

**LANDSLIDE HAZARD AND RISK  
MAPPING OF URBAN MURREE**

**By**

**Muhammad Naeemuddin**

(2002 – NUST – MS - PhD – 8)

**A thesis submitted in partial fulfillment of  
The requirement for the degree of  
Master of Science**

**In**

**Department of Civil Engineering  
National Institute of Transportation  
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**This is to certify that the  
thesis entitled  
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**Submitted by**

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**Brigadier Dr. Tayyeb Akram, Ph. D (USA)**

**National Institute of Transportation, Risalpur**

**National University of Sciences and Technology, Rawalpindi**

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**DEDICATED  
TO  
MY MOTHER  
AND  
WIFE**

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## **ABSTRACT**

Landslides are an inherent dilemma of the mountainous areas and have been observed and recorded for several centuries worldwide. Geographically, Murree lies in the southern part of outer or sub Himalayas and is one of the busiest hill resorts of Northern Pakistan. The altitude of Murree hills above mean sea level ranges from 1600 to 2200m. The population of Murree urban area increases from 25,000 to 300,000 during peak tourist season. Tourist related commercial activities like shops, hotels, and residential construction is growing at a very rapid pace. Owing to the fragile geology, deforestation and uncontrolled urbanization, the area is under constant threat to landslides and slope failures, thereby, creating very high risk to human life, limb and property. In the past no effort was directed towards landslide hazard mapping of the area that should help in the planning, design and construction / maintenance of infrastructure projects, including management and relief works in case of landslide induced disaster. The research described herein highlights the factors affecting the slope instability, causing risk to the human life and property. Landslide Hazard Potential (LHP) and Risk data was collected through reconnaissance site-walkover surveys. Intensive field and laboratory investigations were performed to ascertain critical parameters at the selected locations across Murree urban area. The data was analyzed using Fuzzy Logic Technique. The outcomes of this research are identification of critical factors contributing to the landslide hazard and risk in the study area. Based on the knowledge of these critical factors, landslide hazard and risk models / maps were developed. The resulting maps demarcate the area into different intensity hazard and risk zones.

# TABLE OF CONTENTS

<b>CONTENTS</b>	<b>Page No.</b>
LIST OF FIGURES	xii
LIST OF TABLES	xiv
ACKNOWLEDGEMENT	vi
ABSTRACT	vii
Chapter 1	
INTRODUCTION	1
1.1    GENERAL	1
1.2    RESEARCH OBJECTIVES	2
1.3    RESEARCH PLAN	3
Chapter 2	
LITERATURE REVIEW	7
2.1    GENERAL	7
2.2    DESCRIPTION OF THE STUDY AREA	8
2.3    GEOLOGIC HISTORY	8
2.4    TECTONICS / SEISMICITY OF STUDY AREA	10
2.5    GEOLOGIC STRATIFICATION	11
2.6    CLIMATIC AND VEGETATION CONDITIONS	13
2.7    TYPES OF SLOPE FAILURES IN STUDY AREA	13
2.8    LANDSLIDE STABILIZATION / REHABILITATION WORKS IN THE STUDY AREA	14
2.8.1    Geological Survey of Pakistan (GSP)	14
2.8.2    National Engineering Services of Pakistan (NESPAK)	14
2.8.3    Other Responsible Departments	14
2.9    LANDSLIDES HAZARD ZONATION TECHNIQUES	16
2.9.1    Direct and Indirect Hazard Mapping Techniques	17
2.9.2    White, Black, and Grey Box Models	17
2.9.2.1    Heuristic Approach	20
2.9.2.2    Statistical Approach	20
2.9.2.3    Deterministic Approach	20
2.9.3    Fuzzy Set Theory and Logic	21
2.9.4    Use of Fuzzy Set Theory and Logic in Landslides Studies	22
2.9.5    Use of GIS in Analysis and Prediction of Landslides	24
2.10    LANDSLIDES HAZARD MAPPING WORKS IN STUDY AREA	24
2.11    LANDSLIDES RISK MAPPING TECHNIQUES	26
2.11.1    Relative Risk Scoring	27
2.11.2    Risk Ranking Matrices	28
2.11.3    Relative Risk Rating	31
2.11.4    The FMECA Approach	32
Chapter 3	
METHODOLOGY	39
3.1    GENERAL	39



## CONTENTS

Page No.

