

Contents

List of Figures.....	xiii
Abbreviations	xxviii
Abstract	xxix

CHAPTER 1

Introduction and Methodology	1
1.0 Introduction	1
1.1 Aims and Objectives.....	2
1.2 Malta and its Water in Context.....	2
1.3 Water and the Concept of Risk.....	5
1.4 Chronology	6
1.5 Landscape Theory and Research	7
1.6 Methodology.....	8
1.7 Methodological Limitations.....	10
1.8 Published Sources, Theses and Dissertations	12
1.9 Cartographic Sources.....	14
1.10 Archival Sources.....	15
1.11 Book Structure.....	16

CHAPTER 2

Geomorphological, Climatic and Hydrological Considerations	19
2.0 Geology	19
2.1 Climatic Considerations: Present-day and past.....	19
2.2 Changes to Malta's Demographic Base over the Centuries.....	20
2.3 Crop Types	20
2.4 Maltese Geological Formations, Properties and Stratification	21
2.4.1 Lower Coralline Limestone	22
2.4.2 Globigerina Limestone.....	22
2.4.3 Blue Clay	23
2.4.4 Upper Coralline Limestone.....	23
2.5 Landforms and Relief	24
2.6 The Hydrological Retention Potential of Maltese Geological Formations	25
2.6.1 The perched and mean-sea-level aquifers	25
2.6.2 The Globigerina Limestone perched aquifers	27

CHAPTER 3

Water Resources Management Technology: An overview of ancient water resources management practices	33
3.0 Introduction	33
3.1 Water Capture and Storage	33
3.1.1 Field-terracing as an aid to water conservation.....	33
3.1.2 Flood-water irrigation	33
3.1.3 Diversion dams (<i>azuds</i>).....	34
3.1.4 Urban sewage diversion into countryside areas	34
3.1.5 Well-water capture technology	34
3.1.6 <i>Qanat</i> and adits	35
3.1.7 <i>Cuniculi</i> water drainage systems.....	38
3.1.8 Cisterns: development and diffusion.....	39
3.1.9 Wells and cisterns: an aid to settlement in the Phoenician-Punic, Greek and Roman periods.....	40
3.1.10 Concluding remarks	40
3.2 The Maltese Context: The Phoenician, Punic and Roman periods (8 th century BC to 6 th century AD)	41
3.2.1 Wells and cisterns	41
3.2.2 The Roman Domus at Rabat (Malta) and other neighbouring minor sites.....	42
3.2.3 The Tas-Silġ Sanctuary.....	42
3.2.4 The Ta' Kaċċatura site	44
3.2.5 The Ras il-Wardija Sanctuary at Kerċem (Gozo)	45
3.3 Interpreting the Evidence.....	46

CHAPTER 4

The Changing Maltese Hydrological Landscape: 1800 till the present	47
4.0 Introduction	47
4.1 The Drought of 1834-1841	47
4.2 Developments in the Maltese Hydrological Scenario: The mid-1840s till the end of the nineteenth century	52
4.3 The Twentieth Century	57
4.4 The Agrarian Context	60
4.5 Concluding Remarks	61

CHAPTER 5

The Maltese Hydrological Landscape during the Knights' Period.....	63
5.0 Introduction	63
5.1 Hydrology-Related Cartographic Evidence for the Early Knights' Period	63
5.2 Hydrology-Related Aspects as Presented by Fra Gian Francesco Abela in 1647.....	70
5.2.1 The uninhabited section of Malta.....	74
5.2.1.1 Wied ir-Rum	74
5.2.1.2 The Mtaħleb <i>giardino</i>	79
5.2.1.3 The Aayn Bierda and Aayn tal Carcara springs.....	82
5.2.1.4 Springs in the Mgarr (Malta) territory	84

5.2.1.5 The Mellieħa territory.....	94
5.2.1.6 Other springs and water-related place-names	96
5.2.2 The inhabited section of Malta.....	97
5.2.3 Gozo and Comino	100
5.2.4 The Valletta aqueduct project	100
5.3 Other Seventeenth and Eighteenth-Century Water-Related Documentary Sources of Evidence	106
5.4 Concluding Remarks	112

