Major Soil Types

5

A *general soil type* is a group of soils that are broadly similar in appearance and characteristics because they have developed in response to similar environmental factors such as climate, physiography, and drainage. This is a national classification system, designed to make distinctions that appear significant for understanding the formation, distribution, and use of the soils of Bangladesh. The general soil types represent a very broad level of generalization. It is a nontechnical grouping of soils, made originally to enable nonspecialists to make use of the technical information generated through reconnaissance soil survey work. The bases of the general classification are the physiographic units (Fig. 5.1) of the country. Most general soil types include several different soils that may have developed in more than one kind of parent material and may include a wide range of physical and chemical properties (Brammer 1996). Figure 5.2 shows a map of the general soil types of Bangladesh. The general soil types have been described with reference to their occurrence, geographic distribution, morphology, land use, and cropping pattern (FAO 1985). A total number of 21 general soil types have been recognized that are distributed on three geomorphologic units. Fourteen general soil types have been identified on floodplain areas, six on terraces, and one on hilly areas. The areas of the general soil types and a brief description are given in Fig. 5.2 and Table 5.1. These areas vary widely, ranging from as small as 342 km^2 (brown mottled terrace soils) to as large as 33,872 km^2 (noncalcareous grey floodplain soils). Noncalcareous grey floodplain soils occupy about one-fourth of the total area of Bangladesh. Noncalcareous dark grey floodplain soils and calcareous dark grey floodplain soils together constitute around 44 % of the total land area of Bangladesh. Organic soils occupy only a relatively small area (<1 %) of the country.

5.1 Calcareous Alluvium

These are young soils formed on freshly deposited alluvium of the Ganges and Lower Meghna Rivers that are stratified within 25-cm from the ground surface and contain lime. Soils are stratified or there is raw alluvium throughout or below the cultivated layer. They are calcareous throughout or part of it and lack a diagnostic subsoil horizon. This alluvium on the active Ganges floodplain mainly comprises brownish grey to pale brown sandy and silty deposits, which are moderately calcareous. The top soil is found to have a greyer color and be iron-stained along root channels in places where rice is cultivated. Soils of the Ganges floodplains are moderately to deeply flooded by river water during the rainy season, whereas the soils of the Meghna estuary are flooded by tidal water from the sea. Soils on the Lower Meghna estuarine floodplain are slightly calcareous grey to olive, finely stratified silts. They are mainly calcaric fluvisols.

The agricultural productivity of these soils ranges between moderate and poor. They are more productive and the potentiality is higher than the noncalcareous alluvium. New loamy and clayey Ganges River deposits are more friable and more easily suitable for crop cultivation, especially for dry land *robi* (dry season) crops and jute. Large areas of relatively older soils on the Young Meghna estuarine floodplain are well suited for paddy cultivation, especially transplanted *aman*.

5.2 Noncalcareous Alluvium

These soils occupy extensive areas on the active Tista and Brahmaputra–Jamuna floodplains. In these soils, there are

