

**VIII. CONGRES
INTERNATIONAL**

VITICULTURE DE MONTAGNE ET EN
FORTE PENTE

Montreux – Suisse

Current situation and perspectives for heroic vineyards in the Douro region



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6 May 2026

Overview

- The **Douro Valley** is a leading example of **heroic viticulture**
- Marked by **extreme terrain (steep slope, very, rocky soil)**, high labour demands, and strong **cultural value**
- This presentation covers the **region's context, constraints, pressures, and future opportunities**

01

Regional Context

Oldest demarcated and **regulated** wine region; unique **landscape** and **identity**

02

Key Challenges

Physical, economic, and **market pressures**

03

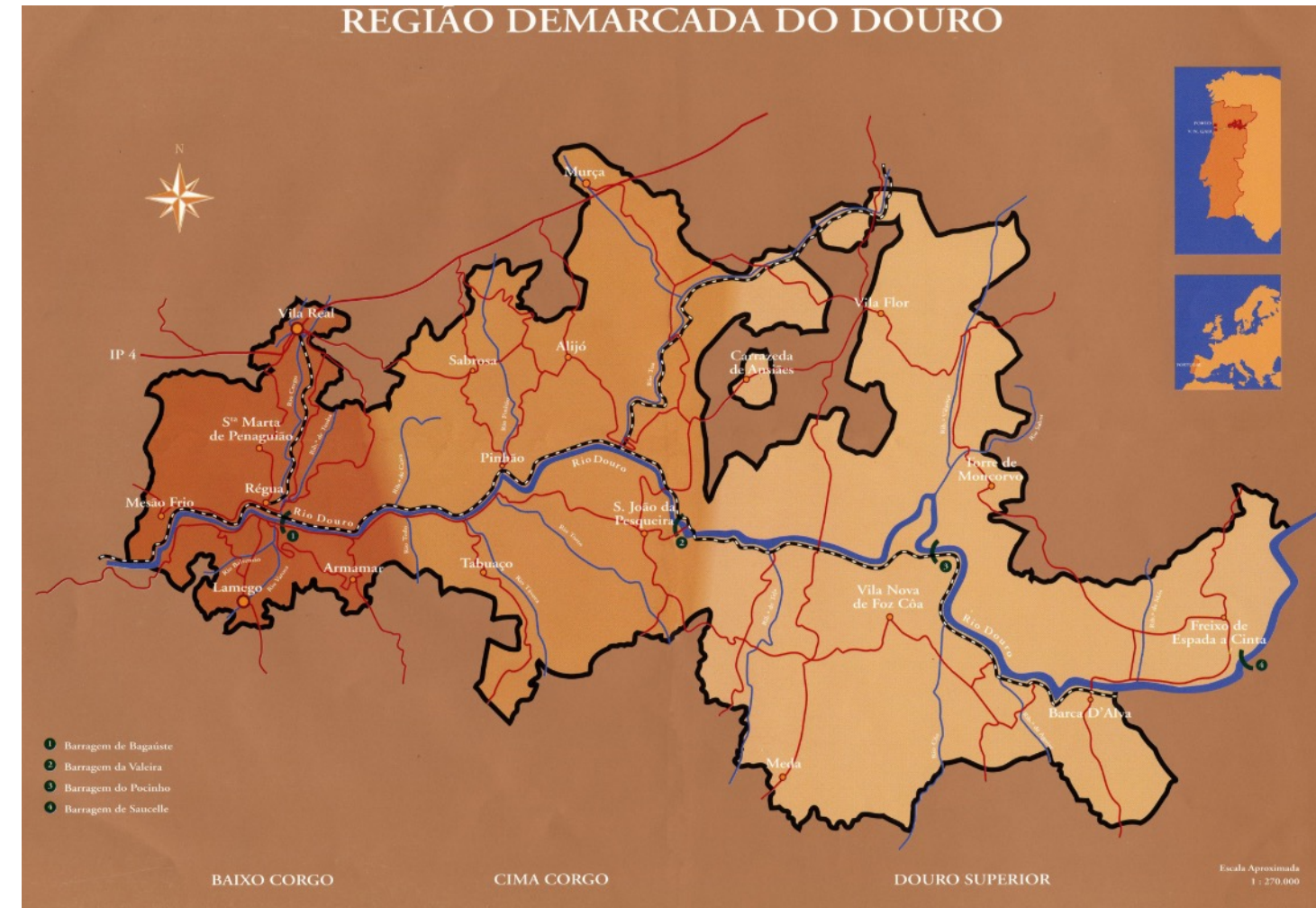
Opportunities

Innovation, heritage value, and **resilience** strategies

The Douro Region in Context

Location

- Northern Portugal along the **Douro River** and its tributaries
- Extends from the Spanish border westward toward the Atlantic
- Total area: **250,000 hectares**
- Area planted with vines: **43,708 hectares**



