

INDONESIA



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General

Indonesia - officially the Republic of Indonesia - is a transcontinental country located mainly in Southeast Asia, with some territories in Oceania. Situated between the Indian and Pacific oceans, it is the world's largest island country, with more than thirteen thousand islands. The area of Indonesia is 190 Mha (million hectares) with in 2024 a population of 284 million, or 1.5 persons per ha (Wikipedia and United Nations, 2024). Java, the world's most populous island, contains more than half of the country's population.

Climate and geography

Lying along the equator, Indonesia's climate tends to be relatively even year-round. Indonesia has a wet season and a dry season with no extremes of summer or winter. For most of Indonesia, the dry season falls between April and October with the wet season between November and March. The climate is almost entirely tropical, dominated by the tropical rainforest climate found in every major island, followed by the tropical monsoon climate predominantly along North Java's coastal area, Sulawesi's South and East coastal areas, and Bali, and finally the tropical Savanna climate, found in isolated locations of Central Java, lowland East Java, coastal southern Papua and smaller islands on the East of Lombok. Some regions, such as Kalimantan and Sumatra, experience only slight differences in rainfall and temperature between the seasons, whereas others, such as Nusa Tenggara, experience far more pronounced differences with droughts in the dry season, and floods in the wet season. Rainfall is plentiful, particularly in West Sumatra, West Kalimantan, West Java and Papua. Parts of Sulawesi and some islands closer to Australia, such as Sumba are drier. The almost uniformly warm waters that make up 81% of Indonesia's area ensure that temperatures on land remain fairly constant, in the coastal plains averaging 28 °C. The area's relative humidity ranges between 70 and 90%. Winds are moderate and generally predictable, with monsoons usually blowing in from the South and East in June through October and from the Northwest in November through March. Typhoons and large scale storms pose little hazard in Indonesian waters; the major danger comes from swift currents in channels, such as the Lombok and Sape straits (source: Wikipedia).

At 4,884 metres, Puncak Jaya is Indonesia's highest peak, and Lake Toba in Sumatra is the largest lake. Indonesia's largest rivers are in Kalimantan and New Guinea and include Kapuas, Barito, Mamberamo, Sepik and Mahakam. They serve as communication and transport links between the island's river settlements (source: Wikipedia).

Van Breen (1917) presented a plan for the development of the drainage of Batavia, as Jakarta was called by that time. This plan included a map where in the coastal zone, among others, polders were proposed (Figure 1). As far as can be traced only parts of this plan, especially the West Banjir Canal, were implemented.

In a report of 1957 the United Nations mentioned that so far, only minor drainage schemes have been implemented, although plans were being formulated for very large drainage developments in both Sumatra and Kalimantan.

The Group Polder Development (1982) described that there are 43 Mha of lowlands in Indonesia, mainly in coastal areas, of which 10,5 Mha had potential for agriculture. About 7 Mha were in the tidal zone: Sumatra 2.35 Mha, Papua 2.3 Mha, Kalimantan 2.27 Mha and Sulawesi 84,000 ha. They also described that both spontaneous and government organized tidal lowland development started around 1930, covering in total an area of several hundreds of thousands hectares.

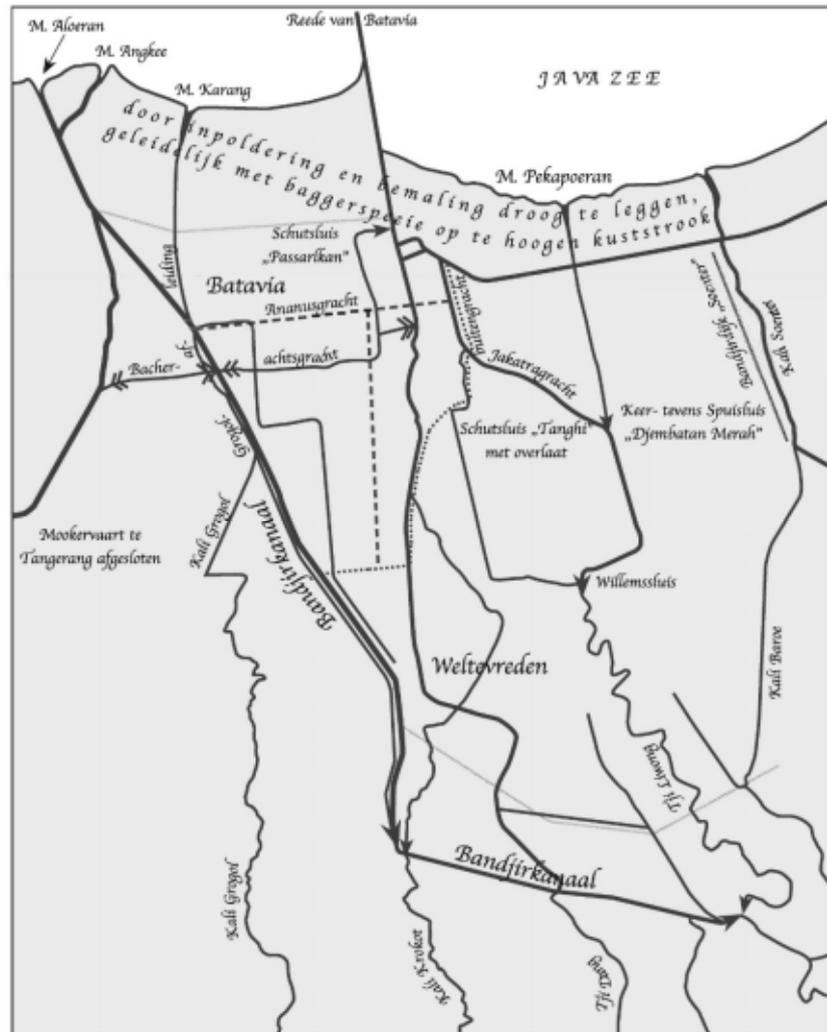


Figure 1. Plan for the development of the drainage of Batavia (Van Breem, 1917)

Existing polders

Amongst others polders can be found in the following places (Group Polder Development, 1982):

- *Sisir Gunting Polder (North Sumatra)*. The Sisir Gunting Polder is the oldest polder in Indonesia, construction started in 1924. The total area is 3,000 ha. After 1975-1976 the dikes and sluices gradually deteriorated to such an extent that more than 1,000 ha became unused;
- *Delta of Kali Brantas*. The main part of this delta has been impoldered;
- *Jakabaring polder in Palembang*. Nasrul *et al.* (2011) described that the Jakabaring area was intended for urban development. Due to the low surface level of this area and the expected land subsidence of about 50 mm/year this will imply polder development. At Google Earth it can be observed that this polder has been made;
- *Polders in Jakarta*. The *Draft Spatial Plan of the Province of DKI Jakarta 2010-2030* showed the existing and proposed polders in Jakarta. In total there were 31 existing and 26 proposed polders (Figure 2) (Badan Perencanaan dan Pembangunan Daerah Provinsi DKI Jakarta, 2010). Budiyo *et al.* (2017) also show a list with polders and their area. In this list several other polders were mentioned and some of the proposed polders had been realised;

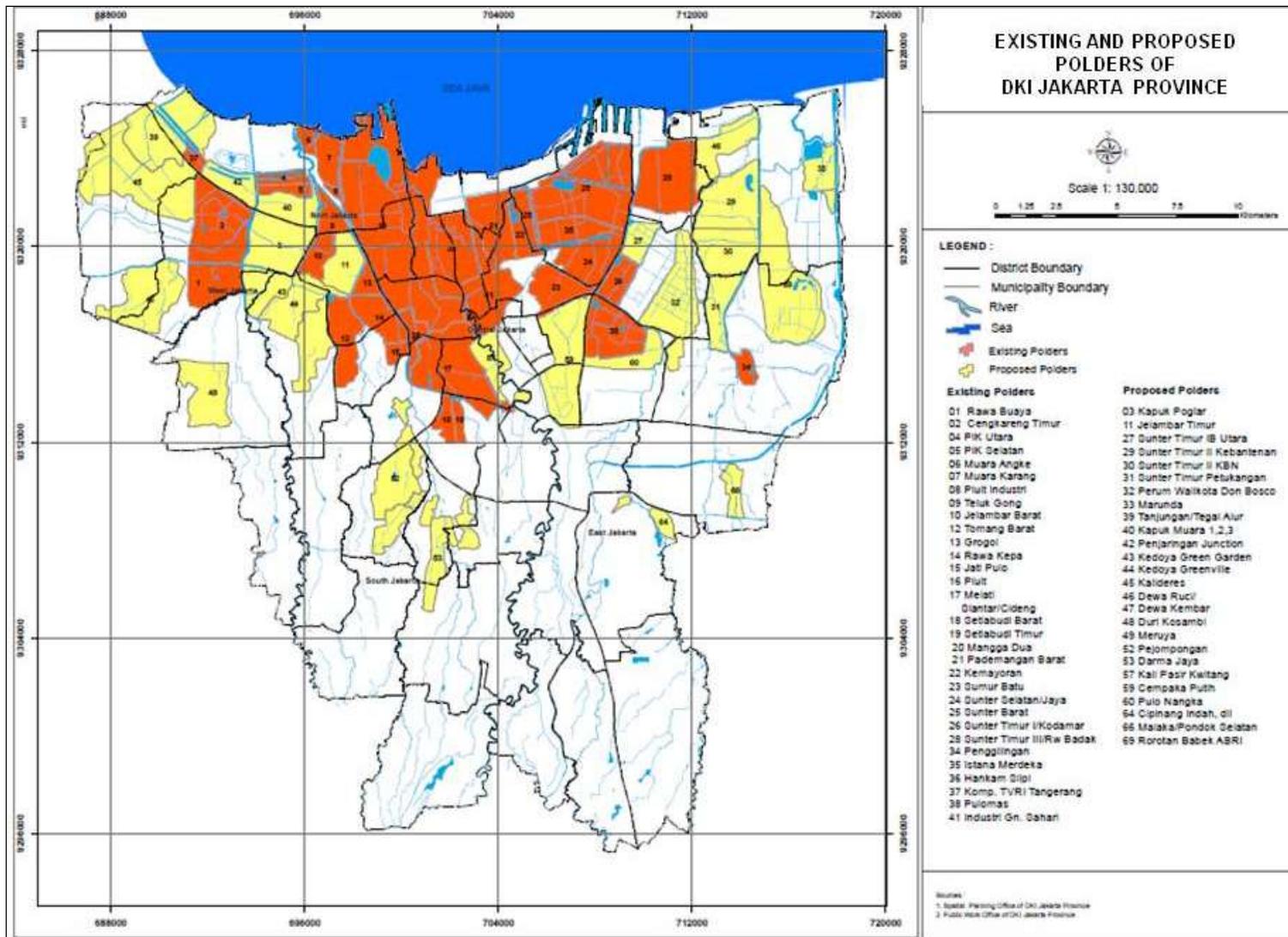


Figure 2. Existing and proposed polder locations according to the Draft Spatial Plan of the Province of DKI Jakarta 2010-2030 (Badan Perencanaan dan Pembangunan Daerah Provinsi DKI Jakarta, 2010)

