Soil Survey, Soil Mapping and Soil Status in Nepal

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Nepal: at a glance

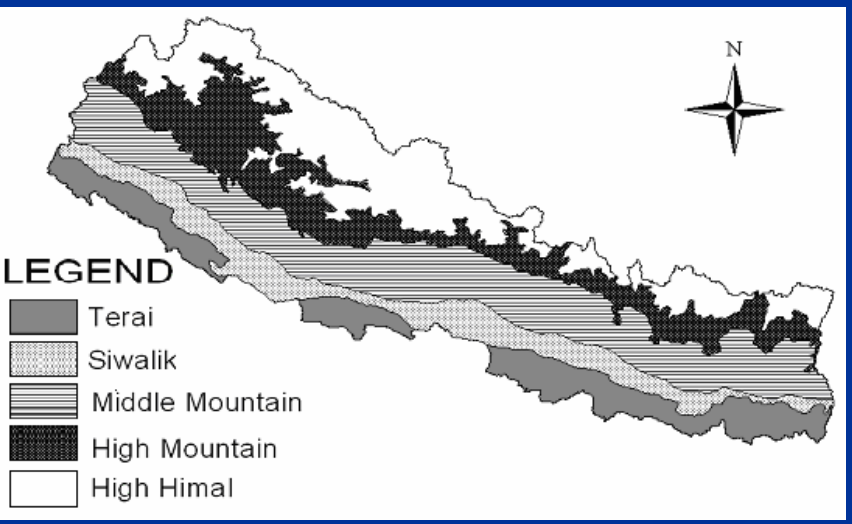
Location :Between of China on the North and India on the East, South, and West (Sandwich)

Total Population : 26 million

Total Area :1,47,181 km^2

Occupations : Mainly Subsistence Agriculture

Physical : Two third of terrain is mountain, Climate is wet in summer and dry in winter. Five physiographic regions : High Himalayas, High Mountains, Middle Mountains, Siwalik and Plain Terai;



Major river systems - Koshi, Gandaki, and Karnali along with more than 6000 tributaries

First soil Survey – 1965

Khajura Forest Area
Govt. Agri. Farm
Nepalgunj-Surkhet road

Thereafter soil survey work was

carried out annually till ……1995

SURVEYED DISTRICTS

- Terai = 20 Districts
- Mid Hill = 33
- High Hills = 2
- Forest Area – Khajura district
- Tobacco Growing Area in Dhanusha district
- Resettlement Project, Nawalparasi district

Soil survey districts = 55

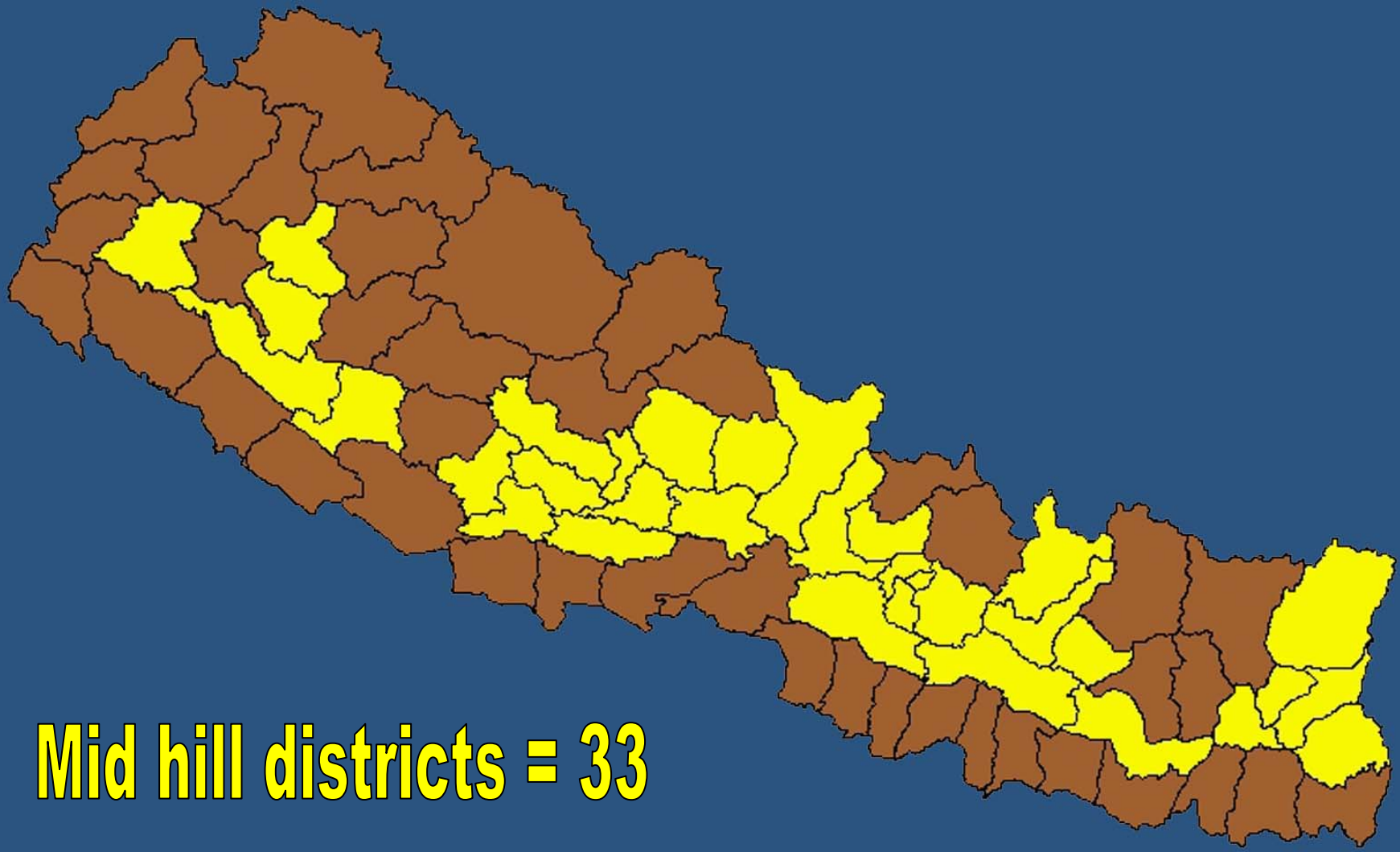
✓ In addition, a semi detail soil survey of the some potential areas of cotton, tea, coffee, citrus and feasible areas for irrigation development have also been accomplished.

- ✓ Contribution of the division for preparing Land System Maps of the country under the Land Resource Mapping Project (LRMP) funded by the CIDA in 1986

- ✓ Most of the survey results have been presented in the form of narrative reports.

