



## **Lights and shadows of the red gold. An integrated assessment of Spanish strawberry production and its impacts.**

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Spanish strawberries are an export success. Spain is the second largest producer of this fruit and it has been the world's leading strawberry exporter for years. In 2012, strawberry exports were approximately 95% of total strawberry production in Spain. The production of the red gold is concentrated in around 7000 hectares of intensive farming in the province of Huelva (south west Spain). At least 85% of all Spanish strawberries are produced in this region, in an area close to the UNESCO World Heritage Site Doñana National Park.

The case of the strawberry production in Huelva makes an interesting case study for the integrated analysis of the water-food-land-political economy nexus. Its combination of bio-physical and socio-economic characteristics (local climatic conditions, agricultural techniques, environmental issues, food value chains, trade networks and socio-economic factors) are quite particular and form a case where social and natural issues coevolve. Supporters of the activity argue a high contribution to local GDP and job market and its strategic position in international markets. Critics maintain that this industry creates social and environmental conflicts.

The strawberry from Huelva supplies early season strawberries to the richer markets of Germany and France and at the same time seems to fail in alleviating a provincial unemployment rate of 34%. The viability of the system is in danger: production costs are 70% higher than 20 years ago while the price per kilo has not changed or even decreased. In environmental terms, the strawberries of Huelva are irrigated with ground water withdrawn from aquifers that feed the water streams of the natural park. Half of the wells that extract the water are not legally registered for what the total amount of water withdrawal remains unknown.

Should we promote the continuity of this activity?

In this work, I perform a Multi-Scale Integrated Assessment of Societal and Ecosystem Metabolism (Mu-SIASEM) of Water for the strawberry production in Huelva. It is a new approach for the joint assessment of different dimensions of human-environment interactions that integrates different interdisciplinary indicators for the analysis of the sustainability (including the Virtual Water Trade and the Water Footprint).

The integrated characterization of the strawberry system in terms of bio-physical and social flows shows a clear connection between the globally driven strawberry production and the abuse of local water resources. The activity guarantees the economic viability of the system at the cost of the feasibility of the local environment dynamics. The climatic conditions as well as the foreign trade, and consequently the market fluctuations, makes the system inherently fragile. I give some recommendations to consider in future planning.