

The logo features a cluster of five green grapes with a small brown stem and leaf, positioned to the left of two stylized leaves. One leaf is dark brown and the other is teal. Below the leaves, the text 'WineWaterFootprint' is written in a sans-serif font, with 'Wine' in green, 'Water' in teal, and 'Footprint' in brown.

WineWaterFootprint

WineWaterFootprint Project

Water footprint assessment in the Portuguese wine chain

A. Saraiva, R. Egipto, P. Presumido, C. Jorge, A. Amaral, A. Castro Ribeiro, A. Ferreira, A. Gonçalves, A. Grifo, A. Oliveira, A. Paulo, A. Ribeiro, G. Rodrigues, H. Mamede, H. Mira, J. Silvestre, L. Ferreira, I. Dias, M. Feliciano, P. Oliveira e Silva, S. Ramôa, M. Oliveira





What is Water Footprint?

“The water footprint is a measure of humanity’s appropriation of fresh water in volumes of water consumed and/or polluted.” (WFN, ND)



Water Footprint





Green Water Footprint

Precipitation water that is stored in soil and evaporated, transpired or used by plants.





Blue Water Footprint

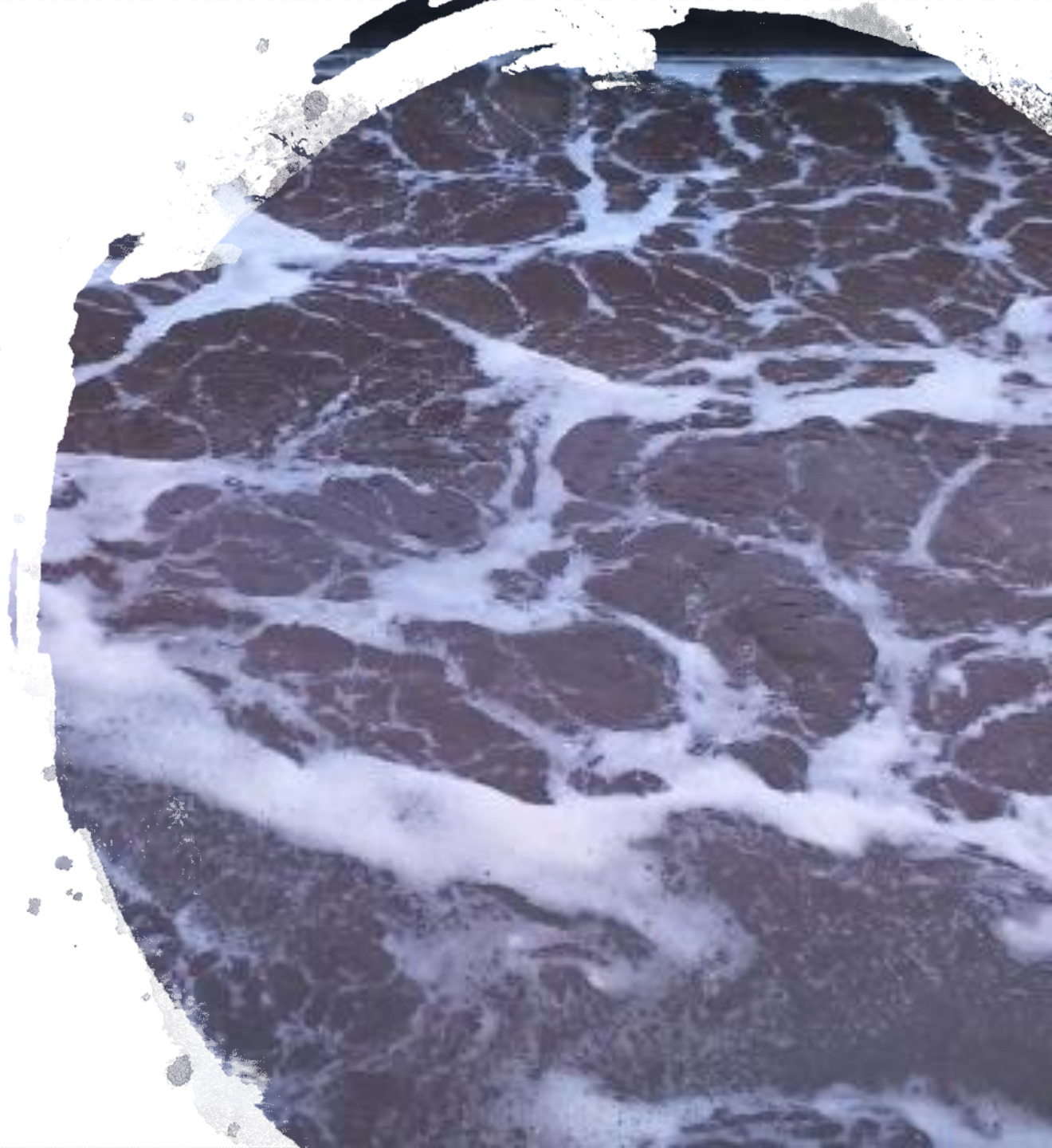
Surface or groundwater that is either evaporated, incorporated or taken from one body of water and returned to another.