The Douro Region in Context

Demarcation

- **Oldest protected and regulated wine region, 1756**
 - Geographically **delimited** the region
 - **Regulated** the production of wine
 - Controlled **quality** and **prices**
 - **Graded** vineyards: assessing the quality of the plot and grapes



Marquês de Pombal



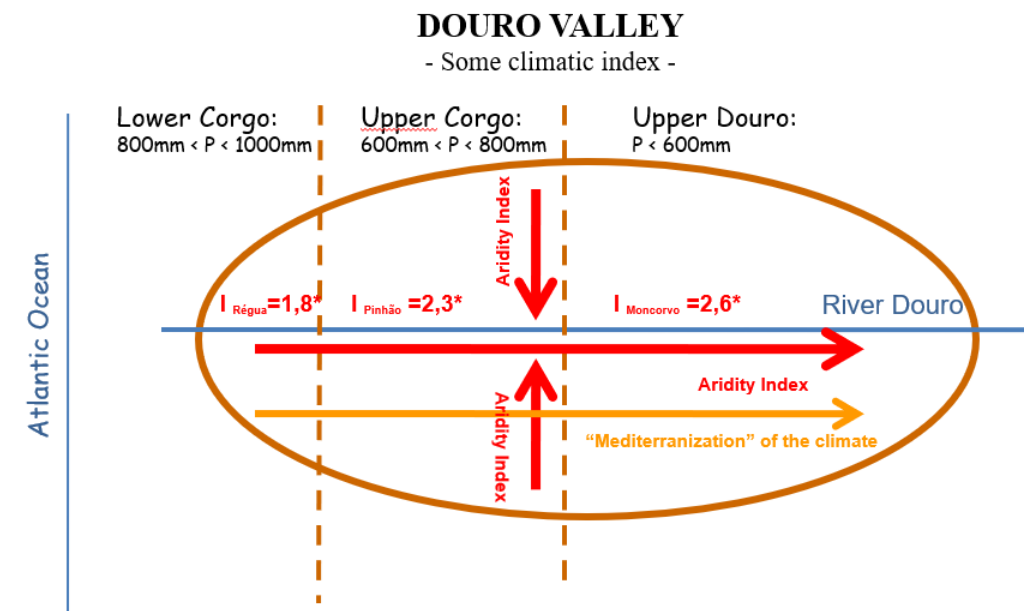
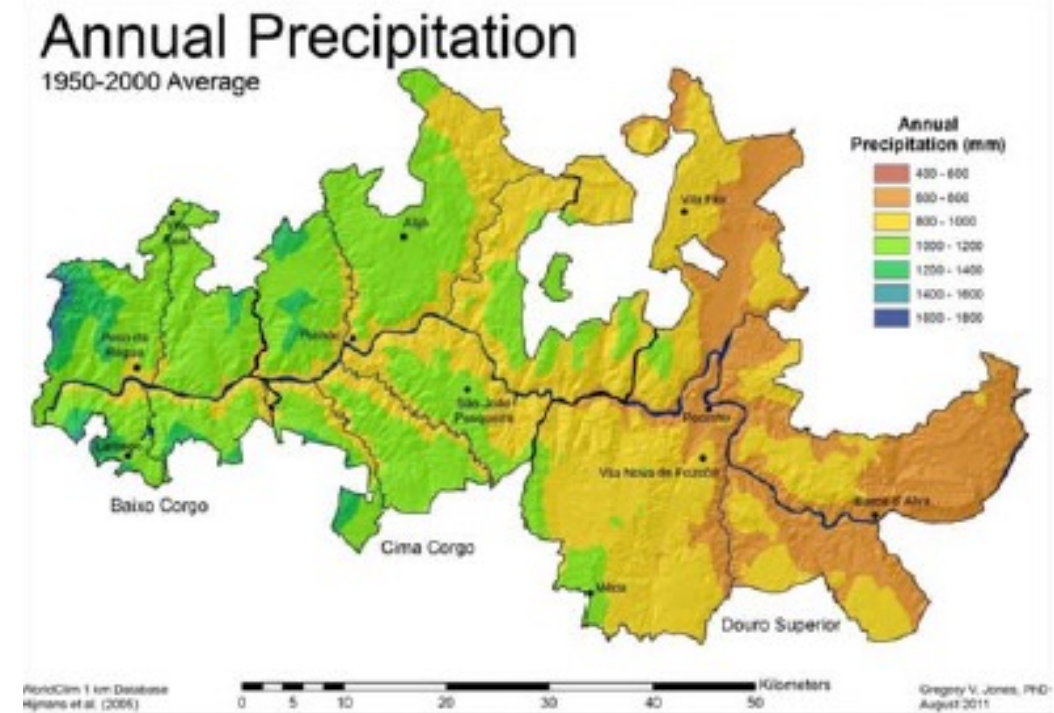
Border of the region marked with **stone pylons**

“Marco de Feitoria”

The Douro Region in Context

Climate

- Mediterranean
- Precipitation:
 - Growing Season: between **189** and **326** mm,
 - Ripening stage only **50** to **85** mm
 - Intense summer water and thermic stress



* **Aridity Index:** $I = (T \times 100) / R$, Where T is the Temperatura in °C and R is rainfall in mm, for the period of time in question. Calculated by Guerra Tenreiro in 1948.