CHAPTER 6

Hydrology-Related <i>Cabreo</i> Documentation for Malta and Gozo during the Knights' Period.....	115
6.0 Introduction	115
6.1 Interpreting the Data Provided by the Seventeenth and Eighteenth-Century <i>Cabrei</i> Manuscripts.....	116
6.1.1 The central and southern plains	118
6.1.2 The north and north-west districts of Malta	119
6.1.3 The Ghajn Qajjed, Ġnien is-Sultan, Ghajn Klieb and San Mikiel <i>giardini</i> of Rabat (Malta)	120
6.1.4 The <i>Marget Neuia</i> estate in the Fiddien territory of Rabat (Malta)	130
6.1.5 Qasam il-Kbir estate in the Fiddien territory of Rabat (Malta).....	132
6.1.6 Wied ir-Rum and Wied Hażrun	134
6.1.7 The Tal-Callus <i>giardino</i> at Wied ir-Rum.....	136
6.1.8 The fief of Tas-Santi in the territory of Mgarr (Malta)	146
6.1.9 Birhauex and the fief of Ghajn Tuffieħa	150
6.1.9.1 Water tunnel at the Roman Baths site.....	153
6.1.9.1.1 Interpreting the evidence	155
6.1.9.2 The perched aquifer galleries at the Ghajn Tuffieħa <i>giardino</i>	156
6.1.9.3 The Ir-Razzett tal-Qasam area at Ghajn Tuffieħa.....	160
6.1.10 The Buskett and Ġnien il-Haggel areas in the territory of Rabat (Malta).....	162
6.1.11 Water sources on the Island of Gozo	164
6.1.11.1 The Ghajn Għabdun spring.....	165
6.1.11.2 The Ghajn Qasab territory	167
6.1.11.3 The Ghajn Nahrin territory	169
6.1.11.4 The Madia territory.....	170
6.1.11.5 The Wied tal-Lunzjata territory	175
6.1.11.6 Government-owned properties at Ta' Ċimblu Rasu	176
6.1.12 Water sources on Comino	177
6.2 Concluding Remarks	178

CHAPTER 7

Water Management in Late Medieval Malta.....	181
7.0 Introduction	181
7.1 The Knight Commissioners' Report of 1524.....	182
7.2 Jean Quintin's 1536 Description of Malta	183
7.3 Documents of the <i>Cancelleria Regia</i> at the State Archives of Palermo: The fourteenth century	185

7.3.1	The fiefs of Dejr Handun and Ghajn Tuffieħa	186
7.3.2	The fiefs of Ġnien is-Sultan, Tal-Qlejgħha and Benwarrad.....	186
7.3.3	The Gomerino estate.....	187
7.3.4	The fief of Hemsija and other <i>viridaria</i> in north-west Malta.....	188
7.3.5	Hydrology-related evidence from Gozo.....	189
7.4	Documents of the <i>Cancelleria Regia</i> at the State Archives of Palermo: The fifteenth century	189
7.4.1	The Għerixem spring.....	189
7.4.2	Għajn Qajjed	190
7.4.3	The Saqqajja and Qattara areas of Rabat (Malta)	190
7.4.4	Gozo.....	190
7.5	The Notarial Documents: Notaries Paulo Bonello and Giacomo Zabbar	191
7.6	The Place-Name Evidence.....	194
7.6.1	“Għajn” and “Għewejna” place-names	194
7.6.1.1	Fourteenth-century “għajn” place-names	195
7.6.1.2	Fifteenth-century “għajn” place-names	198
7.6.1.3	Sixteenth-century “għajn” place-names.....	200
7.6.2	“Bir” place-names	201
7.6.3	“ġnien” place-names	202
7.6.4	Other water-related place-names	202
7.7	Concluding Remarks	205
 CHAPTER 8		
Conclusions.....	209	
8.0	Introduction	209
8.1	Interpreting the Evidence.....	209
8.2	Revisiting the Objectives of this Study.....	219
8.3	Strengths and Weaknesses: An evaluation	220
8.4	Contribution to Knowledge	221
8.5	The Future Beckons: Site protection and prospects for future research.....	222
References	225	
Appendix 1: Gazetteer of Sites Mentioned in the Text.....	251	
Appendix 2: Comparative Table of Place-Names	274	
Appendix 3: A Philological Appreciation of Water-Related Italian Terms Used in Chapters 5 to 7	280	
Appendix 4: A Philological Appreciation of Water-Related Maltese Words/Terms Used in Chapters 5 to 7 ...	282	
Appendix 5: A Philological Appreciation of Water-Related Latin Terms Used in Chapter 7.....	283	