

## TABLE OF CONTENTS

CHAPTER 1 .....	1
DETERMINATION OF THE FUNDAMENTAL GEO-SPATIAL DATASETS FOR AFRICA THROUGH A USER NEEDS ANALYSIS - INTRODUCTION .....	1
1.1 INTRODUCTION .....	1
1.2 OBJECTIVES OF THE PROJECT .....	4
1.3 APPROACH TO IMPLEMENTING THE USER NEEDS ASSESSMENT.....	4
1.3.1 Project initialization .....	4
1.3.2 Conduct user needs assessment.....	5
1.4 CONCLUSION.....	6
ADDENDUM 1: PROJECT PROTOCOL - DETERMINING THE FUNDAMENTAL GEOSPATIAL DATASETS FOR AFRICA .....	8
ADDENDUM 2: EXAMPLE OF TERMS OF REFERENCE .....	16
ADDENDUM 3: GUIDELINES FOR WRITING OF PAPERS IN THE EVALUATION OF FUNDAMENTAL GEOSPATIAL DATA SETS IN AFRICA.....	19
ADDENDUM 4: USER NEEDS ASSESSMENT QUESTIONNAIRE .....	27
CHAPTER 2.....	40
DETERMINATION OF THE FUNDAMENTAL GEOSPATIAL DATASETS FOR AFRICA THROUGH A USER NEEDS ANALYSIS – A SYNTHESIS REPORT.....	40
EXECUTIVE SUMMARY .....	40
2.1 INTRODUCTION .....	42
2.2 PROBLEM STATEMENT.....	43
2.3 GENERAL APPROACH TO STUDY.....	43
2.4 FINDINGS .....	46
2.4.1 An academic perspective.....	46
Review of definitions.....	46
Data Categories.....	46
2.4.2 Review of previous assessments and approaches.....	48
User Needs Assessments in Africa.....	48
Core environmental datasets.....	49

---

	The Africa Data Sampler.....	50
	AFRICOVER.....	50
	Examples from SDI initiatives .....	51
	Mexico .....	51
	Australia and New Zealand.....	53
	Nigeria .....	53
	Namibia .....	54
	Nepal.....	54
	South Africa.....	54
	Other countries and initiatives.....	55
	The VMAP series.....	56
2.4.3	Global perspective.....	56
	Guiding principles .....	56
	European initiatives .....	57
2.4.4	Perspective from multi-national agencies.....	58
	Criteria for defining fundamental geospatial datasets.....	58
	Definitions of fundamental geospatial datasets.....	58
	Data rankings .....	59
2.4.5	Sub-regional perspectives .....	60
	East Africa .....	60
	West Africa .....	61
	North Africa.....	63
	Southern Africa.....	66
2.4.6	Responses from EIS-AFRICA's Network .....	69
2.5	Framework for Africa .....	70
2.5.1	Analysis of literature review.....	70
2.5.2	Data categories .....	71
	Geometric referencing and projection .....	71
	Base geography .....	72
	Geo-coding schemes.....	72
2.5.3	Recommendations.....	73
	Definition .....	73
	Candidate datasets.....	73
	Primary Reference.....	74
	Base geography .....	74
	Administration and spatial organisation.....	77
	Infrastructure .....	77

