PHILIPPINES



Source: esri

General

The Philippines - officially the Republic of the Philippines - is a archipelagic country in Southeast Asia. Situated in the western Pacific Ocean, it consists of about 7,640 islands. Bounded by the South China Sea in the West, the Philippine Sea in the East and the Celebes Sea in the Southwest, the Philippines shares maritime borders with Taiwan in the North, Vietnam in the West, Palau in the East and Malaysia and Indonesia in the South. The area of the Philippines is 34.3 Mha (million hectares) with, in 2024, a population of 116 million, or 3.4 persons per ha (Wikipedia and United Nations, 2024).

Climate and geography

The Philippines has a tropical maritime climate that is usually hot and humid. There are three seasons: the hot dry season or summer from March to May, the rainy season from June to November, the cool dry season from December to February. The southwest monsoon is from May to October, and the dry winds of the northeast monsoon are from November to April. Temperatures usually range from 21 to 32 °C although it can get cooler or hotter depending on the season. The coolest month is January; the warmest is May. The average yearly temperature is around 26.6 °C. In considering temperature, location in terms of latitude and longitude is not a significant factor. Whether in the extreme North, South, East or West of the country, temperatures at sea level tend to be in the same range. Altitude usually has more of an impact. Sitting astride the typhoon belt, most of the islands experience annual torrential rains and thunderstorms from July to October, with around nineteen typhoons entering the Philippines area in a typical year, of which eight or nine make landfall. Annual rainfall is 5,000 mm in the mountainous east coast section but less than 1,000 mm in some of the sheltered valleys (source: Wikipedia).

The Philippines location on the Pacific Ring of Fire and close to the equator makes the country prone to earthquakes and typhoons, but also endows it with abundant natural resources. The Benham Plateau in the East in the Philippine Sea is an undersea region active in tectonic subduction. Around 20 earthquakes are registered daily, though most are too weak to be felt. The last major earthquake was the 1990 Luzon earthquake. There are many active volcanoes such as the Mayon Volcano, Mount Pinatubo, and Taal Volcano. The eruption of Mount Pinatubo in June 1991 produced the second largest terrestrial eruption of the 20th century (source: Wikipedia).

The longest river is the Cagayan River in northern Luzon, measuring about 520 km. Manila Bay, upon the shore of which the capital city of Manila lies, is connected to Laguna de Bay, the largest lake in the Philippines, by the Pasig River.

Siringan and Rodolfo (2003) analysed the causes of the subsidence the Pampanga Delta Region. The main cause was groundwater extraction. In total the subsidence was between 2 and 3 cm/year. In a later publication of Rodolfo (2014) he stated that the coastal areas of Metro Manila are subsiding 9 cm/year. At some places with large groundwater abstractions a subsidence of 15 cm/year has been identified. In addition he warns for the risks of flooding of land reclamation projects due to storm surges and waves.

Existing polders

The Group Polder Development (1982) described two areas where polders are located:

- *Cotabato Development Area*. A considerable wide area in Cotabato River Basin is flood prone. In this area polders are located;
- *Polders in the delta of the Pampanga River*. In this area about 40,000 ha is submerged during high tides. In this area there are many endiked fishponds.

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

Proposed polders

Rodolpho (2014) described that the Philippine Reclamation Authority had identified 102 near-shore reclamation projects covering 38,272 ha in Luzon, Visayas and Mindanao. Of these, 38 projects with a total area of 26,234 ha were intended to reclaim virtually the entire near-shore zone of Manila Bay (Figure 1). Based on Google Earth it looks like that only some small parts of the proposal have been realised.