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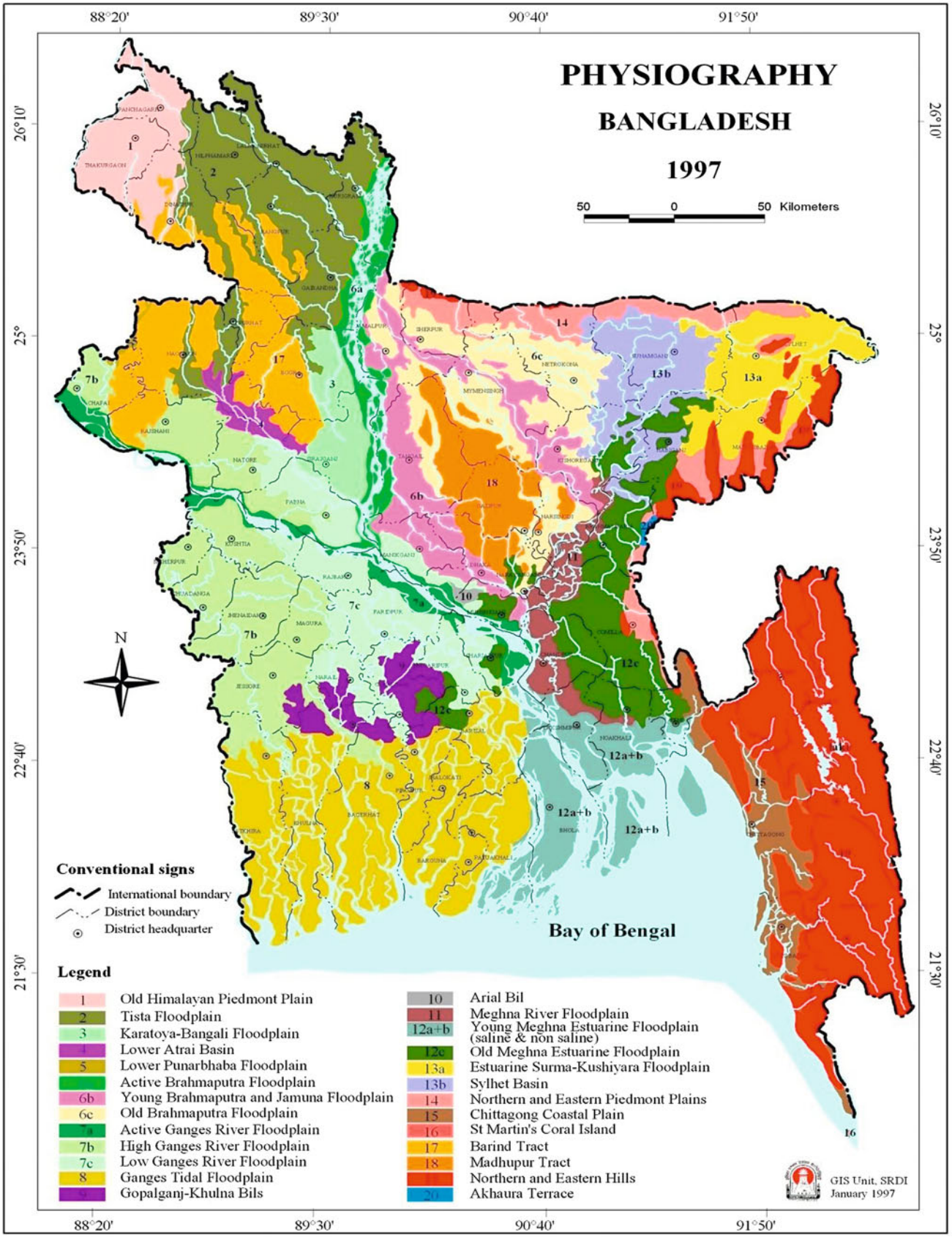

Fig. 5.1 The physiographic units of Bangladesh (*Source* SRDI)

