3rd Organic ASIA Congress

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IDENTIFICATION OF VULNERABLE SITES FOR THE ADOPTION OF ORGANIC FARMING USING GEO-SPATIAL TECHNOLOGIES IN BANGLADESH

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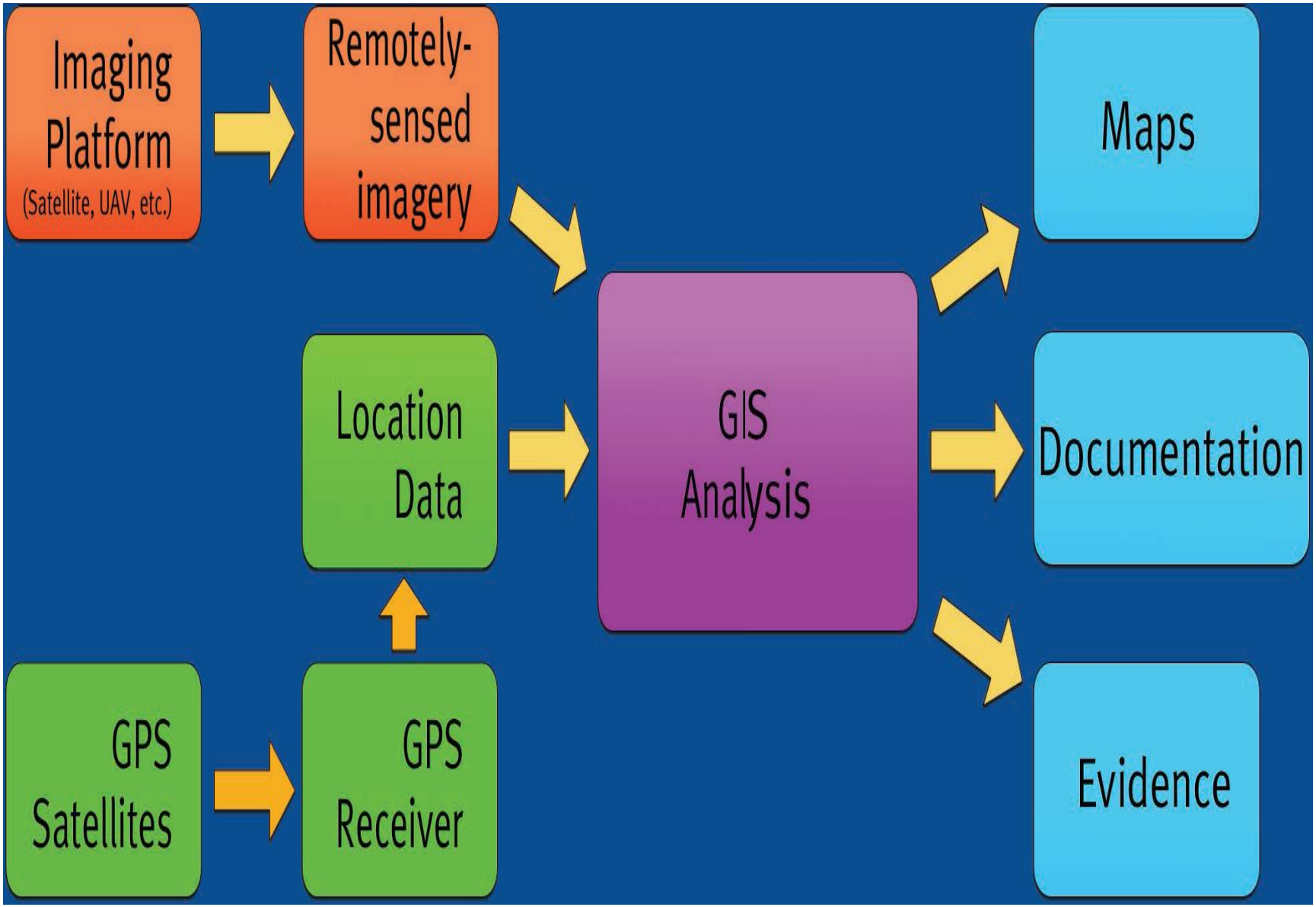
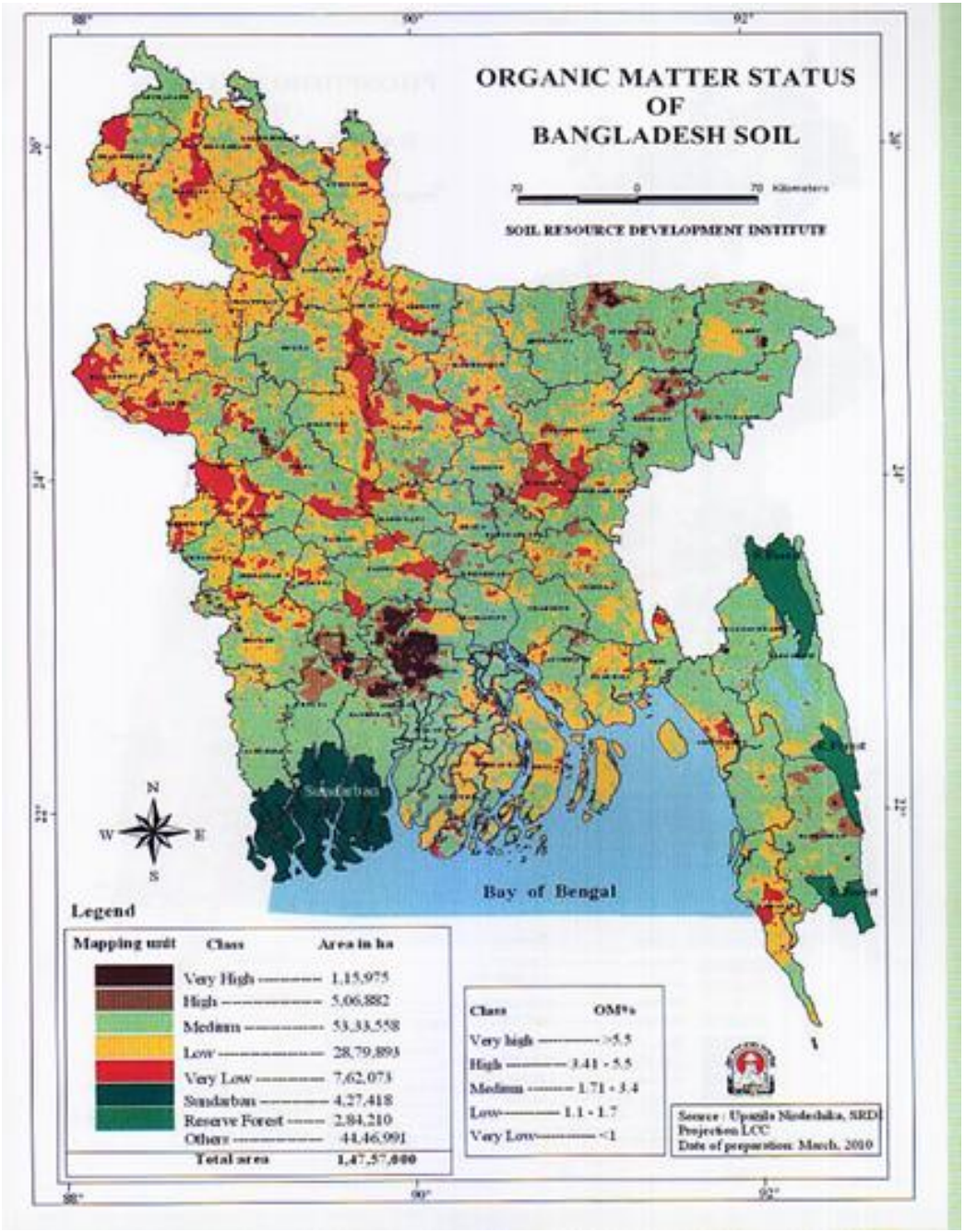
Geospatial Technologies:

- **Global Positioning Systems (GPS)**: A satellite-based geo location system that functions world wide and is accessible to the public via GPS units
- **Remote Sensing** : The acquisition of images and information from a far or remote areas
- **Geographic Information Systems (GIS)**: information systems enabling the creation, organization, and presentation of data in a spatially referenced form, as well as the production of maps

Integration of Geospatial Technologies



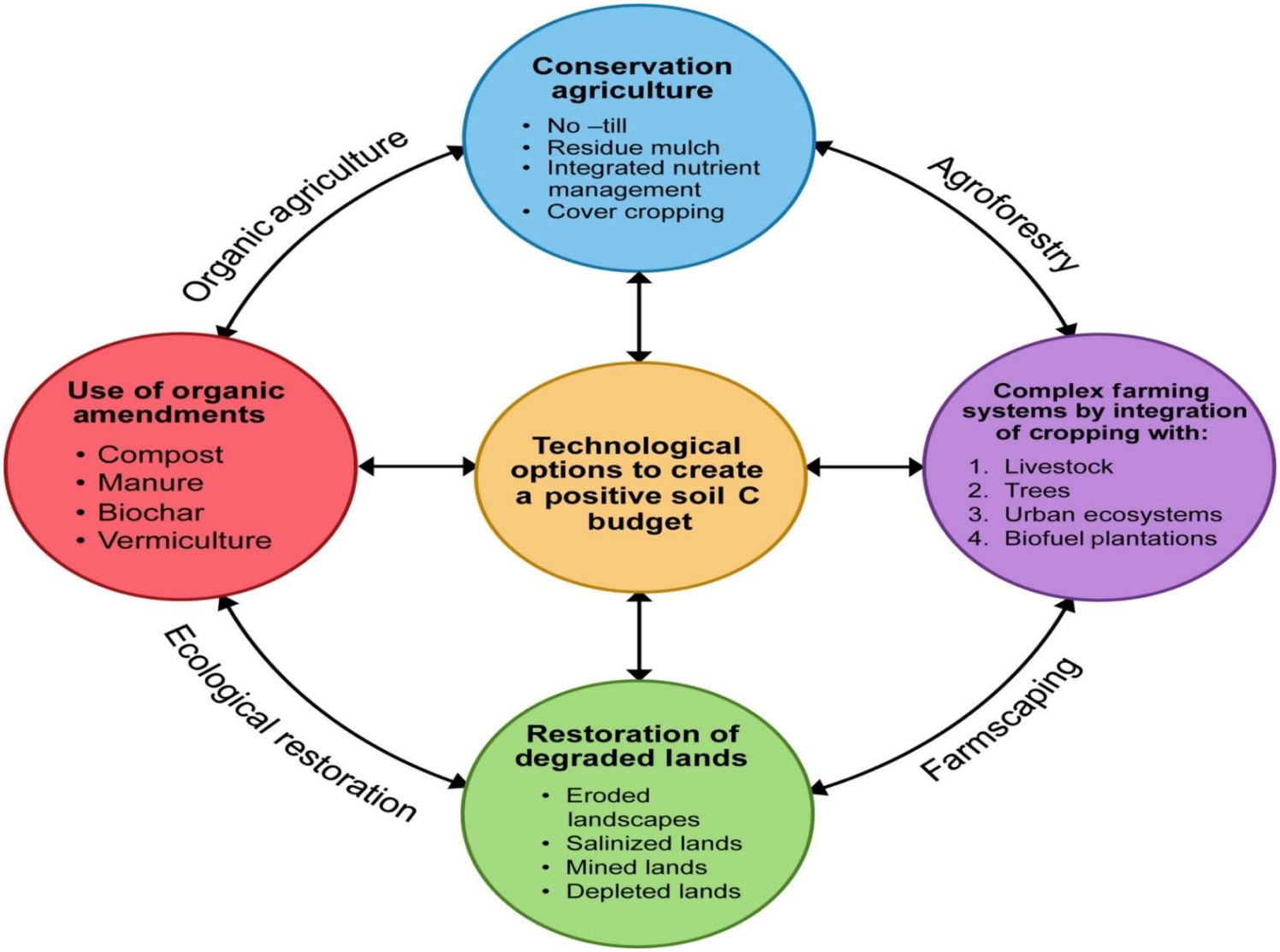

ORGANIC MATTER STATUS
OF
BANGLADESH SOIL
70 0 70 Kilometers
SOIL RESOURCE DEVELOPMENT INSTITUTE
Sundarban
Bay of Bengal
N
W
E
S
Legend
Mapping unit Class Area in ha
Very High ---------- 1,15,975
High ---------- 5,06,882
Medium ---------- 53,33,558
Low ---------- 28,79,893
Very Low ---------- 7,62,073
Sundarban ---------- 4,27,418
Reserve Forest ------ 2,84,210
Others ---------- 44,46,991
Total area 1,47,57,000
Class OM%
Very high ---------- >5.5
High ---------- 3.41 - 5.5
Medium ---------- 1.71 - 3.4
Low ---------- 1.1 - 1.7
Very Low ---------- <1
Source : Upazila Nirdeshika, SRDI
Projection LCC
Date of preparation: March, 2010