Grey Water Footprint

Amount of fresh water that is necessary to **assimilate pollutants** to meet water quality standards.





WineWaterFootprint



Consortium

Research Institutions:

- Escola Superior Agrária – IPSantarém
- Escola Superior Agrária – IPBeja
- Escola Superior Agrária – IPBragança
- INIAV
- COTR





Consortium

Winegrowers

- Herdade do Paço do Conde
- Companhia das Lezírias



Companhia das Lezírias



Consortium

Consultants

- Instituto Superior de Agronomia
- IPCC – Imperial College of London





Project Goal

**Characterize Water Consumption
Patterns**

In order to..

**Prevent and Mitigate future losses
associated to water stress**



How?

Evaluation of cross-cutting broad spectrum **technologies**

- To **reduce water demand**
- To assess the uniformity of water distribution and application efficiency in vineyard
- To determine the water use during wine production

Assessment of **water footprint sustainability**

- To identify **hotspots**
- To **define strategies** to reduce water footprint by 10%

Tasks

Task coordinator:

Task 1 – Project management -----



Task 2 – Vineyard monitorization -----



Task 3 – Winery monitorization -----



Task 4 – Water footprint sustainability -----



Task 5 - Dissemination -----





Task 2

Vineyard monitorization

- **Setting up the experimental fields**
- **Account green water footprint**
 - ✓ vine evapotranspiration estimation through field measurements and satellite imagery
- **Account blue water footprint**
 - ✓ monitoring of irrigation water delivery, distribution uniformity and water quality
- **Account grey water footprint in each experimental field**
 - ✓ quantification of N, P loads in percolated water
- **Water footprint assessment**





Task 3

Winery monitorization

▪ Account blue water footprint

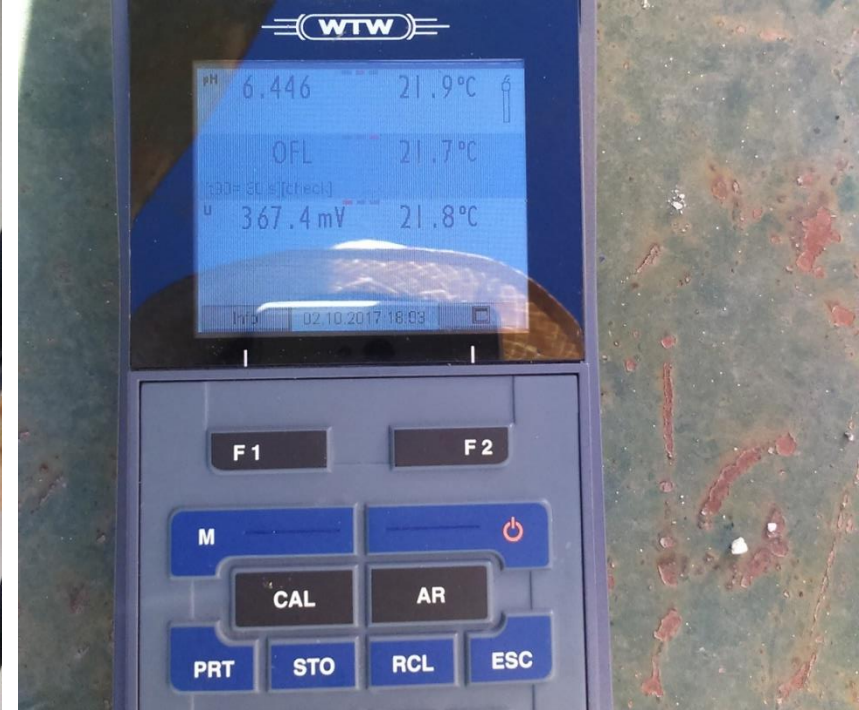
- water counters at key points
- best available technics (BATs)

