BANGLADESH

Source: esri

General

Bangladesh - officially the People's Republic of Bangladesh - is located in South Asia. It shares land borders with India and Myanmar. Bangladesh forms the largest and easternmost part of the Bengal region. It has an area of 14.8 Mha (million hectares) with, in 2022, a population of 171 million, or 11.6 persons per ha (Wikipedia and United Nations, 2022).

Climate and geography

Bangladesh's climate is tropical with a mild winter from October to March, and a hot, humid summer from March to June. The country has recorded a record low temperature of 1.1 °C in the North-west city of Dinajpur. A warm and humid monsoon season lasts from June to October and supplies most of the country's rainfall (source: Wikipedia).

Bangladesh is one of the country’s most vulnerable to climate change. Natural hazards that come from increased rainfall, sea level rise and tropical cyclones are expected to increase as climate changes, each seriously affecting agriculture, water and food security, human health and shelter. The cyclones of 1970 and 1991 were particularly devastating, the latter resulting in the death of some 140,000 people. It is believed that in the coming decades the rising sea level alone will create more than 20 million climate refugees and that by 2050, a 0.90 m sea level rise will inundate some 20% of the land and displace more than 30 million people (source: Wikipedia). However, Brammer (2016) states that an analysis of 50 years of the country’s climate and hydrological data showed no evidence that rainfall amounts have changed or that floods, tropical cyclones and droughts have increased in frequency or severity.

Most of Bangladesh is covered by the Bengal Delta, the largest delta on Earth. The delta has been formed by alluvial deposits of three mighty rivers: the Ganges, the Brahmaputra and the Meghna, it has a complex river network of about 230 rivers occupying about 6% of the area. An important feature of the rivers is that 57 are cross boundary, coming from India and Myanmar. These river systems drain a river basin of about 1.72 million km^2, out of which only 7% is located in Bangladesh. Rests 93% of the river basin situated outside in China, India, Nepal, Bhutan and Myanmar. The rivers bring a substantial amount of silt to the country, which is estimated at 900 million tons for the Brahmaputra and 500 million tons for the Ganges (Abbas, 1963). Uddin and Islam (1983) describe that the coastal deltaic area (about 1.4 Mha) is cut into numerous separate land masses by the intricate tidal river system. Most areas have saucer-like shapes with surface levels from below mean sea level (MSL) to 6 m or more above, seldom exceeding 3 m+MSL and generally lying above high neap tide, but below high spring tide.

Bangladesh is prone to floods, tornadoes, cyclones, and tidal bores that occur almost every year, combined with the effects of deforestation, soil degradation and erosion. As an example of the extent of flooding Figure 1 shows the flooded area at 7 August 2007. In September 1998, Bangladesh saw the most severe flooding its history. As the Brahmaputra, the Ganges and Meghna spilt over and swallowed 300,000 houses, 9,700 km of roads and 2,700 km of dikes, 1,000 people were killed and 30 million made homeless, 135,000 cattle killed, 50 km^2 of land destroyed and 11,000 km of roads damaged or destroyed. Effectively, two-thirds of the country was flooded. The severity of the flooding was attributed to unusually high monsoon rains, the shedding off of equally unusually large amounts of melt water from the Himalayas, and the widespread cutting down of trees (that would have intercepted rain water) for firewood or animal husbandry. Van Alphen and Lodder (2006) mention that the 1998 and 2004 floods in Bangladesh caused damage of US$ 2.8 and 2.2 billion, about 7% of its gross national product (GNP).

Also earthquakes may pose a threat to the country, and tectonics have caused rivers to shift course suddenly and dramatically. Rainy-season flooding can push the underlying crust down by as much as 6 cm and possibly perturb faults (Ali, 2002).

Bangladeshi water is frequently contaminated with arsenic because of the high arsenic content of the soil - up to 77 million people are exposed to toxic arsenic from drinking water (Source: Wikipedia).

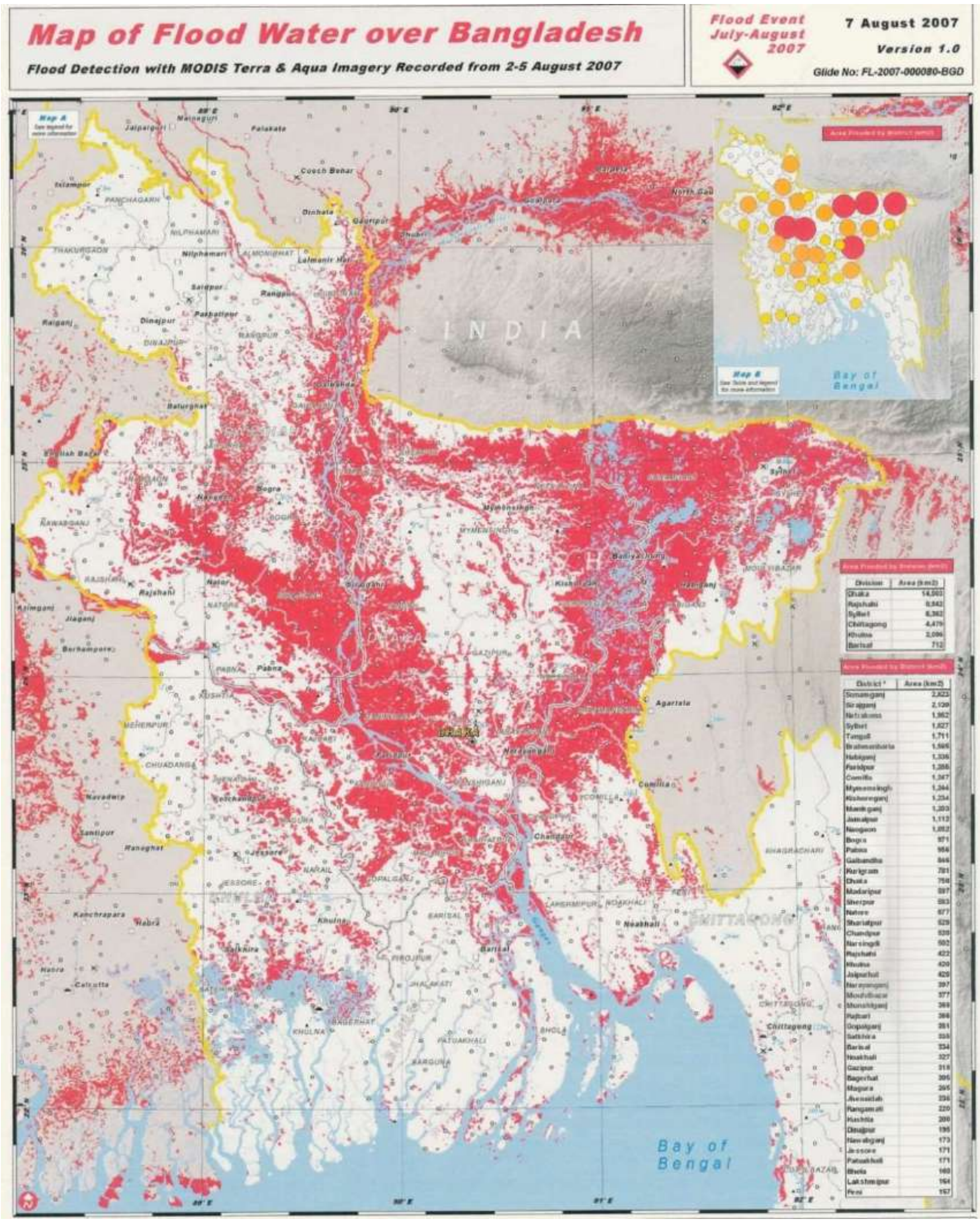


Figure 1. Map of flood water over Bangladesh on 7 August 2007

Bangladesh has been suffering from the twin problem of 'floods and droughts' for centuries (Ali, 2002). Delft Hydraulics and Danish Hydraulic Institute (DHI) and Associates (1996) and Chowdhury *et al*. (1997) show some hydro-morphologic parameters of the three main rivers (Table I).

Saha and Biswas (2017) describe that the earliest recorded dike was built during the Sultani period (1213-1519). Since the 17th century the major part of the flood prone area has been impoldered and cultivated by landlords (Zamindars) (Group Polder Development, 1982). They constructed low dikes and wooden box sluices and maintained them for protection against saline water intrusion and floods. Unofficially the Zamindars have continued this maintenance even though they were relieved from that duty when the British ruler abolished the Zamindary system. In absence of Zamindar's initiative, the local farmers often started to make bunds themselves, which were often technically poor. After taking over the works by the Government more attention was given to the construction of the polders. However, lack of technical know-how and financial constraints hampered the development (Ali, 2002).

Table I. Some hydro-morphologic parameters with respect to gauging stations of the three main rivers in Bangladesh: Ganges, Brahmaputra and Meghna (Delft Hydraulics and Danish Hydraulic Institute (DHI) and Associates, 1996 and Chowdhury *et al*., 1997)

Parameter	Ganges	Brahmaputra	Meghna
River basin (km^2)	1,090,000	573,500	77,000
Mean annual rainfall in the river basin (mm)	1,200	1,900	4,900
Mean annual discharge (m^3/s)	10,600	20,400	4,600
Bankfull discharge (m^3/s)	43,000	48,000	8,000
Mean annual maximum discharge (m^3/s)	50,800	66,200	13,900
Annual sediment transport (million tons/year)	549	586	13

Large-scale impoldering schemes began in the early 1950s. At that time, after several years of studies, a team of United Nations (UN) experts proposed the Ganges-Kobadak Project lying in the greater districts of Kushtia, Jessore and Khulna. After the country had suffered from unprecedented floods in 1954 and 1955, a flood commission was constituted by the Government to look into the problems and to advise on remedial measures. Subsequently, they obtained the services of a UN Technical Assistance Mission in 1956, a team of experts on water resources management, known as the Krug Mission. This Mission submitted the 'Krug Mission report' in 1957 after a detailed review of the gigantic problems associated with the flooding. Based on the recommendations of the Krug Mission, the East Pakistan Water and Power Development Authority (EPWAPDA) was created in 1959 for the unified and co-ordinated development of the water and power resources in the present Bangladesh. This authority, with the help of the International Engineering Company Inc. (IECO), prepared a Master Plan for water resources development in 1964. This plan marked the beginning towards the formulation of an integrated plan for flood control and development of the water resources of the country. In the Master Plan the limited available hydrological data were presented and recommended actions were emphasising on systematic and scientific hydrological data collection and processing (Ali, 2002).

The Master Plan included a portfolio of 58 land reclamation projects including 3 barrages on major rivers for implementation spread over 20 years, beginning in 1965. These projects envisaged flood protection for 5.8 Mha of land. Due to lack of funds not all the identified projects were taken up for implementation. Irrigation within the flood protected areas was foreseen, but emphasis was on flood control through a system of dikes and polders as in those days higher flood control through major water control schemes was seen as the key to increase agricultural production. Three alternative options were proposed: i) dikes with gravity drainage; ii) dikes with tidal sluice drainage; iii) dikes with pump drainage (Ali, 2002).

Abbas (1963) mentions that several river improvement, drainage and flood control projects were under preparation, such as the Comprehensive Drainage Scheme in Faridpur District, improvement of Old Dakatia and Little Feni rivers in Comilla and Noakhali districts, dredging of the Gumti River, drainage schemes in Sadar and Feni Sub-divisions of Noakhali District (48,000 ha), flood protection at Rajshahi, Sirajganj, Gaibandha and Kurigram, and along the Jamuna, Teesta, Gumti, Surma and other rivers. He also shows an overview of completed schemes, or under execution, prepared schemes and schemes under preparation (Figure 2).

In 1961 the Coastal Embankment Project was conceived and initiated by the then East Pakistan Water and Power Development Authority. The project consisted of two phases: *Phase I*: impoldering of 800,000 ha; *Phase II*: impoldering of 560,000 ha (Haq, 1963). In Phase I 73 polders would be constructed (Figure 3). Subsequently, it was proposed in 1967 that the Coastal Embankment Project be divided into two phases and that the first be expedited as part of the Grow More Food programme. Thus, the first phase was approved in April 1968. This phase consisted of 92 polders with about 4,022 km of dikes and 780 drainage sluices. The gross polder area to be protected under phase-I was estimated to be slightly more than one million ha. Phase-I was completed in June 1971. Polders under phase-II were classified as deferred in the revised programme and final project evaluation study. Phase-II included three categories of land areas such as: i) relatively non-saline areas; ii) off-shore islands which were so far unsuitable due to erosion and sediment deposition; iii) partially reclaimed and unreclaimed areas resulting from the construction of the Meghna Cross-Dam (Ali, 2002). Saha and Biswas (2017) describe that phase-II consisted of 16 polders covering 0.4 million ha.

