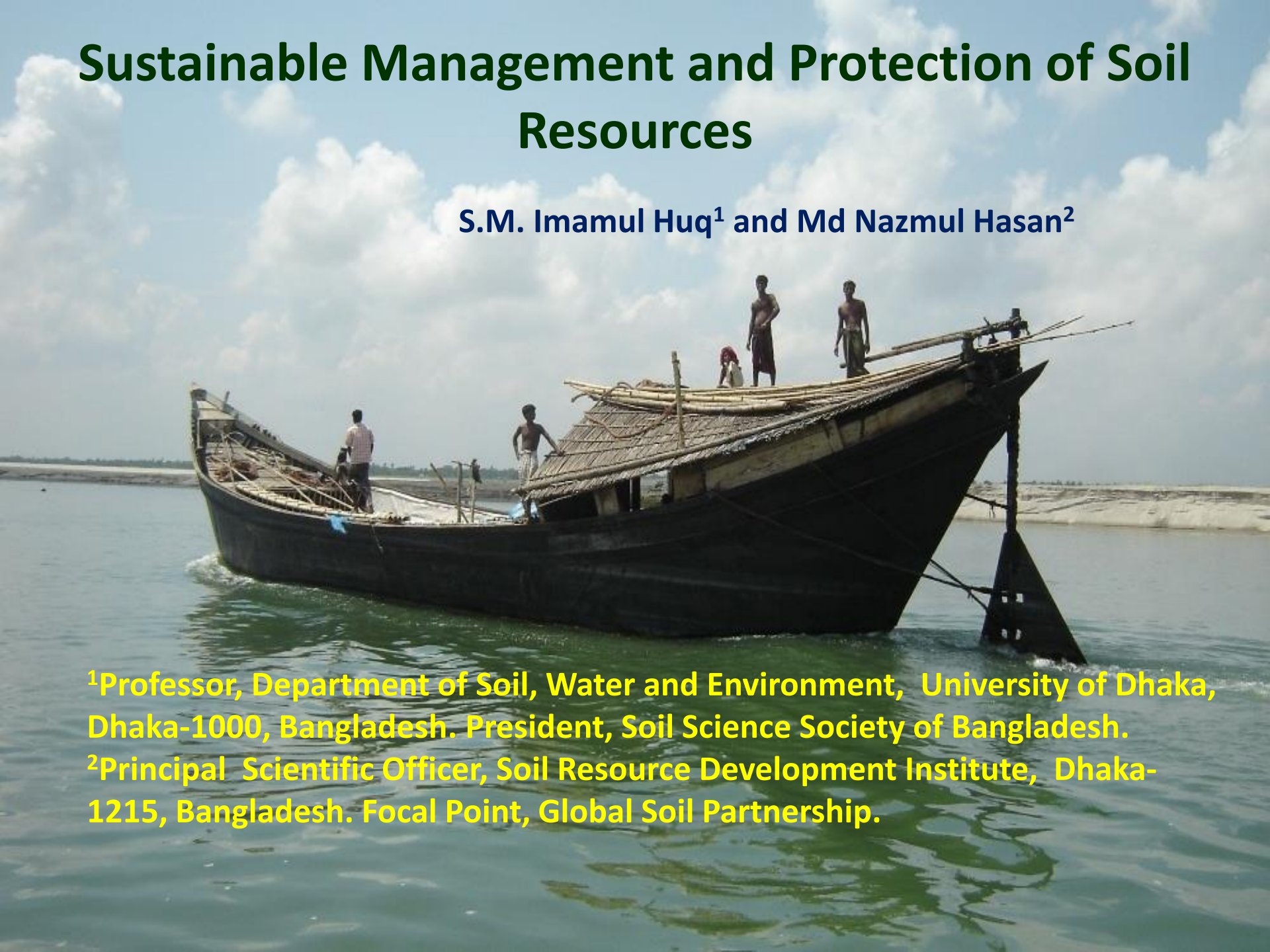
Sustainable Management and Protection of Soil Resources

S.M. Imamul Huq[1] and Md Nazmul Hasan[2]



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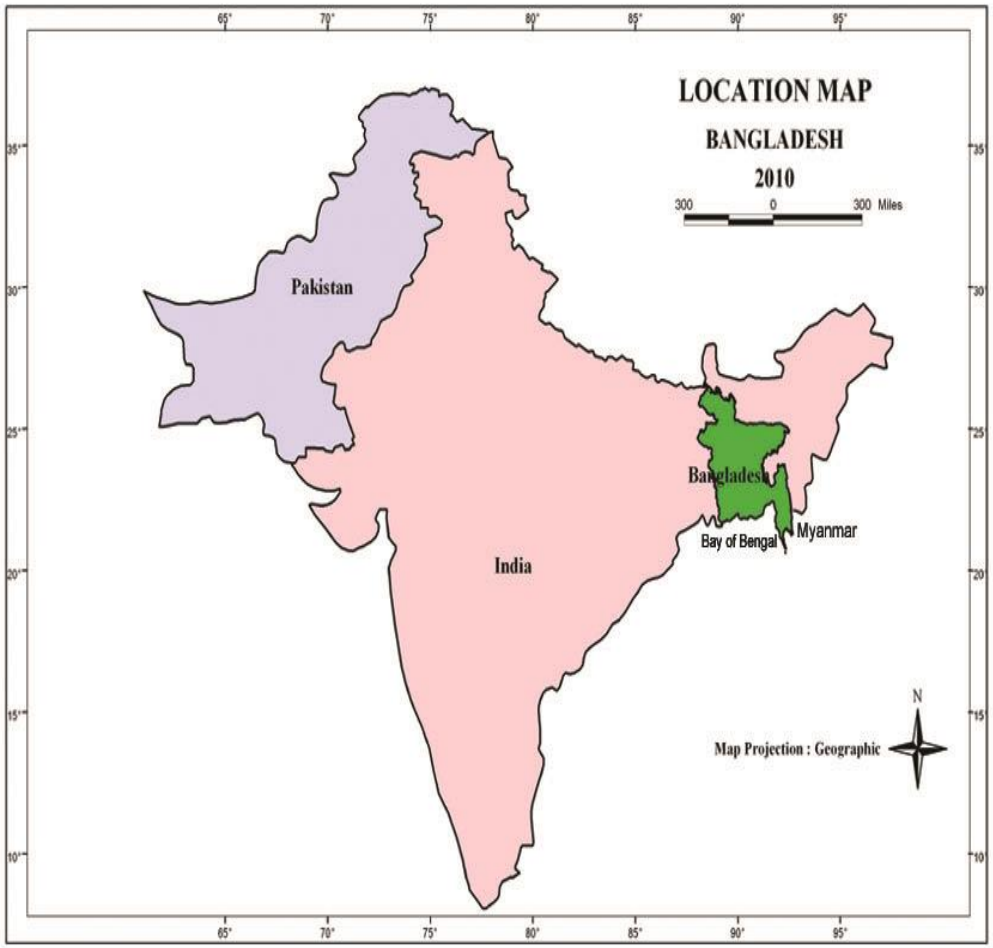
Introduction

- **Agriculture is the most important sector of Bangladesh economy contributing to 18.70% of it's GDP at constant prices (Base: 1995-96 =100). Crop agriculture contribute to 10.25%.**
- **Agriculture plays a vital role in food security, employment and livelihood of the country.**
- **The sector is dynamic, changing with the demand of people, availability of technology and change of management practices.**
- **Thus it requires regular adjustment with different planning and development.**
- **The Bangladesh economy is transforming towards commercial agriculture with expansion of service sector.**

Location of Bangladesh



Bangladesh lies between $20^{0}34^{/}$ and $26^{0}38^{/}$ north latitude and $88^{0}01^{/}$ and $92^{0}41^{/}$ east longitudes.

Located as an interface of two different environments - the Bay of Bengal in the south and the Himalayas in the north.

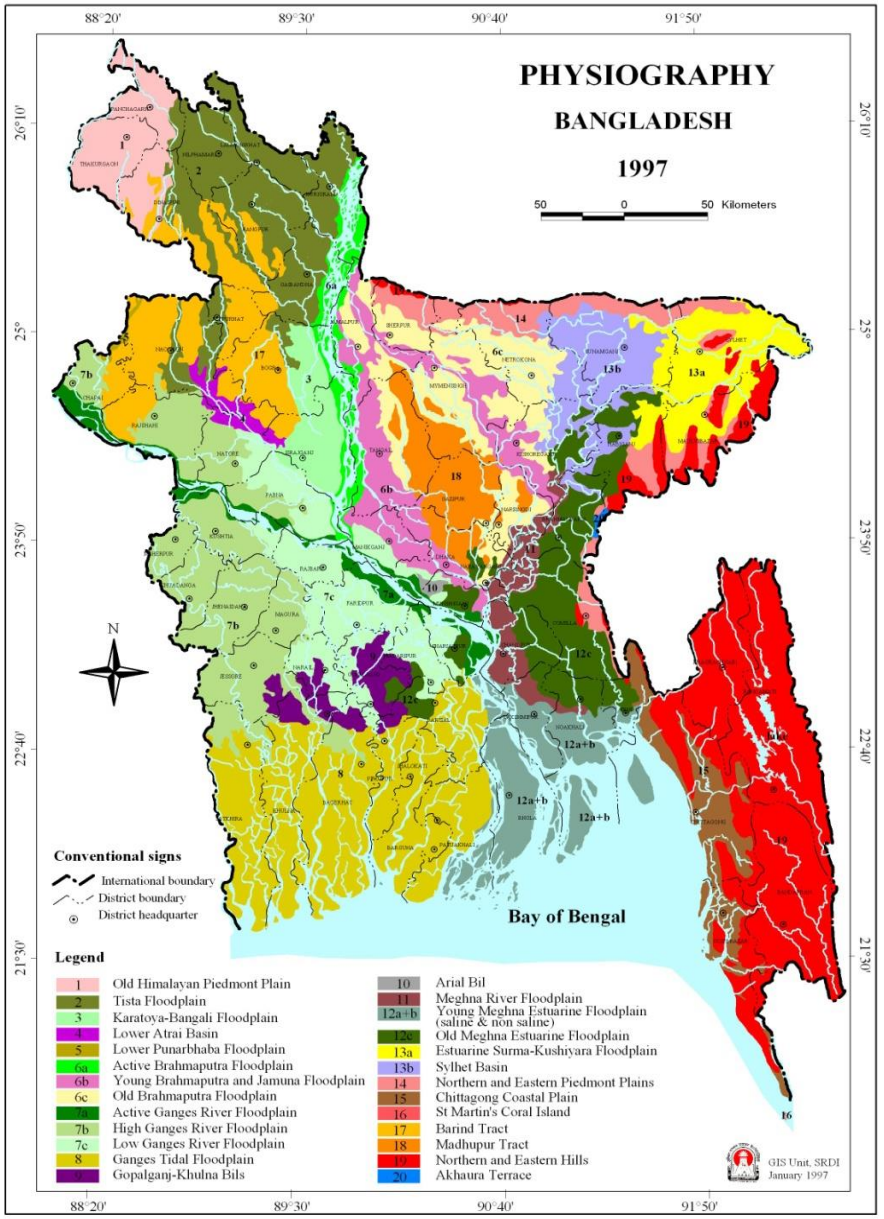
Sits astride the tropic of cancer.

