                  | 413%                              |
|                 | China                         | 9,052       | 0%                   | 31,154,779  | 12%                  | 344076%                           |
|                 | Other APEC countries          | 2,774,372   | 13%                  | 48,613,330  | 19%                  | 1652%                             |
|                 | Total APEC countries          | 14,875,946  | 70%                  | 181,762,606 | 72%                  | 1122%                             |
|                 | Other non-APEC countries      | 6,501,048   | 30%                  | 69,778,966  | 28%                  | 973%                              |
|                 | Total grapes Exports          | 21,376,994  | 100%                 | 251,541,573 | 100%                 | 1077%                             |

Source: Aduanet. (www.sunat.gob.pe). MINAGRI(www.minagri.gob.pe). Own elaboration

*In 2015, 69% of green asparagus were destined to APEC countries, mainly USA (65%), and grapes were destined mainly to APEC countries 72%, being China the second most important destiny (23%) after USA (29%)*

II. Groundwater use by large landowners  
and the new high value crops

### Water consumption by crop in the Ica Valley in 2014

| Crops                     | Water requirement by crop and by year | Has    | Water consumption (In MM3) | Main water source | % Share |
|---------------------------|---------------------------------------|--------|----------------------------|-------------------|---------|
| Asparagus                 | 18,000                                | 10,500 | <b>189,000,000</b>         | Groundwater       | 38%     |
| Cotton                    | 14,000                                | 3,650  | <b>51,100,000</b>          | Surface           | 10%     |
| Grapes                    | 12,000                                | 4,200  | <b>50,400,000</b>          | Groundwater       | 10%     |
| Corn                      | 15,000                                | 2,800  | <b>42,000,000</b>          | Surface           | 8%      |
| Grapes for pisco          | 8,000                                 | 4,100  | <b>32,800,000</b>          | Surface           | 7%      |
| Tomato                    | 44,000                                | 731    | <b>32,164,000</b>          | Groundwater       | 6%      |
| Potato                    | 14,000                                | 1,264  | <b>17,696,000</b>          | Surface           | 4%      |
| Paprika pepper            | 10,000                                | 1,063  | <b>10,630,000</b>          | Groundwater       | 2%      |
| Advocat                   | 7,500                                 | 1,230  | <b>9,225,000</b>           | Groundwater       | 2%      |
| Pallar                    | 4,000                                 | 1,900  | <b>7,600,000</b>           | Surface           | 2%      |
| Onion                     | 6,000                                 | 938    | <b>5,628,000</b>           | Groundwater       | 1%      |
| Subtotal                  |                                       | 32,376 | <b>448,243,000</b>         | Groun/Sur         | 90%     |
| Other crops               | 10,000                                | 4991   | <b>49,910,000</b>          | Groun/Sur         | 10%     |
| <b>Total use of water</b> |                                       |        | <b>498,153,000</b>         |                   | 100%    |

Source: [www.agroica.gob.pe](http://www.agroica.gob.pe). \* Preliminary calculations

*Asparagus uses 38% of the agrarian water of the valley, followed by grapes. The crops destined for the external market use mainly groundwater and for the internal market, surface water*

| <b>Firms with highest surface in the Ica Valley</b> |                |
|---|----------------|
| <b>Firms</b>  | <b>Surface</b> |
| Agroindustrias AIB                                  | 3200           |
| Sociedad Agrícola Agrokasa                          | 1822           |
| Icatom  | 1000           |
| IQF del Perú  | 912            |
| Complejo Agrícola Beta                              | 607            |
| Agrícola Chapi                                      | 590            |
| Agrícola Athos                                      | 500            |
| Camposol  | 3300           |
| <b>Total</b>  | <b>11,931</b>  |

Source: Junta de Usuarios de Agua subterránea. Elabor. propia

| <b>Tamaño promedio de la propiedad agraria</b> |                    |            |                 |
|--|--------------------|------------|-----------------|
| <b>Tamaño propiedad</b>                        | <b>Productores</b> | <b>Has</b> | <b>Promedio</b> |
| Menos 1 Has                                    | 9745               | 2464       | 0.25            |
| 1 a 5 Has                                      | 2854               | 7382       | 2.59            |
| 5 a 20 Has                                     | 1537               | 13240      | 8.61            |
| 20 a 50 Has                                    | 299                | 8594       | 28.74           |
| 50 a 100 Has                                   | 59                 | 5049       | 85.58           |
| 100 a 500                                      | 109                | 23243      | 213.24          |
| 500 a 1000                                     | 17                 | 10737      | 631.59          |
| 1000 a 3000                                    | 9                  | 13608      | 1,512.00        |
| <b>Total</b>                                   | <b>14629</b>       |            |                 |

