

<b>Abstract</b> .....	<b>i</b>
<b>Acknowledgement</b> .....	<b>ii</b>
<b>Table of Contents</b> .....	<b>iii</b>
<b>List of Figures</b> .....	<b>v</b>
<b>List of Tables</b> .....	<b>vii</b>
<b>List of Appendices</b> .....	<b>viii</b>
<b>List of Abbreviations</b> .....	<b>ix</b>
<b>1. Introduction</b> .....	<b>1</b>
1.1. Background.....	1
1.2. Problem Statement.....	2
1.3. Objectives.....	2
1.4. Research Questions.....	2
1.5. Overview of Research Methodology.....	3
1.6. Thesis Structure.....	5
<b>2. Literature Review</b> .....	<b>6</b>
2.1. Land Use Change Assessment.....	6
2.2. What is Surface Runoff?.....	6
2.3. Hydrological Cycle in a Catchment Scale.....	7
2.4. Land Use Change Effect on the Surface Runoff.....	9
2.5. LISEM Rainfall-Runoff Model.....	10
<b>3. Study Area and Methods</b> .....	<b>13</b>
3.1. Study Area.....	13
3.1.1. Selection of Study Area.....	13
3.1.2. Location.....	13
3.1.3. Population.....	14
3.1.4. Rainfall.....	14
3.1.5. Geomorphology.....	16
3.1.6. Soil Type.....	16
3.2. Methods.....	17
3.2.1. Materials.....	17
3.2.2. Softwares.....	17
3.2.3. Parameterization Method for LISEM.....	18
3.2.3.1. Catchment characteristic parameters.....	19
3.2.3.2. Vegetation parameters.....	20
3.2.3.3. Soil surface parameters.....	20
3.2.3.4. Green and Ampt Infiltration Parameters.....	21
3.2.3.5. Channel and Overland Flow parameter.....	22
3.3. Research Procedure.....	23
3.3.1. Land Use Interpretation.....	23



3.3.2. Generating DEM Map .....	24
3.3.3. Sampling Procedure .....	25
3.3.4. Soil Physical Properties Measurement .....	26
3.3.5. Fraction of Soil Covered by Vegetation Measurement .....	29
<b>4. Land Use Change in Kreo Sub Catchment .....</b>	<b>30</b>
4.1. Land Use Types .....	30
4.2. Land Use Changes.....	33
<b>5. LISEM Model Simulation .....</b>	<b>35</b>
5.1. Model Parameterization.....	35
5.1.1. Catchment Maps .....	35
5.1.2. Vegetation Maps.....	36
5.1.3. Soil Surface Maps.....	37
5.1.4. Infiltration Maps.....	38
5.1.5. Channel Maps.....	41
5.1.6. Rainfall Data .....	41
5.2. Model Calibration and Validation.....	41
5.3. Sensitivity Analysis.....	47
5.4. Land Use Change Scenarios .....	48
5.5. Rainfall Size Scenarios.....	50
<b>6. Conclusion .....</b>	<b>57</b>
6.1. Conclusion .....	57
6.2. Recommendation .....	60
<b>References .....</b>	<b>61</b>
<b>Appendices .....</b>	<b>64</b>