CAMBODIA

Source: esri

General

Cambodia - officially known as the Kingdom of Cambodia - is a sovereign state located in the southern portion of the Indochina Peninsula in Southeast Asia. It is bordered by Thailand in the Northwest, Laos in the Northeast, Vietnam in the East, and the Gulf of Thailand in the Southwest. Cambodia has an area of 18.1 Mha (million hectares) with, in 2022, a population of 16.8 million, or 0.93 persons per ha (Wikipedia and United Nations, 2022).

Climate and geography

Cambodia's climate is dominated by monsoons, which are known as tropical wet and dry because of the clear seasonal differences. The temperature ranges from 21 to 35 °C. Southwest monsoons blow inland bringing moisture-laden winds from the Gulf of Thailand and the Indian Ocean from May to October. The northeast monsoon ushers in the dry season, which lasts from November to April. The country experiences the heaviest precipitation from September to October with the driest period occurring from January to February. According to the International Development Research Centre and the United Nations, Cambodia is considered Southeast Asia's most vulnerable country to the effects of climate change, alongside the Philippines. Rural coastal populations are particularly at risk. Shortages of clean water, extreme flooding, mudslides, higher sea levels and potentially destructive storms are of particular concern.

Cambodia's landscape is characterised by a low-lying central plain that is surrounded by uplands and low mountains. The country includes a great lake (*Tonle Sap*) and the upper reaches of the Mekong River delta. Extending outward from this central region are plains, thinly forested and rising to elevations of about 200 m+MSL (mean sea level). To the North the Cambodian plain slopes towards a southward-facing cliff stretching more than 320 km from West to East and rising abruptly above the plain to heights of 180–550 m. This cliff marks the southern limit of the Dângrêk Mountains (source: Wikipedia).

Flowing south through Cambodia's eastern regions is the Mekong River. East of the Mekong the transitional plains gradually merge with the eastern highlands, a region of forested mountains and high plateaus that extend into Laos and Vietnam. In southwestern Cambodia two distinct upland blocks, the Krâvanh Mountains and the Dâmrei Mountains, form another highland region that covers much of the land area between the Tonle Sap and the Gulf of Thailand. The southern coastal region adjoining the Gulf of Thailand is a narrow lowland strip, heavily wooded and sparsely populated, which is isolated from the central plain by the southwestern highlands (source: Wikipedia). Of the area of the Mekong Delta 16,000 km^2 is located in Cambodia.

The most distinctive geographical feature is the inundations of the Tonle Sap, measuring about 2,590 km^2 during the dry season and expanding to about 24,605 km^2 during the rainy season. This densely populated plain, which is devoted to wet rice cultivation, is the heartland of Cambodia (source: Wikipedia).

Disastrous flooding occurred in 2001 and again in 2002, with some degree of flooding almost every year (source: Wikipedia).

Existing polders

The Group Polder Development (1982) presented two polders:

- *Mukh Kampul Polder*. This polder with an area of 30,000 ha is located north of Phnom Penh;
- *North Phnom Penh Polder*. This polder was constructed in 1972 and has an area of 9400 ha (Figure 1).