The Aridity Index in Pinhão for 1971 - 2000 (30 years) = 2,45.

(Note: The irregular rainfall from one year to another, in the same location, also changes the **Aridity Index** from one year to the next, but these are consistent over several years).

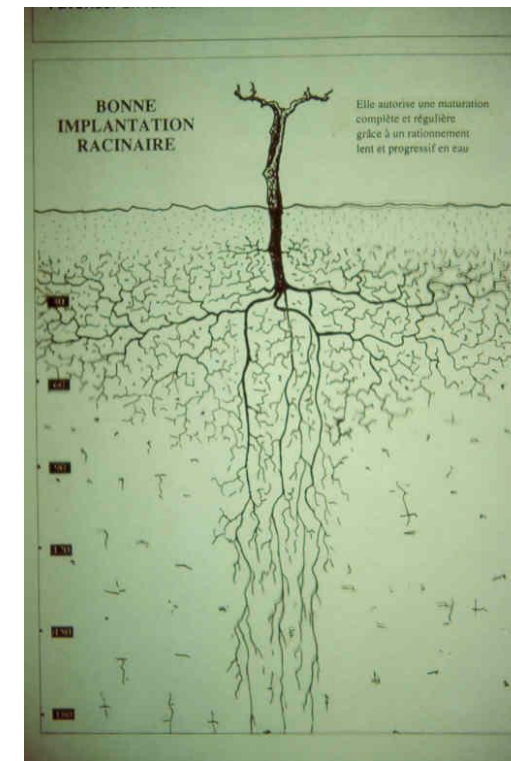
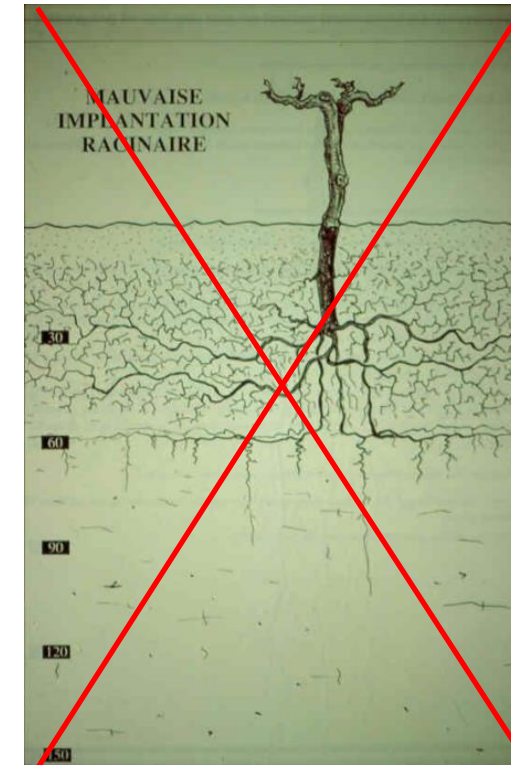
The Douro Region in Context

Soil:

- Schistous, very shallow soil

Leptosols: skeletal soils →

Surribic Arctic Anthrosols
(Technosols)



Aim: Correct establishment of the Root System

Unesco World Heritage



December, 14th, 2001

Categorie: Living and Evolving Cultural Landscape



Heroic Viticulture: DOURO

The term **heroic viticulture** — codified by CERVIM — refers to vine cultivation in extreme conditions.