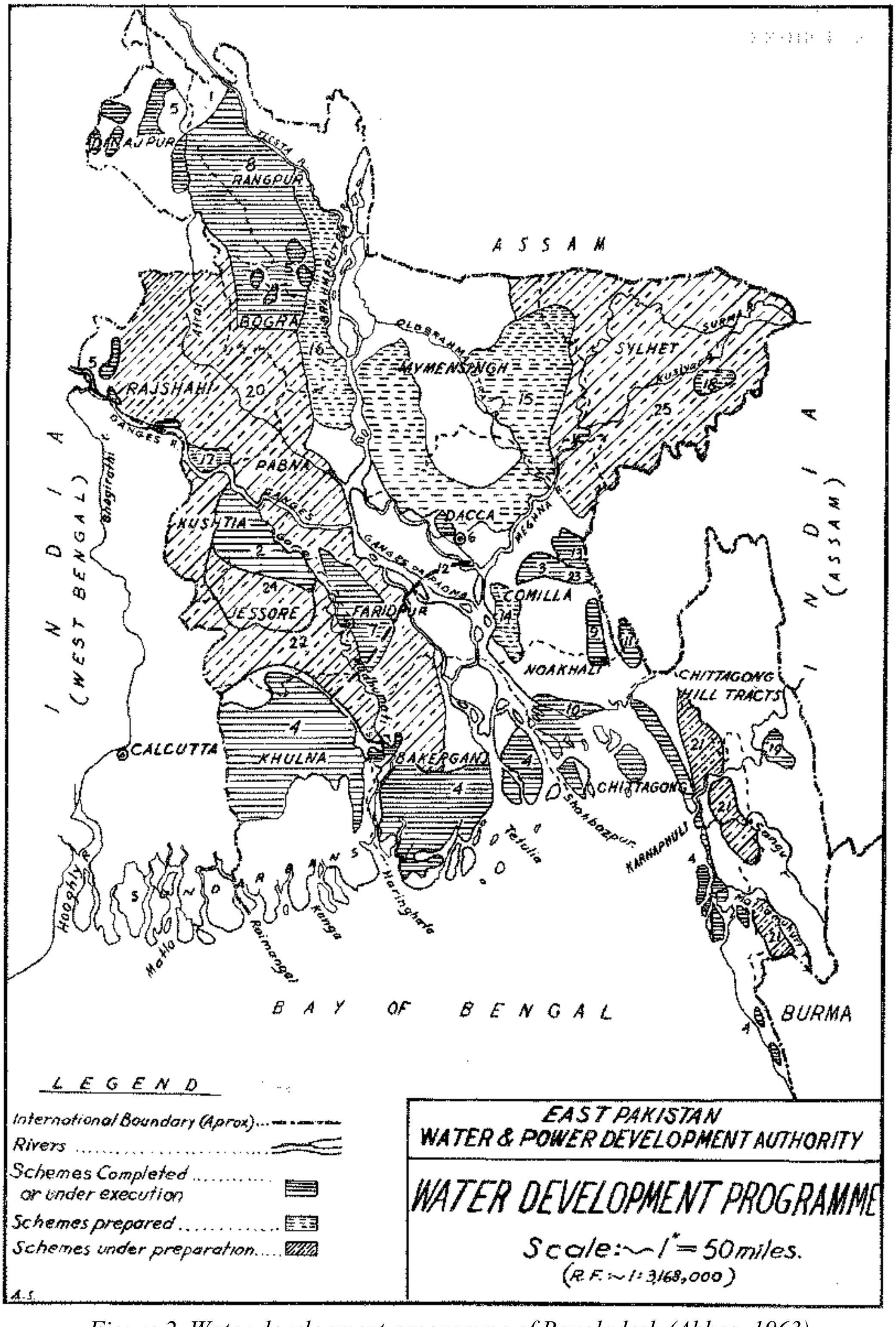


Figure 2. Water development programme of Bangladesh (Abbas, 1963)

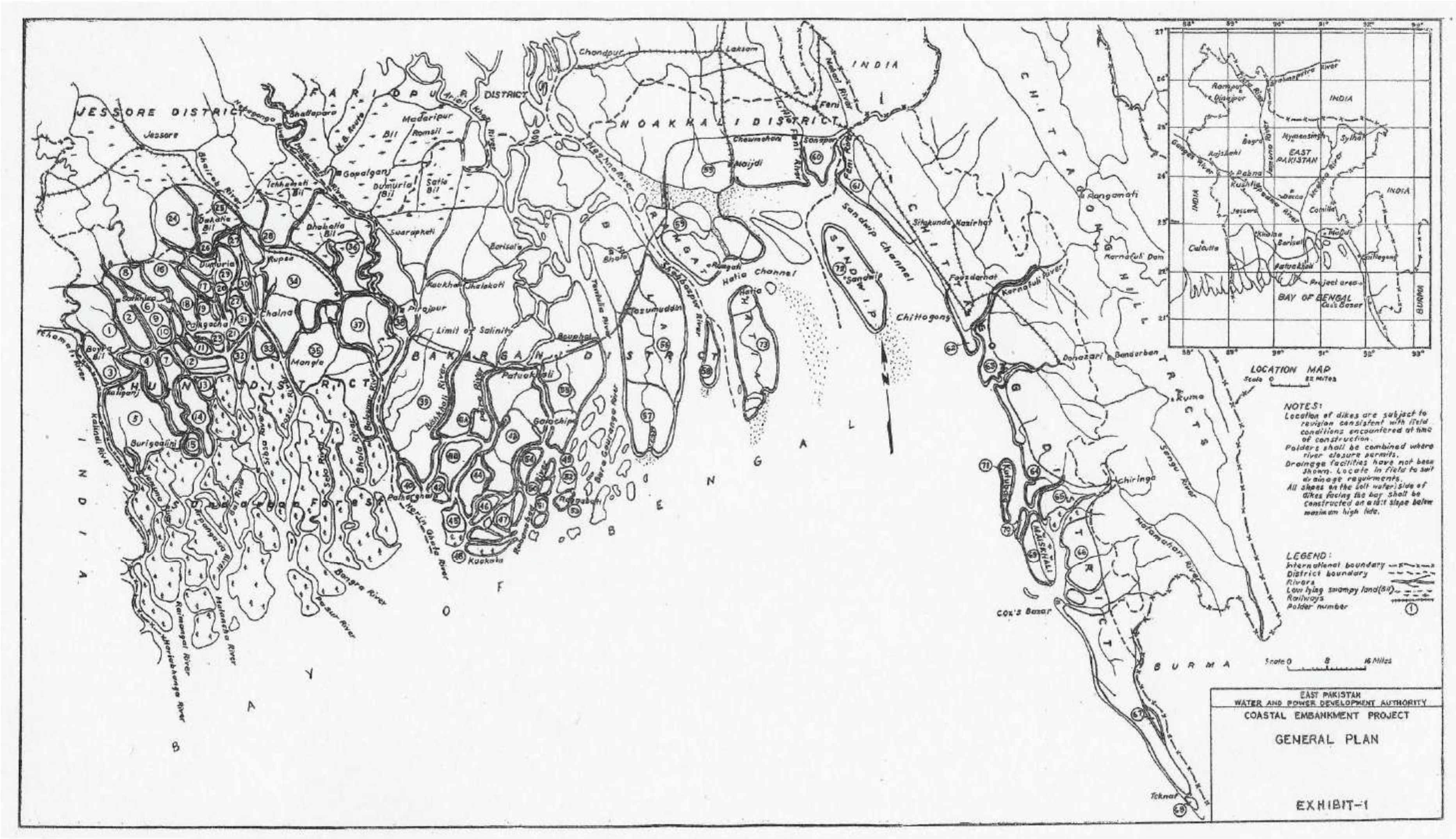


Figure 3. The envisaged 73 polders of the Coastal Embankment Project (Haq, 1963)

After the independence of Bangladesh in December 1971, the East Pakistan Water and Power Development Authority was bifurcated into two separate bodies, leading to the creation of the Bangladesh Water Development Board (BWDB) and the Bangladesh Power Development Board (BPDB). This was done with a view to undertake expanded water and power development programmes and speed up the execution of projects (Ali, 2002).

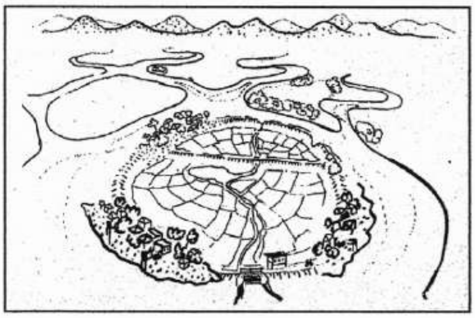
The emphasis on large scale works for high level flood control was dropped following the World Bank's Land and Water Resources Sector Study of 1972. Instead, the development of minor irrigation through low lift pumps (LLP) and tube wells, to some extent supported by complementary low cost Flood Control and Drainage (FCD) projects, was advocated (Ali, 2002).

In 1974 Bangladesh experienced a devastating flood. Considering the damage of that flood the Government realized the need for quick implementable FCD projects. FCD schemes are located in the floodplains of the rivers, or they are coastal polders. Dikes along the periphery provide protection against river, or sea floods, or against salt-water intrusion. Where necessary, hydraulic structures were placed in the dikes to drain natural channels which connect the low-lying areas and the rivers (*khals*). Many inland FCD schemes have field depressions that contain water during most, or all of the year (*beels*). They are often connected to rivers through a network of *khals* or man-made canals and can only be drained when river levels permit. In most FCD schemes there are nowadays three distinct cropping seasons, namely: Kharif-I, Kharif-II and Rabi. From an agricultural perspective the FCD schemes were designed to: i) protect standing Aus against early river floods; ii) expand the area under Aman by excluding flood waters from the schemes; iii) retain water in the schemes during the post-monsoon period (Ali, 2002).

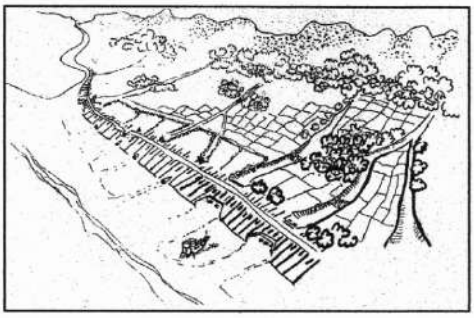
During the past decades huge investments have been made in flood protection, drainage and irrigation systems to reclaim and develop many polder areas. In these areas a careful water management is required to get optimal results from the investments in the physical infrastructure and enable the farmers to have a reasonable living. However, in many instances the actual water management in the FCD schemes has been below expectation, resulting in lower yields than were envisaged during the feasibility, design and construction stages. Past experiences in the water sector development showed the necessity of a good water policy in Bangladesh. After detailed discussions the Government of Bangladesh finalised the National Water Policy in 1999 (Ali, 2002).

Flood protection schemes bring about overall improvements, through the reduction of flood depth to ensure secure environments for living as well as for agriculture. However, they can also bring drastic changes in the existing water regime, which may result in an imbalance in aquatic environments and ecosystems. For example, structural interventions disrupt the free flowing environment of the floodplains. Moreover, continued congestion or stagnation can prevent natural flushing and lead to spreading of water-borne diseases that may threaten public health. Total elimination of floodwater can also severely impact groundwater recharge. FCD schemes generally cause negative impacts on capture fisheries, which results from reduction of regularly inundated floodplains and *beels* and blockage of past fish migration routes into the scheme area. In addition, pesticides used in rice fields may destroy fish species. Many fishermen have lost their livelihood or were diverted to river fisheries, leading to over-fishing in those areas, which are also adversely affected by the change in the fish migration potential. Flood control of FCD schemes has also provided opportunities for culture fisheries (Ali, 2002).

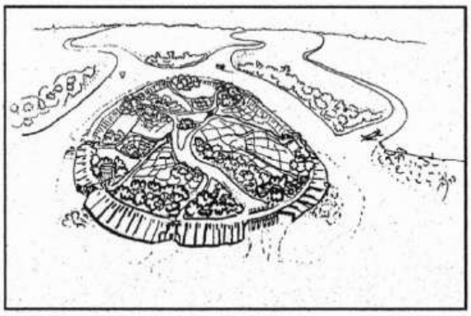
An important characteristic for classifying FCD schemes is the type of flooding they are subjected to. For example, it is possible to classify FCD schemes as drainage-only schemes, high level of protection against river flood schemes, protection against tidal flooding (coastal polders) schemes and protection against flash flood (haors) schemes. This classification ties in with the four different types of floods in Bangladesh, namely: i) rainfall floods; ii) river floods; iii) tidal or coastal flooding; iv) flash floods. Flash floods may occur in the eastern, northern and the north-eastern areas of the country at any time during the wet season. The duration of high flood stages may be for a few days. A rapid rise in river stage and associated high velocity may cause large damage to crops and properties. By taking into account the various characteristics of FCD schemes - such as the types of infrastructure, the topography, the main water management challenges and the typical conflicts - the water management schemes can be classified in (Figure 4): i) *Hoar* schemes; ii) Chittagong polders; iii) Khulna polders; iv) *Beel* schemes; v) Floodplain schemes. The location of polders in the Khulna Region is shown in Figure 5.



