

# PORTUGAL



Source: esri

## General

Portugal - officially the Portuguese Republic - is located mostly on the Iberian Peninsula in southwestern Europe. It is the westernmost state of mainland Europe. It is bordered in the West and South by the Atlantic Ocean and in the North and East by Spain. The country has an area of 9.22 Mha (million hectares) with, in 2022, a population of 10.3 million, or 1.12 persons per ha (Wikipedia and United Nations, 2022).

## Climate and geography

Portugal has a Mediterranean climate and is one of the warmest European countries. The annual average temperature varies from 8–12 °C in the mountainous North to 16–18 °C in the South and on the Guadiana River Basin. There are, however, variations from the highlands to the lowlands. Annual average rainfall varies from just over 3,200 mm in the northern mountains to less than 300 mm in the area of the Massueime River and near Côa along the Douro River (source: Wikipedia).

Portugal is split by its main river, the Tagus, that flows from Spain and discharges in Tagus Estuary, in Lisbon, before discharging into the Atlantic. The northern landscape is mountainous towards the interior with several plateaus indented by river valleys, whereas the South, including the Algarve and Alentejo regions, is characterized by rolling plains (source: Wikipedia).

## Existing polders

The Group Polder Development (1982) identified five areas with existing polders and two areas where impoldering was considered. The existing polders are:

- Polder Lezira Grande de Vila Franca de Vira, located on the Lezira Grande Isle. Impoldering and land reclamation have been carried out since the 16<sup>th</sup> century. Pereira and Bos (1983) and Vieira *et al.* (1983) give detailed information of the Lezira Grande Polder (Figure 1);
- two polders in the estuary of the Marateca River. Their total area is 5,400 ha (Figure 2);
- a polder area of 8,700 ha in the Aveiro Lagoon;
- Castro-Marim Polder with an area of 1,500 ha;
- near Alvor 8,000 ha has been reclaimed.

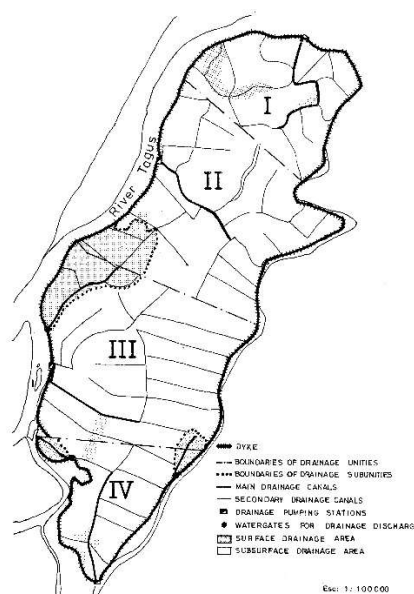


Figure 1. Lay out of the drainage system of the Lezira Grande Polder (Vieira *et al.*, 1983)