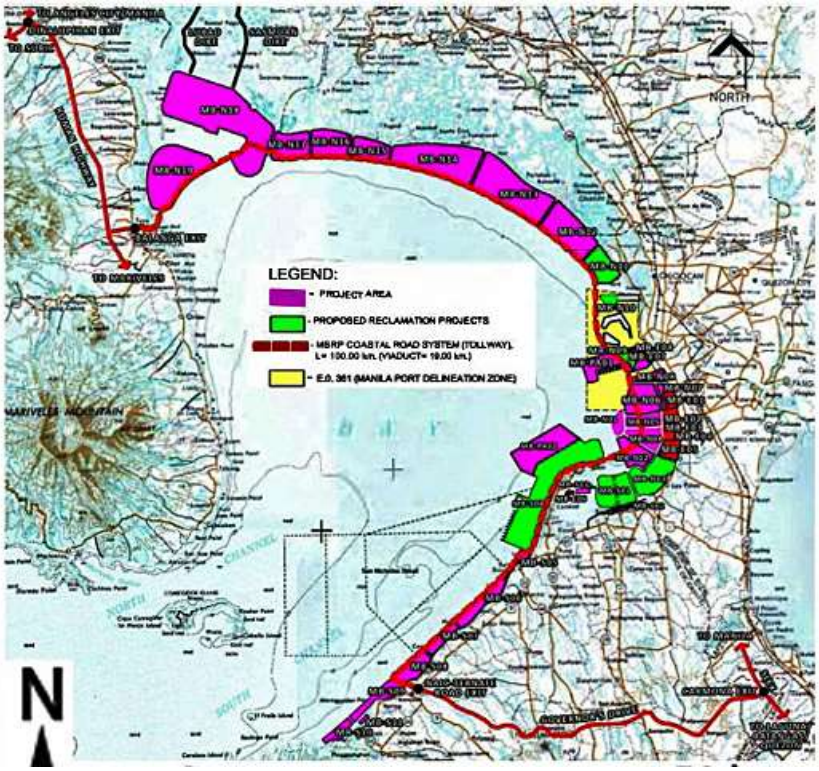


Figure 1. Reclamation plan for Manila Bay area of the Philippine Reclamation Authority (Rodolfo, 2014)

Location of the polders in the Philippines as shown on the World polder map

The location of the polders in Philippines is shown in Figure 2.



Figure 2. Location of the polders in the Philippines (source: esri – Batavialand)

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

Acknowledgement

The author like to thank Dr. Mona Liza Delos Reyes for providing additional information on the polders in the Philippines.

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Note:
Extension of Cebu City could be a polder. At Google Earth Cebu South Road Properties looks like a polder.

Bart Schultz

Lelystad, October 2026

Table I. General characteristics of the polders in Philippines

Name	Reclamation	Area in ha	Type *)	Latitudes	Longitudes	Elevation in m+MSL	Land use
Existing polders							
Cotabato Development Area			RLL	7° 14' N	124° 13' E	4	Rural area
Polder in Malabon			RLL	14° 40' N	120° 57' E	2	Urban
Polders in the delta of the Pampanga River			RLL	14° 51' N	120° 39' E	1	Agriculture
Total							
Proposed polders							
Dagat-Dagatan Scheme		410	RLL	14° 39' N	120° 57' E	2.5	Urban
102 near-shore reclamation schemes in Luzon, Visayas and Mindanao		38,272					
Navotas Bayshore Scheme		500	LGS				Industry
Polder along the Meycauayan River			RLL				
Polder(s) along Laguna de Bay			RLL				
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 Philippines

Name	Design criteria in chance of occurrence/year							
	Water management						Flood protection in chance/year	
	Drainage					Irrigation	Rural	Urban
	Type	Design criterion	Percentage of open water	Discharge capacity				
				m^3/s	mm/day			
Polder in Malabon	RLL							1/30

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

			
A2 062/I.2.62 Hydraulic model of the Pampanga Delta for testing the effects of endiking of depressions at the high water levels	A5 002/I.5.2 Prof. Adriaan Volker during a meeting, presumably in the Philippines	A5 003/I.5.3 Prof. Adriaan Volker during a meeting, presumably in the Philippines	A5 004/I.5.4 Presumably model research in relation to the Pampanga Delta
			