SURVEYED DISTRICTS

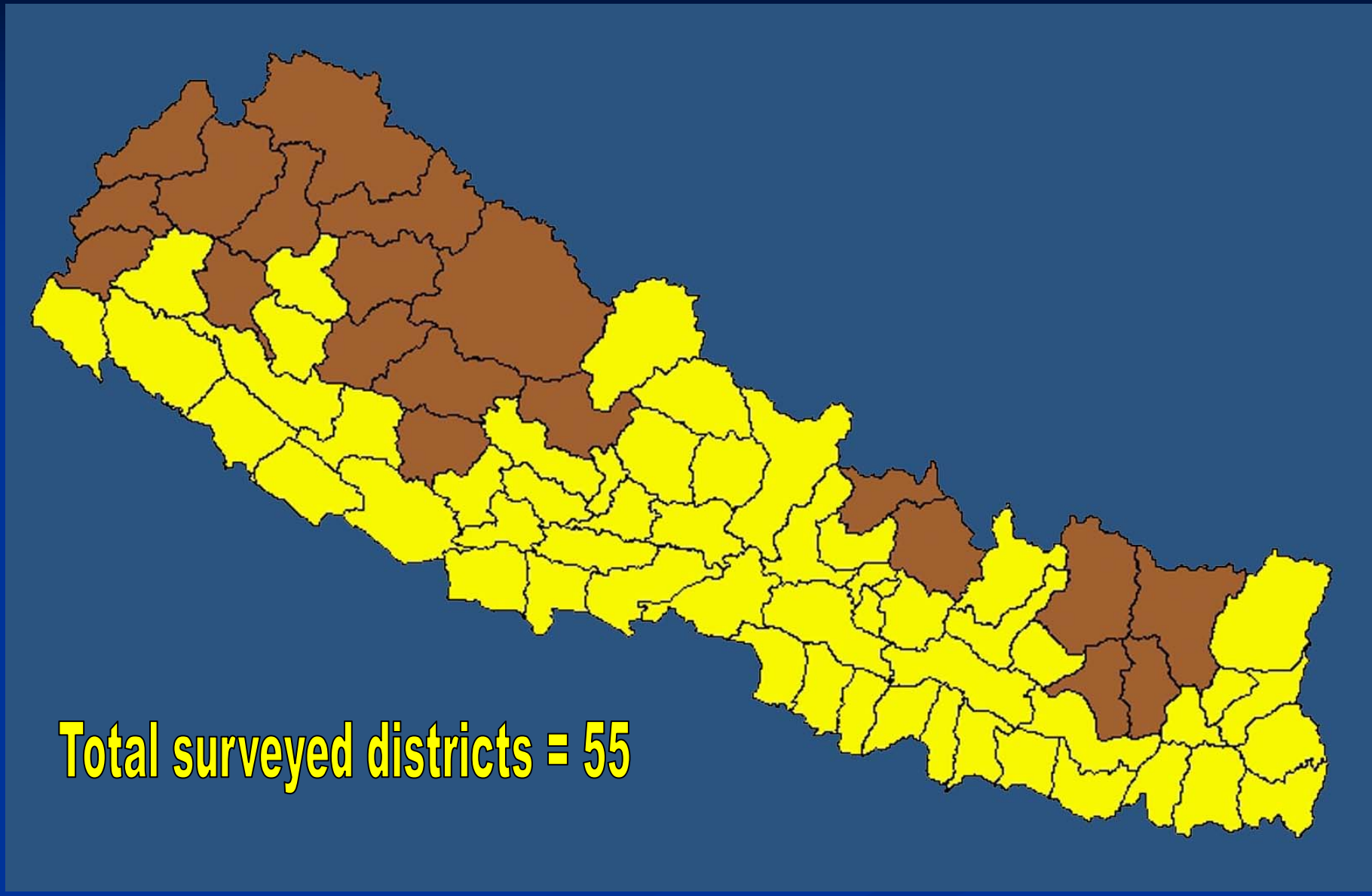
SURVEYED DISTRICTS



Mid hill districts = 33

SURVEYED DISTRICTS

SURVEYED DISTRICTS

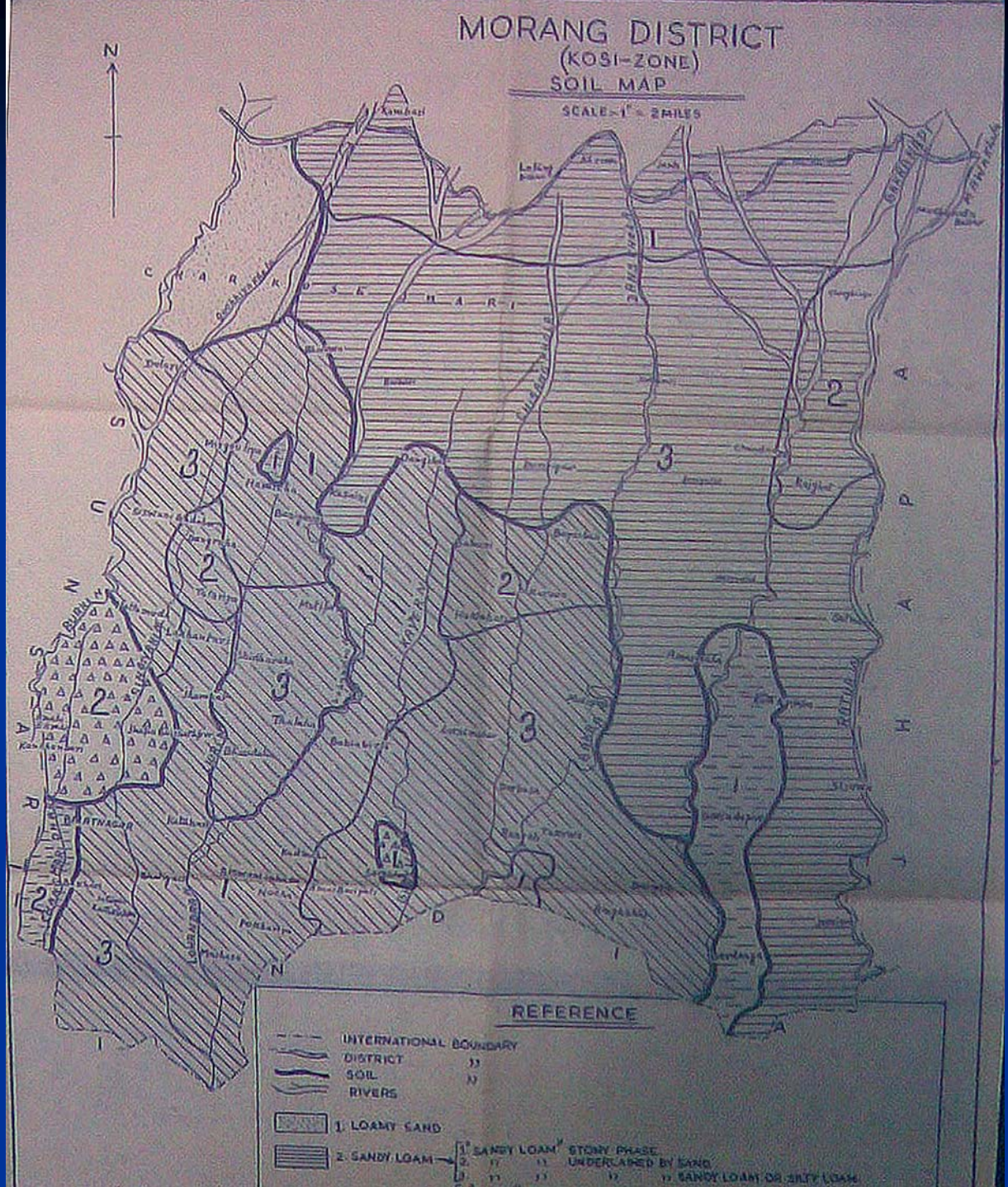


NON SURVEYED DISTRICTS

Surveyors of that time.. .. .. ..

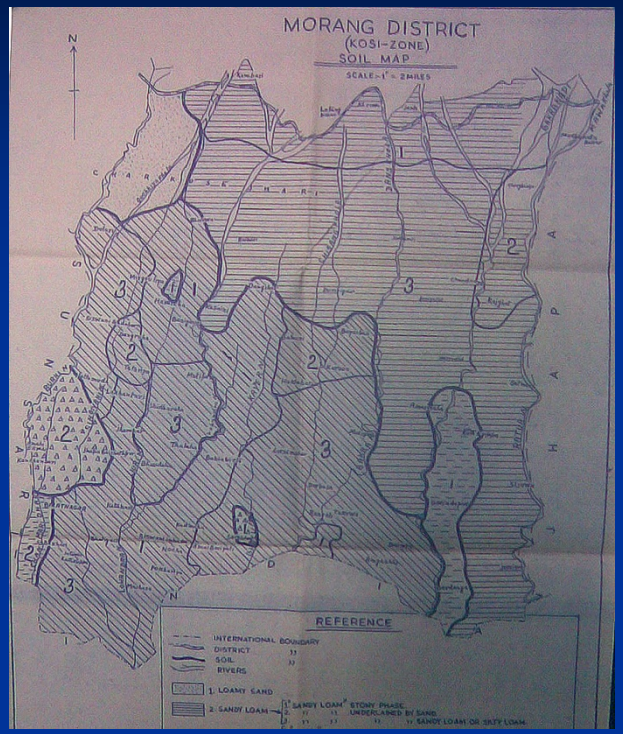
- Bidur Kumar Thapa
- Manik Lal Pradhan
- Ram Hari Singh Basnyat
- Purna Lal Maharjan
- Dambar Bahadur Tamang
- Tej Bahadur KC
- Prabhakar Bikram Shah
- Ram Bahadur Maskey
- Krishna Bahadur Karki
- Dil Prasad Sherchan
- Subhash Nand Vaidya
- Sushil Shrestha
- Bishma Nath Regmi

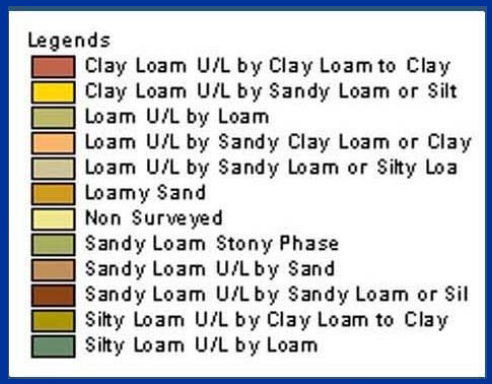
Hats off to them !!