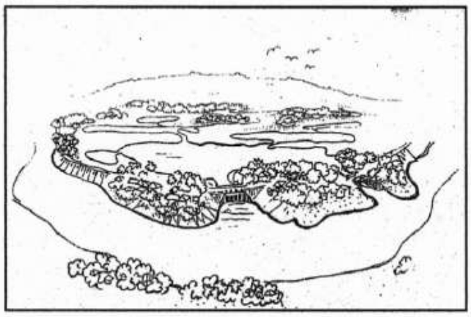
Haor scheme



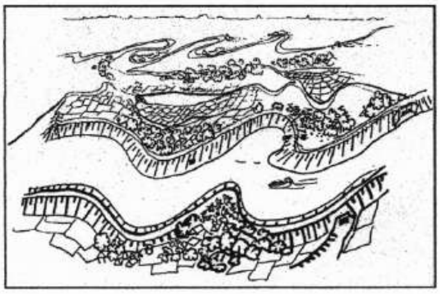
Chittagong polder



Khulna polder



Beel scheme



Floodplain scheme

Figure 4. Classification of water management schemes in Bangladesh (Bangladesh Water Development Board, 1997; Ali, 2002)

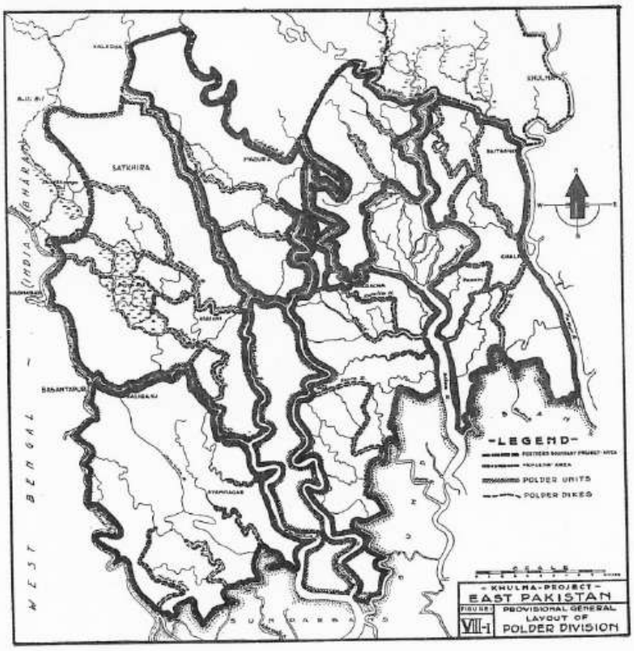


Figure 5. Location of polders in the Khulna Region

Existing polders

In the framework of the Land Reclamation Project the Char Baggardona (3,600 ha) was a pilot polder to identify: i) the lay out of subsurface and open collector drains; ii) desalinisation; iii) agricultural experiments (Chowhury, 1983).

Quassem (1983) gives a description of the Delta Development Project that was originally proposed in 1976 and consisted of three basic components: i) polder projects; ii) pilot areas; iii) delta development studies. In his paper he describes in more detail the activities in Polder 22 (Figure 6).

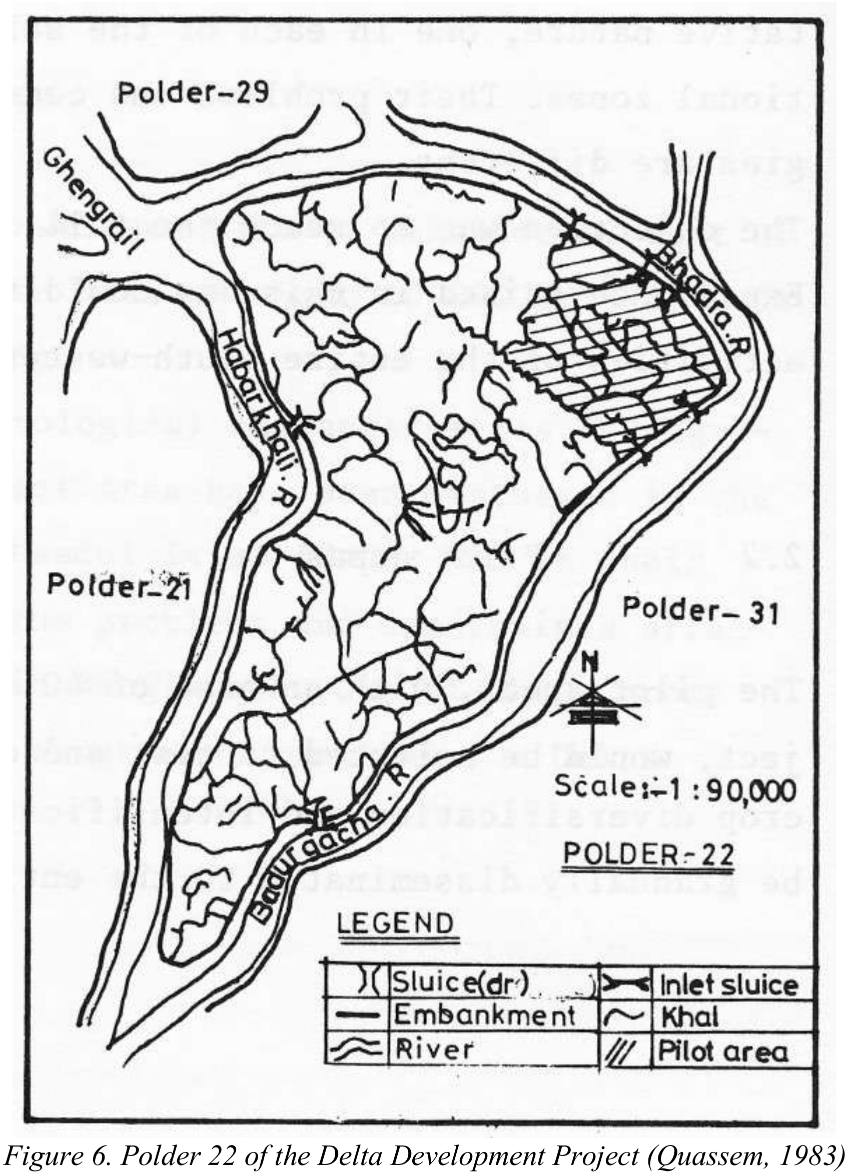


Figure 6. Polder 22 of the Delta Development Project (Quassem, 1983)

Saha and Biswas (2017) describe that since 1960s the Bangladesh Water Development Board (BWDB) has constructed 139 polders in the 14 coastal districts. Mondal *et al.* state that they cover a total area of 1.2 Mha. A detailed map of these polders is shown in Figure 7 (National Water Resources Database).

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

Proposed polders

No proposed polders have been identified.

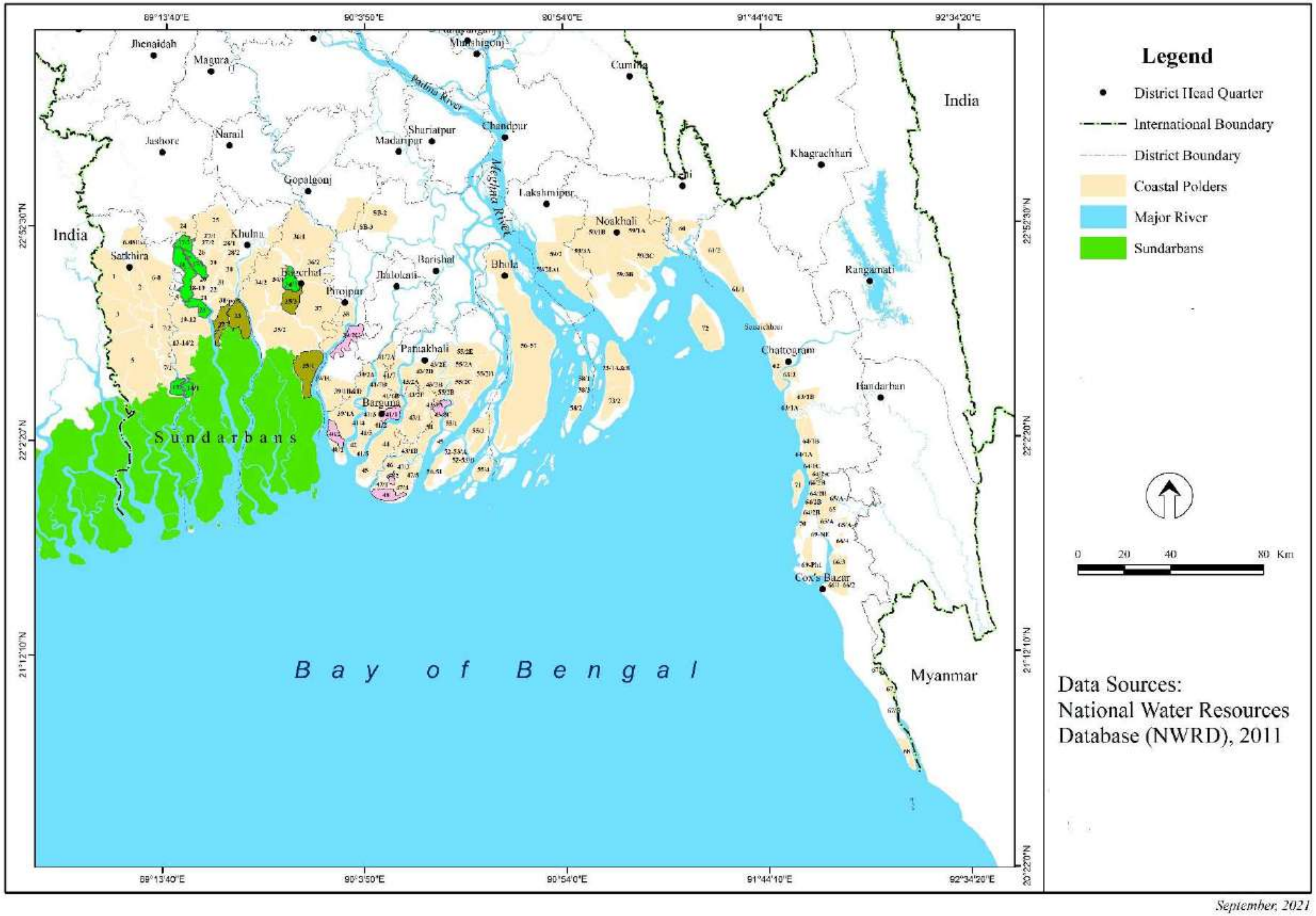


Figure 7. Coastal polders in Bangladesh (National Water Resources Database, 2021)

Drainage and flood protection

Haq (1963) gives design standards for drainage and flood protection. For drainage it would be a discharge capacity of 2.54 cm/day (1 inch) for polders where the mean annual rainfall is 1800 mm/year. For flood protection he gives a crest elevation based on the maximum gauge reading from the available records. For dikes subject to direct wave action from the Bay or large tidal estuaries with long fetches it would have to be a freeboard of 1.50 m (5 feet). For other stretches 0.90 m (3 feet). Side slope outside 1:3 and inside 1:2. For dikes along the Bay outside 1:10. Minimum distance from the outer toe to the river bank 30 m (100 feet) (Figure 8).

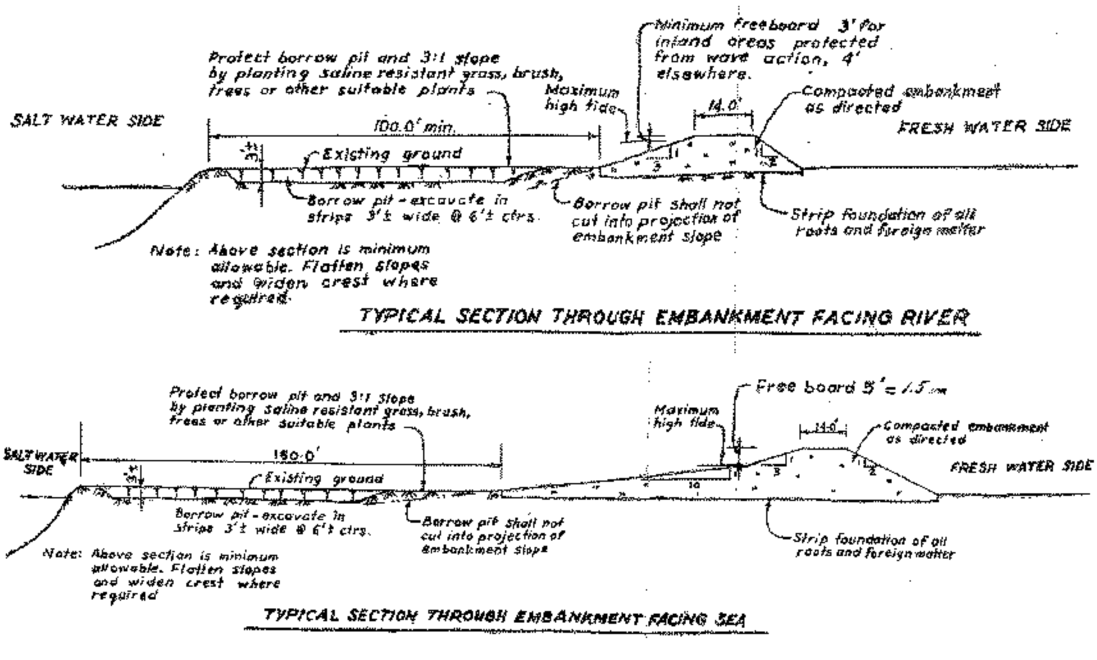


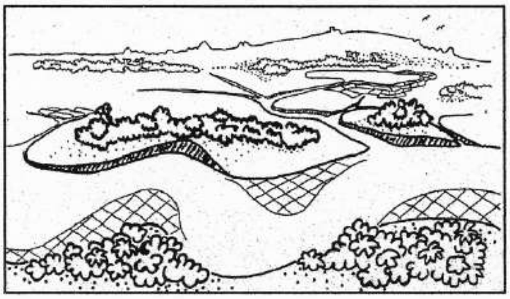
Figure 8. Typical section of the dikes along the Bay of Bengal (Haq, 1963; Aly, 2002)

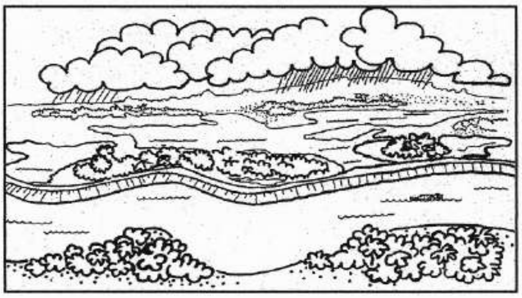
Uddin and Islam (1983) gave standardised dike profiles. These are shown in Table II.