Bordered by India in the west, north and east except for a small portion in the south-east by Myanmar. The entire south of the country is occupied by the Bay of Bengal.

Physiography

- **The three broad physiographic units belonging to three distinct geological ages:**
  - **A. Tertiary hills occupying 12% area**
  - **B. Pleistocene terraces covering 8% area and**
  - **C. Recent floodplains spreading about 80% area of the country.**

- **These three physiographic units are again categorized into 20 different physiography considering their geomorphology and origin of soils.**



- **Geographic location and geo-morphological conditions have made Bangladesh one of the most vulnerable countries to climate change.**
- **Bangladesh has around 310 rivers with a total length of 24,140 km.**
- **Among them, 54 rivers originate from India, all of which eventually flow into the Bay of Bengal. These include three major rivers, the Ganges, the Brahmaputra (Jamuna) and the Meghna, which together constitute the largest river network in the world.**
- **These rivers carry 2.0 billion tons of sediments annually from India and Nepal to the Bay of Bengal.**

- **Bangladesh generally enjoys a sub-tropical monsoon climate.**
- **The annual rainfall varies from 1400 mm to 4500 mm and national average is 2427 mm.**
- **More than 70% of the total rainfall of the country occurs during monsoon (June to September).**
- **The average minimum temperature ranges from 12.5 to 25.7 ^{o}C and the average maximum temperature ranges from 25.2 to 33.2 ^{o}C**
- **Bangladesh is endowed with rich and diverse genetic resources of flora and fauna.**
- **It has 5000 species of flowering plants and 1500 species of fauna.**

- **The forest covers about 12% of the total land area but actual tree cover is only 9%.**
- **The Sundarbans, the largest mangrove forest in the world is located in the south-western part of the country.**
- **Cyclones are the worst natural calamities.**
- **Tornadoes are more common in the central regions of the country.**
- **Flood in Bangladesh is usually considered a blessing as it brings silt to enrich soil fertility for crop production and also create water bodies for fish production.**
- **However, it becomes the cause of sufferings when it exceeds normal and expected level of inundation and duration.**
- **It not only causes damage to crops, it also affects seriously the livestock and fisheries.**
- **Between 1953 and 2004, there were 42 occurrences of flood of which 28 were significant.**

Status of Soil Resources of the Country

Land Use/Land Cover	Area in hectare			Yearly average change in hectare	
	1976	2000	2010	1976-2000	2000-2010
Cropland	9,761,450	9,439,541	8,751,937	-13,413	-68,760
Forest	1,754,917	1,311,121	1,434,136	-18,492	12,301
Mangrove	452,444	486,791	441,455	1,431	-4,534
Aquaculture	582	143,506	175,663	5,955	3,216
Salt pan	11,789	24,306	36,022	522	1,172
Rural settlement	885,637	1,458,031	1,766,123	23,850	30,809
Urban + Industr	26,799	47,495	87,616	862	4,012
Land loss from crop agriculture at the rate of 0.73%/year					
Per capita crop land is 0.052 hectare					

Status of Soil Resources of the Country

Soil Fertility Status of Bangladesh Soil		
Nutrient Element	Critical Level (CL)	Area(mha) below CL
Nitrogen	0.12% (Kjeldahl method)	8.75
Phosphorus	8.0µg/g(modified Olsen Method) & 5.0 µg/g(Bray & Kurtz method)	3.70
Potassium	0.12 meq/100g (N NH4OAc extraction)	2.72
Sulfur	10.0µg/g(Calcium dihydrogen phosphate extraction)	3.31
Calcium	2.0meq/100g (N NH4OAc extraction)	0.30
Magnesium	0.5meq/100g (N NH4OAc extraction)	0.30
Zinc	0.6µg/g (DTPA extraction)	2.75
Boron	0.2µg/g (Calcium Chloride extraction)	2.49
Organic Matter	<1.7 %(Wet oxidation)	3.64

Agro-ecological Zones (AEZ) of Bangladesh

Bangladesh is divided into 30 agro-ecological zones and 88 subzones.

This zoning is based on 33 layers of information under four major heads:

- landform resources,

- soil resources,

- inundation resources and

- climatic resources inventory.

These zoning has been catering the country for about two decades as these zones are considered as Resource Management Domain (RMD) in some respect, though more precise RMD (about 5,000 location specific RMD) is created by semi-detailed soil survey.

Unfavorable Ecosystem

There are many types of production constraints that exists in unfavorable ecosystems:

- **Coastal saline area**
- **Piedmont plain**
- **Charlands (accreted land)**
- **Peat basin**
- **Haors (saucer shaped low lying basins)**
- **Hills and**
- **Terrace (Barind and Modhupur tract).**

Little attention has been paid to improve soil health and productivity in these vulnerable areas.

Main Issues and Soil Threats

- **All agricultural planning including soil management needs database on soil and land resources of the country.**
- **At present per capita crop land is only 0.05 ha and agricultural land is shrinking day by day at the rate of 68,760 ha or 0.73 percent per year (SRDI, 2013).**
- **Judicious and profitable use of soil resources, keeping healthy and productive land for future is the main challenge of Bangladesh.**
- **SRDI conducted RSS for the whole country during 1963-1975, and semi-detailed survey during 1985-2002 and published maps and reports.**
- **Second round of semi-detailed soil survey is going on to update the existing database.**

Land Resources characterization/inventory

- Agriculture is the most important sector of Bangladesh economy
- This sector is dynamic, changing with the demand of people, availability of technology and change of management practices.
- It requires regular adjustment with different planning and development.
- The Bangladesh economy is transforming towards commercial agriculture with expansion of service sector.
- To cater the need of the country in the perspective of 2021 and beyond, more detailed database is needed.

Soil Organic Matter Management

- **Soil organic matter is a key factor in maintaining long-term soil fertility**
- **Depletion of soil organic matter is a major constraint to higher crop production in Bangladesh.**
- **Status of organic matter is below 1 percent in 0.76 million ha and between 1-1.7 percent in 2.87 million ha of land.**
- **Depletion of organic matter has arisen due to increasing cropping intensity, higher rate of organic matter decomposition under prevailing hot and humid climate situation, use of lesser quantities of organic manure. Almost no return of crop residues and little or no use of green manure practice.**

Soil fertility and fertilizer management

- **Depletion of soil organic matter, unbalanced use of fertilizers, minimum use of manures, increasing cropping intensity, high pH and low pH, nutrient leaching and light textured soils have accentuated nutrient deficiency in Bangladesh.**

Soil management in unfavorable ecosystem

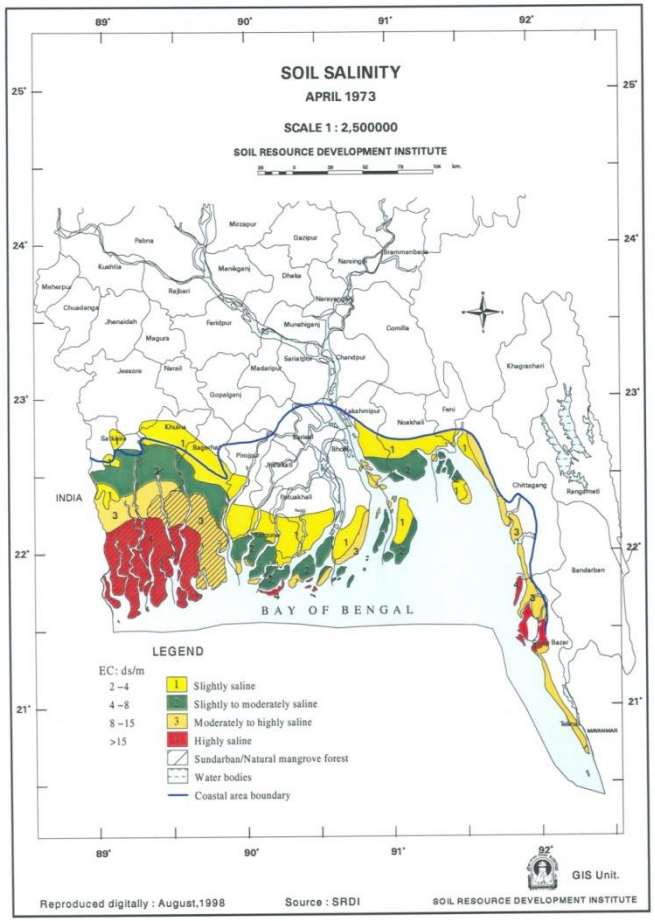
Coastal saline area:

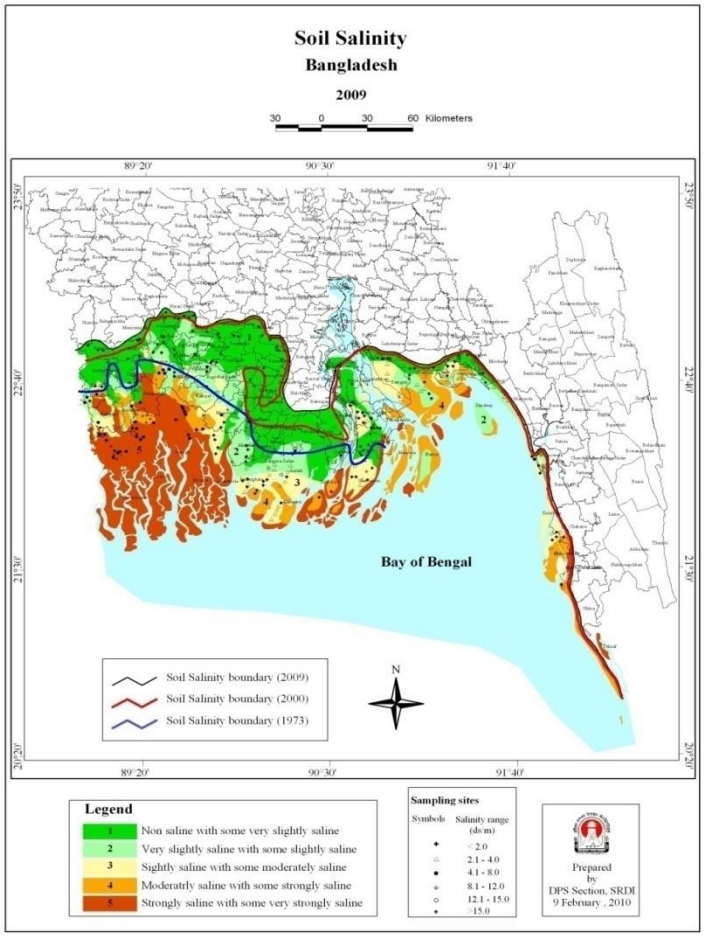
- More than 30% of the cultivable land in Bangladesh is in the coastal area which is about 2.86 million hectares.
- Farmers mostly cultivate low yielding, traditional rice varieties during wet season.
- Most of the land remain fallow in the dry season (January- May) because of soil salinity, lack of good quality irrigation water and late draining condition.

Soil Salinity: A comparative study of the salt affected area between 1973 to 2009 .

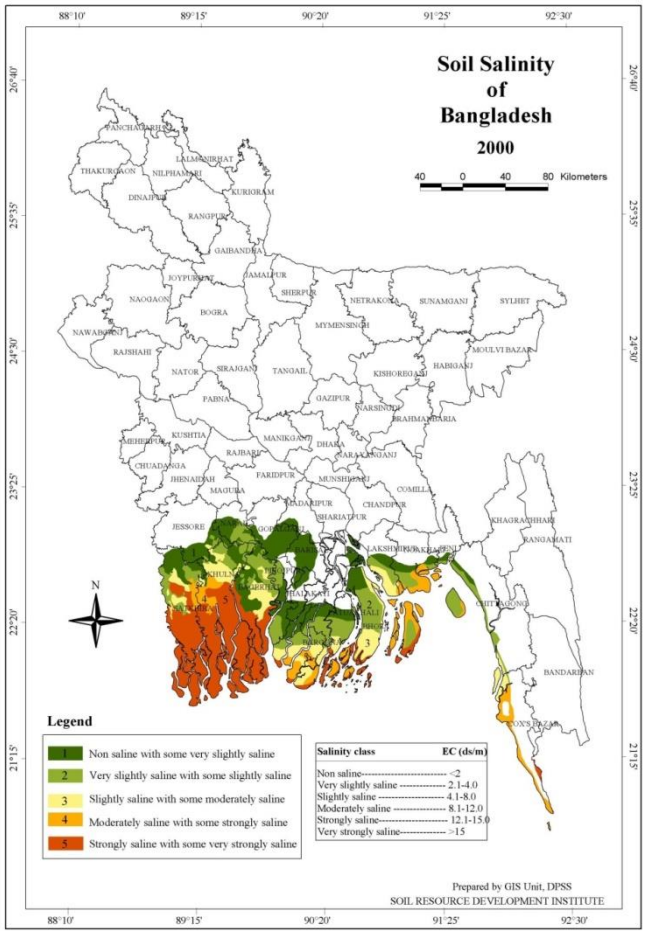
1973	2000	2009	Salt affected area increased during 2000-2009	Salt affected area increased during 1973-2009
Salt affected area (000'ha)				
833.45	1020.75	1056.19	35.44 (3.5%)	222.74 (26.7%)

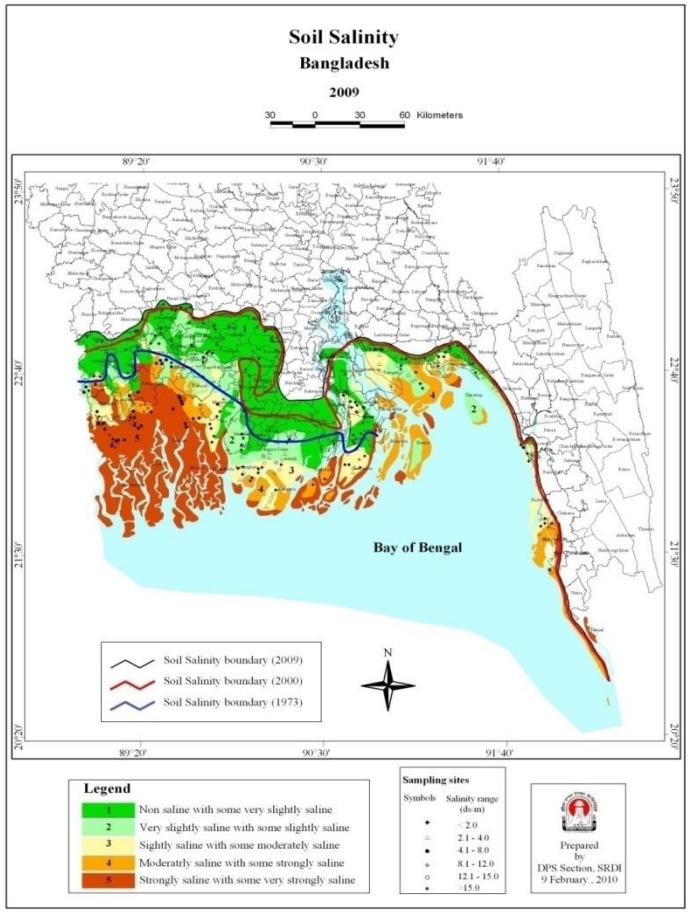
Soil Salinity 1973-2000





Soil Salinity 2000-2009





Soil management in unfavorable ecosystem

Piedmont Plains:

- **Constraints include sandy soils, high permeability, low organic matter content, low pH, iron and aluminum toxicity, macro and micro nutrient deficiencies, stone lifting in some area and flash flood in depressions. Causes of soil fertility depletion are: increasing cropping intensity, high yielding irrigated crops, unbalanced fertilizer use and little or no addition of organic matter to the soil. The extent of the region is about 0.4 million hectares.**

Terraces:

- **Sparsely and deeply dissected terrace soils have high permeability, face drought in dry season and have soil fertility with problems of phosphate fixation and sulfur and boron deficiency. Extent of the area is about 1.2 million hectares.**

Soil management in unfavorable ecosystem

Peat basin:

- **Peat soils occupy about 0.13 million hectares. The bulk density of peat soils are between 0.20 to 0.30 gm/cc. The soils have low bearing capacity when wet, strongly acidic, low nutrient status specially N, K, S, Zn and B, and C:N ratio is very wide. The region is seasonally moderately to deeply flooded by clear water and basin centers remains wet throughout the year.**

Charlands (Accreted Lands):

- **These areas occur along the major river system and cover about 0.55 million hectares of land occupying 3.7 percent of Bangladesh. Soils are light textured, low to very low in organic matter content, low soil fertility and low moisture content. Fresh sediments are also deposited in every year. Flooding in the wet or summer season, low soil fertility and organic matter and low moisture holding capacity, river bank erosion and flood is the main constraints for agricultural development.**

Soil management in unfavorable ecosystem

Haors (saucer shaped deeply flooded basin):

- **Haors occupy 932,793 hectares *i.e.*, about 6.32% area of Bangladesh. Early flood or flash flood, deep to very deep flooding, heavy rainfall, slow drainage at basin center and poor soil qualities are the main constraints for agricultural development in this area.**
- **Hills:**
- **Hilly areas of Bangladesh occupy about 1.7 million hectares, which is about 12% of the country's area located in the south-eastern, eastern and northern part of the country.**

Land susceptible to erosion in the hilly areas of Bangladesh.

Affected areas	Mod. susceptible to erosion	Highly susceptible to erosion	Very highly susceptible to erosion	Total (Sq. Km)
Chittagong Hill Tracts	350	1814	10765	12929
Chittagong & Cox's Bazar	414	949	954	2317
Greater Sylhet	161	462	964	1587
Other districts	-	35	102	37
Total	925 (5%)	3260 (20%)	12785 (75%)	16970

Climate change and environmental hazard effect on soil:

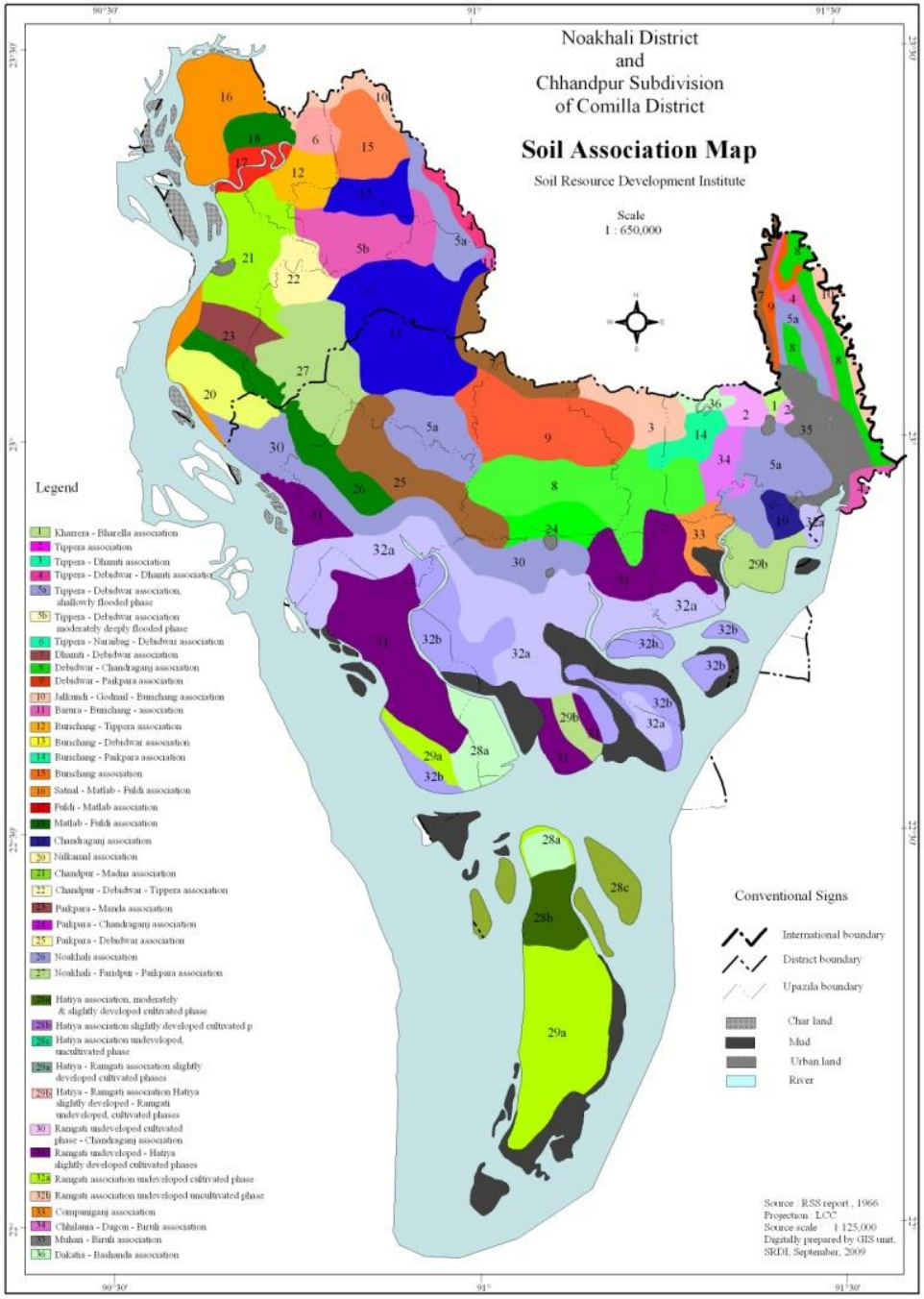
- **It is not unlikely that tomorrow's agriculture would be significantly influenced by the global climate change that includes increase in CO_2 content, increased emission of gases like CH_4, NO_2 etc. which would lead to an increase of temperature of the earth and rise in sea level. The climate change would have a direct effect on crops, water balance, soil organic matter content, salinity intrusion, surface energy balance and indeed, the range of soil properties.**

Heavy metals and other unfriendly elements in soil ecosystem:

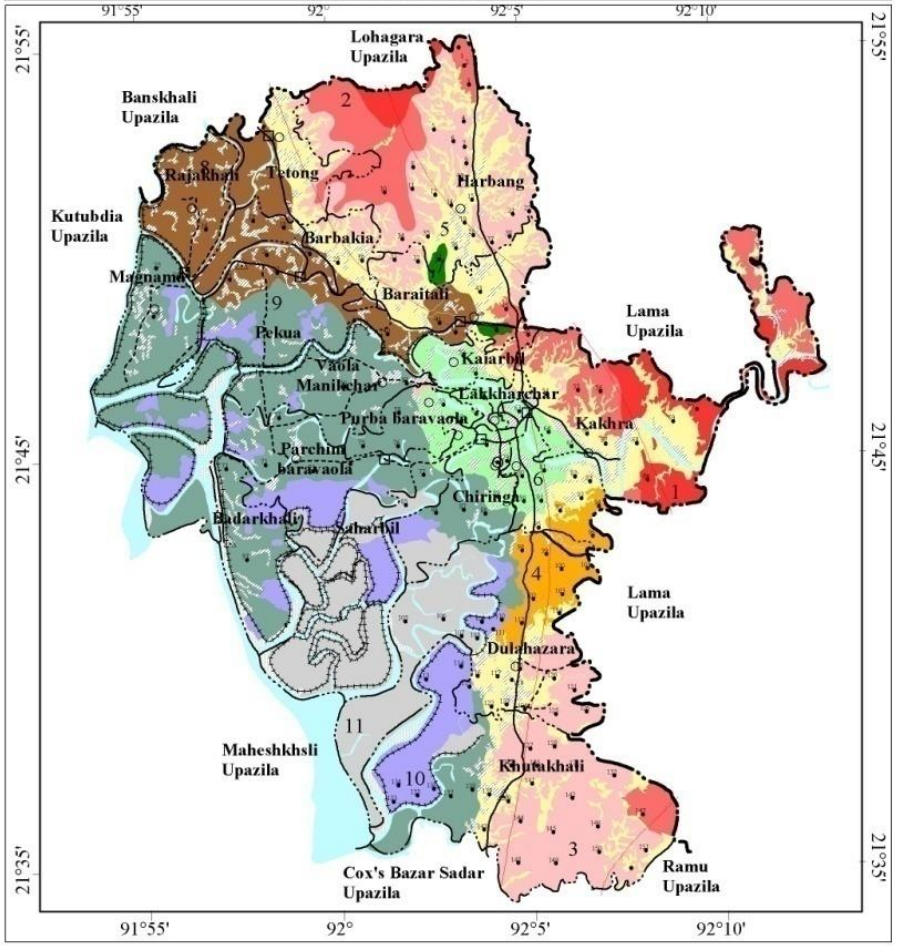
- **It is reported that ground water is contaminated by arsenic in many areas of Bangladesh. Arsenic contamination is linked with ground water; though pot-ability of As-contaminated ground is of much concern, it is however, adversely affecting the soil-crop system because of the dependence on ground water irrigation. Localized contamination of Pb, Cd, Cr and Ni are also reported in the area near to the industrial area.**

Ongoing activities

- **Land and soil resources inventory:** Semi-detailed soil survey to update existing database of Upazila wise "Land and Soil Resources Utilization Guides" and soil salinity survey at 5 years intervals is going on.
- **Soil fertility investigation:** SRDI is conducting soil fertility investigation through collection of soil samples during semi-detailed soil survey, soil fertility monitoring program, mobile soil testing service and farmers' service and analyze the samples in the laboratory. Thus, it is creating huge database on soil fertility and soil pH. These databases are being used in balanced fertilizer application including application of organic manures.


Noakhali District
and
Chhandpur Subdivision
of Comilla District
Soil Association Map
Soil Resource Development Institute
Scale
1 : 650,000
Legend
1 Khanera - Bharella association
2 Tippera association
3 Tippera - Dhamti association
4 Tippera - Debidwar - Dhamti association
5a Tippera - Debidwar association, shallowly flooded phase
5b Tippera - Debidwar association moderately deeply flooded phase
6 Tippera - Naraibag - Debidwar association
7 Dhamti - Debidwar association
8 Debidwar - Chandraganj association
9 Debidwar - Paikpara association
10 Jalkundi - Godnail - Bunchang association
11 Barura - Bunchang - association
12 Bunchang - Tippera association
13 Bunchang - Debidwar association
14 Bunchang - Paikpara association
15 Bunchang association
16 Satnal - Matlab - Fuldi association
17 Fuldi - Matlab association
18 Matlab - Fuldi association
19 Chandraganj association
20 Nilkamal association
21 Chandpur - Madna association
22 Chandpur - Debidwar - Tippera association
23 Paikpara - Manda association
24 Paikpara - Chandraganj association
25 Paikpara - Debidwar association
26 Noakhali association
27 Noakhali - Fandpur - Paikpara association
28a Hatiya association, moderately & slightly developed cultivated phase
28b Hatiya association slightly developed cultivated p
28c Hatiya association undeveloped, uncultivated phase
29a Hatiya - Ramgati association slightly developed cultivated phases
29b Hatiya - Ramgati association Hatiya slightly developed - Ramgati undeveloped, cultivated phases
30 Ramgati undeveloped cultivated phase - Chandraganj association
31 Ramgati undeveloped - Hatiya slightly developed cultivated phases
32a Ramgati association undeveloped cultivated phase
32b Ramgati association undeveloped uncultivated phase
33 Companiganj association
34 Chhalania - Dagon - Barura association
35 Muhari - Barura association
36 Dakatia - Bashanda association
Conventional Signs
International boundary
District boundary
Upazila boundary
Char land
Mud
Urban land
River
Source : RSS report , 1966
Projection : LCC
Source scale 1:125,000
Digitally prepared by GIS unit,
SRDI, September, 2009

SOIL AND LANDFORM MAP OF CHAKARIA UPAZILA COX"S BAZAR DISTRICT



Conventional signs

- District boundary
- Upazila boundary
- Union boundary
- Metal road
- Non metal road
- Reference thermal zone of rabi temperature
- Embankment
- Narrow river
- Union headquarter
- Upazila headquarter
- Sampling point
- Settlement
- Water body