- *Polders in Semarang.* Semarang Old City (Kota Lama) is suffering from regular flooding and pollution that hamper the revitalisation of the old city. In addition, primarily due to extraction of deep groundwater, land subsidence of 5 to 10 centimetres per year is taking place. In this area flooding can be caused by severe rains, river floods and sea floods. Severe rains may result in flooding of Semarang Old City in different ways, being:
 - * severe rains occur in Semarang Old City in such a way that they exceed the drainage capacity of the urban drainage system;
 - * severe rains occur in the surrounding areas in such a way that water flows from these areas into Semarang Old City. In addition to the rainfall in Semarang Old City this overland flow may result in an exceedance of the capacity of the urban drainage system. With respect to the regime of Semarang River several items of significant impact have been recently implemented. These concern:
 - ✓ upstream of Semarang Old City Semarang River has been blocked by the 'Bendung Simongan' and the river water from upstream is diverted to the West Banjir Canal;
 - ✓ on the west side of the Old City there is a split in Semarang River where part of the water went through a straight canal to the sea and the other part through Semarang River. The mouth of the canal has been blocked near the sea and it has lost its function. In the mouth of Semarang River a pumping station with a capacity of 30 m³/s has been built. Although there are discharge sluices aside of this pumping station these are normally closed and will only be opened in extreme cases. This implies that there is no tidal influence anymore in Semarang River and that all excess water from the area that is served by this pumping station is pumped out to the sea. As a consequence of this the Old City is now a polder.

Before the installation of the pumping station flooding of the Old City from the sea could occur during spring tide periods, while there is not really a danger of storm surges, or tsunamis. However, the Banger River was still in open connection with the sea and tidal flooding could occur through this river. The flood water could then still flow overland to the Old City. While also in the Banger Polder a pumping station has been installed and the sea dike has been closed. Flooding from the sea can now only occur under exceptional circumstances.

Discharge of excess water from the Old City takes place to Semarang River in two ways:

- * through an outlet structure that is provided with vertical gates;
- * through two pumping stations, one aside of the Tawang pond and the other near the split in Semarang River. It is not clear if these pumping stations pump the water separately to Semarang River, or that the pumping station near the storage pond pumps water to the pumping station near the split in Semarang River and that all the water is pumped by this pumping station to Semarang River.

As far as the urban drainage of the low part of Semarang is concerned the systems are in principle the same as in the Old City. However, in most of the surrounding areas drainage is still achieved by gravity and no pumping has been introduced yet in addition to the pumping station at the mouth of Semarang River. Flood protection for the lower part of Semarang, including the Old City, is provided by the walls along the East Banjir Canal and the West Banjir Canal. It might be possible that in addition water can flow from higher parts of Semarang directly overland or through small urban drains to the lower parts.

- *Polders in South Kalimantan.* A total area of 800,000 ha has been reclaimed in the framework of the so-called *One million ha project*. Due to severe subsidence of the peat soils several of the reclaimed areas are in a bad state, or abandoned. At present some of the polders in this area are

- being upgraded;
- *Polders in Surabaya*. Nayadiah (2011) describes that the eastern part of Surabaya has an elevation lower than 5 m+MSL and is threatened by floods that are worsened by the tidal fluctuation. She has carefully analysed the conditions in the area. There are several urban drains in the area, part of them are provided with (flap)gates, but others are in open connection with the sea, or the river. Therefore, certain parts are in fact polders, but the boundaries of these polders are not fully clear;
- *Rawa Sragi Swamp (Lampung Province)*. The Rawa Sragi Swamp Reclamation Project is situated along the downstream reach of the Way Sekampung River. The polder area covers 7,400 ha;
- *Secanggang Polder Project (North-east coast of Sumatra)*. This was a pilot polder near Medam with an area of 3,000 ha. In 1970 a report was submitted on a study on establishment of a polder for irrigated rice cultivation in the coastal area of East Sumatra, covering 11,000 ha some 30 km North-east of Medan (NEDECO, 1971). The Group Polder Development (1982) mentioned that there was by that time another polder of 6,000 ha in the neighbourhood in a neglected state.

Since the 1970th the Indonesian Government has been implementing large scale lowland development programmes for agriculture, especially at Sumatra, Kalimantan and Papua. In these programmes a distinction is made between tidal and non-tidal lowlands. Grashoff *et al.* (2025) presented an overview of the tidal lowland schemes per province (Table I).

Table I. Tidal lowland schemes per province (after Grashoff *et al.*, 2025)

Province	Central Government		Provincial Government		District Government		Number	Area in ha
	Number	Area in ha	Number	Area in ha	Number	Area in ha		
<i>Sumatra</i>								
Riau	14	71,679	48	67,101	119	50,237	181	189,017
Jambi	2	16,782	15	110,017	33	20,381	50	147,180
South	22	359,446	4	3,864	74	32,592	100	395,903
Lampung	3	43,837			36	12,485	39	56,321
<i>Kalimantan</i>								
West	17	86,956	34	77,472	150	90,400	201	254,828
South	14	79,906	24	37,981	258	108,818	296	226,705
East	4	24,915	3	6,837	9	3,533	16	35,285
Central	19	143,988	17	27,815	367	226,987	403	398,791
<i>Papua</i>								
	5	24,900	4	4,801	32	5,396	41	35,097
Total	100	852,408	149	335,889	1,078	550,829	1,327	1,739,126

For the tidal lowlands four classes are specified, being (Figure 3) (Euroconsult, 1996; Suryadi, 1996; Suprianto *et al.*, 2010; Grashoff *et al.*, 2025):

- *A – tidal irrigated areas*. The fields can be flooded by the tides at least four or five times during a 14-day neap–spring tidal cycle in both the wet and the dry season;
- *B – periodically tidal irrigated areas*. The fields can be flooded by the tides at least four or five times during a 14-day neap–spring tidal cycle in the wet season only;
- *C – areas just above tidal high water*. The fields cannot be regularly flooded during high tide;
- *D – upland areas*. The fields are entirely above tidal influence.

In the first stage of development all the areas had open connections with the adjacent watercourses. However, in the second stage of development hydraulic control structures have been installed in the tertiary and secondary canals (Figure 4).

The installation of hydraulic control structures also implied that in fact class A and B areas became polder areas, while they also need flood protection and the waterlevel can be controlled. Due to the subsidence after reclamation several class B areas became class A areas and several of the class C areas became class B areas (Figure 5).

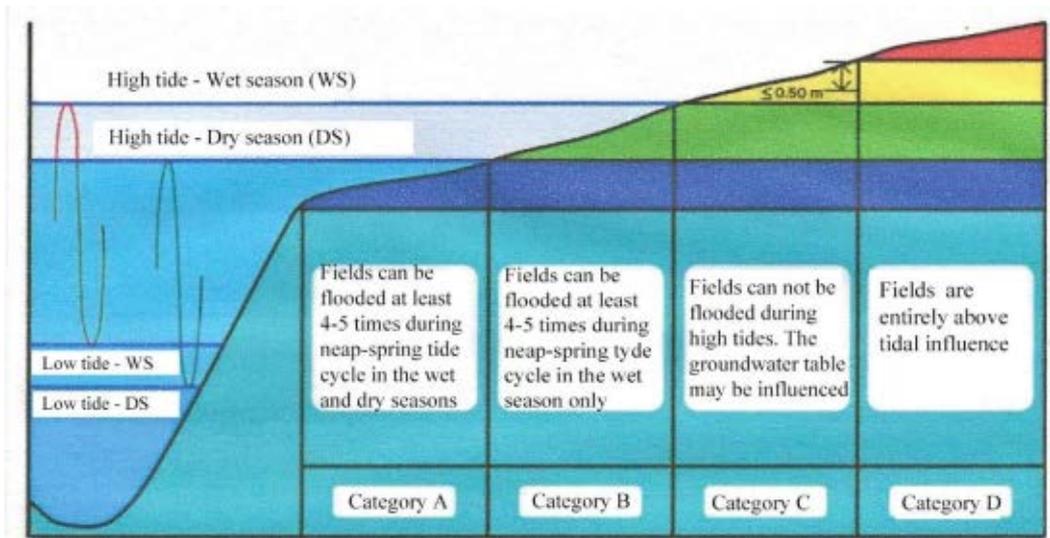


Figure 3. Classification of tidal lowland areas in Indonesia (after Grashoff et al., 2025)



Figure 4. Movable flap gate at the connection of a tertiary canal and a secondary canal (left) and vertical gate at the connection of a secondary canal and a primary canal (right)