---

Environmental information .....	78
2.5.4 Spatial features and attribute information.....	78
2.5.5 Scale and level of detail .....	80
2.5.6 Level of accuracy.....	82
2.5.7 Metadata .....	83
2.5.8 Temporal requirements.....	84
2.6. CONCLUSIONS .....	84
REFERENCES.....	86
ANNEX 1: STUDY TERMS OF REFERENCE DETERMINATION OF THE FUNDAMENTAL GEOSPATIAL DATASETS FOR AFRICA THROUGH USER NEEDS ANALYSIS .....	88
ANNEX 2: REGIONAL PARTNERS AND COUNTRIES ALLOCATED TO THEM ...	93
ANNEX 3: MULTI-NATIONAL ORGANISATIONS IDENTIFIED TO PARTICIPATE IN STUDY.....	94
<b>CHAPITRE 3.....</b>	<b>95</b>
<b>DÉTERMINATION DES ENSEMBLES DE DONNÉES GÉOGRAPHIQUES FONDAMENTALES POUR L'AFRIQUE PAR L'ANALYSE DES BESOINS DES UTILISATEURS – RAPPORT DE SYNTHÈSE .....</b>	<b>95</b>
SOMMAIRE .....	95
3.1 INTRODUCTION .....	98
3.2 PROBLÉMATIQUE.....	99
3.3 APPROCHE GÉNÉRALE DE L'ÉTUDE.....	100
3.4 RÉSULTATS .....	102
3.4.1 PERSPECTIVE UNIVERSITAIRE .....	102
EXAMEN DES DÉFINITIONS.....	102
CATÉGORIES DE DONNÉES.....	103
3.4.2 RÉVISION DES ÉVALUATIONS ET DES APPROCHES PRÉCÉDENTES	105
ÉVALUATION DES BESOINS DES UTILISATEURS EN AFRIQUE .....	105
ENSEMBLES DE DONNÉES CENTRALES SUR L'ENVIRONNEMENT ...	106
AFRICA DATA SAMPLER (ADS) .....	107
AFRICOVER.....	108
EXEMPLES D'INITIATIVES D'INFRASTRUCTURE DE DONNÉES SPATIALES (SDI).....	108

---

MEXIQUE.....	109
AUSTRALIE ET NOUVELLE ZÉLANDE.....	111
NIGERIA.....	111
NAMIBIE.....	112
NÉPAL.....	112
AFRIQUE DU SUD.....	113
AUTRES PAYS ET INITIATIVES.....	113
LA SÉRIE DES VMAP.....	114
3.4.3 PERSPECTIVE MONDIALE.....	115
PRINCIPES DIRECTEURS.....	115
INITIATIVES EUROPÉENNES.....	116
3.4.4 PERSPECTIVE D'ORGANISATIONS MULTINATIONALES.....	116
CRITÈRES DE DÉFINITION D'ENSEMBLES DE DONNÉES GÉOGRAPHIQUES FONDAMENTALES.....	116
DÉFINITIONS DES ENSEMBLES DE DONNÉES GÉOGRAPHIQUES FONDAMENTALES.....	117
CLASSEMENT DES DONNÉES.....	118
3.4.5 PERSPECTIVES SOUS-RÉGIONALES.....	118
AFRIQUE DE L'EST.....	118
PAYS DE LA SADC.....	120
AUTRES INFORMATIONS SOUS-RÉGIONALES.....	123
3.4.6 RÉPONSES DU RÉSEAU SIE-AFRIQUE.....	124
3.5 CADRE POUR L'AFRIQUE.....	125
3.5.1 ANALYSE DE LA REVUE DE LA LITTÉRATURE.....	125
3.5.2 CATÉGORIES DE DONNÉES.....	126
RÉFÉRENCE GÉOMÉTRIQUE ET PROJECTION.....	127
BASE GÉOGRAPHIQUE.....	127
SYSTÈMES DE GÉOCODAGE.....	128
3.5.3 RECOMMANDATIONS.....	128
DÉFINITION.....	128
ENSEMBLES DE DONNÉES CANDIDATS.....	129
RÉFÉRENCE PRIMAIRE.....	129
BASE GÉOGRAPHIQUE.....	130
ADMINISTRATION ET ORGANISATION SPATIALE.....	133
INFRASTRUCTURE.....	133
INFORMATIONS ENVIRONNEMENTALES.....	134

