

Figure 6: Overview of the Mpumalanga Parks Board (MPB) conservation categories associated with the study area

Table 5: Overview of the Mpumalanga Parks Board Conservation Plan categories associated with the study area

Conservation Categories	Surface (ha)	% Cover	Conservation Significance	
			Low	High
No Natural Habitat Remaining	38881	40%	38881	
Least Concern	22692	23%	22692	
Important & Necessary	8369	9%		8369
Highly Significant	27433	28%		27433
Irreplaceable	918	1%		918
Protected Areas	28	0%		28
TOTALS	98320	100%	61572	36748
			63%	37%

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5.1.2 Species diversity

According to SANBI's records 5 296 plant species had been recorded within Mpumalanga Province.

A total of 112 species within Mpumalanga is considered to be threatened (Vulnerable, Endangered and Critical Endangered) in terms of the IUCN Red Data criteria. Of the 112 species, 76 species (86%) are considered to be Vulnerable, 25 species (22%) are considered to be Endangered, and 11 species (10%) are considered to be Critical Endangered (Table 6). The 112 species represent 38 plant families of which the following seven (7) families contain more than 50% of the species (Table 7): Apocynaceae; Asphodelaceae; Fabaceae; Gesneriaceae; Iridaceae; Orchidaceae; Zamiaceae. A total of 72 genera represent the 112 threatened flora within Mpumalanga Province, of which the following 16 genera contains 50% of the species (Table 8): *Aloe*; *Asclepias*; *Asparagus*; *Brachystelma*; *Disa*; *Encephalartos*; *Erica*; *Gladiolus*; *Haworthia*; *Helichrysum*; *Pavetta*; *Protea*; *Streptocarpus*; *Thesium*; *Thorncroftia*; *Zantedeschia*.

Almost 80% of the threatened flora within Mpumalanga Province is associated with the herbaceous layer and mainly forbs (Table 9).

Using available environmental attributes (geology, soil, land forms, vegetation) associated with the threatened Red Data flora occurring in Mpumalanga, it was possible to create a model which shows the potential distribution and extent of flora sensitive areas within the landscape/ region (Figure 7).

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Table 6: Overview of the number of threatened flora species per IUCN category within Mpumalanga Province

Threat status	No of species	% Frequency
Vulnerable	76	68%
Endangered	25	22%
Critical	11	10%
TOTALS	112	100%

Table 7: Overview of the families, which represent the 112 threatened flora species within Mpumalanga Province (SANBI 2009)

Family	No of species	% Frequency	Cumulative % Frequency
Apocynaceae	12	11%	11%
Zamiaceae	9	8%	19%
Asphodelaceae	9	8%	27%
Fabaceae	9	8%	35%
Orchidaceae	9	8%	43%
Gesneriaceae	6	5%	48%
Iridaceae	5	4%	53%
Asteraceae	4	4%	56%
Hyacinthaceae	4	4%	60%
Proteaceae	4	4%	63%
Amaryllidaceae	3	3%	66%
Lamiaceae	3	3%	69%
Mesembryanthemaceae	3	3%	71%
Rubiaceae	2	2%	73%
Anacardiaceae	2	2%	75%
Araceae	2	2%	77%
Asparagaceae	2	2%	79%
Ericaceae	2	2%	80%
Acanthaceae	2	2%	82%
Lobeliaceae	2	2%	84%
Canellaceae	1	1%	85%
Alliaceae	1	1%	86%
Woodsiaceae	1	1%	87%
Oxalidaceae	1	1%	88%
Apiaceae	1	1%	88%
Thymelaeaceae	1	1%	89%
Myricaceae	1	1%	90%
Passifloraceae	1	1%	91%
Crassulaceae	1	1%	92%
Santalaceae	1	1%	93%
Portulacaceae	1	1%	94%
Lauraceae	1	1%	95%
Orobanchaceae	1	1%	96%
Rosaceae	1	1%	96%
Ranunculaceae	1	1%	97%

Hypoxidaceae	1	1%	98%
Zingiberaceae	1	1%	99%
Scrophulariaceae	1	1%	100%
TOTALS	112	100%	