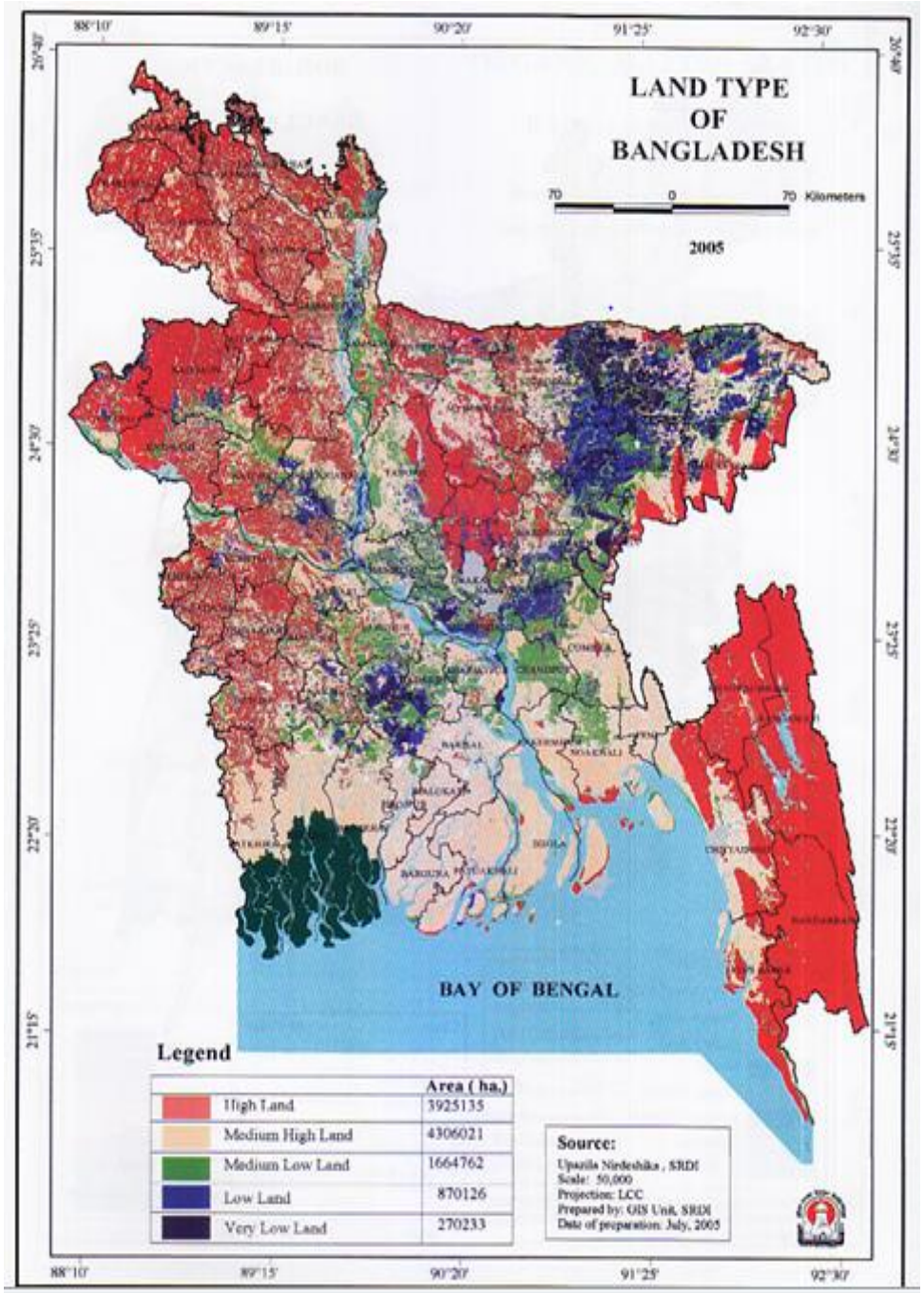
Organic carbon status of Bangladesh soils

SOC Level	Organic carbon (%)	Total area (million ha)	% of net cultivated area
Very low	<0.6	4.05	45
Low	0.6-0.98	1.56	17
Medium	0.98-2.03	1.94	21
High in peat soils	>2.03	1.56	17