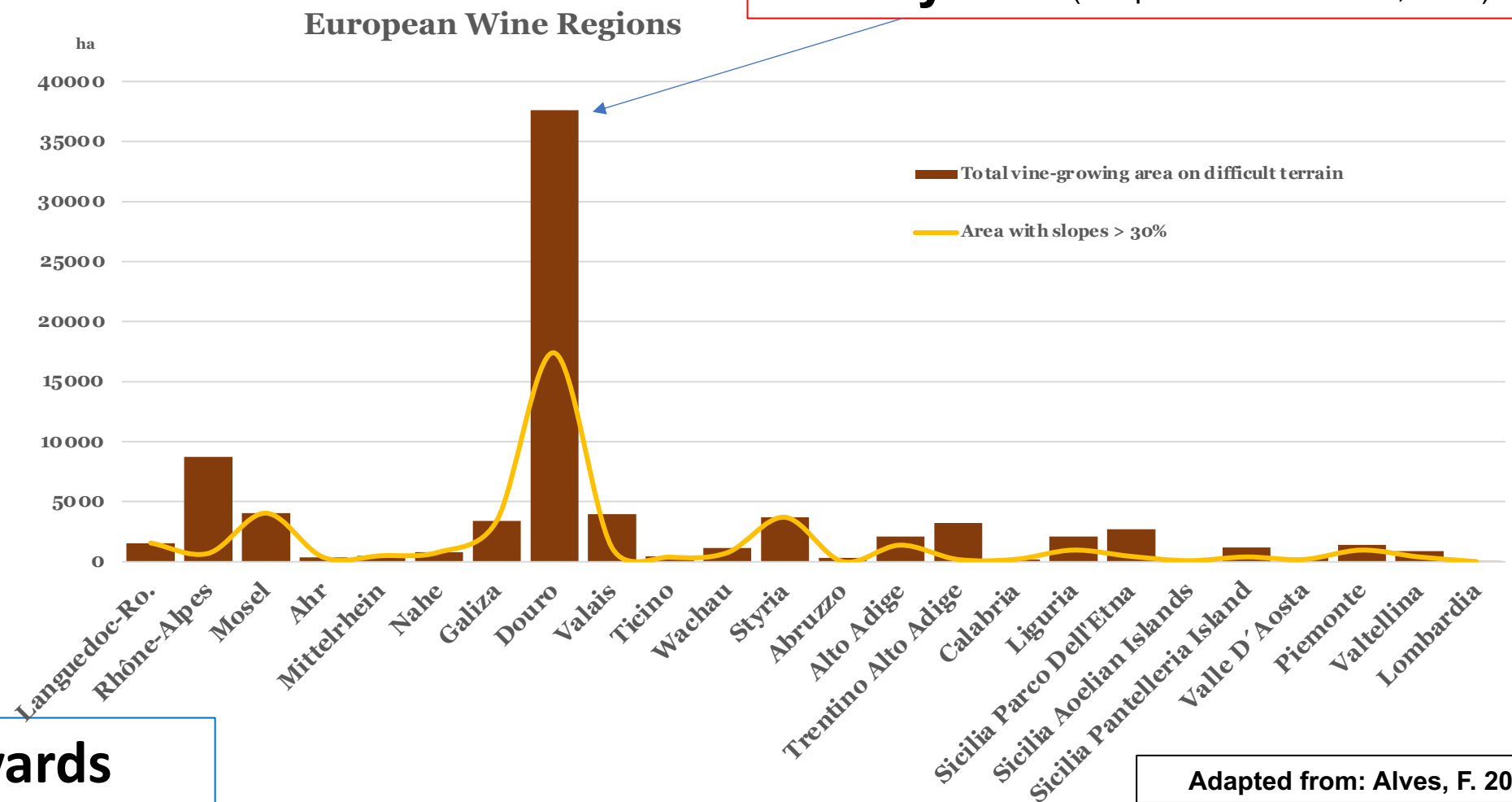
In the **Douro**, the landscape itself defines the challenge.

Douro: 66 % of all mountain vineyards (Adapted from: CERVIM, 2016)



Slope Gradient

< 5%	3,4%
15% - 30%	40,3%
30% - 45%	37,2%
> 45%	19,1%



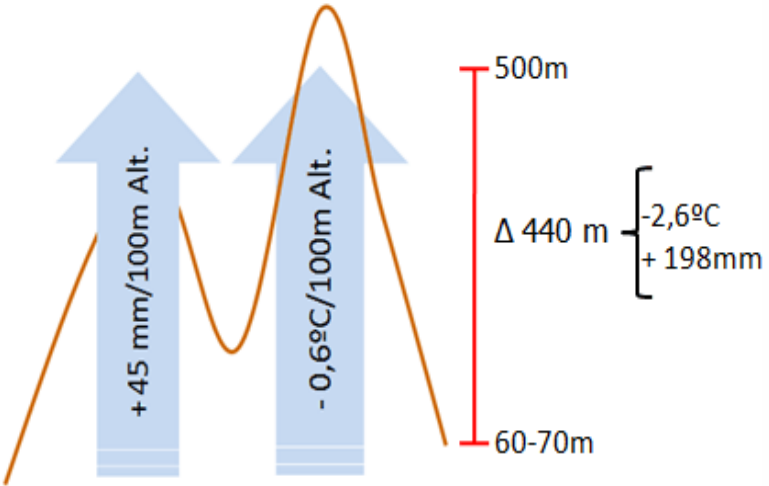
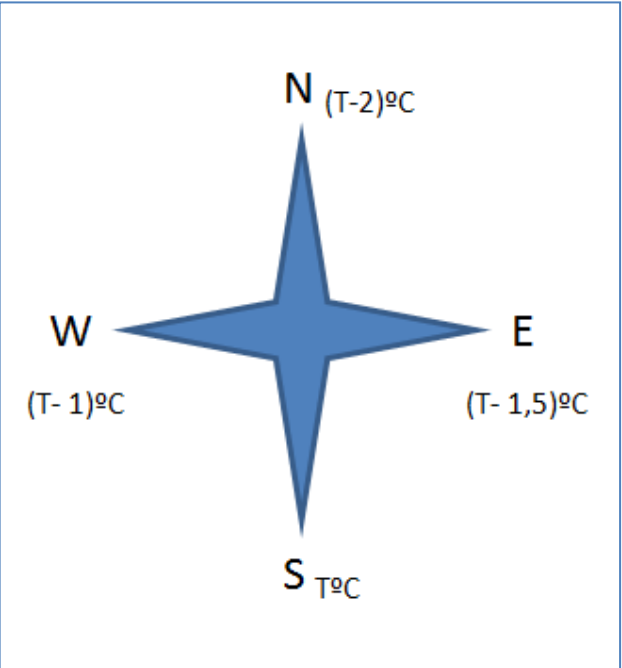
Slope > to 30% = 56,3% vineyards
(71% in the classified area by UNESCO)

