

Table of Contents

Chapter One: Introduction	1
1.1 Background	1
1.2 Problem Statement	2
1.3 Aim and Objectives	3
1.4 Thesis Outline	4
Chapter Two: Literature Review	5
2.1 Overview	5
2.2 Benefits and Incentives of Reuse	6
2.3 Risks and Constrains of Reuse	7
2.4 Guidelines and Regulations for Wastewater Reuse	7
2.4.1 WHO Guidelines	7
2.4.2 EPA Guidelines	7
2.4.3 Comparison between EPA and WHO Guidelines	8
2.4.4 Palestinian Standards	8
2.4.5 Jordanian Standards	9
2.5 Centralized V S. Decentralized Approach	9
2.6 Case Studies	11
2.6.1 United States of America	11
2.6.2 Japan	11
2.6.3 Jordan, Jordan Valley	12
2.6.4 Egypt, Mallawy Area	12
2.7 National Experience in Reuse Projects	12
2.7.1 Case Studies from Palestine	13
Chapter Three: Methodology	15
3.1 Conceptual Framework for Assessing Wastewater Generation, Collection, Treatment and Reuse in Palestinian Rural Areas	15
3.1.1 Household Water Sources for Domestic Use	15
3.1.2 Wastewater Production and Collection	17
3.1.3 Wastewater Treatment and Reuse	18
3.2 Wastewater Generation Projections and Cost of Treatment	23
3.3 Percentages of Water Deficit Compensation	27
3.4 Effluent Quality and Potential for Different Reuse Applications	28
3.5 Water Consumption Categories and Water Savings	30
Chapter Four: The Study Area	36

4.1 General	36
4.2 Geography	36
4.3 Climate	38
4.4 Population.....	39
4.5 Water Resources.....	39
4.5.1 <i>The Jordan River (Surface Water)</i>	40
4.5.2 <i>The Mountain Aquifer (Groundwater)</i>	41
4.5.3 <i>Rainwater Harvesting (Additional water Sources)</i>	41
4.6 Water Tariff.....	41
4.7 Water Consumption.....	42
4.8 Water Services.....	43
4.9 Deficit in Supply and Demand	44
4.10 Water Use Patterns	45
4.10.1 <i>Domestic and Municipal Sectors</i>	45
4.10.2 <i>Industrial Sector</i>	46
4.10.3 <i>Agricultural Sector</i>	46
4.11 Wastewater Status	46
Chapter 5: Results and Discussion	49
5.1 Factors Affecting Reuse Potential.....	49
5.1.1 <i>Local Water Demand and Existing Water Tariff</i>	49
5.1.2 <i>Collection Method and Cost of Treatment</i>	52
5.1.3 <i>Effluent Quality and Potential for Different Reuse Applications</i>	53
5.2 Water Savings under Two Scenarios of collection and Treatment	55
5.2.1 <i>First Scenario: Water Savings with Onsite Treatment Units at Household Level</i>	55
5.2.2 <i>Second Scenario: Water Savings with Collective Treatment at Community Level</i>	56
Chapter Six: Framework for a National Palestinian Strategy for Management of Rural Wastewater	63
Chapter Seven: Conclusions and Recommendations	66
7.1 Conclusions	66
7.2 Recommendations	68
References	69
Annexes	75