Source: Karim and Iqbal, 2001

Technological Options for Soil Organic Carbon Sequestration

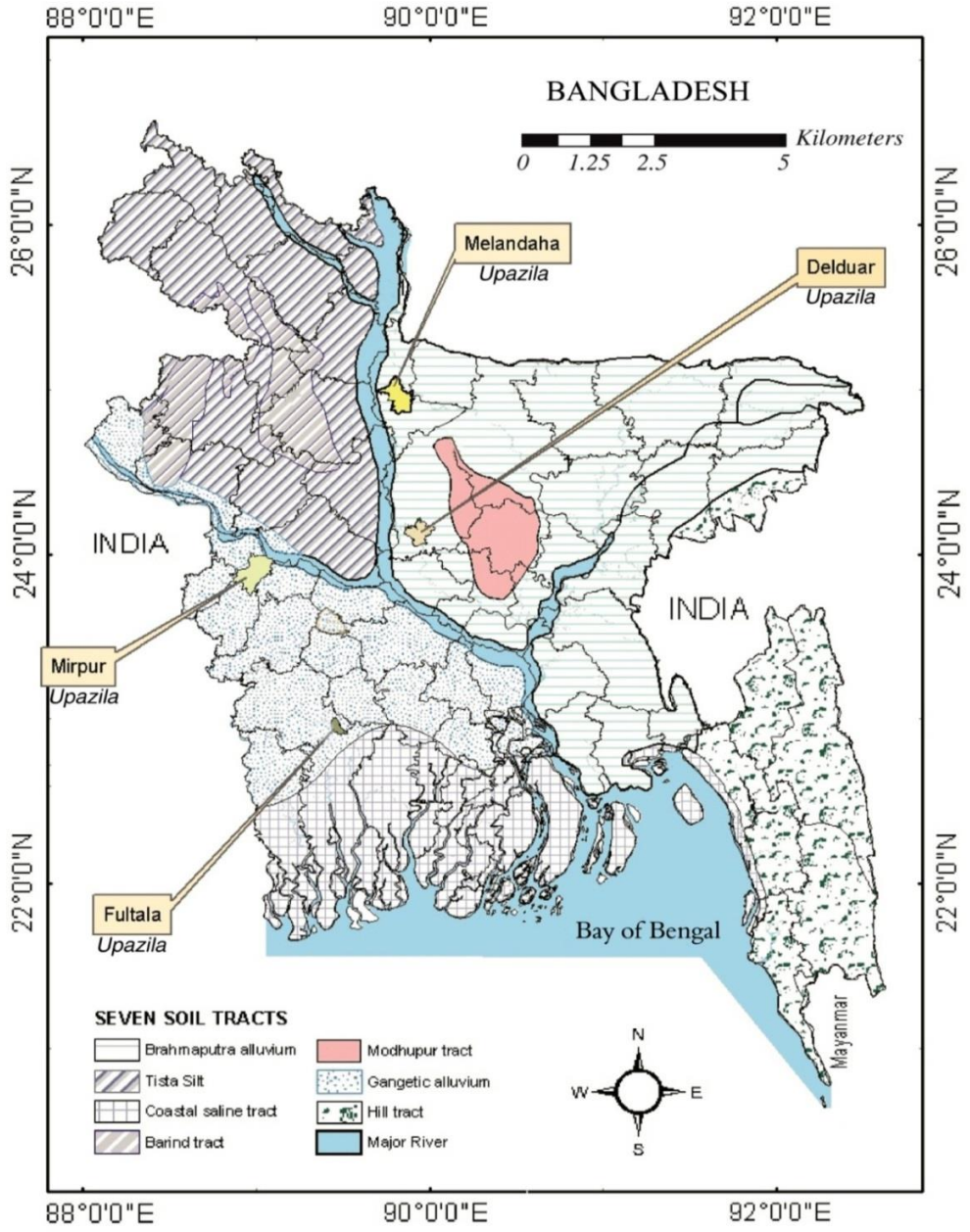


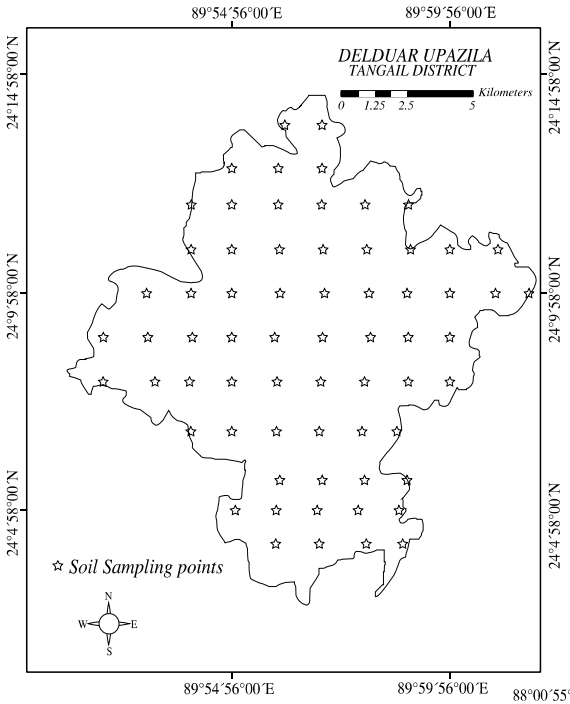

LAND TYPE
OF
BANGLADESH
70 0 70 Kilometers
2005
BAY OF BENGAL
Legend
Area (ha.)
High Land 3925135
Medium High Land 4306021
Medium Low Land 1664762
Low Land 870126
Very Low Land 270233
Source:
Upazila Nirdeshika , SRDI
Scale: 50,000
Projection: LCC
Prepared by: GIS Unit, SRDI
Date of preparation: July, 2005
88°10'
89°15'
90°20'
91°25'
92°30'
25°40'
25°35'
24°30'
23°25'
22°20'
21°15'

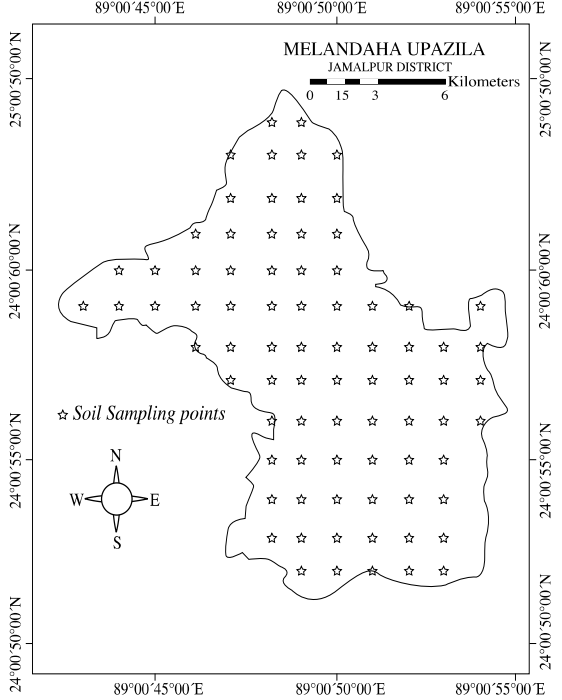
Classification of land types in Bangladesh based on inundation flood level

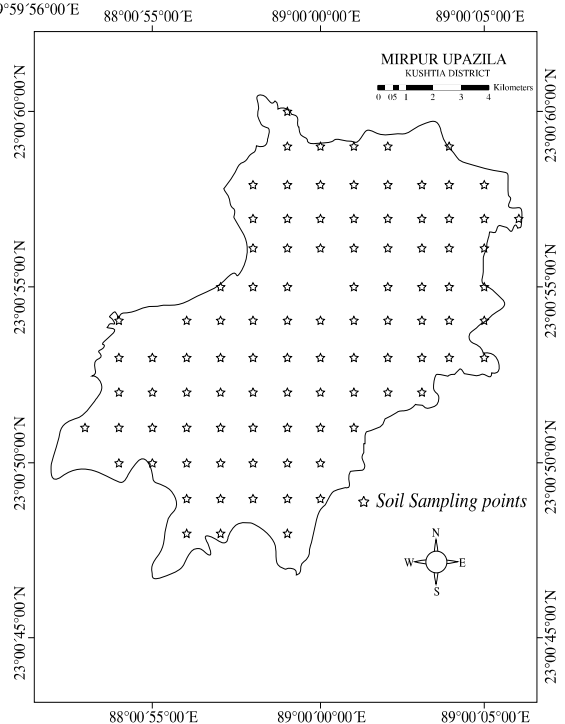
Land Types	Flooding depth	Bangladesh % (Total)	Brahmaputra Alluvium (%)	Ganges Alluvium (%)
Highland (HL)	Land which is above normal flood level	29	1.6	4.2
Medium highland (MHL)	Land which normally is flooded up to about 90 cm deep during the flood season	35	12.2	13.7
Medium lowland (MLL)	Land which normally is flooded up to between 90 cm and 180 cm deep during the flood season.	12	2.4	2.4
Lowland (LL)	Land which normally is flooded up to between 180 cm and 300 cm deep during the flood season.	8	3.6	<1
Very lowland (VLL)	Land which is normally flooded deeper than 300 cm during the flood season.	1	1.0	<1