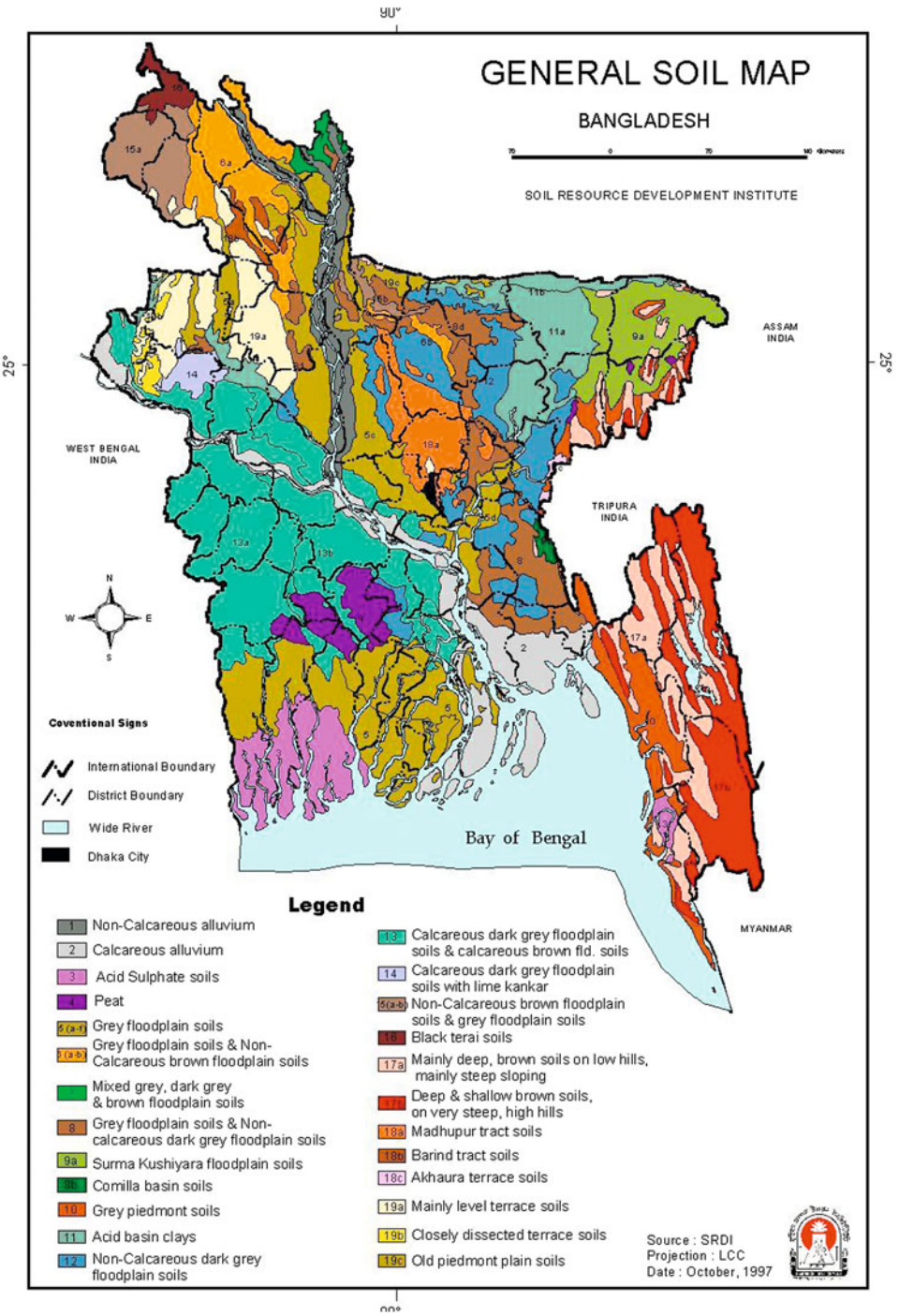

Fig. 5.2 General soil map of Bangladesh (*Source* SRDI)

no calcareous materials within the upper 125 cm of the soil profile. The soils are generally neutral to alkaline in reaction, but do not contain lime. The alluvial deposits are mostly silty, but sands occur on Brahmaputra–Jamuna river *chars*. Soils formed on the active floodplains are sandy or silty with grey to olive grey color, whereas soils on floodplain basins have silty clay loam to clay texture. Most of these soils have been included as eutric fluvisols.

Noncalcareous alluvium soils are mainly shallowly to deeply flooded by river water in the monsoon season, but old beach sands and soils on high floodplain ridges lie above normal flood levels. Except in deep sandy deposits, permeability generally is slow or very slow because of stratification in the upper layers and the presence of unripened alluvium at a shallow depth. New silty material impedes root development on recently deposited alluvium as the roots are

Table 5.1

No.	General soil types	Area (km^2)	Percentage of area
	Floodplain soils		
1	Calcareous alluvium	5,918	4.1
2	Noncalcareous alluvium	5,622	3.9
3	Calcareous brown floodplain soils	4,785	3.3
4	Calcareous grey floodplain soils	1,707	1.2
5	Calcareous dark grey floodplain soils	14,347	9.9
6	Noncalcareous grey floodplain soils	33,871	23.4
7	Noncalcareous brown floodplain soils	3,833	2.6
8	Noncalcareous dark grey floodplain soils	15,996	11.0
9	Black terai soils	834	0.6
10	Acidic basin clays	3,490	2.4
11	Acidic sulphate soils	2,266	1.6
12	Peat	1,300	0.9
13	Grey piedmont soils	2,053	1.5
	Area of floodplain soils	**96,022**	67.1
	Hill soils		
14	Brown hill soils	**15,615**	10.8
	Terrace soils		
15	Shallow red-brown terrace soils	725	0.5
16	Deep red-brown terrace soils	1,894	1.3
17	Brown mottled terrace soils	342	0.3
18	Shallow grey terrace soils	2,654	1.8
19	Deep grey terrace soils	3,522	2.4
20	Grey valley soils	1,143	0.8
	Area of terrace soils	**10,280**	7.1
21	Made land	1063	0.7
	Total soil area	**122,980**	85.0
	Miscellaneous land		
	Water bodies	9,734	6.7
	Urban lands	819	0.6
	Homesteads	11,227	7.7
	Miscellaneous land types	21,780	15
	Total	**144,760**	100

Source FAO/UNDP 1988

poorly aerated. The agricultural productivity of these soils is generally moderate to low. A plowpan is usually formed where transplanted *aman* is grown. Mottles occur along the root channels. The main limitations are the risks of flood damage, bank erosion, and burial by new alluvium.