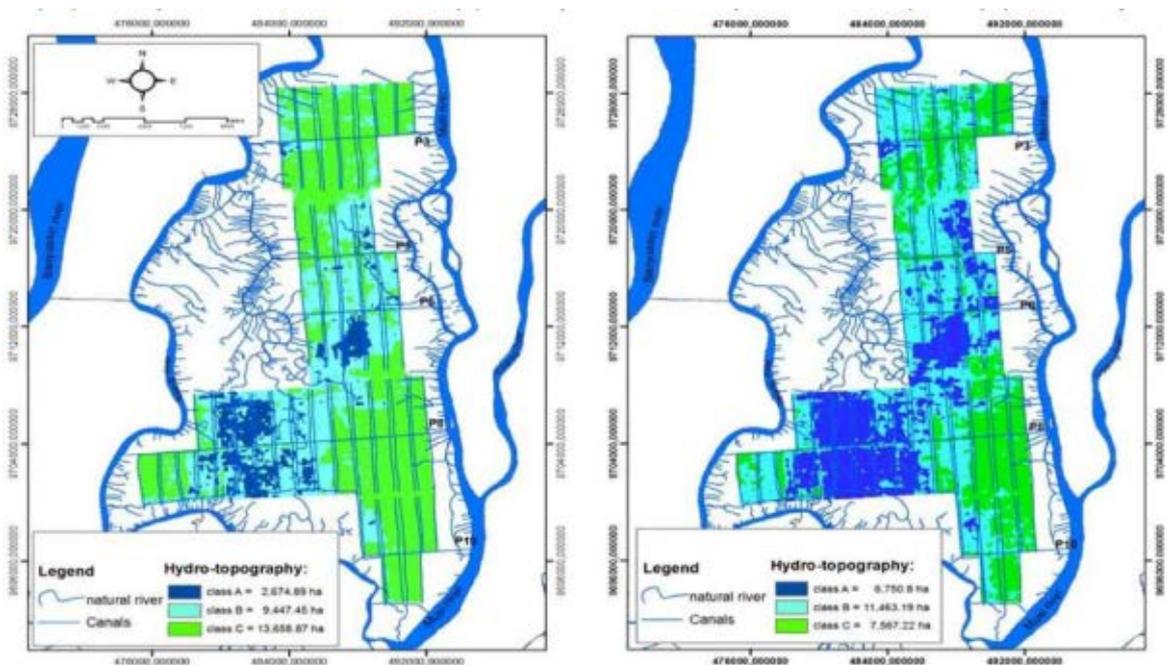


Figure 5. Comparison between the situation in 2010 and expected future situation due to subsidence and sea level rise in the Telang I area, South Sumatra (Rahmadi et al., 2010)

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

Proposed polders

Amongst others proposed polders can be found in the following places (Group Polder Development, 1982):

- *Polder area near Kupang (Timor) (about 3,000 ha)*. The proposed polder is located on the Bay of Kupang in the Ossao-area, about 30 km from Kupang, in the Province of Nusa Tenggara Timur. I could not identify this polder at Google Earth;
- *Rawa Sragi Swamp (Lampung Province)*. Reclaimable areas are: Rawa Selapan, 3,700 ha; Rawa Kramat, 7,500 ha and Rawa Pisang, 7,100 ha. Here some additional polder type landscapes can be identified at Google Earth;
- *Serbahuta Ria and Kuo Swamp*. Part of the area consists of swampy lowlands, which could be reclaimed. However, water management may be very costly, while drainage by pumping will be required. In this case a typical polder area can be identified at Google Earth;
- Mawandha *et al.* (2018) described that the Bengawan Solo River at Java causes regular flooding of the villages of Sumbangtimun and Kandangan. Part of the area was already protected by a dike, but the dike was not surrounding the area. They had analysed the option to create what they call mini polders. The design is shown in Figure 6. Here some polder type landscapes can be identified at Google Earth;



Figure 6. Design of a mini polder and its flow pattern (Mawandha *et al.*, 2018)

Drainage and flood protection

Kop *et al.* (1983) gave more detailed information on the Pluit Polder. For storage within the Pluit Polder a reservoir of 83 ha (3% of the polder area) had been constructed (Figure 7). The design criteria for the water level in the reservoir were under the conditions of 1/25 years: in the wet season P.P.¹ -1.90 m and P.P. + 1.00 m, and a minimum water level of P.P. -1.00 m. Original the pumping capacity of the pumping station was 19 m³/s. After a flooding it had been increased to 49 m³/s.

They also described that the excess water from upstream of Jakarta was in principle diverted around the lowlying areas by the West Banjir Canal and the East Banjir Canal. Originally these canals had been designed for conditions of 1/100 years. The West Banjir Canal was constructed in 1918 and had a capacity of 300 m³/s. The East banjir Canal was only recently completed. The area surrounded by these two canals and the coastline consists predominantly of the polders as mentioned above. Kop *et al.*

¹ P.P. = Peil Priok, which is the reference level in Jakarta. According to Kop *et al.* (1983) it was by that time lowest low water (L.L.W.) = P.P. 0.00 m, highest low water (M.L.W.) = P.P. +0.35 m, minimum high water (M.H.W.) = P.P. + 0.90 m, maximum high water = P.P. + 1.25 m

(1983) also gave values for the short term maximum rainfalls that can be expected in Jakarta. These values are shown in Table IV. Based on the above values a simulation had been done on the urban polder drainage system. The schematisation is shown in Figure 8.



Figure 7. Aerial view of the storage reservoir and waterworks in the Pluit Polder (Kop et al, 1983)

Table IV. Average maximum rainfall in Jakarta (Kop et al., 1983)

Period	Accumulated maximum rainfall in mm with a chance of occurrence per year		
	½	1/25	1/100
5 minutes	10	15	17
15 minutes	27	37	41
1 hour	61	91	106
6 hour	90	163	193
24 hour	133	222	266

Kalmah *et al.* (2010) described the situation in the Kelapa Gading area, which consists of the polders: Kodamar, Don Bosco, Pegangsaan and Sunter Timur. The Kodamar area is separated from the other three areas. It has an area of 169 ha, a pumping capacity of 3.9 m³/s (200 mm/day) and 5% storage capacity, which makes this polder very safe. The other three areas are more or less connected to each other. They have an area of 1,288 ha, a pumping capacity of 10 m³/s (67 mm/day) and a storage capacity of roughly 6 ha (0.5%). This makes this area more risky for flooding. An additional problem, at least up to 2010, was that the dike was not fully closed and that there was still an open connection to the adjacent river, which made the area subject to flooding from the river.

Wahyudi *et al.* (2019) stated that a design practice for drainage systems in Indonesia is 1 m³/s/100 ha.

Budiyono *et al.* (2017) presented drainage design criteria for different types of cities and river basin areas (Table V).

Table V. Return period in years for drainage design criteria for different types of cities and river basins (Budiyono *et al.*, 2017)

Type of city	River basin area in ha			
	< 10	10 - 100	100 - 500	> 500
Metropolitan city	2	2-5	5-10	10-25
Big city	2	2-5	2-5	5-20
Medium city	2	2-5	2-5	5-10
Small city	2	2	2	2

Source: Permen PU 12 (2014)

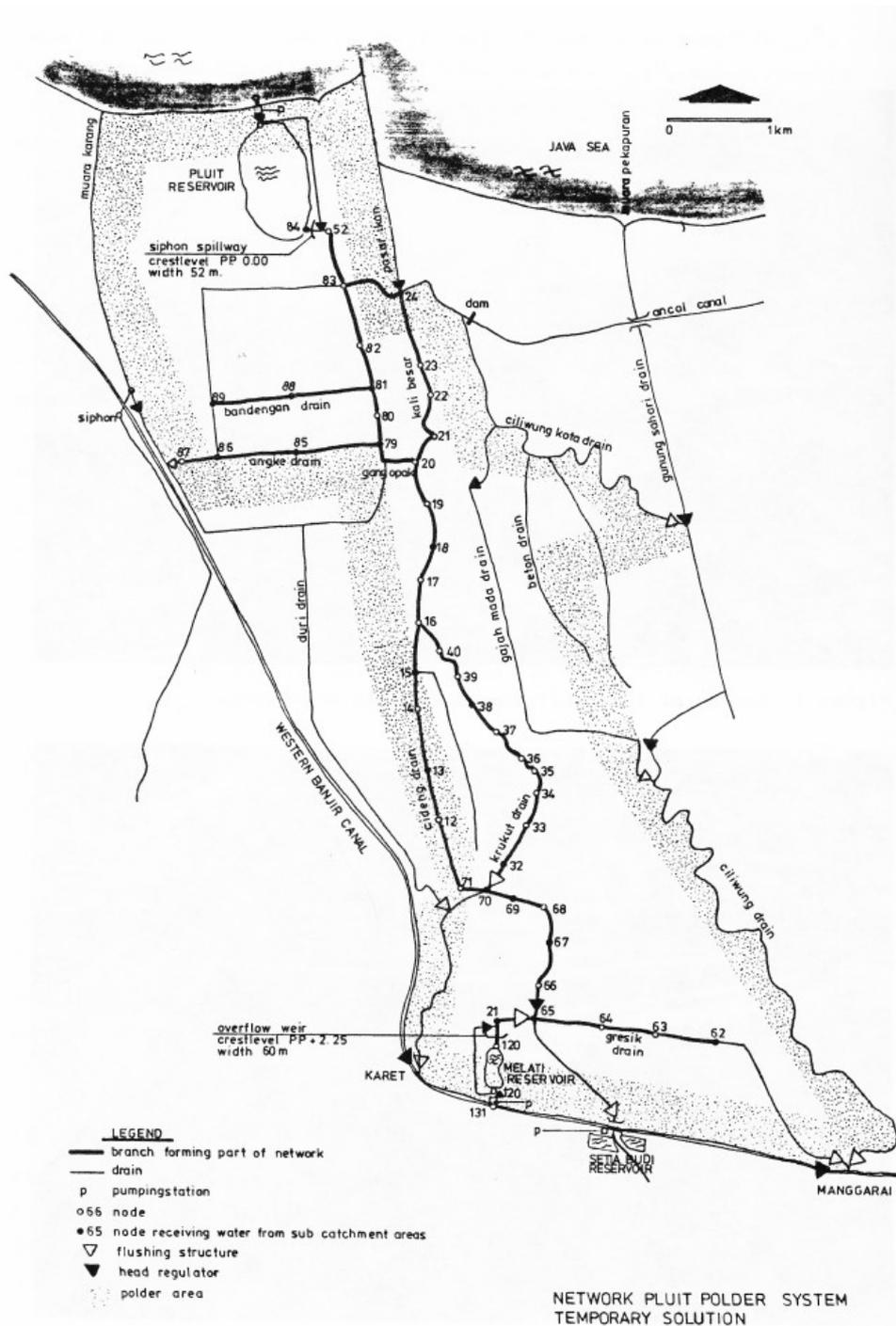


Figure 8. Schematisation of the urban polder drainage system of the Pluit Polder (Kop et al., 1983)

For some of the polders design standards for flood protection have been described in Table III.