▪ Account grey water footprint

- wastewater flow quantification and characterization
- Monitored parameters:
 - pH
 - EC
 - TSS
 - COD & BOD
 - Polyphenols
 - etc.

▪ Water footprint assessment





Task 4

Water Footprint Sustainability

- **Environmental sustainable criteria for identifying hotspots**
 - life cycle inventory (LCI)
 - water footprint indicators
- **Sustainability of the water footprint of a product**
 - scenarios, product and system changes
 - best practices selection



Recommendations for reducing water footprint



Task 5

Dissemination

- Project website
- e-book with methodologies
- Computational application for water footprint assessment in the wine chain

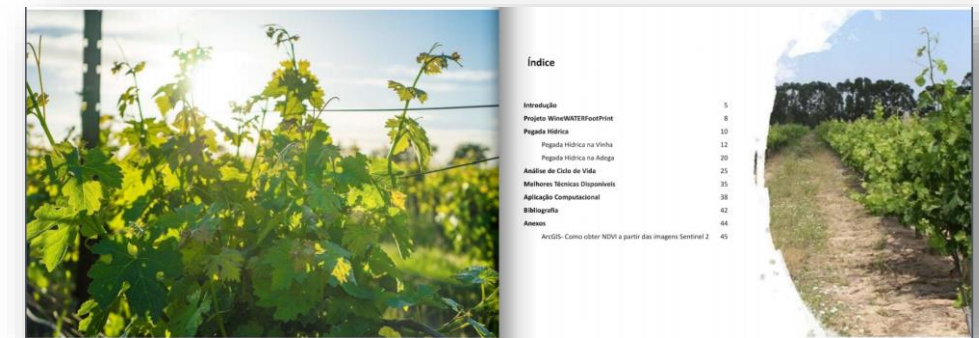



<https://ipsantarem.wixsite.com/winewaterfootprint>



Task 5

e-book of project methodologies





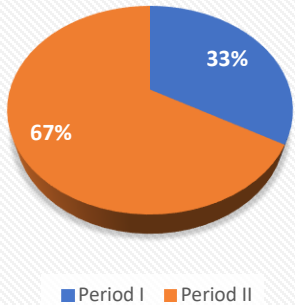
Results

Water Consumption ratio

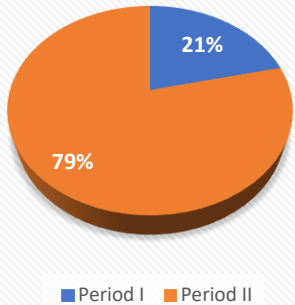
Summary

Water Consumption Ratios

Water consumption at case study I




Water consumption at case study II



$L_{\text{water}}/L_{\text{wine}}$	Case Study I	Case Study II
Period I	1,03	0,93
Period II	2,07	3,42
Global	3,10	4,35