Table 8: Overview of the genera, which represent the 112 threatened flora species within Mpumalanga Province (SANBI 2009)

Genus	No of species	% Frequency	Cumulative % Frequency
Encephalartos	9	8%	8%
Aloe	7	6%	14%
Streptocarpus	6	5%	20%
Disa	5	4%	24%
Brachystelma	4	4%	28%
Protea	4	4%	31%
Helichrysum	3	3%	34%
Gladiolus	3	3%	37%
Asclepias	2	2%	38%
Asparagus	2	2%	40%
Erica	2	2%	42%
Haworthia	2	2%	44%
Zantedeschia	2	2%	46%
Pavetta	2	2%	47%
Thorncroftia	2	2%	49%
Thesium	1	1%	50%
Graderia	1	1%	51%
Siphonochilus	1	1%	52%
Dyschoriste	1	1%	53%
Drimiopsis	1	1%	54%
Syncolostemon	1	1%	54%
Delosperma	1	1%	55%
Cyrtanthus	1	1%	56%
Cyphia	1	1%	57%
Crotalaria	1	1%	58%
Crocosmia	1	1%	59%
Crassula	1	1%	60%
Clivia	1	1%	61%
Eriosema	1	1%	62%
Caesalpinia	1	1%	63%
Eucomis	1	1%	63%
Brachycorythis	1	1%	64%
Bowiea	1	1%	65%
Aspidonepsis	1	1%	66%
Aspidoglossum	1	1%	67%
Tulbaghia	1	1%	68%
Argyrolobium	1	1%	69%
Anacampseros	1	1%	70%
Warburgia	1	1%	71%
Alepidea	1	1%	71%

Adenium	1	1%	72%
Adenia	1	1%	73%
Ceropegia	1	1%	74%
Khadia	1	1%	75%
Pearsonia	1	1%	76%
Prunus	1	1%	77%
Pachycarpus	1	1%	78%
Ozoroa	1	1%	79%
Oxalis	1	1%	79%
Ocotea	1	1%	80%
Nerine	1	1%	81%
Morella	1	1%	82%
Monopsis	1	1%	83%
Miraglossum	1	1%	84%
Melanospermum	1	1%	85%
Lotononis	1	1%	86%
Searsia	1	1%	87%
Knowltonia	1	1%	87%
Platycoryne	1	1%	88%
Indigofera	1	1%	89%
Hypoxis	1	1%	90%
Hypodematum	1	1%	91%
Holothrix	1	1%	92%
Hesperantha	1	1%	93%
Rhynchosia	1	1%	94%
Schizochilus	1	1%	95%
Acacia	1	1%	96%
Gnidia	1	1%	96%
Sclerochiton	1	1%	97%
Gerbera	1	1%	98%
Frithia	1	1%	99%
Ledebouria	1	1%	100%
TOTALS	112	100%	

Table 9: Overview of the major growth forms associated with the 112 threatened flora species within Mpumalanga Province

Note: VU = Vulnerable, EN = Endangered, CR = Critical Endangered

Growth forms	No of species	Conservation Categories			Major Growth Forms			
		VU	EN	CR	Herbs		Woody	Unknown
					Graminoid	Forb		
[No lifeform defined]	2	1	1					2
Climber, geophyte, succulent	2	2				2		
Dwarf shrub	5	3	1	1		5		
Dwarf shrub, geophyte	1			1		1		
Dwarf shrub, herb	3	2	1			3		
Dwarf shrub, herb, succulent	1	1				1		
Dwarf shrub, shrub	2	2				2		
Dwarf shrub, succulent	2		1	1		2		
Epiphyte, herb, lithophyte	1	1				1		
Geophyte	8	8				8		
Geophyte, herb	16	9	4	3		16		
Geophyte, herb, succulent	3	3				3		
Geophyte, succulent	1	1				1		
Herb	19	15	4			19		
Herb, lithophyte	3	3				3		
Herb, parasite	1	1				1		
Herb, shrub	2	1	1			2		
Herb, succulent	11	9	1	1		11		
Scrambler	1		1			1		
Shrub	8	3	5				8	
Shrub, tree	7	2	2	3			7	
Succulent	7	5	1	1		7		
Tree	6	4	2				6	
TOTALS	112					89	21	2
						79%	19%	2%