Fuente: Cenagro 2012. Elaboración propia

*Today 9 firms have more than 500 Has, and on the other side, 10,000 farmers have in average 0.25 Ha*

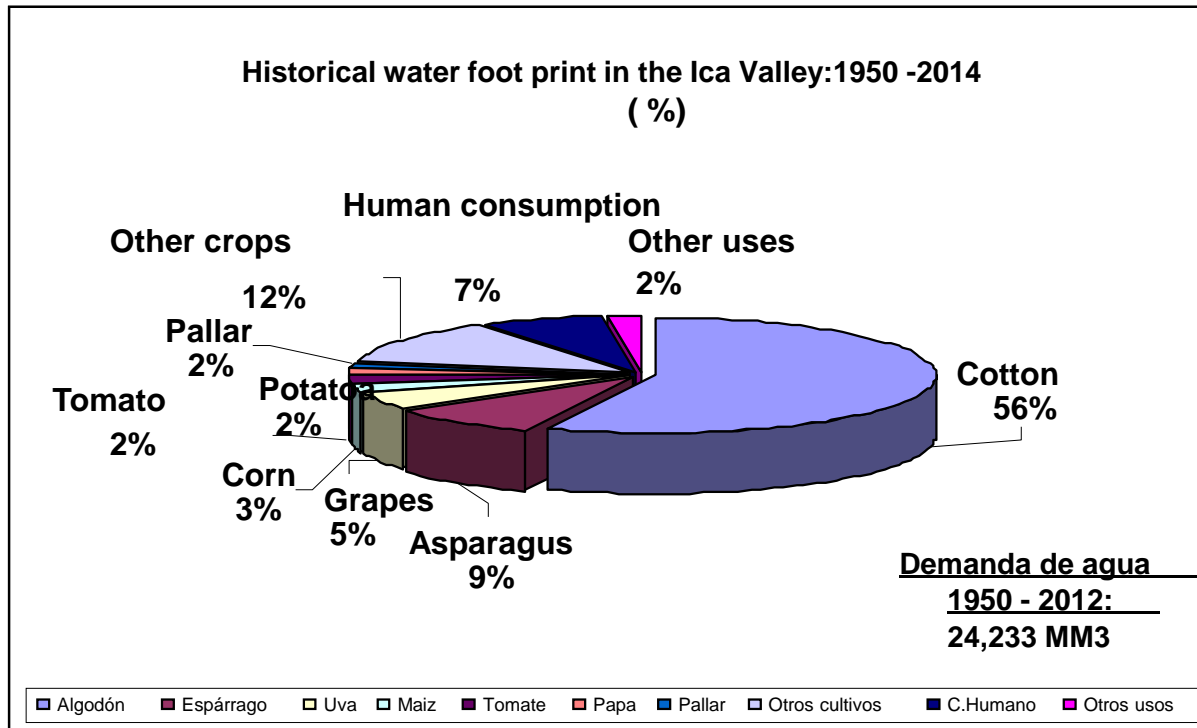
## **Big business clear winner in Peru's asparagus industry**

Today's report on the human cost of Peru's burgeoning asparagus industry goes to the heart of the debate about development - aid policy continues to favour the large agro-exporters, not the poor.



Article published in the Guardian – UK (16/09/2014)