Adapted from: Alves, F. 2021

Douro Viticulture - Hot Climate

- 3 Key Factors

South Exposure: Greater aridity
Northern Exposure: Lower aridity



Adapted from Guimaraens & Magalhães (2013)

Climate Change Adaptation

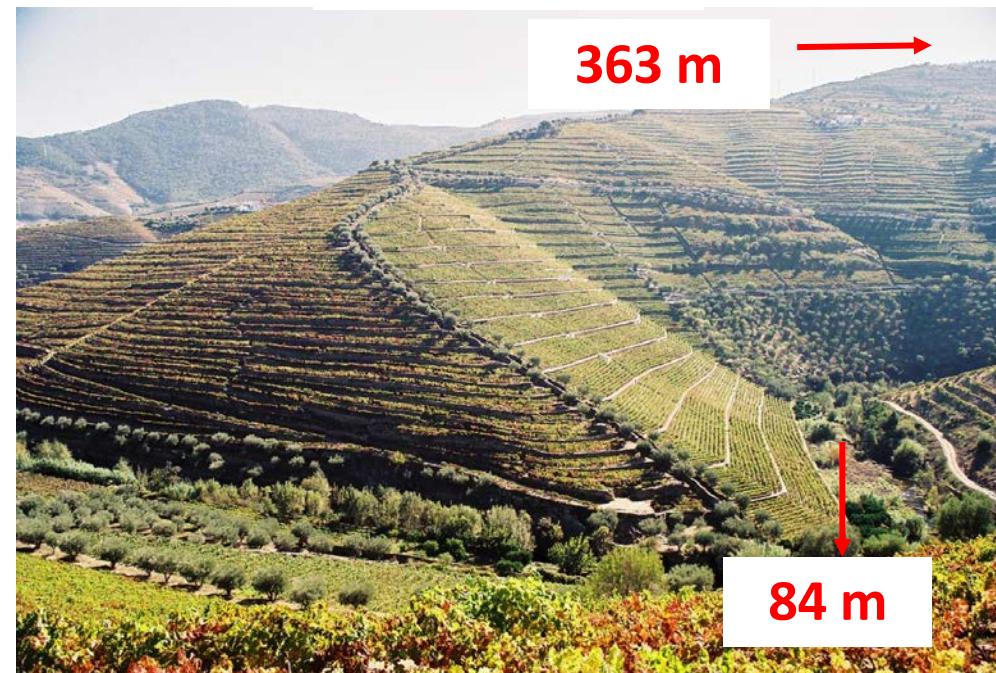
- The **Douro's orographic complexity** recognised as a critical **adaptive resource**.
- **Climatic gradients** across **altitude**, **latitude**, and **aspect** help reduce climate risk through spatial diversification.



