

CONTENTS

	Page
ABSTRACT IN THAI.....	I
ABSTRACT IN ENGLISH.....	III
ACKNOWLEDGEMENTS.....	V
CONTENTS.....	VI
LIST OF TABLES.....	VIII
LIST OF FIGURES.....	IX
LIST OF ABBREVIATIONS.....	XI
CHAPTER	
I INTRODUCTION.....	1
1.1 Background.....	1
1.2 Research objectives.....	3
1.3 Scope of study.....	4
II LITERATURE REVIEWS.....	5
2.1 Forest carbon pools.....	5
2.2 Basic knowledge on mangrove forest.....	6
2.3 Estimation of forest biomass.....	12
2.4 Remote sensing.....	14
2.5 Vegetation indices.....	16
2.6 Related studies in mangrove biomass and carbon stock.....	18
III MATERIALS AND METHODS.....	23
3.1 Workflow.....	23
3.2 Study site.....	24
3.3 Ground truth measurement.....	26
3.4 Remote sensing measurement.....	31
3.5 AGB model development and validation.....	33

CONTENTS (Continued)

	Page
IV RESULTS AND DISCUSSION.....	36
4.1 Ground truth data.....	36
4.2 AGB model development and validation.....	44
4.3 Impacts on the Bamlaem community.....	49
4.4 Limitations and possible applications of the AGB model.....	50
V CONCLUSION.....	52
5.1 Conclusion of this study.....	52
5.2 Future work.....	53
REFERENCES.....	54
APPENDIX.....	64
CURRICURUM VITAE.....	162

LIST OF TABLES

Table	Page
2.1	The types of carbon pools from forest ecosystem.....5
2.2	The salinity range in different estuarine zones.....8
2.3	Comparison of the estimation methods of forest biomass.....13
2.4	Related study in the estimation of mangrove carbon stocks19
3.1	The wood density values utilized in this study.....29
3.2	The vegetation indices used in this study.....33
4.1	The ground truth records in the Banlaem mangrove forest.....37
4.2	Diversity indices recorded in the Banlaem mangrove forest.....39
4.3	List of mangrove tree species found in the Banlaem mangrove forest.....40
4.4	The AGB model development in this study using all plots.....45
4.5	The AGB model development in this study (<i>A. marina</i> plots).....46
4.6	The AGB model development in this study (mixture of <i>A. marina</i> and <i>Rhizophora</i> spp. plots).....47
A	The summary of ground truth data in this study.....65
B	The ground truth data (each individual tree).....69
C	Plot coordinates in each study plot.....154
D	The summary of remote sensing data in this study.....158

LIST OF FIGURES

Figure	Page
1.1 The study area.....	4
2.1 Mangrove wetland diagram.....	6
2.2 Distribution of mangrove species in an Australian mangrove in different salinity zones	8
2.3 The Sundaic biogeographical region and its mangrove area.....	9
2.4 Comparison of mangrove carbon storage with different global forest domains.....	10
2.5 The distribution of mangrove along coastline of Thailand.....	11
2.6 Passive and active remote sensing.....	15
3.1 Workflow diagram of this study.....	23
3.2 Study area in this study.....	25
3.3 The study plot design implemented in the mangrove area.....	27
3.4 The ground truth collection form used in this study.....	27
3.5 Ground truth records in this study.....	28
3.6 Workflow diagram for the remote sensing analysis.....	32
4.1 The mangrove tree species found in the study area.....	38
4.2 The AGB and AGC stock in each study plot of the Banlaem mangrove forest.....	41
4.3 The boxplots of the AGB and AGC stock in the Banlaem mangrove based on tree composition.....	41
4.4 The most accurate AGB model (Model 11), generated from all plots i in this study (a), with its residual plot displayed in (b).....	46
4.5 The most accurate AGB model (Model 22), generated from <i>A. marina</i> plots in this study (a), with its residual plot displayed in (b).....	47

LIST OF FIGURES (Continued)

Figure	Page
4.6 The most accurate AGB model (Model 33), from mixture of <i>A. marina</i> and <i>Rhizophora</i> spp. plots in this study (a), with its residual plot displayed in (b).....	48

LIST OF ABBREVIATIONS

AGB	Aboveground biomass
AGC	Aboveground carbon
BA	Basal area
BEF	Biomass expansion factor
CHM	Canopy height model
DBH	Diameter at breast height
DSM	Digital surface model
DTM	Digital terrain model
GHG	Greenhouse gas
GNDVI	Green Normalized Difference Vegetation Index
H	Tree height
ha	Hectare
LiDAR	Light Detection and Ranging
LMR	Lower Mekong Region
NDC	Nationally Determined Contributions
NDVI	Normalized Difference Vegetation Index
RADAR	Radio Detection and Ranging
RS	Remote sensing
SAVI	Soil-Adjusted Vegetation Index
SEA	Southeast Asia
UAV	Unmanned aerial vehicle
VI	Vegetation index