A5 005/I.5.5 Presumably model research in relation to the Pampanga Delta	A5 006/I.5.6 Presumably model research in relation to the Pampanga Delta	A5 007/I.5.7 Lowland area	A5 008/I.5.8 Lowland area
			
A5 009/I.5.9 Lowland area	A5 010/I.5.10 Lowland area	A5 011/I.5.11 Lowland area	A5 012/I.5.12 Lowland area

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

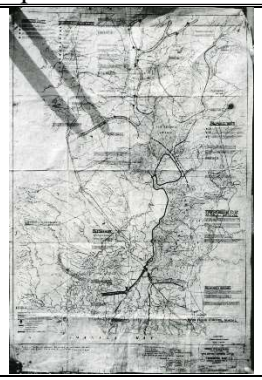
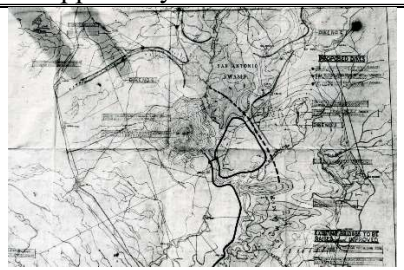
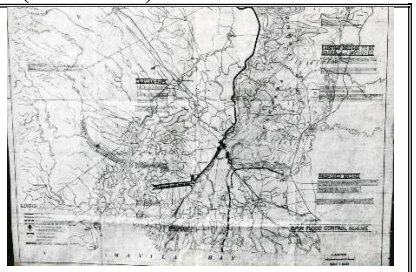
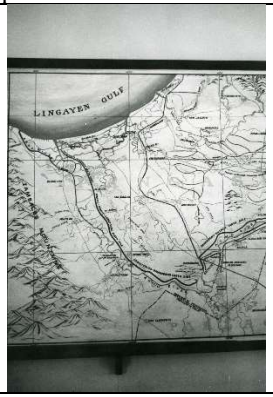
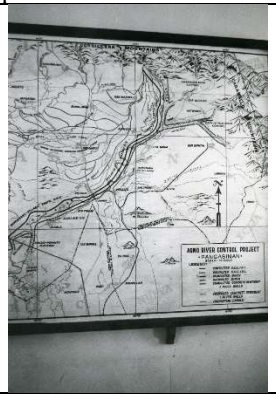
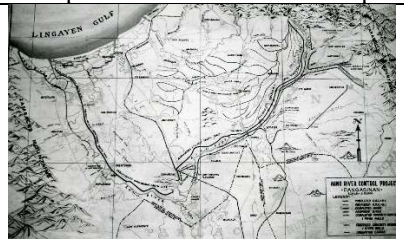
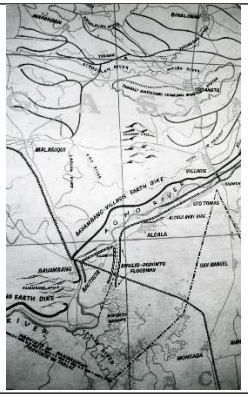
			
A5 013/I.5.13 Maquette of the Candaba Swamp	A5 014/I.5.14 Map of the San Antonio Swamp	A5 015/I.5.15 Map of the San Antonio Swamp	A5 016/I.5.16 Map of the San Antonio Swamp
			
A5 017/I.5.17 Area near the Gulf of Lingayen	A5 018/I.5.18 Area near the Gulf of Lingayen	A5 019/I.5.19 Area near the Gulf of Lingayen	A5 020/I.5.20 Area near the Gulf of Lingayen

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

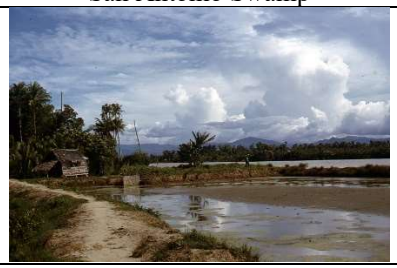
			
A5 021/I.5.21 Area near the Gulf of Lingayen	A5 022/I.5.22 Area near the Gulf of Lingayen	A5 023/I.5.23 Area near the Gulf of Lingayen	A5 024/I.5.24 Area near the Gulf of Lingayen
			
