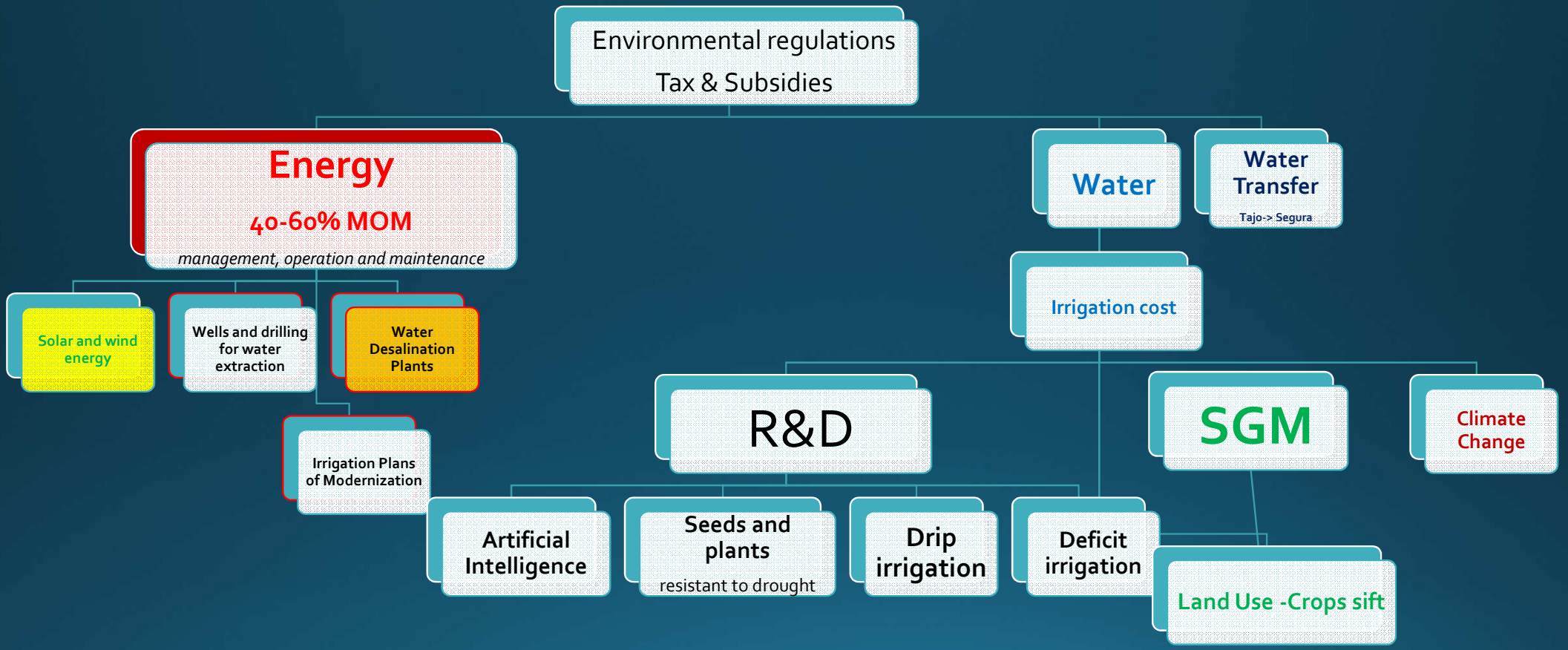
# Land, water and energy: crossing of governance