Table II. Standardised dike profiles in Bangladesh (Uddin and Islam, 1983)

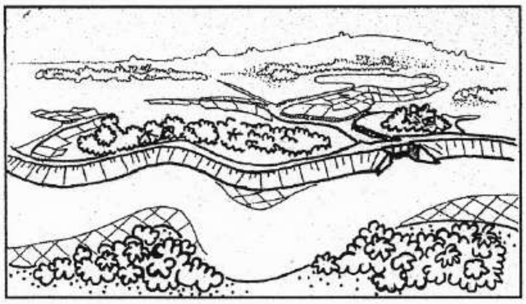
Type of dike	Side slope		Crest width in m	Minimum freeboard in m	Minimum set back from bank in m
	Country side	River side			
Sea	2 : 1	7 : 1	4.2	1.5	75
Interior	2 : 1	3 : 1	4.2	0.9	50
Marginal	2 : 1	2 : 1	2.4	0.9	40

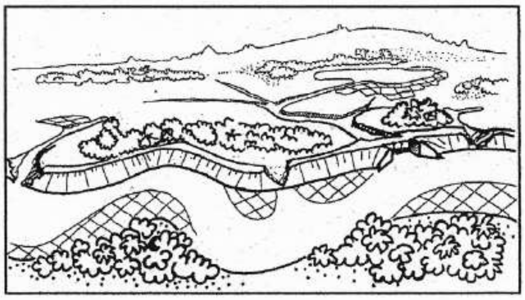
Ali (2002) gives an overview of the different types of drainage and flood control interventions (Figure 9). Many areas are complex and there are diverse sub-systems of the main rivers that enable the temporary storage of excess water during floods. In Bangladesh two types of floodplain can be distinguished, namely internal floodplains and deltaic floodplains. Before any Government intervention, flood control and drainage practices existed on the unprotected floodplains, people took initiatives to control water through the construction of small dikes, cross dams and drainage canals (Bangladesh Water Development Board, 1998; Ali, 2002). The internal floodplains, located mainly in the central and North-eastern part of the country are subject to seasonal flooding during the wet season. These floods are fairly predictable and the cropping patterns are adapted to them, although they result in low cropping intensities and yields. More damaging are the unpredictable flash floods, mainly in the Chittagong and Sylhet regions during the wet season. The situation in the deltaic plains along the coastal belt is not much different. The area suffers from flooding during spring tide and from salt intrusion during the dry season. Consequently yields are low (Bangladesh Water Development Board, 1998; Ali, 2002).



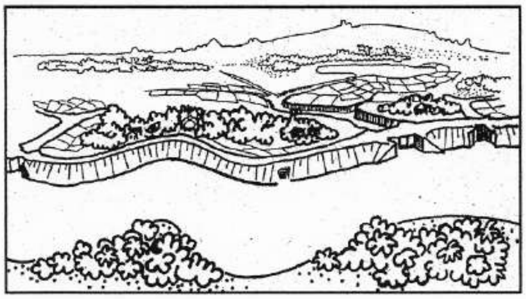


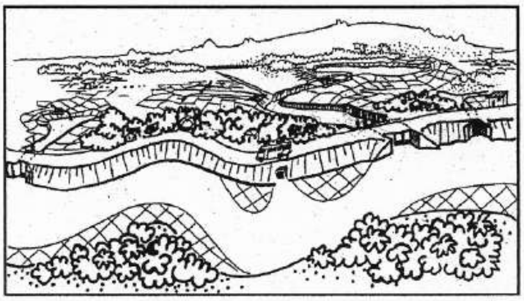
FCD scheme before any intervention | Initial intervention: flood protection





Including main sluices for drainage | Actions to alleviate local drainage congestion





Installation of minor sluices | Optimized water control

Figure 9. Overview of the different interventions in the lowlands of Bangladesh

The land elevation within a polder is not all over the same. That is why conflicts arise on water management. The stakeholders in a polder do not have the same interests. So, conflicts are found in almost all FCD schemes. The multitude of water management options in FCD schemes makes water management in these schemes quite complex. In addition the operation and maintenance of the FCD schemes is not up to the mark. A lot of effort is still needed to improve this situation (Ali, 2002).

Internationally, much has been written on improving water management in irrigation systems. This has resulted in the development of appropriate management models for irrigation systems. For FCD schemes this has not been the case and water management in FCD schemes remains much behind the management of irrigation systems (Bangladesh Water Development Board, 1997; Ali, 2002).

In order to increase crop security in the floodplains, initial Government interventions were invariably related to controlling floods from the river or from the sea. The intervention opted for was the construction of dikes. However, dikes solve the problem of flooding, but create others. They obstruct the drainage of rainwater from within the protected area. In some cases run-off from the hills also accumulated behind the dikes. The engineering solution to this problem is the construction of sluices (in the main channel only) in the dike equipped with flap gates on the riverside. However, the endiked area is not flooding free, because the first round of interventions also creates new problems, in particular drainage problems during the post wet season. Prior to the construction of a dike, the area would drain off almost as fast as river water levels fell, as water could drain from the area along the whole periphery. After completion of the flood control intervention, drainage was confined to the main arteries equipped with sluices, as smaller *khals* were often closed. Moreover, in many locations water got trapped in local low pockets behind the dikes. To evacuate the water trapped in low pockets, people have often cut the dikes. In this phase, surface drainage outlets were constructed to evacuate accumulated water from low pockets behind the dikes. Often some re-excavation work to improve the conveyance capacity of the drainage channels (*khals*) was carried out. This, however, was not the end of the development of the FCD schemes. As a result of the improved control over water farmers saw new possibilities of high yielding varieties and changed cropping patterns and intensities (Bangladesh Water Development Board, 1998; Ali, 2002). This has led to higher demands for water during the dry season. To meet this increasing demand for water, means were devised to retain water within the scheme at the end of the rainy season. During this phase, FCD schemes were remodelled to enable retention of water. The sluices, until then equipped only with flap gates, were modified by adding vertical lift gates on the countryside of the sluices. As water needed to be stored in the scheme for future use *khals* were deepened and widened to increase the storage capacity. With the possibility to retain water in the scheme, the need for devices to lift the water from the channels onto the land developed. Many traditional lifting devises were used, but this was also the moment when the low lift pumps (LLP) made their entry (Bangladesh Water Development Board, 1998; Ali, 2002).

Reinhard *et al*. (2019) describe the implementation of a pilot project on pumped drainage in Polder 2. They came to a required pumping capacity of 21,6 mm/day.

Mondal *et al*. (2019) analysed the drainage system of Polder 30 in the coastal zone (Figure 10). In this polder there are 21 regulators (11 sluice gates used for water intake and discharge and 10 gates for water intake only) in the dike surrounding the polder through which river water is taken in for irrigation during high tide and excess water is discharged to the rivers at low tide. They describe that based on monitoring and consultation with the stakeholders the drainage systems were designed for a ten years return period.

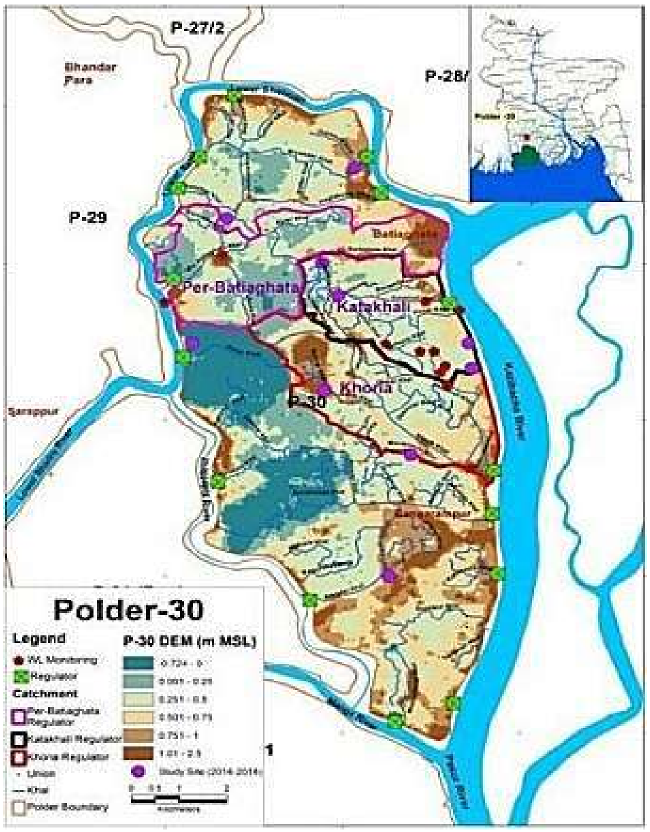


Figure 10. Map of Polder 30 showing the basin areas of the regulators and study sites (Mondal et al., 2019)

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

The locations of the polders in Bangladesh are shown in Figure 10.

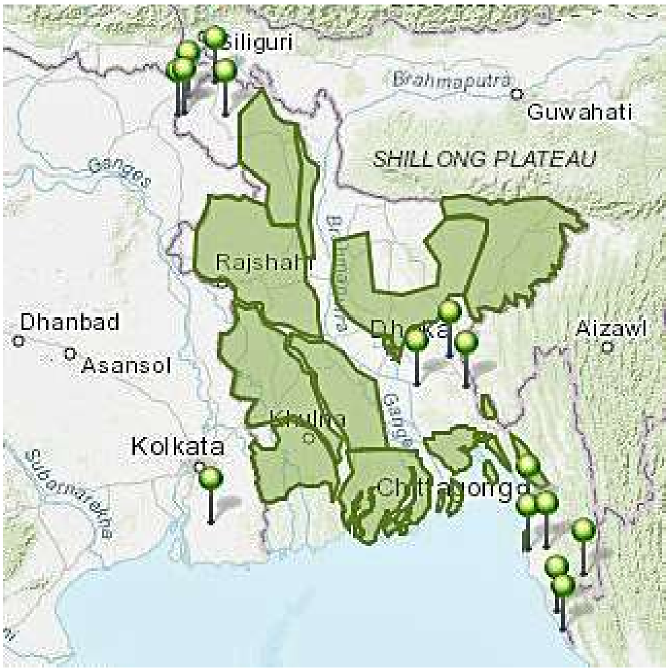


Figure 10. Location of the polders in Bangladesh (source: esri – Batavialand)

Table V shows the pictures by Prof. Adriaan Volker, and Table VI the pictures by Prof. Bart Schultz.

References

Abbas A.T., 1963. *Utilisation and development of the deltaic area of East Pakistan*. In: Proceedings of the regional symposium on flood control, reclamation, utilization and development of deltaic areas. 2-9 July 1963, Bangkok, Thailand. Water Resources Series No. 25. United Nations. New York, USA.

Alam, M., 1996. *Subsidence of the Ganges—Brahmaputra Delta of Bangladesh and associated drainage, sedimentation and salinity problems*. In: J. D. Milliman & B. U. Haq (Eds.), Sea-level rise and coastal subsidence: Causes, consequences, and strategies (pp 169-192). Dordrecht, The Netherlands: Springer, https://doi.org/10.1007/978-94-015-8719-8_9.

Ali, Kudrat, 1994. *Reduction of damage to submersible dikes in haor areas of Bangladesh*. MSc thesis. IHE. Delft, the Netherlands.

Ali, Liakath, 1995. *Flood control and drainage improvement possibilities in haor areas of Surma-Kushiara basin in the North-East of Bangladesh*. MSc Thesis, IHE. Delft, the Netherlands.

Ali, Liakath, 2002. *An integrated approach for the improvement of flood control and drainage schemes in the coastal belt of Bangladesh*. PhD thesis IHE, Delft, the Netherlands.

Alphen, J. van and Q. Lodder, 2006. Integrated flood management: experiences of 13 countries with their implementation and day-to-day management. *Irrigation and Drainage*. 55.S1. 159-171.

Bangladesh Planning Commission, 2018. *Bangladesh Delta Plan 2100. Volumes 1-Strategy and 2-Investment Plan. Dhaka, Bangladesh*. Government of the People's Republic of Bangladesh, General Economics Division (GED). https://www.bangladeshdeltaplan2100.org/. Last accessed 8 October 2018.

Bangladesh Water Development Board, 1997. *Water management in flood control and drainage system in Bangladesh*, Volume 1, System Rehabilitation Project, Technical Report No. 50, Dhaka, Bangladesh.

Bangladesh Water Development Board, 1998. *Annual flood report*. Flood Forecasting and Warning Centre, Dhaka, Bangladesh.

Bangladesh Water Development Board, 2012. *Social management plan Polder 39/2A*.

Brammer, H., 1990a, Floods in Bangladesh - Part 1, Geographical background to the 1987 and 1988 floods, *Geographical Journal* 156, No. 1, pp. 12-22.

Brammer, H., 1990b, Floods in Bangladesh - Part 2, Flood mitigation and environmental aspects, *Geographical Journal* 156, No. 2, pp. 158-165.

Brammer, H., 2004. *Can Bangladesh be protected from floods?* University Press Limited. Dhaka, Bangladesh.

Brammer, H., 2016. Floods, cyclones, drought and climate change in Bangladesh: a reality check. *The International Journal of Environmental Studies*. volume 73, issue 6 865-886.

Brown, S. and R. Nicholls, 2015. Subsidence and human influences in mega deltas: the case of the Ganges-Brahmaputra-Meghna. *Science of the Total Environment*, 527, 362-374.