Legend

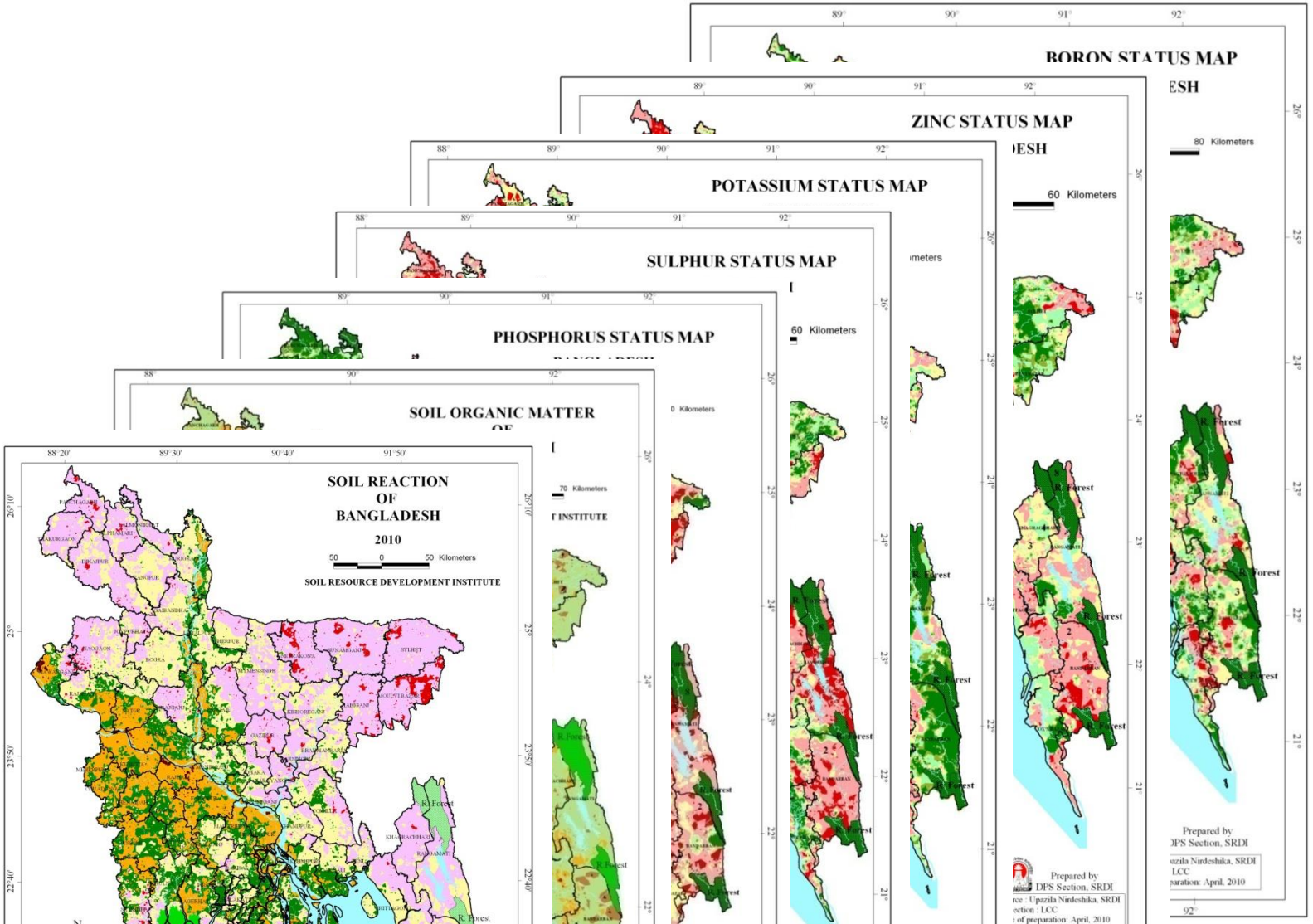
Map unit	Physio-graphy	Area(ha)	Land type	Major soil	Slope class
1	Northern and Eastern Hills	1,533	HL	Barkal	Very steep
2		2,995	HL	Nalua	Steep
3		5,179	HL	Nalua	Steep
4		5,502	HL	Matiranga	Gently sloping
5	Northern and Eastern Piedmont Plains	8,373	MHL	Mirsarai	Nearly level
6		2,310	MHL	Pahartali	Nearly level
7		185	MLL	Muhuri	Nearly level
8		4,572	MHL	Kutubdia	Nearly level
9		11,618	MHL	Kutubdia	Nearly level
10		5,683	MHL	Kutubdia	Nearly level

Source:
SRDI District Office, Cox's Bazar, 1990
Scale: 50,000
Projection: LCC
Prepared by GIS unit, SRDI

3 0 3 Kilometers

N

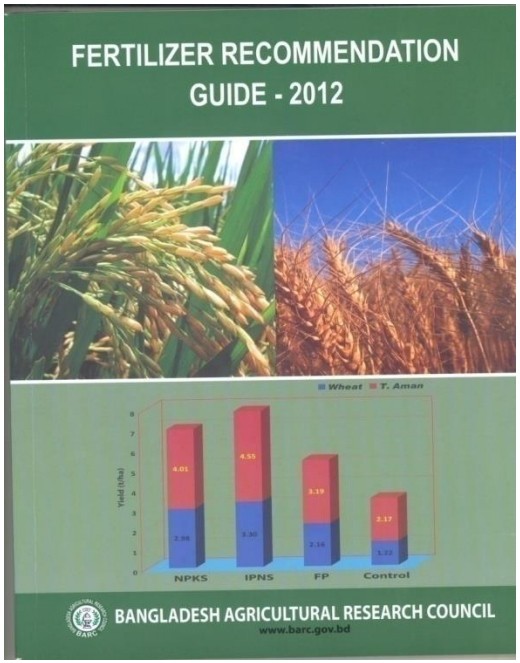
SOIL RESOURCE DEVELOPMENT INSTITUTE

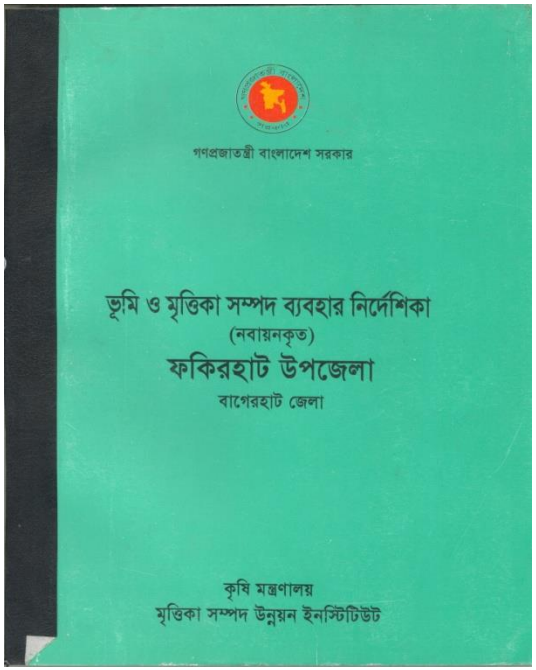

BORON STATUS MAP
ZINC STATUS MAP
POTASSIUM STATUS MAP
SULPHUR STATUS MAP
PHOSPHORUS STATUS MAP
SOIL ORGANIC MATTER
SOIL REACTION
OF
BANGLADESH
2010
50 0 50 Kilometers
SOIL RESOURCE DEVELOPMENT INSTITUTE
Bay of Bengal
Legend
Mapping unit Class Area(ha)
Extremely Acid 3,46,382
Strongly Acid 51,30,997
Slightly Acid 37,89,487
Neutral 19,95,654
Slightly Alkaline 19,86,477
Strongly Alkaline 35,375
Sundarban 4,27,418
Class pH Value
Extremely acid < 4.5
Strongly acid 4.5 - 5.5
Slightly acid 5.6 - 6.5
Neutral 6.6 - 7.3
Slightly alkaline 7.4 - 8.4
Prepared by
DPS Section, SRDI
Upazila Nirdeshika, SRDI
LCC
Preparation: April, 2010
Preparation: March, 2010
R. Forest
Sundarban

Fertilizer Recommendation System:

- **BARC publishes "Fertilizer Recommendation Guides" at 5 years interval. Different research institutes under National Agricultural Research System (NARS) are conducting research on soil test based fertilizer use for different crops and SRDI has generated database on soil fertility of the country. Based on which Fertilizer Recommendation Guides are developed.**
- **Upazila wise "Land and Soil Resources Utilization Guides" are also used for crop selection and soil fertility based fertilizer recommendations.**
- **Mobile Soil Testing Laboratory is operating to popularize soil test based fertilizer use. SRDI is also providing balanced fertilizer recommendation services to the farmers by analyzing soil samples through its 15 static laboratories.**
- **SRDI introduced On Line Fertilizer Recommendation System (OFRS) in the country.**
- **Beside this, very good networks have been developed for fertilizer distribution. Government established many laboratories to ensure quality of fertilizers through analysis.**
- **Research is also being conducted on soil fertility and fertilizer management in different universities of Bangladesh.**