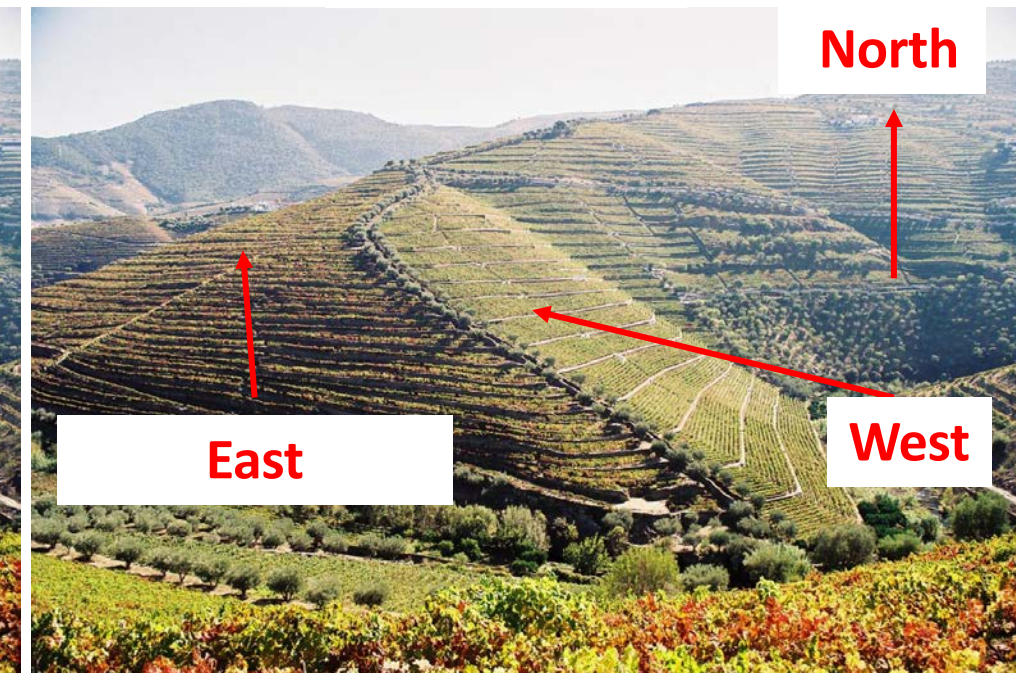
Altitude and Aspect

- Higher elevations
- Cooler north-facing slopes
- Preserve acidity
- Extend ripening

Altitude



Aspect



Genetic Diversity as a Resilience Asset

- One of the world's most **genetically** diverse grapevine portfolios
- **115** authorised **varieties** in the Porto and Douro PDO
- Major of them **Autochthonous**

Key resilience **benefits**:

- Distinct **phenological** cycles
 - Different **drought** tolerance levels
 - Varied **heat** stress responses
 - Strategic **selection** can support climate adaptation
 - **Breeding** can strengthen resilience without losing identity
- (Touriga Francesa = Touriga Nacional x Mourisco
TintoPhylloxera period



Viosinho



Rabigato



Arinto



Gouveio



Malvasia Fina



Cercial



Códega



Fernão Pires



Tinta Roriz



Tinto Cão



Touriga Francesa



Touriga Nacional



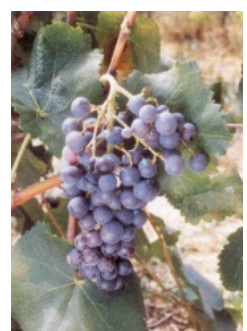
Tinta Barroca



Alicante Boucshet



Sousão



Mourisco

Climate Change Adaptation

Site-Specific Decision:

- Thermal and hydric gradients
- Plot-level decisions
- Match varieties to climate

