

## SPAIN



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### General

Spain - officially the Kingdom of Spain - is mostly located on the Iberian Peninsula. The country's mainland is bordered in the South and East by the Mediterranean Sea except for a small land boundary with Gibraltar, in the North and Northeast by France, Andorra, and the Bay of Biscay and in the West and Northwest by Portugal and the Atlantic Ocean. The country has an area of 50.6 Mha (million hectares) with in 2020 a population of 46.8 million, or 0.92 persons per ha (Wikipedia and United Nations, 2019).

### Climate and geography

Three main climatic zones can be distinguished according to geographical situation and orographic conditions (source: Wikipedia):

- *Mediterranean climate*, characterised by warm/hot and dry summers, is dominant in the peninsula. It is predominant in the Mediterranean and Southern Atlantic coast and inland throughout Andalusia, Extremadura and most of the centre;
- *semi-arid climate*, is predominant in the south-eastern quarter of the country, but is also widespread in other areas of Spain. It covers most of the Region of Murcia, southern Valencia and eastern Andalusia, where true hot desert climate also exist. Further to the North, it is predominant in the upper and mid reaches of the Ebro valley, which crosses southern Navarre, central Aragon and western Catalonia. It is also found in Madrid, Extremadura, Castilla-La Mancha, and some locations of western Andalusia. The dry season extends beyond the summer and average temperature depends on altitude and latitude;
- *oceanic climate*, located in the northern quarter of the country, especially in the Atlantic region. Additionally it is also found in northern Navarre, in most highlands areas along the Iberian System and in the Pyrenean valleys, where a humid subtropical variant also occurs. Winter and summer temperatures are influenced by the ocean, and have no seasonal drought.

Spain is a mountainous country, dominated by high plateaus and mountain chains. There are several major rivers such as the Tagus, Ebro, Guadiana, Douro, Guadalquivir, Júcar, Segura, Turia and Minho. Alluvial plains are found along the coast, the largest of which is that of the Guadalquivir in Andalusia.

The Group Polder Development (1982) states that the polder areas are mainly found on the South-west coast and on the East coast between Valencia and Ebro Delta.

### Existing polders

The following polders have been identified by the Group Polder Development (1982):

- *polders between the Ebro Delta and Valencia/Alicante*. There are nine polders with respectively the following areas: 888 ha, 1,058 ha, 798 ha, 1,118 ha, 370 ha, 1643 ha, 19,575 ha, 5,743 ha and 1,482 ha (Figure 1) (Gil Sánchez, 1983);
- *Ebro Delta*. The total area of the delta is 20,000 ha. The delta has been subdivided in 6 polders of 2,000 – 4,000 ha each;
- *Guadalquivir River*. In the area called the Marismas, South of Sevilla, there is a polder of 28,500 ha (Figure 2) (Guzmán, 1983). Rivera (1983) briefly describes how the area was reclaimed. Some of the marshes on the left bank have been reclaimed;
- *Cadis Bay*. An area of 4,230 ha has been reclaimed. Gomez-Miguel *et al.* (1983) mention that the Castillo de Dona Blanca Polder of 1,500 ha is located along the right hand side of the Guadelete River;
- *Odiel-Tinto Marshes*. There is a reclaimed area, mainly for industry;

- *polder south of Granada*. Motril Plain;
- *in addition the following areas are mentioned*: Guadiana River Marshes, Barbate River Marshes, Algeciras Bay, Albufera Plains/Marshes.