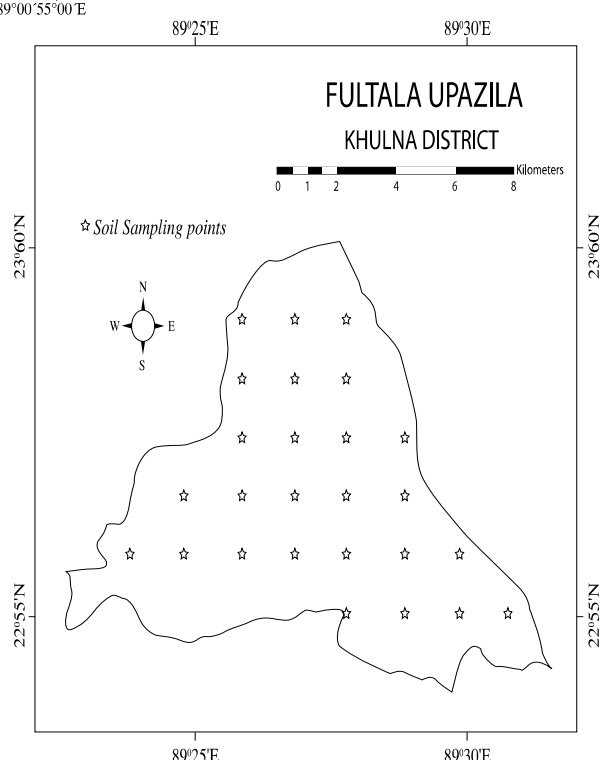
Location map of the study sites



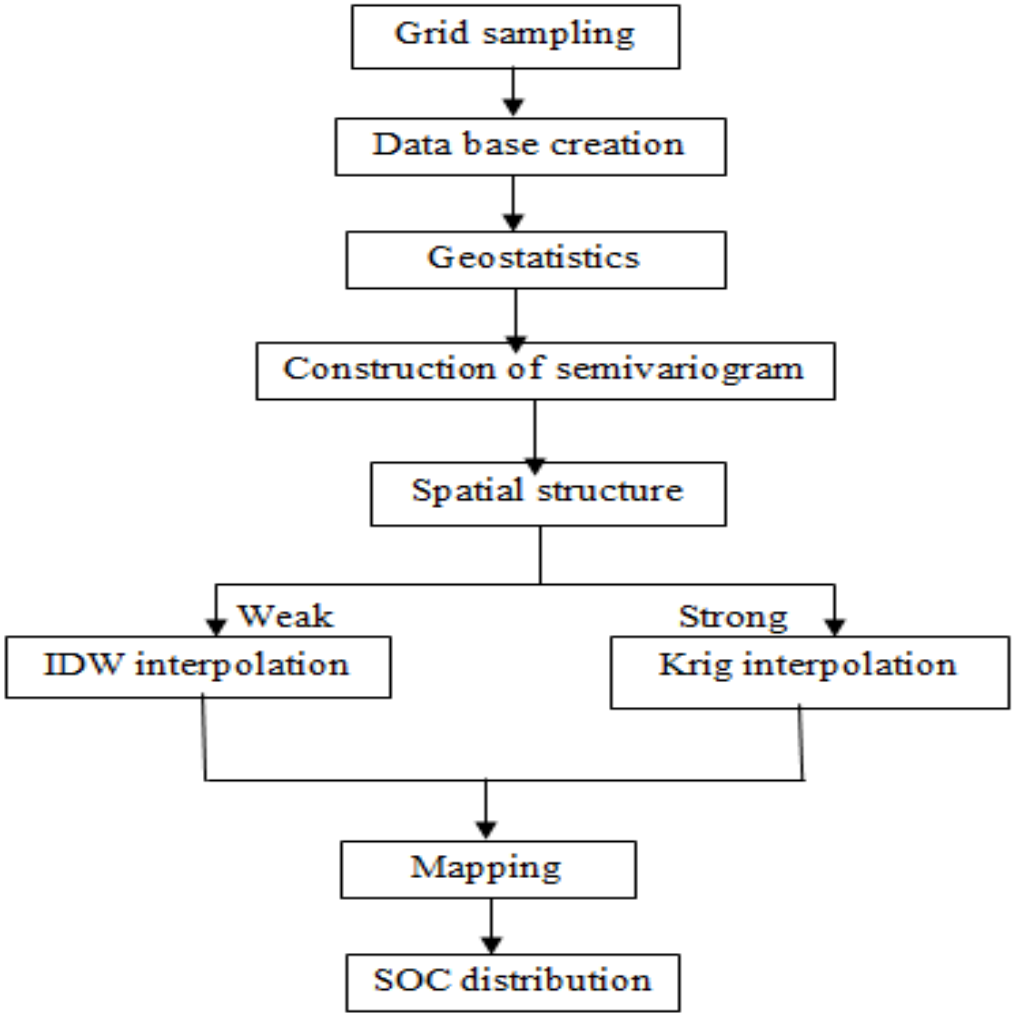

89°54´56°00´E
89°59´56°00´E
24°14´58°00´N
24°9´58°00´N
24°4´58°00´N
DELDUAR UPAZILA
TANGAIL DISTRICT
Kilometers
0 1.25 2.5 5
Soil Sampling points
N
W
E
S


89°00´45°00´E
89°00´50°00´E
89°00´55°00´E
25°00´50°00´N
24°00´60°00´N
24°00´55°00´N
24°00´50°00´N
MELANDAHA UPAZILA
JAMALPUR DISTRICT
Kilometers
0 15 3 6
Soil Sampling points
N
W
E
S