Subsidence

In several lowland rural and urban areas significant subsidence may occur. For the rural areas this especially takes place during and after the reclamation of peat soils. Here the subsidence and oxidation can be up to 20 centimetres per year. For the urban areas the subsidence is mainly caused by the extraction of groundwater. Here the subsidence can also be up to 20 centimetres per year, Abidin *et al.* (2011). Presented a Table with subsidence values of Jakarta, Bandung and Semarang (Table VI).

Table VI. Summary of observed land subsidence rates in Jakarta, Bandung, and Semarang (after Abidin *et al.*, 2015)

No.	Method	Subsidence rates in cm/year		Observation period
		Min - max	Typically	
Jakarta				
1	Levelling surveys	1-9	3-7	1982-1991
		1-25	3-10	1991-1997
2	GPS surveys	1-28	4-10	1997-2011
3	InSAR	1-12	3-10	2006-2010
Bandung				
1	GPS surveys	1-23	4-11	2000-2010
2	InSAR	1-19	5-12	1999-2010
Semarang				
1	Levelling surveys	1-17	2-10	1999-2003
2	GPS surveys	1-19	3-10	2008-2011
3	PS InSAR	1-10	3-8	2002-2006
4	Microgravity	1-15	2-10	2002-2005

With interferometric synthetic aperture radar (InSAR) Chaussard *et al.* (2013) identified subsidence in western Indonesia with high spatial and temporal resolution. The data revealed significant subsidence, at rates up to 22 cm/year, in Lhokseumawe, Medan, Jakarta, Bandung, Blanakan, Pekalongan, Bungbulang, Semarang, and in the Sidoarjo regency (Table VII).

Table VII. Average and maximum subsidence rates in nine cities in Indonesia (Chaussard *et al.*, 2013)

Location	Average LOS*) rate (cm/year)	Maximum LOS rate (cm/year)	Average vertical rate (cm/year)	Maximum vertical rate (cm/year)
Lhokseumawe	3.5	9.4	4.2	11.3
Medan	4	6.9	4.8	8.3
Jakarta	6	18.2	7.2	21.8
Bandung	6	18.8	7.2	22.5
Blanakan	4	10.0	4.8	12.0
Pekalongan	4	8.8	4.8	10.5
Semarang	4	10.8	4.8	13.0
Bungbulang	5	12.6	6.0	13.1
Sidoarjo	4	13.8	4.8	16.5

Note: LOS = rader line of sight. 1 cm of LOS displacement corresponds with 1.2 cm of vertical displacement

Purnomo *et al.* (2025) described that the subsidence in the coastal region of Kendal Regency exceeded 2.4 cm per year. From there it gradually reduced in the other regions to less than 1 cm/year.

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

The location of the polders in Indonesia is shown in Figure 9.

The pictures by Prof. Adriaan Volker are shown in Table VII. The pictures by Prof. Bart Schultz are shown in Table VIII.



Figure 9. Location of the polders in Indonesia (source: esri – Batavialand)

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Note: United Nations (1957) mention West Kalimantan (5,000).

Bart Schultz

Lelystad, Januari 2026

Table II. General characteristics of existing polders in Indonesia

Name	Reclamation	Area in ha	Type *)	Latitudes	Longitudes	Elevation in m+MSL	Land use
<i>Existing polders</i>							
Sisir Gunting Polder	1924	3,000	RLL				
Alabio	1930	6,600	RLL	2° 28' S	115° 12' E	7	Agriculture
Dadahup Polder	1998/2024	21,224	RLL	2° 39' S	114° 42' E	-2	Agriculture
Delta of Kali Brantas			RLL	7° 33' S	112° 51' E	0	Agriculture
Jakabaring			RLL	3° 1' S	104° 48' E	2	Urban
Kulon Progo		265	RLL	7° 50' S	110° 10' E		
Lakbok Swamp		11,000	RLL	7° 24' S	108° 37' E		Agriculture
Mentaren			RLL	3° 05' S	114° 33' E	7	Agriculture
Mulyorejo		184	RLL	6° 52' S	109° 39' E		Urban
Polder near Secanggang		6,000	RLL	3° 51' N	98° 32' E	-2	
Sadar River Polder			RLL				
Tegalsari Polder			RLL	6° 51' S	109° 08' E		
<i>Polders in Jakarta:</i>							
* Ancol Pademangan		557	RLL	6° 08' S	106° 50' E		
* Cakung Timur Selatan		278	RLL	6° 11' S	106° 57' E		
* Cakung Timur Utara		290	RLL	6° 10' S	106° 57' E		
* Cengkareng		791	RLL	6° 09' S	106° 44' E	0	Urban
* Grogol		82	RLL	6° 10' S	106° 47' E	4	Urban
* Hankam Slipi		247	RLL	6° 12' S	106° 47' E		Urban
* Industri Gn Sahan			RLL				Urban
* Istana Merdeka			RLL	6° 10' S	106° 49' E	4	Urban
* Jati Pulo		304	RLL	6° 11' S	106° 48' E	5	Urban
* Jelambar Barat		286	RLL	6° 09' S	106° 47' E	4	Urban
* Johar Baru		468	RLL	6° 11' S	106° 51' E		
* K. Item Serdang		1,530	RLL	6° 11' S	106° 52' E		
* Kapuk Muara (I, II, III)		329	RLL	6° 09' S	106° 46' E		
* Kedoya Green Garden		165	RLL	6° 10' S	106° 45' E		
* Kemayoran		377	RLL	6° 09' S	106° 51' E	5	Urban
* Kembangan		896	RLL	6° 11' S	106° 44' E		
* Komplek Dewa Rusi		53	RLL	6° 06' S	106° 55' E		
* Komp. TVRI Tangerang			RLL	6° 10' S	106° 38' E	17	Urban
* Mangga Dua			RLL	6° 08' S	106° 42' E	5	Urban
* Marina		302	RLL	6° 08' S	106° 50' E		

* Melat Oantar Odeng			RLL	6° 12' S	106° 49' E	7	Urban
* Muara Angke		70	RLL	6° 07' S	106° 46' E	0	Urban
* Muara Karang		290	RLL	6° 07' S	106° 47' E	0	Urban
* Pademangan Barat			RLL	6° 08' S	106° 50' E	2	Urban
* Pantai Indah Kapuk		1,029	RLL	6° 07' S	106° 45' E		
* Pasar Ikan		313	RLL	6° 07' S	106° 49' E		
* Penggilingan		601	RLL	6° 12' S	106° 56' E	8	Urban
* Penjaringan Junction		202	RLL	6° 08' S	106° 44' E		
* Perum Walikota (Don Bosco)		58	RLL	6° 10' S	106° 53' E		
* P K Selatan			RLL				Urban
* P K Utara			RLL				Urban
* Pluit Polder	1981	2,450	RLL	6° 07' S	106° 47' E	0	Urban
* Pluit Industri			RLL	6° 07' S	106° 47' E	0	Urban
* Pulo Gebang		701	RLL	6° 12' S	106° 57' E		
* Pulo Mas		589	RLL	6° 11' S	106° 53' E	5	Urban
* Rawa Buaya		443	RLL	6° 10' S	106° 44' E	0	Urban
* Rawa Kepa		203	RLL	6° 10' S	106° 48' E	1	Urban
* Semanan		946	RLL	6° 10' S	106° 43' E		
* Setiabudi Barat		754	RLL	6° 13' S	106° 49' E	8	Urban
* Setiabudi Timur			RLL	6° 13' S	106° 50' E	10	Urban
* Siantar Melati		1,365	RLL				
* Sumur Batu			RLL	6° 10' S	106° 52' E	5	Urban
* Sunter Barat		1,735	RLL	6° 08' S	106° 52' E	4	Urban
* Sunter Selatan/Jaya		773	RLL	6° 09' S	106° 52' E	4	Urban
* Sunter Timur I (Kodamar) atas		800	RLL	6° 07' S	106° 55' E	3	Urban
* Sunter Timur I (Kodamar) bawah		335	RLL	6° 10' S	106° 53' E		
* Sunter Timur III (Rawa Badak)		650	RLL	6° 10' S	106° 54' E	4	Urban
* Sunter Utara		1,324	RLL	6° 08' S	106° 53' E		
* Teluk Gong		108	RLL	6° 08' S	106° 47' E	3	Urban
* Tomang Barat		253	RLL	6° 11' S	106° 47' E		
<i>Polders in Semarang</i>			RLL	6° 59' S	110° 25' E	5	Urban
* Banger Polder		670	RLL	6° 58' S	110° 28' E	1	urban
Polders in South Kalimantan		800,000	RLL	2° 29' S	114° 37' E	8	Agriculture
Polders in Surabaya			RLL	7° 14' S	112° 44' E	1	Urban
Rawa Sragi Swamp		7,400	RLL	5° 32' S	105° 39' E	4	Agriculture
Secanggang Polder Project		3,600	RLL	3° 53' N	98° 33' E	-3	Agriculture
Sub-total		> 882,890					

<i>Proposed polders</i>						
Polder polder area near Kupang		3,500				
<i>Polders in Jakarta:</i>						
* Cemoaka Puti			RLL			Urban
* Cipinang	181		RLL			Urban
* Darma Jaya			RLL			Urban
* Dewa Kembar			RLL			Urban
* Dewa Ruc			RLL			Urban
* Dura Kosambi			RLL			Urban
* Duren Sawit	671					
* Jelambar Timur	284		RLL			Urban
* Kalideres	2230		RLL			Urban
* Kali Pasir Kwitang			RLL			Urban
* Kapuk Polgar	527		RLL			Urban
* Kayu Puti	980					
* Kedoya Greenville			RLL			Urban
* Kedoya Taman Ratu	942					
* Klender	211					
* Komplek Dewa Kendar	529					
* Kramat Jaya	109					
* Malaka/Pondok Delatan			RLL			Urban
* Marunda besar	1555		RLL			Urban
* Marunda kecil	241					
* Meruya			RLL			Urban
* Pegangsaan Dua	159					
* Pejompongan			RLL			Urban
* Pondok Kopi	381					
* Pulo Gadung	628					
* Pulo Nangka			RLL			Urban
* Rawa Bunga	151					
* Rorotan	1405		RLL			Urban
* Sunter Timur I B	101		RLL			Urban
* Sunter Timur II KBN	398		RLL			Urban
* Sunter Timur II Kebantenan	784		RLL			Urban
* Sunter Timur Petukangan	156		RLL			Urban
* Tanjungan	928		RLL			Urban
* Warung Jengkol Vespa	262					