Choudhury, G.A. 2006. *Experiences in integrated flood management in Bangladesh: A case study of Dhaka city in 2004 flood*. In: Alphen, J. van, E. van Beek and M. Taal (eds.). Floods, from defence to management. Symposium Proceedings. Taylor & Francis. Leiden/London/New York/Philagdelphia/Singapore.

Chowdhury, J.U. and M. Koch, 2000. *Bangladesh, a state at permanent flood risk*. In: Kassel Reports of Hydraulic Engineering. No. 9/2000. Hercules Verlag. Kassel, Germany.

Chowdhury, J.U., J.U. Rahamn and M.R. Salehin, 1997. *Flood control in a floodplain country: experiences of Bangladesh*. Islamic Educational, Scientific and Cultural Organization (ISESCO). Rabat, Morocco.

Chowhury, A.T., 1983. *Polder development in Bangladesh. Paper II: The land reclamation project.* In: Proceedings International Symposium 'Polders of the World'. International Institute for Land Reclamation and Improvement, Wageningen, the Netherlands.

Delft Hydraulics and Danish Hydraulic Institute (DHI) and Associates, 1996. *River survey projects*. Final report. Dhaka, Bangladesh.

Delta Development Project, 1985. *Design manual for polders in South-west Bangladesh*. Part 1, Vol. I – IV, Part 2, Vol. V – VII. Dhaka, Bangladesh.

Ellen, W.F.T, van, 1982. Polders in Bangladesh. *Cultuurtechnisch tijdschrift*, Jaargang 22, nr. 2. Aug./sept. (in Dutch)

Government of Bangladesh and Government of the Netherlands, 1997. *Char development and settlement project (CDSP)*. Report of the Joint Evaluation Mission.

Group Polder Development, Department of Civil Engineering, Delft University of Technology, 1982. *Polders of the World. Compendium of polder projects*. Delft, the Netherlands

Haq, Shafiqul, 1963. *Development of coastal region of East Pakistan by embankment*. In: Proceedings of the regional symposium on flood control, reclamation, utilization and development of deltaic areas. 2-9 July 1963, Bangkok, Thailand. Water Resources Series No. 25. United Nations. New York, USA.

Kabir, T., M. Salehin and Md. G. Kibria, 2016. *Impacts of post-disaster slow rehabilitation of a coastal polder on coastal livelihoods: a case study on Aila*. In: Proceedings of the 3rd International Conference on Civil Engineering for Sustainable Development (ICCESD 2016), 12~14 February 2016, KUET, Khulna, Bangladesh.

Land Reclamation Project, 1990. *Feasibility study on South Hatia cross-dams*. Bangladesh Water Development Board.

Minhaj Uddin Ahmed, 2002. *Development of a decision support system for water management in polder 43/2A*, Bangladesh. MSc Thesis, IHE. Delft, the Netherlands.

Mondal, M.K., Sudhir-Yadav, E. Hunphreys, S.V.K. Jagadish, Z.H. Khan, A.Sutradhar and F.A. Kamal, 2019. *Gravity drainage for cropping intensification in polders of the coastal zone of Bangladesh*. In: Development for water, food and nutrition security in a competitive environment. 3rd World Irrigation Forum. Bali, Indonesia.

Nicholls, R.J., W.N. Adger, C.W. Hutton and S.E. Hanson (eds), 2019. *Deltas in the antropocene*. Palgrave, Macmillan, Springer Nature, Switzerland. https://doi.org/10.1007/978-3-030-23517-8.

Quassem, A., 1983. *Polder development in Bangladesh. Paper III: The delta development project.* In: Proceedings International Symposium 'Polders of the World'. International Institute for Land Reclamation and Improvement, Wageningen, the Netherlands.

Rahman, Md. Habibur, Emaduddin Ahmad and Mukhles Zaman, 2007. *Management of closed off tidal basin - Muhuri Basin in Bangladesh*. In: Rijkswaterstaat. Management of closed-off tidal basins. International expert meeting 9 to 12 October 2017. The Netherlands.

Rahman, Md. Habibur and S. Kumar Biswas, 2010. *Cost effective adaptation strategy for the disaster prone areas of coastal area of Bangladesh*. In: Proceedings of the International Symposium on Coastal Zones and Climate Change: Assessing the Impacts and Developing Adaptation Strategies, 12 -13 April, Monash University Gippsland, Churchill, Victoria, Australia.

Rahman, Md. Habibur and GM Akram Hossain Peng, 2018. *Post ECRRP integrated coastal polder irrigation management in Southern Banglades – Case studies of success in polder 55/2D*. In: Irrigation in support of evergreen revolution. Proceedings of the 8th Asian Regional Conference. Kathmandu, Nepal.

Rahman, S. and M.A. Rahman, 2015. Climate extremes and challenges to infrastructure development in coastal cities in Bangladesh. *Weather and Climate Extremes*, Volume 7, 96-108.

Rafiqul Islam, M., 2004. *Where land meets the sea: a profile of the coastal zone of Bangladesh*. Program Development Office for Integrated Coastal Zone Management Plan (PDO-ICZMP), Water Resources Planning Organization (WARPO). Dhaka, Bangladesh.

Rasid, Harun and Bimal Kanti Paul, 1987. Flood problems in Bangladesh: Is there an indigenous solution? *Environmental Management*. Volume 11, Issue 2, pp 155–173.

Reinhard, S., T. Vergroesen and F. Schasfoort. 2019. *Governance of investment in pumped drainage in waterlogged polders*. In: Proceedings 3rd World Irrigation Forum, Bali, Indonesia. International Commission on Irrigation and Drainage. New Delhi, India.

Saha, Subrota and Satchidananda Biswas, 2017. *Polder drainage system to mitigate vulnerable ecosystem of coastal Bangladesh*. In: Proceedings of the 13th ICID International Drainage Workshop. 4 – 7 March, Ahwaz, Iran.

Saleem, M., 1990. *Impeded drainage and water management problems of polders in the South-West Delta of Bangladesh.* MSc Thesis, IHE, Delft, the Netherlands.

Sarwar, G.M. and M.H. Khan, 2007. Sea level rise. A threat to the coast of Bangladesh. *Internationales Asienforum*, vol. 38, issue 3-4.

Sazedul, MD., K. Chowdhury and MD. A. Haque, 2010. *Climate chance impacts in coastal zones: context Bangladesh*. In: Proceedings of the International Symposium on Coastal Zones and Climate Change: Assessing the Impacts and Developing Adaptation Strategies, 12 -13 April, Monash University Gippsland, Churchill, Victoria, Australia.

Schultz, Bart and M. Liakath Aly, 2001. *New approach to water management in the polders of Bangladesh*. In: Proceedings workshop on the Agricultural based development of tidal swamps and estuaries and environmental considerations, Seoul, Korea, 19 September 2001.

Schultz, Bart, Md. Liakath Ali and F.X. Suryadi, 2002. *Water management objectives and their realization in tidal lowland areas in Bangladesh and Indonesia*. In: Proceedings of the workshop on Sustainable development of tidal lands, Montreal, Canada, July 22. International Commission on Irrigation and Drainage, New Delhi, India.

Shamaji, M.M.H., 2010. *Adaptation strategies and policies of LGED in the coastal areas of Bangladesh*. In: Proceedings of the International Symposium on Coastal Zones and Climate Change: Assessing the Impacts and Developing Adaptation Strategies, 12 -13 April, Monash University Gippsland, Churchill, Victoria, Australia.

Staveren, M. van, 2017. *Bringing in the floods: a comparative study on controlled flooding in the Dutch, Bangladesh and Vietnamese deltas.* PhD thesis. Wageningen University & Research. Wageningen, the Netherlands.

Uddin, Md. M. and Sh. Islam, 1983. *Polder development in Bangladesh. Paper I: Past and present development.* In: Proceedings International Symposium 'Polders of the World'. International Institute for Land Reclamation and Improvement, Wageningen, the Netherlands.

United Nations, Department of Economic and Social Affairs, Population Division. 2022. *World population prospects, medium prognosis. The 2022 revision*. New York, USA.

World Bank, 2021. *Building coastal resilience to protect lives and Livelihoods in Bangladesh*.

Web site:

- https://bwdb.gov.bd/en/completed-project

Bart Schultz
Lelystad, June 2023

Table III. General characteristics of existing polders in Bangladesh

Name	Reclamation	Area in ha	Type *)	Latitudes	Longitudes	Elevation in m+MSL	Land use
Chittagong polders							
Noakhali	1957-1963	25,000	RLL	22° 52' N	91° 05' E	5	Agriculture
Polder 62			RLL	22° 15' N	91° 48' E	7	Agriculture
Polder 63/1A			RLL	22° 12' N	91° 49' E	5	Agriculture
Polder 63/1B			RLL	22° 12' N	91° 55' E	6	Agriculture
Polder 63/2			RLL	22° 18' N	91° 50' E	4	Agriculture
Polder 64/1A			RLL	21° 58' N	91° 56' E	3	Agriculture
Polder 64/1B			RLL	22° 6' N	91° 54' E	6	Agriculture
Polder 64/1C			RLL	21° 57' N	91° 54' E	5	Agriculture
Polder 64/2A			RLL	21° 54' N	91° 55' E	5	Agriculture
Polder 64/2B			RLL	21° 50' N	91° 56' E	6	Agriculture
Polder 65			RLL	21° 45' N	91° 60' E	5	Agriculture
Polder 65/A			RLL	21° 40' N	91° 59' E	6	Agriculture
Polder 65/A-1			RLL	21° 39' N	92° 3' E	5	Agriculture
Polder 65/A-3			RLL	21° 50' N	91° 59' E	6	Agriculture
Polder 66/1			RLL	21° 28' N	91° 59' E	6	Agriculture
Polder 66/2			RLL	21° 27' N	92° 2' E	6	Agriculture
Polder 66/3			RLL	21° 34' N	92° 1' E	6	Agriculture
Polder 66/4			RLL	21° 39' N	92° 1' E	6	Agriculture
Polder 67			RLL	21° 3' N	92° 14' E	8	Agriculture
Polder 67/A			RLL	21° 9' N	92° 11' E	4	Agriculture
Polder 67/B			RLL	20° 58' N	92° 15' E	8	Agriculture
Polder 68			RLL	20° 51' N	92° 18' E	7	Agriculture
Polder 69-NE, Maiskhali			RLL	21° 40' N	91° 53' E	6	Agriculture
Polder 69-Ph1			RLL	21° 34' N	91° 54' E	7	Agriculture
Polder 70			RLL	21° 42' N	91° 53' E	5	Agriculture
Polder 71			RLL	21° 50' N	91° 52' E	5	Agriculture
Polder 72, Sandwip			RLL	22° 30' N	91° 29' E	5	Agriculture
Khulna polders							
Ganges-Kobadak Scheme		25,000	RLL	23° 60' N	88° 60' E	15	Agriculture
Polder 1			RLL	22° 37' N	89° 11' E	1	Agriculture
Polder 2		12,296	RLL	22° 39' N	89° 12' E	0	Agriculture
Sub-total		50,000					

Table III. General characteristics of existing polders in Bangladesh (continued)

Name	Reclamation	Area in ha	Type *)	Latitudes	Longitudes	Elevation in m+MSL	Land use
Sub-total previous page		50,000					
Polder 4			RLL	22° 30' N	89° 9' E	2	Agriculture
Polder 5, Burigoalini			RLL	22° 21' N	89° 2' E	0	Agriculture
Polder 6			RLL	22° 37' N	89° 13' E	1	Agriculture
Polder 7/1			RLL	22° 17' N	89° 14' E	0	Agriculture
Polder 7/2			RLL	22° 28' N	89° 14' E	0	Agriculture
Polder 8			RLL	22° 37' N	89° 13' E	-1	Agriculture
Polder 9			RLL	22° 36' N	89° 12' E	1	Agriculture
Polder 10			RLL	22° 34' N	89° 14' E	1	Agriculture
Polder 11			RLL	22° 34' N	89° 14' E	0	Agriculture
Polder 12			RLL	22° 34' N	89° 14' E	0	Agriculture
Polder 13			RLL	22° 25' N	89° 13' E	0	Agriculture
Polder 14/1			RLL	22° 15' N	89° 19' E	0	Agriculture
Polder 14/2			RLL	22° 25' N	89° 13' E	0	Agriculture
Polder 15			RLL	22° 14' N	89° 17' E	0	Agriculture
Polder 16			RLL	22° 42' N	89° 13' E	-1	Agriculture
Polder 17/1			RLL	22° 42' N	89° 14' E	0	Agriculture
Polder 17/2			RLL	22° 46' N	89° 14' E	0	Agriculture
Polder 18			RLL	22° 40' N	89° 13' E	-1	Agriculture
Polder 19			RLL	22° 40' N	89° 14' E	-1	Agriculture
Polder 20			RLL	22° 41' N	89° 15' E	2	Agriculture
Polder 21			RLL	22° 36' N	89° 14' E	3	Agriculture
Polder 22			RLL	22° 40' N	89° 15' E	3	Agriculture
Polder 23			RLL	22° 35' N	89° 14' E	2	Agriculture
Polder 24			RLL	22° 51' N	89° 13' E	-1	Agriculture
Polder 26			RLL	22° 43' N	89° 14' E	-1	Agriculture
Polder 27/1			RLL	22° 48' N	89° 14' E	1	Agriculture
Polder 27/2			RLL	22° 48' N	89° 14' E	1	Agriculture
Polder 28/1			RLL	22° 46' N	89° 16' E	3	Agriculture
Polder 28/2			RLL	22° 43' N	89° 17' E	3	Agriculture
Polder 29			RLL	22° 42' N	89° 15' E	0	Agriculture
Polder 30 (Batiaghata Upazila)	1971	7,725	RLL	22° 41' N	89° 17' E	0 - 1	Agriculture
Sub-total		57,725					

