

List of Contents

DEDICATION	III
ACKNOWLEDGMENTS	IV
ABSTRACT	V
LIST OF CONTENTS.....	VII
LIST OF FIGURE.....	IX
LIST OF TABLE	X
LIST OF APPENDICES.....	X
 1. INTRODUCTION.....	1
INTRODUCTION	1
AIM AND SCOPE.....	4
2. STUDY AREA	6
2.1 INTRODUCTION	6
2.2 WATER IN WEST BANK.....	9
2.3 STUDY AREA LOCATION AND FEATURES	12
2.4 POPULATIONS AND LAND USE.....	13
2.5 TOPOGRAPHY AND SOIL	13
2.6 CLIMATE AND METROLOGICAL DATA	14
2.7 GEOLOGY	19
2.7.1 Stratigraphy and Lithology of study area.....	20
2.7.1.1 West Bank mountains formation	20
2.7.1.2 The Jordan Valley deposits (Dead Sea Group)	23
2.8 HYDROLOGY OF STUDY AREA.....	25
2.8.1 Eastern Aquifer Basin (EAB).....	25
2.8.2 Ramallah Jerusalem sub-basin	29
2.8.3 The Upper Cretaceous Carbonate Aquifer (UCCA).....	30
2.9 SPRINGS	31
2.9.1 The Eastern Slope springs of Wadi Qilt	31
2.9.2 Jordan Valley springs.....	31
2.10 HYDROCHEMISTRY	33
3. METHODOLOGY	38
3.1 SAMPLING TIME AND SITE	38
3.2 SAMPLING AND ANALYSIS	38
3.3 DETERMINATION OF CHEMICAL PARAMETERS	40
3.4 ISOTOPES.....	42
4. RESULTS AND DISCUSSION	45
4 .1 METEOROLOGICAL DATA FOR THE YEAR 2006/2007	45
4.2 FLUCTUATION OF GROUND WATER WITH TIME.....	47
4.3 HYDROCHEMISTRY	49
4.3.1 Nitrate NO ₃	49
4.3.2 Dissolved Organic Carbon DOC	53
4.3.3 Total Dissolved Solids (TDS)	55
4.3.4 Hydrochemical variations	59

4.3.5 Mg/Ca ratio	61
4.3.6 Calcite Saturation	65
4.4 ANTHROPOGENIC POLLUTANTS AND NATURAL CHEMICAL VARIATION	69
4.4 STABLE ISOTOPES.....	72
4.4.1 Isotopes Variation in rainwater	72
4.4.2 Deuterium Excess	80
4.4.3. Isotopes variation in Ground water.....	83
4.4.4. Deuterium ($\delta^2\text{H}$) signatures and groundwater residence	85
4.4.5. Isotopes signatures and Temperature.....	86
4.5 VARIATION IN THE GROUNDWATER RECHARGE MECHANISMS	88
5. CONCLUSION AND RECOMMENDATIONS	90
5. 1 CONCLUSION	90
5.2. RECOMMENDATIONS.....	91
REFERENCES	94
APPENDICES	99