Rawa Sragi Swamp		18,300	RLL				Agriculture
Serbahuta Ria and Kuo Swamp			RLL				
Sub-toatal		> 35,351					
Total		> 907,241					

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

Table III. Characteristics of the water management and flood protection system of existing polders in Indonesia

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			
Banger Polder	RLL	1/10					1/50
Kulon Progo	RLL			8,4	274		
Mulyorajo Polder	RLL	1/25					
Pluit Polder	RLL	1/25		49	173		1/100
Sunter Barat	RLL	1/25		15	74		

Table IV. Pictures of polders and lowlands in Indonesia by Prof. Adriaan Volker

			
A2 058/I.2.58 Lengkon distribution structure apex of the Kali Brantas delta in East Java	A6 003/1.6.3 Banjarmasin, Delta Pulau Petak, South Kalimantan. February 1977	A6 004/1.6.4 Banjarmasin, Delta Pulau Petak, South Kalimantan. February 1977	A6 006/1.6.6 Barambai, South Kalimantan. February 1977
			
A6 007/1.6.7 Barambai, South Kalimantan. February 1977	A6 008/1.6.8 Barambai, South Kalimantan. February 1977	A6 010/1.6.10 Barambai, South Kalimantan. February 1977	A6 012/1.6.12 Barambai, South Kalimantan. February 1977
			
A6 014/1.6.14 Barambai, South Kalimantan. February 1977	A6 017/I.6.17 Tamban Luar. February 1977	A6 018/I.6.18 Tamban Luar. February 1977	A6 020/I.6.20 Tamban Luar. February 1977

Table IV. Pictures of polders and lowlands in Indonesia by Prof. Adriaan Volker (continued)

			
A6 024/I.6.24 Anjir Tamban. February 1977	A6 027/I.6.27 Delta Upang, Primary canal 2, South Sumatra. February 1977	A6 032/I.6.32 Delta Upang, Primary canal 2, South Sumatra. February 1977	A6 034/I.6.34 Delta Upang, Primary canal 2, South Sumatra. February 1977
			
A6 036/I.6.36 Delta Upang, Primary canal 2, South Sumatra. February 1977	A6 040/I.6.40 Rawa Seragi. February 1977	A6 041/I.6.41 Urban area in lowland	A6 043/I.6.43 Urban area in lowland
			
A6 047/I.6.47 Urban area in lowland	A6 048/I.6.48 Urban area in lowland	A6 049/I.6.49 Karang Agung, Musi delta, South Sumatra. 1981	A6 050/I.6.50 Karang Agung, Musi delta, South Sumatra. June 1987

Table IV. Pictures of polders and lowlands in Indonesia by Prof. Adriaan Volker (continued)

			
A6 051/I.6.51 Karang Agung, Musi delta, South Sumatra. June 1987	A6 052/I.6.52 Karang Agung, Musi delta, South Sumatra. June 1987	A6 054/I.6.54 Karang Agung, Musi delta, South Sumatra. June 1987	A6 059/I.6.59 Karang Agung, Musi delta, South Sumatra. June 1987
			
A6 060/I.6.60 Karang Agung, Musi delta, South Sumatra. June 1987	A6 061/I.6.61 Karang Agung, Musi delta, South Sumatra. June 1987	A6 062/I.6.62 Karang Agung, Musi delta, South Sumatra. June 1987	A6 063/I.6.63 Karang Agung, Musi delta, South Sumatra. June 1987
			
A6 068/I.6.68 Karang Agung, Musi delta, South Sumatra. June 1987	A6 070/I.6.70 Karang Agung, Musi delta, South Sumatra. June 1987	A6 073/I.6.73 Base camp in de Musi delta, South Sumatra. June 1987	A6 078/I.6.78 Karang Agung Hulu, Musi delta, South Sumatra. June 1987

Table IV. Pictures of polders and lowlands in Indonesia by Prof. Adriaan Volker (continued)

			
A6 080/I.6.80 Karang Agung Hulu, Musi delta, South Sumatra. June 1987	A6 081/I.6.81 Karang Agung Hulu, Musi delta, South Sumatra. June 1987	A6 083/I.6.83 Karang Agung II, Musi delta, South Sumatra. 1985	A6 085/I.6.85 Karang Agung II, Musi delta, South Sumatra. 1985
			
A6 086/I.6.86 Karang Agung II, Musi delta, South Sumatra. 1985	A6 089/I.6.89 Delta Telang I, Musi delta, South Sumatra. June 1987	A6 090/I.6.90 Delta Telang I, Musi delta, South Sumatra. June 1987	A6 094/I.6.94 Tidal irrigation Banyuasin Delta Telang II, South Sumatra. June 1987
			
A6 096/I.6.96 Tidal irrigation Banyuasin Delta Telang II, South Sumatra. June 1987	A5 6 064/A.5.6.64 Primary canal, presumably in Indonesia	D3 4 041/D.3.4.41 Hydrological station in Lowland area	D3 4 044/D.3.4.44 Bridge over primary canal

Table IV. Pictures of polders and lowlands in Indonesia by Prof. Adriaan Volker (continued)

			
D3 4 045/D.3.4.45 Culvert and staff gauge in tertiary canal	D3 4 046/D.3.4.46 Bridge over secondary canal	D3 4 047/D.3.4.47 Distribution structure in tertiary canal	D3 4 048/D.3.4.48 Bridge over secondary canal
			
D3 4 049/D.3.4.49 Transplantation of rice	D3 4 050/D.3.4.50 Dredged material from secondary canal at the bank	D3 4 052/D.3.4.52 Dike along lowland area	D3 4 053/D.3.4.53 Water supply to and discharge from an installation
			
D3 4 054/D.3.4.54 Discharge sluice	D3 4 056/D.3.4.56 Primary canal to discharge sluice, or drainage pumping station	D3 4 057/D.3.4.57 Discharge sluice	D3 4 058/D.3.4.58 Dike along primary canal

Table IV. Pictures of polders and lowlands in Indonesia by Prof. Adriaan Volker (continued)

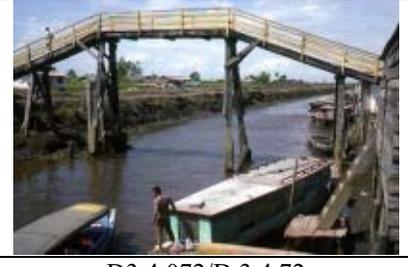
			
D3 4 059/D.3.4.59 Discharge sluice?	D3 4 060/D.3.4.60 Bridge over primary canal	D3 4 061/D.3.4.61 View from the sluice	D3 4 062/D.3.4.62 Rice fields
			
D3 4 067/D.3.4.67 Aerial picture of rice fields and urban area	D3 4 069/D.3.4.69 Landscape in lowland area	D3 4 070/D.3.4.70 Traditional boat in lowland area	D3 4 071/D.3.4.71 Primary canal in lowland area
			
D3 4 072/D.3.4.72 Bridge over Primary canal	D3 4 073/D.3.4.73 Nice house in lowland area	D3 4 074/D.3.4.74 Secondary canal in lowland area	D3 4 076/D.3.4.76 Open connection between tertiary and secondary canal

Table IV. Pictures of polders and lowlands in Indonesia by Prof. Adriaan Volker (continued)

			
D3 4 077/D.3.4.77 Open field drain between bananas and palm trees	D3 4 078/D.3.4.78 Transmigrant house in lowland area	D3 5 001/D.3.5.1 Tertiary canal in lowland area	D3 5 002/D.3.5.2 Transmigrant house with roofwater collection
			
D3 5 003/D.3.5.3 Rice field in lowland area	D3 5 004/D.3.5.4 Rice field surrounded by high ridges – Sorjan system	D3 5 005/D.3.5.5 Connection of primary canal with secondary canals	D3 5 007/D.3.5.7 Secondary canal in lowland area
			
D3 5 008/D.3.5.8 Landscape with mosk in newly reclaimed lowland area	D3 5 009/D.3.5.9 Jetty for boats at low tide	D3 5 010/D.3.5.10 Landscape with transmigrant houses in newly reclaimed lowland area	D3 5 011/D.3.5.11 Primary canal in lowland area at low tide

Table IV. Pictures of polders and lowlands in Indonesia by Prof. Adriaan Volker (continued)

			
D3 5 012/D.3.5.12 Boat in primary canal at low tide	D3 5 014/D.3.5.14 Profiling of the bank of a primary canal at low tide	D3 5 016/D.3.5.16 Thatched huts in lowland area	D3 5 019/D.3.5.19 Hydraulic crane with a long arm
			
D3 5 023/D.3.5.23 Newly dredged tertiary canal in lowland area	D3 5 024/D.3.5.24 House at the bank in lowland area	D3 5 025/D.3.5.25 Discharge sluice	D3 5 026/D.3.5.26 Presumably discharge sluice
			
EV 004/EV-VI-4 Boats in canal lowland area	EV 005/EV-VI-5 Overgrown canal in lowland area	D2 4 036/IV-36 Bridge over the Musi River near Palembang, South Sumatra. 27/9-10/10 1985	D2 4 039/IV-39 Newly excavated crossing of a secondary and a tertiary canal in the Musi Delta. 27/9-10/10 1985

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz

			
<p>D2 4 044/IV-44 Prof. Jan van Dam steps from a speedboat at a jetty in a primary canal in the Musi Delta. 27/9-10/10 1985</p>	<p>D2 4 045/IV-45 Traditional boat is stuck at low tide in a primary canal in the Musi Delta. 27/9-10/10 1985</p>	<p>D2 4 046/IV-46 Nipah palms at the bank of a river branch in the Musi Delta. These palms grow in the transition zone from fresh to saline water. 27/9-10/10 1985</p>	<p>D3 5 001/V-1 Sluice with vertical gates in lowland area Upang in the Musi Delta. 27/9-10/10 1985</p>
			