Table III. General characteristics of existing polders in Bangladesh (continued)

Name	Reclamation	Area in ha	Type *)	Latitudes	Longitudes	Elevation in m+MSL	Land use
Sub-total previous pages		57,725					
Polder 31			RLL	22° 40' N	89° 17' E	2	Agriculture
Polder 32			RLL	22° 34' N	89° 17' E	3	Agriculture
Polder 33			RLL	22° 35' N	89° 18' E	1	Agriculture
Beel schemes							
Polder 3, Boyra *Beel*			RLL	22° 35' N	89° 11' E	0	Agriculture
Polder 25, *Beel* Dakatia	1994	1,043	RLL	22° 52' N	89° 14' E	0	Agriculture
Polder 36/1, Dhabalia Bil			RLL	22° 48' N	89° 44' E	8	Agriculture
Polder 36/2, Dhabalia Bil			RLL	22° 41' N	89° 50' E	8	Agriculture
Coastal polders							
Polder 34/1, Rupsa			RLL	22° 41' N	89° 41' E	5	Agriculture
Polder 34/2			RLL	22° 40' N	89° 39' E	5	Agriculture
Polder 34/3			RLL	22° 40' N	89° 43' E	5	Agriculture
Polder 35/1, Mongla			RLL	22° 18' N	89° 49' E	1	Agriculture
Polder 35/2			RLL	22° 34' N	89° 43' E	1	Agriculture
Polder 35/3			RLL	22° 36' N	89° 43' E	1	Agriculture
Polder 37			RLL	22° 36' N	89° 49' E	6	Agriculture
Polder 38			RLL	22° 36' N	89° 57' E	1	Agriculture
Polder 39/1A	1968	30,200	RLL	22° 8' N	89° 58' E	2	Agriculture
Polder 39/1B&D			RLL	22° 15' N	89° 58' E	2	Agriculture
Polder 39/1C			RLL	22° 17' N	89° 57' E	2	Agriculture
Polder 39/2A			RLL	22° 18' N	90° 2' E	2	Agriculture
Polder 39/2C			RLL	22° 18' N	89° 57' E	2	Agriculture
Polder 40/1		2,000	RLL	22° 0' N	89° 58' E	1	Agriculture
Polder 40/2		4,480	RLL	22° 2' N	89° 58' E	1	Agriculture
Polder 41/1			RLL	22° 9' N	90° 10' E	2	Agriculture
Polder 41/2			RLL	22° 8' N	90° 7' E	3	Agriculture
Polder 41/3			RLL	22° 9' N	90° 4' E	3	Agriculture
Polder 41/4			RLL	22° 8' N	90° 2' E	3	Agriculture
Polder 41/5			RLL	22° 2' N	90° 4' E	3	Agriculture
Polder 41/6B			RLL	22° 15' N	90° 7' E	3	Agriculture
Polder 41/7			RLL	22° 18' N	90° 7' E	3	Agriculture
Polder 41/7A			RLL	22° 25' N	90° 6' E	3	Agriculture
Sub-total		95,408					

Table III. General characteristics of existing polders in Bangladesh (continued)

Name	Reclamation	Area in ha	Type *)	Latitudes	Longitudes	Elevation in m+MSL	Land use
Sub-total previous pages		58,768					
Polder 41/7B			RLL	22º 17' N	90º 7' E	3	Agriculture
Polder 42			RLL	22º 01' N	90º 02' E	2	Agriculture
Polder 43/1			RLL	22º 9' N	90º 15' E	1	Agriculture
Polder 43/1A			RLL	22º 12' N	90º 24' E	1	Agriculture
Polder 43/1B			RLL	22º 0' N	90º 15' E	1	Agriculture
Polder 43/2A		5,100	RLL	22º 19' N	90º 14' E	1	Agriculture
Polder 43/2B			RLL	22º 17' N	90º 23' E	1	Agriculture
Polder 43/2C			RLL	22º 9' N	90º 24' E	1	Agriculture
Polder 43/2D			RLL	22º 20' N	90º 20' E	1	Agriculture
Polder 43/2E			RLL	22º 21' N	90º 24' E	1	Agriculture
Polder 43/2F			RLL	22º 14' N	90º 16' E	1	Agriculture
Polder 44			RLL	22º 03' N	90º 7' E	3	Agriculture
Polder 45			RLL	21º 55' N	90º 3' E	5	Agriculture
Polder 46			RLL	21º 59' N	90º 9' E	3	Agriculture
Polder 47/1			RLL	21º 52' N	90º 7' E	4	Agriculture
Polder 47/2			RLL	21º 53' N	90º 11' E	4	Agriculture
Polder 47/3			RLL	21º 56' N	90º 14' E	4	Agriculture
Polder 47/4			RLL	21º 51' N	90º 12' E	4	Agriculture
Polder 47/5			RLL	21º 56' N	90º 16' E	4	Agriculture
Polder 48			RLL	21º 49' N	90º 10' E	1	Agriculture
Polder 49			RLL	22º 06' N	90º 22' E	2	Agriculture
Polder 50-51			RLL	21º 54' N	90º 20' E	3	Agriculture
Polder 52-53A			RLL	22º 1' N	90º 26' E	3	Agriculture
Polder 52-53/B			RLL	21º 58' N	90º 27' E	3	Agriculture
Polder 54			RLL	22º 06' N	90º 20' E	3	Agriculture
Polder 55/1			RLL	22º 7' N	90º 26' E	2	Agriculture
Polder 55/2A			RLL	22º 21' N	90º 29' E	2	Agriculture
Polder 55/2B			RLL	22º 14' N	90º 26' E	2	Agriculture
Polder 55/2C			RLL	22º 16' N	90º 26' E	2	Agriculture
Polder 55/2D			RLL	22º 20' N	90º 34' E	2	Agriculture
Polder 55/2E			RLL	22º 24' N	90º 29' E	2	Agriculture
Sub-total		100,508					

Table III. General characteristics of existing polders in Bangladesh (continued)

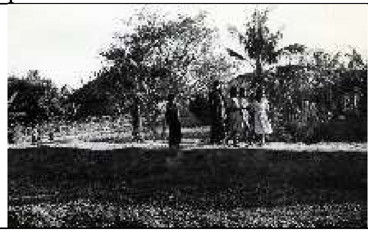
Name	Reclamation	Area in ha	Type *)	Latitudes	Longitudes	Elevation in m+MSL	Land use
Sub-total previous pages		100,508					
Polder 55/3			RLL	22º 5' N	90º 33' E	2	Agriculture
Polder 55/4			RLL	21º 56' N	90º 33' E	2	Agriculture
Polder 56-57			RLL	22º 21' N	90º 45' E	2	Agriculture
Polder 58/1			RLL	22º 16' N	90º 59' E	2	Agriculture
Polder 58/2			RLL	22º 9' N	90º 57' E	2	Agriculture
Polder 58/3			RLL	22º 13' N	90º 59' E	2	Agriculture
Polder 59/1A			RLL	22º 51' N	91º 14' E	2	Agriculture
Polder 59/1B			RLL	22º 51' N	90º 59' E	2	Agriculture
Polder 59/2			RLL	22º 44' N	90º 54' E	2	Agriculture
Polder 59/2Ext			RLL	22º 44' N	90º 51' E	2	Agriculture
Polder 59/3A			RLL	22º 46' N	90º 58' E	2	Agriculture
Polder 59/3B			RLL	22º 40' N	91º 7' E	2	Agriculture
Polder 59/3C			RLL	22º 47' N	91º 16' E	2	Agriculture
Polder 60			RLL	22º 52' N	91º 24' E	2	Agriculture
Polder 61/1			RLL	22º 36' N	91º 39' E	4	Agriculture
Polder 61/2			RLL	22º 48' N	91º 32' E	4	Agriculture
Classification not yet identified							
Char Baggardona	1983	3,600	RLL				Agriculture
Muhuri Basin	1985	3,500	RLL	23º 00' N	91º 28' E	5	Agriculture
Sub-total		7,100					Agriculture
Total		> 3,500,000					

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

Table IV. Characteristics of the water management and flood protection system of existing polders in Bangladesh

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			
Polder 2	RLL				21.6			
Polder 30 (Batiaghata Upazila)	RLL	0.1% per year						
Polder 47/4	RLL						1/20 free board 1m	
Polder 61/1	RLL						1/20 free board 1m	

Table V. Pictures on polders and lowlands in Bangladesh by Prof. Adriaan Volker

			
A2 060/I.2.60 Sluice with gates for discharge during low tide in Bangladesh	A3 001/IX.3.1 Group picture in front of a plane. Prof. Adriaan Volker in the middle	A3 002/IX.3.2 Dike, dike construction and probably polder area Bhil Dakhatia	A3 003/IX.3.3 Dike, dike construction and probably polder area Bhil Dakhatia
			
A3 005/IX.3.5 Dike, dike construction and probably polder area Bhil Dakhatia	A3 006/IX.3.6 Dike, dike construction and probably polder area Bhil Dakhatia	A3 007/IX.3.7 Dike, dike construction and probably polder area Bhil Dakhatia	A3 008/IX.3.8 Dike, dike construction and probably polder area Bhil Dakhatia
			
A3 009/IX.3.9 Habitation behind a local dike, probably polder area Bhil Dakhatia	A3 010/IX.3.10 Dike, dike construction and probably polder area Bhil Dakhatia	A3. 011/IX.3.11 Dike, dike construction and probably polder area Bhil Dakhatia	A3. 012/IX.3.12 Dike, dike construction and probably polder area Bhil Dakhatia

*) Batavialand/orginal

Table V. Pictures on polders and lowlands in Bangladesh by Prof. Adriaan Volker (continued)

			
A3. 013/IX.3.13 Dike, dike construction and probably polder area Bhil Dakhatia	A3. 014/IX.3.14 Dike, dike construction and probably polder area Bhil Dakhatia	A3. 015/IX.3.15 Dike, dike construction and probably polder area Bhil Dakhatia	A3. 016/IX.3.16 Preparation of blocks for dike construction, probably polder area Bhil Dakhatia
			
A3. 017/IX.3.17 Preparation of blocks for dike construction, probably polder area Bhil Dakhatia	A3. 018/IX.3.18 Preparation of blocks for dike construction, probably polder area Bhil Dakhatia	A3. 019/IX.3.19 Dike, dike construction and probably polder area Bhil Dakhatia	A3. 020/IX.3.20 Dike, dike construction and probably polder area Bhil Dakhatia
			
A3. 021/IX.3.21 Dike, dike construction and probably polder area Bhil Dakhatia	A3. 022/IX.3.22 Tiket Nadi, probably a polder area	A3. 023/IX.3.23 Tiket Nadi, probably a polder area	A3. 024/IX.3.24 Tiket Nadi, probably a polder area

Table V. Pictures on polders and lowlands in Bangladesh by Prof. Adriaan Volker (continued)

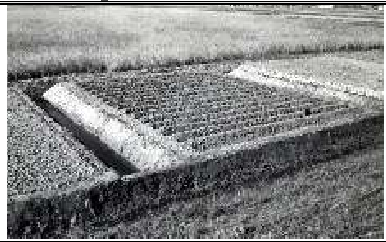
			
A3. 025/IX.3.25 Tiket Nadi, probably a polder area	A3. 026/IX.3.26 Tiket Nadi, probably a polder area	A3. 027/IX.3.27 Polder area	A3. 028/IX.3.28 Polder area
			
A3. 029/IX.3.29 Polder area	A3. 030/IX.3.30 Polder area	A3. 031/IX.3.31 Polder area	A3. 032/IX.3.32 Dacca Demra project, October 1975
			
A3. 033/IX.3.33 Dacca Demra project, October 1975	A3. 034/IX.3.34 Dacca Demra project, October 1975	A3. 035/IX.3.35 Aerial picture polder area along the Megna River	A3. 036/IX.3.36 Aerial picture polder area along the Megna River

Table V. Pictures on polders and lowlands in Bangladesh by Prof. Adriaan Volker (continued)

			
A3. 037/IX.3.37 Sea dike Bhola Isle	A3. 038/IX.3.38 Sea dike Bhola Isle	A3. 039/IX.3.39 Aerial picture Nabu Patharghata	A3. 040/IX.3.40 Aerial picture Nabu Patharghata
			
A3. 041/IX.3.41 Aerial picture Ganges Kobadak	A3. 042/IX.3.42 Ganges Kobadak	A3. 043/IX.3.43 Aerial picture Ganges Kobadak	A3. 044/IX.3.44 Aerial picture right bank dike Brahmaputra
			
A3. 045/IX.3.45 Aerial picture right bank dike Brahmaputra	A3. 046/IX.3.46 Chankra sluice of Polder 1	A3. 047/IX.3.47 Chankra sluice of Polder 1	A3. 048/IX.3.48 Chankra sluice of Polder 1

Table V. Pictures on polders and lowlands in Bangladesh by Prof. Adriaan Volker (continued)

			
A3. 049/IX.3.49 Sluice Satkhira *Khal*, 9 October	A3. 050/IX.3.50 Sluice Satkhira *Khal*, 9 October	A3. 051/IX.3.51 Sluice Satkhira *Khal*, 9 October	A3. 052/IX.3.52 Assasuni, 9 October
			
A3. 053/IX.3.53 Assasuni, 9 October	A3. 054/IX.3.54 Assasuni, 9 October	A3. 055/IX.3.55 Assasuni, 9 October	A3. 056/IX.3.56 Outlet sluice, flap gates, 11 October
			