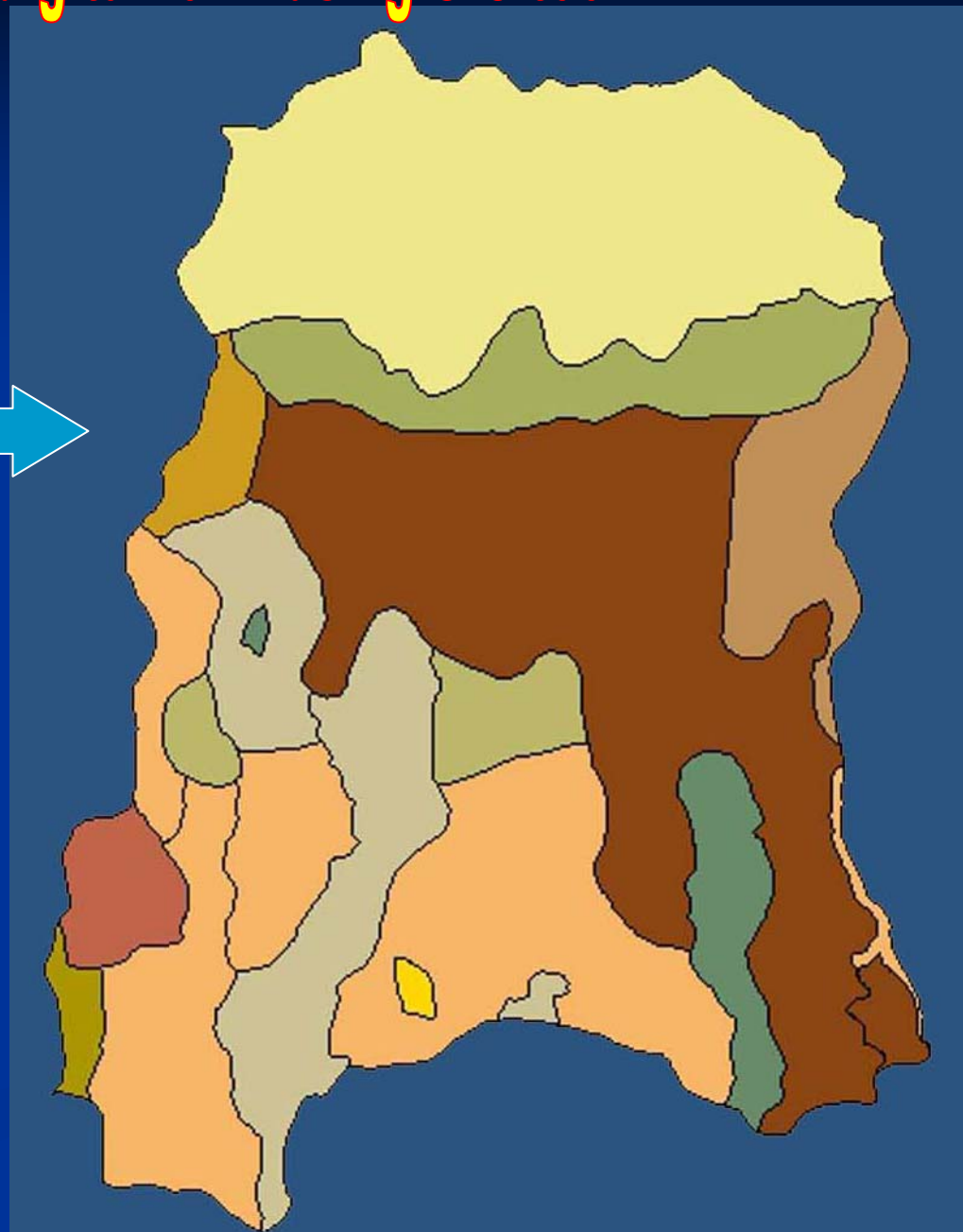


Map prepared from Soil survey of Morang district

Analog map converted to digital form using GIS tool





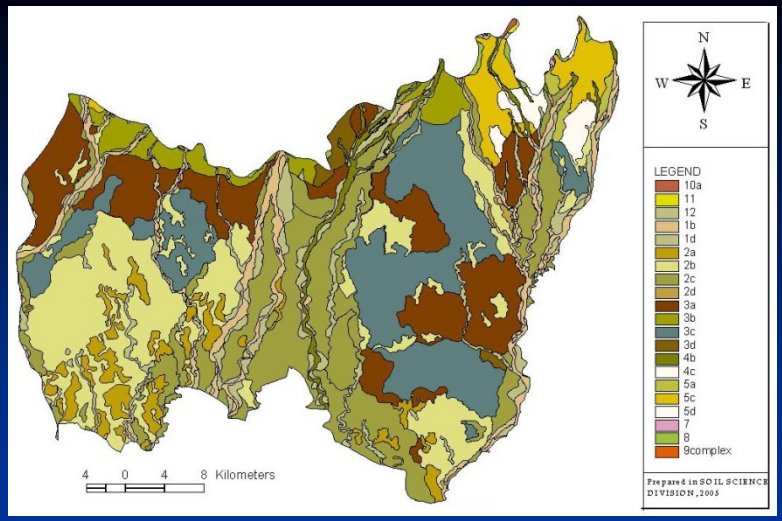


Brief History

- Started in 1995 - ICIMOD
- Network Established 1999 – CIMMYT, Nepal
- Hardware & software support – Cornell University
  - Computer + ArcView 3.1 software

Objective

- To prepare spatial and non spatial database related with Agriculture
- To assist the soil survey and mapping
- To develop spatial analytical procedures to address the researchable issues for effective decision making processes.


N
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LEGEND
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1d
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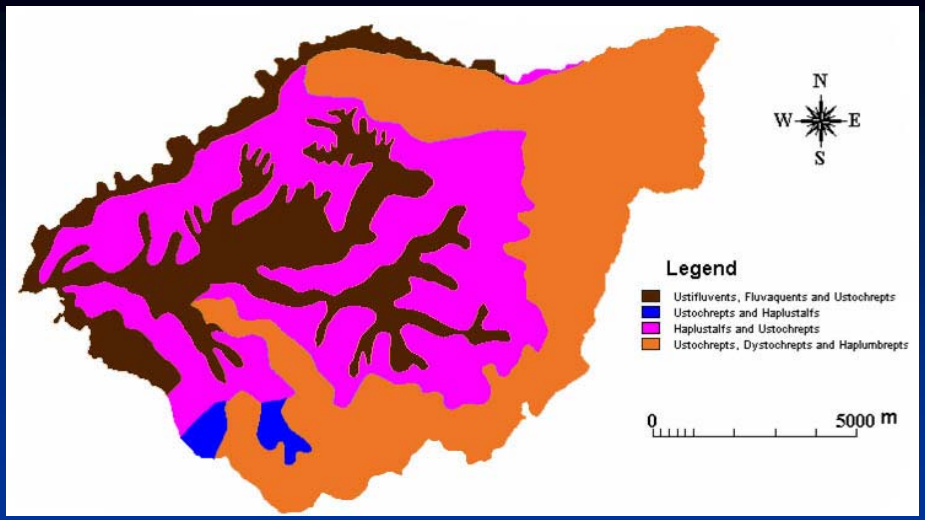
9complex
4 0 4 8 Kilometers
Prepared in SOIL SCIENCE DIVISION, 2005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Legend
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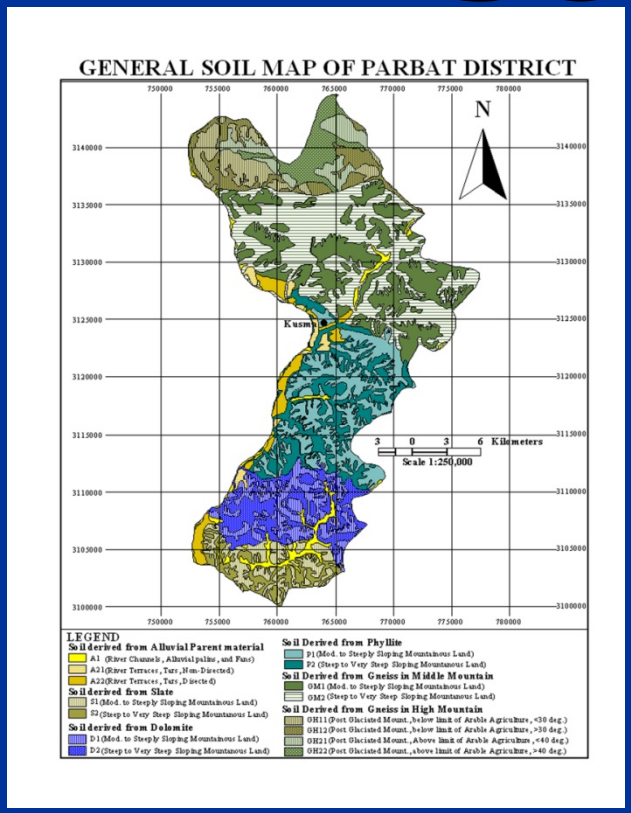
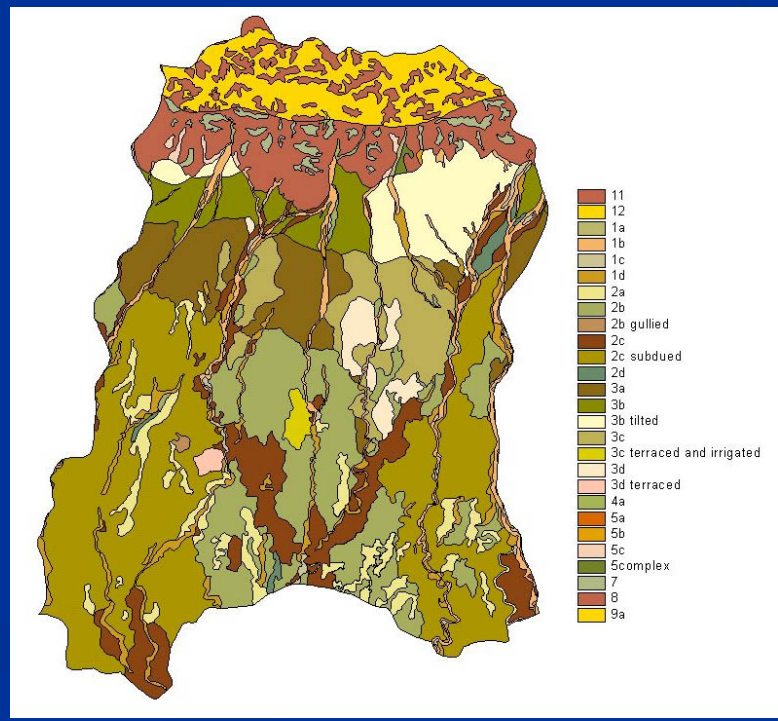
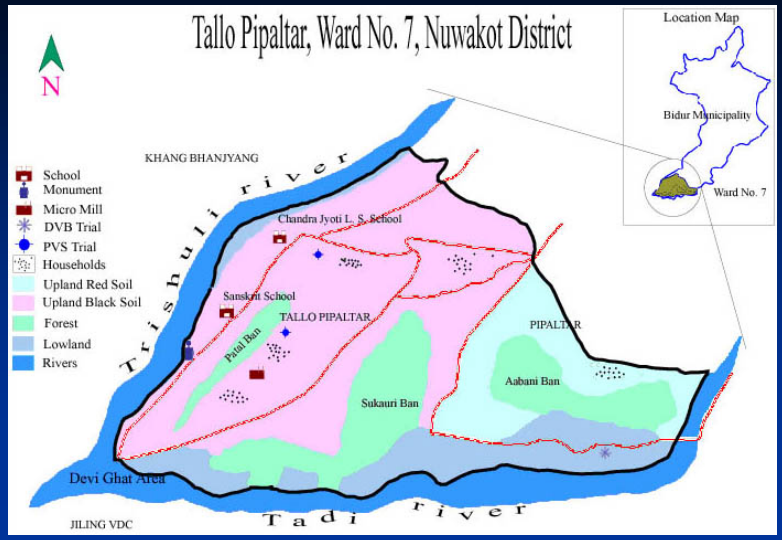
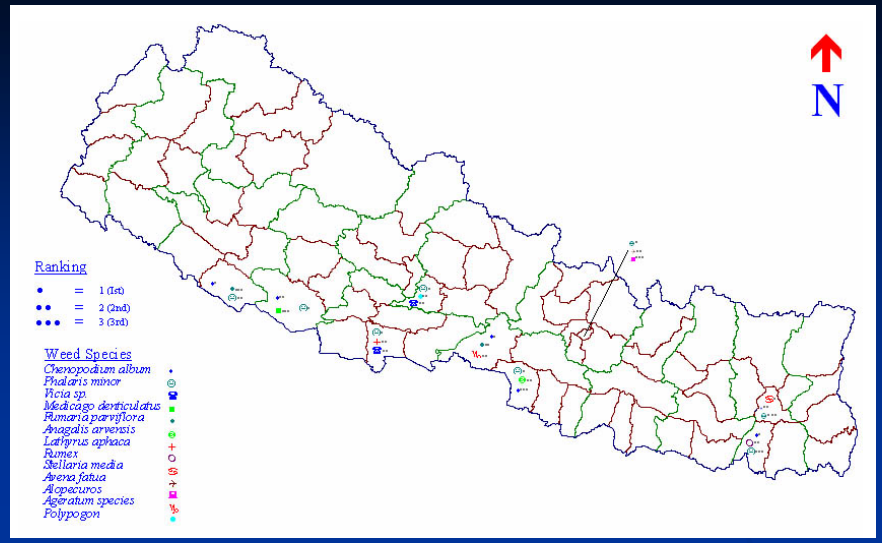
Ustochrepts and Haplustalfs
Haplustalfs and Ustochrepts
Ustochrepts, Dystochrepts and Haplumbrepts
0
5000 m