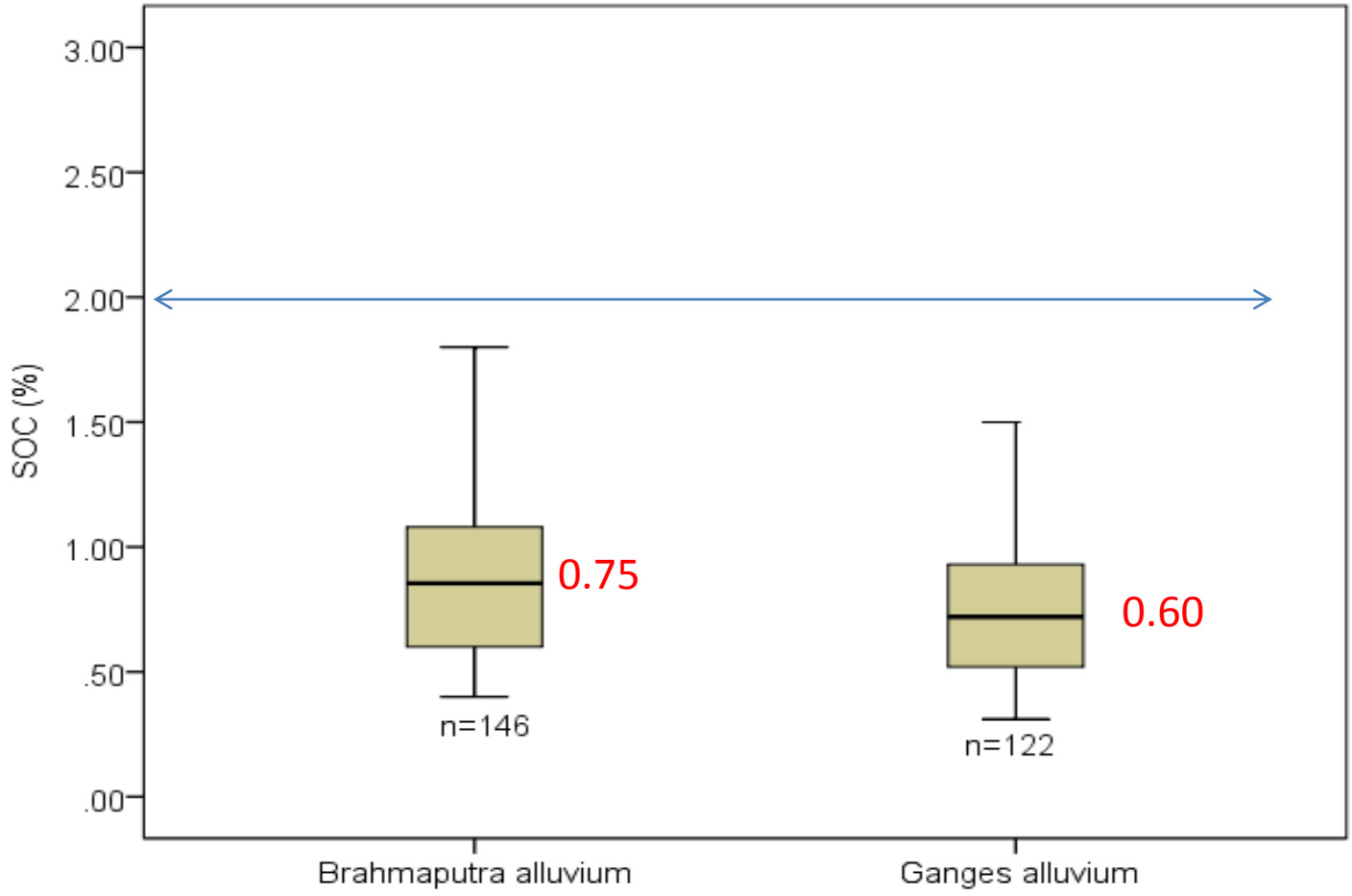

88°00´55°00´E
89°00´00°00´E
89°00´05°00´E
23°00´60°00´N
23°00´55°00´N
23°00´50°00´N
23°00´45°00´N
MIRPUR UPAZILA
KUSHTIA DISTRICT
Kilometers
0 05 1 2 3 4
Soil Sampling points
N
W
E
S


89°25'E
89°30'E
23°60'N
22°55'N
FULTALA UPAZILA
KHULNA DISTRICT
Kilometers
0 1 2 4 6 8
Soil Sampling points
N
W
E
S

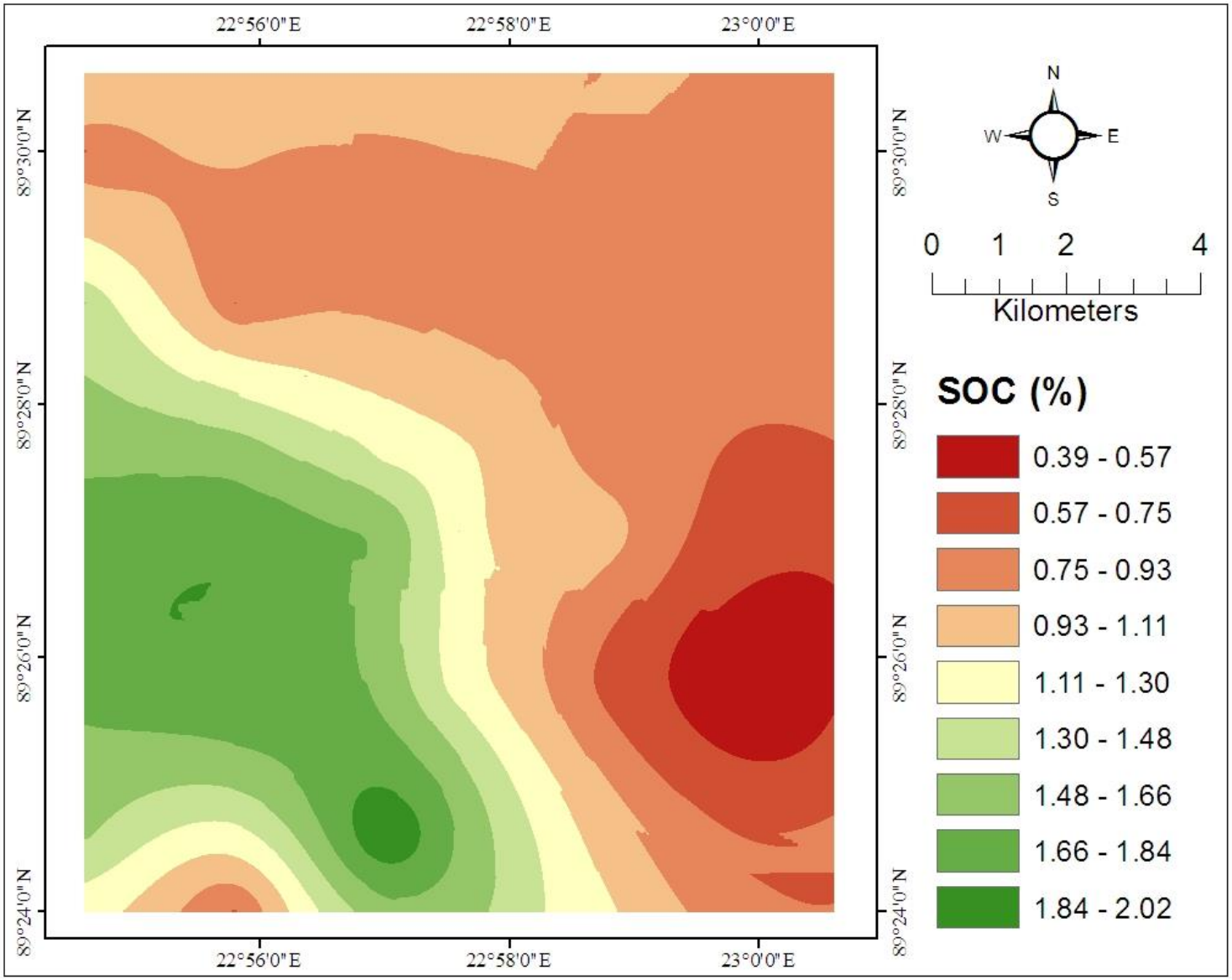
Flow chart showing the geostatistics and data interpolation of SOC in the study sites



