

# Contents

---

<b>Preface</b> .....	<b>i</b>
<b>Acknowledgements</b> .....	<b>vii</b>
<b>Abstract</b> .....	<b>xi</b>
<b>Zusammenfassung</b> .....	<b>xiii</b>
<b>Contents</b> .....	<b>xv</b>
<b>List of Figures</b> .....	<b>xix</b>
<b>List of Tables</b> .....	<b>xxiii</b>
<b>List of Abbreviations</b> .....	<b>xxv</b>
<b>1 Introduction</b> .....	<b>1</b>
1.1 Background .....	1
1.2 Motivation .....	4
1.3 Research questions .....	7
1.4 Outline of the thesis .....	11
<b>2 Flood vulnerability assessment</b> .....	<b>13</b>
2.1 Conceptualization of flood vulnerability and risk .....	13
2.2 Methods to assess flood vulnerability .....	16
2.3 Vulnerability indicators .....	20
<b>3 Multi-criteria decision-making (MCDM)</b> .....	<b>23</b>
3.1 An overview of MCDM .....	23
3.2 Phases of the spatial MCDM process .....	24
3.3 Participatory MCDM .....	25
3.4 Multi-criteria decision-making for flood risk management: a survey of the current state of the art (Paper 1) .....	28
3.4.1 Abstract .....	28
3.4.2 Introduction .....	29

3.4.3	Overview of multi-criteria decision-making methods.....	31
3.4.4	Framework for systematic literature review .....	33
3.4.5	Results and discussion.....	36
3.4.6	Research limitations and recommendations for future research.....	48
3.4.7	Conclusions.....	50
<b>4</b>	<b>Case study area.....</b>	<b>53</b>
4.1	Geographical setting.....	53
4.2	Climate.....	54
4.3	Hydrology.....	54
4.4	Socio-economic aspects and urbanization.....	55
4.5	Spatio-temporal characteristics of floods.....	56
<b>5</b>	<b>Application of the proposed framework for flood vulnerability assessment.....</b>	<b>61</b>
5.1	Prioritization of flood vulnerability, coping capacity and exposure indicators through the Delphi technique: a case study in Taquari-Antas basin, Brazil (Paper 2).....	61
5.1.1	Abstract.....	61
5.1.2	Introduction .....	62
5.1.3	Vulnerability within the framework of disaster risk.....	64
5.1.4	Method.....	65
5.1.5	Results.....	71
5.1.6	Discussion .....	79
5.1.7	Conclusions.....	84
5.2	Participatory flood vulnerability assessment: a multi-criteria approach (Paper 3).....	85
5.2.1	Abstract.....	85
5.2.2	Introduction .....	86
5.2.3	Study area.....	89
5.2.4	Framework for flood vulnerability assessment .....	90
5.2.5	Results.....	97
5.2.6	Discussion .....	105
5.2.7	Conclusions.....	112

5.3	Spatially-explicit sensitivity and uncertainty analysis in a MCDA-based flood vulnerability model (Paper 4).....	113
5.3.1	Abstract.....	113
5.3.2	Introduction.....	114
5.3.3	Material and methods.....	116
5.3.4	Results.....	120
5.3.5	Discussion.....	125
5.3.6	Conclusions.....	129
<b>6</b>	<b>Conclusions and recommendations.....</b>	<b>131</b>
6.1	Main findings.....	131
6.2	Concluding remarks.....	137
6.3	Limitations of the study.....	139
6.4	Recommendations for further research.....	142
	<b>References.....</b>	<b>145</b>
	<b>Supplementary material.....</b>	<b>173</b>
	<b>Publications.....</b>	<b>185</b>