5.3 Calcareous Brown Floodplain Soils

These soils occur on the upper parts of ridges on the Ganges River floodplain. Small areas occur on the Lower Meghna River floodplain and on the Ganges tidal floodplain. The topsoil usually is grey where rice is grown, brown where other crops are grown, and dark grey where sugarcane or other vegetables are heavily manured. Most topsoils are calcareous, but some are noncalcareous. The reaction usually is moderately alkaline, but may be slightly acidic to mildly alkaline, if the topsoil is decalcified. The subsoil is olive-brown. The prismatic structure is developed in relatively heavier soils, and thin, grey, subsoil coatings are sometimes found. Soil texture on the higher ridges usually is silt loam and occasionally sandy loam. Lower sites usually have silt loams or silty clay loams with a finer texture in the top soil than in the subsoil. The agricultural potential of these soils ranges from

high to low. The potentiality is highest in deep loamy soils where irrigation is available, and lowest in shallow ridge soils and in soils affected by salinity or strong alkalinity. Most of these soils belong to chromic–calcaric gleysols.

5.4 Calcareous Grey Floodplain Soils

These soils occupy parts of the Ganges tidal floodplain, mainly in the southwest and small areas on the Ganges and Lower Meghna River floodplains. They contain lime in part or all of the upper 125 cm of the profile. The topsoil usually is grey or olive-grey when dry, but may be darker and bluish or greenish grey when wet and reduced in the monsoon season. The subsoil usually is grey with yellow-brown or brown mottles and broken or continuous grey coatings. The structure usually is prismatic in coarse soils and blocky in clayey soils. Extensive areas of these soils on the Ganges tidal floodplain become saline in the topsoil during the dry season. Seasonal flooding is mainly shallow and fluctuates with the tides on the Ganges tidal floodplain and Lower Meghna River floodplain. Elsewhere, flooding is mainly moderately deep. Flooding is mainly by fresh water. Permeability is slow in the top soil because of the presence of plowpan. These soils are classified as chromic–calcaric gleysols.

5.5 Calcareous Dark Grey Floodplain Soils

These soils occur extensively in basins and on the lower parts of ridges on the Ganges floodplain. The soils in ridges are friable, oxidized, calcareous, and loamy, but the soils are dark grey, decalcified with heavy clays in basins. They are found within 125 cm of the soil surface and have dark grey subsoil coatings. The topsoil usually is about 15 cm thick, with a weakly developed plowpan at the base. Seasonal flooding ranges from shallow on the ridges to moderately deep to deep in basins. Flooding is predominantly by rainwater or the raised ground watertable. There are brown mottles along root channels. These soils have thick, yellow to red, bacterial iron coatings in the lower parts. The topsoils in ridges contain lime and are moderately alkaline in reaction. However, the topsoils become strongly to extremely acidic in the dry season when decalcified. Whether alkaline or acidic in the dry condition, the topsoils become reduced and neutral in reaction when they are submerged in the monsoon season. The structure is coarse prismatic which breaks down to coarse blocky, and a fine blocky or lenticular structure. Most soils of this type are clays, but the clay content varies with position on the relief. The soils in ridges are mainly silty clay loams to silty clays. Basin soils are heavy clays, often with clay contents of 70–80 % in the upper layers. The moisture-holding capacity generally is moderate. They are classified as chromi–calcaric gleysols.

5.6 Noncalcareous Grey Floodplain Soils

These are most extensive soils in the country, occupying most of the Tista, Jamuna, Karatoya–Bangali, eastern Surma–Kushiyara, and Middle Meghna River floodplains and the Ganges tidal floodplain as well as part of the Old Brahmaputra floodplain, Old Meghna estuarine floodplain, Sylhet basin, and the Chittagong coastal plain. The topsoils consist of 5–10-cm thick layers. These layers are grey or olive-grey when dry, but darker when wet, and are medium to very strongly acidic in reaction when dry, but neutral in the reduced condition. The subsoils are 15–50-cm thick and have coarse prismatic structure. Clay subsoils have a blocky structure. The soil texture varies both within the profile and on different positions of the floodplain relief. The topsoil generally is lighter in texture than the subsoil. On most floodplains, the highest ridge soils have a silt loam texture and the basin soils are silty clay loam to silty clays. These soils are seasonally flooded. In most areas, flooding is by rainwater or the raised groundwater table. The moisture-holding capacity is moderate to high in silt loam and silty clay loam soils. Shallow-depth soils or soils with plowpan have a low moisture-holding capacity. These soils are among the most productive soils in the country. In general, they are suitable for both dryland crops as well as paddy cultivation. These soils have been included in areni–eutric gleysols.

The general soil types and their diagnostic properties are summarized in Table 5.2.