III. Relevant water use indicators in the Ica Valley and vulnerabilities for the food security in small farmers



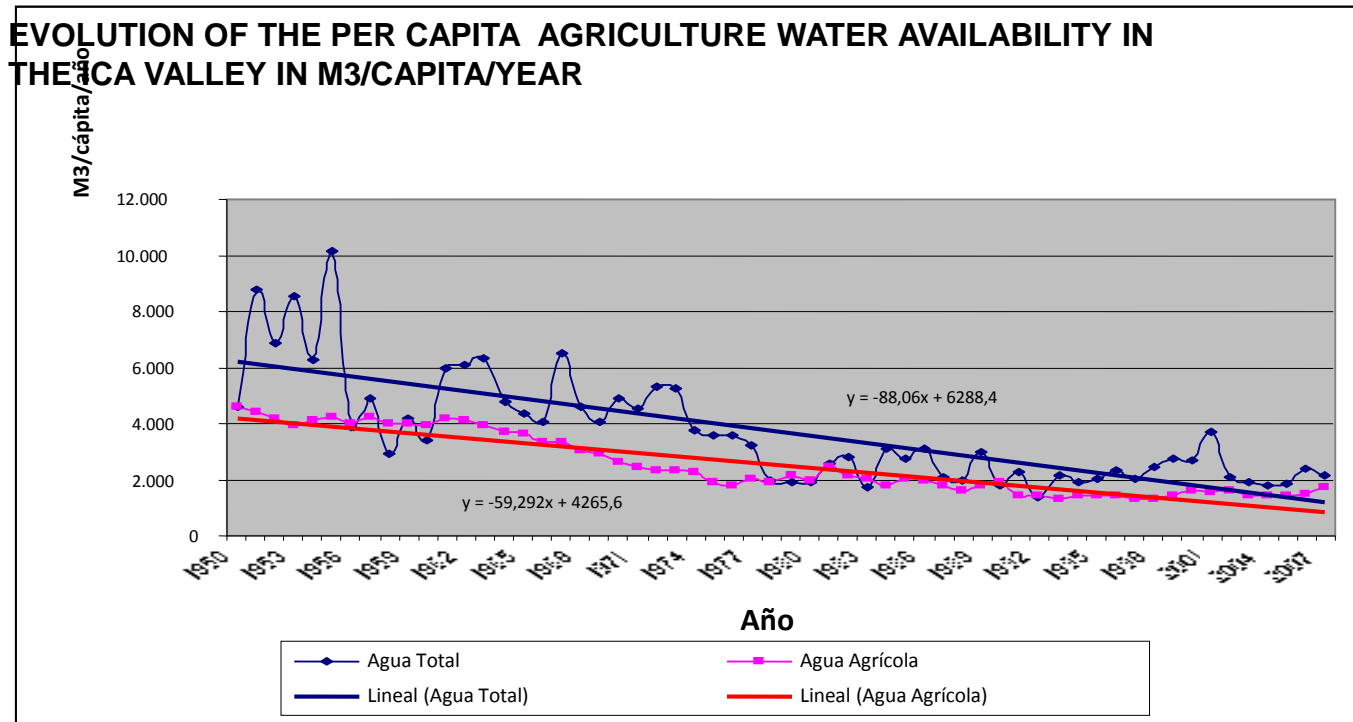
*Historical Water footprint in the Ica Valle  
between 1950 – 2014: Cotton: 56%*

| Uso               | MM3 | %       |
|-------------------|-----|---------|
| Asparagus         | 300 | 43.54%  |
| Grapes            | 120 | 17.22%  |
| Other crops       | 220 | 31.73%  |
| Human consumption | 50  | 7.2%    |
| Total             | 690 | 100.00% |

Today asparagus has the biggest Water Footprint in the Ica Valley:40%, followed by grapes: 16%