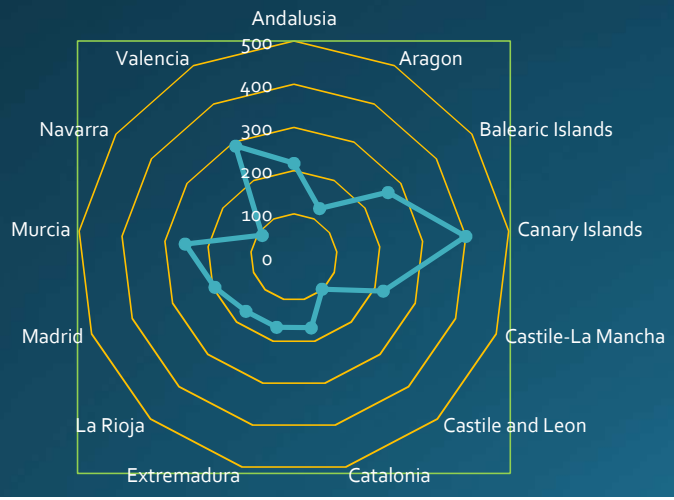
C. San Juan Mesonada. UC3M.



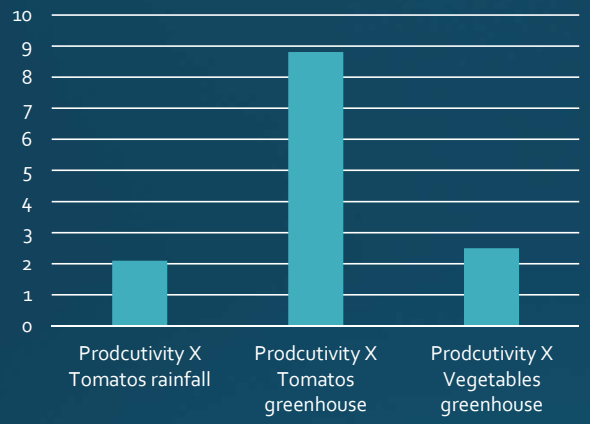
# WATER PRODUCTIVITY VERSUS WATER PRICE AND SUBSIDIES
## Exporting water embodied in fruits and vegetables.

Water and energy tax & subsidies -> very different impact by region in irrigation costs

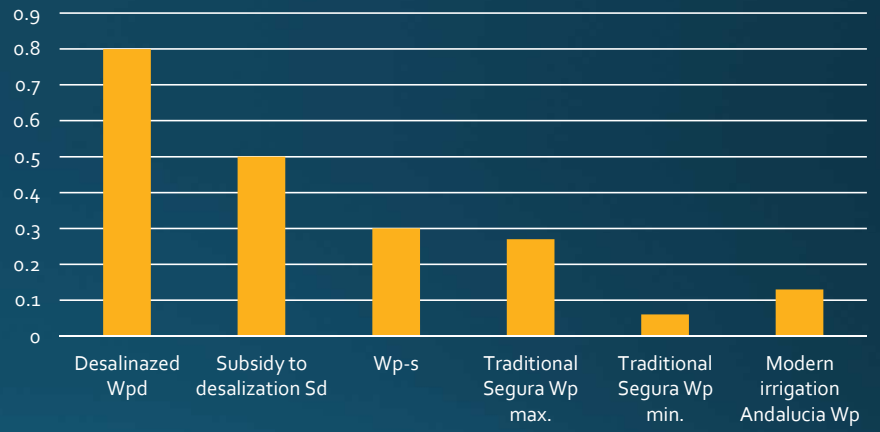
WATER & ENERGY SENSITIVITY
Average by irrigated land area




WATER PRODUCTIVITY €/m3



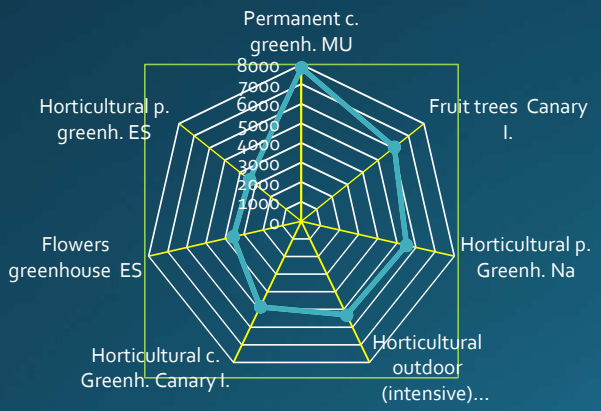

WATER SCARCITY versus EXPORT PRODUCTIVITY
cost and inconme €/m3



# CONCLUSIONS

- The same regulation for water and/or energy may have a very different impact in the agricultural landscape between the regions
- Horticultural products and flowers in greenhouse are the most sensitive to energy and water costs in all regions
- Permanent crops in greenhouse in Murcia and Fruit trees in Canary Island are the most sensible to irrigation costs.