A3. 057/IX.3.587 Outlet sluice, flap gates, 11 October	A3. 058/IX.3.58 Outlet sluice, flap gates, 11 October	A3. 059/IX.3.59 Outlet sluice, flap gates, 11 October	A3. 060/IX.3.60 Outlet sluice, flap gates, 11 October

Table V. Pictures on polders and lowlands in Bangladesh by Prof. Adriaan Volker (continued)

			
A3. 061/IX.3.61 Polder area, 12 October	A3. 062/IX.3.62 Polder area, 12 October	A3. 063/IX.3.63 Polder area, 12 October	A3. 064/IX.3.64 Polder area, 12 October
			
A3. 065/IX.3.65 Polder area, 12 October	A3. 066/IX.3.66 Polder area, 12 October	A3. 067/IX.3.67 Polder area, 12 October	A3. 068/IX.3.68 Pilot Polder Patharghata, 13 October
			
A3. 069/IX.3.69 Pilot Polder Patharghata, 13 October	A3. 070/IX.3.70 Pilot Polder Patharghata, 13 October	A3. 071/IX.3.71 Polder 44, 13 October	A3. 072/IX.3.72 Polder 44, 13 October

Table V. Pictures on polders and lowlands in Bangladesh by Prof. Adriaan Volker (continued)

			
A3. 073/IX.3.73 Polder 44, 13 October	A3. 074/IX.3.74 Polder 44, 13 October	A3. 075/IX.3.75 Polder area, 13 October	A3. 076/IX.3.76 Polder area, 13 October
			
A3. 077/IX.3.77 Polder area, 13 October	A3. 078/IX.3.78 Polder area, 13 October	A3. 079/IX.3.79 Cyclone shelter, 13 October	A4 001/IX.4.1 Polder area, 1978
			
A4 002/IX.4.2 Polder area, 1978	A4 003/IX.4.3 Polder area, 1978	A4 004/IX.4.4 Polder area, 1978	A4 005/IX.4.5 Polder area, 1978

Table V. Pictures on polders and lowlands in Bangladesh by Prof. Adriaan Volker (continued)

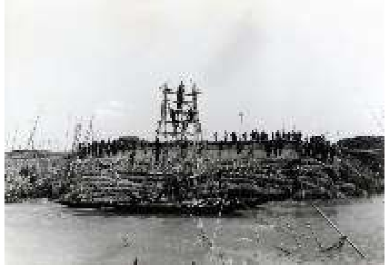
			
A4 006/IX.4.6 Polder area, 1978	A4 007/IX.4.7 Polder area, 1978	A4 008/IX.4.8 Polder area, 1978	A4 009/IX.4.9 Polder area, 1978
			
A4 010/IX.4.10 Visit to a closing gap in a river dike under construction. 1978	A4 011/IX.4.11 Polder area, 1978	A4 012/IX.4.12 Polder area, 1978	A4 013/IX.4.13 Polder area, 1978
			
A4 014/IX.4.14 Polder area, 1978	A4 015/IX.4.15 Polder area, 1978	A4 016/IX.4.16 Polder area, 1978	A4 017/IX.4.17 Polder area, 1978

Table V. Pictures on polders and lowlands in Bangladesh by Prof. Adriaan Volker (continued)

			
A4 018/IX.4.18 Polder area, 1978	A4 019/IX.4.19 Polder area, 1978	A4 020/IX.4.20 Polder area, 1978	A4 021/IX.4.21 Polder area, 1978
			
A4 022/IX.4.22 Polder area, 1978	A4 030/IX.4.30 Polder area, 1978	A4 031/IX.4.31 Polder area, 1978	A4 032/IX.4.32 Polder area, 1978
			
A4 033/IX.4.33 Polder area, 1978	A4 034/IX.4.34 Polder area, 1978	A4 035/IX.4.35 Polder area, 1978	A4 036/IX.4.36 Polder area, 1978

Table V. Pictures on polders and lowlands in Bangladesh by Prof. Adriaan Volker (continued)

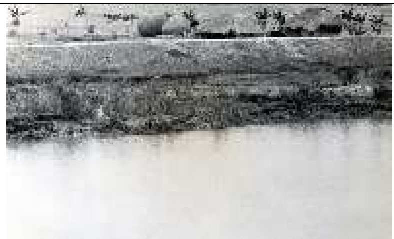
			
A4 037/IX.4.37 Polder area, 1978	A4 038/IX.4.38 Polder area, 1978	A4 039/IX.4.39 Polder area, 1978	A4 040/IX.4.40 Polder area, 1978
			
A4 041/IX.4.41 Polder area, 1978	A4 042/IX.4.42 Polder area, 1978	A4 043/IX.4.43 Polder area, 1978	A6 000/IX.6.0 Group picture International symposium on humid tropics. Volker left from the middle in the last row, 1964
			
A6 001/IX.6.1 Probably Sutarkhali Polder 32, 26 February 1964	A6 002/IX.6.2 Probably Sutarkhali Polder 32, 26 February 1964	A6 003/IX.6.3 Probably Sutarkhali Polder 32, 26 February 1964	A6 004/IX.6.4 Probably Sutarkhali Polder 32, 26 February 1964

Table V. Pictures on polders and lowlands in Bangladesh by Prof. Adriaan Volker (continued)

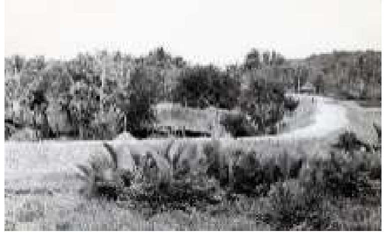
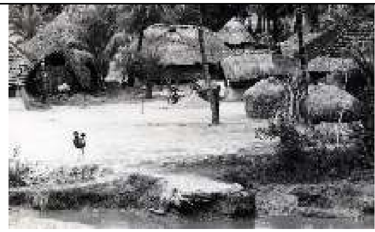
			
A6 005/IX.6.5 Probably Sutarkhali Polder 32, 26 February 1964	A6 006/IX.6.6 Village behind local dikes. Probably Sutarkhali Polder 32, 26 February 1964	A6 007/IX.6.7 Probably Sutarkhali Polder 32, 1964	A6 008/IX.6.8 Probably Sutarkhali Polder 32, 1964
			
A6 009/IX.6.09 Outlet in a local dike. Probably Sutarkhali Polder 32, 1964	A6 010/IX.6.10 Probably Sutarkhali Polder 32, 1964	A6 011/IX.6.11 Probably Sutarkhali Polder 32, 1964	A6 012/IX.6.12 Probably Sutarkhali Polder 32, 1964
			
A6 013/IX.6.13 River dike in the landscape. Probably Sutarkhali Polder 32, 1964	A6 014/IX.6.14 River dike in the landscape. Probably Sutarkhali Polder 32, 1964	A6 015/IX.6.15 Village behind a local dike. Probably Sutarkhali Polder 32, 1964	A6 016/IX.6.16 River dike in the landscape. Probably Sutarkhali Polder 32, 1964

Table V. Pictures on polders and lowlands in Bangladesh by Prof. Adriaan Volker (continued)

			
A6 017/IX.6.17 Village behind a dike with a (temporary) low section in it, probably to let irrigation water in. Probably Sutarkhali Polder 32, 1964	A6 018/IX.6.18 Probably Sutarkhali Polder 32, 1964	A6 019/IX.6.19 Probably Sutarkhali Polder 32, 1964	A6 020/IX.6.20 Probably Sutarkhali Polder 32, 1964
			
A6 021/IX.6.21 Probably Sutarkhali Polder 32, 1964	A6 022/IX.6.22 Probably Sutarkhali Polder 32, 1964	A6 023/IX.6.23 Dike construction	A6 024/IX.6.24 Construction of a solid dike
			
A6 025/IX.6.25 Solid protection of the outer slope of a river dike, 1964	A6 026/IX.6.26 Construction of a solid dike	C4 1 001/C.4.1.1 Map	C4 1 002/C.4.1.2 Map

Table V. Pictures on polders and lowlands in Bangladesh by Prof. Adriaan Volker (continued)

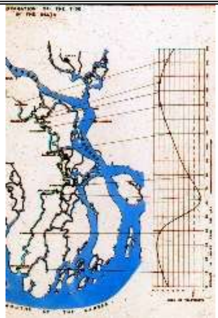
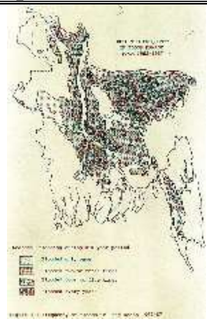
			
C4 1 003/C.4.1.3 Map	C4 1 004/C.4.1.4 Map with frequencies of cases of flooding	C4 1 005/C.4.1.5 Aerial picture of lowland area, 1975	C4 1 006/C.4.1.6 Aerial picture of lowland area, 1975
			
C4 1 007/C.4.1.7 Aerial picture of lowland area, 1975	C4 1 008/C.4.1.8 Aerial picture of lowland area, 1975	C4 1 009/C.4.1.9 Aerial picture of lowland area, 1975	C4 1 010/C.4.1.10 Discharge sluice
			
C4 1 011/C.4.1.11 Discharge sluice	C4 1 012/C.4.1.12 Pond and dike	C4 1 013/C.4.1.13 Rice field	C4 1 014/C.4.1.14 Discharge sluice

Table V. Pictures on polders and lowlands in Bangladesh by Prof. Adriaan Volker (continued)

			
C4 1 015/C.4.1.15 Coastal area, 1989	C4 1 016/C.4.1.16 Canal in lowland area, 1989	C4 1 017/C.4.1.17 Road at a small dike in coastal area, 1989	C4 1 018/C.4.1.18 Canal in lowland area, 1989
			
C4 1 019/C.4.1.19 Coastal area, 1989	C4 1 020/C.4.1.20 Drain in the clay, 1989	C4 1 021/C.4.1.21 Discharge sluice under construction, 1989	C4 1 022/C.4.1.22 Dike in coastal area, 1989
			
C4 1 023/C.4.1.23 Canal in lowland area	C4 1 024/C.4.1.24 Canal in lowland area	C4 1 025/C.4.1.25 Bank protection and dike	C4 1 026/C.4.1.26 Small village in in coastal area

Table V. Pictures on polders and lowlands in Bangladesh by Prof. Adriaan Volker (continued)

			
C4 1 027/C.4.1.27 House at artificial mount, 1989	C4 1 028/C.4.1.28 Silted up discharge sluice, 1989	C4 1 029/C.4.1.29 Aerial picture of a river	C4 1 030/C.4.1.30 Discharge sluice
			
C4 1 031/C.4.1.31 Aerial picture of river and bank	C4 1 032/C.4.1.32 Aerial picture of river and bank	C4 1 033/C.4.1.33 Stone dike in landscape	C4 1 034/C.4.1.34 Aerial picture of landscape
			
C4 1 035/C.4.1.35 Aerial picture of landscape with building pit	C4 1 036/C.4.1.36 Aerial picture of landscape	C4 2 001/C.4.2.1 Aerial picture of landscape	C4 2 002/C.4.2.2 Aerial picture of landscape

Table V. Pictures on polders and lowlands in Bangladesh by Prof. Adriaan Volker (continued)

			
C4 2 003/C.4.2.3 Aerial picture of landscape	C4 2 004/C.4.2.4 Aerial picture of landscape	C4 2 005/C.4.2.5 Aerial picture of landscape	C4 2 006/C.4.2.6 Aerial picture of landscape
			
C4 2 007/C.4.2.7 Rice field with densely vegetated water course	C4 2 008/C.4.2.8 Drain	C4 2 009/C.4.2.9 Water supply pond and rice field	C4 2 010/C.4.2.10 River and dike
			
C4 2 011/C.4.2.11 Presumably commemoration plant	C4 2 012/C.4.2.12 Stone dike	C4 2 013/C.4.2.13 Dike construction by many people	C4 2 014/C.4.2.14 Dike construction by many people

Table V. Pictures on polders and lowlands in Bangladesh by Prof. Adriaan Volker (continued)

			
C4 2 015/C.4.2.15 Dike construction by many people	C4 2 016/C.4.2.16 Dike construction by many people	A6 002/D2.VI.2 Small village behind a local dike	A6 006/D2.VI.6 Discharge sluice
			
A6 007/D2.VI.7 Busy local ship traffic	A6 009/D2.VI.9 Discharge sluice	A6 013/D2.VI.13 Discharge sluice	A6 014/D2.VI.14 Small village along the water with in the background a dike
			
A6 025/D2.VI.25 Landscape behind a small dike, with probably a remaining part of a former dike	A6 027/D2.VI.27 Local ship traffic		

Table VI. Pictures on polders and lowlands in Bangladesh by Prof. Bart Schultz

			
Rij 1 001/XIII/1-1 Dike and discharge sluice Polder 43/2A, June 2001	Rij 2 001/XIII/2-1 Dike and discharge sluice Polder 43/2A, June 2001	Rij 2 002/XIII/2-2 Landscape in Polder 43/2A, June 2001	Rij 2 003/XIII/2-3 Landscape in Polder 43/2A, June 2001
			
Rij 2 004/XIII/2-4 Landscape in Polder 43/2A, June 2001	Rij 3 001/XIII/3-1 Landscape in Polder 43/2A, June 2001	Rij 3 002/XIII/3-2 Landscape in Polder 43/2A, June 2001	Rij 3 002/XIII/3-2 Discussion with the farmers on the water management in Polder 43/2A. First from left Prof. Ainun Nishat (Bangladesh) and second from left Prof. Bart Schultz (UNESCO-IHE), June 2001