5.7 Noncalcareous Brown Floodplain Soils

These soils occur largely on the Old Himalayan piedmont plain, in the north of the Tista floodplain, and more locally on the Old Brahmaputra floodplain and in some sandy deposits on the northern and eastern piedmont plains. The topsoil is dark brown to dark grayish brown. This layer is medium to strongly acidic in reaction. In the old piedmont deposits, the subsoil is dark yellowish-brown and usually 60–90-cm thick. Elsewhere, it is brown or tallow-brown and may be 30-cm thick. The subsoil is medium to strongly acidic in reaction. The substratum usually consists of pale-colored loose sand. There is little or no difference between the topsoil and subsoil texture in the Old Himalayan piedmont plain. The soils are sandy loams on the highest ridges and silt loams on the lower ridges. However, there is a significant difference in texture between the topsoil and subsoil in the Tista and Old Brahmaputra floodplains. The

Table 5.2

	Floodplain soils	
1	Calcareous alluvium	Raw or stratified alluvium; calcareous throughout or within 125 cm from surface
2	Noncalcareous alluvium	Raw or stratified alluvium; not calcareous or sulphidic within 125 cm from surface (generally neutral to moderately alkaline)
3	Calcareous brown floodplain soils	Moderately well to imperfectly drained floodplain ridge soils with an oxidized cambic B horizon; calcareous throughout or within 125 cm of the surface
4	Calcareous grey floodplain soils	Seasonally flooded soils with a cambic B horizon which is dominantly grey and/or has prominent grey gleyans; calcareous throughout or within 125 cm of the surface
5	Calcareous dark grey floodplain soils	Seasonally flooded soils with a cambic B horizon which is either dominantly grey and/or has prominent grey gleyans or pressure faces; calcareous within 125 cm of the surface. Many basin soils have a neutral to acid topsoil and a neutral subsoil over a calcareous substratum at 40–60 cm
6	Noncalcareous grey floodplain soils	Seasonally flooded soils with a cambic B horizon which is dominantly grey and/or has prominent grey gleyans; not calcareous within 125 cm of the surface. The topsoil generally is slightly to very strongly acidic (when not submerged); lower layers generally are slightly acidic to moderately alkaline
7	Noncalcareous brown floodplain soils	Moderately well to imperfectly drained floodplain ridge soils with an oxidized cambic B horizon; not calcareous within 125 cm of the surface. Topsoil and upper subsoil generally are medium to strongly acidic; lower layers are less acidic to neutral
8	Noncalcareous dark grey floodplain soils	Soils similar to noncalcareous grey floodplain soils but with a dark grey cambic B horizon and/or dark grey gleyans
9	Black terai soils	Imperfectly to poorly drained soils with a very dark brown to black topsoil more than 25-cm thick. A brown cambic B horizon occurs in soils where the dark A horizon is less than about 90-cm thick. Medium to strongly acidic in upper layers; less acidic to neutral below
10	Acid basin clays	Poorly or very poorly drained, grey or dark grey heavy clays with a cambic B horizon; very strongly or extremely acidic (pH < 5) to 50 cm or more, but not sulphuric or sulphidic
11	Acid sulfate soils	Poorly or very poorly drained, grey or dark grey soils with or without a cambic B horizon, which are actually or potentially toxically acidic (pH < 3.5) within 125 cm of the surface
12	Peat	Very poorly drained soils in which organic matter (peat or muck) comprises all or more than half of the upper 80 cm
13	Grey piedmont soils	Imperfectly to poorly drained soils in piedmont alluvium; similar to noncalcareous grey floodplain soils, but generally having a more prominently mottled subsoil which is medium to strongly acidic
	Hill soils	
14	Brown hill soils	Excessively to moderately well-drained soils with a yellow-brown to strong-brown (locally red-brown), cambic or argillic B horizon (except where very shallow), mainly overlying soft or fragmented rock at 50–100 cm. Mainly very strongly to extremely acidic throughout; sometimes less acidic in the surface layer or in weathering rock
	Terrace soils	
15	Shallow red-brown terrace soils	Moderately well to imperfectly drained, olive-yellow to strong brown soils with a cambic or argillic B horizon overlying grey, heavy, Madhupur clay at 25–60 cm. Mainly strongly to very strongly acidic, but very shallow soils locally contain lime nodules
16	Deep shallow red-brown terrace soils	Well drained to moderately well drained, red to yellow-brown soils with a cambic or argillic B horizon overlying a strongly red-mottled pervious clay substratum. Strongly to very strongly acidic throughout
17	Brown mottled terrace soils	Imperfectly drained soils similar to deep shallow red-brown terrace soils but with a strongly mottled pale brown and red subsoil overlying the dominantly red-mottled substratum
18	Shallow grey terrace soils	Poorly drained, grey, silty soils overlying grey, heavy, Madhupur clay at 25–60 cm. Slightly to strongly acidic in the silty topsoil and subsoil, becoming less acidic (locally calcareous) in the clay substratum
19	Deep grey terrace soils	Poorly drained, grey, silty soils, more red-mottled in the subsoil than the shallow soils and overlying a dominantly remottled, pervious, clay substratum. Mainly medium to strongly acidic throughout
20	Grey valley soils	Poorly drained, deep, grey, porous, silty soils occurring in terrace valleys
	Man-made land	
21	Man made	Soils on artificially raised cultivation platforms; better drained and more permeable than the subsoil materials from which they are derived, but broadly similar to them in other properties