---

3.5.4	INFORMATIONS SUR LES ENTITÉS ET LES ATTRIBUTS GÉOGRAPHIQUES.....	134
3.5.5	ÉCHELLE ET NIVEAU DE DÉTAIL .....	136
3.5.6	NIVEAU DE PRÉCISION.....	139
3.5.7	MÉTADONNÉES.....	140
3.5.8	CONDITIONS TEMPORELLES.....	141
3.6	CONCLUSIONS .....	141
	RÉFÉRENCES.....	144
	<b>CHAPTER 4.....</b>	<b>153</b>
	<b>FUNDAMENTAL GEOSPATIAL DATA SETS FOR AFRICA: DEFINITIONS AND EDUCATIONAL ASPECTS .....</b>	<b>153</b>
4.1	INTRODUCTION .....	153
4.2	KEY QUESTIONS .....	154
4.3	DEFINITION OF 'FUNDAMENTAL GEOSPATIAL DATASETS' AND DATA CATEGORIES.....	155
4.4	CLASSIFICATION OF DATASETS.....	157
4.5	SCALES, RESOLUTION, GENERALISATION AND ACCURACY.....	158
4.6	MAP PROJECTION AND REFERENCE ELLIPSOID .....	159
4.7	CLASSIFICATION OF GEOSPATIAL DATA.....	160
4.8	EDUCATION AND CAPACITY BUILDING IN THE CONTEXT OF FUNDAMENTAL GEOSPATIAL DATASETS.....	163
4.9	GENERAL OBSERVATIONS ON THE CONDITIONS FOR EDUCATORS AND PROFESSIONALS IN AFRICA.....	164
4.10	INSTITUTIONAL PROBLEM AREAS.....	166
4.11	RESEARCH AND POSTGRADUATE EDUCATION .....	167
4.12	BLACK BOX TECHNOLOGY AND TECHNIKON EDUCATION.....	168
4.13	THE STATUS OF AFRICAN EDUCATION RELEVANT TO THE ESTABLISHMENTS OF FUNDAMENTAL GEOSPATIAL DATASETS .....	169
4.14	SURVEY/GEOMATICS DEPARTMENTS IN AFRICA .....	169
4.15	POSSIBLE ACTIVITIES TOWARDS THE ESTABLISHMENT OF FUNDAMENTAL GEOSPATIAL DATASETS FOR AFRICA.....	172
4.16	CONCLUSIONS .....	173
	REFERENCES.....	173

---

<b>CHAPTER 5.....</b>	<b>174</b>
<b>A PERSPECTIVE FROM MULTI-NATIONAL AGENCIES ON THE FUNDAMENTAL GEOSPATIAL DATA SETS NEEDED IN AFRICA .....</b>	<b>174</b>
5.1 INTRODUCTION .....	174
5.1.1 Africa in context .....	174
5.1.2 NEPAD – a framework for developing fundamental geospatial data sets in Africa .....	176
5.1.3 The situation with Africa’s geospatial data sets.....	178
5.2 METHODOLOGICAL APPROACH USED IN THE STUDY.....	179
5.3 CRITERIA FOR DEFINING FUNDAMENTAL GEOSPATIAL DATA SETS	181
5.4 DEFINITIONS OF FUNDAMENTAL GEOSPATIAL DATASETS.....	183
5.5 FUNDAMENTAL GEOSPATIAL DATASETS FOR AFRICA .....	184
5.5.1 Geodetic reference frame .....	186
5.5.2 Administrative boundaries.....	187
5.5.3 Transportation .....	189
5.5.4 Human settlements.....	190
5.5.5 Hydrography .....	191
5.5.6 Fundamental geospatial datasets revisited .....	192
5.6 CONCLUSION.....	193
REFERENCES.....	196
<b>CHAPTER 6.....</b>	<b>199</b>
<b>FUNDAMENTAL GEOSPATIAL DATA SETS FOR AFRICA - A GLOBAL PERSPECTIVE .....</b>	<b>199</b>
6.1 INTRODUCTION .....	199
6.2 DEFINITION OF FUNDAMENTAL GEOSPATIAL DATA SETS.....	200
6.2.1 Fundamental geospatial data sets and SDI .....	200
6.2.2 Conditions for fundamental geospatial data .....	201
6.2.3 Content of fundamental geospatial data.....	202
6.2.4 Cost and needs of fundamental geospatial data sets.....	204
6.2.5 Accuracy and scales of fundamental geospatial data sets .....	205
6.2.6 Data provision of fundamental geospatial data sets .....	205
6.3 FUNDAMENTAL GEO-DATA SETS: EUROPEAN INITIATIVES .....	206