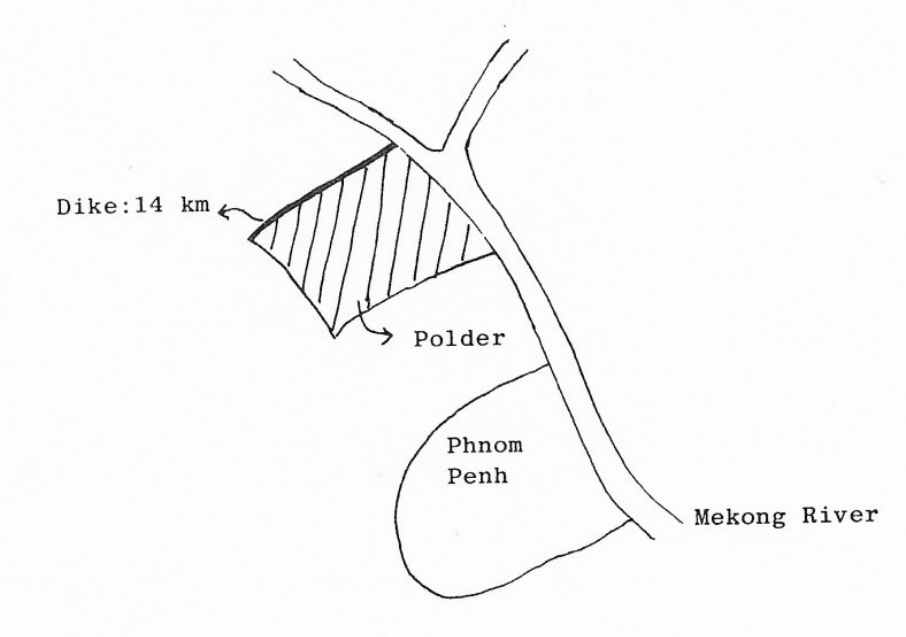

Figure 1. North Phnom Penh Polder (Group Polder Development, 1982)

The land use in the polder is rice land 6,000 ha, pasture land 1,000 ha, industrial park 500 ha and storage reservoir 1,900 ha. The capacity of the pumping station is 72.3 m^3/s (66 mm/day). In addition there is a culvert for drainage by gravity when this would be possible. The capacity is also 72.3 m^3/s (Group Polder Development, 1982);

- Gret (1998), Lagandré and Lavigne Delville (2007) and Emmerik and Piet (2012) describe the *Prey Nub Polders* (Figure 2). Reclamation of five polders started in 1935. In the period 1975-1979 an extension to the Prey Nub Polders with 1,000 ha was made. The water from the polder area is drained by gravity during low tide, for example, by a structure as shown in Figure 3.

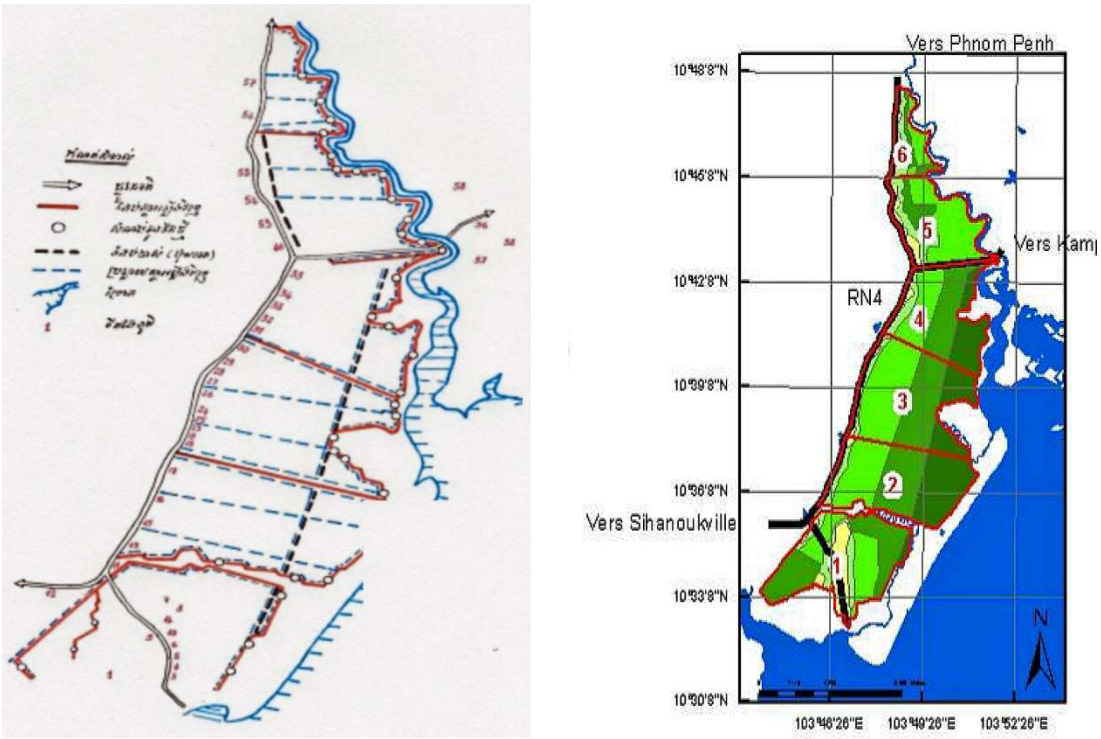

Figure 2. The Prey Nub Polders
Left Emmerik and Piet (2012) and Right Lagandré and Lavigne Delville (2007)

Figure 3. One of the outlet structures of the Prey Nub Polders. At the polder side vertical gates and at the sea side flap gates (locally called baffles) (Emmerik and Piet, 2012)

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

Proposed polders

No proposed polders have been identified.

