

TABLE OF CONTENTS

1.	INTRODUCTION	1
1.1	Background.....	1
1.2	Problem statement	2
1.3	Research objectives	5
1.4	Outline of the study	6
2.	THE STUDY AREA	8
2.1	Introduction	8
2.2	Irrigation system of District 1.....	9
2.2.1	Talavera River Irrigation System-Lower (TRIS-L).....	10
2.2.2	Santo Domingo Area-A (SDA-A)	11
2.2.3	Santo Domingo Area-B (SDA-B)	11
2.2.4	Santo Domingo Area-C (SDA-C)	11
2.3	Water delivery schedule	12
2.4	Present conditions of irrigation system	13
2.5	Climate	14
2.6	Soils	15
2.7	Cropping calendar	15
2.8	Land use.....	16
3.	WATER FLUX MEASUREMENT	18
3.1	Water flux measurement.....	18
3.1.1	Water balance	18
3.2	Re-use of water.....	29
3.2.1	Pumps	30
3.2.2	Creeks	34
3.2.3	Check dams	35
3.3	On-farm water management.....	36
4.	REMOTE SENSING RESULTS	39
4.1	Land-use classification	39
4.1.1	Introduction	39
4.1.2	Methods	40
4.1.3	Results and discussion.....	41
4.2	Evapotranspiration.....	43
4.2.1	Evapotranspiration estimation using TERRA/ASTER Sensor: A case study in District 1 of UPRIIS, Central Luzon, Philippines	45
4.2.2	Estimation of spatially-distributed evapotranspiration through remote sensing: a case study for irrigated rice in the Philippines.....	57
4.2.3	Evapotranspiration estimation through MODIS.....	67

4.2.4	Crop water deficit through remote sensing in District 1 of UPRIIS, Central Luzon, Philippines	72
4.2.5	Field evapotranspiration estimation in Central Luzon using different sensors: Landsat 7 ETM+, TERRA MODIS and ASTER	79
4.2.6	Seasonal evapotranspiration through satellite remote sensing	89
5.	WATER ACCOUNTING AND PRODUCTIVITY RESULTS	95
5.1	Water accounting and productivity at different scales	95
5.1.1	Spatial scales	95
5.1.2	Water accounting	103
5.1.3	Water accounting indicators	106
5.1.4	Water accounting indicator trends across scales	113
5.2	Accuracy analysis	118
5.2.1	Surface flow measurement	118
5.2.2	Groundwater	123
5.2.3	Percolation	124
5.2.4	Rainfall	125
5.2.5	Evapotranspiration.....	126
6.	GENERAL DISCUSSION AND CONCLUSIONS	130
6.1	General Discussion	130
6.1.1	Evapotranspiration.....	131
6.1.2	Water accounting and productivity.....	134
6.2	Conclusions	136
7.	REFERENCES	138

APPENDIX

ACKNOWLEDGEMENT