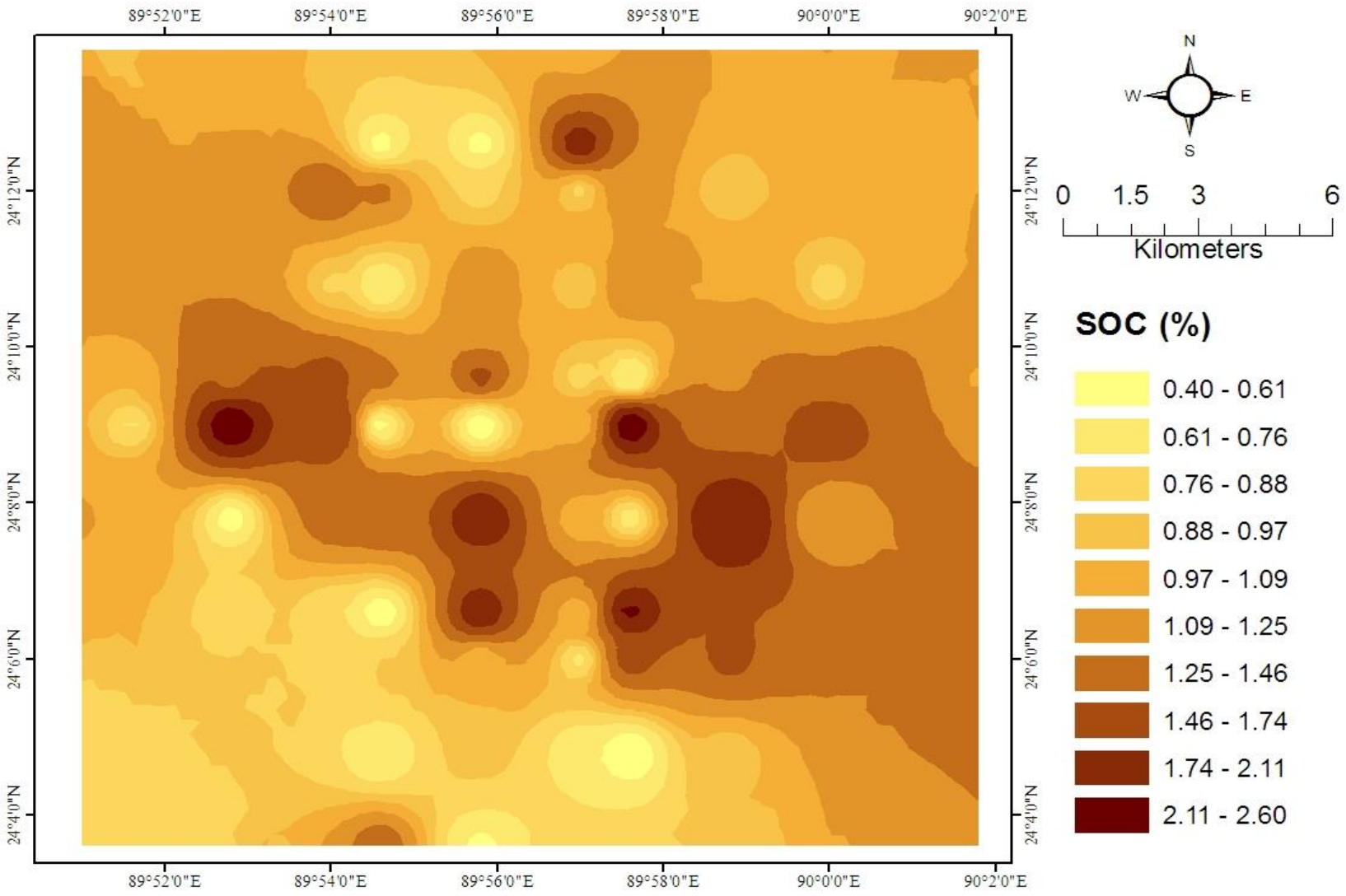
Boxplots showing SOC distribution across the alluviums of the study sites



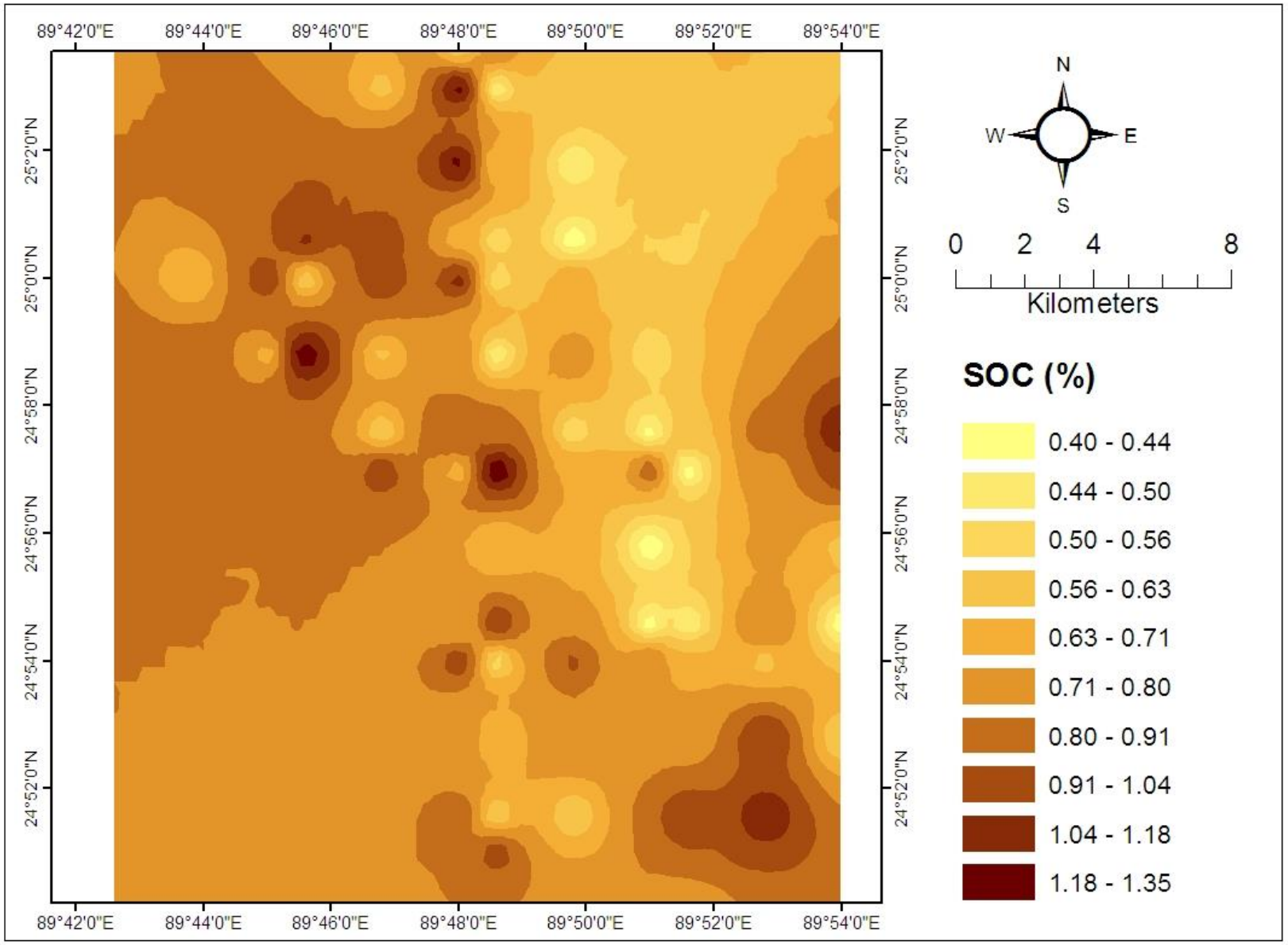
Distribution of SOC contents (%) in the Fultala upazila using Kriging