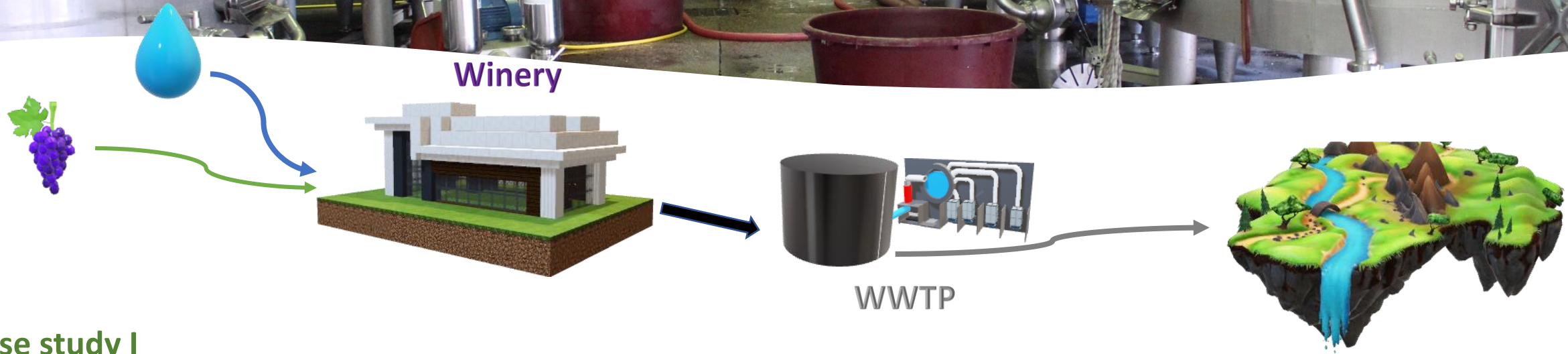
Period I – vintage and 1st racking Period II – other operations