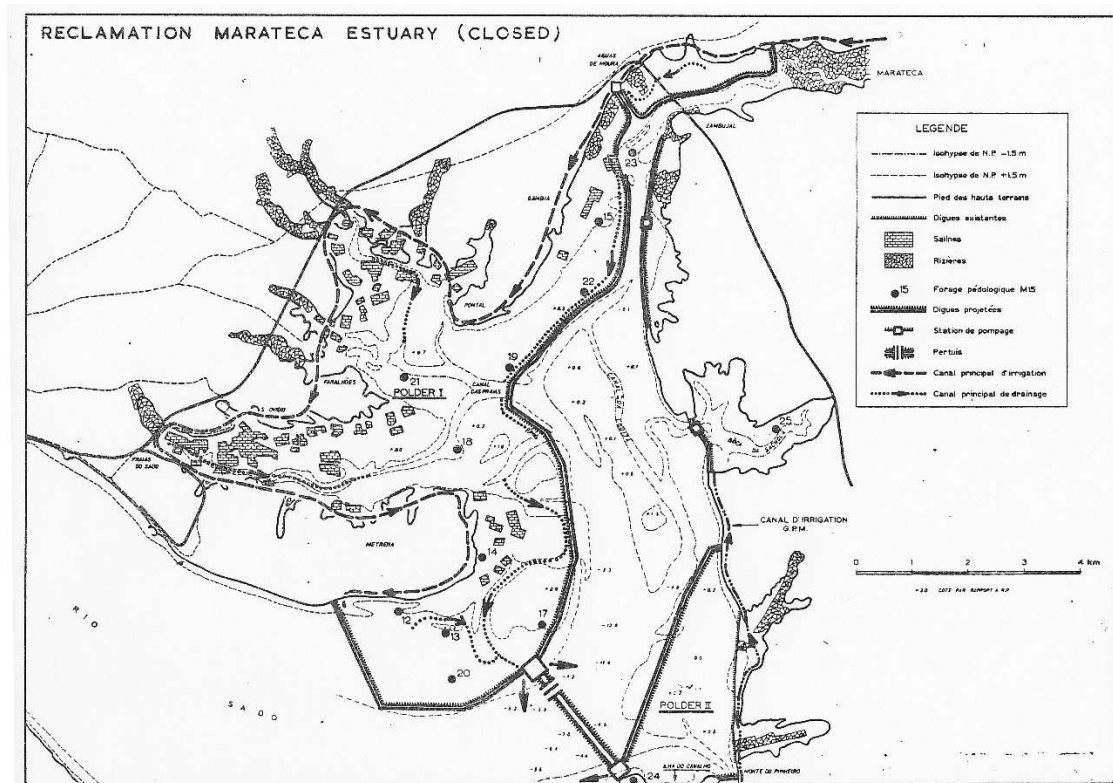


Figure 2. Polders in the estuary of Marateca River

Volker refers to the Polder Ludo.

General characteristics of the polder in Portugal are shown in Table I. Table II shows the characteristics of the water management and flood protection systems of the existing polders.

### Proposed polders

The Group Polder Development (1982) also mentions that an area of 3,000 ha near Faro was under study. They also mention a reclamation of the estuary of the Sado River.

### Location of the polders in Portugal as shown on the World polder map

The location of the polders in Portugal is shown in Figure 3.



Figure 3. Location of the polders in Portugal (source: esri – Batavialand)

The pictures by Prof. Adriaan Volker are shown in Table III.

## References

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*Lelystad, February 2024*

Table I. General characteristics of existing polders in Portugal

Name	Reclamation	Area in ha	Type *)	Latitudes	Longitudes	Elevation in m+MSL	Land use
<i>Existing polders</i>							
Polder Leziria Grande de Vila Franca de Vira	Since 16th century	13,074	RLL	38° 56' N	8° 55' W	0	Agriculture
Castro-Marim Polder		1,500	RLL	37° 13' N	7° 25' W	2	Agriculture
Polder in Aveiro Lagoon		8,700	RLL	40° 42' N	8° 43' W	2	Agriculture
Polder near Alvor		8,000	RLL	37° 8' N	8° 36' W	2	Agriculture
Polder Ludo			RLL	37° 2' N	7° 60' W	2	Agriculture
Two polders in the estuary of the Marateca River		5,400	RLL	38° 35' N	8° 43' W	2	Agriculture
Total		23,613					
<i>Proposed polders</i>							
Polder near Faro reclamation of the estuary of the Sado River		3,000					
Total							

\*) RLL = reclaimed low-lying land; LGS = land gained on the sea; DL = drained lake

Table II. Characteristics of the water management and flood protection system of existing polders in Portugal

Name	Design criteria in chance of occurrence/year						
	Water management					Flood protection	
	Drainage				Irrigation	Rural	Urban
	Type	Design criterion	Percentage of open water	Discharge capacity			
m <sup>3</sup> /s				mm/day			
Polder Leziria Grande de Vila Franca de Vira	RLL			20	13.2		

Table III. Pictures on polders and lowlands in Portugal by Prof. Adriaan Volker




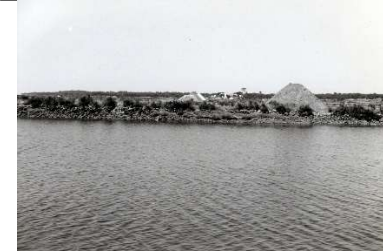








			
A1 001/VIII.1.1 Marateca, entrance of Esteiro da Soba	A1 002/VIII.1.2 Marateca, 600 m in Esteiro da Soba, north side	A1 003/VIII.1.3 Marateca, 600 m in Esteiro da Soba, north side	A1 004/VIII.1.4 Marateca, Salinhas, small dike with stone protection along Zambiyal Canal
			
