

# Contents

<b>Preface</b>	iii
<b>Statutory Declaration (s)</b>	v
<b>Acknowledgements</b>	vi
<b>Abstract of the thesis</b>	ix
<b>List of Acronyms</b>	xiii
<b>List of Tables</b>	xx
<b>List of Figures</b>	xxiii
<b>List of Photographs</b>	xxvii
<b>Chapter 1: Introduction</b>	<b>1-16</b>
1.1 The Land Use Land Cover Concept	1
1.2 Conceptual Framework of Terrain Analysis	2
1.3 Study Area	2
1.4 General Introduction to the Problem	4
1.5 Aims and Objectives	5
1.6 Hypothesis	5
1.7 Methodology	5
1.8 Review of Literatures	7
1.9 Research Gap	12
1.10 Conclusion	12
<b>Chapter 2: Sanka River Basin: An Overview</b>	<b>17- 40</b>
2.1 Introduction	17
2.2 Focal themes of the chapter	18
2.3 Materials and methods	18
2.4 Geology	21
2.5 Sanka River: Channel Network	24
2.6 Major Tributaries of Sanka River Basin	29
2.7 Climatic Characteristics	30
2.8 Broad Physiography	33
2.9 Demographic Characteristics/ Attributes	36
2.10 Conclusion	40

<b>Chapter 3: Geomorphological and Terrain Attributes of Sanka River Basin</b>	<b>41- 131</b>
3.1 Introduction	41
3.2 Focal themes of the chapter	41
3.3 Materials and methods	42
3.4 Delineation of Stream segment and Stream ordering	43
3.5 Demarcation of Basin and Sub-basins	44
3.6 Drainage Composition	47
3.7 Law of Stream Numbers	54
3.8 Law of Stream Lengths	57
3.9 Law of Basin Area	58
3.10 Law of Basin Relief	59
3.11 Law of Allometric Growth	60
3.12 Basin Geometric Properties	61
3.13 Basin Morphometric Properties	68
3.14 Basin Morphological Attributes	72
3.15 Longitudinal Profiles	75
3.16 Morphometric Parameters of the Sanka basin Grid wise	76
3.17 Analysis of Morphometric Parameters of the Sanka Basin	79
3.17.1 Altimetric Frequency Histogram	79
3.17.2 Maximum Elevation	80
3.17.3 Relative Relief	82
3.17.4 Average Slope	85
3.17.5 Stream Frequency	89
3.17.6 Drainage Density	91
3.17.7 Drainage Texture	94
3.17.8 Dissection Index	96
3.17.9 Ruggedness Index	98
3.17.10 Coefficient of Relative Massiveness	99
3.18 Statistical Analysis of Morphometric Parameters	102
3.18.1 Descriptive Measures	102
3.18.2 Correlation Matrix	103
3.18.3 Factor Analysis	104
3.19 Morphometric Regions	106
3.20 Hypsometric Analysis	108

3.21	Topographic Profiles	112
3.22	Concept of Terrain	122
3.23	Classification of Terrain	123
3.24	Characteristics of Terrain Classes	125
3.25	Conclusion	128
<b>Chapter 4: Surface Soil Status within the Basin</b>		<b>132 - 202</b>
4.1	Introduction	132
4.2	Focal themes of the chapter	133
4.3	Materials and methods	133
4.4	Soil Order	134
	4.4.1 <i>Inceptisols</i>	134
	4.4.2 <i>Alfisols</i>	135
	4.4.3 <i>Ultisols</i>	136
4.5	Local Soil Series	136
4.6	Collected Soil Sample Sites and Chemical Analysis of Soilsamples	155
4.7	Methods for analysis of chemical properties of soil	157
4.8	Distribution of Chemical Properties of soil of Sanka Basin	165
	4.8.1 Soil <i>pH</i> (Puissance de Hydrogen)	165
	4.8.2 Organic Carbon	166
	4.8.3 Nitrogen	168
	4.8.4 Phosphorus	169
	4.8.5 Potassium	171
	4.8.6 Available Sulphur	172
	4.8.7 Electric Conductivity	174
4.9	Descriptive statistical measure	175
4.10	Physical Properties of soil of Sanka Basin	177
4.11	Statistical Analysis of Grain size distribution	181
4.12	Characteristics of Soil according to Terrain Class	192
4.13	Prioritisation of sub-basins and Estimation of Sediment Production Rate	195
4.14	Conclusion	199
<b>Chapter 5: LULC pattern within the Basin Area</b>		<b>203 - 240</b>
5.1	Introduction	203
5.2	Importance of RS-GIS in Land Use Land Cover Analysis	205
5.3	Focal themes of the chapter	206

5.4	Materials and methods	206
5.5	Land Use Land Cover (LULC) Classes	208
5.6	Accuracy Assessment	222
5.7	Changing pattern of LULC and its comparison	224
5.8	Village- Wise Land use Pattern	226
5.9	Terrain class Wise Land use Land cover Character	234
5.10	Conclusion	237
<b>Chapter 6: Surface Water Storage in Sanka River Basin</b>		<b>241 - 294</b>
6.1	Introduction	241
6.2	Focal themes of the chapter	242
6.3	Materials and methods	242
6.4	Ground water Resources	246
6.5	Ground water Harvesting	256
6.6	Recharge and Draft scenario of Ground Water	260
6.7	Ground Water Scenario of Twenty Years	261
6.8	Statistical Measures of Ground Water Status	266
6.9	Surface water	268
6.10	Surface water Storage method/strategies	268
	6.10.1 Indigenous Surface water Storage Method	268
	6.10.2 Modern Surface water Storage Method	271
6.11	Village wise Distribution of Tanks and Source of Surface Water	277
6.12	Distribution of Surface water Bodies	281
6.13	Cross Profiles of Sanka River	286
6.14	Logistic Regression Model (LRM)	289
6.15	Conclusion	293
<b>Chapter 7: Effect of Terrain Characteristics and related Remedial Measures</b>		<b>295 - 318</b>
7.1	Introduction	295
7.2	Focal themes of the chapter	296
7.3	Materials and methods	296
7.4	Impact of Terrain characteristics on Land Use Land Cover	297
	7.4.1 Correlation between Terrain attributes and LULC variables	297
	7.4.2 Impact of Terrain characteristics on Land UseLand cover according to Terrain Class	299
	7.4.3 Multinomial Logistic Regression	312

7.5	Proposed Remedies	316
<b>Chapter 8:</b>	<b>Summary and Conclusions</b>	<b>319 - 326</b>
	<b>Bibliography</b>	
	<b>Appendices</b>	
	<b>Index</b>	