# The agricultural water availability per capita



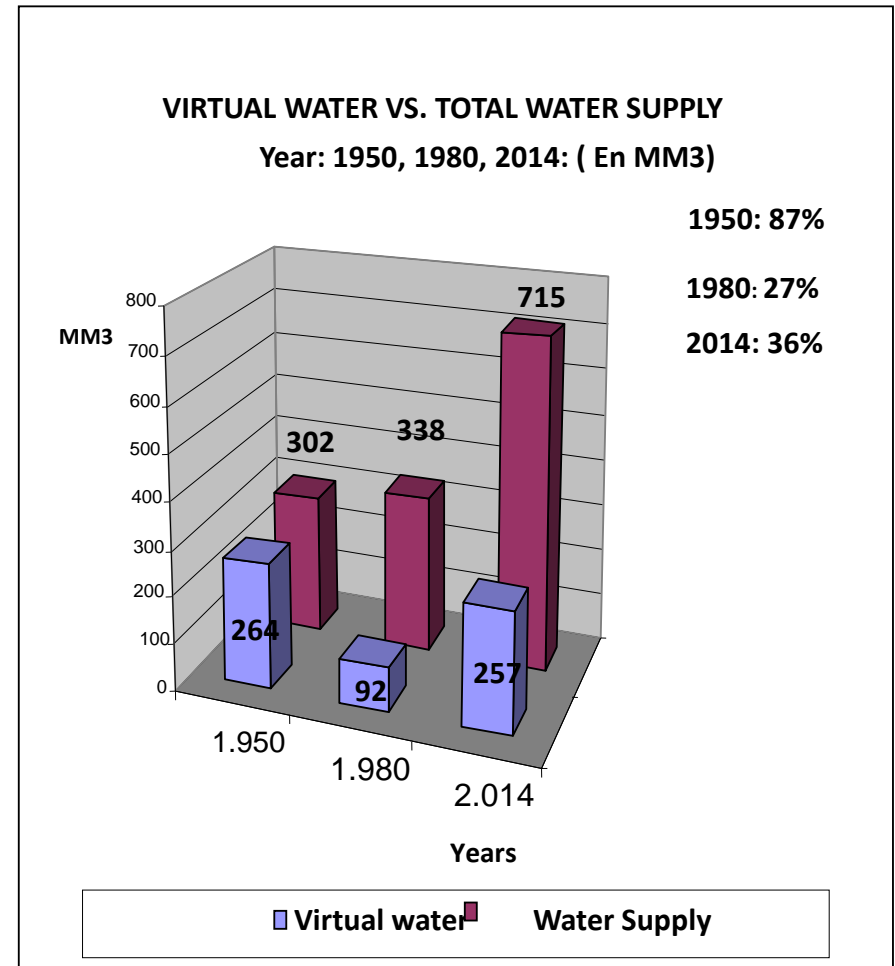
According to IHE-UNESCO, when availability levels falls under 1000 M3/inh./year, there is a situation of water scarcity, and when this level varies between 1000 and 1700 M3/inh./año, it corresponds to a situation called hydric stress of Falkenmark. In the Ica valley, today the value is under 1000 m3/inh/year, which corresponds to a hydric stress level, and near the hydric scarcity level.

# Virtual Water

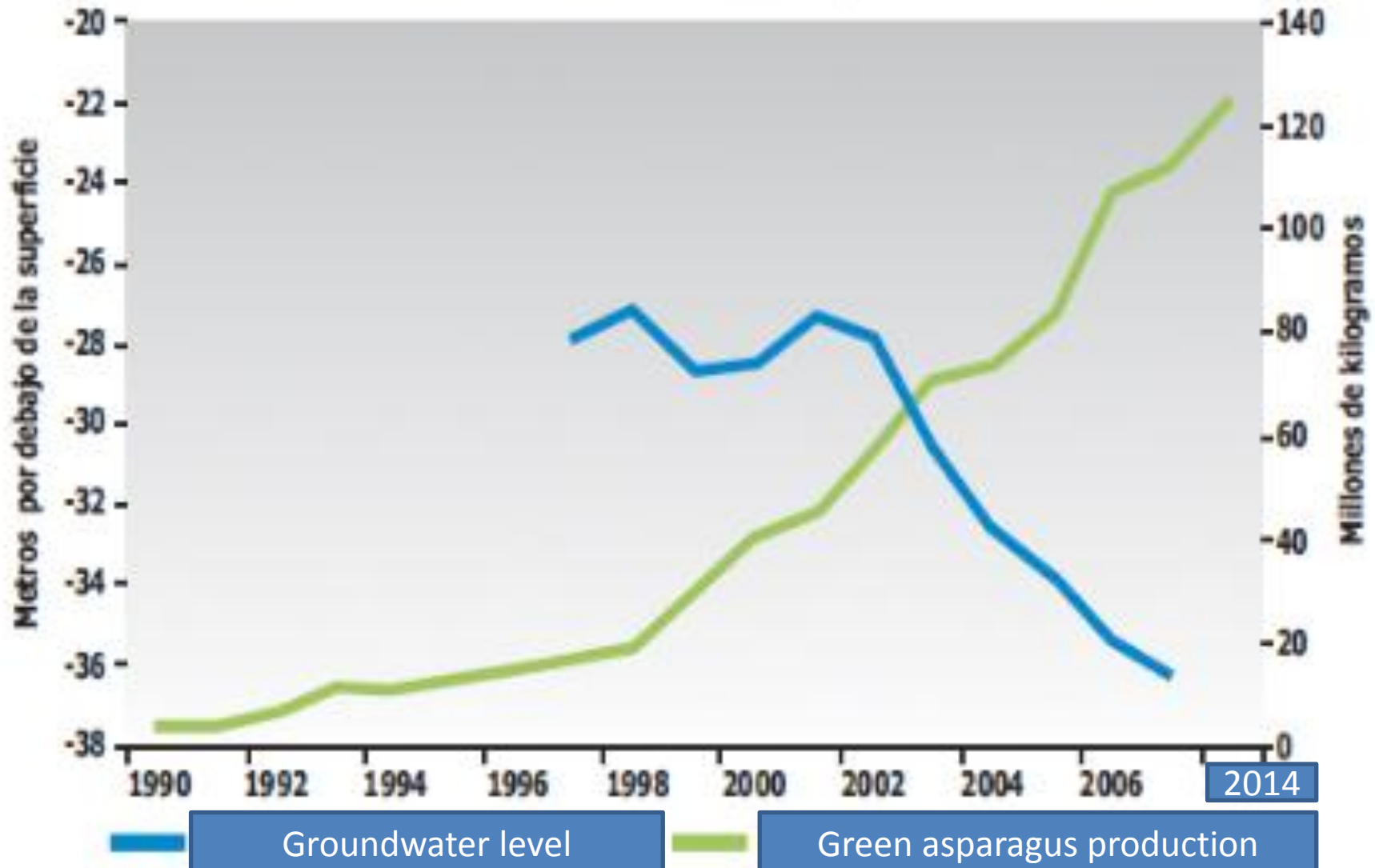
\* Professor J.A. Allan, expert in water resources of the London University, introduced at the beginning of the nineties, the term “virtual water”, defined as the water used in the process of production of any good (agriculture, nutritional, industrial). Thus, if a country exports a product that demands much water for its production, it is equivalent to export water.