A1 005/VIII.1.5 Marateca, railway bridge over Zambiyal Canal	A1 006/VIII.1.6 Ilhado Cavalho, dike at the north side	A1 007/VIII.1.7 Agreas do Moiera. Pump for groundwater for irrigation	A1 008/VIII.1.8 Agreas do Moiera, distribution structure
			
A1 009/VIII.1.9 Impoldering at the south side of Sachola. Breach in the dike due to settlement	A1 010/VIII.1.10 Impoldering at the south side of Sachola. Culvert in new dike	A1 011/VIII.1.11 Impoldering at the South side of Sachola. New dike	A1 012/VIII.1.12 Comporta along Zambiyal Canal

Table III. Pictures on polders and lowlands in Portugal by Prof. Adriaan Volker (continued)













			
<p>A1 013/VIII.1.13 Comporta along Zambiyal Canal, self-recording staff gauge</p>	<p>A1 014/VIII.1.14 Comporta at Zambiyal Canal, self- recording staff gauge</p>	<p>A1 015/VIII.1.15 Comporta, bitter rice near the Atlantic Ocean</p>	<p>A1 016/VIII.1.16 Comporta, discharge structure near the Atlantic Ocean</p>
			
<p>A1 017/VIII.1.17 Comporta near the Atlantic Ocean</p>	<p>A1 018/VIII.1.18 Comporta, execution of a drilling</p>	<p>A1 019/VIII.1.19 Comporta, execution of a drilling</p>	<p>A1 020/VIII.1.20 Comporta, execution of a drilling</p>
			
<p>A1 021/VIII.1.21 Small dike in lowland area</p>	<p>A1 022/VIII.1.22 Small dike in lowland area</p>	<p>A1 023/VIII.1.23 Small dike in lowland area</p>	<p>A1 024/VIII.1.24 Small dike in lowland area</p>

Table III. Pictures on polders and lowlands in Portugal by Prof. Adriaan Volker (continued)













			
A1 025/VIII.1.25 Small stone dike in lowland area	A1 026/VIII.1.26 Small stone dike in lowland area	A1 027/VIII.1.27 Small stone dike in lowland area	A1 028/VIII.1.28 Vishermen huts in Ludo
			
A1 029/VIII.1.29 Vishermen huts in Ludo	A1 030/VIII.1.30 Dike of the polder Ludo	A1 031/VIII.1.31 Faro	A1 032/VIII.1.32 Faro
			
A1 033/VIII.1.33 Faro	A1 034/VIII.1.34 Faro, Fialho	A1 035/VIII.1.35 Faro	A1 036/VIII.1.36 Salt pans in Faro

Table III. Pictures on polders and lowlands in Portugal by Prof. Adriaan Volker (continued)













			
A1 037/VIII.1.37 Salt pans in Faro	A1 038/VIII.1.38 Salt pans in Faro	A1 039/VIII.1.39 Lowland area	A1 040/VIII.1.40 Lowland area
			
A1 041/VIII.1.41 Lowland area	A1 042/VIII.1.42 Lowland area	A1 043/VIII.1.43 Lowland area	A1 044/VIII.1.44 Aveiro – Canal do Principe – Pisto the Remo
			
A1 045/VIII.1.45 Aveiro	A1 046/VIII.1.46 Aveiro – Rio e Marinhas	A1 047/VIII.1.47 Aveiro – Canal des Piramides	A1 048/VIII.1.48 Aveiro



Table III. Pictures on polders and lowlands in Portugal by Prof. Adriaan Volker (continued)