Soil Maps

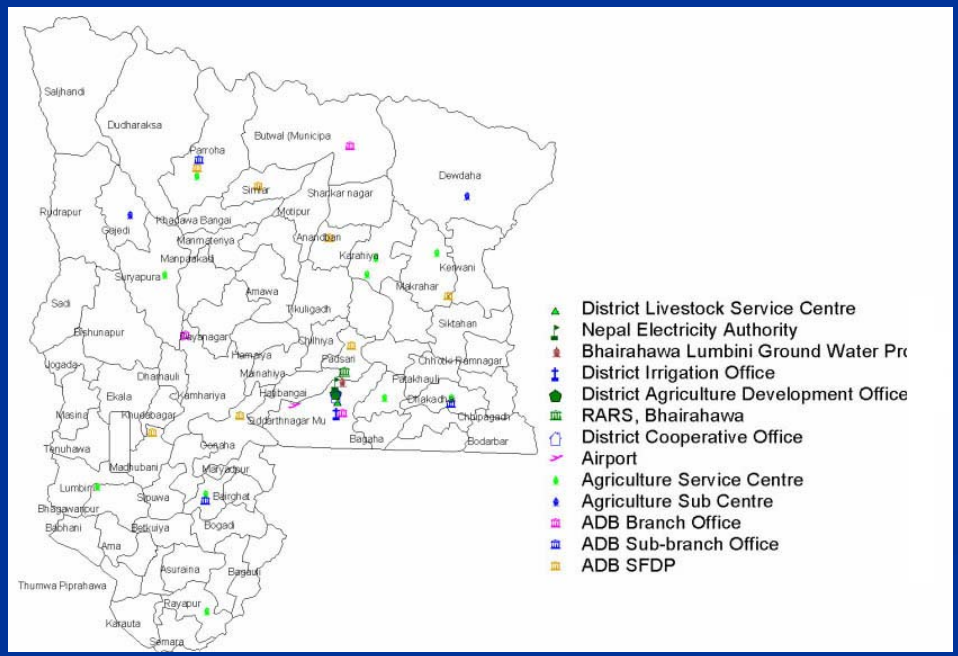

GENERAL SOIL MAP OF PARBAT DISTRICT
N
Kusma
3 0 3 6 Kilometers
Scale 1:250,000
LEGEND
Soil derived from Alluvial Parent material
A1 (River Channels, Alluvial palins, and Fans)
A21(River Terraces, Turs, Non-Directed)
A22(River Terraces, Turs, Directed)
Soil derived from Slate
S1(Mod. to Steeply Sloping Mountainous Land)
S2(Steep to Very Steep Sloping Mountainous Land)
Soil derived from Dolomite
D1(Mod. to Steeply Sloping Mountainous Land)
D2(Steep to Very Steep Sloping Mountainous Land)
Soil Derived from Phyllite
P1(Mod. to Steeply Sloping Mountainous Land)
P2 (Steep to Very Steep Sloping Mountainous Land)
Soil Derived from Gneiss in Middle Mountain
GM1(Mod. to Steeply Sloping Mountainous Land)
GM2 (Steep to Very Steep Sloping Mountainous Land)
Soil Derived from Gneiss in High Mountain
GH11(Post Glaciated Mount.,below limit of Arable Agriculture, <30 deg.)
GH12(Post Glaciated Mount.,below limit of Arable Agriculture, >30 deg.)
GH21(Post Glaciated Mount.,Above limit of Arable Agriculture, <40 deg.)
GH22(Post Glaciated Mount.,above limit of Arable Agriculture, >40 deg.)

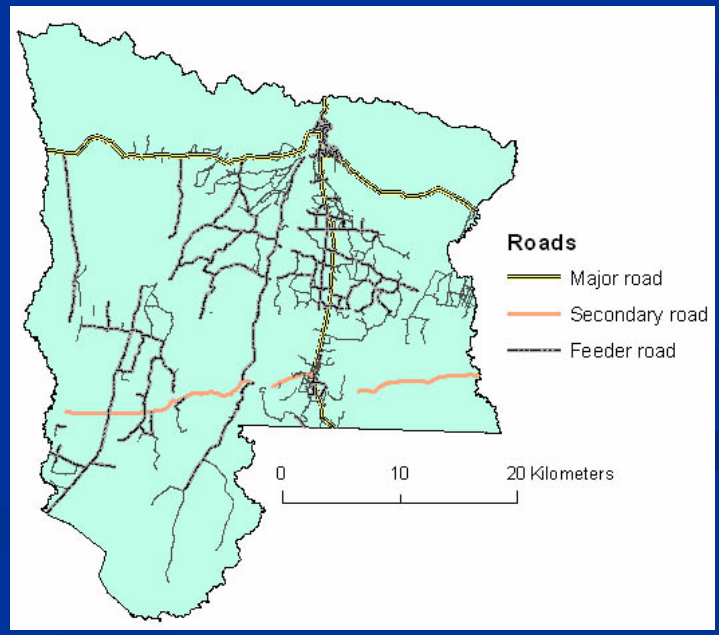

11
12
1a
1b
1c
1d
2a
2b
2b gullied
2c
2c subdued
2d
3a
3b
3b tilted
3c
3c terraced and irrigated
3d
3d terraced
4a
5a
5b
5c
5complex
7
8
9a