\* Hoekstra calculated that in average 15% of the water used for food is exported.

\* From 1950 to 2014, 32.281 MM3 were used, having exported 9.061 MM3, which represents 28,63%, a percentage higher than the average established by Hoekstra (15%). This fact is very serious, specially if we consider that the Ica Valley is in a desert.



# Asparagus production and groundwater level



## FORECAST OF DEVASTATION OF THE UNDERGROUND AQUIFER WITHOUT HIGH-TECH IRRIGATION SYSTEM

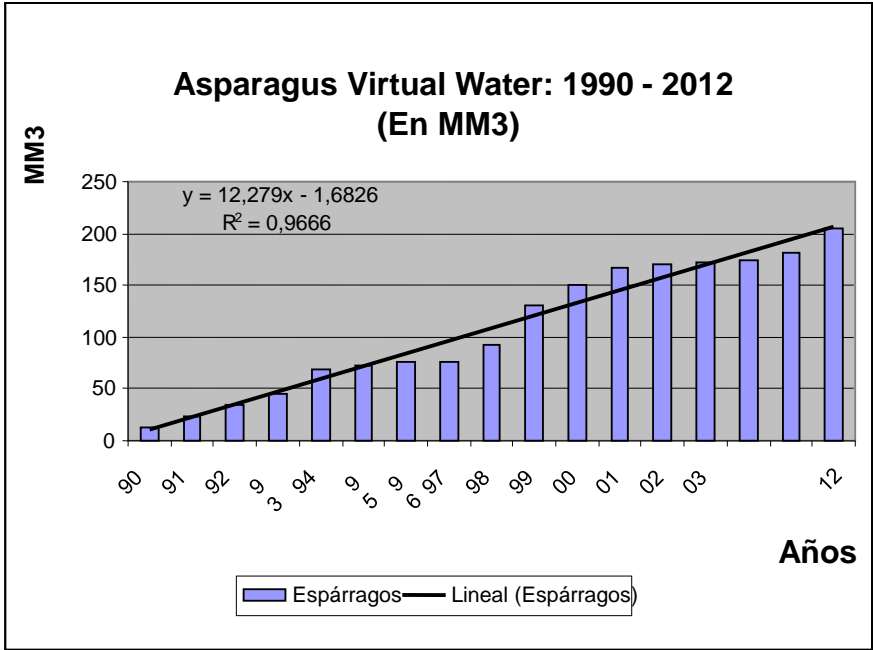
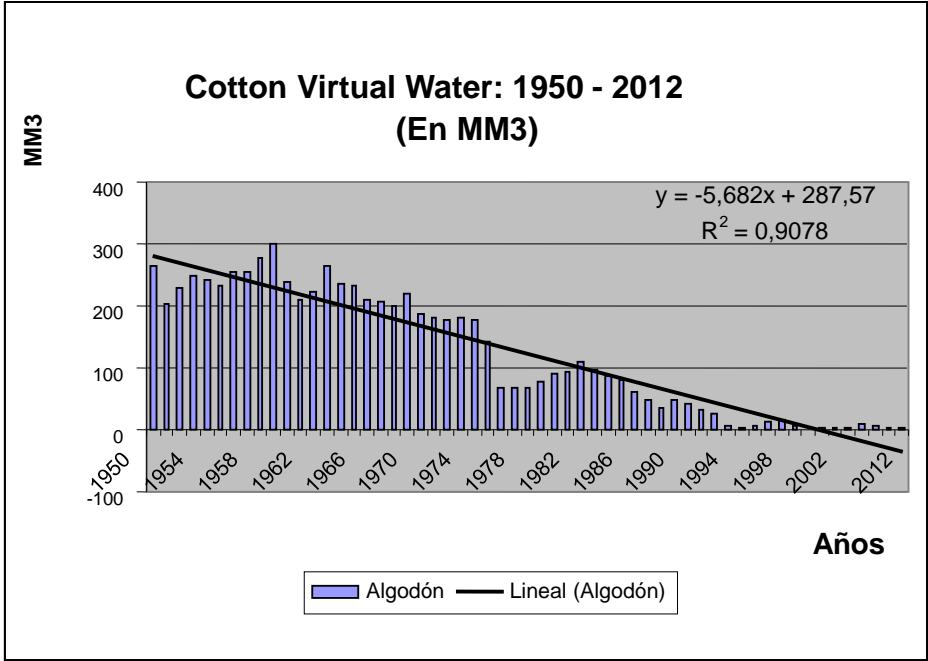
| YEARS                                     | 2016 |      |      |      |      |      |      |      |      |      |      | 2027 |     |
|---|------|------|------|------|------|------|------|------|------|------|------|------|-----|
| INITIAL WATER STOCK (A)                   | 3758 |      |      |      |      |      |      |      |      |      |      |      |     |
| WATER USE (B)                             |      | 352  | 352  | 352  | 352  | 352  | 352  | 352  | 352  | 352  | 352  | 352  | 352 |
| BALANCE OF THE AQUIFER<br>(C)= (A) - (B)  |      | 3406 | 3054 | 2702 | 2350 | 1998 | 1646 | 1294 | 942  | 590  | 238  | -114 |     |
| RECHARGE OF THE AQUIFER<br>(RATE= 5%) (D) |      | 170  | 153  | 135  | 118  | 99,9 | 82,3 | 64,7 | 47,1 | 29,5 | 11,9 | -5,7 |     |
| FINAL RESERVE (E) = (C) + (D)             |      | 3576 | 3207 | 2837 | 2468 | 2098 | 1728 | 1359 | 989  | 620  | 250  | 0    |     |

The area of the underground water aquifer is 2971 km<sup>2</sup>, with 3.758 Million Cubic meters (MM<sup>3</sup>), and a yearly use of 352 MM<sup>3</sup>; considering recharge level of 5%, the groundwater could reach approximately for the next 11 years, that is, until the year 2027.

# *Missed lagoons due to the use of groundwater*



30 years ago, there were 9 lagoons along the Ica River; nevertheless, due to the overuse of groundwater those lagoons disappeared.