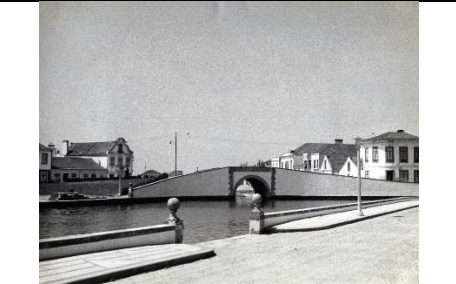



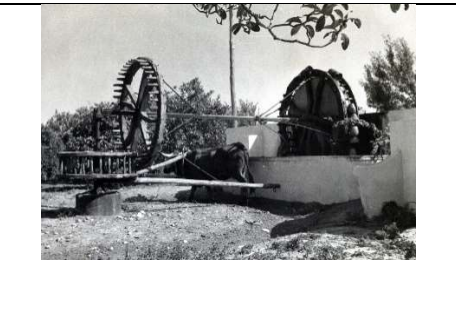

 <p>AVEIRO - CANAL CENTRAL</p>		 <p>AVEIRO - Canal central</p>	 <p>AVEIRO - Ria. Centro da cidade</p>
<p>A1 049/VIII.1.49 Aveiro – Canal Central</p>	<p>A1 050/VIII.1.50 Aveiro</p>	<p>A1 051/VIII.1.51 Aveiro – Canal Central</p>	<p>A1 052/VIII.1.52 Aveiro – Ria. Centro da cidade</p>
			
<p>A1 053/VIII.1.53 Aveiro</p>	<p>A1 054/VIII.1.54 Aveiro – Canal Central</p>	<p>A1 055/VIII.1.55 Aveiro</p>	<p>A1 056/VIII.1.56 Aveiro</p>
 <p>AVEIRO - CAPITANIA DO PORTO</p>			
<p>A1 057/VIII.1.57 Aveiro – Capitania do Porto</p>	<p>A1 058/VIII.1.58 Aveiro</p>	<p>A1 059/VIII.1.59 Lifting devices, driven by windmills</p>	<p>A1 060/VIII.1.60 Lifting devices, driven by windmills</p>

Table III. Pictures on polders and lowlands in Portugal by Prof. Adriaan Volker (continued)













			
<p>A1 061/VIII.1.61 Lifting devices, driven by windmills</p>	<p>A1 062/VIII.1.62 Lowland area</p>	<p>A1 063/VIII.1.63 Lowland area</p>	<p>A1 064/VIII.1.64 Dike in lowland area</p>
			
<p>A1 065/VIII.1.65 Lowland area</p>	<p>A1 066/VIII.1.66 Lowland area</p>	<p>A1 067/VIII.1.67 Lowland area</p>	<p>A1 068/VIII.1.68 Lowland area</p>
			
<p>A1 069/VIII.1.69 Lowland area</p>	<p>A1 070/VIII.1.70 Lowland area</p>	<p>A1 071/VIII.1.71 Prof. Adriaan Volker observes at a stone stairs</p>	<p>A1 072/VIII.1.72 Lowland area, clay cracks</p>

Table III. Pictures on polders and lowlands in Portugal by Prof. Adriaan Volker (continued)

















			
<p>A1 073/VIII.1.73 Lowland area</p>	<p>A1 074/VIII.1.74 Small dike in lowland area, consisting of cracked clay</p>	<p>A1 075/VIII.1.75 Lowland area</p>	<p>A1 076/VIII.1.76 Lowland area</p>
			
<p>A1 077/VIII.1.77 Lowland area</p>	<p>A1 078/VIII.1.78 Salt pans in lowland area</p>	<p>A1 079/VIII.1.79 Prof. Adriaan Volker at a ship</p>	<p>EV 001/EV-V-1 Bank protection along the coast</p>
			
<p>EV 002/EV-V-2 Bunkers at the coast</p>	<p>EV 003/EV-V-3 Dike construction</p>	<p>EV 004/EV-V-4 Dike construction</p>	<p>EV 005/EV-V-5 Dike construction</p>

Table III. Pictures on polders and lowlands in Portugal by Prof. Adriaan Volker (continued)

			
EV 006/EV-V-6 Dike construction	EV 007/EV-V-7 Dike construction	EV 008/EV-V-8 Sea dike	EV 009/EV-V-9 Sea dike