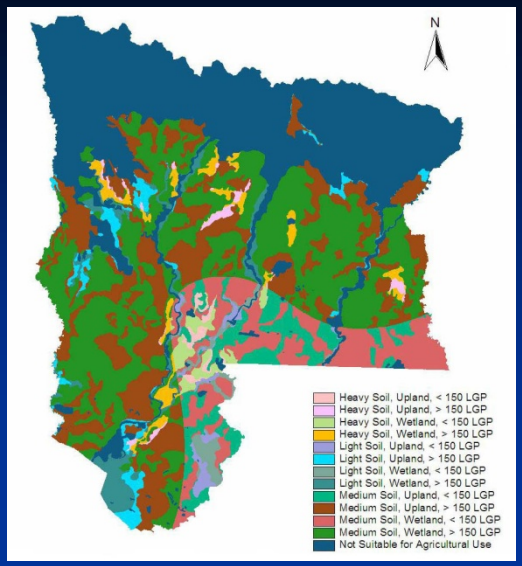




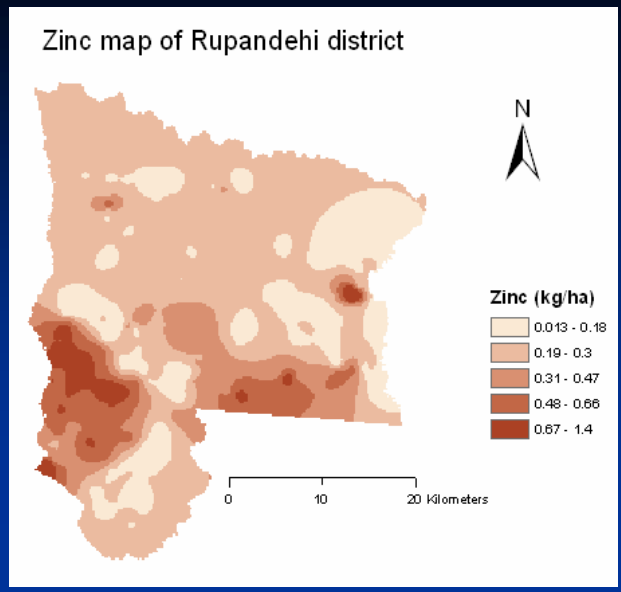
Resource maps



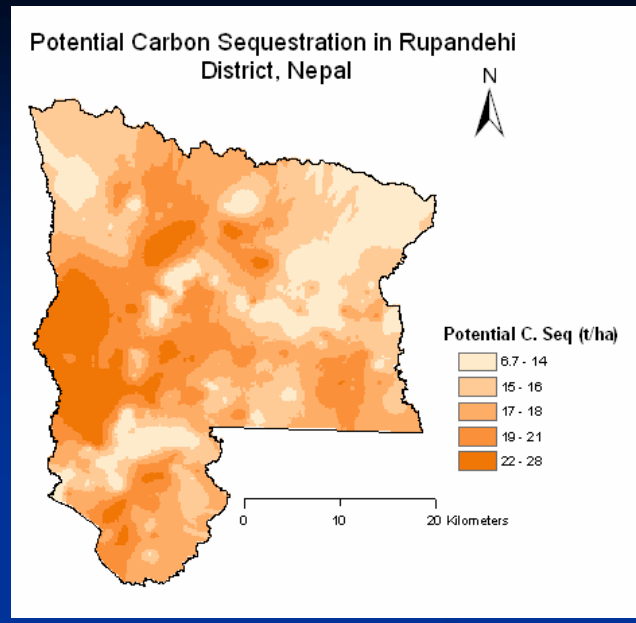




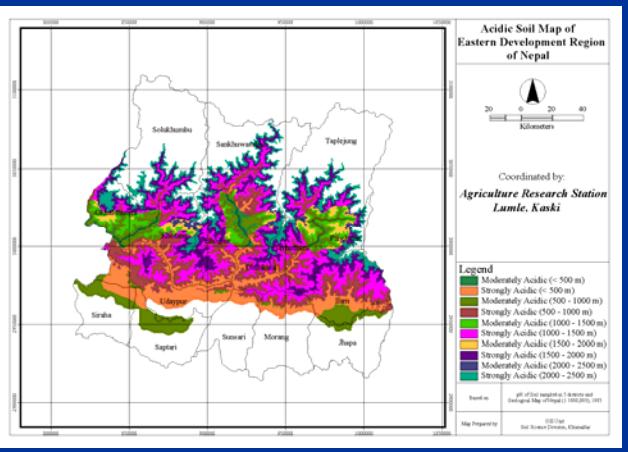
AEZ Map



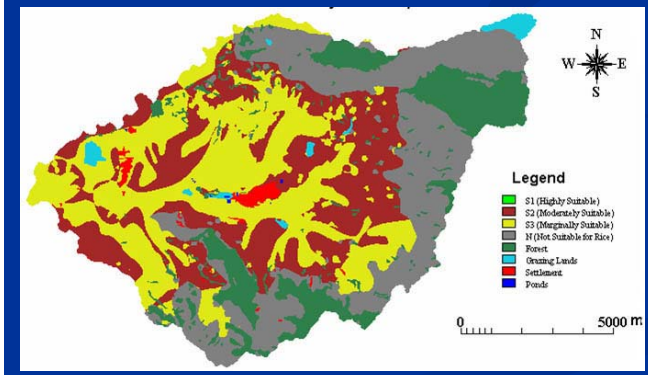
Zinc Map



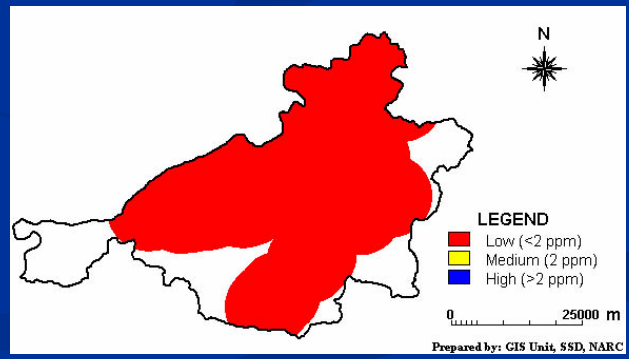
Carbon Seq. Map