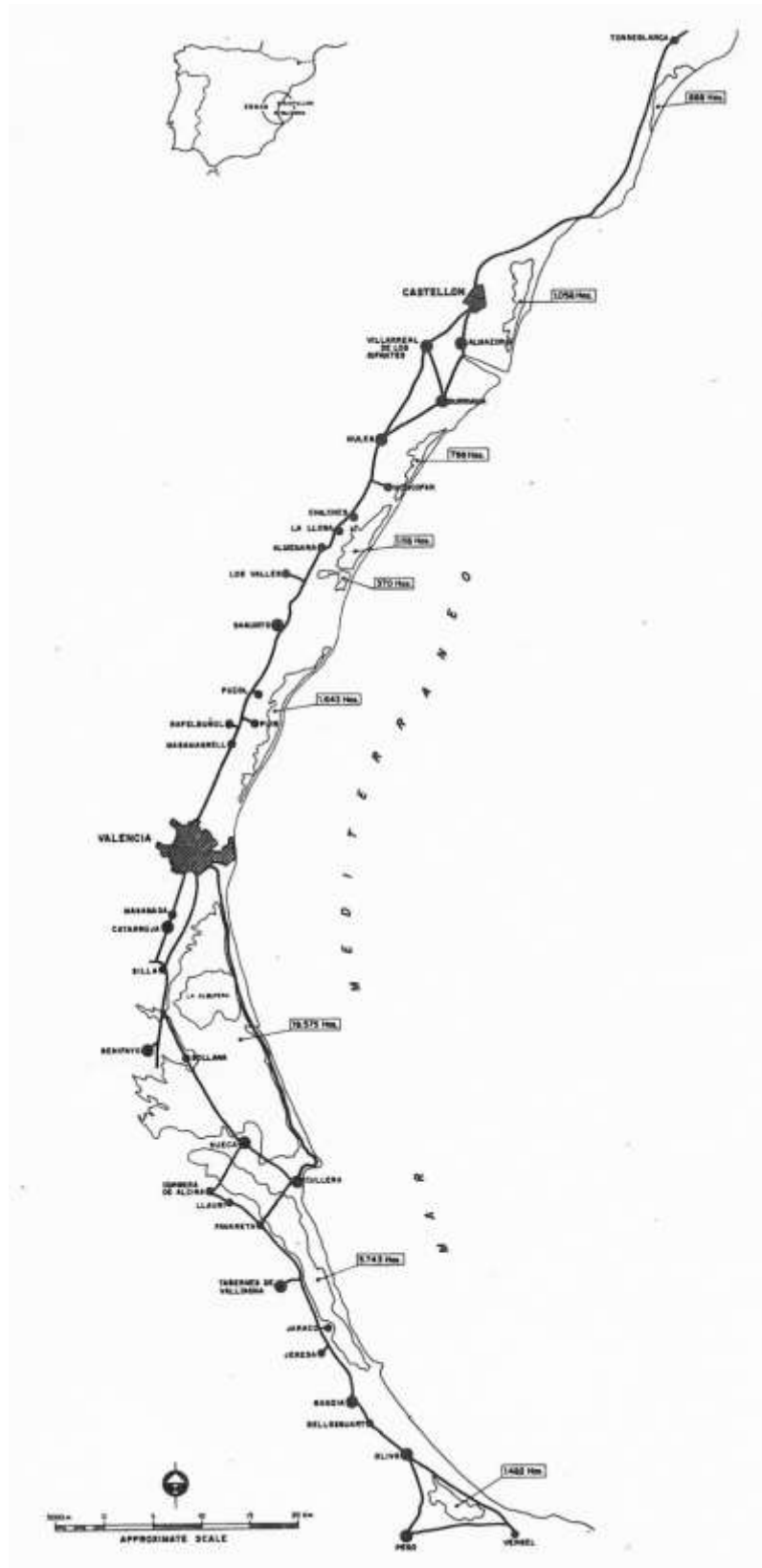


Figure 1. Location map of actual and potential polders on the eastern Spanish littoral (Gil Sánchez, 1983)