agricultural potential of noncalcareous brown floodplain soils is mainly moderate to low. Most of these soils are dystric/eutric gleysols or cambisols.

5.8 Noncalcareous Dark Grey Floodplain Soils

These are the second-most extensive soils in the country. They do not contain lime in any layer within 125 cm of the surface. These soils occupy the Old Brahmaputra and Old Meghna estuarine floodplains, and locally the Tista, Karatoya–Bangali, Lower Atrai, Young Brahmaputra, and Lower Meghna River floodplains, and some basins on the Old Himalayan piedmont plain. They are differentiated from the noncalcareous grey floodplain soils by having dark grey instead of grey subsoil coatings, and from calcareous dark grey floodplain soils in being noncalcareous throughout the profile. The topsoils have surface layers 5–10-cm thick overlying a plowpan about 5-cm thick. These layers vary from grey to dark grey, and have rusty iron stains along root channels and cracks. The soils are medium to very strongly acidic in reaction when dry and neutral in the reduced condition. The subsoil usually is 20–45-cm thick. The upper part of these soils is dark grey having oxidized mottles. They have a strong coarse prismatic structure, but clay soils have an angular blocky structure. The subsoils are slightly acidic to moderately alkaline in reaction. The topsoil is much lighter in texture than the subsoil. The ridges are silt loam or silty clay loam, whereas basins are silty or clay in texture. The texture of the substratum usually is lighter than the subsoil. The substratum usually is neutral to moderately alkaline in reaction. The agricultural potential of these soils is highest on shallowly flooded ridge soils and lowest in deep basin centers.

5.9 Black Terai Soils

These soils occupy a small area on the Old Himalayan piedmont plain. Most of the soils are shallowly flooded in the monsoon, mainly by rainwater and the raised groundwater table. Depression soils are subject to flash floods from rivers crossing the old alluvial fan. The thickness of the topsoil ranges from 25 cm to more than 75 cm. The topsoil is very dark grayish brown to black. Where transplanted rice is practiced, the soil is slightly pale with a few grey and brown mottles. The cultivated layer is medium to very strongly acidic in reaction. The lower part is slightly to medium acidic. The substratum usually consists of white, grey, or very pale brown loose sand. This layer is slightly acidic to neutral in reaction. The texture of the topsoil and subsoil is uniform and both layers contain much more clay and silt than the substratum. The most extensive soils are sandy loam, but loams and sandy clay loams also occur on lower sites. The sand is predominantly medium and fine. These soils are rapidly permeable. The moisture-holding capacity is high, except in sandy and shallow soils. The agricultural potential of black terai soils is moderate to low. These soils are classified as chromi–mollic gleysols.

5.10 Acidic Basin Clays

These soils occur extensively on the Lower Punarbhaba floodplain, Lower Atrai basin, Arial beel, Surma–Kushiyara floodplain, Sylhet basin, and its piedmont basins. They also occur in the deep valleys of the Madhupur Tract. Most soils are deeply flooded with rainwater and runoff from the adjoining areas in the monsoon. The topsoil usually is 12–25-cm thick. It is grey to dark grey with yellow to red mottles along the root channels. These soils are heavy clay in texture, but silty clay loam or silty clay occurs in some places. Cultivated soils crack widely when dry. The subsoil is grey to dark grey with heavy clay and strong yellow to red mottles. The structure is coarse prismatic and blocky. The subsoil is very strongly to extremely acidic. The substratum occurs at variable depth, usually below 50 cm. This layer is usually silty and sometimes clayey, and is permanently wet and reduced. The reaction varies from extremely acidic to moderately alkaline. The agricultural potential of acidic basin clays is low. They are classified as eutric, dystric, or mollic gleysols.