Soil Acidity Map

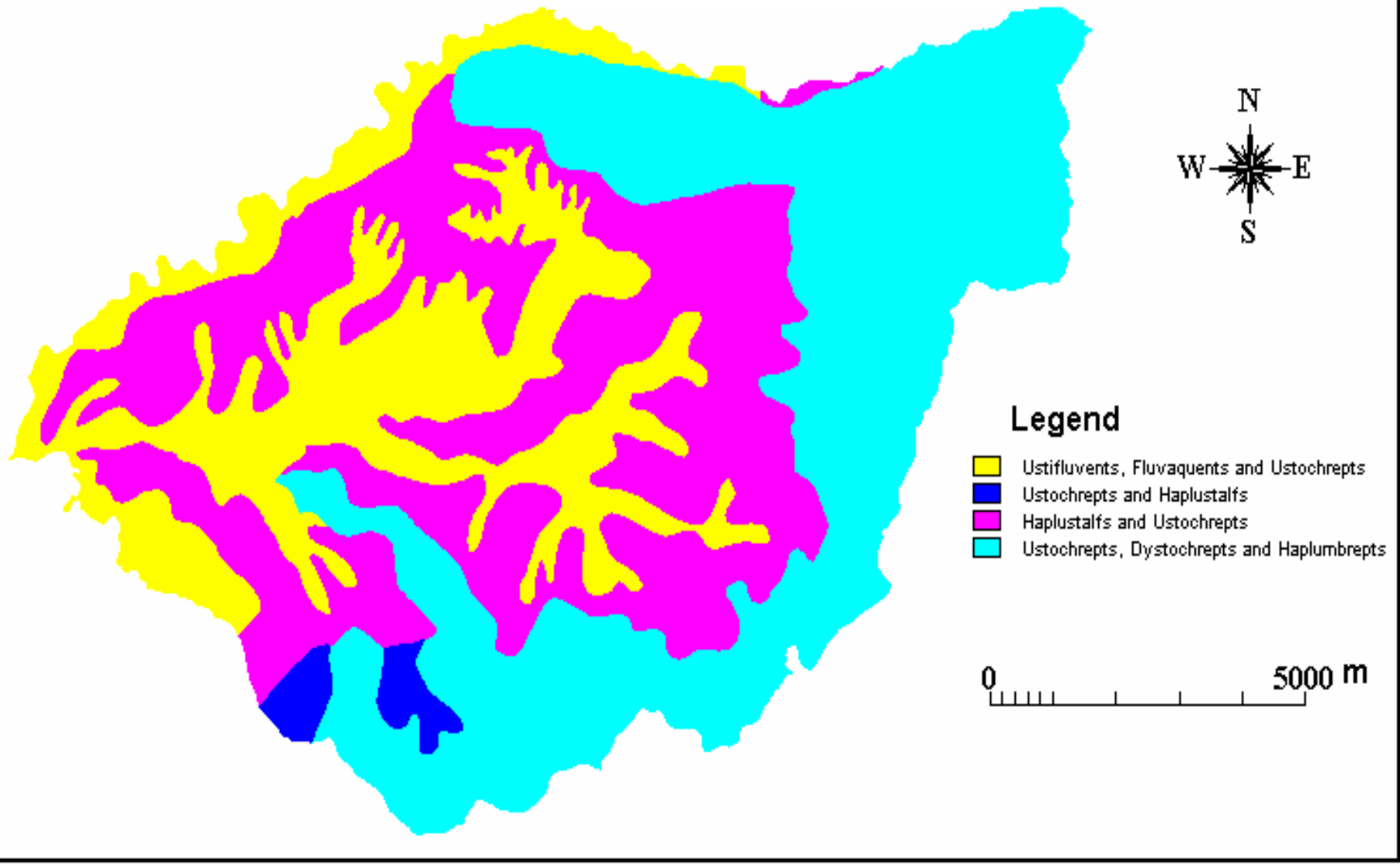


Suitability Map

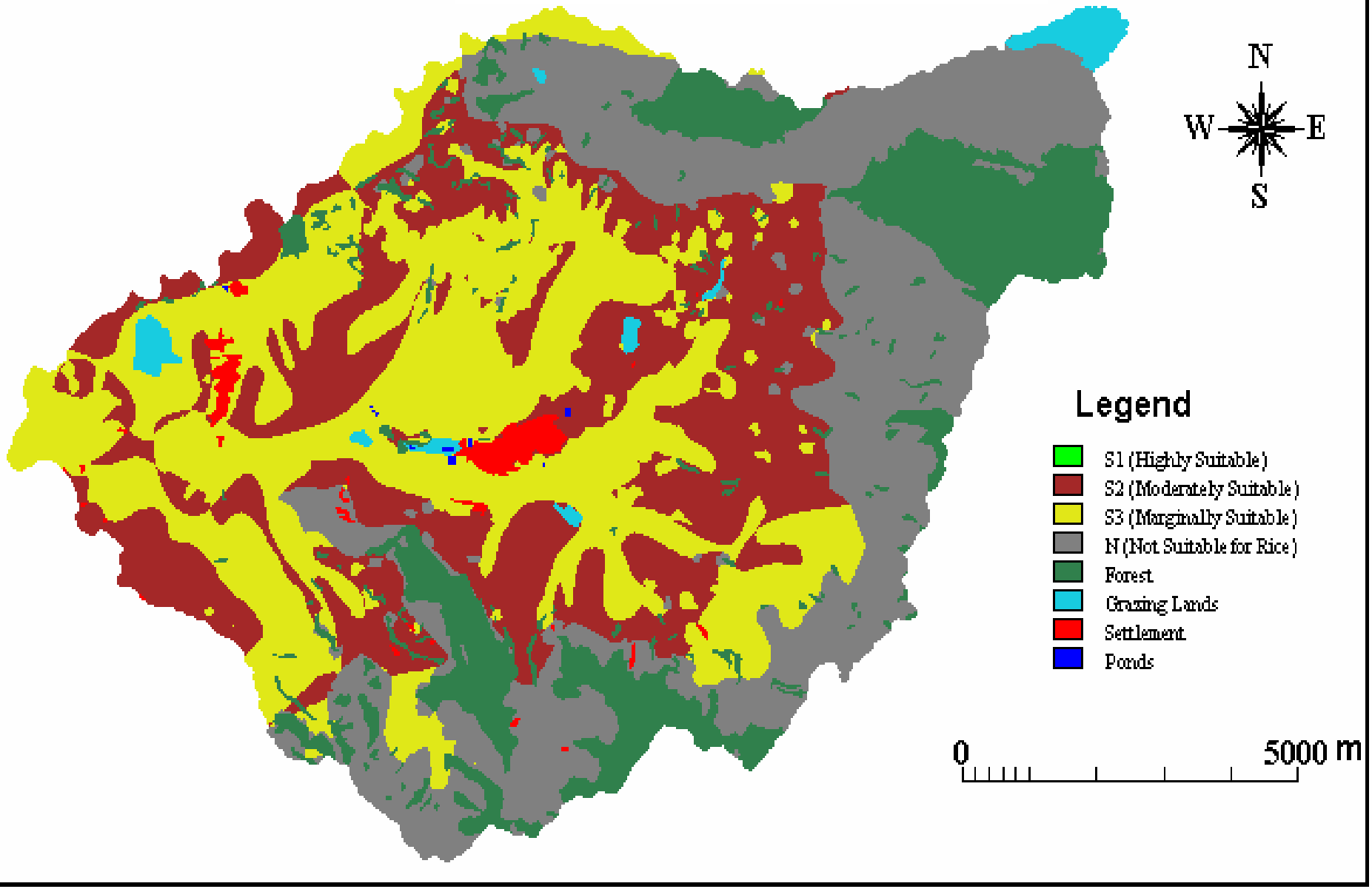


N status Map

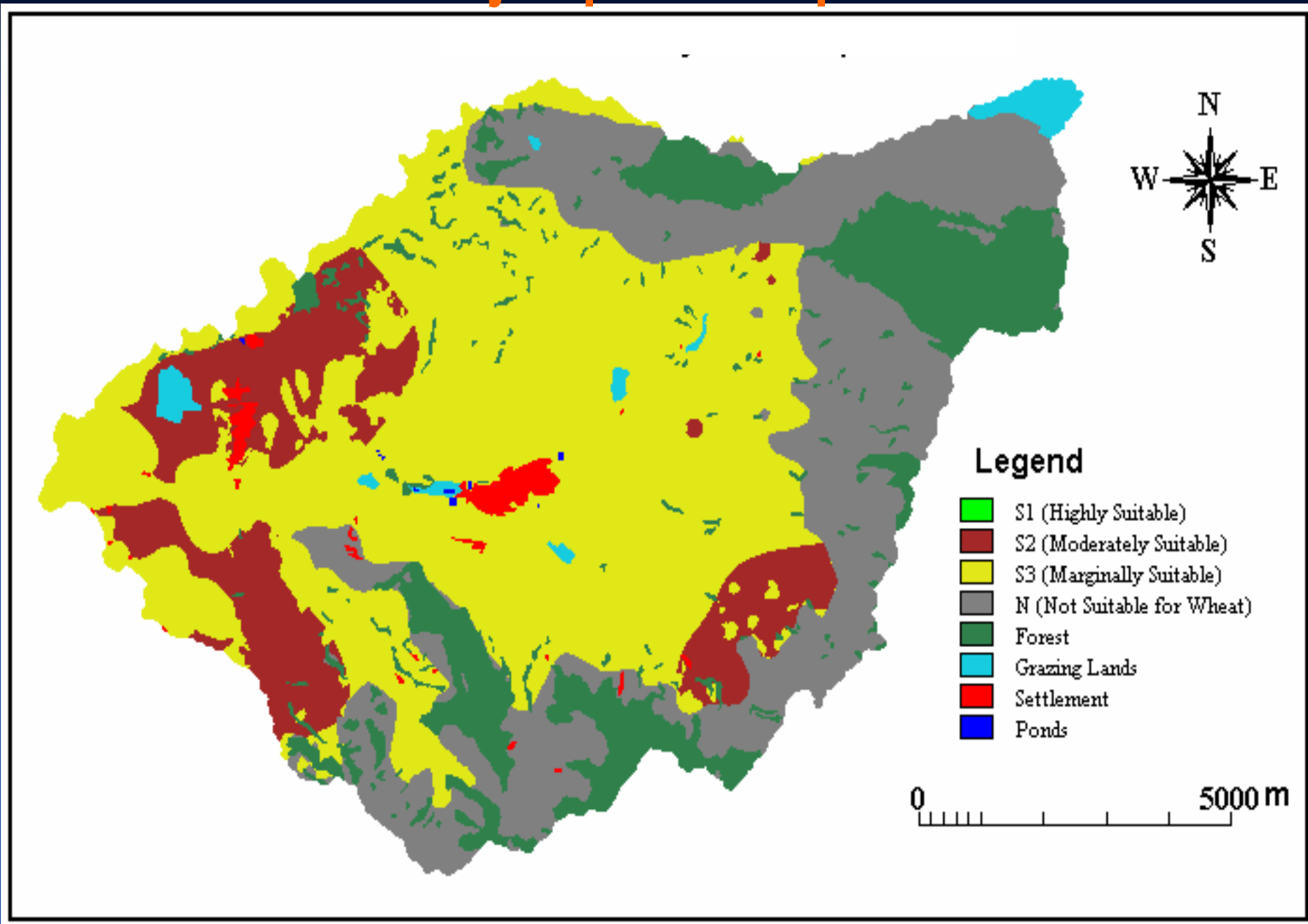
Soil map of Bhaktapur district



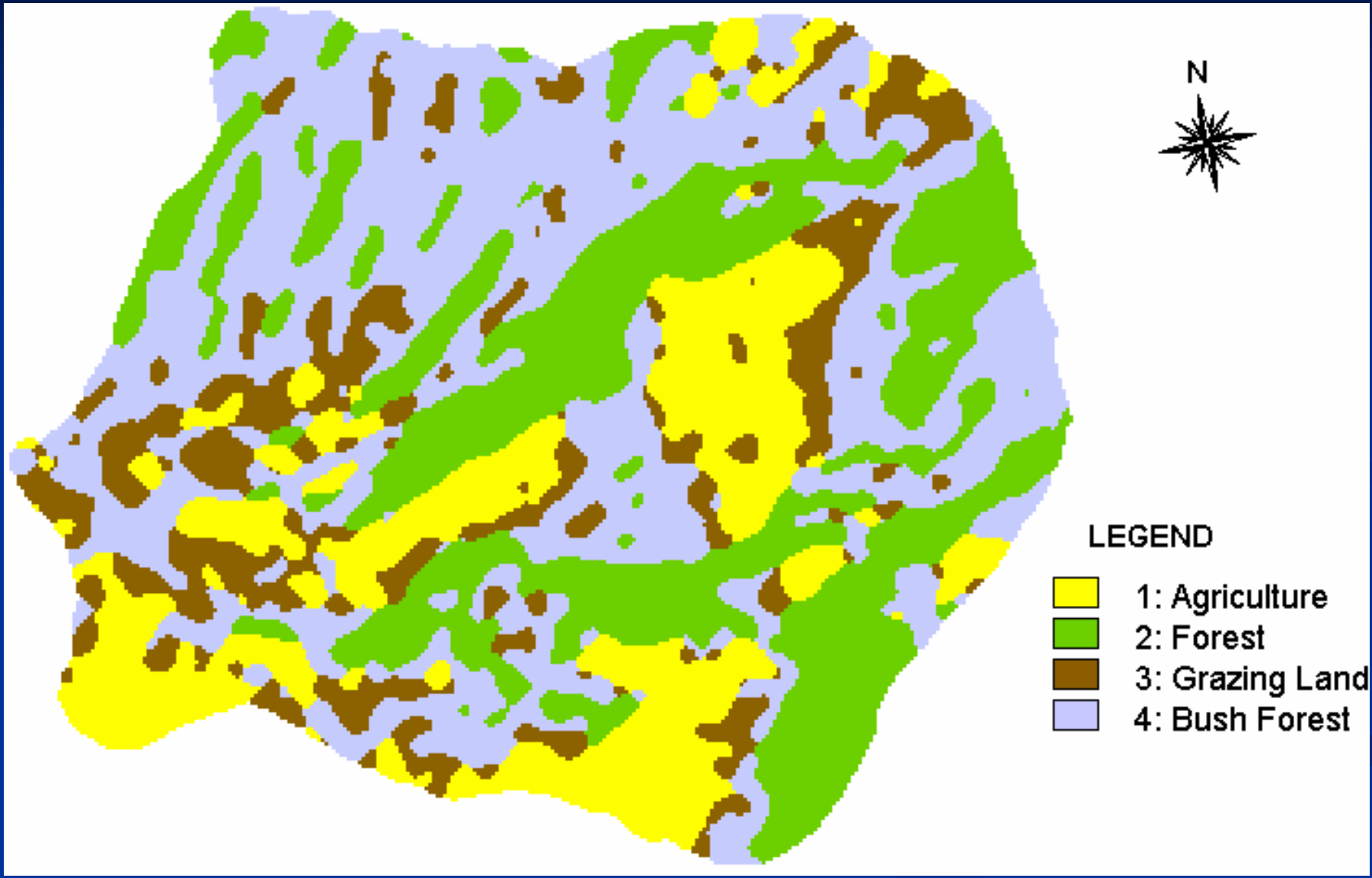
Rice suitability map of Bhaktapur district



