

## PAKISTAN



Source: esri

### General

Pakistan - officially the Islamic Republic of Pakistan - has a 1,046 kilometres coastline along the Arabian Sea and Gulf of Oman in the South and is bordered by India in the East, Afghanistan in the West, Iran in the Southwest, and China in the far Northeast. It is separated from Tajikistan by the Afghanistan's Wakhan Corridor in the Northwest, and also shares a maritime border with Oman. The area is 88.2 Mha (million hectares) with, in 2022, a population of 236 million, or 2.68 persons per ha (Wikipedia and United Nations, 2022).

### Climate and geography

The climate varies from tropical to temperate, with arid conditions in the coastal south. There is a monsoon season with frequent flooding due to heavy rainfall, and a dry season with significantly less rainfall or none at all. There are four distinct seasons in Pakistan: a cool, dry winter from December through February; a hot, dry spring from March through May; the summer rainy season, or southwest monsoon period, from June through September; and the retreating monsoon period of October and November. Rainfall varies greatly from year to year, and patterns of alternate flooding and drought are common (source: Wikipedia).

Geologically, Pakistan is located in the Indus–Tsangpo Suture Zone and overlaps the Indian tectonic plate in Sindh and Punjab provinces; Balochistan and most of Khyber Pakhtunkhwa are within the Eurasian plate, mainly on the Iranian plateau. Gilgit-Baltistan and Azad Kashmir lie along the edge of the Indian plate and hence are prone to violent earthquakes. This region has the highest rates of seismicity and the largest earthquakes in the Himalaya region. Ranging from the coastal areas of the South to the glaciated mountains of the North, Pakistan's landscapes vary from plains to deserts, forests, hills, and plateaus. Pakistan is divided into three major geographic areas: the northern highlands, the Indus River plain, and the Balochistan Plateau. The northern highlands contain the Karakoram, Hindu Kush, and Pamir mountain ranges. The Balochistan Plateau lies in the West and the Thar Desert in the East. The 1,609 km long Indus River and its tributaries flow through the country from the Kashmir Region to the Arabian Sea. There is an expanse of alluvial plains along it in the Punjab and Sindh (source: Wikipedia).

The Group Polder Development (1982) describes that the Indus Delta covers an area of 855,000 ha. It is a large flat plain with an average slope towards the sea of about 13.5 cm/km. The tidal plain consists of 200 km of coastline with mud flats, tidal marshes and mangroves. It is subject to frequent flooding by sea water.

### Existing polders

The Indus Delta has the main characteristics of a polder area. Dikes or (small) bunds have been built in part of the delta, providing various degrees of flood control and water management (Figure 1) (Group Polder Development, 1982).

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

### Proposed polders

No proposed polders have been identified.

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

The location of the polders in Pakistan is shown in Figure 1.

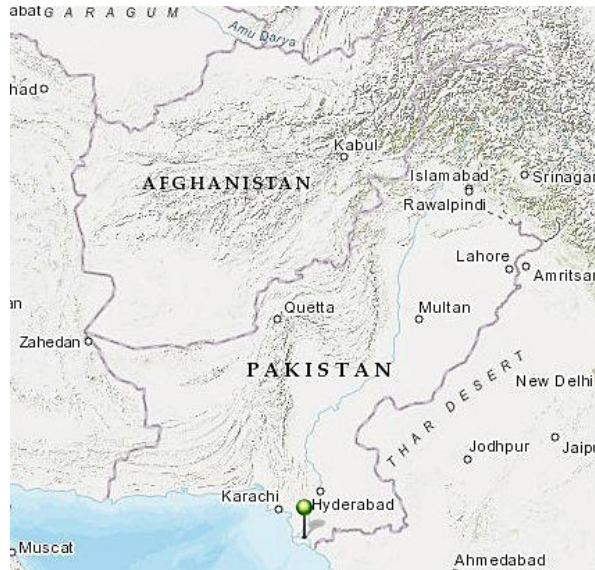


Figure 1. Location of the polders in Pakistan (source: esri – Batavialand)