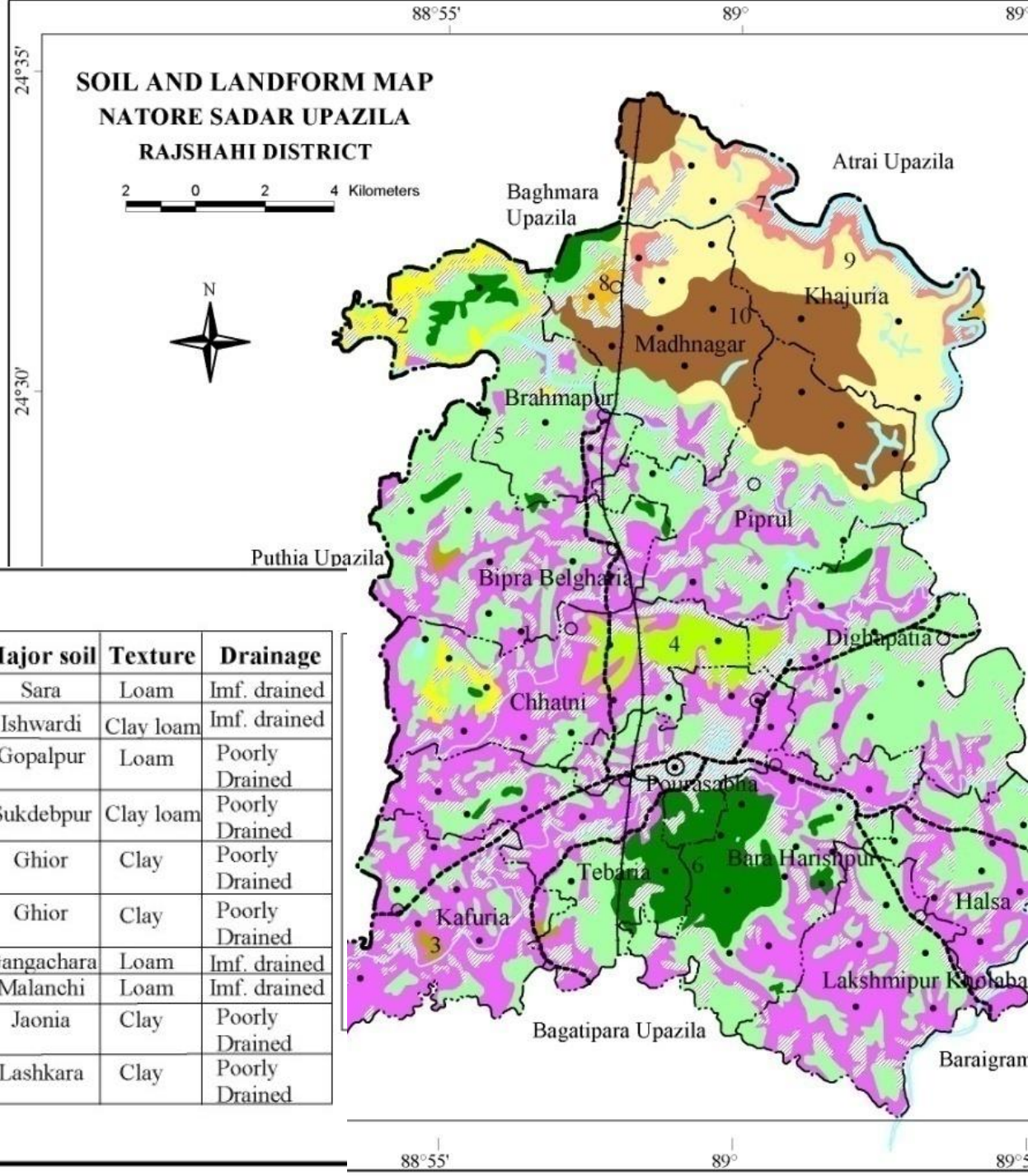
Guides and MSTL





Online Fertilizer Recommendation System

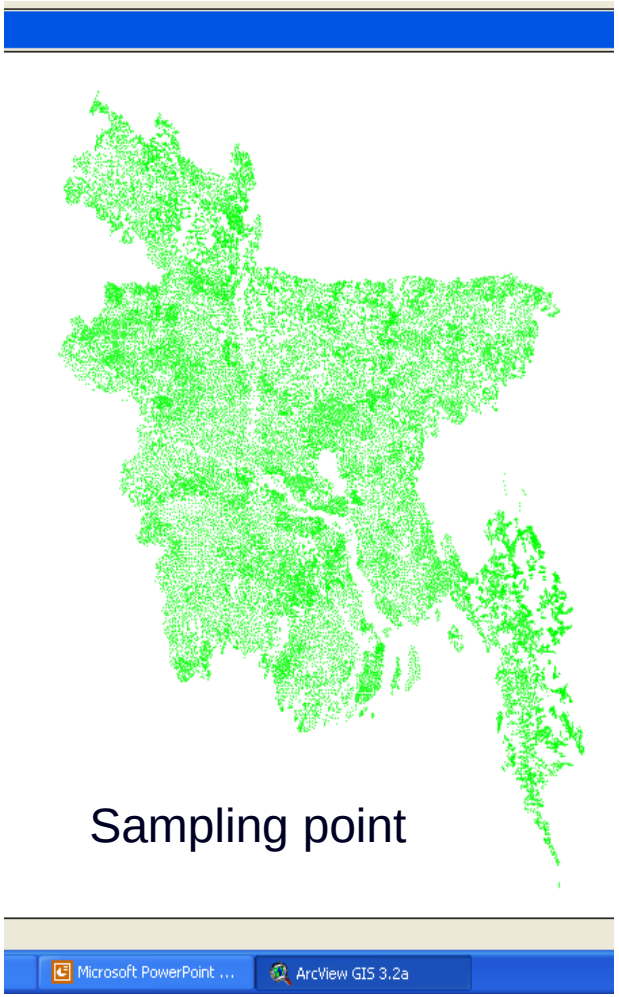
Soil and Land Resource Database of SRDI



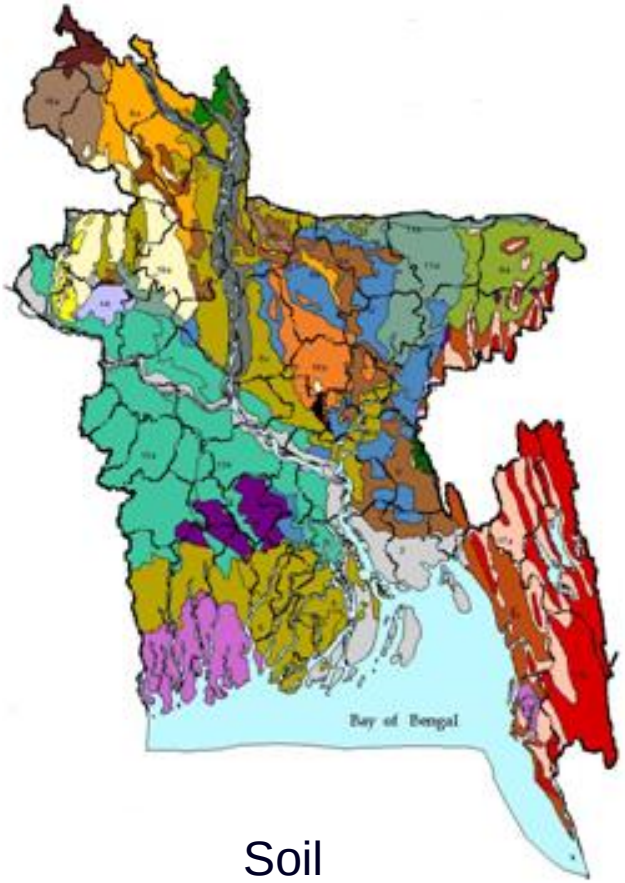
Legend

Map unit	Physiography	Area(ha)	Land type	Major soil	Texture	Drainage
1	Higher Ganges River Floodplain	12,122	High land	Sara	Loam	Imf. drained
2		604	High land	Ishwardi	Clay loam	Imf. drained
3		93	Medium high land	Gopalpur	Loam	Poorly Drained
4		763	Medium high land	Sukdebpur	Clay loam	Poorly Drained
5		10,855	Medium high land	Ghior	Clay	Poorly Drained
6		1,838	Medium low land	Ghior	Clay	Poorly Drained
7	Lower Atrai Basin	416	High land	Gangachara	Loam	Imf. drained
8		394	High land	Malanchi	Loam	Imf. drained
9		2,558	Medium high land	Jaonia	Clay	Poorly Drained
10		2,829	Medium low land	Lashkara	Clay	Poorly Drained