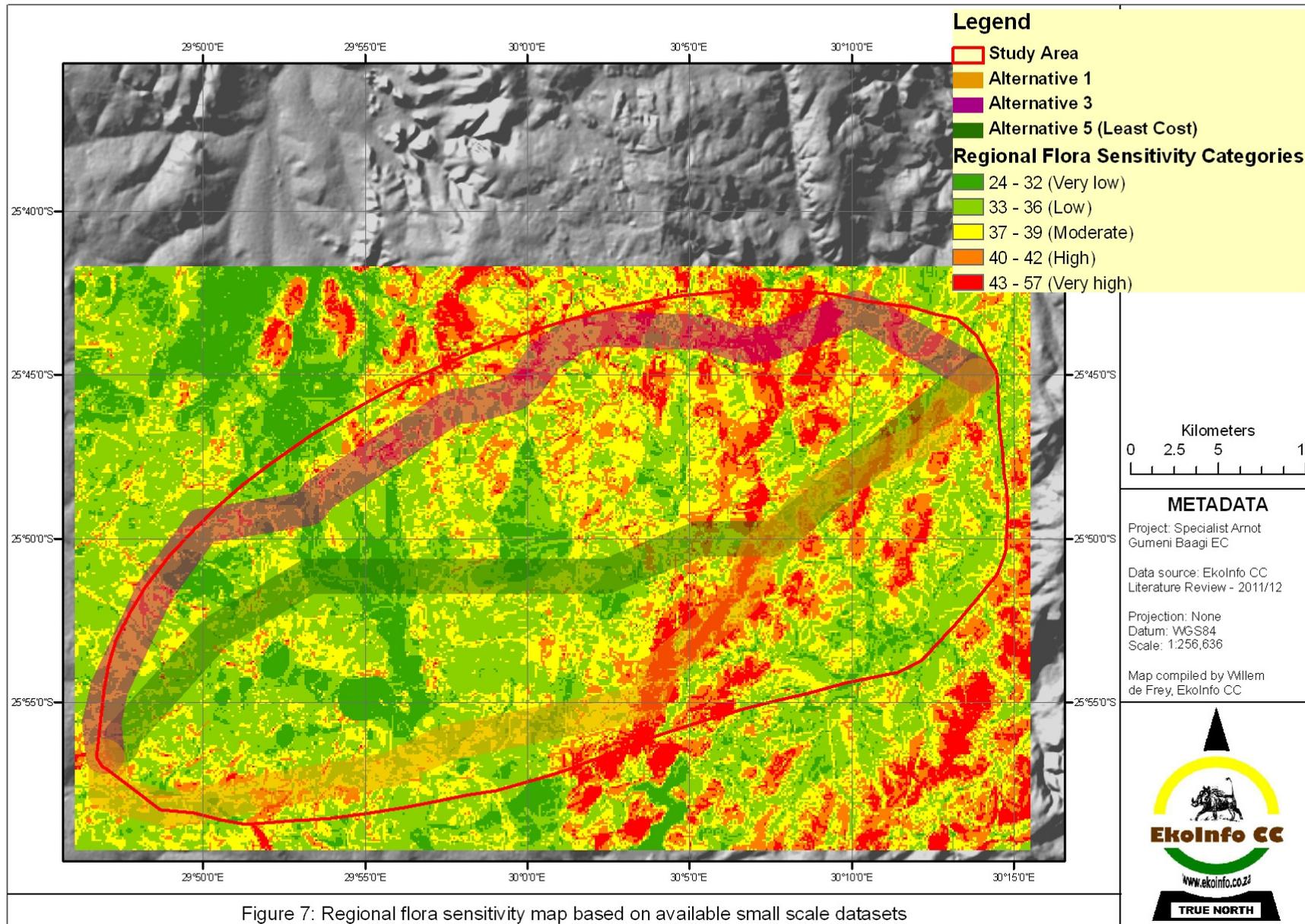


Figure 7: Regional flora sensitivity map based on available small scale datasets

5.2 Local Context

5.2.1 *Ecosystem diversity*

The detail surveys were done during February/ March 2012, while the veld was still in optimal flowering condition. Twenty-four plots were surveyed, based on the following criteria:

1. Remaining natural vegetation (Figure 5)
2. Slope (Figure 8.A)
3. Aspect (Figure 8.B)
4. Wetness Index³ (Figure 8.C)

The above environmental attributes were derived from the Shuttle Radar Topography Mission (SRTM)⁴ Digital Elevation Model (DEM) (Figure 9), with a 90 m pixel resolution and a field-tested vertical relevance of 5 m.

The floristic composition recorded was used in a TWINSpan analysis (Figure 10), which resulted in the identification of five (5) vegetation clusters/ units. These five clusters represent four vegetation communities, of which the first community is related to moist grassland, whether seasonally, or temporary wet, and the other three with edaphic/ terrestrial grassland. The four communities are (Figure 11):

1. Temporary or seasonally moist grassland associated with sandy clay loam soils (Photo plate 1)
2. Shrub dominated utilised grassland on sandy clay loam soils with surface rock derived from mudrock (Photo plate 1)
3. Climax grassland on loamy sand soils derived from sandstone (Photo plate 1)
4. Short climax grassland on highlying areas associated with very shallow, sandy soils large rocks and boulders on quartzite rock (Photo plate 1)

These four communities and the two sub communities associated within community one could not be mapped in detail within the scope and context of the study. However, they could be linked to a topographic sequence which repeats itself both on a small (regional/ landform) - and large (local/ terrain unit) scale (Figure 12). The wetland related communities expected to occur on the footslopes and valley bottoms were avoided because a separate study was done on the wetlands.

1. Temporary or seasonally moist grassland associated with sandy clay loam soils

Phytosociological name: *Monopsis decipiens* - *Senecio achilleifolius* moist grassland in low lying areas, temporary or seasonally saturated

This community occurs away from ridges (below 5% 8% slopes), in areas where there is an increase in the probability in the landscape for water to accumulate (Table 10). It occurs therefore lower in the landscape, with the tendency for finer material to accumulate. Surface rock does occur but does not exceed 10%, mainly as large rocks. It occurs on all of the lithological units present within the study area, but are more prominent on the coarse sandstone and shales (Table 11). It represents mainly grassland, but some low shrubs could be present, especially where there is surface rock present (Table 12).

The following species were recorded within this community:

Grasses: *Agrostis eriantha*, ***Agrostis montevidensis***, *Alloteropsis semialata*, ***Andropogon appendiculatus***, *Aristida congesta*, *Aristida junciformis*, ***Aristida sciurus***, ***Arundinella nepalensis***, *Brachiaria serrata*, *Cyperus denudatus*, *Cyperus esculentus*, *Diheteropogon amplexans*, *Elionurus muticus*, *Eragrostis capensis*, *Eragrostis chloromelas*, *Eragrostis curvula*, *Eragrostis gummiflua*, *Eragrostis plana*, *Eragrostis racemosa*, ***Fuirena pubescens***, *Helictotrichon turgidulum*, *Heteropogon contortus*, *Hyparrhenia filipendula*, *Hyparrhenia hirta*, ***Imperata cylindrica***, ***Juncus lomatophyllus***, *Kyllinga alba*, *Melinis nerviglumis*, ***Miscanthus junceus***, *Monocymbium cerasiiforme*, *Paspalum urvillei*, *Pogonarthria squarrosa*, *Pycneus nitidus*, ***Schoenoplectus paludicola***, *Setaria sphacelata*, *Sporobolus africanus*, *Themeda triandra*, *Trachypogon spicatus*, *Trichoneura grandiglumis*, *Tristachya leucothrix*
Forbs: *Acalypha angustata*, *Acalypha peduncularis*, *Agapanthus campanulatus*, *Agapanthus inapertus*, *Alepidea natalensis*, *Aloe boylei*, *Anthericum transvaalense*, *Anthospermum rigidum*, *Berkheya radula*, *Berkheya setifera*, *Bulbine narcissifolia*