Results

Water Footprint



Winery

WWTP

Case study I

1 000 t of processed grape

Equalization tank
+
Micro-bubble bioreactor

Crop Irrigation
+
Discharge on the waterbody

Case study II

1 250 t of processed grape

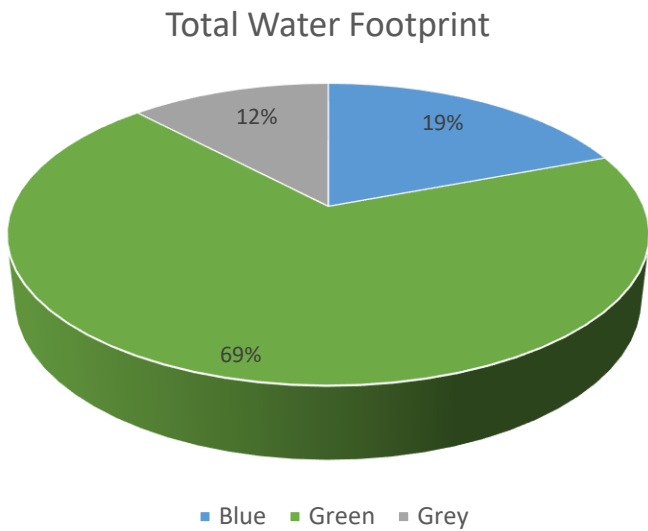
Equalization tank
+
Evaporation ponds

Crop Irrigation

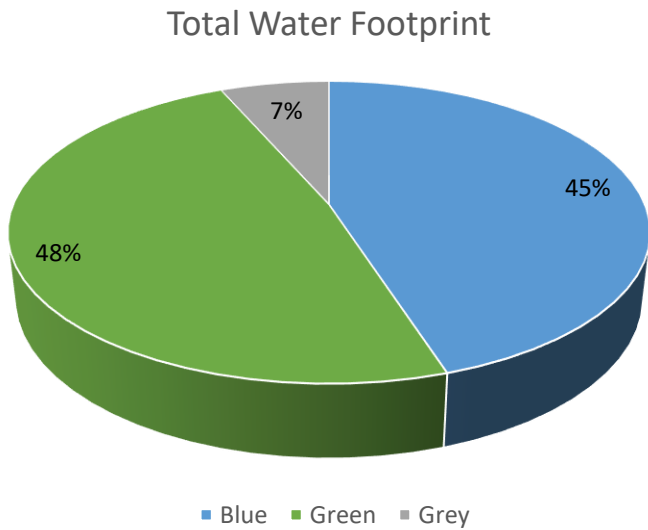
Summary

Wine Water Footprint

Case study I



Case study II

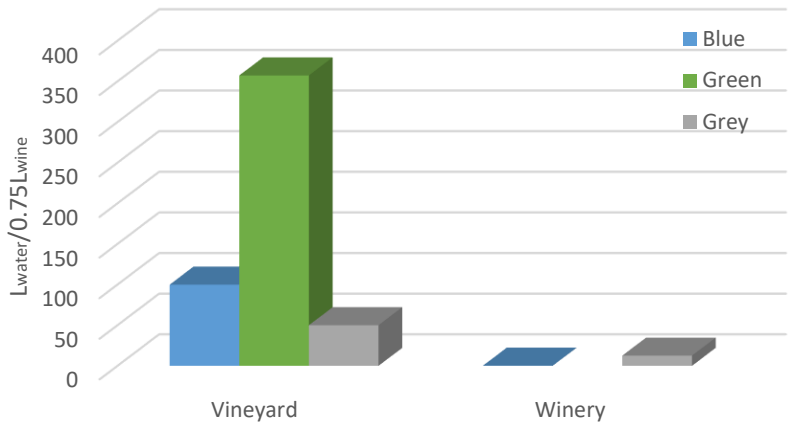


Summary

Wine Water Footprint

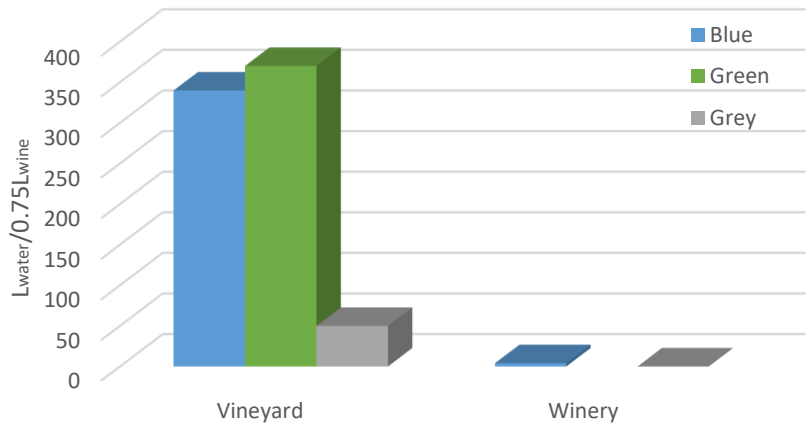
Case study I

Processes contribution to Water Footprint



Case study II

Processes contribution to Water Footprint





Wine Water Footprint:

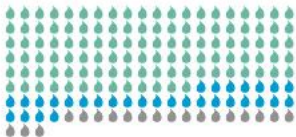
$(L_{\text{water}}/0.75 L_{\text{wine}})$	Vineyard Water Footprint	Winery Water Footprint	WINE WATER FOOTPRINT
Case Study I	507.26	9.56	517
Case Study II	759.80	3.00	763

Water Footprint Comparison

Global average water footprint

1608 litre/kg

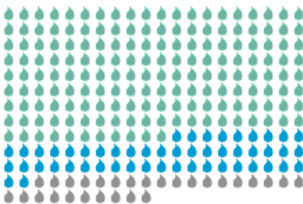
70% green, 19% blue, 11% grey



Global average water footprint

2497 litre/kg

68% green, 20% blue, 11% grey



Global average water footprint

765 litre/ 0.75 litre

85% green, 8% blue, 7% grey



Global average water footprint

654 litre/ 0.75 litre

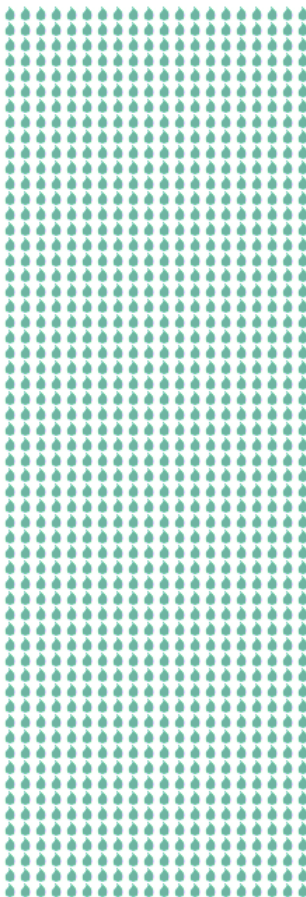
70% green, 16% blue, 14% grey



Global average water footprint

15415 litre/kg

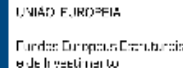
94% green, 4% blue, 3% grey



Thank you!



WineWaterFootprint



Project Coordinator: margarida.oliveira@esa.ipsantarem.pt