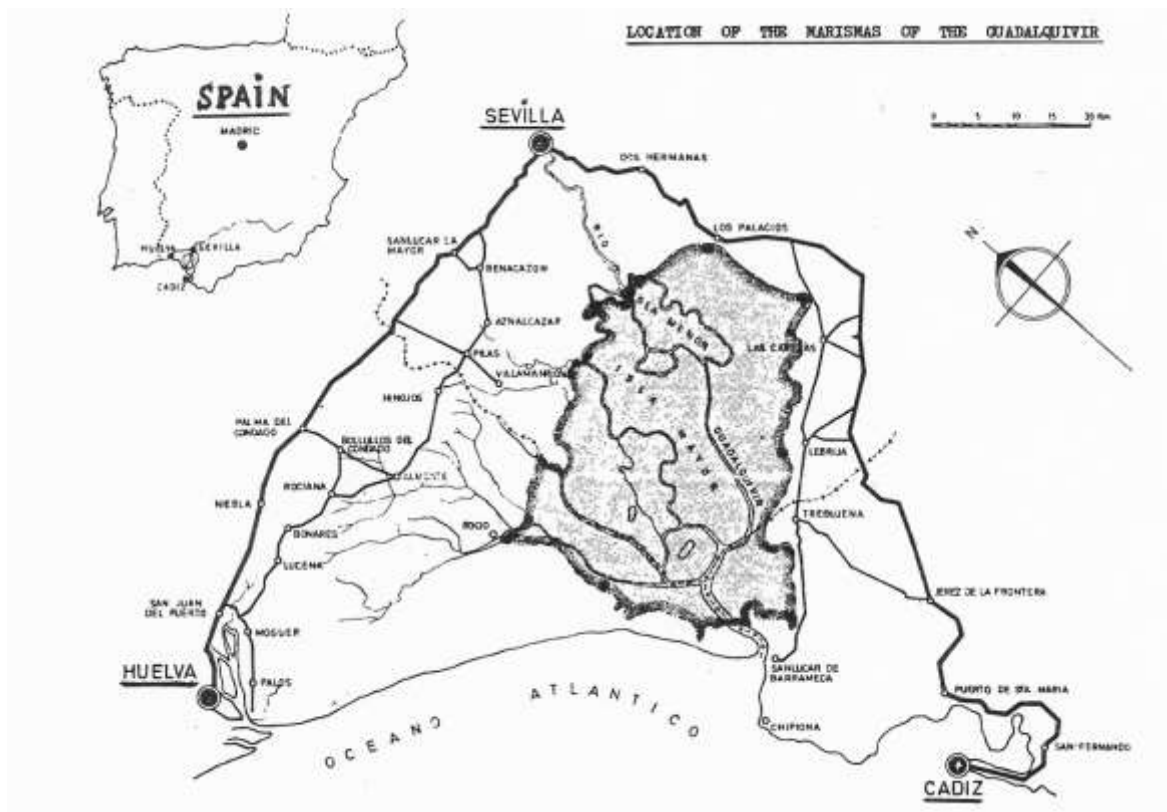


Figure 2. Location of the Marismas of the Guadalquivir River (Rivera, 1983)

General characteristics of the polders in Spain are shown in Table I.

### Proposed polders

No proposed polders have been identified.

### Pictures of polders

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

### References

- Beltrán, J.M., 1987. *Drainage in Spanish land reclamation projects*. In: J. Vos (ed.). Twenty-five years of drainage experience. Proceedings, Symposium 25th International Course on Land Drainage. ILRI publication 42. International Institute for Land Reclamation and Improvement (ILRI) and International Agricultural Centre (IAC). Wageningen, the Netherlands.
- Gil Sánchez, I. and J. Martínez Beltrán, 1983. *Drainage of peat soils in the polder of Pego-Oliva Alicante, Spain*. In: Proceedings International Symposium 'Polders of the World'. International Institute for Land Reclamation and Improvement, Wageningen, the Netherlands.
- Gomez-Michuel, V., J. Peres Arias, F. Guerrero and C. Roquero, 1983. *The soils and watertable properties of the polder area 'Castillo de Dona Blanca', Puerto de Santa Maria, Cadiz, Spain*. In: Proceedings International Symposium 'Polders of the World'. International Institute for Land Reclamation and Improvement, Wageningen, the Netherlands.
- Group Polder Development, Department of Civil Engineering, Delft University of Technology, 1982. *Polders of the World. Compendium of polder projects*. Delft, the Netherlands
- Guzmán, A.F., 1983. *Construction aspects in the polders of the left bank at low Guadalquivir marches, Sevilla, Spain*. In: Proceedings International Symposium 'Polders of the World'. International Institute for Land Reclamation and Improvement, Wageningen, the Netherlands.

Rivera, R.B., 1983. *Basic information about the marshes at the low Guadaquivir River (Sevilla - Spain)*.  
In: Proceedings International Symposium 'Polders of the World'. International Institute for Land  
Reclamation and Improvement, Wageningen, the Netherlands.  
United Nations, Department of Economic and Social Affairs, Population Division. 2019. *World  
Population Prospects, medium prognosis. The 2019 revision*. New York, USA.