3.2	FIELD RECONNAISSANCE	40
3.3	FIELD INVESTIGATIONS	40
3.3.1	Development of Landslide Hazard Potential (LHP) Factors	41
3.3.2	Collection of Landslide Hazard Potential (LHP) Data	42
3.3.3	Geologic / Geotechnical Data	45
3.3.3.1	Geotechnical Strata Models	45
3.3.3.2	Climatic Data	46
3.3.3.3	Vegetation Data	46
3.3.3.3	Hydrologic Data	50
3.3.2.6	Topographic / Landform Data	51
3.3.4	Subsurface Exploration	51
3.3.4.1	Electrical Resistivity Tests	51
3.3.4.2	Test Pits	52
3.3.4.3	Drilling and Sampling of Boreholes	52
3.3.4.4	Installation of Standpipe Piezometers	54
3.4	LABORATORY INVESTIGATIONS	55
3.4.1	Classification Tests	55
3.4.2	Triaxial Strength Studies	55
3.4.3	Swell / Consolidation Tests	55
3.4.4	Slake Durability Tests	56
3.5	LANDSLIDE HAZARD ZONATION AND MAPPING	56
3.5.1	Statistical Modeling using Fuzzy Logic Analysis	57
3.5.1.1	Input	57
3.5.1.2	Fuzzifier	58
3.5.1.3	Rules and Inferences	61
3.5.1.4	Defuzzification	61
3.5.2	LHPI Zoned Maps	61
3.6	IDENTIFICATION AND COLLECTION OF FACTORS CONTRIBUTING IN RISK ANALYSIS OF THE STUDY AREA	62
3.6.1	Population	62
3.6.2	Type of Structures	63
3.6.3	Nature of Structures	64
3.6.4	Consequences Level	65
3.6.5	Value of Land	65
3.7	LANDSLIDE RISK MODELING AND MAPPING	68
3.7.1	Risk Modeling	68
3.7.2	Risk Mapping	69
Chapter 4		
RESULTS AND DISCUSSIONS		71
4.1	GENERAL	71
4.2	SLOPE INSTABILITY CAUSAL FACTORS IN THE STUDY AREA	72
4.2.1	Slope Instability Conditioning Factors	73
4.2.1.1	Weathering Zones	73
4.2.1.2	Weatherable / Erodible Rocks	74

## CONTENTS

Page No.

4.2.1.3	Poor Surface Drainage	77
4.2.1.4	Poor Subsurface Drainage	78
4.2.1.5	Improperly Designed / Inefficient Slope Retaining Structures	83
4.2.1.6	Removal of Trees / Vegetation	84
4.2.2	Slope Instability Triggering Factors	84
4.2.2.1	Intense Long Duration Rainfalls	86
4.2.2.2	Rapid Snowmelt	86
4.2.2.3	Change in Slope Configuration and Wrong Placement and Design of Structures	86
4.3	TYPES OF LANDSLIDES IN THE STUDY AREA	87
4.3.1	Rotational Slope Failures	87
4.3.2	Road Settlements / Failures	88
4.3.3	Rock / Boulder Falls	88
4.4	LANDSLIDE HAZARD POTENTIAL ZONING OF STUDY AREA	90
4.4.1	Spatial Distribution of LHP	91
4.4.2	Temporal Variations of LHP	93
4.5	FACTORS CONTRIBUTING TO LANDSLIDE RISK	94
4.5.1	Landslide Hazard Failure Potential Index (LHPI)	94
4.5.2	Population	94
4.5.3	Type and Nature of Structures	97
4.6	LANDSLIDE RISK MAPPING OF THE STUDY AREA	99
4.6.1	Spatial distribution of the Risk	99
4.6.2	Temporal Variations of Risk	100
Chapter 5		
CONCLUSIONS AND RECOMMENDATIONS		103
5.1	CONCLUSIONS	103
5.2	RECOMMENDATIONS	106
5.3	RECOMMENDATION FOR FUTURE STUDY	107
<b>REFERENCES</b>		109
<b>APPENDIX I</b>		
<b>FIELD DATA COLLECTION SHEETS</b>		
ROUTE:	GPO - Jhika Gali (Upper Jhika Gali Road)	112
ROUTE:	GPO - Kashmir Point (Bank Road)	115
ROUTE:	GPO - Kuldana (Kuldana Road)	116
ROUTE:	Jhika Gali - Kuldana Road	118
ROUTE:	Lawrence College - Jhika Gali (Lower Jhika Gali Road)	121
ROUTE:	GPO - Pindi Point (Mall Road)	130
ROUTE:	Station Headquarter - Lawrence College Road	132
ROUTE:	Station Headquarter - Sunny Bank Road	136
ROUTE:	Upper Jhika Gali - Kashmir Point (Viewforth Road)	138
ROUTE:	Kashmir Point - GPO (Hall Road)	139

