

Table of contents

Dedication	VII
Acknowledgments.....	VIII
Abstract	IX
الخلاصة	XI
Chapter one	1
1. Introduction	1
1.1 Background.....	1
1.2 Objectives	4
1.3 Research methodology	4
1.4 Literature Review	6
Chapter Two: Description of the Study Area	11
2. Physiography	11
2.1 Location	11
2.2 Population.....	14
2.3 Climate.....	15
2.4 Temperature.....	15
2.5 Rainfall	16
2.6 Evaporation.....	16
2.7 Relative humidity	16
2.8 Geology	17
2.8.1 Cretaceous Formation.....	17
2.9 Soil.....	21
2.10 Land use classes.....	22
2.11 Digital elevation model for Al-Qilt catchment (DEM)	23
2.12 Hydrogeology.....	24
2.12.1 Discharge Variation And Springs.....	24
2.13 Groundwater and Wells.....	28
2.14 Water quality	28
Chapter Three: Water Balance.....	31
3. Soil Moisture Demand (SMD)	31

3.1 Introduction	31
3.2 Methodology	33
3.2.1 The Monthly Rainfall (Precipitation (P))	34
3.2.2 The Monthly Temperature (T).....	35
3.2.3 The Soil Moisture Content	36
3.2.4 Evapotranspiration.....	37
3.2.5 Recharge (Delta Storage).....	40
3.2.6 Rainfall Runoff	44
3.2.7 The Annual Deficit	46
3.3 Recharge calculations based on analytical equations.....	48
3.3.1 Chloride mass concentration	48
3.3.2 Guttman and Zukerman equations.....	49
3.3.3 Goldschmidt (1959) equation	50
3.3.4 Recharge estimation comparison.....	51
Chapter Four: Suitability of Artificial Recharge	52
4. Artificial Recharge	52
4.1 Introduction	52
4.2 Methodology	53
4.2.1 Weighted Overlay Method for Artificial Recharge	53
4.2.2 Preparation of thematic maps	56
4.2.2.1 Slope	56
4.2.2.2 Infiltration Capacity.....	57
4.2.2.3 Wells Distribution And Wells Depth.....	59
4.2.2.4 Land Use.....	61
4.2.2.5 The Artificial Recharge By Treated Wastewater	63
4.3 Artificial recharge methods.....	65
4.3.1 Injection wells.....	65
4.3.2 Rainwater Harvesting	65
Chapter Five: Conclusion and Recommendation	66
5.1 Conclusion.....	66
5.2 Recommendation.....	67
References.....	68