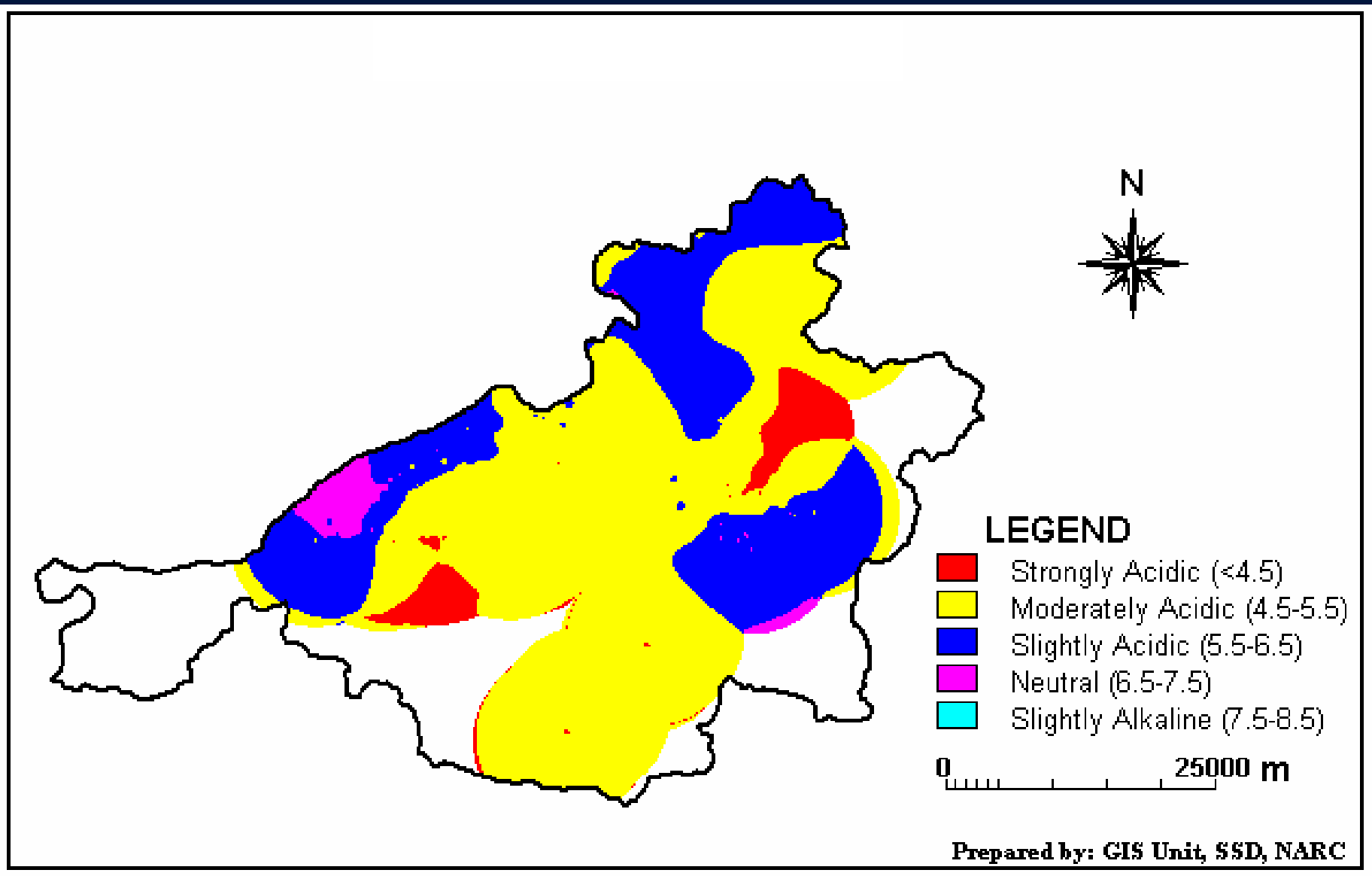
Wheat suitability map of Bhaktapur district



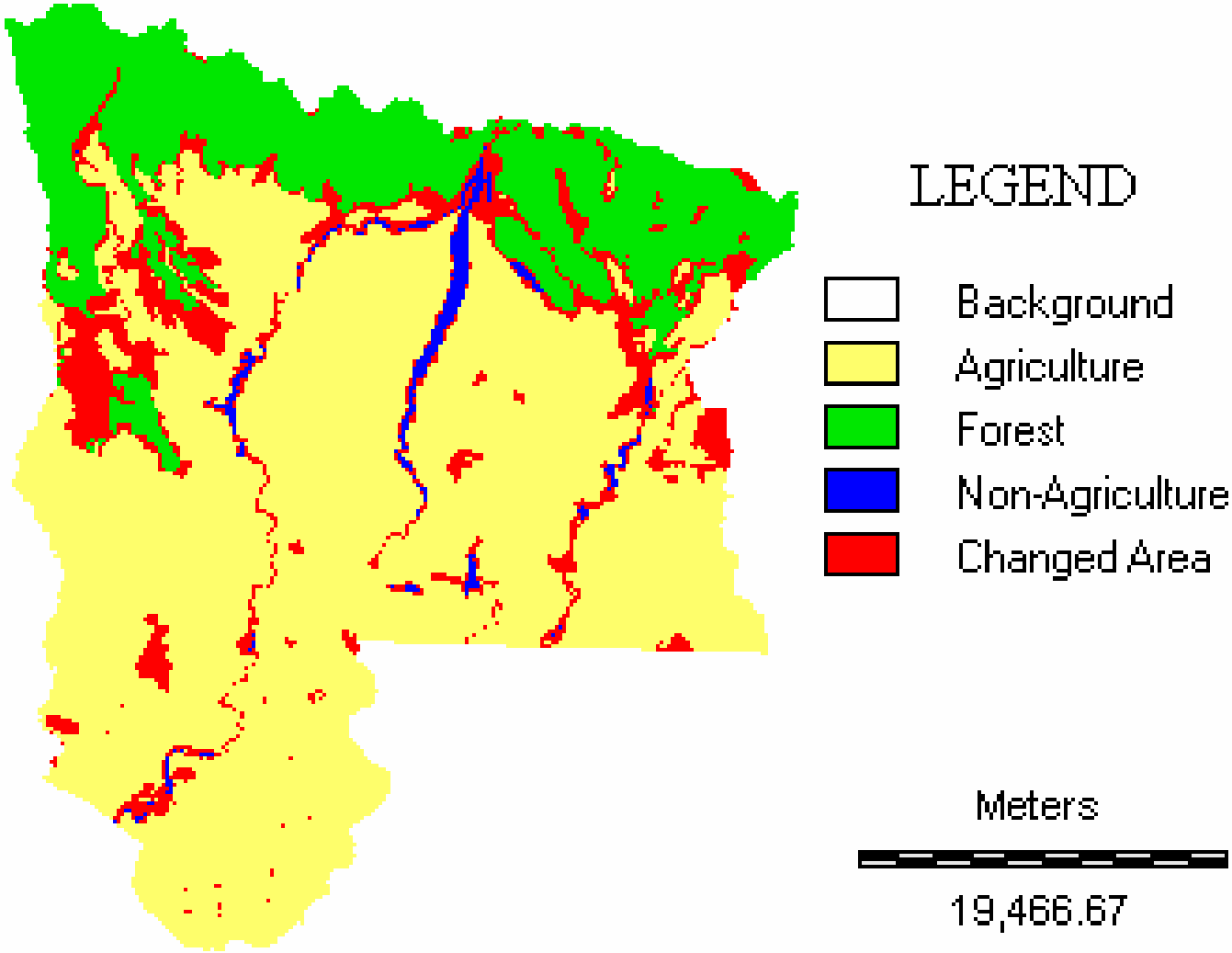
CLASSIFIED SATELLITE IMAGE



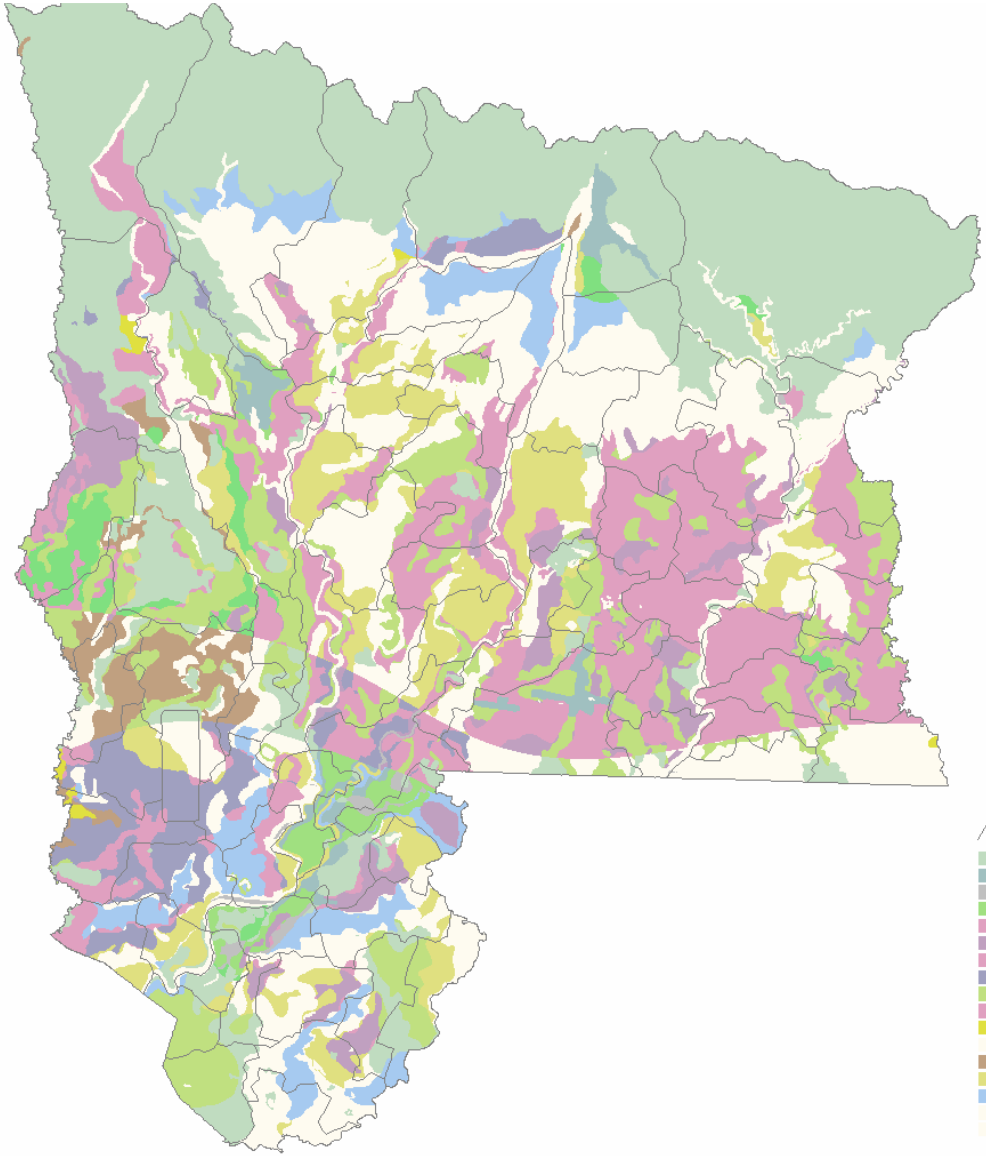
pH map of Chitwan district



Land use change map - Rupandehi district 1978-1990



Agro-ecological zone map - Rupandehi district



Village Development Committee Boundary

Zone 1
Zone 10
Zone 11
Zone 12
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Zone 85
Zone 9