<b>APPENDIX II</b>	
<b>METROLOGICAL DATA</b>	
Precipitation Data	140
Maximum Temperature Data	141
Minimum Temperature Data	142
Humidity Data	143
<b>APPENDIX III</b>	
<b>BOREHOLE / TEST PIT LOGS</b>	
BH-JK-01	144
BH-JL-01	145
BH-SHQ-01	146
BH-UJG-01	147
TP-JL-01	148
TP-JL-02	149
TP-JL-03	150
<b>APPENDIX IV</b>	
<b>LABORATORY TEST RESULTS</b>	
Soil Classification Tests	151
Slake Durability Tests	152
Triaxial Test (At Natural Moisture Level)	153
Triaxial Test (At Saturated Moisture Level)	154
Swell / Consolidation / Permeability Tests	155

## LIST OF FIGURES

<b>Fig. 1.1.</b>	Research Plan – Flow Chart of Activities	5
<b>Fig. 1.2.</b>	Layout of the Study Area	6
<b>Fig. 2.1.</b>	Location Map of the Study Area (Source Geological Survey of Pakistan)	9
<b>Fig. 2.2.</b>	Layout Map of the Study Area (Murree Guide Map, Survey of Pakistan, 1997)	10
<b>Fig. 2.3.</b>	Tectonic Map of Northern Pakistan (Source Geological Survey of Pakistan)	12
<b>Fig. 2.4.</b>	Geological Map of the Study Area (Source Geological Survey of Pakistan)	12
<b>Fig. 2.5.</b>	Stabilization Work at Chitta Morr Landslide by NESPAK	15
<b>Fig. 2.6.</b>	Stabilization Work at Shawala Landslide by NESPAK	15
<b>Fig. 2.7.</b>	Heuristical Approach in Landslide Hazard Zoning	20
<b>Fig. 2.8.</b>	Deterministic Approach for Landslide Hazard Zoning	21
<b>Fig. 2.9.</b>	Slope Failure Potential Factors Tree	23
<b>Fig. 2.10:</b>	Digital Elevation Model (DEM) and Landslide Hazard Map of Northern Murree Area (Ishfaq, 2005)	25
<b>Fig. 2.11.</b>	Example of a Risk Matrix (Lee and Jones)	28
<b>Fig. 2.12.</b>	A typical LCI Diagram (Lee, 2003)	34
<b>Fig. 3.1.</b>	Morphogenetic Regions (after Peltier, 1950)	47
<b>Fig. 3.2.</b>	Weathering Regions (after Peltier, 1950)	47
<b>Fig. 3.3.</b>	Chemical Weathering Regions (after Peltier, 1950)	48
<b>Fig. 3.4.</b>	Frost Action Regions (after Peltier, 1950)	48
<b>Fig. 3.5.</b>	Pluvial Erosion Regions (after Peltier, 1950)	49
<b>Fig. 3.6.</b>	Mass Movement Regions (after Peltier, 1950)	49
<b>Fig. 3.7.</b>	Perforated PVC Pipe Used for Standpipe Piezometers.	54
<b>Fig. 3.8.</b>	Typical Fuzzy Logic Process Adopted in the Study	57
<b>Fig. 3.9.</b>	Normal Distribution Curve for Risk Scores in Monsoon	70
<b>Fig. 4.1.</b>	Typical View of Intact Murree Formation	75