<p>D3 5 003/V-3 Boats for local transport in lowland area Upang in the Musi Delta. 27/9-10/10 1985</p>	<p>D3 5 004/V-4 Goat at the top of a discharge sluice in lowland area Upang in the Musi Delta. 27/9-10/10 1985</p>	<p>D3 5 005/V-5 New transmigrants for their house in the Musi Delta. 27/9-10/10 1985</p>	<p>D3 5 011/V-11 Local boats at the Barito River in South Kalimantan. 31/1-9/2 1986</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>D3 5 013/V-13 Prof. Wil Segeren, former Head of the Scientific Decision of the IJsselmeerpolders Development Authority exercises soil treatment in South Kalimantan. 31/1-9/2 1986</p>	<p>D3 5 015/V-15 Ir. Wout de Vries, staff member IHE Delft, poses with the village people and their children in South Kalimantan. 31/1-9/2 1986</p>	<p>D3 5 017/V-17 The transport of rice in order to transplant it in a transmigration area in South Kalimantan. 31/1-9/2 1986</p>	<p>D3 5 022/V-22 Traditional houses along a river in South Kalimantan. 31/1-9/2 1986</p>
			
<p>D3 5 024/V-24 Jetty in Kuala Kapuas along the Barito River in South Kalimantan. 31/1-9/2 1986</p>	<p>D3 5 030/V-30 Watercourse along the access road with bridges near the houses in a transmigration area in South Kalimantan. 31/1-9/2 1986</p>	<p>D3 5 032/V-32 Improved transmigration house in one of the transmigration areas in South Kalimantan. 31/1-9/2 1986</p>	<p>D3 5 033/V-33 Pump for the water supply in one of the transmigration areas in South Kalimantan. 31/1-9/2 1986</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>D3 5 038/V-38 Bridge over one of the watercourses along the access roads in a low lying transmigration area in South Kalimantan. Under the bridge is a stoplog weir, to prevent the inflow of high outside water. However, the logs were missing and flooding occurred. 31/1-9/2 1986</p>	<p>D3 5 040/V-40 Groups picture with Prof. Wil Segeren, Prof. Bart Schultz, Ir. Wout the Vries and several Indonesian counterparts in South Kalimantan. 31/1-9/2 1986</p>	<p>D3 6 020/VI-20 From 24 August till 3 September 1986 the bilateral Indonesian – Netherlands Symposium on Lowland Development in Indonesia was conducted in the Erasmushouse near the Netherlands Embassy in Jakarta. Preceding to the symposium there was er a two day field trip to South Sumatra. At the picture a banner at the airport of Palembang. Here Mrs. Anneke Stuip (left) and Mrs. Truus Luijendijk (right). 24 and 25/8 1986</p>	<p>D3 6 021/VI-21 In speedboats there was a visit to the transmigration area Karang Agung in the Musi Delta in South Sumatra. 24 and 25/8 1986</p>
			
<p>D3 6 030/VI-30 Lookout in the transmigration area Karang Agung in the Musi Delta in South Sumatra. 24 and 25/8 1986</p>	<p>D3 6 032/VI-32 Departure by speedboat from the transmigration area Karang Agung in the Musi Delta in South Sumatra. 24 and 25/8 1986</p>	<p>D3 6 034/VI-34 Welcome banner in the Telang area, Musi Delta, South Sumatra. 24 and 25/8 1986</p>	<p>D3 6 037/VI-37 Newly constructed secondary canal in the Telang area, Musi Delta, South Sumatra. 24 and 25/8 1986</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>D4 7 037/VII-37 Badly maintained secondary canal in the transmigration area Telang, Musi Delta, South Sumatra. 24/7 – 10/8 1988</p>	<p>D4 7 039/VII-39 Local transport in secondary canal in the transmigration area Telang, Musi Delta, South Sumatra. 24/7 – 10/8 1988</p>	<p>D4 7 040/VII-40 Zuurzak tree. 24/7 – 10/8 1988</p>	<p>D4 7 042/VII-42 The Director of the Ministry of Public Works, South Sumatra Division, shows how the vegetation at the bank of a secondary canal in the transmigration area Telang, Musi Delta, South Sumatra has to be maintained. 24/7 – 10/8 1988</p>
			
<p>D4 7 044/VII-44 Extention of a transmigrants house in Telang, Musi Delta, South Sumatra. 24/7 – 10/8 1988</p>	<p>D4 7 047/VII-47 Landscape in the transmigration area Telang, Musi Delta, South Sumatra. 24/7 – 10/8 1988</p>	<p>D4 7 048/VII-48 Discharge trench in the 'home yard' – area of 0,25 hectare for the cultivation of vegetables and fruits - in the transmigration area Telang, Musi Delta, South Sumatra. 24/7 – 10/8 1988</p>	<p>D4 7 049/VII-49 Dischatge point of the trench in the 'home yard' – area of 0,25 hectare for the cultivation of vegetables and fruits - in the transmigration area Telang, Musi Delta, South Sumatra. 24/7 – 10/8 1988</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>D4 7 050/VII-50 Newly constructed road drain along an access road in the transmigration area Telang, Musi Delta, South Sumatra. 24/7 – 10/8 1988</p>	<p>D4 8 003/VIII-3 Excavated soil from a newly excavated road drain spread over the access road in the transmigration area Telang, Musi Delta, South Sumatra. 24/7 – 10/8 1988</p>	<p>D4 8 006/VIII-6 Rice field in the transmigration area Saleh, Musi Delta, South Sumatra. 24/7 – 10/8 1988</p>	<p>D4 8 009/VIII-9 Demonstration of the operation of a weir with a vertical gate in a field canal in the transmigration area Telang, Musi Delta, South Sumatra. 24/7 – 10/8 1988</p>
			
<p>D4 8 011/VIII-11 Manual maintenance of a tertiary canal in the transmigration area Telang, Musi Delta, South Sumatra. 24/7 – 10/8 1988</p>	<p>D4 8 012/VIII-12 Excavation of a fishpond near a house in the transmigration area Telang, Musi Delta, South Sumatra. 24/7 – 10/8 1988</p>	<p>D4 8 016/VIII-16 Access to the house of a local governor in the transmigration area Telang, Musi Delta, South Sumatra. 24/7 – 10/8 1988</p>	<p>D4 8 026/VIII-26 Maintenance of a primary canal in the transmigration area Saleh, Musi Delta, South Sumatra. 2 - 24/7 1989</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>D4 8 029/VIII-29 Sorjan system in the transmigration area Saleh, Musi Delta, South Sumatra. 2 - 24/7 1989</p>	<p>D5 9 011/IX-11 House along secondary canal at low tide in the transmigration area Telang, Musi Delta, South Sumatra. 28/7 - 19/8 1989</p>	<p>D5 9 013/IX-13 Preparation and storage of prefab elements for the weirs in the tertiary canals in the transmigration areas in the Musi delta, South Sumatra. 28/7 - 19/8 1989</p>	<p>D6 11 015/XI-15 Bank protection along a primary canal in the transmigration area near Banjarmasin in Kalimantan. 23/11 - 1/12 1995</p>
			
<p>D6 12 008/XII-8 Discharge sluice in a large canal in South Kalimantan. 11 - 18/7 1998</p>	<p>D6 12 010/XII-10 Provisional bridge in a transmigration area in South-Kalimantan. 11 - 18/7 1998</p>	<p>D6 12 011/XII-11 Pumping station in a transmigration area in South-Kalimantan. 11 - 18/7 1998</p>	<p>D6 12 012/XII-12 Newly excavated secondary canal in a transmigration area in South-Kalimantan. 11 - 18/7 1998</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>D6 12 017/XII-17 Weir in a newly excavated secondary canal in a transmigration area in South-Kalimantan. 11 – 18/7 1998</p>	<p>D6 12 019/XII-19 Staff gauge at a crossing of a newly excavated secondary canal in a transmigration area in South-Kalimantan. 11 – 18/7 1998</p>	<p>D6 12 021/XII-21 Weir in a newly excavated secondary canal in a transmigration area in South-Kalimantan. 11 – 18/7 1998</p>	<p>D6 12 024/XII-24 Discharge sluice in a large canal in South Kalimantan. 11 – 18/7 1998</p>
			
<p>D6 12 028/XII-28 Bridge over a newly excavated secondary canal in a transmigration area in South-Kalimantan. 11 – 18/7 1998</p>	<p>D6 12 033/XII-33 Construction of a discharge sluice in a large canal in South Kalimantan. 11 – 18/7 1998</p>	<p>114_1427 Kali Sunter, the canal where part of the excess water of the Kelapa Gading Polder is being pumped out. 1 April 2006</p>	<p>114_1430 Trash rack in front of one of the pumping stations that pump the excess water of Kelapa Gading Polder to Kali Sunter. 1 April 2006</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>114_1433 Discharge point of the pumping stations that pump out the excess water of Kelapa Gading Polder to Kali Sunter. 1 April 2006</p>	<p>114_1437 Water withdrawal from Kali Sunter. 1 April 2006</p>	<p>114_1438 View on Kali Sunter. 1 April 2006</p>	<p>114_1439 Gates at the discharge point of a pumping station that pumps out the water of Kelapa Gading Polder to Kali Sunter. 1 April 2006</p>
			
<p>114_1442 Polluted water and bank erosion in Kali Sunter. 1 April 2006</p>	<p>114_1443 Pollution in front of a culvert in one of the canals of the Kelapa Gading Polder. 1 April 2006</p>	<p>114_1447 Storage pond for the separated part of the polder that is under responsibility of the navy. 1 April 2006</p>	<p>114_1451 Vegetation in a canal in the Kelapa Gading polder. 1 April 2006</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>114_1454 Houses along the canal along the east side of Kelapa Gading Polder. 1 April 2006</p>	<p>114_1455 Drain along the central boulevard in the Kelapa Gading Polder. 1 April 2006</p>	<p>114_1456 Trash rack in front of a culvert in Kelapa Gading Polder. 1 April 2006</p>	<p>114_1459 Drain in Kelapa Gading Polder. 1 April 2006</p>
			