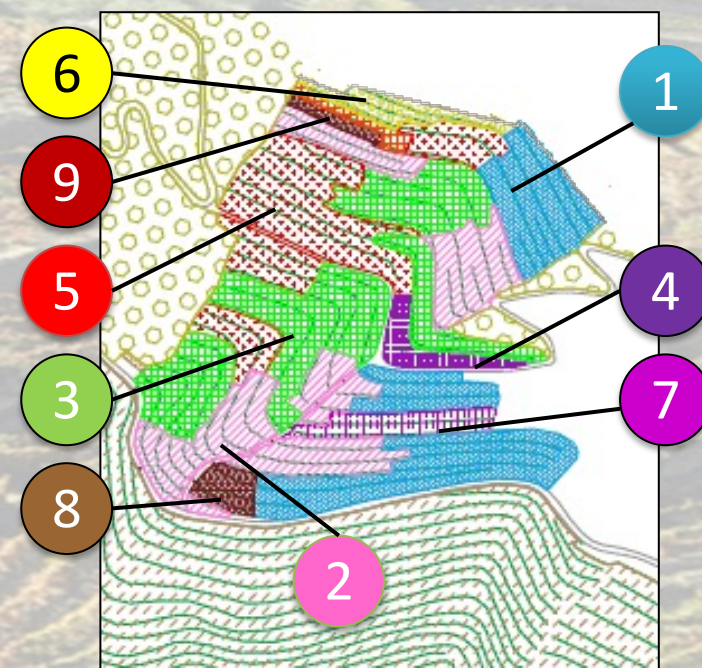
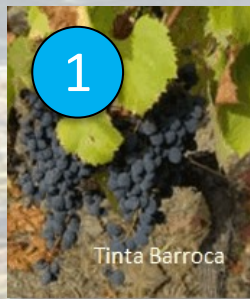
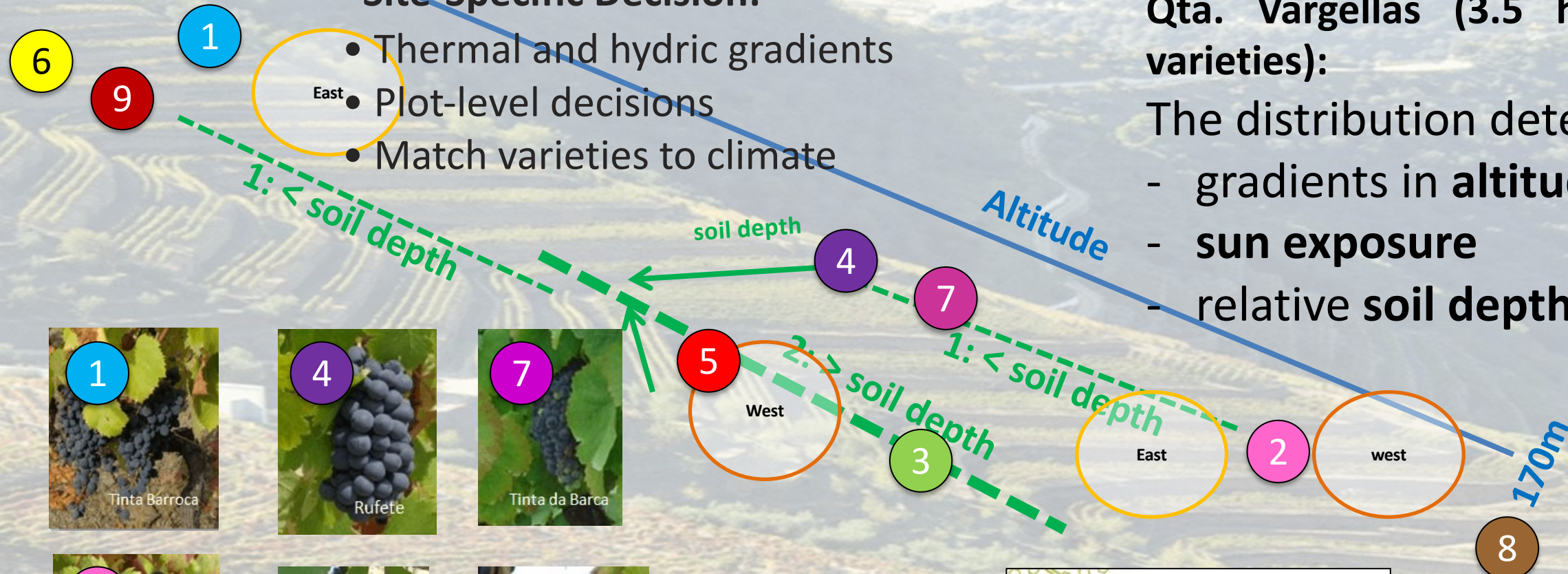
Grape varieties distribution:

Guimaraens & Magalhães (2013)

Qta. Vargellas (3.5 ha / 9 grape varieties):

The distribution determined by:

- gradients in **altitude**
- **sun exposure**
- relative **soil depth**



Douro: A Cultural Landscape Worth Preserving

The Douro's **terraced vineyards** are among Europe's most striking agricultural **landscapes**.

- Built over **centuries** through collective **human** effort
- Dry-stone **terrace** walls (*socalcos*) support farming on steep slopes
- They reduce **erosion**, retain **soil**, and protect **biodiversity**

Soil Protection

Prevents **erosion** and helps retain **topsoil**.



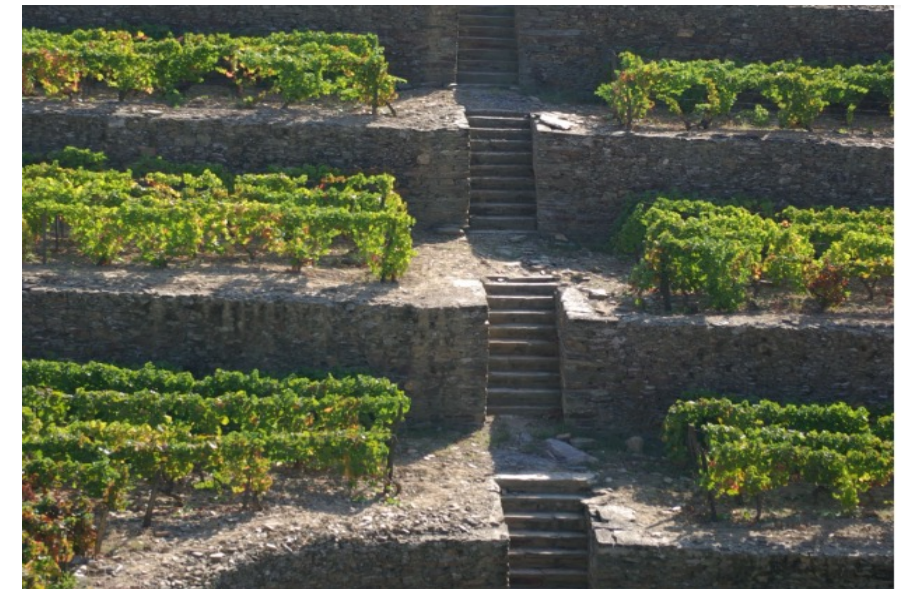
Biodiversity

Supports vineyards, **scrubland**, and **wildlife** corridors.