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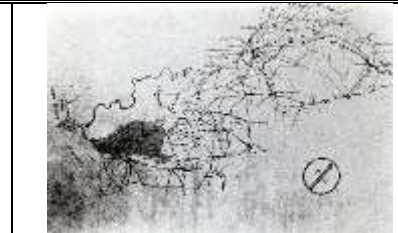

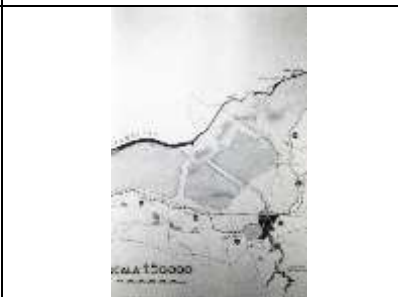
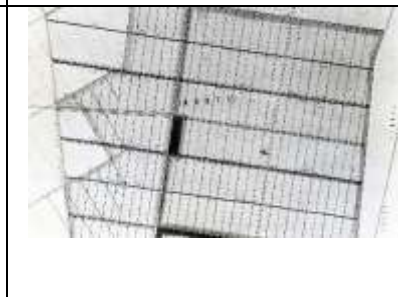
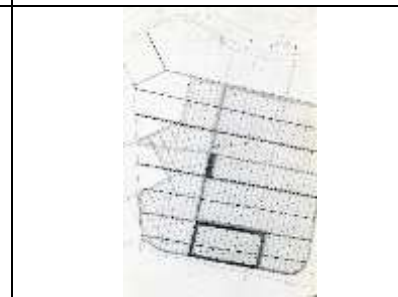
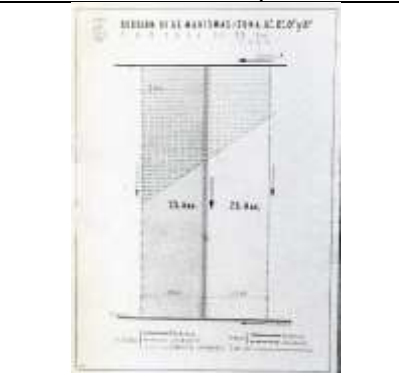



*Lelystad, August 2022*

Table I. General characteristics of existing polders in Spain

Name	Reclamation	Area in ha	Type *)	Latitudes	Longitudes	Elevation in m+MSL	Land use
Albufera Plains/Marshes		19,575	RLL	39° 17' N	0° 19' W	-9	Agriculture and nature
Algeciras Bay			RLL	36° 10' N	5° 27' W	-1	Agriculture and urban
Barbate River Marshes			RLL	36° 11' N	5° 54' W	1	Agriculture
Polder near Torre Blanca		888	RLL	40° 11' N	0° 12' W	-1	Agriculture and nature
Polder near Castellon		1,058	RLL	39° 59' N	0° 0' W	6	Agriculture
Polder near Nules		798	RLL	39° 50' N	0° 7' W	-1	Agriculture
Polder near La Llosa		1,118	RLL	39° 45' N	0° 11' W	-1	Agriculture
Polder near Almenara		370	RLL	39° 43' N	0° 12' W	0	Agriculture
Polder near Puzol		1,643	RLL	39° 36' N	0° 16' W	-2	Agriculture and urban
Polder near Tavernes de la Valldigna		5,743	RLL	39° 5' N	0° 15' W	2	Agriculture
Polder near Oliva		1,482	RLL	38° 52' N	0° 3' W	6	Agriculture
Cadiz Bay		4,230	RLL	36° 35' N	5° 10' W	5	Agriculture
Castillo de Dona Blanca Polder		1,500	RLL	36° 37' N	6° 9' W	2	Agriculture
Ebro Delta – six polders		20,000	RLL	40° 42' N	0° 43' E	0	Agriculture
Guadiana River Marshes			RLL				
Marismas		28,500	RLL	37° 05' N	6° 9' W	-1	Agriculture
Motril Plain			RLL				
Odiel-Tinto Marshes			RLL				
Total		86,905					

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

Table II. Pictures of polders and lowlands in Spain by Prof. Adriaan Volker

			
<p>A4 001/VIII.4.1 Aranjuez San Isidro, Prof. Adriaan Volker at a reception, 3 June</p>	<p>A4 002/VIII.4.2 Prof. Adriaan Volker between children</p>	<p>A4 003/VIII.4.3 Prof. Adriaan Volker during a diner</p>	<p>A6 0045/VIII.6.45 Polder Guadalquivir</p>
			
<p>A6 0046/VIII.6.46 Polder Guadalquivir</p>	<p>A6 0047/VIII.6.47 Polder Guadalquivir</p>	<p>A6 0048/VIII.6.48 Polder Guadalquivir</p>	<p>A6 0049/VIII.6.49 Polder Guadalquivir</p>
			
<p>A6 0050/VIII.6.50 Polder Guadalquivir</p>	<p>A6 0051/VIII.6.51 Polder Guadalquivir</p>	<p>B1 6 001/B.1.6.41 Excavator</p>	<p>B1 6 002/B.1.6.42 Lifting device</p>