Table VI. Pictures on polders and lowlands in Bangladesh by Prof. Bart Schultz (continued)

			
Rij 3 004/XIII/3-4 Discussion with the farmers on the water management in Polder 43/2A. Second from left Prof. Ainun Nishat (Bangladesh) and third from left Prof. Bart Schultz (UNESCO-IHE), June 2001	Rij 4 001/XIII/4-1 Discussion with the farmers on the water management in Polder 43/2A. mid behind, left Prof. Ainun Nishat (Bangladesh) and mid behind, right Prof. Bart Schultz (UNESCO-IHE), June 2001	Rij 4 002/XIII/4-2 Discussion with the farmers on the water management in Polder 43/2A, June 2001	Rij 4 003/XIII/4-3 Landscape in Polder 43/2A, 2001
			
Rij 4 004/XIII/4-4 Group picture in Polder 43/2A. Second from left Liakath Ali (Bangladesh, PhD student UNESCO-IHE), second from right Prof. Ainun Nishat (Bangladesh) and third from right Prof. Bart Schultz (UNESCO-IHE), June 2001	Rij 5 001/XIII/5-1 Group picture in Polder 43/2A. Second from left Liakath Ali (Bangladesh, PhD student UNESCO-IHE), second from right Prof. Ainun Nishat (Bangladesh) and third from right Prof. Bart Schultz (UNESCO-IHE), June 2001	Rij 5 002/XIII/5-2 Landscape in Polder 43/2A, June 2001	Rij 5 003/XIII/5-3 Landscape in Polder 43/2A, June 2001

Table VI. Pictures on polders and lowlands in Bangladesh by Prof. Bart Schultz (continued)

			
Rij 5 004/XIII/5-4 Landscape in Polder 43/2A, June 2001	Rij 6 001/XIII/6-1 Landscape in Polder 43/2A, June 2001	Rij 6 002/XIII/6-2 Landscape in Polder 43/2A, June 2001	Rij 6 003/XIII/6-3 Landscape in Polder 43/2A, June 2001
			
Rij 6 004/XIII/6-4 Landscape in Polder 43/2A, June 2001	Rij 7 001/XIII/7-1 Landscape in Polder 43/2A, June 2001	Rij 7 002/XIII/7-2 Landscape in Polder 43/2A, June 2001	Rij 7 003/XIII/7-3 Landscape in Polder 43/2A, June 2001
			
Rij 7 004/XIII/7-4 Dike and discharge sluice Polder 43/2A, June 2001	RRij 1 001/XIV/1-1 Dike and discharge sluice Polder 43/2A, June 2001	RRij 1 002/XIV/1-2 Dike and discharge sluice Polder 43/2A, June 2001	RRij 1 003/XIV/1-3 Dike and discharge sluice Polder 43/2A, June 2001

Table VI. Pictures on polders and lowlands in Bangladesh by Prof. Bart Schultz

			
RRij 1 004/XIV/1-4 Ferry at one of the river branches near Polder 43/2A, June 2001	RRij 2 001/XIV/2-1 View at a fisherman in a traditional boat and the pilothouse of a ferry at one of the river branches near Polder 43/2A, June 2001. Negative in colour	RRij 2 002/XIV/2-2 Fisherman in a traditional boat at one of the river branches near Polder 43/2A, June 2001. Negative in colour	RRij 2 003/XIV/2-3 Fisherman in a traditional boat at one of the river branches near Polder 43/2A, June 2001. Negative in colour
			
RRij 2 004/XIV/2-4 Fisherman in a traditional boat at one of the river branches near Polder 43/2A. Negative in colour	RRij 4 001/XIV/4-1 Dike around Dhaka with several activities at the west side, June 2001	RRij 4 002/XIV/4-2 Dike around Dhaka with several activities at the west side, June 2001. Negative in colour	RRij 4 003/XIV/4-3 Pedestrians at the dike around Dhaka with houses in the river at the west side. Negative in colour

Table VI. Pictures on polders and lowlands in Bangladesh by Prof. Bart Schultz (continued)

			
RRij 4 004/XIV/4-4 Pedestrians at the dike around Dhaka with houses in the river at the west side, June 2001	RRij 5 001/XIV/5-1 City side of the dike around Dhaka, June 2001	RRij 5 002/XIV/5-2 Dike around Dhaka with houses in the river at the west side, June 2001. Negative in colour	RRij 5 003/XIV/5-3 Pedestrians at the dike around Dhaka with houses in the river at the west side, June 2001. Negative in colour
			
RRij 5 004/XIV/5-4 Pedestrians at the dike around Dhaka with houses in the river at the west side, June 2001. Negative in colour	RRij 6 001/XIV/6-1 City side of the dike around Dhaka, June 2001. Negative in colour	RRij 6 002/XIV/6-2 Outer slope of the dike around Dhaka with the river in the background, June 2001. Negative in colour	RRij 6 003/XIV/6-3 Outer slope of the dike around Dhaka with the river in the background, June 2001

Table VI. Pictures on polders and lowlands in Bangladesh by Prof. Bart Schultz (continued)

			
RRij 6 004/XIV/6-4 Outer slope of the dike around Dhaka with houses in the river at the west side, June 2001	RRij 7 001/XIV/7-1 Pedestrians and traffic at the dike around Dhaka, June 2001. Negative in colour	RRij 7 002/XIV/7-2 Depression and view at the city at the inside of the dike around Dhaka, June 2001	RRij 7 004/XIV/7-4 The river at the west side of Dhaka, pictured in upstream direction, June 2001. Negative in colour
			
RRRij 1 001/XV/1-1 Traffic at the access of a bridge over a river in Dhaka, June 2001. Negative in colour	RRRij 1 002/XV/1-2 Traffic at the access of a bridge over a river in Dhaka, June 2001. Negative in colour	SD7 13 009/XIII-9 Landing site in the centre of Dhaka, 3-10 June 1999. Negative in colour	SD7 13 010/XIII-10 One of the six discharge/inlet sluices of polder 43/2A, 3-10 June 1999

Table VI. Pictures on polders and lowlands in Bangladesh by Prof. Bart Schultz (continued)

			
SD7 13 011/XIII-11 Refugee building in the area of the coastal polders, 3-10 June 1999	SD7 13 012/XIII-12 Landing site in the centre of Dhaka with a sheetpile wall under construction that will be part of the dike around the western part of Dhaka, 3-10 June 1999. Negative in colour	SD7 13 013/XIII-13 Landing site in the centre of Dhaka with a sheetpile wall under construction that will be part of the dike around the western part of Dhaka, 3-10 June 1999. Negative in colour	SD7 13 014/XIII-14 Boats at the river near Dhaka, 3-10 June 1999. Negative in colour
			
SD7 13 015/XIII-15 Boats at the river with a view at Dhaka, 3-10 June 1999	SD7 13 016/XIII-16 Landing site in the centre of Dhaka with a sheetpile wall under construction that will be part of the dike around the western part of Dhaka, 3-10 June 1999	SD7 13 017/XIII-17 Landing site in the centre of Dhaka with a sheetpile wall under construction that will be part of the dike around the western part of Dhaka, 3-10 June 1999	SD7 13 018/XIII-18 Landing site in the centre of Dhaka with a sheetpile wall under construction that will be part of the dike around the western part of Dhaka, 3-10 June 1999

Table VI. Pictures on polders and lowlands in Bangladesh by Prof. Bart Schultz (continued)

			
SD7 13 019/XIII-19 Discharge sluice in the wall that is part of the dike around the western part of Dhaka, 3-10 June 1999	SD7 13 020/XIII-20 Construction work at the discharge sluice in the wall that is part of the dike around the western part of Dhaka, 3-10 June 1999	SD7 13 021/XIII-21 House at a small mount in polder 43/2A, 3-10 June 1999	SD7 13 022/XIII-22 House at a small mount in polder 43/2A, 3-10 June 1999
			
SD7 13 023/XIII-23 House at a small mount in polder 43/2A, 3-10 June 1999	SD7 13 024/XIII-24 Landscape in Polder 43/2A, 3-10 June 1999	SD7 13 025/XIII-25 Landscape in Polder 43/2A, 3-10 June 1999	SD7 13 026/XIII-26 One of the discharge/inlet sluices of polder 43/2A, 3-10 June 1999
			
SD7 13 027/XIII-27 Staff gauge in a river in the area of the coastal polders, 2-10 June 1999	SD7 13 028/XIII-28 Staff gauge in a river in the area of the coastal polders, 2-10 June 1999	SD7 13 029/XIII-29 Refugee building in the area of the coastal polders, 3-10 June 1999	SD7 13 030/XIII-30 Strengthening of a dike in the area of coastal polders, 3-10 June 1999

Table VI. Pictures on polders and lowlands in Bangladesh by Prof. Bart Schultz (continued)

			
SD7 13 031/XIII-31 Strengthening of a dike in the area of coastal polders, 3-10 June 1999	SD7 13 032/XIII-32 Strengthening of a dike in the area of coastal polders, 3-10 June 1999	SD7 13 033/XIII-33 Strengthening of a dike in the area of coastal polders, 3-10 June 1999	SD7 13 034/XIII-34 Women strengthening a dike of a coastal polder, 3-10 June 1999
			
SD7 13 035/XIII-35 Women strengthening a dike of a coastal polder, 3-10 June 1999	SD7 13 036/XIII-36 Dike around the western part of Dhaka, 3-10 June 1999	SD7 13 037/XIII-37 Part of the dike around the western part of Dhaka, 3-10 June 1999	SD7 13 038/XIII-38 Dike around the western part of Dhaka, 3-10 June 2019
			
SD7 13 039/XIII-39 Dike around the western part of Dhaka, 3-10 June 2019	SD7 13 040/XIII-40 Dike around the western part of Dhaka, 3-10 June 2019	SD7 13 041/XIII-41 Dike around the western part of Dhaka, 3-10 June 2019	SD7 13 042/XIII-42 Landfill in the endiked area of Dhaka. These landfills are made by project developers for their building activitiees.Because of this the open water storage in the city is being reduced, 3-10 June 2019

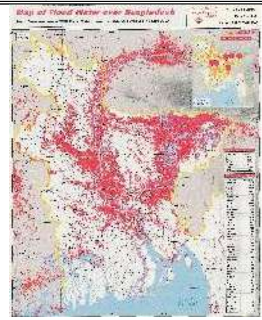
Table VI. Pictures on polders and lowlands in Bangladesh by Prof. Bart Schultz (continued)

			
SD7 13 043/XIII-43 The dike of Dhaka with on the left side a landfill. These landfills are made by project developers for their building activities. Because of this the open water storage in the city is being reduced, 3-10 June 1999	SD7 13 044/XIII-44 The dike of Dhaka with on the left side a landfill. These landfills are made by project developers for their building activities. Because of this the open water storage in the city is being reduced, 3-10 June 1999	SD7 13 045/XIII-45 Part of the dike around the western part of Dhaka under construction, 3-10 June 1999	SD7 13 046/XIII-46 Dike around the western part of Dhaka, 3-10 June 1999
			
SD7 13 047/XIII-47 Discharge sluice in the dike around the western part of Dhaka, 3-10 June 1999	SD7 13 048/XIII-48 Dike around the western part of Dhaka, 3-10 June 1999	SD7 13 049/XIII-49 Part of the dike around the western part of Dhaka under construction, 3-10 June 1999	SD7 13 050/XIII-50 Part of the dike around the western part of Dhaka under construction, 3-10 June 1999

Table VI. Pictures on polders and lowlands in Bangladesh by Prof. Bart Schultz (continued)

			
SD7 14 001/XIV-1 Group picture in front of one of the four drainage pumping stations of Dhaka under construction. From left to right: two staff members of the Bangladesh Water Development Board, Dr. M.A. Quassem, responsible for the construction of the dike around Dhaka, Prof. Bart Schultz and Liakath Aly, promovendus of Prof. Schultz, 3-10 June 1999	SD7 14 002/XIV-2 Group picture in front of one of the drainage pumping stations of Dhaka under construction. From left to right: two staff members of the Bangladesh Water Development Board (BWDB), Dr. M.A. Quassem, responsible for construction of the dike around Dhaka, Prof. Bart Schultz and Liakath Aly, promovendus of Prof. Schultz, and a staff member of the BWDB, 3-10 June 1999	SD7 14 003/XIV-3 One of the four drainage pumping stations of Dhaka under construction, 3-10 June 1999	SD7 14 004/XIV-4 One of the four drainage pumping stations of Dhaka under construction, 3-10 June 1999
			
SD7 14 005/XIV-5 One of the six discharge/inlet sluices of polder 43/2A, 3-10 June 1999	SD7 14 006/XIV-6 Farmers demonstrate how difficult it is to open a gate in the discharge/inlet sluice, while the operation mechanism is broken, 3-10 June 1999	SD7 14 007/XIV-7 Farmers demonstrate how difficult it is to open a gate in the discharge/inlet sluice, while the operation mechanism is broken, 3-10 June 1999	SD7 14 008/XIV-8 Farmers demonstrate how difficult it is to open a gate in the discharge/inlet sluice, while the operation mechanism is broken, 3-10 June 1999

Table VI. Pictures on polders and lowlands in Bangladesh by Prof. Bart Schultz (continued)

			
SD7 14 009/XIV-9 One of the discharge/inlet sluices of polder 43/2A, 3-10 June 1999	SD7 14 010/XIV-10 Landscape in Polder 43/2A, 3-10 June 1999	SD7 14 011/XIV-11 Ferry at one of the rivers in Bangladesh	Flooding in Bangladesh situation at 7 August 2007