<b>Fig. 4.2.</b>	Geotechnical Strata Map of Urban Murree	76
<b>Fig. 4.3.</b>	Typical View of Poor Surface Drainage in the Area	78
<b>Fig. 4.4a.</b>	Electrical Resistivity Inverse Section at RD 152 Lower Jhika Gali Road	80
<b>Fig. 4.4b.</b>	Electrical Resistivity Inverse Section at RD 1984 Jhika Gali – Kuldana Road	81
<b>Fig. 4.4c.</b>	Electrical Resistivity Inverse Section at RD 172 SHQ Murree	82
<b>Fig. 4.5.</b>	Typical Poor Subsurface Drainage in the Area	83
<b>Fig. 4.6.</b>	Bent-up Trees Showing High Creep in the Area.	83
<b>Fig. 4.7.</b>	Vegetation Type Map of Urban Murree	85
<b>Fig. 4.8.</b>	Vegetation Density Map of Urban Murree	85
<b>Fig. 4.9.</b>	View of Construction of a Multistory Building and Slope Toe Cutting	87
<b>Fig 4.10.</b>	View of an Old Landslide Scarp near Chitta Morr on Murree- Rawalpindi Road	89
<b>Fig. 4.11.</b>	View of Movement Cracks on the Valley Side of an Old landslide Scarp near Chitta Morr	89
<b>Fig. 4.12.</b>	A Chronic Settlement Problem in Urban Murree	90
<b>Fig. 4.13.</b>	Boulder Fall Scene in Urban Murree Area on Lower Jhika Gali Road	90
<b>Fig. 4.14a.</b>	Landslide Hazard Map of Urban Murree at Very High Saturation Level	92
<b>Fig. 4.14b.</b>	Landslide Hazard Map of Urban Murree at High Saturation Level	92
<b>Fig. 4.14c.</b>	Landslide Hazard Map of Urban Murree at Medium Saturation Level	93
<b>Fig. 4.15a.</b>	Population Density Map of Urban Murree (Monsoon Season)	95
<b>Fig. 4.15b.</b>	Population Density Map of Urban Murree (Summer Season)	95
<b>Fig. 4.15c.</b>	Population Density Map of Urban Murree (Spring Season)	96
<b>Fig. 4.15d.</b>	Population Density Map of Urban Murree (Winter Season)	96
<b>Fig. 4.16.</b>	A View of Multistorey Buildings in Urban Murree	98
<b>Fig. 4.17.</b>	View of a Collapsed Building near GPO.	98
<b>Fig. 4.18.</b>	Structure Map of Urban Murree	99
<b>Fig. 4.19a.</b>	Landslide Risk Map of Urban Murree (Monsoon Season)	101
<b>Fig. 4.19b.</b>	Landslide Risk Map of Urban Murree (Summer Season)	101
<b>Fig. 4.19c.</b>	Landslide Risk Map of Urban Murree (Spring Season)	102
<b>Fig. 4.19d.</b>	Landslide Risk Map of Urban Murree (Winter Season)	102

## LIST OF TABLES

<b>Table 2.1.</b>	Overview of Input Data in Landslide Hazard Analysis	19
<b>Table 2.2a.</b>	Indicative Measures of landslide likelihood (Australian Geomechanics Society, 2000)	29
<b>Table 2.2b.</b>	Indicative Measures of Consequences (Australian Geomechanics Society, 2000)	30
<b>Table 2.2c.</b>	Qualitative Risk Assessment Matrix: Levels of Risk to Property (Australian Geomechanics Society, 2000)	30
<b>Table 2. 2d.</b>	Indicative Risk Implications (Australian Geomechanics Society, 2000)	31
<b>Table 2.3a.</b>	The FMECA Approach: Key Considerations for Defining a Confidence Score in an LCI Diagram (Hughes et al., 2000)	35
<b>Table 2.3b.</b>	FMECA Approach: Impact Scoring System (Hughes et al., 2000)	36
<b>Table 2.3c.</b>	FMECA Approach: Standard Tables for Calculating Impact Scores (Hughes et al., 2000)	38
<b>Table 3.1.</b>	Primary and Secondary Level Factors affecting Slope Stability in the Study Area	43
<b>Table 3.2.</b>	Tertiary Level Attributes to the Secondary Level Factors Affecting Slope Stability in the Study Area	44
<b>Table 3.3.</b>	Summary of boreholes locations	54
<b>Table 3.4.</b>	Primary and Secondary Level Factors and Their Grades with Assigned Values Considered in Landslide Hazard Analysis	.59
<b>Table 3.5.</b>	Tertiary Level Attributes to Secondary Level Factors and Their Corresponding Grades with their Numerical Values Effecting Stability of Slopes in the study area.	60
<b>Table 3.6.</b>	Different Seasons of Year and Corresponding Population and Saturation Levels	63
<b>Table 3.7.</b>	Different Factors and their Grade & Values in Risk analysis	67
<b>Table 3.8.</b>	Cutoff Values for Defining Different Level of Risk in Monsoon	70