

CONTENTS

1. INTRODUCTION

1.1	GENERAL BACKGROUND.....	1
1.2	RESEARCH RATIONALE AND OBJECTIVES.....	6
1.2.1	RESEARCH HYPOTHESES.....	6
1.2.2	GENERAL OBJECTIVES.....	6
1.2.3	SPECIFIC OBJECTIVES.....	6
1.3	THESIS OUTLINE.....	7

2. STUDY AREAS

2.1	THE ANDES OF CENTRAL CHILE.....	9
2.2	THE PATAGONIAN ANDES.....	11

3. METHODOLOGY

3.1	COMPREHENSIVE COSEISMIC LANDSLIDE INVENTORY CRITERIA	14
3.1.1	METHODS.....	14
3.1.2	SELECTING REMOTE SENSING IMAGENS.....	15
3.1.3	COSEISMIC LANDSLIDES CLASIFICATIONS.....	16
3.1.4	COSEISMIC LANDSLIDES MAPPING CRITERIA.....	20
3.1.5	COSEISMIC LANDSLIDES DATABASES.....	22
3.1.6	STATISTICAL ANALYSIS OF COSEISMIC LANDSLIDES.....	23
3.2	EVALUATION OF CONTROLLING FACTORS OF COSEISMIC LANDSLIDES.....	24
3.3	CONCEPTUAL MODELS FOR THE RECOGNITION OF COSEISMIC HAZARD.....	25

4. COSEISMIC LANDSLIDES

4.1	INTRODUCTION.....	26
4.2	SHALLOW CRUSTAL SEISMICITY VS MEGATHRUST EARTHQUAKES.....	27
4.3	A NOTE ON TERMINOLOGY.....	28
4.4	REFERENCES OF EARTHQUAKES TRIGGERED LANDSLIDES.....	41
4.5	COSEISMIC LANDSLIDES DISTRIBUTION.....	31
4.6	FACTOR THAT INFLUENCE THE DYNAMIC RESPONSE OF HILLSLOPES UNDERGOING SEISMIC SHAKING.....	35
4.6.1	HILLSLOPE RELIEF.....	35
4.6.2	BEDROCK LITHOLOGY.....	36
4.6.3	SEISMIC FAULT EFFECTS.....	36

4.6.4	GROUND MOTION PARAMETERS.....	38
4.6.5	TOPOGRAPHIC AMPLIFICATION.....	39
4.6.6	ANTHROPIC FACTORS.....	40
4.7	THE LONG-TERM EVOLUTION OF COSEISMIC LANDSLIDES.....	41
5.	LANDSLIDES INDUCED BY THE 2010 CHILE MEGATHRUST EARTHQUAKE: A COMPREHENSIVE INVENTORY AND CORRELATIONS WITH GEOLOGICAL AND SEISMIC FACTORS	
5.1	INTRODUCTION.....	44
5.2	THE 2010 M _w 8.8 MAULE EARTHQUAKE.....	45
5.3	GEOLOGICAL AND GEOMORPHOLOGICAL SETTING OF THE COSEISMIC LANDSLIDES.....	47
5.4	THE 2010 M _w 8.8 MAULE EARTHQUAKE GROUND MOTION DISTRIBUTION.....	48
5.5	LANDSLIDES INDUCED BY THE 2010 MAULE MEGATHRUST EARTHQUAKE.....	52
5.5.1	LANDSLIDE INVENTORY AND CORRELATIONS WITH RELIEF AND GEOLOGY.....	52
5.5.2	SPATIAL ANALYSIS OF COSEISMIC LANDSLIDE DISTRIBUTION AND GROUND MOTION.....	57
5.6	DISCUSSION.....	61
5.7	CONCLUSION.....	66
6.	CASE STUDY: UPDATE COMPREHENSIVE INVENTORY OF LANDSLIDES INDUCED BY THE 2007 AYSÉN EARTHQUAKE	
6.1	INTRODUCTION.....	67
6.2	UPDATE COMPREHENSIVE INVENTORY.....	67
6.3	ANALYSIS OF COSEISMIC LANDSLIDES.....	72
6.4	DISCUSSION.....	75
6.5	CONCLUSIONS.....	76
7.	DEVELOPING CONCEPTUAL MODELS FOR THE RECOGNITION OF COSEISMIC LANDSLIDES HAZARD FOR SHALLOW CRUSTAL AND MEGATHRUST EARTHQUAKES IN DIFFERENT MOUNTAIN ENVIRONMENTS– AN EXAMPLE FROM THE CHILEAN ANDES	
7.1	INTRODUCTION.....	78
7.2	COSEISMIC LANDSLIDES IN THE MOUNTAIN ENVIRONMENT OF CHILE.....	79
7.2.1	THE SEISMOTECTONIC SETTING AND SEISMICITY OF CHILE.....	80
7.3	GEOMODEL CONSTRUCTION.....	83
7.3.1	DATA USED IN CONSTRUCTION OF THE GEOMODELS.....	83

7.3.2	DISTRIBUTION AND CHARACTERISTIC OF COSEIMIC LANDSLIDES FOR GEOMODELS IN THE CHILEAN ANDES...	84
7.3.3	FACTORS THAT INFLUENCE THE DYNAMIC RESPONSE OF HILLSLOPES UNDERGOING SEISMIC SHAKING.....	87
7.4	CONCEPTUAL HAZARD MODELS.....	90
7.4.1	GLACIAL CORDILLERAN ENVIRONMENT.....	90
7.4.2	FLUVIAL CORDILLERAN ENVIRONMENT.....	94
7.4.3	PLUTONIC CORDILLERAN ENVIRONMENT.....	98
7.4.4	MOUNTAIN FRONT ENVIRONMENT.....	102
7.5	DISCUSSION.....	106
7.6	CONCLUSION.....	109
8. FINAL DISCUSSION AND CONCLUSIONS		
8.1	FINAL DISCUSSION.....	111
8.2	THESIS CONCLUSION.....	116
8.3	FUTURE PERSPECTIVE.....	117
BIBLIOGRAPHY.....		119
ANNEX		