5.11 Acidic Sulphate Soils

Acidic sulphate soils are formed in the tidal alluvium and are actually or potentially extremely acidic ($pH < 3.5$) within 125 cm of the surface. These soils occur in the Khulna and Chakaria Sundarbans, where former mangrove forest has been cleared for cultivation. Two kinds of soil are included in this type. One is tidally flooded with saline water throughout the year and is under mangrove forest and contains soft, finely stratified, muddy sediment layers. The other kind of soil occurs on land that has been cleared and brought under cultivation. Under field conditions, these soils are slightly acidic, but the pH decreases when dried. These extremely acidic soils are locally known as *Kosh* soils in the south of the Chittagong region. The agricultural productivity of acidic sulphate soils is severely limited due to the extreme acidity of these soils. Shrimp culture is more economic than agricultural use because of the high cost for reclamation. The soils are classified as either thionic fluvisols or thionic gleysols.

5.12 Peat Soils

Peat soils occur extensively in the Gopalganj–Khulna beels and locally in some haors of the Sylhet basin. In these soils, partially or wholly decomposed organic matter occupy more than half of the uppermost 80 cm of the profile. These soils have a low bearing capacity. Peat and muck layers are black to dark brown, strongly reduced, and neutral in reaction under natural conditions. These layers become extremely acidic when they are allowed to dry. They are seasonally flooded by rainwater and remain wet throughout the season. They become dry during the dry season where mineral topsoil is present. Mineral topsoils are mainly grey or dark grey and become strongly acidic under dry condition. The agricultural productivity of these soils generally is low. Under natural conditions, the land is used for reed production and fishing. They have been included as Histosols.

5.13 Grey Piedmont Soils

These soils occur on alluvial outwash fans at the foot of the northern and eastern hills and locally on the Chittagong coastal plain. Seasonal flooding is shallow, but they are severely affected by occasional flash floods by heavy rainfall. The topsoils have a 5–10-cm thick cultivated layer. They are grey to pale brown when dry and grey to olive-grey when wet. These layers are strongly to extremely acidic when dry, but neutral in reduced condition. The subsoils vary from 15 cm to more than 60 cm in thickness. They are grey with yellow-brown, brown, or red mottles. The structure is prismatic and blocky. The substratum comprises stratified material. Most soils are loamy in texture. They usually are more sandy close to hills, and more silty and clayey on the lower parts of the piedmont slopes. The topsoil usually is lighter in texture than that of the subsoil. The agricultural productivity of these soils is mainly moderate to low. Most soils except sandy ridge soils are much better suited for paddy cultivation than dryland crops. These soils are classified as dystric or eutric gleysols.

5.14 Brown Hill Soil

These soils occur on gentle to very steep slopes of northern and eastern hills. These soils have been developed over consolidated or unconsolidated rocks, which are imperfectly to excessively drained. The thickness of the topsoil ranges from 5 to 7.5 cm. Under forest vegetation, the color varies from dark grayish brown to grayish brown. Under cultivation, the surface layer is pale brown. The subsoil usually is 30–90-cm thick. In most cases, they have a cambic or argillic B-horizon. Generally the subsoils are yellow to strong brown, friable, porous, sandy loam to sandy or silty clay loam, and are very strongly to extremely acidic. The topsoil usually has less clay than the subsoil. The profile is strongly leached throughout. The agricultural productivity of these soils is mainly low for field crops, but ranges between low and high for tree plantation. The majority of these soils are dystric Cambisols and haplic and ferric Alisols.

5.15 Shallow Red-Brown Terrace Soils

These soils occur extensively on gently undulating to rolling relief on the Madhupur Tract and locally in the Barind Tract. Most of the soils are found under degraded *sal* (*Shorea robusta*) forest. These soils are imperfectly to moderately well drained. Under forest vegetation, a 2-cm thick surface layer is present having the properties of grey to brown, silty, platy structure and are slightly to strongly acidic in reaction. Under cultivation, the topsoil is 5–10-cm thick and is brown to strong brown, strongly to very strongly acidic, and clay loam or clay. The subsoil ranges from a porous yellow brown loam to olive brown, strong or reddish. The substratum comprises recognizable Madhupur clay which has a strong blocky structure and is plastic when wet and hard when dry. It is grey with red or brown mottles and is very strongly acidic. The agricultural productivity of these soils is low both for field crops and tree crops. The majority of them have been classified as haplic and gleyic Alisols.

5.16 Deep Red-Brown Terrace Soils

These soils occur extensively in the northeastern Barind Tract, on the Madhupur Tract and on the Akhaura terrace. The topsoil usually is 8–14-cm thick and has a brown to yellow-brown color, loam to clay loam texture, and rusty stains along root channels. The subsoil usually is 60–120-cm thick. The color is dark red on well-drained terrace and strong brown to yellow brown on moderately well-drained soils. This layer is clay in texture, porous, and very strongly acidic in reaction. The subsoil grades into the red-mottled substratum, with yellow, pale yellow, and pale brown mottles. Weatherable feldspar and biotite are present in small amounts in both the subsoil and the substratum. Kaolinite is the dominant clay mineral (about 60 %) with 20 % illite and 5–20 % vermiculite. The agricultural potential of these soils is mainly moderate or low for rainfed field crops, but moderate or high for irrigated field crops. They are classified as orthi-ferric Alisols.