---

6.3.1	INSPIRE .....	207
6.3.2	EuroGeographics.....	207
6.3.3	EuroSpec.....	208
6.3.4	EuroRoadS.....	209
6.3.5	EuroMapFinder.....	209
6.3.6	RISE.....	209
6.3.7	SABE.....	209
6.3.8	EuroGlobalMap.....	210
6.3.9	EuroRegionalMap.....	210
6.4	FUNDAMENTAL GEO-DATA SETS: AMERICAN INITIATIVES .....	210
6.4.1	The National Map .....	210
	Partnerships .....	211
6.4.2	Geospatial One-Stop Portal.....	211
6.5	FUNDAMENTAL GEO-DATA SETS: GLOBAL INITIATIVES RELEVANT FOR AFRICA .....	211
6.5.1	The Global Map .....	212
6.5.2	The USGS Global GIS database .....	212
6.5.3	The Africover project.....	213
6.5.4	SALB Project .....	214
6.5.5	U.S. Census bureau - International Data Base (IDB) .....	215
6.5.6	Shuttle Radar Topography Mission (SRTM).....	216
6.5.7	Summary of fundamental geo-datasets available for Africa .....	216
6.5.8	NOAA's National Geophysical Data Center (NGDC).....	217
6.5.9	The Geo Data Portal, United Nations Environment Programme (UNEP) ...	218
6.6	FUNDAMENTAL GEO-DATA SETS FOR AFRICA: THE STATE OF NATIONAL MAPPING .....	218
6.7.	CONCLUSION AND SUMMARY: PROSPECTS AND POTENTIALS FOR FUNDAMENTAL GEOSPATIAL DATASETS IN AFRICA .....	219
	REFERENCES.....	223
	APPENDIX 1: WEB LINKS DATA WAREHOUSES.....	226
	APPENDIX 2: WEB LINKS OF ORGANIZATIONS PROVIDING THE INFRASTRUCTURE FOR THE ACCESS TO GEOSPATIAL INFORMATION.....	229
	<b>CHAPTER 7.....</b>	<b>231</b>
	<b>DETERMINING THE FUNDAMENTAL GEOSPATIAL DATA SETS FOR SADC COUNTRIES.....</b>	<b>231</b>

---

7.1	BACKGROUND.....	231
7.1.1	Current situation with fundamental geospatial datasets in the SADC region 232	
7.1.2	Literature review.....	232
7.1.3	Definition of the problem.....	234
7.1.4	Study objectives and approach.....	235
7.2	METHODOLOGY.....	235
7.2.1	Introduction.....	235
7.2.2	Identifying user organizations.....	236
7.2.3	Issues discussed in the questionnaire.....	236
7.2.4	Sectoral backgrounds of users.....	237
7.2.5	Response Rate.....	237
7.2.6	Analysis of data from the questionnaires.....	238
7.3	USER NEEDS SURVEY RESULTS.....	239
7.3.1	Summary of questionnaire responses.....	239
	Geographic coverage of organizations.....	241
	Application sector(s) of organization.....	242
	Use geospatial information by organizations.....	242
	Criteria to be used to define a fundamental geospatial datasets.....	242
	Definition of a fundamental geospatial dataset.....	244
	Identification of fundamental geospatial datasets at a national, sub-regional and regional level.....	245
	Theme/class and spatial features and attributes that must be collected.....	247
	Metadata for fundamental geospatial datasets.....	250
	Matrix of fundamental geospatial datasets.....	251
7.3.2	Evaluation of the user needs survey.....	252
7.4	RECOMMENDED FUNDAMENTAL GEOSPATIAL DATA SETS FOR THE SADC REGION.....	252
7.6	CONCLUSIONS AND RECOMMENDATIONS.....	254
	REFERENCES.....	256
	Appendix I – List of Contacts to whom questionnaires were sent.....	259
	<b>CHAPTER 8.....</b>	<b>261</b>