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

## References

- Bhatti, A.K., 1987. *A review of planning strategies of salinity control and reclamation projects in Pakistan*. In: J. Vos (ed.). *Twenty-five years of drainage experience*. Proceedings, Symposium 25<sup>th</sup> International Course on Land Drainage, 24-28 November 1986. International Institute for Land Reclamation and Improvement (ILRI) and International Agricultural Centre (IAC). Wageningen, the Netherlands.
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- United Nations, Department of Economic and Social Affairs, Population Division. 2022. *World population prospects, medium prognosis. The 2022 revision*. New York, USA.

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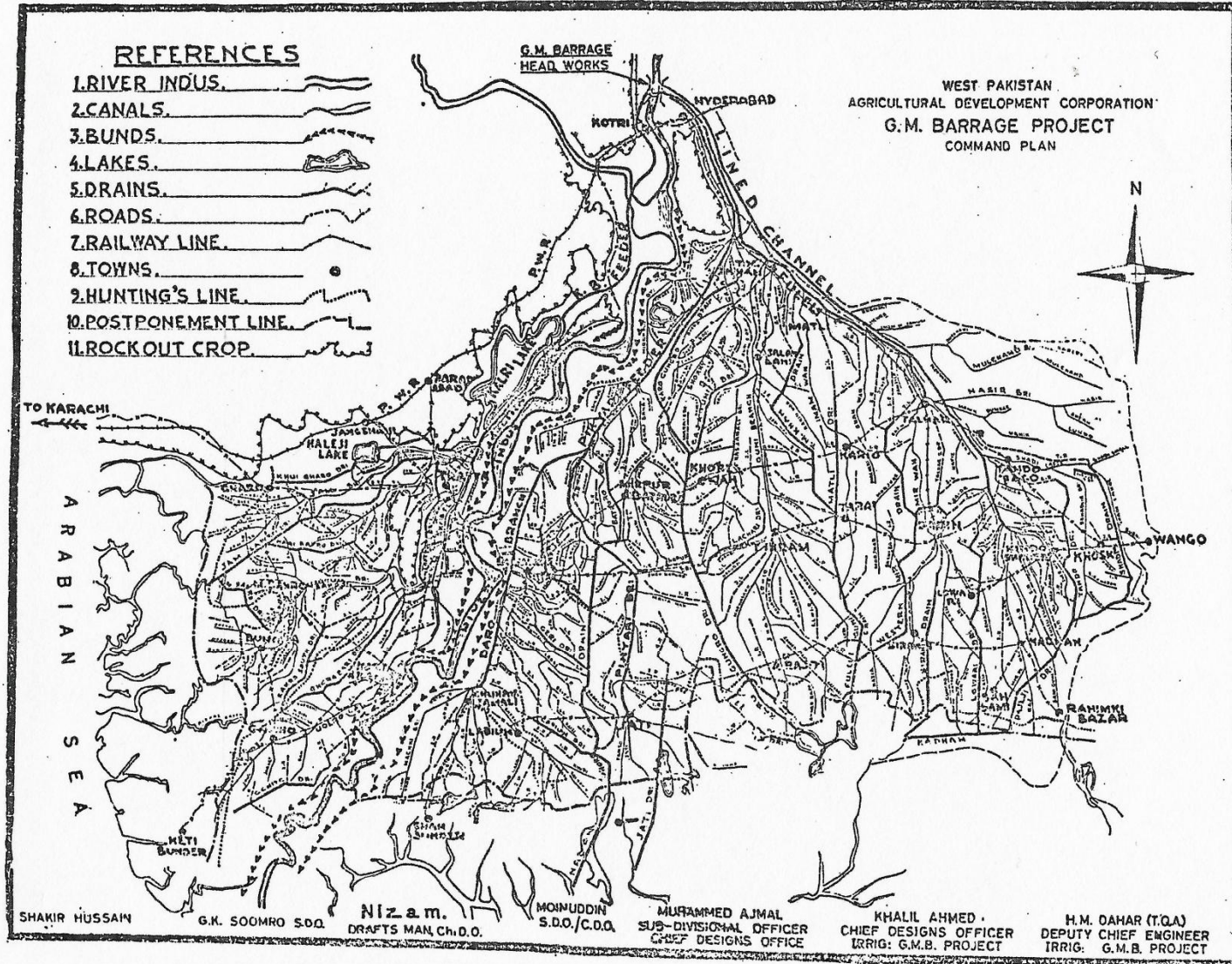