A5 025/I.5.25 Prof. Adriaan Volker during a diner	D1 6 001/D.1.6.1 Map with project area in the San Antonio Swamp	D1 6 002/D.1.6.2 Map with proposal for dikes in the San Antonio Swamp	D1 6 003/D.1.6.3 Map with proposal for dikes in the San Antonio Swamp
			
D1 6 004/D.1.6.4 Model research, July 1963	D1 6 005/D.1.6.5 Model research, July 1963	D1 6 006/D.1.6.6 Small dike along a river	D1 6 007/D.1.6.7 Concrete dike protection

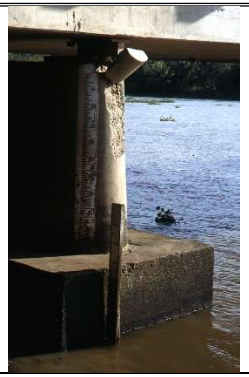
Table III. Pictures on polders and lowlands in the Philippines by Prof. Adriaan Volker (continued)

			
D1 6 008/D.1.6.8 Concrete dike protection	D1 6 009/D.1.6.9 Concrete dike protection	D1 6 010/D.1.6.10 Transplantation of rice	D1 6 011/D.1.6.11 Rice fields
			
D1 6 012/D.1.6.12 River in lowland area	D1 6 013/D.1.6.13 Rice fields	D1 6 014/D.1.6.14 Presumably sugarcane	D1 6 015/D.1.6.15 Rice fields

Table IV. Pictures on polders and lowlands in the Philippines by Prof. Bart Schultz

			
D5 10 019/X-19 Urban canal in the centre of Cotabato City, Mindenao, 14 – 26/1 1994	D5 10 020/X-20 Boats at the river Rio Grande the Mindanao along which Cotabato City is located, 14 – 26/1 1994	D5 10 021/X-21 Creek through a housing area in Cotabato City, 14 – 26/1 1994	D5 10 022/X-22 Creek through a housing area in Cotabato City, 14 – 26/1 1994
			
D5 10 023/X-23 Pollution at the outlet of a sewer in Cotabato City, 14 – 26/1 1994	D5 10 024/X-24 Pollution at the outlet of a sewer in Cotabato City, 14 – 26/1 1994	D5 10 025/X-25 Lake in Cotabato City, Mindenao, 14 – 26/1 1994	D5 10 026/X-26 Mouth of the creek in Cotabato City in the river Rio Grande the Mindanao, 14 – 26/1 1994
			
D5 10 027/X-27 At the bank of the river Rio Grande the Mindanao, 14 – 26/1 1994	D5 10 028/X-28 Aerial picture Cotabato City, Mindenao, 14 – 26/1 1994	D5 10 029/X-29 Aerial picture Cotabato City, Mindenao, 14 – 26/1 1994	D5 10 030/X-30 Aerial picture Cotabato City, Mindenao, 14 – 26/1 1994

Table IV. Pictures on polders and lowlands in the Philippines by Prof. Bart Schultz (continued)

			
D5 10 031/X-31 Staff gauge in Rio Grande the Mindanao, 14 – 26/1 1994	D5 10 032/X-32 Staff gauge in Rio Grande the Mindanao, 14 – 26/1 1994	D5 10 033/X-33 Aerial picture of the surroundings of Cotabato City, Mindenao, 14 – 26/1 1994	D5 10 034/X-34 Straightened section of Rio Grande the Mindanao between Cotabato City and the Sea, 14 – 26/1 1994
			
D5 10 035/X-35 Aerial picture of the surroundings of Cotabato City, Mindenao, 14 – 26/1 1994	D5 10 036/X-36 Aerial picture of the surroundings of Cotabato City, Mindenao, 14 – 26/1 1994		