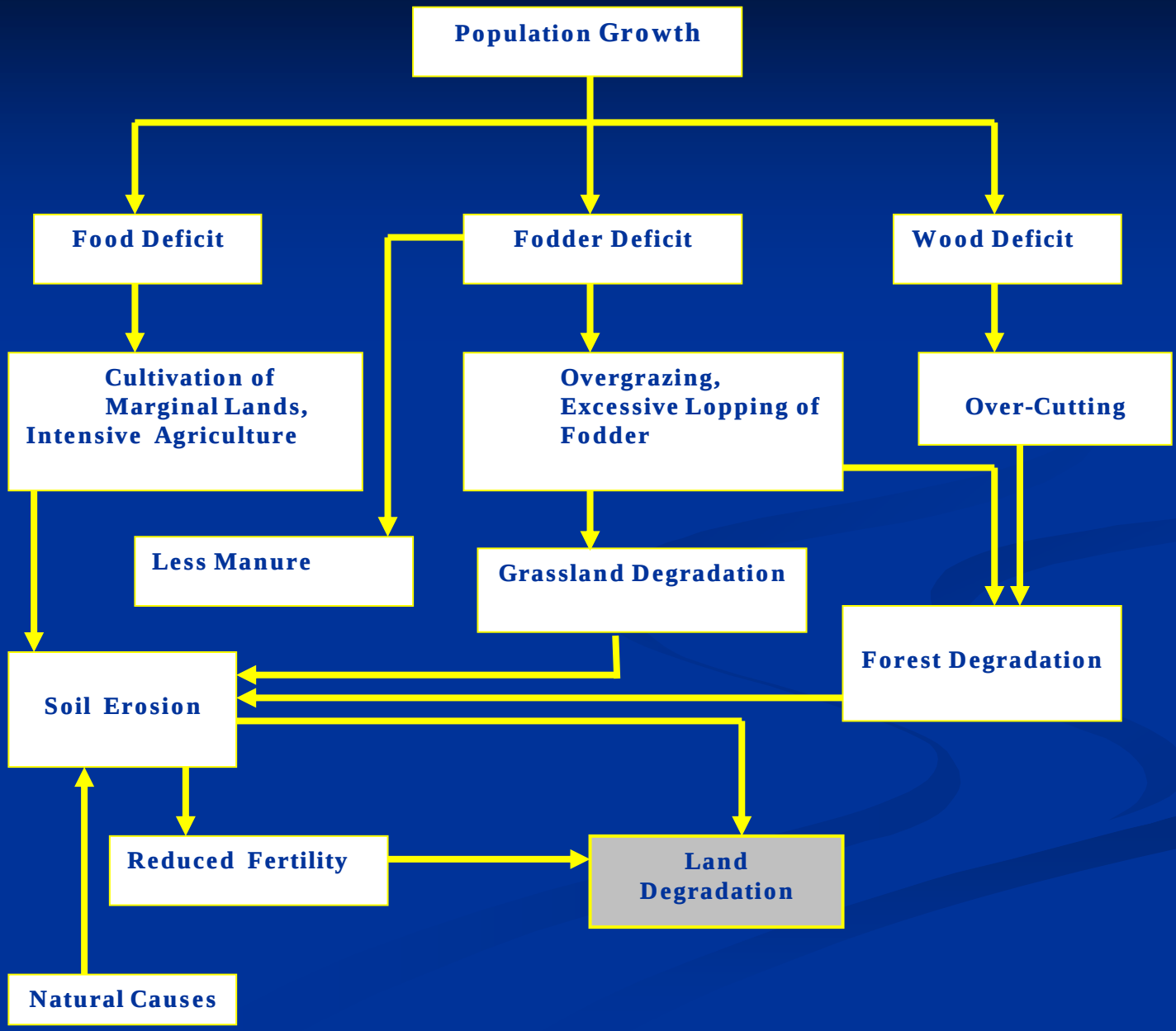
Soil Classification of Nepal

- *Soils of Nepal are not classified in detail*
- *LRMP (1986) - reported dominant 14 soil groups covering 4 soil orders that are encountered in Nepal*
- *Major soil orders of Nepal according USDA taxonomy - **Entisols, Inceptisols, Mollisols, and Alfisols.** Soil orders Spodosols, Histosols, Utisols, and Aridisols are occasionally found*
- *Soils originating from weathered soft rocks (Phyllite, Quartzite, sandstone, Granites, Gneiss and Schists) are characterized by high degree of porosity and poor slope stability, shallow soil depth, course texture and acidic reaction are common problem*

Specific Soil Problems and Threats to Soil of Nepal

- Soil Productivity decline
- Soil Erosion and land degradation
- Soil organic matter decline
- Loss of soil nutrients
- Landslide and flooding
- Soil pollution and contamination
- Soil sealing

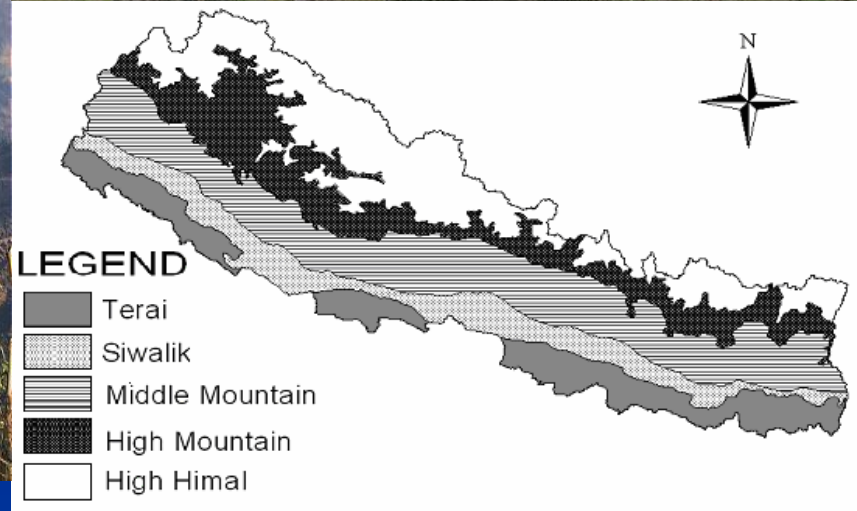
Causes of Land Degradation in Nepal



Contd….

Causes of Land Degradation in Nepal

Geomorphology and Land form



Shifting Cultivation

- Practiced in Central and Western Midhills
- Regeneration of forests is hampered in long run
- Cultivation practice without replenish of plant nutrients threat sustainability
- Soil erosion due to lack of surface cover

Government Programs

Agriculture:

- Sloping Agricultural Land Technology (SALT)
- Integrated Plant Nutrients Management (IPNM)
- Technology of Sustainable Soil Management Practices (SSMP) Dissemination
- Delivery of Agricultural Inputs
- Upgrading livestock
- Rehabilitation by promoting horticultural crop in district level

Contd..

Forestry:

- Community and Private Forestry Program
- National and Leasehold Forest
- Soil Conservation and Watershed Management Program
- Conservation of Ecosystems and Genetic Resources
- River Training Programs

Conclusion and Recommendations

a. Polices

- Study on land degradation and its trends at National and Regional Level
- Awareness of land degradation and incorporation of environmental education in school education
- Implement integrated package programs that include vegetative, agronomic, and water management measures to tackle soil erosion problems with watershed management approach
- Involvement & mobilize local people in implementation of soil and land conservation activities

Contd…

- Formulate clear policy, strategies and programs, which should be given high priority to tackle rehabilitation of degraded lands
- Formulate proper land use policy, which direct people to use according its suitability
- Establish and maintain linkages and networking with all related sectors (Forestry, Agriculture, Livestock, Water Resources, Roads and so on)
- Mobilize people's participation in implementation of soil conservation activities
- Preparing a **national action program** to address the issues of land degradation and desertification

b. Technical Aspects

- Afforestation on degraded forest and establish and maintain linkages and networking with all related sectors
- Land gradation and land consolidation
- Mulching on dry degraded lands
- Liming on acidic lands

Contd…

- IPNM, conservation tillage, fallowing, and scientific management techniques (such as use of legumes in the cropping systems, strip cropping, cover cropping etc.)
- Promotion of Sloping agricultural land technology (SALT) in sloping land
- Promotion of erosion control techniques such as contouring, terracing or other bioengineering approach in sloping land


Thank you