TOP WATER AND ENERGY SESITIVITY BY REGION




- The water and energy sensitivity within the same region are very different.
- **Modern** intensive crops in irrigated areas are more **energy sensitive** since **traditional** irrigated areas are more **water sensitive.**
- It is a **mistake** to measure the partial productivity of the water as if it were **constant and independent of the place**, the quantity and the moment in which the water is used.
- It should not be forgotten that in open-air crops, precipitation and the time at which it occurs substantially affect crop yields.

- Results empirically contrast the relevance of the **differences of energy and water** cost between regions and within the same crop in different locations.
- **Research and development** and **coherent governance in water and energy** markets show up as a key elements for the integral management of the natural resources and the preservation of the irrigated farming viability.
- The **excess water demand** is fueled by the irrigated area expansion (olive groves and vineyards) and climate change.
- The **decision** on whether a project should be subsidized must be based on the correct calculation of its **social profitability**.
- For which a model (and reliable data) is needed to calculate the **marginal benefit** of the increase in water supply in the area. Therefore, it is necessary to start from a **water benefit function model**.

Land, water and energy: crossing of governance

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# DISCUSSION

# Land, water and energy: crossing of governance

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## Land, water and energy: crossing of governance

**Feedbacks between natural landscapes and human populations**

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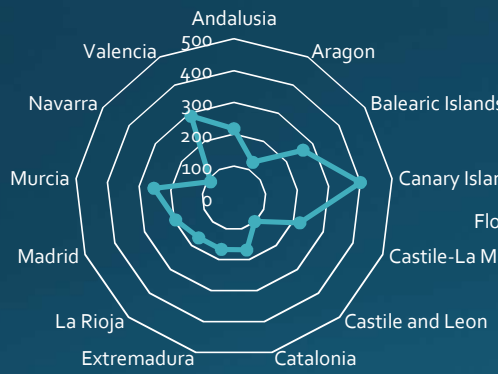
- The paper focuses on the conflictive relationship between the regulation to preserve natural resources and farmer populations. In irrigated areas, especially those with intensive greenhouse crops, the interaction with the human populations that develop agricultural systems for commercial production of food is highly dependent on governance quality
- Use of land and water has a long tradition of regulations to resolve social conflicts. With the development of new irrigation techniques involving pressurized pipes **energy** began to be a **key factor** to save water and intensify food production
- The **liberalization of the energy market** in Spain provides a natural experiment to observe the impact on irrigated land of changes in the regulation of water and energy markets. Regulatory measures in the water market, together with crop taxes and subsidies, are also considered to quantify the impact on farm profitability

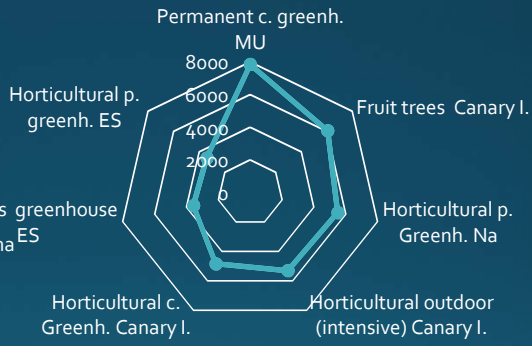
WATER & ENERGY SENSITIVITY

Average by irrigated land area




- The same regulation for water and/or energy may have a very different impact in the agricultural landscape between the regions
- Desalinized water price is currently capped at 0.3 €/m3 during the drought (Law 1/2018)