<p>114_1460 Vertical gate in a drain in Kelapa Gading Polder. 1 April 2006</p>	<p>114_1462 Water hyacinths in the drain to Kali Pertukangan. 1 April 2006</p>	<p>114_1465 Polluted urban drain in Kelapa Gading Polder. 1 April 2006</p>	<p>114_1467 Culverts at the downstream side of a drain in Kelapa Gading Polder. 1 April 2006</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>114_1468 Mobile pump along a storage pond in Kelapa Gading Polder. 1 April 2006</p>	<p>IMG_3287 Cleaned tertiary canal in the example area in Telang II. 2 June 2012</p>	<p>IMG_3295 Jetty in the primary canal in the Telang II area. 2 June 2012</p>	<p>IMG_3301 Group picture in front of the newly built market place in the Telang II area. Forth from right Prof. Robiyanto Susanto, third from right Prof. Bart Schultz. The others are staff members of Sriwijaya University. 2 June 2012</p>
			
<p>IMG_3302 Jetty in the primary canal in the Telang II area. 2 June 2012</p>	<p>IMG_3309 New house in the Telang II area. 2 June 2012</p>	<p>IMG_3311 Material for the construction of pavement for the first to be paved local road in the lowlands in the Musi Delta. 2 June 2012</p>	<p>IMG_3316 New house in the Telang II area with a provision for obtaining swallow nests, a delicacy. 2 June 2012</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>IMG_3318 New government building in the Telang II area. 2 June 2012</p>	<p>IMG_3322 Vertical gate in a canal to a storage pond in Palembang. 6 June 2012</p>	<p>IMG_3323 Storage pond in Palembang. 6 June 2012</p>	<p>IMG_3326 Cleaning activities in a storage pond in Palembang. 6 June 2012</p>
			
<p>IMG_3330 Canal in Palembang. 6 June 2012</p>	<p>IMG_3331 Outlet of a pumping station in Palembang with two lorries for the discharge of rubbish that has been removed from a canal. 6 June 2012</p>	<p>IMG_3335 Separation of rubbish near a recreation pond in the new urban quarter Jakabaring of Palembang. 6 June 2012</p>	<p>IMG_3891 Inlet for a pumping station of one of the polders in Jakarta. 25 September 2012</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>IMG_3893 Storage pond for the pumping station of one of the polders in Jakarta. 25 September 2012</p>	<p>IMG_3896 Discharge canal to a storage pond. This canal has insufficient discharge capacity compared to the capacity of the pumping station to pump the water to the storage pond. 25 September 2012</p>	<p>IMG_3898 Staff gauge at the inlet of a pumping station of one of the polders in Jakarta. 25 September 2012</p>	<p>IMG_3899 Concrete wall to prevent flooding from the mouth of a river near the Java Sea. 25 September 2012</p>
			
<p>IMG_3905 House and rubbish in the mouth of a river near the Java Sea. 25 September 2012</p>	<p>IMG_3917 Concrete wall to prevent flooding from the mouth of a river near the Java Sea. 25 September 2012</p>	<p>IMG_3921 Boats at the mouth of a river near the Java Sea. 25 September 2012</p>	<p>IMG_3923 Heap of rubbish in front of a discharge sluice at the mouth of a river near the Java Sea. 25 September 2012</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>IMG_3930 Discharge sluice towards a river in Jakarta. 25 September 2012</p>	<p>IMG_3933 Pumping station in one of the canals in Jakarta where the water is pumped out to a river. 25 September 2012</p>	<p>IMG_3939 Canal towards a storage basin in Jakarta. 25 September 2012</p>	<p>IMG_3941 Rubbish remover in front of the inlet of a pumping station in a polder in Jakarta. 25 September 2012</p>
			
<p>IMG_3945 Pollution in a canal in Jakarta. 25 September 2012</p>	<p>IMG_3950 Removal of rubbish in front of an outlet of one of the canals in Jakarta. 25 September 2012</p>	<p>IMG_3953 Outlet of a pumping station in a canal in Jakarta. 25 September 2012</p>	<p>IMG_3966 Mobile pumps in a storage in Jakarta. 25 September 2012</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>IMG_3968 Storage basin in Jakarta. 25 September 2012</p>	<p>IMG_3973 Cleaning drums in front of the inlets of a pumping station for a storage basin in Jakarta. 25 September 2012</p>	<p>IMG_3979 Aerating installation in front of the outlet of water from an urban quarter near the storage basin in Jakarta. 25 September 2012</p>	<p>IMG_3992 Buildings in the higher part of a storage basin in Jakarta. 25 September 2012</p>
			
<p>IMG_4005 Canal with a concrete wall to prevent flooding. 25 September 2012</p>	<p>IMG_4010 Storage basin and discharge canal of the Setia Budi Barat pumping station. 25 September 2012</p>	<p>IMG_4012 Name plate Setia Budi Barat pumping station. 25 September 2012</p>	<p>IMG_5948 Boat taxis in front of a restaurant on the bank of the Musi River, South Sumatra. 7 May 2014</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>IMG_5954 Mr. Suparmono, former Director-General Water Resources and Prof. Bart Schultz. 7 May 2014</p>	<p>IMG_5963 Discharge and inlet sluice in the mouth of a secondary canal in the Telang I area, Musi Delta, South Sumatra. 7 May 2014</p>	<p>IMG_5965 Explanation of the system by Prof. Robiyanto H. Susanto at the discharge and inlet sluice in the mouth of a secondary canal in the Telang I area, Musi Delta, South Sumatra. 7 May 2014</p>	<p>IMG_5967 Houses and a building for the cultivation of swallow nests along a secondary canal in the Telang I area, Musi Delta, South Sumatra. 7 May 2014</p>
			
<p>IMG_5971 Enlarged tertiary canal in the Telang I area, Musi Delta, South Sumatra. 7 May 2014</p>	<p>IMG_5972 Group picture in front of a banner at the beginning of an access road near rice fields in the Telang I area, Musi Delta, South Sumatra. 7 May 2014</p>	<p>IMG_5973 Tertiary canal and access road near rice fields in the Telang I area, Musi Delta, South Sumatra. 7 May 2014</p>	<p>IMG_5981 Secondary canal in the Telang I area, Musi Delta, South Sumatra. 7 May 2014</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>IMG_5983 Lunch in a tent during the field visit of the INACID Seminar near the Telang I area. Second of left Mr. Saiful Mahdi, aside him Prof. Bart Schultz. 7 May 2014</p>	<p>IMG_5990 Masonry house and motor cycles in the Telang I area, Musi Delta South Sumatra. 7 May 2014</p>	<p>IMG_5992 The first truck in the Telang I area in front of the building near the jetty. 7 May 2014</p>	<p>IMG_5995 Boats at the bank of primary canal 6 in the Telang I area. 7 May 2014</p>
			
<p>IMG_2441 Discharge canal in the old quarter Kota Lama of Semarang. 16 November 2015</p>	<p>IMG_2444 Inlet to and outlet from the Tawang Storage Basin. 16 November 2015</p>	<p>IMG_2446 Tawang Storage Basin near the railway station of Semarang. 16 November 2015</p>	<p>IMG_2448 Information plate with the characteristic data of the drainage system of the old quarter Kota Lama of Semarang 16 November 2015</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>IMG_2454 Vertical gates at the inlet of the right branch of the Semarang River that has been closed off near the mouth. 16 November 2015</p>	<p>IMG_2455 Pumping station behind the inlet of the right branch of the Semarang River that has been closed off near the mouth. This pumping station also pumps out the excess water of the old quarter Kota Lama of Semarang. 16 November 2015</p>	<p>IMG_2458 View at the Semarang River from the branching point in upstream direction. 16 November 2015</p>	<p>IMG_2469 Damaged and polluted canal in a housing area in Semarang. 16 November 2015</p>
			
<p>IMG_2472 Newly built pumping station in the mouth of the Semarang River. 16 November 2015</p>	<p>IMG_2473 Construction of bank protection and a jetty in the closed off mouth of the Semarang River with in the background the newly built pumping station. 16 November 2015</p>	<p>102_0299 Boats at and buildings along the Musi River, South Sumatra. 25 January 2005</p>	<p>103_0303 Secondary canal at high tide in the Saleh Area, Musi Delta, South Sumatra. 25 January 2005</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>103_0314 Structure to control the discharge of and supply to a secondary canal in the Saleh Area, Musi Delta, South Sumatra. 25 January 2005</p>	<p>103_0318 Movable fiberglass flapgate for the control of the discharge of and water supply to a tertiary canal in the Saleh Area, Musi Delta, South Sumatra. 25 January 2005</p>	<p>103_0321 Masonry house in the Saleh Area. 25 January 2005</p>	<p>103_0332 Tertiary canal between rice fields in the Telang I area. 25 January 2005</p>
			
<p>103_0336 Field canal along a rice field in the Telang I area. 25 January 2005</p>	<p>103_0342 Inspection of the movable fiberglass flapgate for the control of the discharge of and water supply to a tertiary canal in the Telang I area. 25 January 2005</p>	<p>103_0343 Inspection of the movable fiberglass flapgate for the control of the discharge of and water supply to a tertiary canal in the Telang I area. 25 January 2005</p>	<p>103_0352 Stone house in the Telang I area. 25 January 2005</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>103_0358 Shops at a central location in the Telang I area. 25 January 2005</p>	<p>103_0370 Visit to a bridge over a secondary canal that has been constructed by the local population. 27 January 2005</p>	<p>103_0374 Access road with a masonry house in the Telang I area. Transport of the harvest to the jetty for the further transport over water. 27 January 2005</p>	<p>103_0376 Masonry house in the Telang I area. 27 January 2005</p>
			
<p>107_0717 Low tide at a structure for the control of the discharge of and water supply to a secondary canal in the Telang I area. 1 August 2005</p>	<p>107_0724 Nice house in Telang I area. 1 August 2005</p>	<p>107_0726 Renovated steel Bridge over a primary canal in the Telang I area. 1 August 2005</p>	<p>107_0728 Provisorional dam in a secondary canal in the Saleh Area at low tide. 1 August 2005</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>107_0732 Characteristic Bridge in Palembang over the Musi River. 1 August 2005</p>	<p>107_0740 Visit to a weir with a movable fibreglas flapgate for the control of the discharge of and water supply to a tertiary canal in the Saleh area. 2 August 2005</p>	<p>107_0742 Visit to a weir with a movable fibreglas flapgate for the control of the discharge of and water supply to a tertiary canal in the Saleh area. 2 August 2005</p>	<p>107_0747 Secondary canal in the Saleh Area at low tide. 2 August 2005</p>
			