³ <http://www.saga-gis.org/en/index.html>

⁴ <http://www2.jpl.nasa.gov/srtm/>

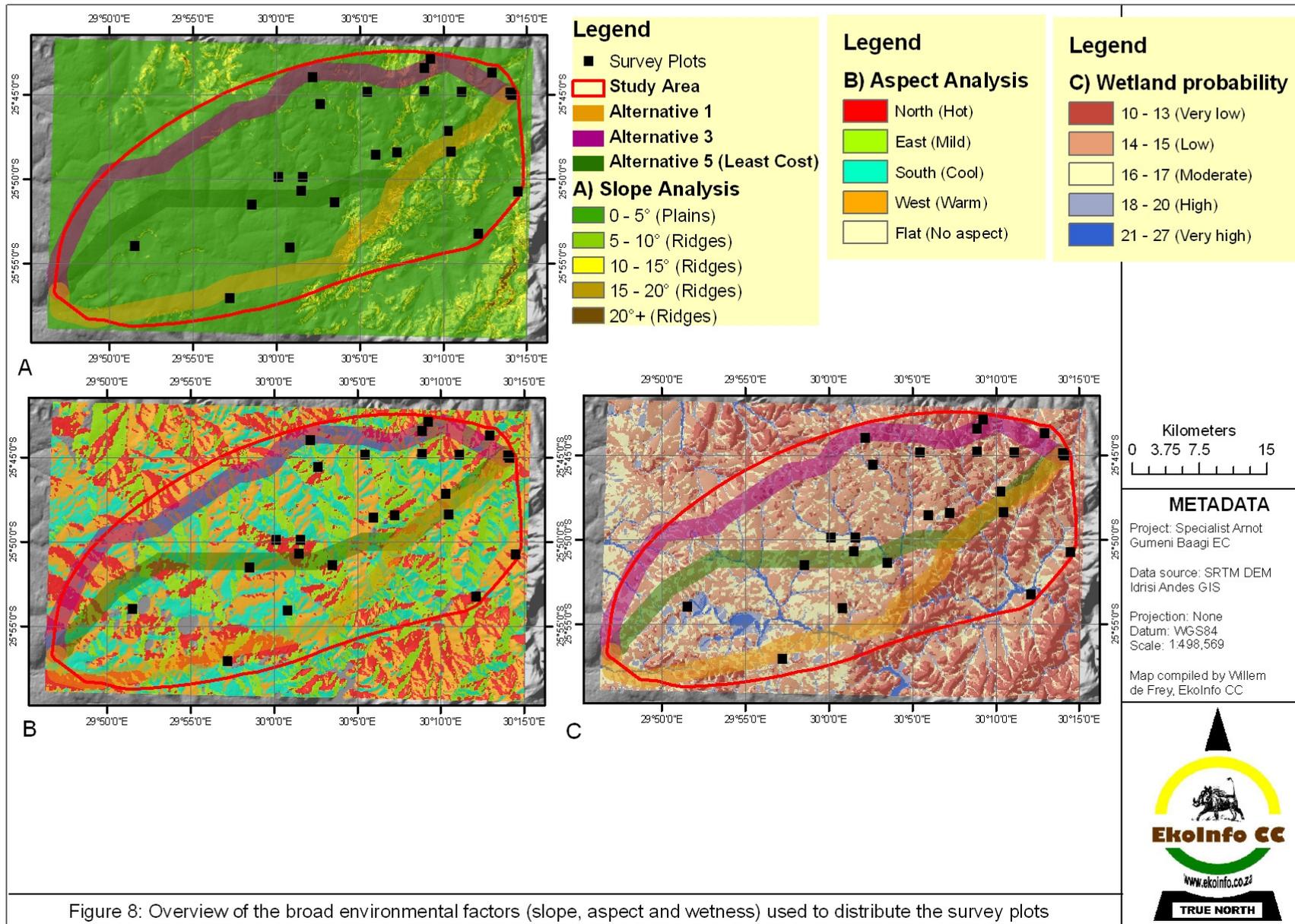


Figure 8: Overview of the broad environmental factors (slope, aspect and wetness) used to distribute the survey plots