TOP WATER AND ENERGY SESITIVITY BY REGION

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## Conclusions

- Results empirically contrast the relevance of the **differences of energy and water** cost between regions and within the same crop in different locations.
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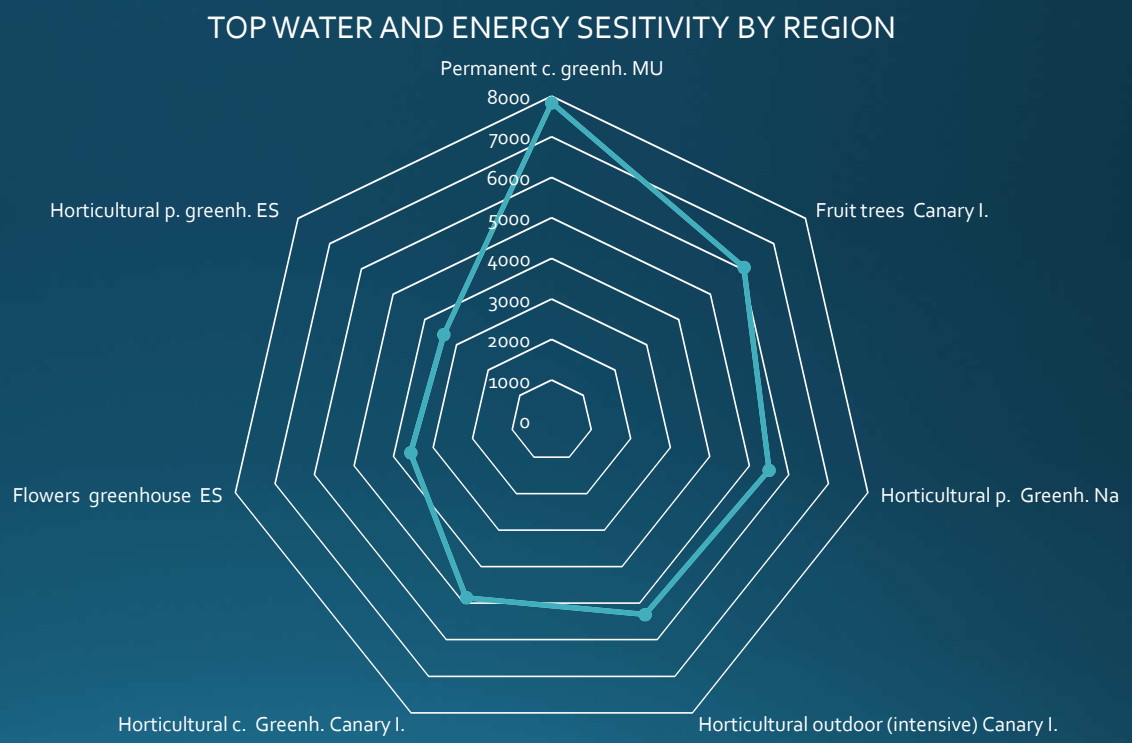
# Water cost by hectare €/Ha

General on energy and water regulations affect the farmers SGM very differently by region

| TOP WATER AND ENERGY €/Ha | |
|---|---|
| Permanent c. greenh. MU | 7839 |
| Fruit trees Canary I. | 6063 |
| Horticultural p. Greenh. Na | 5499 |
| Horticultural outdoor (inter | 5311 |
| Horticultural c. Greenh. Ca | 4849 |
| Flowers greenhouse ES | 3569 |
| Horticultural p. greenh. ES | 3402 |



WATER PRODUCTIVITY VERSUS WATER PRICE AND SUBSIDIES
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- DATA OF WATER PRICE VERSUS

WATER SCARCITY DEGREES

- Real price 0,8 desalinized water
- Desalinized water price is currently capped at 0.3 during the drought (Law 1/2018)
- Subsidy aprox. 0,5 to desalinized water
- Average in traditional Segura irrigation área Wp min. = 0,06 to max:= 0,27
- Modern irrigation Andalucia average Wp = 0.13 (range from 0,04 to 0,18)
- Water partial productivity in export tomatos 2,1 (rainfall), 7,8 (greenhouse)

Note: All figures are average water price in €/m³