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**THE USE OF A GEOGRAPHIC INFORMATION SYSTEM  
(GIS) FOR FARM SOIL CONSERVATION PLANNING**

**A Thesis Presented in Partial Fulfilment of the Requirements  
for the Degree of Master of Agricultural Science in Soil Science  
at Massey University**

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## ABSTRACT

The use of a Geographic Information Systems (PC ARC/INFO) for farm soil conservation planning was demonstrated in several neighbouring properties in the Apiti district, Manawatu. The area (775 ha) was mainly steep and strongly rolling hill country where the dominant land use was pastoral grazing by sheep and cattle. The main objective of this study was to utilize the GIS at each step of the farm soil conservation planning process.

The planning process began with a land resources inventory (LRI) where information on basic physical resources relevant to land management and soil conservation was collected and stored in a database before further processing. Factors collected in the LRI included primary factors (soil type, soil depth, slope, rock type and elevation) and secondary factors (existing erosion, land use, fence lines and ownership, and drainage condition). A digital elevation model (DEM) was developed to display landforms. Field observations were also used and local farmers were given the opportunity to become involved in the planning process.

The next step involved delineating areas of similar land use capability and potential land use. The areas were also assessed in terms of potential erosion and conservation needs. These operations were undertaken by combining the LRI factors in various ways. Results of these assessments were matched to define land units which have similar physical characteristics. Recommendations for management practices were then made by considering combinations of the factors.

The plan was displayed as maps showing the management options available for farmers.

Both map overlay procedures and database analyses were carried out at each step of the planning process. As the map overlay is a unique operation in the GIS, it was used to combine necessary factors from the LRI based on a set of criteria. Database analyses were then carried out using macro commands which were developed according to the criteria. The ability of the GIS for database analyses distinguishes the GIS from other systems whose primary objective is map production. The use of database analyses in this study was a particular example for making recommendations in soil conservation planning. However, the techniques are applicable to many different conditions and different purposes. The maps presented in this study are examples of how it is possible to show the results of analyses. Advantages and constraints of such procedures at each step of the planning process were discussed.

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# TABLE OF CONTENTS

ABSTRACT .....	i
ACKNOWLEDGEMENTS .....	iii
TABLE OF CONTENTS .....	v
LIST OF FIGURES .....	x
LIST OF TABLES .....	xi
CHAPTER I : INTRODUCTION AND OVERVIEW .....	1
Introduction .....	1
An Overview of Geographic Information Systems .....	2
<i>Definitions.</i> .....	2
<i>Data Structure</i> .....	4
<i>Components of GIS</i> .....	5
An Overview of Soil Conservation Planning .....	8
<i>Information and Planning Levels</i> .....	8
<i>Soil Degradation and Soil Conservation</i> .....	9
<i>Soil Conservation Planning</i> .....	11
Objective .....	13



<b>CHAPTER II :</b>	<b>SITE DESCRIPTION</b>	15
	<b>General Description</b>	15
	<b>Climate</b>	15
	<b>Physiography</b>	18
	<b>Soils</b>	19
	<b>Land Use and Vegetation</b>	21
<b>CHAPTER III :</b>	<b>LAND RESOURCES INVENTORY</b>	23
	<b>Introduction</b>	23
	<b>Data Collection</b>	25
	<i>Preliminary Survey</i>	25
	<i>Mapping</i>	27
	<i>Field Orientation</i>	27
	<i>Aerial photo-interpretation</i>	27
	<i>Field Observation</i>	35
	<i>Data Compilation and Transfer</i>	38
	<b>The Use of The GIS for Land Resources Inventory</b>	39
	<i>Data Input and Management</i>	40
	<i>Digitizing</i>	40
	<i>Building Topology and Editing</i>	44
	<i>Transformations</i>	46

<i>Digital Elevation Model</i> .....	48
<i>Data Display</i> .....	52
<i>Display of Individual Maps.</i> .....	52
<i>Display Database.</i> .....	54
<b>Results and Discussions</b> .....	54
<i>Results of LRI mapping.</i> .....	54
<i>LRI Data Management</i> .....	58
<i>Errors and Uncertainty in the LRI Data.</i> .....	60
<b>Technical Notes</b> .....	63