Map Attributes



Sampling point

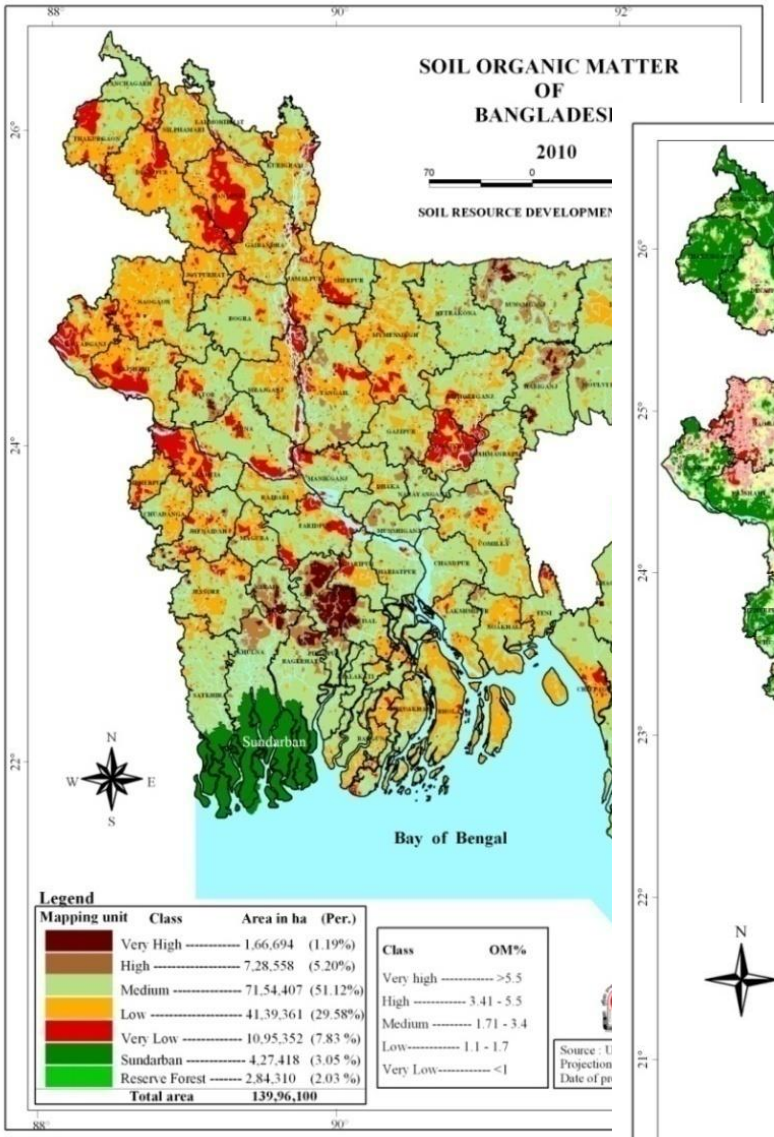


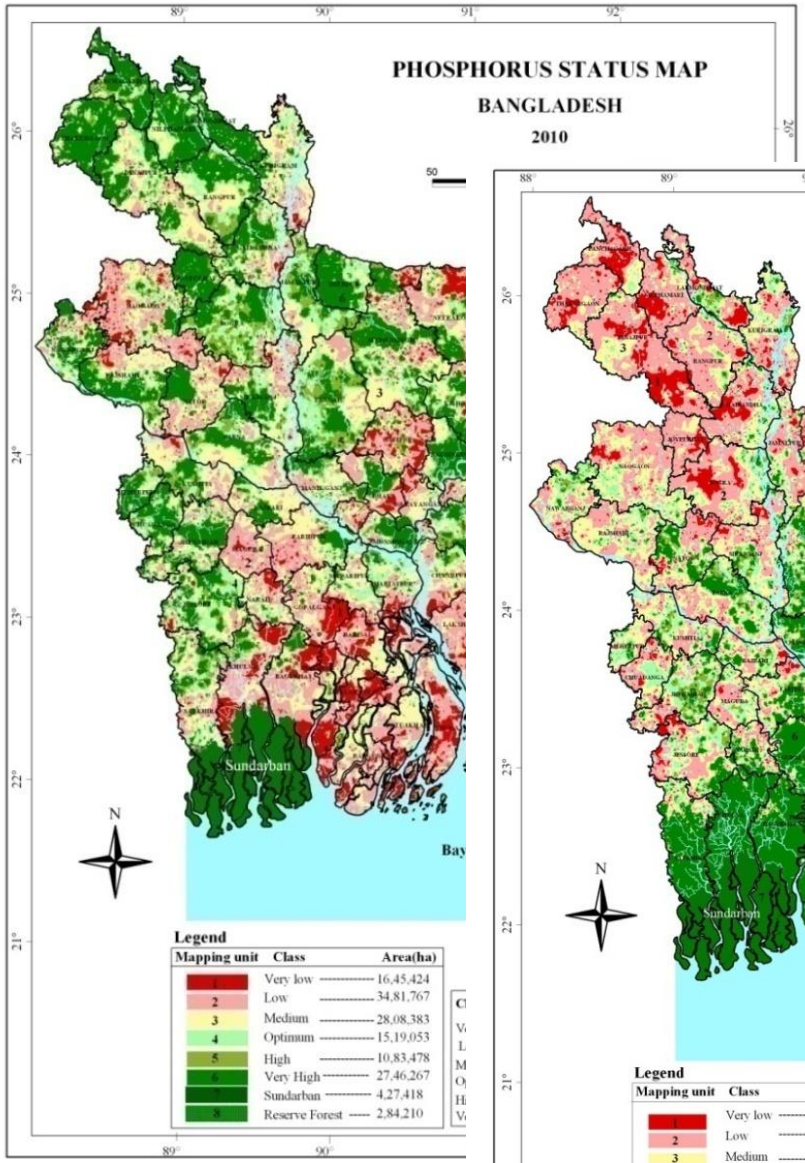
Soil

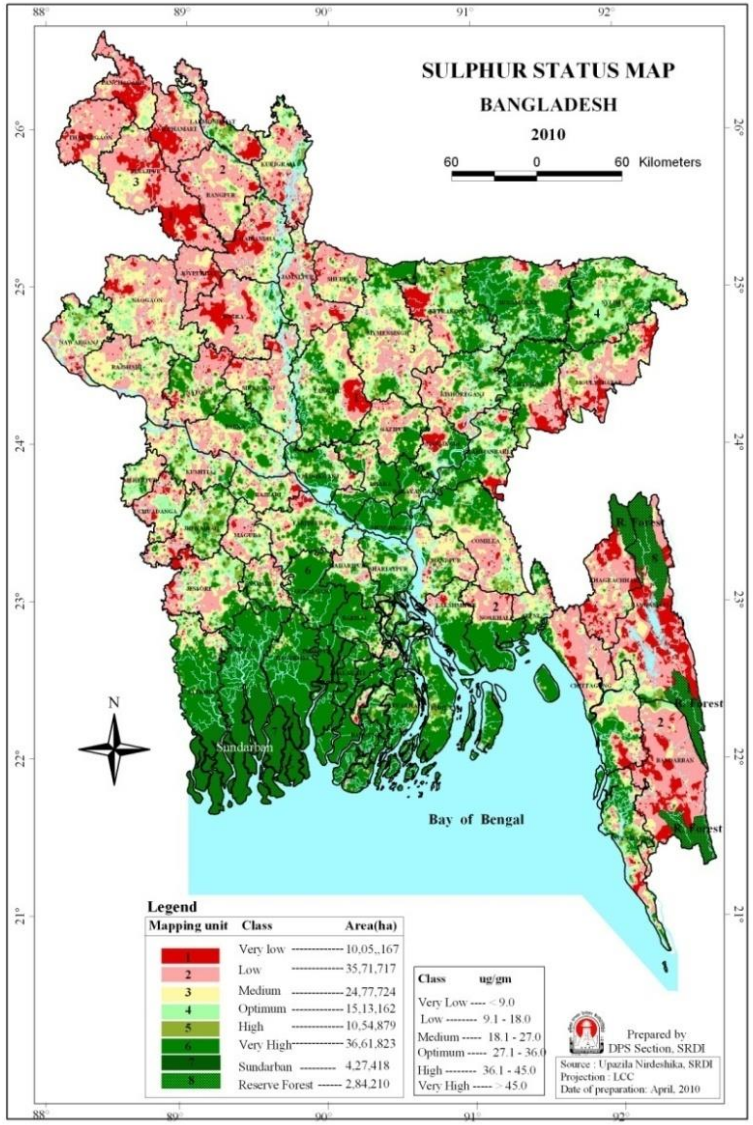
-

-

- Lat-long
- District
- Upazila
- Union
- Physiography
- Land Type
- Texture
- Drainage


SOIL ORGANIC MATTER
OF
BANGLADESH
2010
SOIL RESOURCE DEVELOPMENT
Sundarban
Bay of Bengal
Legend
Mapping unit Class Area in ha (Per.)
Very High 1,66,694 (1.19%)
High 7,28,558 (5.20%)
Medium 71,54,407 (51.12%)
Low 41,39,361 (29.58%)
Very Low 10,95,352 (7.83 %)
Sundarban 4,27,418 (3.05 %)
Reserve Forest 2,84,310 (2.03 %)
Total area 139,96,100
Class OM%
Very high >5.5
High 3.41 - 5.5
Medium 1.71 - 3.4
Low 1.1 - 1.7
Very Low <1

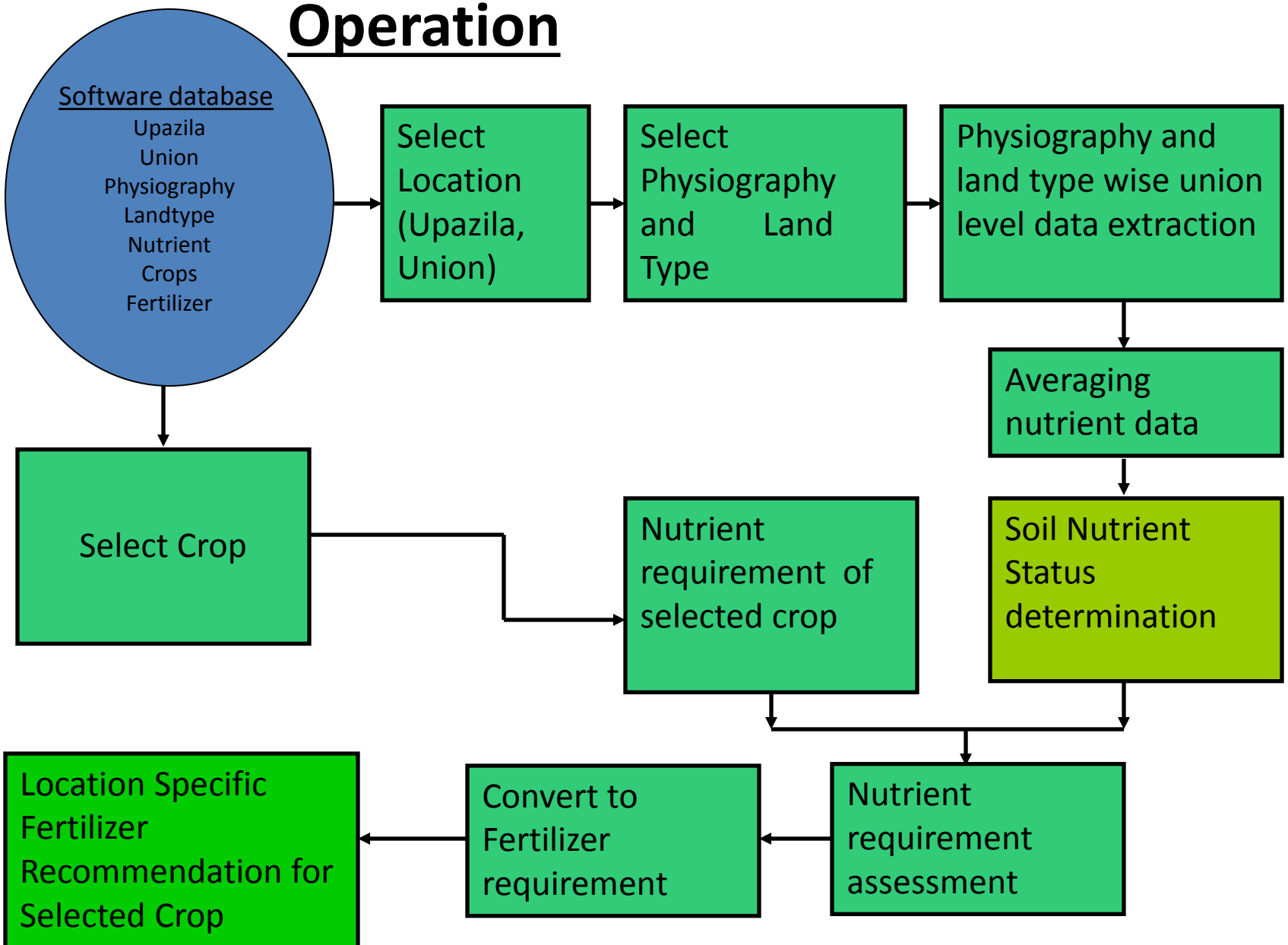

PHOSPHORUS STATUS MAP
BANGLADESH
2010
Sundarban
Legend
Mapping unit Class Area(ha)
1 Very low 16,45,424
2 Low 34,81,767
3 Medium 28,08,383
4 Optimum 15,19,053
5 High 10,83,478
6 Very High 27,46,267
7 Sundarban 4,27,418
8 Reserve Forest 2,84,210


SULPHUR STATUS MAP
BANGLADESH
2010
60 0 60 Kilometers
Sundarban
Bay of Bengal
Legend
Mapping unit Class Area(ha)
1 Very low 10,05,,167
2 Low 35,71,717
3 Medium 24,77,724
4 Optimum 15,13,162
5 High 10,54,879
6 Very High 36,61,823
7 Sundarban 4,27,418
8 Reserve Forest 2,84,210
Class ug/gm
Very Low < 9.0
Low 9.1 - 18.0
Medium 18.1 - 27.0
Optimum 27.1 - 36.0
High 36.1 - 45.0
Very High > 45.0
Prepared by
DPS Section, SRDI
Source : Upazila Nirdeshika, SRDI
Projection : LCC
Date of preparation: April, 2010

- Developed a smart web based software named **Online Fertilizer Recommendation System** to generate location specific fertilizer recommendation for selected crops analyzing this national nutrient database developed by SRDI.