Heritage Value

Represents living **heritage** and **cultural tourism**.



Douro: Socioeconomic Challenges

3–5x

Cost Premium

Higher **production costs** than mechanised flatland vineyards

> 1000 h manual work /ha

Manual Labour

Most vineyard work still requires a lot of **hand labour**

- **Steep terrain** raises **costs**
- Small, fragmented **plots** reduce **efficiency**
- **Manual labour** remains essential
- Seasonal **workers** are scarce
- **Rural depopulation** weakens labour supply
- **Ageing workforce** limits continuity
- **Mechanisation** is not feasible on the steepest parcels
- **Low productivity/ha** gains keep costs high
- **Sales and revenue** are **reducing** in the last 20 years



Douro, Portugal, 1985

Structural Challenges Threatening Sustainability

Market Pressures



A Shifting Commercial Landscape

- **Port wine:** demand **down** in key export markets
- **Douro Still Wine:** diversification, but tighter margins
- **Competition:** lower-cost producers
- **Supply:** excess regional output in some vintages
- **Prices:** pressure on entry-level DOC wines

- **Declining** global demand has reduced **revenue**
- **Bulk and Entry-level wines** sales are most exposed

IVDP 2024 Sales (Volume and Value)

	Mcxs	M€	€/litre
Porto	7.3	367	5.59
	-6.1%	-3.2%	+3.1%
Douro	5.0	227	5.04
	-4.2%	+2.7%	+7.1%
Total RDD	12.8	615	5.33
	-5.6%	-1.0%	+4.9%

Source: IVDP (2024)

Structural Challenges:

How to balance:

- Supply and Demand?
- Revenue of producers and of Merchants?

2024 Harvest

Almost 120 hectares (237 plots) of vineyards remained unharvested in the Douro this year (2024) (Published: 5 December 2024)

It's unanimous: 2024 is a vintage year for Port wine

(Published: 30 April 2026)



Vintage 2024 Declaration



Sogrape



Ramos Pinto



Symington Family



Fladgate Partnership: Taylor's, Fonseca

Opportunities for Innovation

Despite significant structural pressures, the Douro's heroic vineyards have considerable untapped **potential** for innovation.

Viticulture



- **New technologies** (use of **laser systems** in systematization of hillsides)

- **New training systems:** Double Cordon – a canopy trained upward and other trained downward
Increase in yield 56,8%, Touriga Francesa 2007-2011

- Increase of **plant density** and possibility of **mechanization** in very narrow terraces (1.5-1.7 m width)

Opportunities for Innovation

Soil Management:
coverage management,
without risk of
competition with vines
by water and nutrients
in a Mediterranean
climate

One Row Terraces: reduction in Herbicide use and erosion control
with grass coverage of earth embankments



Balance between the annual grasses (Autumn, Winter) and Vines: erosion control,
landscape without water competition

Opportunities for Innovation

Oenology: Rediscovery of a traditional Wine (Port)

New Wine Styles



Pink

New Consumption Trends: Cocktails



White



New Super Premium Categories (Tawnies)

50 Years



80 Years



VVO (Very Very Old)
> 80 Years



Value Creation Beyond the Bottle

The Douro's **advantage** lies not only in what is **produced**, but in *where* and *how* it is produced.

Heroic viticulture is a story of **place, culture, and human endeavour** — qualities that support **premium value**.

Landscape & Heritage Valorisation

- **UNESCO** status strengthens credibility
- **Mountain Viticulture** and terraced valley is a **premium story**
- **Differentiates** from commodity wines

Enotourism Development

- “**Quinta**” visits and harvest experiences
- **Luxury** accommodation
- High-margin **revenue** potential



Conclusion

The **heroic vineyards** of the **Douro** stand at a **critical juncture**.

The **challenges** are real, compound, and urgent — yet so too is the region's adaptive capacity.

Significant Challenges

- **Climate** change
- **Labour** scarcity
- **Market** pressure
- High production **costs**



Strong Adaptive Potential

- Genetic **diversity**
- Mesoclimate **complexity**
- Cultural heritage
- New technologies



Integrated Strategies Required

- **Research**
- **Policy** support
- **Market** development
- Cross-sector **collaboration**

The **Douro's Steep Slope** vineyards are a **civilisation** in **stone** and **vine**.

Their future depends on collective action.



"And the men made the wine...

They climbed the mountains, broke the rock, shaped the earth, raised walls; they planted vines and selected grape varieties.

They endured powdery mildew, phylloxera, downy mildew, ..., and began everything again, time after time...

... They cared for the vines as they did for their children, and for the wineries as their homes...

... They harvested while singing, to forget the fatigue and the forty-degrees heat ...

... And so the wine was made - and the wine, in turn, made the men...".

Adaptedde Barreto (1984)



Thank you very much for your attention!