*Asparagus replaced cotton as main virtual water exporter*

## *Other environmental impacts*

- \* As a consequence of the agricultural activity growth, the annual rate of deforestation of a native tree called *Huarango* is 11,2%. Today there are in the valley hardly 200 ha of this tree.
- \* Because 60% of the farm units (around 14.000) have 0,3 or less ha, a consequence is that the land is being sold to produce bricks. This is affecting around 3000 ha.
- \* There is a possible pollution of the aquifer by the nitrate use in the asparagus, which could affect the human health, because the potable water of Ica is underground water.

- IV. FINAL REMARKS



1) The material and social progress in the Ica Valley has generated some welfare, because the growth of the agri-food export model, based on comparative advantages and free trade agreements, like APEC, but it was not taking into account environmental aspects, like the case of the water devastation in the Ica Valley.

2) The water crisis in the Ica valley could serve as an opportunity for reinforcing food security strategies in the valley, by promoting crops with low water use rates, and also opportunities of free trade agreement could benefit small farmers, and not only the great landowners.

3) It is possible that the exports of asparagus, grapes and other crops will grow in the next years, mainly to APEC markets, and also the aquifer devastation will continue, and that's why the agri-food export model in the valley, could be menaced.

4) It is necessary to implement integrated public management policies taking into account sustainable aspects, not only thinking in short-term profits, but thinking mainly with a long term view.

Thank you

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