Figure 1. The Indus Delta with the various infrastructure provisions, including the dikes (Group Polder Development, 1982)

Table I. General characteristics of existing polders in Pakistan

Name	Reclamation	Area in ha	Type *)	Latitudes	Longitudes	Elevation in m+MSL	Land use
Polders in the Indus Delta			RLL	24° 10' N	67° 40' E	2	Agriculture
Total							

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

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
















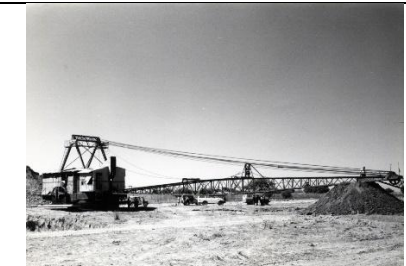





			
<p>A2 050/I.2.50 Kotri Barrage near Hyderabad, diversion structure for the irrigation in the Indus Delta. Total length of the barrage is 900 m. Design peak flow of the Indus 24,000 m<sup>3</sup>/s</p>	<p>A2 051/I.2.51 Kotri Barrage. Ready in 1955. Discharge sluices at the right bank</p>	<p>A2 052/I.2.52 Jam Sakro drain in the Indus Delta</p>	<p>A2 053/I.2.53 Erosion by the tide in the mouth of the Jam Sakro drain in the Indus Delta</p>
			
<p>A2 054/I.2.54 Discharge sluice in the mouth of the Garho drain near Ghora Bari</p>	<p>A7 001/X.7.1 Prof. ir. W.H. Van der Molen in Pakistan</p>	<p>A7 002/X.7.2 Prof. ir. W.H. Van der Molen with presumably at a wall a flood mark</p>	<p>A7 003/X.7.3 Prof. ir. W.H. Van der Molen with presumably at a wall a flood mark</p>
			
<p>Drainage machine for deep drainage</p>	<p>A8 001/X.8.1 Jam Sakro drain, element of the Kotri Barrage Project</p>	<p>A8 002/X.8.2 Jam Sakro drain, element of the Kotri Barrage Project</p>	<p>A8 003/X.8.3 Jam Sakro drain, element of the Kotri Barrage Project</p>

Table II. Pictures of polders and lowlands in Pakistan by Prof. Adriaan Volker (continued)

			
<p>A8 005/X.8.5 Garho drain regulator, Ghora Bari</p>	<p>A8 006/X.8.6 Excavation of the Left Bank Outfall Drain</p>	<p>A8 007/X.8.7 Excavation of the Left Bank Outfall Drain</p>	<p>A8 008/X.8.8 Excavation of the Left Bank Outfall Drain</p>
			
<p>A8 009/X.8.9 Excavation of the Left Bank Outfall Drain near Nindo Shaher</p>	<p>A8 010/X.8.10 Excavation of the Left Bank Outfall Drain near Nindo Shaher</p>	<p>A8 011/X.8.11 Nagan Ghoru Drain</p>	<p>A8 012/X.8.12 Nagan Ghoru Drain</p>
			
<p>A8 013/X.8.13 Nagan Ghoru Drain</p>	<p>A8 014/X.8.14 Nagan Ghoru Drain</p>	<p>A8 015/X.8.15 Dike along the Indus River</p>	<p>A1 2 001/A.1.2.1 Machine for deep drainage</p>