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

The location of the polders in Cambodia is shown in Figure 4.

Figure 4. Location of the polders in Cambodia (source: esri – Batavialand)

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

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Bart Schultz

Lelystad, July 2023

Table I. General characteristics of existing polders in Cambodia

Name	Reclamation	Area in ha	Type *)	Latitudes	Longitudes	Elevation in m+MSL	Land use
Mukh Kampul Polder		30,000	RLL	11° 43' N	104° 57' E	9	Urban and rural
North Phnom Penh Polder		9400	RLL	11° 37' N	104° 53' E	9	Urban
Prey Nub Polders:	1935-1944						Agriculture
* Polder 1		1759	RLL	10° 34' N	103° 47' E	5	Agriculture
* Polder 2		2525	RLL	10° 37' N	103° 48' E	3	Agriculture
* Polder 3		2129	RLL	10° 39' N	103° 49' E	1	Agriculture
* Polder 4		1857	RLL	10° 41' N	103° 50' E	2	Agriculture
* Polder 5		1699	RLL	10° 44' N	103° 49' E	2	Agriculture
Extention of Prey Nub Polders with Polder 6	1975-1979	531	RLL	10° 46' N	103° 49' E	5	Agriculture
Total		49,900					

*) 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 Cambodia

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^3/s	mm/day			
Mukh Kampul Polder	RLL							
North Phnom Penh Polder	RLL			72.3	66			
Prey Nub Polders:								
* Polder 1	RLL							
* Polder 2	RLL							
* Polder 3	RLL							
* Polder 4	RLL							
* Polder 5	RLL							
Extention of Prey Nub Polders with Polder 6	RLL							

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

			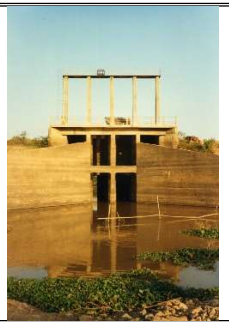
A1 001/IX.1.1 Volker in Cambodja, presumably Phnom Penh, February 1987	A1 002/IX.1.2 Outlet and dike, February 1987	A1 003/IX.1.3 Outlet and dike, February 1987	A1 004/IX.1.4 Tonlé Sap, February 1987
			
A1 005/IX.1.5 Tonlé Sap, February 1987	A1 006/IX.1.6 Tonlé Sap, February 1987	C4 6 001/C.4.6.1 Possibly irrigation canal and drain	C4 6 002/C.4.6.2 Lowland area
			
C4 6 003/C.4.6.3 Lowland area	C4 6 004/C.4.6.4 Lowland area	C4 6 005/C.4.6.5 Lowland area	C4 6 006/C.4.6.6 Lowland area

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

			
C4 6 007/C.4.6.7 Lowland area	C4 6 008/C.4.6.8 Probably irrigation canal	C4 6 009/C.4.6.9 Lowland area	C4 6 010/C.4.6.10 Probably irrigation canal
			
C4 6 011/C.4.6.11 Possibly other lowland area	C4 6 012/C.4.6.12 Possibly other lowland area	C4 6 013/C.4.6.13 Possibly other lowland area	C4 6 014/C.4.6.14 Possibly other lowland area
			
C4 6 015/C.4.6.15 Possibly other lowland area	C4 6 016/C.4.6.16 Possibly other lowland area	A7 019/D1.VII.19 Aerial picture of the Mekong river near Lake Tonle Sap 28 September 1971	A7 020/D1.VII.20 Aerial picture of the Mekong river near Lake Tonle Sap 28 September 1971

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

			
A7 021/D1.VII.21 Aerial picture of the Mekong river near Lake Tonle Sap 28 September 1971	A7 022/D1.VII.22 Aerial picture of the Mekong river near Lake Tonle Sap 28 September 1971	A7 023/D1.VII.23 Mekong river - Quatre Bras 30 September 1971	A7 024/D1.VII.24 Rice field with harvest in lowland area, 30 September 1971