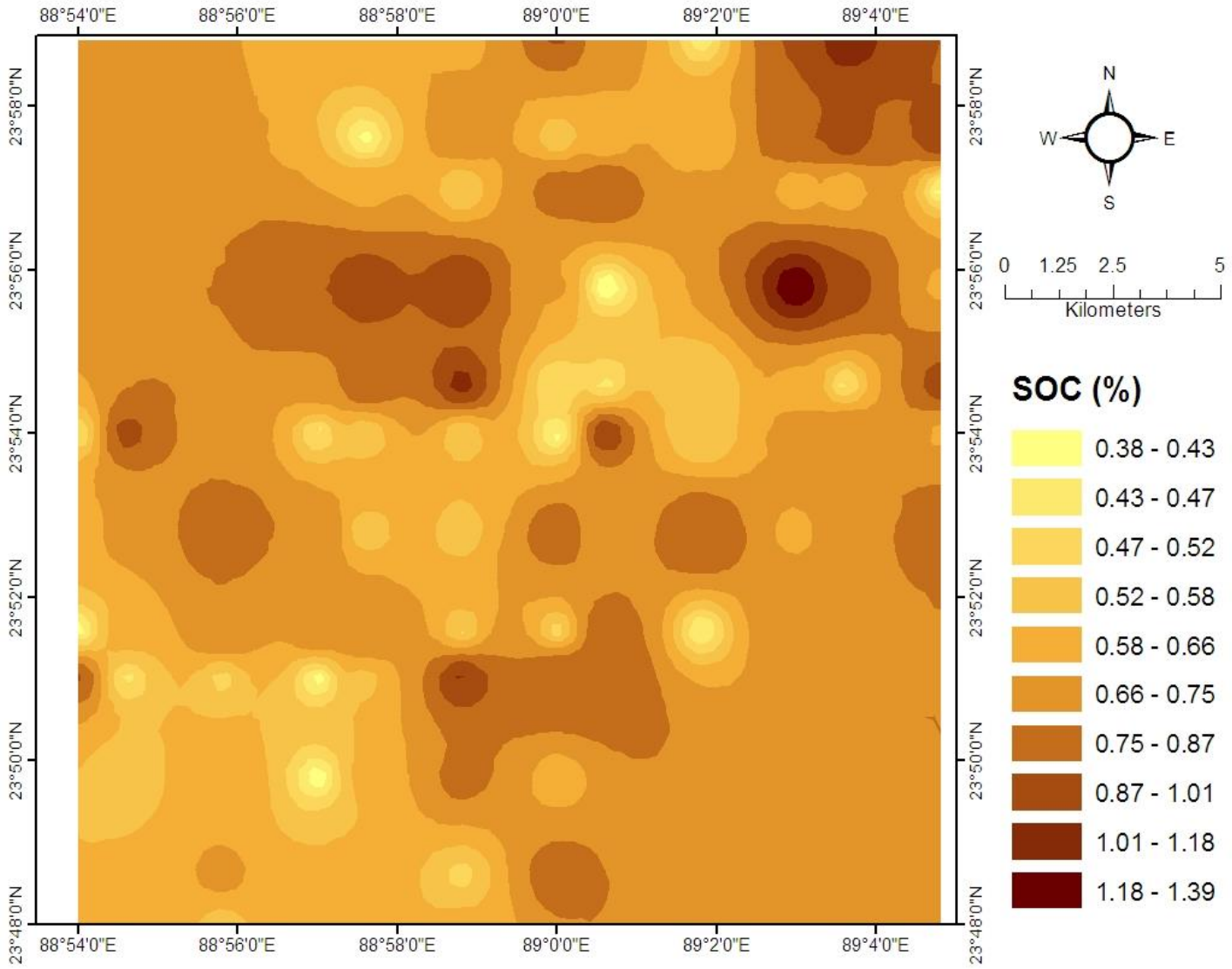
Distribution of SOC contents (%) in the Delduar upazila using IDW



Distribution of SOC contents (%) in the Melandah upazila using IDW



Distribution of SOC contents (%) in the Mirpur upazila using IDW



Land management practices on carbon sequestration (t/C/ha/yr)

Land management practices	Dry lands	Tropical areas
Conservation tillage	0.1-0.2	0.2-0.5
Mulch farming or plant cover	0.05-0.1	0.1-0.3
Conservation agriculture	0.15-0.3	0.3-0.8
Composting	0.1-0.3	0.2-0.5
Nutrient management	0.1-0.3	0.2-0.5
Water management	0.05-0.1	-
Grassland and pastures	0.05-0.10	0.1-0.2
Agroforestry	-	0.2-3.1

(Source: Lal, 1999)

Conclusion

- Investigated SOC in the HL and MHL sites were very low. The reasons for low SOC may be due to their lower inundation level.

- Low SOC in this vulnerable soil is very much alarming and needed to be improved. It is emergence to initiate organic farming for enhancing the vulnerable soils in Bangladesh or similar climatic conditions in other regions to restore soil health.

- Geo-spatial technologies (GPS, RS and GIS) are effective tools in delineating site specific soil carbon deficient sites and their mapping.

- Adoption of proper doses of organic composting to sequester C .

Thank you very much

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