#### **CHAPTER IV : LAND USE CAPABILITY ASSESSMENT**

#### **AND DEFINING POTENTIAL LAND USES ..... 66**

<b>Introduction</b> .....	66
<b>Land Use Capability Assessment</b> .....	67
<i>Concepts and Assumptions</i> .....	67
<i>Structure of Classification</i> .....	70
<b>The Use of the GIS for LUC Assessment</b> .....	72
<i>Assessment Procedure</i> .....	73
<i>Defining Potential Land Use</i> .....	77
<b>Results and Discussion</b> .....	78
<i>Results of the Assessment</i> .....	78
<i>Discussion</i> .....	83

<b>CHAPTER V :</b>	<b>POTENTIAL EROSION ASSESSMENT</b>	
	<b>AND DEFINING CONSERVATION NEEDS . . . .</b>	<b>88</b>
<b>Introduction.</b>	.....	<b>88</b>
<b>Basic Principles of the Assessment</b>	.....	<b>89</b>
<b>Assessment Procedure</b>	.....	<b>91</b>
<b>Defining Conservation Needs</b>	.....	<b>95</b>
<b>Results and Discussion</b>	.....	<b>98</b>
<i>Results of the Assessment</i>	.....	<b>98</b>
<i>Discussion</i>	.....	<b>102</b>
<b>CHAPTER VI :</b>	<b>FARM SOIL CONSERVATION PLANNING . . .</b>	<b>104</b>
<b>Introduction</b>	.....	<b>104</b>
<b>Basic Principles of Farm Soil Conservation Planning</b>	.....	<b>105</b>
<b>Recommendations for Management Practices</b>	.....	<b>108</b>
<i>General Recommendations for Land Management Practices</i>	.....	<b>108</b>
<i>Recommendations for Each Land Unit</i>	.....	<b>111</b>
<b>Additional Improvements</b>	.....	<b>118</b>
<i>Grazing Management and Paddock Maintenance</i>	.....	<b>118</b>
<i>Additional Dam Sites</i>	.....	<b>121</b>
<b>Discussion</b>	.....	<b>123</b>

<b>CHAPTER VII :</b>	<b>GENERAL DISCUSSION AND</b>	
	<b>CONCLUSIONS</b>	<b>..... 127</b>
<b>General Discussion</b>	<b>.....</b>	<b>127</b>
<b>Conclusions</b>	<b>.....</b>	<b>128</b>
<b>APPENDIX 1 :</b>	<b>Land Resources Inventory Factors</b>	<b>..... 131</b>
<b>APPENDIX 2 :</b>	<b>SML Commands to Select LUC Classes and</b>	
	<b>Subclasses</b>	<b>..... 141</b>
<b>APPENDIX 3 :</b>	<b>SML Commands to Calculate Total Area of Each</b>	
	<b>Class and Subclass</b>	<b>..... 147</b>
<b>APPENDIX 4 :</b>	<b>SML Commands for Potential Erosion</b>	
	<b>Assessments</b>	<b>..... 149</b>
<b>REFERENCES</b>	<b>.....</b>	<b>151</b>

## LIST OF FIGURES

1.	The sequence of steps for soil conservation planning .....	11
2.	Location of study area .....	16
3.	Mean monthly rainfall data of the study area (1921 - 1950) .....	17
4.	Procedure for land resources inventory .....	24
5.	Observation sites of the study area .....	37
6.	Data input and management operations (modified from ESRI, 1990) .....	41
7.	Soil erosion by water (Sanders, 1986) .....	56
8.	A basic concept of the land use capability classification .....	69
9.	Flowchart of operations to select areas suitable for cropping .....	79
10.	Land use capability map .....	81
11.	Database analysis procedure for potential erosion assessment .....	93
12.	Potential erosion map .....	99
13.	Conservation needs map .....	100
14.	Farm soil conservation planning .....	113
15.	Land information map on property basis .....	120
16.	Areas suitable for additional dams .....	122

## LIST OF TABLES

1.	The classification of factors which were collected in the LRI . . . . .	29
2.	Sub classes which are applicable to each LUC class (SRCC, 1971) . .	71
3.	Set of criteria for the LUC classification . . . . .	75
4.	The polygon attribute table (PAT) of the multi-factor map showing operations of LUC classification . . . . .	80
5.	Total area of LUC class and subclass in the study area . . . . .	82
6.	Soil types in the study area and rock types from which they are derived . . . . .	92
7.	Criteria which were used to assess potential erosion . . . . .	94
8.	Total area of each combination and potential erosion grade . . . . .	101
9.	Criteria defining land management recommendations . . . . .	112