<p>107_0765 Name plate of the Wetland-lowland and Coastal Area Data and Information Centre in Palembang. 4 August 2005</p>	<p>107_0769 Building of the Wetland-lowland and Coastal Area Data and Information Centre in Palembang. 4 August 2005</p>	<p>113_1386 Visit to a water control structure for the control of the discharge of and water supply to a secondary canal in the Telang I area, Musi Delta, South Sumatra. Left Dr. F.X. Suryadi, right a farmer from the area. 27 March 2006</p>	<p>113_1389 Storage of rice near a rice mill in the Telang I area. 27 March 2006</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>113_1397 Properly constructed weir with a movable fiberglass flapgate for the control of the discharge of and water supply to a tertiary canal in the Telang I area. 27 March 2006</p>	<p>113_1402 Bridge over the mouth of a secondary canal near a primary canal in the Telang I area. In the background a structure for the control of the discharge of and water supply to a secondary canal. 27 March 2006</p>	<p>113_1407 Tertiary canal along a rice field in the Telang I area. 27 March 2006</p>	<p>113_1409 Delivery of rice at a drying installation. 27 March 2006</p>
			
<p>113_1411 House for the receipt of rice at a drying installation. 27 March 2006</p>	<p>113_1412 Building in the Telang I area in which there are drying installations for rice. 27 March 2006</p>	<p>113_1416 Installations for the drying of rice. 27 March 2006</p>	<p>113_1420 Statue aan the entrance of Srimulyo village, Telang I area, District Banyuasin. 27 March 2006</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>113_1426 Bridge over a primary canal in the Telang I area. 27 March 2006</p>	<p>118_1809 Visit to the pilot area of the project Sustainable Development of Tidal Lowlands in South-Kalimantan. 24 August 2006</p>	<p>118_1811 Crossing of a primair and a secondary canal in a transmigration area in South-Kalimantan. 24 August 2006</p>	<p>118_1818 Nice rice field in a transmigration area in South-Kalimantan. 24 August 2006</p>
			
<p>120_2086 High tide in a secondary canal in the Sambas area in West Kalimantan. 9 January 2007</p>	<p>120_2090 Structure for water supply to and discharge from a tertiary canal in in the Sambas area in West Kalimantan. 9 January 2007</p>	<p>120_2097 Secondary canal in the Sambas area in West Kalimantan. 9 January 2007</p>	<p>121_2106 Track along rice fields and a inlet and discharge strucutre in the Pontianak area in West Kalimantan. 10 January 2007</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>121_2108 Open field drain for the drainage of a 'home yard' – area around the house for the cultivation of vegetables and fruits - in the Pontianak area in West Kalimantan. 10 January 2007</p>	<p>121_2109 Secondary canal in the Pontianak area in West Kalimantan. 10 January 2007</p>	<p>121_2118 Tekarang Village in the Pontianak area in West Kalimantan. 10 January 2007</p>	<p>121_2141 Nice house in the Telang I area, Musi Delta, South Sumatra. 12 January 2007</p>
			
<p>121_2143 Visit to a weir with a movable fiberglass flapgate for the control of the discharge of and water supply to a tertiary canal in the Telang I area, Musi Delta, South Sumatra. Left Ir. Ad of den Eelaart, right Prof. Robiyanto H. Susanto. 12 January 2007</p>	<p>121_2145 Concrete Bridge over a primary canal in the Telang I area, Musi Delta, South Sumatra. 12 January 2007</p>	<p>121_2150 Illuminated Bridge in the evening over the Musi River in Palembang, South Sumatra. 12 January 2007</p>	<p>127_2752 Secondary canal at low tide in the Telang I area, Musi Delta, South Sumatra. 28 June 2007</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>127_2759 The chairman (Mr. Cipto, right) of the water users association in the area of Telang I, bordering primary canal 6, with the first prize for best water users association. 28 June 2007</p>	<p>127_2760 The house of Mr. Cipto, chairman of the water users association in the area of Telang I, bordering primary canal 6. 28 June 2007</p>	<p>127_2779 Wall along the east Banjir canal of Semarang to prevent flooding. 4 July 2007</p>	<p>127_2787 Bridge over the Banger River in Semarang at high tide. The Banger Polder is located at the east side of Semarang. Due to the discharge of the Banger River in 2016 the area was still in open connection with the Java Sea. 4 July 2007</p>
			
<p>127_2791 Waterlogging in the Banger Polder in Semarang along the Banger River. 4 July 2007</p>	<p>127_2794 Wall to prevent flooding along the Banger River in Semarang at high tide. The Banger Polder is located at the east side of Semarang. Due to the discharge of the Banger River in 2016 the area was still in open connection with the Java Sea. 4 July 2007</p>	<p>128_2801 Pumping station along the Banger River to pump out local water from the western part of Banger Polder. 4 July 2007</p>	<p>128_2809 Open drain in Banger Polder, Semarang. 4 July 2007</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>128_2815 Pumping station for the pumping out of water from Semarang to the Eastern Banjir Canal. 4 July 2007</p>	<p>128_2819 Damaged bridge over a river in the Pontianak area, West Kalimantan. 7 July 2007</p>	<p>128_2820 Inadequately maintained primary canal in peatland in the Pontianak area, West Kalimantan. 7 July 2007</p>	<p>128_2825 Processing of maize in the pilot project - about 250 hectares - in the Pontianak area, West Kalimantan. 7 July 2007</p>
			
<p>128_2844 Structure with a very damaged vertical gate for the discharge of water. 7 July 2007</p>	<p>128_2855 Nursery for rice in the Sambas area, West Kalimantan. 8 July 2007</p>	<p>IMG_3025 Newly excavated tertiary canal in the Sambas area, West Kalimantan. 19 November 2007</p>	<p>IMG_3026 Hydraulic crane for the excavation of a primary canal in the Sambas area, West Kalimantan. 19 November 2007</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>IMG_3028 Weir with different options for water supply to or discharge of water from a tertiary canal in the Sambas area, West Kalimantan. 20 November 2007</p>	<p>IMG_3036 Construction of a structure for water supply to or discharge of water from a secondary canal in the Sambas area, West Kalimantan. 20 November 2007</p>	<p>IMG_3040 Meeting in the field in the Sambas area, West Kalimantan. At the head of the table the head of the Sambas District. 20 November 2007</p>	<p>IMG_3044 Speech in the field by the Head of the Sambas District, West Kalimantan. Right of him Mr. Erwin Rafaje, in the Ministry of Public Works responsible for operation and maintenance of lowland systems. Aside of him Mr. Arnoud Haag, Euroconsult. 20 November 2007</p>
			
<p>IMG_3060 The tractor that was delivered in the framework of the project Strengthening Tidal Lowland Development in front of the access gate of the village. 22 November 2007</p>	<p>20241017_122521 Welcome at the inlet structure of the main canal of Dadahup Polder</p>	<p>20241017_123125 Upstream side of the inlet structure at the upstream side of the main canal through the Dadahup Polder</p>	<p>20241017_123412 Main canal upstream of Dadahup Polder, seen from the inlet structure</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>20241017_124656 Automatic water level recorder at the inlet structure of the Dadahup Polder</p>	<p>20241017_131010 Main canal in Dadahup Polder, seen from the inlet structure at the upstream side</p>	<p>20241017_131044 Preparation of rice fields at the upstream side of Dadahup Polder</p>	<p>20241017_155818 Mengkatip River in downstream direction at one of the connection points with a secondary canal in the Dadahup Polder</p>
			
<p>20241017_155722 Bridge over the Mengkatip River</p>	<p>20241017_154904 Inlet and outlet of a secondary canal in the Dadahup Polder at the Mengkatip River</p>	<p>20241017_155005 Secondary canal from the inlet and outlet of the secondary canal in the Dadahup Polder to the Mengkatip River in the direction of the Mengkatip River</p>	<p>20241017_155047 Main drain between the inlet and outlet of the secondary canal in the Dadahup Polder at the Mengkatip River and the Mengkatip River</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>20241017_132146 Inlet and outlet structure in a secondary canal at the side of the main canal of Dadahup Polder</p>	<p>20241017_132203 Open air fruitstore. Beginning of economic activity in Dadahup Polder</p>	<p>20241017_132509 Road along the secondary canal from the inlet and outlet structure in the direction of the main canal. In the background some preliminary buildings and hydraulic cranes for reclamation of Dadahup Polder</p>	<p>20241017_132647 Staff gauge at the inlet and outlet structure in the secondary canal in the direction of the main canal of Dadahup Polder</p>
			
<p>20241017_132822 Inlet and outlet structure at the inside of a secondary canal in Dadahup Polder</p>	<p>20241017_132832 Secondary canal in Dadahup Polder</p>	<p>20241017_132907 Landscape in Dadahup Polder with a tertiary canal and road</p>	<p>20241017_133019 Landscape in Dadahup Polder with a tertiary canal and in the background some preliminary buildings and hydraulic cranes for reclamation of Dadahup Polder</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

				
<p>20241017_133213 Staff gauge at the inner side of the inlet and outlet structure of a secondary canal in Dadahup Polder</p>		<p>20241017_141809 Display of the Ministry of Public Works and companies involved in the reclamation of Dadahup Polder</p>	<p>20241017_141928 Office building of the Ministry of Public Works in Dadahup Polder</p>	<p>20241017_144505 Display and meeting building in Dadahup Polder</p>
				
<p>20241017_144800 Ripening rice fields in Dadahup Polder</p>		<p>20241017_145639 Display of the activities in Dadahup Polder</p>	<p>20241017_145913 Tertiary canal in Dadahup Polder</p>	<p>20241017_150011 Inlet and outlet structure of a tertiary canal in Dadahup Polder at the side of the tertiary canal</p>

Table V. Pictures of polders and lowlands in Indonesia by Prof. Bart Schultz (continued)

			
<p>20241017_150057 Staff gauge at the inside of the inlet and outlet structure of a tertiary canal in Dadahup Polder at the side of the tertiary canal</p>	<p>20241017_150105 Staff gauge at the inside of the inlet and outlet structure of a tertiary canal in Dadahup Polder at the side of the tertiary canal</p>	<p>20241017_150655 Structure for opening and closing the inlet and outlet structure of a tertiary canal in Dadahup Polder</p>	