- The software needs only location and land type information to generate crop specific fertilizer recommendation.

Flow Chart of Software Operation



মৃত্তিকা সম্পদ উন্নয়ন ইনস্টিটিউট

KATALYST

সার সুপারিশ নির্দেশিকা

Welcome, srdi.

সার সুপারিশ নির্দেশিকা > সার সুপারিশ কার্ড

সার সুপারিশ কার্ড

সার সুপারিশ কার্ড

লগআউট

জেলা	কুমিল্লা *	কৃষক	
উপজেলা	মুরাদনগর *	গ্রাম	
ইউনিয়ন	আকুবরপুর *	মোবাইল	

মাটির ধরন: পলি মাটি *

ফসলের ক্যাটাগরি: শস্য জাতীয় ফসল *

ফসল: বোরো (বিআর-১, ২, ৭, ১৫, ব্রিধান-২৮, ৩৫ এবং ৩৬) *

জমির পরিমান: 33 (শতাংশ)

ভূমি শ্রেণী: মাঝারি উঁচু জমি *

টিএসপি/ডিএপি: টিএসপি *

অন্যান্য(ঐচ্ছিক)[+]

সার্চ

এই ফসল উঁচু জমি, মাঝারি উঁচু জমি, মাঝারি নিচু জমি, নিচু জমি তে চাষ করার সুপারিশ করা হয়েছে।

ক্রমিক নং	পুষ্টি উপাদান	সার	ফলাফল(৩৩ শতাংশ'র জন্য)	সার প্রয়োগ পদ্ধতি

ভূমি শ্রেণী মাঝারি উঁচু জমি * টিএসপি/ডিএপি টিএসপি *

অন্যান্য(ঐচ্ছিক)[+]

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ক্রমিক নং	পুষ্টি উপাদান	সার	ফলাফল(৩৩ শতাংশ'র জন্য)	সার প্রয়োগ পদ্ধতি
1	নাইট্রোজেন	ইউরিয়া	২৫ কেজি ৫১৩ গ্রাম	১ম কিস্তি- চারা রোপনের ১০-১৫ দিন পর, ২য় কিস্তি- কুশি গজানোর সময়, ৩য় কিস্তি- কাইচ থোড় আসার ৫-৭ দিন পূর্বে ছিটিয়ে দিতে হবে।
2	ফসফরাস	টিএসপি	১ কেজি ৬৭০ গ্রাম	জমি তৈরির সময় এক সাথে প্রয়োগ করতে হবে
3	পটাশিয়াম	এমওপি	৮ কেজি ১৫০ গ্রাম	জমি তৈরির সময় এক সাথে প্রয়োগ করতে হবে
4	গন্ধক	জিপসাম	৫ কেজি ৯৪৩ গ্রাম	জমি তৈরির সময় এক সাথে প্রয়োগ করতে হবে
5	দস্তা	জিংক সালফেট (হেপ্টা)	প্রয়োজন নেই	
6	দস্তা	জিংক সালফেট(মনো)	প্রয়োজন নেই	
7	বোরণ	সলুবর	প্রয়োজন নেই	
8	বোরণ	বরিক এসিড	প্রয়োজন নেই	
9	জৈব পদার্থ	গোবর/কম্পোষ্ট	প্রয়োজন মত	জমি তৈরির সময় এক সাথে প্রয়োগ করতে হবে

মন্তব্য

স্টেটাস্ সুপারিশকৃত *

অ্যাড প্রিন্ট প্রিভিউ

সার সুপারিশ কার্ড

মৃত্তিকা সম্পদ উন্নয়ন ইনস্টিটিউট কর্তৃক মৃত্তিকা নমুনা বিশ্লেষনের ফলাফলের ভিত্তিতে সার সুপারিশ

জেলা: খুলনা, **উপজেলা:** কয়রা, **ইউনিয়ন:** আমাদি, **ভূমি শ্রেণী:** মাঝারি উঁচু জমি (মাঝারি উঁচু জমি), **মাটির ধরন:** পলি মাটি

কৃষক: প্রযোজ্য নয়, **গ্রাম:** প্রযোজ্য নয়

ফসল: রোপা আমন (বি আর-৪, ১০, ১১, ২২, ২৩, ব্রিধান-৩০, ৩১, ৩২ এবং বিনাধান-৪)

ক্রমিক নং	মাটির পুষ্টি উপাদান	সার	ফলাফল (৪০ শতাংশ'র জন্য)	সার প্রয়োগ পদ্ধতি
১	নাইট্রোজেন	ইউরিয়া	২৬ কেজি ৫৩৩ গ্রাম	১ম কিস্তি- চারা রোপনের ১০-১৫ দিন পর, ২য় কিস্তি- কুশি গজানোর সময় এবং ৩য় কিস্তি- কাইচ থোড় আসার ৫-৭ দিন পূর্বে ছিটিয়ে দিতে হবে।
২	ফসফরাস	টিএসপি	১৪ কেজি ৫৭৫ গ্রাম	জমি তৈরির সময় এক সাথে প্রয়োগ করতে হবে
৩	পটাশিয়াম	এমওপি	২ কেজি ৭৫৩ গ্রাম	জমি তৈরির সময় এক সাথে প্রয়োগ করতে হবে
৪	গন্ধক	জিপসাম	প্রয়োজন নেই	
৫	দস্তা	জিংক সালফেট (হেপ্টা)	প্রয়োজন নেই	
৬	দস্তা	জিংক সালফেট (মনো)	প্রয়োজন নেই	
৭	বোরণ	সলুবর	প্রয়োজন নেই	
৮	বোরণ	বরিক এসিড	প্রয়োজন নেই	
৯	জৈব পদার্থ	গোবর/কম্পোষ্ট	প্রয়োজন মত	জমি তৈরির সময় এক সাথে প্রয়োগ করতে হবে

Service delivery Process of Fertilizer Recommendation Software Using Digital Channels

KATALYST
partners in business innovation

Conceptualization, facilitation & integration of digital channels

Generation
software services simplified

Development of the software

Result in Online Server

Online Database

Server

Database of soil samples

Online Interface (Website)
www.frs-bd.com

সার সুপারিশ নির্দেশিকা

SRDI
RESOURCE DEVELOPMENT

Soil Sample

Farmer comes to CIC for fertilizer recommendation

গ্রামীণফোন

জি পি সি আই সি-তে আসুন

AIS Service Center

Union Digital Center

কৃষি জিজ্ঞাসা ৭৬৭৬

Farmer calls for fertilizer recommendation

- **Research on soil fertility management:** Research is being conducted in the NARS institutes on soil fertility and fertilizer management. Universities are also conducting research on the same.
- **Research on soil salinity and management:** SRDI is conducting research on salinity management. It has developed technologies on saline soil management such as mulching, double mulching, pitcher irrigation, furrow and ridge system of cultivation and assessed surface water quality in some area.
- **Research on soil conservation and watershed management:** SRDI through its Soil Conservation and Watershed Management Center is conducting adaptive and basic research on soil conservation and watershed management. Among the technologies generated are jute-geo textiles for reclamation of degraded land, gabion check dam, bench terracing, hedge row, submersible earthen dam for water conservation for dry period etc.

Bench Terrace

Hedge Row

Gabion Check Dam (Front View & Back View with Apron)

The whole depth of gabion is filled with earth transported from the upper end during the rainy season

Pitcher Irrigation

Traditional Irrigation

Pitcher Irrigation

- **Analytical services to the farmers: SRDI is providing analytical services to the farmers through its static laboratories and mobile soil testing laboratories. Annually more than 30,000 farmers are getting balanced fertilizer recommendation based on soil test and crop requirement.**

- **Academic courses in university and colleges: Soil survey, soil chemistry, soil physics, soil mineralogy, soil microbiology have good share in the curriculum of different universities and colleges at undergraduate and post graduate level. Huge number of research is also conducted on soil fertility and fertilizer management.**

- **Unfavorable ecosystem management: SRDI has implemented "Food Security Programme-2006, Soil Fertility Component (FS-SFC)" Project with financial assistance from the European Union aiming at sustainably enhancing production and access to nutritious food for vulnerable households through the promotion of optimal farming practices and crop diversification with subsequent improvement in soil fertility. The project was executed in 6 ecologically disadvantaged areas (unfavorable ecosystem) *viz*., coastal region; active flood plain and char land; haor area; peat basin; and old Himalayan piedmont plain.**

- **Human resource development:** SRDI along with other NARS institutes is conducting regular training program skill development and human resources development.

  SRDI itself provides training to more than 12,000 farmers annually on balanced fertilizer, soil sample collection techniques, identification of adulterated fertilizers, crop and soil management.

  SRDI also imparts training to extension personnel on the use of land and soil resource data and information in selecting suitable crops and cropping patterns and balanced fertilizer use.

- **Dissemination of technologies:** Dissemination of technologies is done through demonstration, poster, festoon, billboards, documentaries etc. through DAE and NARS institutes.

- **Policy:** National agriculture policy and agriculture extension policy is quite in favor of soil health and productivity. Government is giving price subsidies in fertilizer, which results in increase of balanced fertilizer uses.

National priorities for sustainable soil management

- **Soil Organic Matter Management.**
- **Soil fertility and fertilizer management: Soil fertility evaluation and GIS mapping at 5 years interval, increase nitrogen use efficiency, popularize integrated nutrient management for crop and cropping patterns and liming to increase soil pH at desired level, balanced fertilizer use and ensure quality fertilizer.**
- **Soil management in unfavorable ecosystem.**
- **Climate change impact.**
- **Land Resources inventory at semi-detailed soil survey to update existing database and detailed soil survey to prepare "Land and Soil Resources Utilization Guide" at union level (lowest administrative unit) and soil salinity survey at 5 years intervals.**
- **Generation of GIS based information on land and soil and soil fertility.**
- **Technology dissemination.**
- **Human resource development.**
- **Farmers' service.**

THANK YOU

FOR YOUR TIME