5.17 Brown Mottled Terrace Soils

These soils occur on level terrace sites on the north and east of the Barind Tract, the Madhupur Tract, and the Akhaura terrace. These soils are brown and red-mottled, strong to extremely acidic, friable clay loam to clay soils over deeply weathered, red-mottled, Madhupur clay. They are moderately to imperfectly drained. The topsoil is 10–15-cm thick. The color is predominantly brown, with grey and stronger brown mottles. The soil is silt loam or loam in texture, and usually very strongly acidic in reaction. A strong plowpan is present in soils used for transplanted rice. They have been classified as ferric Luvisols and Alisols. The subsoil usually is 40–60-cm thick. The subsoil comprises brown or yellow-brown, friable, porous, clay loam to clay. The reaction is medium to very strongly acidic. The substratum usually is red, mottled with pale brown, friable, porous clay, and usually very strongly acidic in reaction. These soils have low agricultural potential for both dryland crops and for paddy cultivation. They are classified as orthi-ferric Luvisols.

5.18 Shallow Grey Terrace Soils

These soils occur extensively on the level Barind Tract and the high Barind Tract, but occur more locally on the Madhupur Tract. Most soils are shallowly flooded by rainwater or by a raised groundwater table. The topsoil is 10–15-cm thick, which is grey and silty, with yellow brown to strong brown mottles along cracks and root channels. It is strongly to very strongly acidic when dry, but neutral in reduced condition. A compact plowpan occurs below the cultivated layer. The thickness of the subsoil varies between zero and about 50 cm. It is grey, highly porous, silt loam to silt clay loam. The reaction is medium or strongly acidic throughout. The substratum has grey color mottled olive or red, heavy silty clay or clay texture and a strong blocky or wedge-shaped structure. The soils have low permeability because of the presence of compact plowpan. Lime nodules are found in some soils. These soils have moderate agricultural potentiality. The soils are well suited for transplanted paddy, especially with irrigation, but are poorly suited for dryland crops and for tree crops. They have been classified as chromi-eutric Planosols.

5.19 Deep Grey Terrace Soils

These soils occur in some central and western parts of the Barind Tract, locally on the Madhupur Tract, in the northeast of the Barind Tract and on parts of the piedmont plain in the north of the Mymensingh region. These soils are shallowly flooded with rainwater or raised groundwater. The topsoil is dark grey and silt loam or silty clay loam. Yellow-brown or strong brown mottles are found along root channels and cracks. The reaction is medium to strongly acidic when moist or dry, but neutral when submerged. The subsoil is grey, mottled yellow-brown, red and sometimes black, friable, highly porous, and silty clay loam to silty clay. The substratum is generally friable, porous, clay, and weakly structured. Thick grey coatings occur on ped faces and in pores in the lower parts of the subsoil and in the substratum. These soils have low agricultural potential. These soils are better suited for paddy cultivation than for dryland crops and are classified as chromi-albic gleysols.

5.20 Grey Valley Soils

These soils occur in the shallow valleys of the Madhupur and Barind Tracts. They comprise deep, grey, mottled, silt loam to clay soil. These soils are moderately to deeply flooded by local runoff of flood water. The topsoil is about 15-cm thick having the properties of grey silt loam or silty clay loam with yellow-brown to strong brown iron stains along cracks and root channels. The reaction usually is strongly to very strongly acidic in moist and dry conditions, but is neutral in reduced condition. The subsoil has a brightly oxidized, friable, silty layer up to 10-cm thick at the top and grades into 50–100 cm or more of grey, mottled yellow-brown to reddish brown, highly porous, silt loam or silty clay loam. The Grey Valley soils have a low to moderate agricultural potential.

5.21 Made-Land Soils

These include a miscellaneous group of soils. These soils are common in several parts of the country. The soils vary in properties according to the materials from which they are constructed. These materials are mainly derived from adjoining topsoil and subsoil material, or from deeper substratum material. Generally, the soils are loamy, but sandy, clay, and peat also occur. These soils are darker in color, more oxidized, friable, and permeable. Generally, they are more acidic. The organic matter content is low. There is no difference in texture between the subsoil and topsoil. The distribution of clay down to the profile is irregular. These soils have been classified as fimic anthrosols.

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