---

<b>EVALUATION OF FUNDAMENTAL GEOSPATIAL DATASETS IN EAST AFRICA..</b>	<b>261</b>
.....	
8.1 INTRODUCTION .....	261
8.2 REVIEW OF THE LITERATURE .....	263
8.3 METHODOLOGY .....	265
8.4 ANALYSIS OF RESULTS.....	266
8.5 CONCLUSIONS .....	269
REFERENCES.....	269
APPENDIX 1: CONTACT DETAILS OF PERONS INTERVIEWED .....	271
<b>CHAPTER 9.....</b>	<b>272</b>
<b>EVALUATION OF FUNDAMENTAL GEOSPATIAL DATA SETS IN WEST AFRICA</b>	<b>272</b>
.....	
9.1 INTRODUCTION .....	272
9.2 CURRENT SITUATION WITH GEOSPATIAL INFRASTRUCTURE .....	273
9.3 PROBLEM DESCRIPTION AND OBJECTIVES .....	276
9.4 METHODOLOGY .....	277
9.4.1 Study area .....	277
9.4.2 Research approach .....	277
9.5 RESULTS.....	278
9.5.1 Organizations participating in study .....	278
9.5.2 Problems/constraints experienced in the study .....	280
9.6 ANALYSIS AND RESULTS .....	281
9.6.1 Fundamental datasets .....	281
9.6.2 Metadata .....	283
9.6.3 Revisiting fundamental geospatial datasets .....	283
9.6.4 Relevance of cadastral and property datasets for poverty alleviation .....	285
9.7 MANAGING FUNDAMENTAL GEOSPATIAL DATASETS.....	287
9.8 PUBLIC PRIVATE PARTNERSHIP IN GEOINFORMATION PROVISION.	289
9.9 CONLUSIONS.....	291
REFERENCES.....	293
<b>CHAPTER 10.....</b>	<b>296</b>
<b>DETERMINING THE FUNDAMENTAL GEOSPATIAL DATASETS FOR NORTH AFRICA .....</b>	<b>296</b>

---

10.1	INTRODUCTION .....	296
10.2	METHODOLOGY .....	297
10.2.1	Data gathering technique.....	297
10.2.2	The users incorporated into the study .....	297
	Egypt.....	298
	Sudan.....	298
	Tunis.....	298
	Morocco.....	300
10.2.3	Coding and analyzing the data .....	302
10.2.4	Interpreting the results .....	302
10.3	ANALYSIS OF RESULTS.....	302
10.3.1	Egypt.....	302
10.3.2	Sudan.....	304
10.3.3	Tunis.....	305
10.3.4	Morocco.....	305
10.3.5	Features of fundamental geospatial datasets.....	306
10.3.6	Critical spatial features and attributes .....	307
10.3.7	Attributes of Metadata.....	308
10.3.8	Fundamental geospatial datasets and Features .....	309
10.4	CONCLUSIONS .....	310
10.5	ACKNOWLEDGEMENTS.....	313
	APPENDIX 1: RESPONSES TO QUESTION 18.....	315
	APPENDIX 2: DATASET, THEME, SPATIAL FEATURE, ATTRIBUTES AND LEVEL OF DETAIL FOR FUNDAMENTAL GEOSPATIAL DATASETS AT NATIONAL LEVEL .....	320
	APPENDIX 3: MATRIX OF FUNDAMENTAL GEOSPATIAL DATASETS AND FEATURES.....	329
	ABBREVIATIONS/ACRONYMS.....	373

---

